The EUMETSAT Network of Satellite Application Facilities

NWC SAF
Support to Nowcasting and Very Short Range Forecasting

Interface Control Document for the External and Internal Interfaces of the SAF NWC / MSG

SAF/NWC/CDOP2/INM/SW/ICD/1, Issue 7, Rev. 0

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Applicable to SAFNWC/MSG version 2013

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REPORT SIGNATURE TABLE

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DOCUMENT CHANGE RECORD

Version	Date	Pages	Change(s)
Document code SAF/NWC/INM/SW/ICD/1			
1.0	April 99	36	First version
2.0	9 June 99	18	Document updated as for actions of PTM4
2.1	26 July 1999	24	Main updates in Task Manager and Auxiliary data files. Change bars have been used
2.2	3 December 1999	25	Updates after Task Manager implementation. Updates to input data. Change bars have been used.
2.3	24 February 2000	27	Main updates to NWP interface and RDT inputs. Partners inputs have been included. Minor changes to other sections. Change bars have been used.
2.4	28 June 2000	29	Configuration files updated. Change bars have been used.
2.5	10 October 2000	31	Updates for input data of all PGEs. Implemented MTR RID: ICD_1_Roesli_126
3.0	3 September 2001	80	Consolidation of the document for the SIRR • Description of the Model Configuration Files for all PGEs included • Updated the lists and descriptions of needed input and auxiliary data • Included formats and contents of internal DATABUF files Change bars have been used.
3.1	25 January 2002	85	Updates information concerning MF-CMS products • PGE01, PGE02, PGE03 model configuration files • NWP data table • Auxiliary data • Internal control results Updates information concerning PGE09 – High Resolution winds: • Tables describing the bands required by the PGE • PGE09 model configuration file • Auxiliary files. • Includes the auxiliary file containing the tracer features and auxiliary file to write the output product Updated keywords in PGE07 and PGE08 model configuration files. New keywords were defined for sat_conf_file. Correction by MFCNRM to the example presented in Lightning Data Final Revision Change bars have been used.
Document code SAF/NWC/IOP/INM/SW/ICD/1			
0.1	30 May 2003	64	Contributions to MFL products have been included: – Section 4.3.1 *"Climatology data for MFL products"* has been renamed to *"Climatology, Topography and Sea/Land data for PGE01-02-03"*. – Removed section 4.3.5 *"Topography and Sea/Land masks for MFL products"* – Added a new section: 4.3.1 *"General Information File for PGE01-02-03"* – *Updated keywords in sections: 4.3.7, 4.3.8 and 4.3.9* Contribution to ZAMG products have been included – *Added the Model configuration files for PGE10 and PGE12 in sections 4.2.4.10 and 4.2.4.12*

Version	Date	Pages	Change(s)
			Contribution to INM products have been included – Modifications on section section 4.2.4.5 *"CRR PGE05 Model Configuration File". Section* 4.3.3 updated to define the new matrix used (differences matrix). New section 4.3.3.3 added for this purpose – Modifications on section 4.2.4.6 *"TPW PGE06 Model Configuration File"* – Modifications on section 4.2.4.7 *"LPW PGE07 Model Configuration File"* – Modifications on section 4.2.4.8 *"SAI PGE08 Model Configuration File"* – Modifications on section 4.2.4.9 *"HRW PGE09 Model Configuration File"* Included the PGE09 predecessor winds file descriptions and updated the PGE09 bufr descriptor file and PGE09 tracer data file descriptions Included the SEVIRI input file structure New M_End_Slot monitoring task New wildcards: $rname $gname $system_file $endall_slot A_PrintScreen and A_Bell interfaces changed New tm log printtty <print_tty> command New PRINT_TTY keyword in System Configuration file HRV limits were dropped from the sat_conf_file in current version. Other modifications after revision: Change bars have been used.
1.0draft	26 March 2004	87	First checking and tuning tasks: - PGE01 : *General format of the IR threshold files* - PGE02 : *Threshold computation tables for PGE02* - PGE03 : *Atmospheric corrections tables for PGE03* - PGE04 : *Model Configuration File updated.* Product/Algorithm configuration file has been updated. Section 4.3.12 has been deleted - PGE06 : *Model Configuration File:* MSGZ_THRES keyword included *Formula for the TPW computation has been corrected* - PGE08 : *Model Configuration File:* Next keywords have been removed: SAI_MIN, SAI_CUT, SAI_MAX, BRIT_SAI_MIN, BRIT_SAI_RANGE1 and BRIT_SAI_RANGE2 - PGE09 : *Model Configuration File* updated *BUFR descriptors table* updated - PGE11 : *Model Configuration File updated.* - PGE12 : *Model Configuration File*: A new keyword has been

Version	Date	Pages	Change(s)
			included NWCLIB calibration: - *Stored value for radiances, reflectances and brightness temperature are 0 when radiance calculation is negative.* - *Description of Palette definition files have been included*
1.0	18 May 2004	87	ECMWF unit for parameter 137 Atmospheric WV content has been corrected to mm in section 3.3.3 “Code tables for ECMWF model” (see DCR LE_2) ORR1 RIDs implemented: - ORR-1 RID 017 (Hein) (sec. 4.2.5) *Note: Change bars apply to v0.1*
1.1draft	30 September 2004	86	Sec 4.2.4.9: - Change the keyword BUFR_EDITION from the PGE09 configuration model file replacing it by GENERATING_APPLICATION - New ZEN_THRES keyword included in the configuration file. Sec. 4.2.4.5: New keywords have been defined in the PGE05 model configuration file. Sec. 4.3.3: Calibration matrices description for PGE05 have been also updated (new 2D & 3D matrices have been included).
1.1	27 October 2004	86	DRI-2 review: - No changes
1.2d	28 March 2005	87	DCR "Marcelino 3": LPW and SAI NORM_RAD_XX default values updated in tables 27 and 28 (Model Configuration Files for PGE07 & 08) DCR "EAv12-1" default value for CH keyword in the table 29 (model Conf. file for PGE09) corrected to AFG Table 6: - Required Channel IR13.4 added to PGE01 - Required Channel WV 7.3 added to PGE02 - Required Channel IR12.0 added to PGE10. - Required Channels WV 6.2 and WV 7.3 added to PGE04. Table 35 : (PGE09 tracer parameters) one parameter was not described in the table. Section 4.2.4.1: Updated PGE01 model configuration file. Added IR13.4 to the SEV_BANDS keyword. Section 4.2.4.2: Updated PGE02 model configuration file. Added WV7.3 to the SEV_BANDS keyword. Section 4.2.4.4: PGE04 model configuration file updated Section 4.2.4.5: Updated the Model Configuration file of PGE05. New keywords COEFF_EVOL_GRAD_CORR_*xx*, xx=00,01,02 Section 4.2.4.6: Updated the Model Configuration file of PGE06. Modified the DAY_NIGHT_THRESHOLD description New keyword SEASON_FACTOR added. Modified the TPW_C_ii keywords by TPW_ii Section 4.2.4.9: Updated the Model Configuration file of PGE09. New keyword MSG_ZEN_THRES added Section 4.2.4.10: Updated the Model Configuration file of PGE10. New keyword <IR10.8 or WV6.2>.<Offset or Factor> Section 4.2.4.12: Updated the Model Configuration File of PGE12.

Version	Date	Pages	Change(s)
			Several keywords have been added Section 4.3.7.1: General format of the IR thresholds files: Updated keywords and comprehensive_table_names Section 4.3.7.2: General format of the VIS thresholds files: Updated keywords Section 4.3.9: Atmospheric corrections tables for PGE03: Updated keywords. Section 4.3.10: PGE04 Algorithm configuration in Auxiliary data updated Section 4.5.11: Updated PGE03 internal control result format Section 4.2.8 “RT coefficient file for RTTOV 6” has been removed. The coefficients are included in the 3rd party software.
1.2	12 April 2005	87	Updated document version and date to be in line with the provided SW (project management requirement). DRI-3 Review - No changes were required after EUMETSAT’s revision. Change bars apply to v1.1
2.0d	31 July 2006	72	Section 3.2.1: Included a new command tm_newregion Sec 3.2.1 and 3.2.2 : Updated to include System Log notifications Section 4.1.5: Included a new Action A_ProcessRegion Sec 4.1.6: Included new wildcard ‘%msgn’ Sec 4.2.3: Included region centre clarifications Sec. 4.2.4.5: New keywords have been defined in the PGE05 model configuration file. Sec 4.2.4.10: Updated ASII PGE10 model configuration file Sec 4.2.4.11: Updated RDT PGE11 model configuration file Sec 4.2.4.12: Updated AMA PGE12 model configuration file Sec. 4.2.4.9: Updated the PGE09 model configuration file Updated sat_conf_file with new keywords and a new representation of navigation coefficients (according [AD.7.]) in section 4.2.6 Section 4.2.7: Updated nwp_conf_file with new NWP_MFTERM keyword Sec 4.3.1: Updated information about the header for PGE01-02-03 Sec 4.3.4 : Included new Auxiliary data for PGE05 Sec 4.3.7 : Included new Auxiliary data for PGE09 Included sec 4.3.9 . Minimum and Maximum surface matrices for PGE09 Sec 4.3.10.1: Updated general format of the IR thresholds files for PGE01 Sec 4.3.10.2: Updated general format of the VIS thresholds files for PGE01 Sec 4.3.11: Updated threshold computation tables for PGE02 Sec 4.3.12: Updated atmospheric corrections tables for PGE03 Sec 4.3.19 and 4.3.21: Updated information for PGE09 Sec 4.3.23: Updated BUFR table files inclusion for PGE11 Included sec 4.3.7 : Local bias correction matrices for PGE07 and PGE08 Removed “Band Information” parameters from Table 31: Satellite Configuration File Contents Included temporal file information for Sfc_min and Sfc_max matrices used by PGE09 in section 4.5.12 Included temporal file information for topography matrices used by PGE05, 06. 07 and 08 in section 4.5.13
2.0rev	29 September 2006	92	INM Revised version: Updated applicable document table

Version	Date	Pages	Change(s)
			Corrected Table 38 data types Sec. 4.2.4.9: Updated the PGE09 model configuration file Other minor modifications Sec 4.1.6: Updated $st wildcard format Version submitted to ORR-2 RB for revision *Note: Change bars apply to v1.2*
2.0	19 January 2007	91	Document updated after ORR-2 / OR-2006. - Removed bias correction keywords for PGE07 and PGE08 configuration files, previously included in document version 2.0d - Removed section 4.3.7 “Local bias correction matrices for PGE07 and PGE08” included previously in document version 2.0d *Note: Change bars apply to v1.2*
Document code SAF/NWC/CDOP/INM/SW/ICD/1			
2.1draft	07 November 2007	93	Section 4.2.4.5 : Updated CRR model configuration file Section 4.2.4.6 : Updated TPW model configuration file Section 4.2.4.7 : Updated LPW model configuration file Section 4.2.4.12 : Updated AMA model configuration file Section 4.3.3: Updated calibration matrices filenames for PGE05 Section 4.3.5: Included PGE06 Section 4.3.6 “Local bias correction matrices for PGE06 PGE07 and PGE08 (TPW, LPW and SAI)” this section has been included according last changes on PGE06, PGE07 and PGE08 Section 4.3.9: Included Topographic matrix for Rapid Scan Section 4.3.16: Removed all references to PGE12 Section 4.3.17: Removed all references to PGE12 Section 4.3.20 ”Classification Reference Table for PGE12”: This section has been included according last changes on PGE12 Section 4.5.13: Updated topography filename criteria Table 6: Updated SEVIRI band needed by PGE06 and PGE12 Table 16: Included new wildcard ‘%msg_mode’ Table 31: - Included new keyword ‘MODE’ for satellite processing mode (normal, rapid scan or parallel) - Nominal centre wavelength (λ_0) parameter included in the Satellite Configuration file to allow computing Brightness temperature using Spectral Radiances. - SCAN_DELTA_T parameter in sat_conf_file updated for MSG1 in Rapid Scan mode - Removed NB_SLOTS and TIME_SLOT1 keywords - Updated REPEATING_CYCLE units to “seconds” Table 32: Updated auxiliary data sets required by PGE05, PGE06, PGE07, PGE08 and PGE12 Figure 3: Updated PGE dependencies Document submitted to the DRI-2008 Review Board
2.1rev	03 December 2007	93	Document updated after DRI-2008: Minor changes after final revision *Note: Change bars apply to v2.0*
2.1	26 February 2008	94	Final release for SAFNWC/MSG v2008 SEVIRI input files (compressed) clarifications included in sec. 3.3.1 Section 4.3.6: Updated location directory for matrices Table 31: - New keywords included in sat_conf_file for brightness temperature polynomial fit *Note: Change bars apply to v2.0*

Version	Date	Pages	Change(s)
3.0d	01 December 2008	97	Sec. 4.3.11.1: Updated header keywords in IR threshold files for Cma Sec. 4.3.13: Updated header keywords in IR threshold files for CTTH Sec. 4.3.16 : Updated projection information tables for PGE10 Sec. 4.3.17 : Updated grid description files for PGE10 Sec. 4.3.24 : Updated BUFR descriptors for PGE10 and PGE12 Sec. 4.5.9: Updated PGE01 internal control result format Sec. 4.5.10: Updated PGE02 internal control result format Sec. 4.5.11: Updated PGE02 internal control result format Sec 4.3.26: Updated files for discrimination needed by PGE11 Table 6: - Updated SEVIRI bands required by PGE01, 02, 03 and 11 Table 7: - Added Geopotential NWP data as optional input for PGE05 - Updated footnotes 3 and 4 for PGE12 pressure levels - Updated footnote number 8 for PGE05 pressure levels Table 21: PGE01 configuration file - Updated SEV_BANDS default value - Included HRV_NEED and TEMPORAL_USE keywords Table 22: PGE02 configuration file - Updated SEV_BANDS default value - Included HRV_NEED keyword Table 23: PGE03 configuration file - Updated CTTH_SZSEG default value - Updated sampling rate default value for NWP data Table 25: PGE05 configuration file - New NWP keywords included in PGE05 configuration file Table 26: PGE06 configuration file - Updated values for TPW with MSG1 - Added specific rapid scan parameters for TPW Table 27: PGE07 configuration file - Updated values for LPW with MSG1 - Added specific rapid scan parameters for LPW Table 28: PGE08 configuration file - Added specific rapid scan parameters for SAI - Updated values for SAI with MSG1 Table 29: PGE09 configuration file - New keyword USE_CLOUDTYPE included in PGE09 configuration file. Table 32: PGE11 configuration file - Most of the parameters have been updated Table 37: Auxiliary data sets required - Included RDT discrimination coefficients Table 36: Added sat_conf_file.msg1.rss for rapid scan processing Document submitted to the DRI-2009 Review Board
3.0	16 February 2009	97	Document updated after DRI-2009. Sec 4.5.12 (Tracers features file for PGE09) and Sec 4.5.13 (Predecessor Winds for PGE09) have been moved from Sec 4.3.I3 “Auxiliary data files” to 4.5..I5 “Databuf” section.

Version	Date	Pages	Change(s)
			Sec. 4.2.4.9 Included PGE09 performance information in section
3.1	02 July 2009	106	Updated for PGE13 v0.1 patch delivery to beta testers: Figure 2: Included PGE13 Figure 4: Included PGE13 dependencies Table 6: Included PGE13 required SEVIRI bands Table 7: Included PGE13 required NWP data Table 9: Included PGE13 Table 18: Included PGE13 as PS_PGES possible value Table 20: Included PGE13 as PGE_ID possible value Table 36: Included PGE13 as PGE_ID, DEPENDENCY, OPT_DEPENDENCY and PRIORITY possible value New section 4.2.4.13 SPhR PGE13 Model Configuration File New sections 4.5.16 , 4.5.17, 4.5.18, 4.5.19, 4.5.20
4.0d	12 February 2010	112	Sec. 3.3.4.1: Updated lightning description to include PGE05 information Sec. 4.2.4.2: Updated PGE02 model configuration file Sec. 4.2.4.3: Updated PGE03 model configuration file Sec. 4.3.1: Updated keyword list for PGE01-02-03 Sec. 4.3.4: S_long replaced by S_int Sec. 4.3.8: S_long replaced by S_int Sec. 4.3.11.1: Updated keyword list Sec. 4.3.12: Updated keyword list Sec. 4.3.16: New orography information for PGE10 Sec. 4.3.17: New grid and projection table information for PGE10 Sec. 4.3.23: Minor changes Sec. 4.3.26, 4.3.27 and 4.3.28: PGE13 auxiliary files included Sec 4.5.9: Included “HRV detection FOVS” output Sec 4.5.12: Updated PGE09 tracer filename depending on the channel Type definition updated according NWCLIB types Sec 4.5.13: Updated PGE09 predecessor winds filename depending on the channel Type definition updated according NWCLIB types Table 6: Updated used channels Table 25: Updated CRR model configuration file description Table 29: Updated HRW model configuration file description Table 32: Updated RDT model configuration file description Table 39: Updated data files description for PGE01-02-03 Document submitted to the DRI-2010 Review Board
4.0	12 May 2010	110	Replaced GRIBEX references by GRIB_API *Note: Track changes apply to v3.0*
5.0d	10 February 2011	112	Updated Table 37 to include OUTPUT_FORMAT, PIXEL_SAMPLING and PIXEL_SAMPLING_HRV keywords Figure 6: Updated PGE11 and PGE12 optional dependencies Table 6: Updated to mark WV73 band as needed by PGE01. Table 21:Updated to include default value WV73 for SEV_BANDS keyword Section 4.3.1: Table names have been updated. Section 4.3.11.1: Keywords list has been updated Table 7: Updated with PGE11 information. Sec 3.3.5: Updated Figure 3. Table 32: Updated Sec 4.3.23: Updated BUFR descriptors files, and updated arguments. Sec 4.3.24: Updated names of parameters files for the discrimination of convective systems for PGE11. Table 33: Updated to include some new parameters Table 34: SAI_THRES keyword has been replaced by LI_THRES Table 24: Updated with a new parameter in the PGE04 model configuration file, named SATID_IN_STAT_FILENAME Sec 4.2.4.9 Added explanation: BUFR_CENTR_OR must be modified by users in the model configuration file of PGE09.

Version	Date	Pages	Change(s)
			Table 29 Updated Sec 4.3.21: Changes in the names of the local BUFR tables used by PGE09 Sec 4.3.25: Changes in filename format of PGE13 emissivity files
5.0	1 April 2011	112	Added section 4.5.22, where emissivity atlases temporal files created in DATBUF are described (Format, content, etc) Table 35: PGE13 model configuration file updated with new bias values for MSG1
6.0d	15 December 2011	114	Delivered to DRI-2012 RB for Review: Updated to SAFNWC/MSG v2012 Section 3.2: Added information on the use of *tm_file* as SAFNWC interface from scripts. PGE06, PGE07 and PGE08 have been removed from SAFNWC/MSGv2012. The entire document has been reviewed in order to eliminate those PGEs. PGE09 and PGE13 Model Configuration Files (sections 4.2.4.6 and 4.2.4.10) has been updated according the modifications included in v2012 Nominal central wavelength, and frequency, and band width data have been included in the Satellite Configuration File Figure 3. Included new dependency of AMA on PGE03, and new optional dependency of PGE11 on PGE05. Table 29. Updated PGE11 Model Configuration File information with BUFR new versions information, and two new keywords for CRR products usage Section 4.3.20. Updated with a new BUFR table version 3 for PGE11. A new Auxiliary File containing the B^{-1} matrix elements for PGE13 has been included in section 4.3.26 Clarifications included in sections 3.3.3 (tables describing the required NWP forecast table) and 4.2.4.3 (the PGE03 model configuration file)
6.0	15 February 2012	101	Final version after DRI-2012 Change bars refer to previous applicable version 5.0
Document code SAF/NWC/CDOP2/INM/SW/ICD/1			
7.0d	May 2013	100	Delivered to DRR-2013 RB for review: Update to NWC SAF / MSG v2013 Section 3.3.1: Required SEVIRI data updated for PGE11, and included for PGE14 Section 3.3.3 & 4.2.7: Format and content in nwp_conf_file has been updated. Required NWP data for PGE14 included. Section 3.3.4: Required Auxiliary data for PGE14 included Section 3.3.5:PGE dependencies have been updated (PGE12 removed, new PGE14) Section 4.2.4: PGE Model Configuration Files has been updated removing pressure levels in NWP_PARAM_XX keywords Section 4.2.4.5: Keywords related to 2D and 3D calibration matrices have been removed from PGE05 model configuration file Section 4.2.4.6: Model Configuration File for PGE09 has been updated according the release of HRW in v2013. Section 4.2.4.8: Model Configuration file for PGE11 has been updated according the release of RDT in v2013 Section 4.2.4.9:New key NWP_EXEC_MODE select NWP to be used (in Pressure or Hybrid levels). Obsolete BCC_FILENAME keyword has been removed. Section 4.2.4.10: Model configuration file for newPGE14 has been added

Version	Date	Pages	Change(s)
			Section 4.3: Section containing information about calibration matrices for PGE05 has been removed. Section 4.3.17: New BUFR local tables, and EUMETSAT tables as auxiliary data for PGE09. Section 4.3.22: Naming convention and content for Fist guess regression coefficients used by PGE in hybrid mode have been added Former section 4.3.24 (PGE13 Band coefficients file for noise error adjustment) has been removed. These files are no longer used by PGE13. Section 4.5.11: New Temporary File containing microphysics data computed by PGE02 has been included Section 4.5.13/14/15: New and updated content for temporary files including PGE09 Tracers, Predecessor winds and Trajectories Section 4.5.23: New section describing the optimal binary files generated by PGE13 in Hybrid mode. General: PGE12 has been removed from SAFNWC/MSG v2013
7.0	15 July 2013	102	Changes after DRR-2013. Change bars refer to previous applicable version 6.0 OBJ1_PUM9_Borde_011 and OBJ1_PUM9_Borde_012: Section 4.2.4.6. Two new keywords in PGE09 Model Configuration file (VERYLOWINFRAREDAMVS and FINALCONTROLCHECK)

Table of contents

List of Tables and Figures

1. INTRODUCTION

1.1 PURPOSE

This document describes the external and internal interfaces of the SAFNWC MSG-based application, referred to as SAFNWC/MSG from now on. The major purpose of the SAFNWC is the timely generation of near real time products suitable for Nowcasting and Very Short Range Forecasting based on MSG SEVIRI data.

This document provides information about the external and internal interfaces available in the SAFNWC/MSG software package. In this document, it is described the directory structure and the available TM commands.

Related to the external interfaces this document provides a description of the input/output data for the application.

Related to the internal interfaces this document provides a description of the configuration files used by the application and those used by the TM. In addition, for each PGE, here are described the particular parameters used by each one of them. Also, auxiliary data and format for databuf files are described in this document.

Definition of the SAFNWC/MSG output products can be found in [AD.5.], and the interfaces provided by NWCLIB are defined in [AD.4.].

1.2 SCOPE

The ICD has been produced from the software requirements contained in the SRD [AD.2.] and preliminary architecture ADD for the SAFNWC/MSG [AD.3.]. The ICD reflects the implementation choices.

The purpose of this document is to:

- Describe the format of the SAFNWC/MSG expected input products.
- Describe the control mechanisms used to generate SAFNWC/MSG products.

1.3 DEFINITIONS AND ACRONYMS

See [RD..] for a complete list of acronyms for the SAFNWC project.

1.4 REFERENCES

See Help Desk web tool (http://www.nwcsaf.org) for last versions and dates of each document

1.4.1 Applicable Documents

For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the current edition of the document referred to applies.

Current documentation can be found at SAFNWC Help Desk web: http://www.nwcsaf.org

Reference	Title	Code	Vers	Date
[AD.1.]	NWCSAF Product Requirements Document	SAF/NWC/CDOP/INM/MGT/PRD	1.2	17/11/11
[AD.2.]	Software Requirements Document for the SAFNWC/MSG	SAF/NWC/CDOP/INM/SW/SRD/1	1.0	16/02/09
[AD.3.]	Architectural Design Document for the SAFNWC/MSG	SAF/NWC/CDOP2/INM/SW/AD/1	7.0	15/07/13
[AD.4.]	Interface Control Document for the NWCLIB of the SAFNWC/MSG	SAF/NWC/CDOP2/INM/SW/ICD/2	7.0	15/07/13
[AD.5.]	SAFNWC/MSG Output Product Format Definition	SAF/NWC/CDOP2/INM/SW/ICD/3	7.0	15/07/13

Table 1: List of Applicable Documents

1.4.2 Reference Documents

The reference documents contain useful information related to the subject of the project. These reference documents complement the applicable ones, and can be looked up to enhance the information included in this document if it is desired.

For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the current edition of the document referred to applies

Current documentation can be found at SAFNWC Help Desk web: http://www.nwcsaf.org

Reference	Title	Code	Vers	Date
[RD.1.]	The Nowcasting SAF Glossary	SAF/NWC/CDOP/INM/MGT/GLO		
[RD.2.]	Co-ordination group of Meteorological Satellites, LRIT/HRIT Global Specification	CGMS/03	2.6	12/08/99
[RD.3.]	MSG Ground Segment – LRIT/HRIT Mission Specific Implementation	MSG/SPE/057	6	21/06/06
[RD.4.]	MSG Ground Segment: IMPF – DADF Interface Control Document	MSG/ICD/004	1.4	21/06/00

Table 2: List of Referenced Documents

1.5 DOCUMENT OVERVIEW

This document contains the description of the external and internal interfaces of the SAF NWC MSG-based application.

- Section 1 contains the current introduction.
- Section 2 contains a general overview of the SAFNWC/MSG interfaces.
- Section 3 contains the definition of the external interfaces. It presents the format and contents of all the external files used as input by the SAFNWC/MSG application.
- Finally, section 4 contains the definition of the internal interfaces, describing the files used to configure the system, auxiliary files used to configure the PGEs and the format of the files internally generated by the SAFNWC/MSG (the DataBuf format).

2. OVERVIEW OF THE INTERFACES

The diagram in Figure has been depicted using information available in the SAFNWC/MSG SRD [AD.2.] and ADD [AD.3.]. It shows all the interfaces of the SAFNWC/MSG application, where the external interfaces are identified with a name beginning with "e", and the internal interfaces with a name beginning with "i".

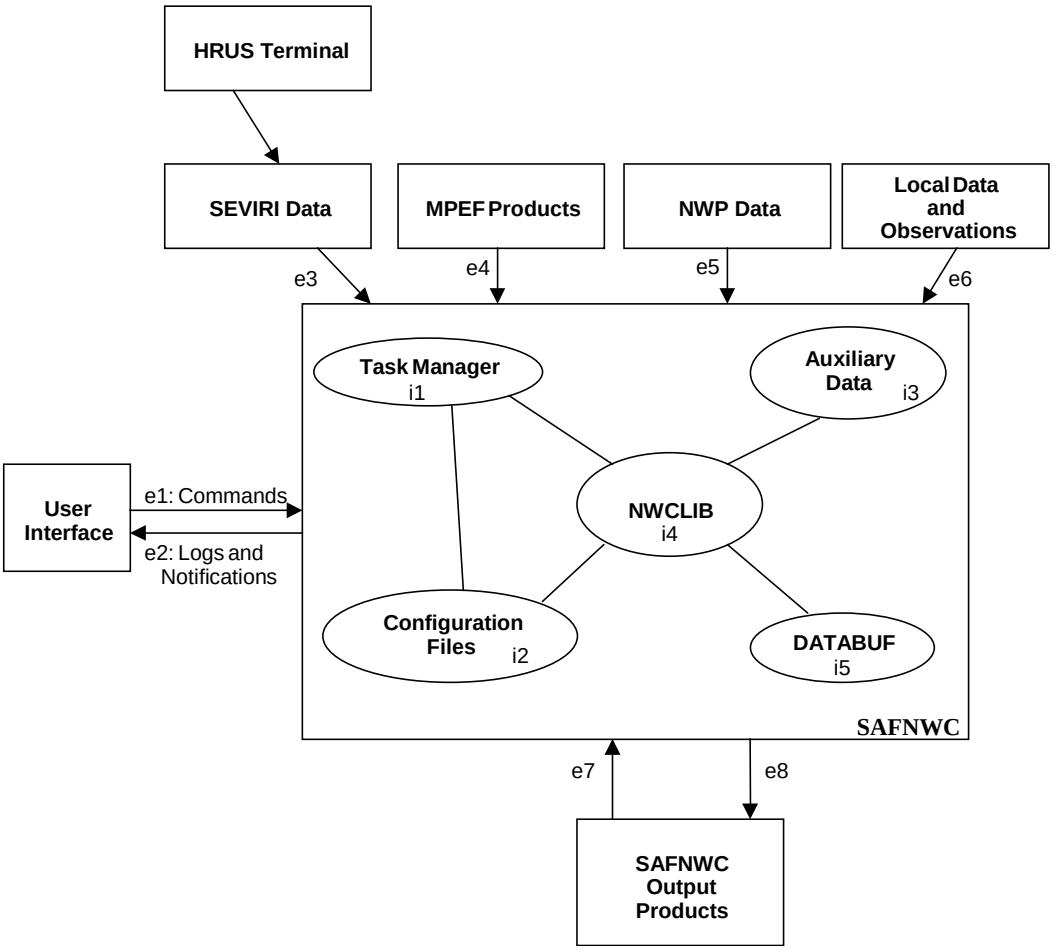


Figure 1: SAFNWC/MSG Interfaces

All interfaces represented in Figure are described in this document, except i4 (NWCLIB) which can be found in [AD.4.], and e7/e8, the SAFNWC/MSG output products format which is defined in [AD.5.].

3. EXTERNAL INTERFACES

3.1 DIRECTORY STRUCTURE

The SAFNWC/MSG application will run in the directory structure as shown in Figure . The root directory of the SAFNWC/MSG will be defined by the environment variable SAFNWC. Other directories will hang from this root directory.

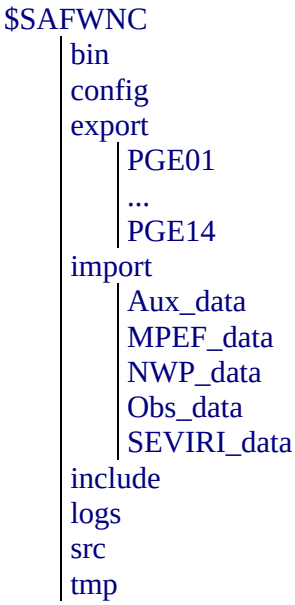


Figure 2: SAFNWC/MSG directory structure

The contents and cleaning strategy of the directories represented in Figure are explained in the following sections.

3.1.1 Directory “bin”

This directory contains all the executable code of the SAFNWC/MSG application. Several versions could be saved in this directory, creating sub-directories for each operative version. The executables of SAFNWC/MSG are the Task Manager (TM) and the Product Generator Elements (PGE).

The *bin* directory will also contain the libraries needed to create the executable files for the SAFNWC/MSG (e.g. NWCLIB, GRIB API, BUFRDC, RTTOV and HDF5 libraries).

3.1.2 Directory “src”

The src directory contains the source code of the SAFNWC/MSG application. Not only the code for PGEs, but also source for the required 3rd party software is also provided in this directory. Code for different modules are stored in a logical subdirectory structure within src directory.

3.1.3 Directory “include”

This directory holds all source headers. Appropriate subdirectory structure is created to manage header files from different components of the application.

3.1.4 Directory "config"

All the files used by the Task Manager (described in section 4.1), and all the configuration files described in section 4.2 will be stored in this directory, or linked to it. This will enable the Task Manager and other programs to access to the configuration parameters needed for their execution.

The files located in the *config* directory control the execution of the SAFNWC/MSG Task Manager and the Product Generator Elements. Therefore a *scientific manager* will be in charge of maintaining these files according to specific needs: regions where the products will be generated, products to be produced, priorities, specific configurations (thresholds) for each PGE, etc.

Description	Filename	See section
Satellite Configuration File	sat_conf_file	§ 4.2.6
NWP Configuration File	nwp_conf_file	§ 4.2.7
PGE Configuration Files	safnwc_pge*xx*.cfp	§ 4.2.4.10
System Configuration File	___.cfs	§ 4.2.1
Run Configuration File[s]	___.cfr	§ 4.2.2
Region Configuration File[s]	___.cfg	§ 4.2.3
Model Configuration Files[s]	____.cfm	§ 4.2.4
Monitor Definition File[s]	____.mdf	§ 4.1.1
Monitor Task Definition Files[s]	____.mdt	§ 4.1.2
Program Definition File[s]	____.pdf	§ 4.1.3
Program Task Definition File[s]	____.pdt	§ 4.1.4
Colour Palette for HDF5 products	___.pal	

Table 3: Configuration files in $SAFNWC/config directory

3.1.5 Directory "logs"

The logs and notification files created during execution of SAFNWC/MSG application will be saved to this directory by the Task Manager. It will be in charge of cleaning this directory with a predefined frequency (e.g. daily) and saving the existing files to a backup directory by means of a configurable programmed action.

3.1.6 Directory "tmp"

All temporary files generated during SAFNWC/MSG processing, either by the PGEs or by the NWCLIB routines, will be stored in this directory. The Task Manager is in charge of cleaning this directory upon starting of a new execution, deleting the obsolete files.

3.1.7 Directory "import"

All SAFNWC/MSG needed input files (except for SAFNWC/MSG output products and configuration files) will be linked to this directory, or stored directly in it. This enables the Task Manager and the PGEs to find the files they need. The sub-directories will be customised for the needs of each PGE, e.g. the Aux_data directory will be sub-divided into as much directories as necessary to hold all the data needed by the different PGEs.

The user of the SAFNWC/MSG application will be in charge of filling the directories with the adequate files. The complete list of files to be provided to the SAFNWC/MSG application will be provided to the user when delivering the software.

3.1.8 Directory "export"

All products generated by the SAFNWC/MSG application will be saved to the export sub-directories with the naming convention described in [AD.5.]. The users will then find all the products there.

A back-up strategy may be defined for this directory, in order to keep low the memory space occupied by those files, and to archive in another disk or on tape the products older than a few days. The Task-Manager can be used to perform this task by programming an action to be executed daily (or other period if required).

3.2 USER INTERFACE

The SAFNWC/MSG products processing will be performed through a main application, hereafter called Task Manager or TM.

Though in operational mode the SAFNWC/MSG will be able to run unassisted, interaction with the user is allowed and required for the following purposes:

- Notification of processing status, failures, warnings and other messages
- Modification of the configuration
- Interactive requests (commands)
- On-line help

The Task Manager main application will be started by an authorised user when desired. A priori, only one instance of the Task Manager will be allowed to run in a machine at once. The start procedure will initiate the application to be executed as a background process in order to avoid improper manipulations. All the required actions described above will be executed through a set of commands inserted by the user connected to the workstation or machine where the process is running. The syntax of the application to interface with the Task Manager will be:

```
% tm command [parameters]
```

where:

- *tm* is the name of the TM interface application, that can be run for any user connected to the workstation where the SAFNWC/MSG is running,
- *command* is the name of the command to be executed, and
- *parameters* are, if required, a set of parameters needed to execute the command.

The *tm* application will notify to the TM the input of a user command by sending a specific signal. The TM will be in charge of handle the signal, retrieve the user command and related parameters, and act in consequence. *tm* uses the operator's terminal (tty) to retrieve the answer of the SAFNWC.

If the user requires executing a user command from a script or cron, the use of *tm* will fail because of lack of terminal. In that case, the user must use the application ***tm_file***. This command has the same functionality than *tm*, but the answer of the SAFNWC is redirected to the file $SAFNWC/tmp/TM_command.info

3.2.1 E1: Commands

Table summarises the available commands recognised by the Task Manager.

#	Command	Summary Description	Output
1	`quit`	Terminates TM	Notification in the log file
2	`suspend`	Suspends the execution of TM	Notification in the log file
3	`resume`	Resumes the execution of TM	Notification in the log file
4	`status`	Prints the actual TM status	Console output
5	`rldconf` *`file.cfs`*	Reloads all the configuration files	Notification in the log file
6	`showlog` *`n`*	Shows the last n entries of the log file	Console output
7	`showsyslog` *`n`*	Shows the last n entries of the system log file	Console output
8	`log [logfile | syslogfile | errfile | errtty | errmail | printtty]`	Displays and changes the current Log, Sytem Log and Error devices.	Notification in the log file
9	`help [`*`command`*`]`	Shows a description of the command	Console output
10	`monitor [add|load|remove]`	Shows and manages monitoring tasks	Console output & Notification in the log file
11	`program [add|load|remove]`	Shows and manages programmed tasks	Console output & Notification in the log file
12	`schedule [abort|remove]`	Shows and manages scheduled tasks	Console output & Notification in the log file
13	`newslot` *`YYYYMMDDhhmm`*	Adds the needed tasks for the processing of a new slot	Notification in the log file
14	`newregion` *`YYYYMMDDhhmm reg_id`*	Adds the needed tasks for the processing of a specific region and slot	Notification in the log file
15	`tmplist`	Display all files located in the *tmp* directory	Console output
16	`tmpdel` *`filename`*`|all`	removes a file or all files in the *tmp* directory	Console output

Table 4: Task-Manager Commands

1.- quit terminates the execution of the TM and all the associated tasks (processing of products).

2.- suspend stops all the active processes governed by the Task Manager, and stops the scheduling line. Nevertheless, Task Manager continues as an active process, and will accept the entry of any other command (as e.g. resume).

3.- resume continues the execution of the scheduling line of the TM hanged by the *tm suspend* command.

4.- status describes the actual status of the Task Manager and some statistics about the processing of the PGEs. For example, this command will display the number of regions in process and the number of products to be generated for each region. In addition it will display the number of products executed by the TM and the number of products successfully generated. It also will show the total and mean runtimes consumed by each PGE.

5.- rldconf forces the TM to update the internal parameters by reading the referenced System Configuration File. The new configuration will only affect the next slot to be processed, (the current slot will be finished with the previous configuration).

6.- showlog *n* displays the last n messages of the log file. (10 lines are presented as default)

7.- showsyslog *n* displays the last n messages of the system log file. (10 lines are presented as default)

8.- log displays the current log and error devices used by the TM, and allows the change of such devices. Different uses are available:

- `log`: Displays the current log and error devices

- `log logfile` *`filename`*: Change the TM Log File. If user does not submit a parameter, TM will not log any message.
- `log syslogfile` *`filename`*: Change the System Log File. If user does not submit a parameter, TM will not log any message.
- `log errfile` *`filename`*: Change the TM Error File. If user does not submit a parameter, TM will not write any error message.
- `log errtty` *`tty_device`*: Change the TM Error Terminal. If user does not submit a parameter, TM will not display any message.
- `log errmail` *`address`*: Change the e-mail address used to send error messages. If user does not submit a parameter TM will not mail any error message.
- `log printtty` *`tty_device`*: Change the terminal where all A_PrintScreen and A_Bell actions will be displayed.

9.- help [command] will display a detailed description of the command. If no command is entered, a brief description for all the available commands will be presented.

10.- monitor allows the management of the list of tasks to be monitored by the Task Manager. Different uses are available:

- `monitor`: Will show the list of monitoring task currently loaded into the system.
- `monitor add` *`filename`*: Adds, to the current list, the monitor task defined in the Monitor Task Definition File given as argument. The definition of monitor events within the file follows the format described in section 4.1.2
- `monitor load` *`filename`*: Replace the list of monitor events currently loaded in the system by the list of tasks defined in the Monitor Definition File given as argument (see section 4.1.1).
- `monitor remove` *`n`*: Removes the n-th monitoring task (The task number is obtained by executing the command *monitor* without arguments)
- `monitor remove all`: Removes all tasks in the monitor list.

11.- program allows the management of the list of tasks to be executed at a predefined date and time by the Task Manager. Different uses are available:

- `program`: Will show the list of programmed task.
- `program add` *`filename`*: Adds, to the current list, the programmed action defined in the Program Task Definition File given as argument. The definition of programmed actions within the file follows the format described in section 4.1.4
- `program load` *`filename`*: Replace the list of programmed task currently loaded in the system by the list of tasks defined in the referenced Program Definition File given as argument (see section 4.1.3).
- `program remove` *`n`*: Removes the n-th programmed task (The task number is obtained by executing the command *program* without arguments)
- `program remove all`: Removes all task in the program list.

12.- schedule allows the management of the list of PGE-related tasks to be executed sequentially or recurrently by the Task Manager. Different uses are available:

- `schedule`: Will show the list of scheduled task.

- `schedule remove` *n*: Removes the n-th scheduled task (The task number is obtained by executing the command schedule without arguments). If task is currently running, use the schedule abort option.
- `schedule abort` *n*: Terminates the execution of a PGE-related task, currently in execution.
- `schedule remove all`: Removes all task in the program list (except those in execution)

13.- newslot adds, to the *Schedule List* all the PGE-related tasks needed to process a new slot. It is not envisaged the use of this command in a standard operational mode. This action will be executed automatically by the Task Manager.

14.- newregion adds, to the *Schedule List* all the PGE-related tasks needed to process a new slot in a specific region. It is not envisaged the use of this command in a standard operational mode.

15.- tmplist display a listing for all files in the $SAFNWC/tmp directory

16.- tmpdel allows to remove a file located in the $SAFNWC/tmp directory. In addition "tmpdel all" command will remove all files in that temporary directory.

3.2.2 E2: Logs and Notifications

The SAFNWC/MSG will generate logs during execution. Information saved by this logging includes notices (such as processing start/end times), warnings and errors messages.

Depending on the origin of this notifications, it will be classified in :

- System logs : All notifications generated by the SAFNWC/MSG application.
- Application logs: Notification coming from the PGEs or Task Manager which information is relevant for the user

Following this criteria, the notifications will be stored in two log-files (system logs and application logs).

Each message event will add an entry line in the appropriate log-file with the following format: "Class Code Sender Date Message", where:

- **Class** is a character that classifies the message ((N)otify, (W)arning or (E)rror)
- **Code** is a numerical codification of the message
- **Sender** holds the identification of the PGE that produces the message.
- **Date** contains the date and time of the event in the format "YYYYMMDD hh:mm:ss"
- **Message** field describes the event that produces the log.

In addition, warning messages will be displayed in the console, and error messages will be also notified on the screen or by mail to a configurable user or set of users.

Some of the lines generated during the logging procedure look like as follows:

Class	Code	Sender	Date	Message
N	00010	PGE04 PC	20071012 19:04:17	PC Product Begin
W	00067	PGE04 PC	20071012 19:04:20	Input Product xxxxxxx not found.
E	00530	PGE04 PC	20071012 19:04:40	Cannot create final product xxxxxx.

3.3 INPUT DATA DESCRIPTION

3.3.1 E3: MSG SEVIRI Level 1.5

MSG uncompressed and unencrypted HRIT SEVIRI data received by a High-Rate User Station (HRUS) will be used as the main input for the generation of SAFNWC/MSG products over a default MSG-N area. Compressed SEVIRI images (i.e. filename ending with "–_C") cannot be managed by the SAFNWC/MSG package. These images must be pre-processed using the wavelet de-compressor available via EUMETSAT web site: http://www.eumetsat.int

The SAFNWC/MSG application is able to manage nominal images coming from Meteosat-10 (MSG3), Meteosat-9 (MSG2) or Meteosat-8 (MSG1). In addition, it is able to use the application with rapid scan images provided by Meteosat-9 (MSG2) or Meteosat-8 (MSG1).

The data received by the HRUS station is MSG SEVIRI Level 1.5 data in segmented HRIT format. The general LRIT/HRIT file structure consists of one or more header records describing the contents of the file and one data field with the data being presented in forms such as image data, GTS messages, alphanumeric text or encryption keys. The file structure is described in [RD..]. A description of the LRIT/HRIT mission specific implementation can be found in [RD..]. A complete description of the Level 1.5 data format is given in [RD..].

The SEVIRI image formats used by the application for Prologue, Epilogue and Segment files, are described in the next table:

File type	HRIT Header types (see [RD..]):	L15 Records (see [RD..]):
PROLOGUE	– Type 0: Primary Header – Type 4: Annotation – Type 5: Time Stamp – Type 7: Key Header (Optional)	– SatelliteStatus – ImageAcquisition – CelestialEvents – ImageDescription – RadiometricProcessing – GeometricProcessing
EPILOGUE	– Type 0: Primary Header – Type 4: Annotation – Type 5: Time Stamp – Type 7: Key Header (Optional)	– 15TRAILERVersion – ImageProductionStats – NavigationExtractionResults – RadiometricQuality – GeometricQuality – TimelinessAndCompleteness
SEGMENT	– Type 0: Primary Header – Type 1: Image Structure – Type 2: Image Navigation – Type 4: Annotation – Type 5: Time Stamp – Type 7: Key Header (Optional) – Type 128: Segment Identification – Type 129: Image Segment Line Quality	– LineData

Table 5: SEVIRI structure

In [RD..], section 4.3.2.5, the naming convention for the segmented SEVIRI level 1.5 HRIT files is given. This convention will be used in a first time in order to identify the HRIT files needed for the processing. The input files to the SAFNWC/MSG application will have to be placed within the $SAFNWC/import/SEVIRI_data directory.

Level 1.5 data are image data that have been corrected for all unwanted radiometric and geometric effects, have been geolocated using a standardised projection, and have been calibrated and radiance-linearised. The data correspond to images of the Earth in 12 different spectral channels, from visible to infrared, with a sampling distance corresponding nominally to 3km at sub-satellite point (or 1km for the High Resolution Visible channel on a reduced Earth area).

For full Earth disk processing, the total image size for the HRV channel is 5568x11136 pixels and 3712x3712 pixels for the other 11 SEVIRI channels. This images will use a repeat cycle of 15 minutes.

For rapid scan service, SEVIRI images will use a repeat cycle of 5 minutes duration, a scan region covering the approximate latitude range of 15°N - 70°N . The repeat cycle duration for the MSG Rapid Scanning Service is 5 minutes, which is the same as currently used for weather radars. A single HRV window will be used. The East-West location of this window will be the same as that of the upper HRV window used for the nominal full Earth disc imaging service.

Table lists the SEVIRI channels needed by each PGE. For processing, all channels will be available, but the current implementation of the PGEs only foresees to use the marked channels, guaranteeing nevertheless the quality of the output products. SEVIRI channels are required at full SEVIRI resolution, calibrated in radiance, brightness temperature or bi-directional reflectance.

SEVIRI channel	PGE									
	01 CMa	02 CT	03 CTTH	04 PC	05 CRR	09 HRW	10 ASII	11 RDT	13 SPhR	14 PPh
HRVIS	✓✚	✓				✓✚				
VIS0.6	✓✚	✓		✓	✓	✓✚		✓		
VIS0.8	✓					✓✚				
IR1.6	✓	✓		✓						
IR3.9	✓	✓		✓						
WV6.2			✓	✓	✓	✓✚	✓✚	✓	✓	
WV7.3	✓	✓	✓	✓		✓✚		✓	✓	
IR8.7	✓✚	✓						✓	✓	
IR9.7										
IR10.8	✓✚	✓	✓	✓	✓✚	✓✚	✓✚	✓✚	✓	✓
IR12.0	✓✚	✓	✓	✓		✓✚	✓	✓	✓	
IR13.4	✓	✓	✓						✓	

Table 6: SEVIRI bands needed by PGEs

NOTE: For PGE01 and PGE05, data from previous slots may be required from SEVIRI 1h and 15 minutes before, if not present they are not used

An interface will be provided within the SAFNWC/MSG application to extract the processing region and other needed data from the SEVIRI 1.5 files. It is described in [AD.4.].

3.3.2 E4: MPEF data

At the current state of the SAFNWC development, none of the PGEs use MPEF products. Nevertheless, the $SAFNWC/import/MPEF_data directory is reserved to store MPEF data if needed.

3.3.3 E5: NWP data

Numerical Weather Prediction data is used by most of the PGEs. These data must be received in one of the accepted sources accepted by the application: ECMWF, HIRLAM or Arpege as described in [AD.2.] and coded in GRIB format.

The NWP data must be available in a single file containing all the parameters coded in GRIB format for one forecast term. This file will be placed in $SAFNWC/import/NWP_data directory with the following name convention:

NWP_YYYYMMDDHHmm_hh

where YYYY represents the year, MM the month, DD the day, HH the hour and mm the minutes of the model run time. The field hh represents the forecast term.

A regular latitude-longitude grid has been chosen between the different grids supported by the GRIB format.

Table lists the forecast data needed by each PGE. NWP forecasts are required at segment resolution, nearest in time.

NWP data	PGE									
	01 CMa	02 CT	03 CTTH	04 PC	05 CRR	09 HRW	10 ASII	11 RDT	13 SPhR	14 PPh
2m air temp.			✓		✓			✓		
2m relative humidity			✓					✓		
2m dew point temperature[1]			✓		✓			✓		
Skin temperature	✓	✓	✓	✓		✷			✓	
Surface Pressure			✓		✓			✓	✓	
Atmospheric WV content	✓	✓								
Temperature at various levels[2]	✓	✓	✓		✓	✓	✓	✓	✓	✓
Humidity at various levels[3]			✓		✓		✓	✓	✓	
Tropopause temperature		✷						✓		
Wind velocity at various levels[4]					✓	✓	✓			
NWP altitude model[6]	✓	✓	✓					✓		
NWP landsea[5]	✓	✓								
Geopotential at surface[6]	✓	✓	✓					✓		
Geopotential[7]					✷	✷	✓			✷

Table 7: NWP short-term forecasts required

Before using any NWP data, the time validity of the input product will be checked, i.e. ensure that the forecast validation time differs by less than six hours from the observation time or from a configurable forecast (less than 24 hours lead-time by default).

Following table presents the coding of all needed NWP data in ECMWF GRIB files

[1] 2m relative humidity (alternatively 2m dew point temperature) is required.

[2] 950 hPa (or 925 hPa when 950 is not available) for **PGE01**;
950 (or 925 when 950 is not available), 850, 700, 500 hPa for **PGE02**;
All AV_PRESSURE_LEVELS for **PGE03**;
1000, 850, 700, 500, 400, 300, 250, 200 hPa for **PGE05;**
1000, 850, 700, 500, 400, 300 hPa for **PGE10;**
1000, 925, 850, 700, 500, 400, 300, 250, 200, 150, 100, 70, **for PGE09,**
1000, 925, 850, 700, 500, 400, 300, 250, 200, 150, 100, 70, 50, 30, 10, **for PGE13,**
AV_PRESSURE_LEVELS from 1000 to 50 hPa for **PGE11**

[3] All AV_PRESSURE_LEVELS for **PGE03**;
1000, 850, 700, 500 hPa for **PGE05;**
1000, 850, 700, 500 hPa for **PGE10;**
10, 30, 50, 70, 100, 150, 200, 250, 300, 400, 500, 700, 850, 925, 1000 **for PGE13,**
AV_PRESSURE_LEVELS from 1000 to 50 hPa for **PGE11**

[4] 850 hPa for **PGE05;**
1000, 850, 700, 500, 400, 300 hPa for **PGE10**; All
1000, 925, 850, 700, 500, 400, 300, 250, 200, 150, 100, 70, **for PGE09**

[5] Indirectly because used in interpolation method when remapping surface temperature fields

[6] RequestedNWP altitude model (alternatively "Geopotential at the surface") is required

[7] 1000 and 500 hPa for **PGE10;**
1000, 925, 850, 700 and 500, 400, 300, 250, 200 hPa as optional input for **PGE05** and
1000, 925, 850, 700 and 500 hPa as optional input for **PGE09**

NWP forecast	Unit	NWP config file keyword	ECMWF		
			P	*T*	*L*
2m air temp.	K	NWP_2T	167	1	0
2m relative humidity	%	NWP_2RH	Not Available		
Surface temp. (skin temp.)	K	NWP_ST	235	1	0
Surface pressure	Pa	NWP_SP	134	1	0
Atmospheric WV content	mm	NWP_TCWV	137	1	0
Temperature at various levels	K	NWP_PT	130	100	
Humidity at various levels	%	NWP_PR	157	100	
Tropopause temperature	K	NWP_TT	Not Available		
Wind velocity (u-component)	ms^{-1}	NWP_UW	131	100	
Wind velocity (v-component)	ms^{-1}	NWP_VW	132	100	
NWP altitude model	m	NWP_ALTM	Not Available		
Geopotential (at the surface:orography)	m^2s^{-2}	NWP_SGEOP	129	1	0
NWP landsea	(0-1)	NWP_LSM	172	1	0
Geopotential	m^2s^{-2}	NWP_GEOP	129	100	
2m dewpoint temperature	K	NWP_2D	168	1	0

Table 8: Code tables for ECMWF model

*AV_PRESSURE_LEVELS: 1000, 925, 850, 700, 500, 400, 300, 250, 200, 150, 100, 70, 50, 30, 10

Note that if different levels to those described in AV_PRESSURE_LEVELS keyword of the nwp_conf_file are received, this keyword have to be updated accordingly.

3.3.4 E6: Local Data and Observations

The PGEs will use local and observation data like radiosonde, radar or other measurements obtained through the GTS or from a local network for their processing. The files containing local data and observations will be placed in $SAFNWC/import/Obs_data directory.

Measurements data	PGE									
	01 Cma	02 Ct	03 CTTH	04 PC	05 CRR	09 HRW	10 ASII	11 RDT	13 SPhR	14 PPh
Lightning data					✶			✶		✶

Table 9: Local Data and Observations

3.3.4.1 Lightning Data

PGE05 (CRR) and PGE11(RDT) will use lightning data files stored in ASCII files coming from lightning detection networks as optional input. These files must be available in the $SAFNWC/import/Obs_data directory.

For PGE05 and PGE14: One ASCII file for each MSG slot containing all lighting flashes detected from 1 hour before until the current slot time. The files must follow next filename criteria:

"Lightning_1h_*YYYYMMddhhmm*"

PGE11: For a given MSG slot, the expected ASCII file should contain all lightning flashes detected from half an hour before the time of this slot and up to 15 minutes after. The name of the file containing the lighting information must follow next filename criteria:

"PGE11_lightning_data"

3.3.4.1.1 File Format

Each line of a lightning data file documents one of these lightning flashes and is composed of five fields separated with one blank character.

For a given lightning flash, the input format is the following:

LAT LON DATE TYPE AMPLITUDE

Where:

- LAT is the latitude of the lightning flash (in decimal degrees)
- LON is the longitude of the lightning flash (in decimal degrees)
- DATE is the UTC date of the lightning flash (format YYYYMMDDhhmmss)
- TYPE is the type of lightning: "CG" for Cloud-to-Ground flashes and "IC" for Intra-Clouds flashes.
- AMPLITUDE is the amplitude (peak current) of the lightning flash (in kiloAmps, with sign, indicating polarity)

For instance, a lightning data file for the slot of the 12 June 2003 at 12UTC looks as follows:

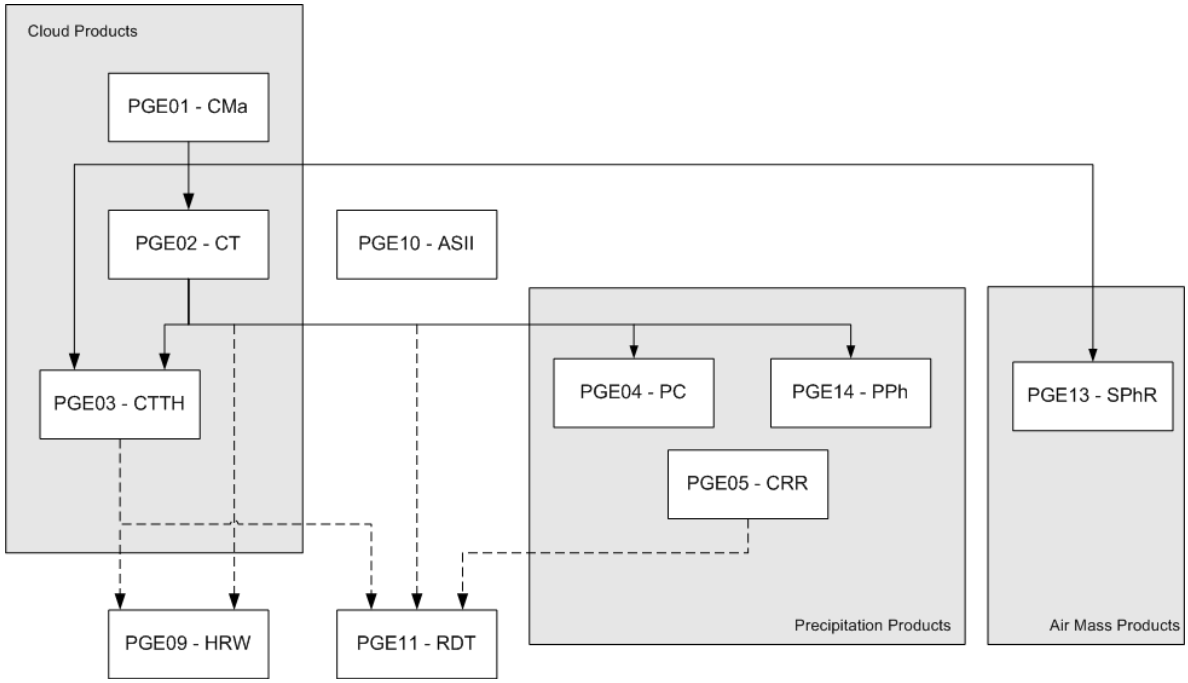
```
44.6797 1.2426 20030612113000 CG -245
45.5878 1.9144 20030612113003 IC -308
43.8912 2.6606 20030612113007 CG 121
:::::
43.8649 2.5538 20030612121447 IC -226
45.6050 2.9638 20030612121459 CG –147
```

Data content: quality control responsibility for lightning data is left to the data providing process.

3.3.5 E7: SAFNWC/MSG Products as Inputs

Some PGEs need other SAFNWC/MSG products for their processing, from the same time slot or even from a previous one. This is described in Figure through the product dependency.

The schedule of the SAFNWC/MSG processing will be defined in such a way that the needed SAFNWC/MSG product was available before starting the processing of a PGE that needing it.



(*) dashed lines show optional dependencies

Figure 3: SAFNWC Products Dependencies

3.4 OUTPUT PRODUCTS

3.4.1 E8: Saving of SAFNWC/MSG Output Products

Upon generation of a product (i.e. when a PGE has completed the execution), the Task Manager writes the output product to the "export" directory of the SAFNWC application directory structure described in section 3.1.

The naming convention and the format of the products stored in this directory are described in [AD.5.].

4. INTERNAL INTERFACES

4.1 I1: TASK MANAGER

As already described in section 3.2, only one instance of the Task Manager will run at the same time. The TM is in charge of reading the information needed for the processing from the configuration files (i.e. number of regions to be processed, PGEs to be run for each region), creating the scheduling of tasks to be performed, and finally running the SAFNWC/MSG processing.

Due to the dependency between SAFNWC/MSG products, each processing of the Task Manager will run on the defined region (and uniquely defined) for the requested output products (i.e. PGEs). This ensures that the PGEs needing other SAFNWC/MSG products as input have them available, with the correct coverage. In case several regions have to be processed for the same SEVIRI input file, a parameter in the "system configuration file" enables the user to set the number of regions to be processed. At this stage, the Task Manager will handle the scheduling and sequentially execution of all required and defined regions, generating the products corresponding to each one of them.

The command line used by the Task Manager to execute the Product Generator Elements is the most important constraint to take into account by the PGE developers. PGEs will be implemented as stand-alone applications. The task manager execute them according to the following interface:

```
% PGExx YYYYMMDDhhmm region_conf_file model_conf_file
```

where

- *xx* is the PGE number
- *YYYMMDDhhmm* is the nominal time for the slot to be processed
- *region_conf_file* is the name of the file containing the parameters defining the region.
- *model_conf_file* is the name of the file containing the model configurable parameters for the PGEs.

More details about the Task Manager processing can be found in the ADD [AD.3.].

Task Manager will be able to execute user-defined actions at a specific date and time (controlled by the TM_Program module) or as response of certain events (checked by TM_Monitor). The list of tasks related to monitoring and programmed actions, under the Task Manager control, could be initialised by the TM_Initialise module (see details in the ADD [AD.3.]) by reading the Monitor Definition and Program Definition files described in this section. These files can also be used by the system manager and/or others authorised users to change the list of monitoring and programmed task on-line, using the *monitor* and *program* user commands (see section 3.2.1). The TM is able to monitor the number of free disk blocks, the existence of predefined files and the ending in the process of a PGE. The list of available actions to be executed as response of an event (monitor or program event) is presented in detail in the Table .

All the configuration files will be coded as ASCII files with the main purpose to ease the procedures of reading, writing and modifying them, and will be stored in the $SAFNWC/config directory. Each line will contain an entry data with the format "*KEYWORD VALUE*". Additional lines with comments can be added using special codes as first character (any no-alphanumeric character, as % ; # & : …).

The keyword must be a short name that clearly identifies the associated value. It will not use blank or special character (as those used to identify a comment line). Duplicated keyword names are not allowed. The value field will hold the value assigned to the keyword, as a number, a string or a set of them separated by blanks or commas. The end of the data line will be marked with the *LF* code. The general-purpose library NWCLIB will provide a set of functions to read a desired value or set of values from a specific configuration file.

For example, according to the previous rules, a configuration file will look like as follows:

```
% Products Generation
PS_PGES          PGE01, PGE03, PGE04
…
% Coordinates of centre of area to process (latitude and longitude in degrees)
REGION_CENTRE    +40.40000-05.0000
…
% Output for messages
MESSAGE_OUT      SCREEN
```

4.1.1 Monitor Definition File

The Monitor Definition File contains the description of a set of tasks to be monitored by the Task Manager. This file can be used to load an initial list of tasks at the beginning of the SAFNWC or as parameter for the ***tm monitor load*** user command (see section 3.2.1).

The files must contain the following keywords:

Keyword	Description	Type	Possible Value(s)
NB_MONITOR	Number of monitoring tasks	integer	> 0
MONITOR_FILE_ii	Name of the file describing each monitoring task. ii goes from 1 to NB_MONITOR	chain of characters	

Table 10: Monitor Definition File Contents

A Monitor Definition File looks-like as follows:

```
# mymonitor.mdf
# Monitor Definition File describing the monitor tasks
NB_MONITOR      3
# Filename with the definition for each monitoring task
MONITOR_FILE_01 file01.mdt
MONITOR_FILE_02 file02.mdt
MONITOR_FILE_03 file03.mdt
```

4.1.2 Monitoring Task Definition File

The Monitoring Task Definition Files describe a single monitoring task: The monitoring action to be executed, the thresholds, etc., and are used as entry in the Monitor Definition File. Monitoring actions can be also loaded into the system using the ***tm monitor add*** command (see section 3.2.1) The following keywords and data compose these files:

Keyword	Description	Type	Possible Value(s)
MON_METHOD	The monitor method to be employed.	chain of character	See Table
MON_PARAMETER	If needed, parameter to be used by the monitor method (See Table)	chain of character	
MON_THRESHOLD	If needed, range defining the nominal behaviour (See Table)	min max (two floats)	max > min
MON_STEP	If needed, monitor rate time (in seconds) (See Table)	integer	≥ 0
MON_TIMEOUT	If needed, sleeping time after trigger of the event (in seconds). If TIMEOUT = -1 the monitoring task is automatically removed after the first trigger. (See Table)	integer	≥ 0
MON_NB_ACTION	Number of actions to be executed if monitor task throws an event.	integer	> 0
MON_ACTION_ii	Definition of the action. ii goes from 1 to MON_NB_ACTION	chain of characters	See Table

Table 11: Monitoring Task Definition File Contents

MON_METHOD	MON_PARAMETER	MON_THRESHOLD	MON_STEP MON_TIMEOUT	Comment
M_Free_Disk	file system	✓	✓	Monitors the free disk space
M_File_Exists	filename		✓	Monitors if a file exists
M_End_PGE	-			Monitors if a PGE has terminated
M_End_Region	-			Monitors if all PGEs for a region and slot have finished
M_End_Slot	-			Monitors if a full Slot has finished (all PGEs for all regions)
M_New_NWP	-		✓	Monitors if a new NWP file has arrived to $SAFNWC/import/NWP_Data. This monitoring action will be used to remap NWP data

Required keywords in the Monitor Task Definition File are marked with symbol ✓

Table 12: Available Monitor Actions for the SAFNWC Task Manager

A typical Monitoring Task Definition File will look like as follows:

```
# filexx.mdt
# This file describes a single monitoring task
#
# The monitoring task to be executed. (Available free disk space)
MON_METHOD      M_Free_Disk
#
# Check the free disk space in $SAFNWC/export directory
MON_PARAM       $SAFNWC/export
#
# And execute the actions if free disk space < 3MB
MON_THRESHOLD   3000000 1E+20
#
# Checks disk space every 60 seconds. If Disk space
# falls below 3MB, TM will monitor every 5 minutes
MON_STEP        60
MON_TIMEOUT     300
#
# If free disk space < 3 MB, execute 2 actions (See Table Table )
MON_NB_ACTION   2
MON_ACTION_01   A_Bell
MON_ACTION_02   A_Mail saf@machine.domain TM_W_Disk Free disk below 3MB
```

4.1.3 Program Definition File

The Program Definition File contains the description of a set of tasks to be executed by the task manager at a predefined date and time. This file can be used to load an initial list of tasks at the beginning of the SAFNWC or as parameter for the ***tm program load*** user command (see section 3.2.1).

The files must contain the following keywords:

Keyword	Description	Type	Possible Value(s)
NB_PROGRAM	Number of programmed tasks	integer	> 0
PROGRAM_FILE_ii	Name of the file describing each programmed tasks. ii goes from 1 to NB_PROGRAM	chain of characters	

Table 13: Program Definition File Contents

A Program Definition File looks-like as follows:

```
# myprogram.pdf
# Program Definition File describing the programmed tasks
NB_PROGRAM      2
# Filename with the definition for each programmed task
PROGRAM_FILE_01 file01.pdt
PROGRAM_FILE_02 file02.pdt
```

4.1.4 Programmed Task Definition File

The Programmed Task Definition Files describe a single programmed task: the date and time for execution, the reprogramming time and the set of actions to be executed, and are used as entry in the Program Definition File. The programmed actions can be also loaded into the system by using the ***tm program add*** command (see section 3.2.1)

The files must contain the following keywords:

Keyword	Description	Type	Possible Value(s)
PRG_TIME	Programmed date and time for the beginning of the execution. The value field must contain the following format: hh:mm:ss [dd-mm-yyyy] Current date is assumed if dd-mm-yyyy field is not present.	chain of character *hh:mm:ss [dd-mm-yyyy]*	
PRG_REPEAT	Repeating time cycle. Use the format dd hh:mm:ss If this value is set to 0 (0d 00:00:00) the task is automatically removed after the first execution	chain of character *dd hh:mm:ss*	
PRG_NB_ACTION	Number of actions to be executed at the specified PRG_TIME	integer	> 0
PRG_ACTION_ii	Definition of the action. ii goes for 1 to PRG_NB_ACTION	chain of characters	See Table

Table 14: Programmed Task Definition File Contents

```
The following file can be used to program 3 actions to be executed with 3
hour repeating cycle:#
# filexx.pdt
# This file describe a single programming task
#
PRG_TIME         03:00:00 01-04-2000
PRG_REPEAT       0 03:00:00
PRG_NB_ACTION    1
PRG_ACTION_01    A_PrintScreen System Time: $system_time
```

This file programs the TM to execute an action (see Table for details in actions) at $03^h00^m00^s$ the 1st April 2000. The action will be automatically repeated every 3 hours.

4.1.5 Action Definition

The Task Manager is able to execute different actions as result of several programmed events. The actions to be executed by the Task Manager are defined in the Monitor Task Definition File (keyword MON_ACTION_ii) and in the Program Task Definition File (keyword PRG_ACTION_ii). This section presents the set of available actions to the TM, and the parameters for each of them. All this information is summarised in the following table.

Action Name	Parameters	Coments
A_Ignore	-	Action is ignored.
A_PrintScreen	message	Display a *message* in the PRINT_TTY terminal
A_Log	message	Writes a *message* in the TM Log File
A_SysLog	message	Writes a *message* in the System Log File
A_Bell	-	Emits an audible signal in the PRINT_TTY terminal
A_Mail	address subject message	Send a mail message to *address*.
A_Execute	command	Executes the system command *command*. (system command, program or executable script) It is recommended to execute time-consuming commands with the & option to avoid the pause of the Task Manager.
A_Reconfigure	system_conf_file	Reload all the configurable parameters from the *system_conf_file* file
A_CleanObsoleteFiles	path time	Removes obsolete files from *path* directory. A file is considered obsolete if its last access time differs more than *time* minutes with respect the current system time
A_CleanObsoleteMonitor	time	Removes obsolete monitoring task from the *Monitor List*.
A_LogFile	log_file	Change the TM Log File to *log_file*
A_SysLogFile	syslog_file	Change the System Log File to *syslog_file*
A_ErrFile	err_file	Change the TM Error File to *err_file*
A_ErrTTY	err_tty	Change the TM Error TTY to err_tty
A_MonitorAdd	file.mdt	Adds a monitoring task to the current *Monitor List*.
A_MonitorDel	monitor_id	Removes a monitoring task in the *Monitor List*
A_MonitorCancel		Removes all the monitoring tasks in the *Monitor List*
A_MonitorLoad	file.mdf	Loads a set of monitoring tasks. All tasks in the *Monitor List* are removed before loading the new list.
A_ProgramAdd	file.pdt	Adds a programmed task to the current *Program List*
A_ProgramDel	program_id	Removes a programmed task in the *Program List*
A_ProgramCancel	-	Removes all the programmed task in the *Program List*
A_ProgramLoad	-	
A_ScheduleDel	schedule_id	Removes a schedule task in the *Schedule List*.
A_ScheduleCancel	-	Removes all scheduled tasks in the S*chedule List*
A_ScheduleAbort	schedule_id	Cancels a task currently in execution
A_TMAbort	-	Terminates the execution of TM
A_ProcessSlot	YYYYMMDDhhmm	Inserts in the *Schedule List* all the tasks required to generate all PGEs for a new slot
A_ProcessRegion	YYYYMMDDhhmm reg_id	Inserts in the *Schedule List* all the tasks required to generate all PGEs for a specific slot/region
A_Remap	-	Remaps all new received NWP files (in GRIB format) and extract the parameters needed for all PGES and regions currently under processing. (Normally, this action will be used in combination with M_New_NWP monitoring action)

Table 15: Available Actions for the SAFNWC/MSG Task Manager

The parameter field allows the use of wildcards (See section 4.1.6)

Examples

```
A_PrintScreen Proving the PrintScreen Action
```

This line describes an action intended to display the message "*Proving the PrintScreen Action*" in default terminal

```
A_MonitorAdd monitor001.mdt
```

The execution of this action will add a new task to the *Monitor List*. The monitor parameters are read from the file *monitor001.mdt*

```
A_Execute myprogram file_$system_time.dat -p
```

This line will command the execution of program *myprogram* with two arguments. The first one use the wildcard *$system_time* and will be replaced by the current system time (See section 4.1.6 for details)

4.1.6 Wildcards

The user is able to use some wildcards in the Monitor Task Definition Files and Program Task Definition Files to represent the current system time, the number of the last processed PGE, etc. Available wildcards are presented in Table

Wildcard	Comment	Format
% wildcards		
%system_time	To be replaced by current system time	YYYYMMDDhhmm
%system_slot	To be replaced by current slot	YYYYMMDDhhmm
%safnwc_home	To be replaced by the root directory for the SAFNWC	Chain of chars.
%msgn	To be replaced by the value of the key '*MSG*' in the satellite configuration file (see 4.2.6)	string
%msg_mode	To be replaced by the value of the key '*MODE*' in the satellite configuration file (see 4.2.6)	string
$ wildcards		
$system_time	To be replaced by current system time	YYYYMMDDhhmm
$system_slot	To be replaced by current slot	YYYYMMDDhhmm
$system_file	To be replaced by current System Configuration File	Chain of chars.
$msgn	To be replaced by the current value of the key '*MSG*' in the satellite configuration file (see 4.2.6)	string
$msg_mode	To be replaced by the value of the key '*MODE*' in the satellite configuration file (see 4.2.6)	string
$p	To be replaced by the number of the last termitated PGE	xx (01-12)
$r	To be replaced by the number of the region related to the last terminated PGE	xx (01-12)
$rname	To be replaced by the name of the region related to the last terminated PGE	Chain of chars.
$st	To be replaced by the completion status of the last terminated PGE. Completion status can be: - exit*xxxx* (when process have been normally completed) - sign*xxxx* (when process have been interrupted by a signal) - stop*xxxx* (when process have been stopped by a signal) Where *xxxx* is a signed value	String
$endpge_slot	To be replaced by the nominal slot related to the last terminated PGE	YYYYMMDDhhmm
$g	To be replaced by the number of the last terminated region (all PGEs have terminated)	xx (01-99)
$gname	To be replaced by the name of the last terminated region (all PGEs have terminated)	Chain of chars.
$endreg_slot	To be replaced by the nominal slot related to the last terminated region	YYYYMMDDhhmm
$endall_slot	To be replaced by the last finalised slot	YYYYMMDDhhmm

Table 16: Available Wildcards for the Task Manager

There exists two different types of wildcards (%-type and $-type) in order to define the moment in which TM must resolve the wildcard:

- %-type wildcards are resolved at the moment of reading the Task Definition File
- $-type wildcards are resolved at the moment of executing the tasks

The difference between the two types of wildcards can be easily understood with the following example.

```
# Programmed_task-pdt
# ===================
#
PRG_TIME            00:00:00
PRG_REPEAT       0d 00:00:01
PRG_NB_ACTION    2
PRG_ACTION_01    A_PrintScreen This programmed action was inserted at %system_time
PRG_ACTION_02    A_PrintScreen Current time: $system_time
```

The previous programmed task will display 2 lines in the terminal defined by command "tm log printtty" every minute. First message line use a %-type wildcard (%system_time). Therefore, this first line will display a fixed message because task-manager resolve the %-type wildcards when file is read. The second line uses a $-type wildcard ($system_time), resolved by the sofware each time the TM executes the action. Consequently this second line will change every time the message is displayed, according to the current system time.

We will obtain the following messages in the PRINTTTY terminal every minute:

```
This programmed action was inserted at 200711241542
Current time: 200711241542

This programmed action was inserted at 200711241542
Current time: 200711241543

This programmed action was inserted at 200711241542
Current time: 200711241544
```

4.2 I2: CONFIGURATION FILES

The SAFNWC/MSG will be configured according to a set of configuration files. General description and criteria used to create the configuration files are explained in § 4.1.

All parameters needed for the SAFNWC/MSG processing will be defined in the configuration files, except the home directory of the application (`$SAFNWC`), which will be defined in a shell as environment variable.

The following sections describe each of the configuration files needed to run the SAFNWC/MSG software. All configuration files should be copied or linked to the `$SAFNWC/config` directory before starting the execution (refer to section 3.1). This directory contains system configuration parameters. PGE specific files will be stored into separated folders in import/Aux_data/PGE*xx* directory.

4.2.1 System Configuration File

A single system configuration file exists for the SAFNWC/MSG application, i.e. in the `$SAFNWC/config` directory, only one system configuration file must be present. This file contains general configurable system parameters, and some processing specific parameters as described below.

The System Configuration File (**.cfs*) must be placed into the `$SAFNWC/config` directory, in order to enable the TM to identify it. The TM will load the system configuration file submitted by the user at start-up or the file *safnwc.cfs* as default.

The Table lists the parameters to be set in the system configuration file:

Keyword	Description	Type	Possible Value(s)
REAL_TIME	Specifies the operational mode as REAL_TIME or OFF_LINE	chain of character	TRUE (REAL_TIME) FALSE (OFF_LINE)
SORT_KEY	Configure the criteria used to order the PGE-related tasks. Tasks can be ordered by REGION priority or by PGE priority	chain of character	REGION PGE
NB_PROCESS[RT]	Number of concurrent process. TM will execute, if possible, a maximum of *n* PGEs concurrently, taking into account the dependencies between the Products	Integer	>0
BEG_SLOT[OL]	Beginning slot to be processed in OFF-LINE mode	YYYYMMDDhhmm	
END_SLOT[OL]	Ending slot to be processed in OFF-LINE mode	YYYYMMDDhhmm	
NB_REGION	Number of regions to be processed for the current SEVIRI image	integer	>0 Default value is 1
RUN_CONF_ii	Name of run configuration files (1 per region). “ii” goes from 1 to NB_REGION. Only the filename is needed, as the files are expected to be in the $SAFNWC/config directory.	run configuration filename	<filename>.cfr
PRIORITY_ii	Priority of the processing of each region.	integer	From 1 (first region to be processed) to i (last region to be processed)
[MONITOR_FILE]	File name for the Monitor Definition File used to initialise the list of monitoring tasks	chain of character	
[PROGRAM_FILE]	File name for the Program Definition File used to initialise the list of programmed tasks	chain of character	
[LOG_FILE]	Name for the TM Log File. File will be created in the *$SAFNWC/logs* directory	chain of character	
[SYS_LOG_FILE]	Name for the System Log File. File will be created in the *$SAFNWC/logs* directory	chain of character	
[ERR_FILE]	Name for the TM Error File. File will be created in the *$SAFNWC/logs* directory	chain of character	
[ERR_TTY]	Terminal device to display error messages	chain of character	tty device
[ERR_MAIL]	Account to mail error messages	chain of character	e-mail address
[PRINT_TTY]	Terminal device to display A_PrintScreen and A_Bell actions	chain of character	tty device

[RT]: keyword used only in REAL-TIME mode
[OL]: keywords used only in OFF-LINE mode

Table 17: System Configuration File Contents

As only one instance of the SAFNWC/MSG software is running at once, the TM will perform the requested processing for the different regions sequentially, according to the priority defined in the PRIORITY_ii parameter.

4.2.2 Run Configuration File

There will be one run configuration file per region (the number of regions being defined in the System Configuration File). The name of the file will be the one given in the System Configuration File for the corresponding region.

Naming convention: each run configuration file will end with the “cfr” extension, and will be placed in the `$SAFNWC/config` directory of the current application.

This file specifies parameters used as run-time options for the Task Manager, replacing the need to pass such options as command line arguments

Keyword	Description	Type	Possible Value(s)
REG_CONF	Name of the region configuration file	chain of characters	<filename>.cfg
PS_PGES	Identifier of PGEs to be run for this region	chain of identifiers separated by space or comma	Any combination of: PGE01, PGE02, PGE03, PGE04, PGE05, PGE09, PGE10, PGE11, PGE13, PGE14
MODEL_CONF_ii	Name of the model configuration file where "ii" indicates the PGE it belongs to (e.g. i=03 is for PGE03). There will be maximum one model configuration file per PGE.	Model configuration filename	<filename>.cfm

Table 18: Run Configuration File Contents

4.2.3 Region Configuration File

There will be one region configuration file per processing region. The name of the file will be the one given in the Run Configuration File for the corresponding region.

Naming convention: each region configuration file will end with the "cfg" extension, and will be placed in the `$SAFNWC/config` directory of the current application.

This file specifies parameters used as run-time options for the PGEs, replacing the need to pass such options as command line arguments. Table describes its contents.

Keyword	Description	Type	Possible Value(s)
REGION	Identification of the region to be processed.	chain of characters	Any string
REGION_CENTRE_C	Coordinates of the centre of region to be processed in degrees of latitude longitude. The region centre can also be set using the REGION_CENTRE_P keyword.	two real numbers separated by a space or comma (order is latitude, longitude)	latitude: from –90.0 to +90.0 longitude: from –180.0 to +180.0
REGION_CENTRE_P	Coordinates of the centre of region to be processed in line index and column index. Indexes refer to full SEVIRI image in VIS_IR resolution (the indices will be converted if HRV resolution is required) Line and Column indexes are 1-based. The region centre can also be set using the REGION_CENTRE_C keyword. If both keys are defined only REGION_CENTRE_C will be used.	two integers (order is line, column)	line: from 1 to 3712 column: from 1 to 3712
REGION_SIZE	Size of region to be processed, in number of lines x number of columns. Numbers of lines and columns refer to SEVIRI image for VIS_IR resolution (they will be multiplied by 3 if HRV resolution is required)	two integer numbers separated by a space or a comma (order is number of lines, number of columns)	two integers greater than zero.

Table 19: Region Configuration File Contents

```
# Region Configuration File describing a region
# of 801 lines x 1001 columns, centered at 40ºN, 4ºW
#
REGION          Region_Spain
REGION_CENTRE_C 40.0 -4.0
REGION_SIZE     801 1001
```

The processing region is defined by the coordinates of the central pixel (REGION_CENTRE) and the size of the region (REGION_SIZE)

The region boundaries are computed as:

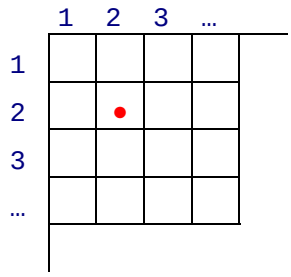
- *upper line*: `region_central_line – region_lines/2`
- *lower line*: `upper_line + region_lines – 1`
- *left line*: `region_central_col – region_cols/2`
- *right line*: `left_line + region_cols – 1`

where all coordinates are expressed as 0-based

Note that for odd sized regions, the central pixel set during the definition remains as the centre of the region, but this is not the case for even sized region.

As an example, consider the following definition of a region:

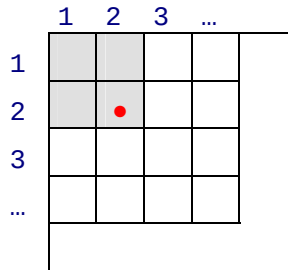
```
REGION_CENTRE_P    2 2
REGION_SIZE        2 2
```



The region boundaries are computed as follows (note that region coordinates are here expressed as 0-based)

- *upper line*: `region_central_line – region_lines/2 = 1 – 2/2 = 0`
- *lower line*: `upper_line + region_lines – 1 = 0 + 2 - 1 = 1`
- *left line*: `region_central_col – region_cols/2 = 1 – 2/2 = 0`
- *right line*: `left_line + region_cols – 1= 0 + 2 - 1 = 1`

Following this example, the final region is established in the SEVIRI frame (1-based) as follows:



4.2.4 Model Configuration File

There will be one model configuration file for each PGE to be generated. If more than one region will be processed, the PGE can be executed with the same or different models in each region. The Model Configuration File describes configurable items in the product generation process such as algorithm thresholds, SEVIRI bands to be used by the PGE, etc.

Naming convention: each model configuration file will end with the “cfm” extension, and will be placed in the `$SAFNWC/config` directory of the current application.

The exact content of these files depends on each PGE, and is presented in following sections. Some (expected) common keyword to all PGEs are here suggested, although the PGE developer is free to use any keyname.

The only constraint in the use of any name is the key used to specify the parameters to be used from NWP models: NWP_PARAM. The use of this keyname is mandatory, and will be used by a preprocessing task in charge of remapping NWP incoming files (in GRIB format).

Keyword	Description	Type	Possible Value(s)
PGE_ID	Identifier of the PGE	chain of characters	Any of: PGE01, PGE02, PGE03, PGE04, PGE05, PGE09, PGE10, PGE11, PGE13, PGE14
NWP_PARAMii(*)	One entry for each parameter to be extracted from NWP data. Five different fields are specified separated by comas or spaces: parameter, type of level, level, sampling rate and interpolation method. The parameter and the type of level are defined using KEYWORDS. These KEYWORDS are associated to their real values in the NWP configuration file.	- string, - string, - integer, - integer, - chain of characters	-Parameter: key of the parameter in the NWP table corresponding to the used model. -Type: key of the type of level in the NWP table -Level: level to be extracted. -Sub_sampling rate: sub sampling rate of SEVIRI resolution. -Interpolation method: one of BILIN, MAX, NEIGHBOUR or BILIN_MASKED
AUX_FILE_i	Names of the MPEF products to be used by the PGE. Only the name is needed as those files will be searched for in the $SAFNWC/import/Aux_Data directory	-	-
OBS_FILE_i	Names of the observation and other data files to be used by the PGE. Only the name is needed as those files will be searched for in the $SAFNWC/import/Obs_data directory	-	-
SEV_BANDS	SEVIRI bands to be used by the PGE algorithms	-	Any combination of: HRVIS, VIS06, VIS08, IR16, IR38, WV62, WV73, IR87, IR97, IR108, IR120, IR134

(*) Mandatory keyname for all PGEs requiring NWP data

Table 20: Common Model Configuration File Keynames

4.2.4.1 CMa PGE01 Model Configuration File

The CMa model configuration file contains all the coefficients and some constant values required by PGE01 product. The model configuration file must be placed at the $SAFNWC/config directory.

The file contains the following information:

Keyword	Description	Default Value(s)
PGE_ID	Identifier of the PGE	PGE01
SEV_BANDS	SEVIRI bands to be used by PGE 01	HRVIS,VIS06,VIS08,IR16,IR39,WV73,IR87,IR108,IR120,IR134
CMA_SZSEG	Size of PGE01 segments expressed in SEVIRI coordinates (same value for lines and columns)	4
HRV_NEED	Flag to indicate if HRVIS band is to be used	TRUE
TEMPORAL_USE	Flag to indicate if temporal information from previous scenes and products are to be used	TRUE
NWP_PARAM01	Parameter :Temperature at surface level sampling rate : (=segment size) interpolation method.	NWP_ST 4 BILIN_MASKED
NWP_PARAM02	Parameter :Temperature at pressure levels sampling rate : (=segment size) interpolation method.	NWP_PT 4 BILIN
NWP_PARAM03	Parameter :Total column water vapour sampling rate : (=segment size) interpolation method.	NWP_TCWV 4 MAX
NWP_PARAM04	Parameter :Altitude of the model at surface sampling rate : (=segment size) interpolation method.	NWP_ALTM 4 BILIN
NWP_PARAM05	Parameter : Geopotential at surface sampling rate : (=segment size) interpolation method	NWP_SGEOP 4 BILIN

Default PGE01 model configuration file resulting of the PGE01 installation step, containing requests for remapping NWP parameters covering both ECMWF and ARPEGE specifications.

Table 21: Cma Model Configuration File description

4.2.4.2 CT PGE02 Model Configuration File

The CT model configuration file contains all the coefficients and some constant values required by PGE02 product. The model configuration file must be placed at the $SAFNWC/config directory.

The file contains the following information:

Keyword	Description	Default Value(s)
PGE_ID	Identifier of the PGE	PGE02
SEV_BANDS	SEVIRI bands to be used by PGE 02	HRVIS,VIS06,IR16,IR39,WV73 ,IR87,IR108,IR120,IR134
CT_SZSEG	Size of PGE02 segments expressed in SEVIRI coordinates (same value for lines and columns)	4
HRV_NEED	Flag to indicate if HRVIS band is to be used	FALSE
PHASE_COMPUTATION	Flag to indicate if PHASE is to be computed	FALSE
CT_PHASE_SZSEG	Size of the segment for cloud phase flag computation	8
NWP_PARAM01	Parameter :Temperature at surface sampling rate : (=segment size) interepolation method.	NWP_ST 4 BILIN_MASKED
NWP_PARAM02	Parameter :Temperature at pressure levels sampling rate : (=segment size) interepolation method.	NWP_PT 4 BILIN
NWP_PARAM03	Parameter :tropopause temperature sampling rate : (=segment size) interepolation method.	NWP_TT 4 BILIN
NWP_PARAM04	Parameter :Water vapour content sampling rate : (=segment size) interepolation method.	NWP_TCWV 4 MAX
NWP_PARAM05	Parameter :Altitude of the model sampling rate : (=segment size) interpolation method.	NWP_ALTM 4 BILIN
NWP_PARAM06	Parameter : Geopotential at surface sampling rate : (=segment size) interpolation method	NWP_SGEOP 4 BILIN

Default PGE02 model configuration file resulting of the PGE02 installation step, containing requests for remapping NWP parameters covering both ECMWF and ARPEGE specifications.

Table 22: CT Model Configuration File description

4.2.4.3 CTTH PGE03 Model Configuration File

The CTTH model configuration file contains all the coefficients and some constant values required by PGE03 product. The model configuration file must be placed at the $SAFNWC/config directory.

The file contains the following information:

Keyword	Description	Default Value(s)
PGE_ID	Identifier of the PGE	PGE03
SEV_BANDS	SEVIRI bands to be used by PGE03	WV62,WV73,IR108,IR120,IR134
CTTH_SZSEG	Size of PGE03 segments expressed in SEVIRI coordinates (same value for lines and columns)	16
RTTOV_USE_USERLEVEL	User level (TRUE) RTTOV level (FALSE)	FALSE
RTTOV_NB_THREADS	Number of threads for RTTOV	4
NWP_PARAM01	Surface Pressure	NWP_SP 16 BILIN
NWP_PARAM02	Surface Temperature	NWP_ST 16 BILIN_MASKED
NWP_PARAM03	Temperature at 2m	NWP_2T 16 BILIN
NWP_PARAM04	Relative humidity at 2m	NWP_2RH 16 BILIN
NWP_PARAM05	Dew point temp. at 2m	NWP_2D 16 BILIN
NWP_PARAM06	Altitude	NWP_ALTM 16 BILIN
NWP_PARAM07	Geopotential at surface	NWP_SGEOP 16 BILIN
NWP_PARAM08(*)	Temperature at various pressure levels	NWP_PT 16 BILIN
NWP_PARAM09(*)	Relative humidity at various pressure levels	NWP_PR 16 BILIN

(*) Temperature and relative humidity are requested to be remapped for each iiii pressure level of AV_PRESSURE_LEVELS in nwp_conf_file.

Table 23: CTTH Model Configuration File description

4.2.4.4 PC PGE04 Model Configuration File

The PC model configuration file contains most coefficients and some constant values required by PGE04 product. It also gives the filename to a more product internal algorithm configuration file situated in $SAFNWC/import/Aux_data/PGE04 directory. The model configuration file must be placed at the $SAFNWC/config directory. The file contains the following information:

Keyword	Description	Type	Default Value(s)
PGE_ID	Identifier of the PGE	Chain of characters	PGE04
SEV_BANDS	SEVIRI channels to be used by PGE04	Chain of characters	VIS06 IR16 IR39 IR108 IR120 WV62 WV73
NWP_PARAM01	Parameter :Temperature at surface sampling rate : (=segment size) interepolation method.	Chain of characters	NWP_ST 4 BILIN_MASKED
PRODUCT_CONFIG_FILE	PGE04 Algorithm/Product configuration file giving additional configurable options to PGE04. File is searched for in $SAFNWC/import/Aux_data/PGE04 directory. Possible Value: Filename (without path)	Chain of characters	pge04_algorithm.conf
SATID_IN_STAT_FILENAME	Set the style of the stat-file name: If 0: have the name of the stat-file without satellite id, as before. Example: stat_PGE04_200812121100_spain_____.txt If 1: have satellite id in the name of the stat-file; new from v2011. Example: stat_MSG2_PGE04_200812121100_spain_____.txt	0/1	0/1

Table 24: PC Model Configuration File description

4.2.4.5 CRR PGE05 Model Configuration File

The CRR model configuration file contains all the coefficients and some constant values required by PGE05 product. The model configuration file must be placed at the $SAFNWC/config directory.

The file contains the following information:

Keyword	Decription	Type	Default Value(s)
PGE_ID	Identifier of the PGE	Chain of characters	PGE05
SEV_BANDS	SEVIRI channels to be used by PGE05	Chain of characters	VIS06 WV62 IR108
DAY_NIGHT_ZEN_THRESHOLD	Solar zenith angle to select between day and night cases (in degrees)	Double	80
WIN_FILTER_SEMISIZE	Semi-size of the window used to filter the Basic CRR image (in pixels). Window_Size=(2*WIN_FILTER_SEMISIZE +1) * (2*WIN_FILTER_SEMISIZE +1)	Integer	3
FILTER_THRESHOLD	Threshold for filtering process	Integer	3
APPLY_HUMIDITY_CORR	Indicator whether the Humidity correction should be applied or not (1 yes: 0 no)	Integer	1
APPLY_EVOL_GRAD_CORR	Indicator whether the Evolution/Gradient correction should be applied or not (1 yes: 0 no)	Integer	1
APPLY_PARALLAX_CORR	Indicator whether the Parallax correction should be applied or not (1 yes: 0 no)	Integer	1
APPLY_OROGRAPHIC_CORR	Indicator whether the Orographic correction should be applied or not (1 yes: 0 no)	Integer	1
COEFF_EVOL_GRAD_CORR_00	Coefficient used when the Evolution/Gradient correction is applied. When two consecutives IR images are available and the Evolution correction is applied, this coefficient multiplies the rainfall rate computed from the second image if the analysed pixel becomes warmer in this image.	Real	0.35
COEFF_EVOL_GRAD_CORR_01	Coefficient used when the Evolution/Gradient correction is applied. When the previous IR image is not available an the Gradient correction is applied, this coefficient multiplies the previous computed rainfall rate if the analysed pixel has a local temperature maximum.	Real	0.25

Keyword	Decription	Type	Default Value(s)
COEFF_EVOL_GRAD_CORR_02	Coefficient used when the Evolution/Gradient correction is applied. When the previous IR image is not available an the Gradient correction is applied, this coefficient multiplies the previous computed rainfall rate if the analysed pixel has not a local temperature maximum nor minimum.	Real	0.50
USE_SOLAR_CHANNEL	Indicates if the SEVIRI solar channel has to be used in the computation of the CRR (1 yes: 0 no)	Integer	1
APPLY_LIGHTNING	Flag to use or not the lightning data 0: NO 1: YES	Integer	0
LIGHTNING_DELTA_TIME	Time interval to consider lightning data files	Integer	15
RAIN_LIGHTNING_RATE_1	Rain rate parameter 1 linked to observed lightning	Real	2.3
RAIN_LIGHTNING_RATE_2	Rain rate parameter 2 linked to observed lightning	Real	0.75
RAIN_LIGHTNING_RATE_3	Rain rate parameter 3 linked to observed lightning	Real	0.25
RAIN_LIGHTNING_RATE_4	Rain rate parameter 4 linked to observed lightning	Real	0.1
COEFF_N_LIGHTNING_A	Coefficient “A” to be applied during the lightning adjustment function	Real	0.45
COEFF_N_LIGHTNING_B	Coefficient “B” to be applied during the lightning adjustment function	Real	0.7
NWP_PARAM01	Parameter :Wind Velocity (u-component) at pressure levels sampling rate : (=segment size) interpolation method.	Chain of characters	NWP_UW 1 BILIN
NWP_PARAM02	Parameter :Wind Velocity (v-component) at pressure levels sampling rate : (=segment size) interpolation method.	Chain of characters	NWP_VW 1 BILIN
NWP_PARAM03	Parameter : Humidity at pressure levels sampling rate : (=segment size) interpolation method.	Chain of characters	NWP_PR 1 BILIN
NWP_PARAM04	Parameter : 2m dewpoint temperature sampling rate : (=segment size) interpolation method.	Chain of characters	NWP_2D 1 BILIN
NWP_PARAM05	Parameter : 2m air temperature sampling rate : (=segment size) interpolation method.	Chain of characters	NWP_2T 1 BILIN
NWP_PARAM06	Parameter : Temperature at pressure levels sampling rate : (=segment size) interpolation method.	Chain of characters	NWP_PT 1 BILIN
NWP_PARAM07	Parameter : Surface pressure sampling rate : (=segment size) interpolation method.	Chain of characters	NWP_SP 1 BILIN
NWP_PARAM08	Parameter : Geopotential at pressure levels sampling rate : (=segment size) interpolation method.	Chain of characters	NWP_GEOP 1 BILIN

Table 25: CRR Model Configuration File description

4.2.4.6 HRW PGE09 Model Configuration File

The HRW model configuration file holds the configurable parameters needed for the execution of PGE09. It must be located within $SAFNWC/config directory. A brief description of the keywords used is specified in the following table:

Keyword	*Description*	*Type*	*Default Value(s)*
Identification parameters			
PGE_ID	PGE identification. This keyword is optional, but should not be changed by the user.	Chain of characters	`PGE09`
SEV_BANDS	SEVIRI bands that can be used to run the PGE. This keyword is optional, but should not be changed by the user. It defines the maximum value of SEVIRI bands for which AMVs can be calculated.	Chain of characters	`HRVIS,VIS06,VIS08, WV062,WV073,IR108,IR120`
WIND_CHANNEL	SEVIRI bands really used for AMV calculation. As possible values, it can include any of the next SEVIRI channels separated by commas (not by spaces): HRVIS,VIS06,VIS08,WV062, WV073,IR108,IR120.	Chain of characters	`HRVIS,VIS08,WV062,` `WV073,IR120`
SLOT_GAP	Ordering number of the previous SEVIRI slot, for which tracers are to be considered for AMV processing. Possible values: 1: Nominal mode (15 min., previous slot) 2: Rapid scan mode (10 min, 2nd previous slot)	Integer	`1 (Nominal mode)` `2 (Rapid scan mode)`
Output parameters			
BUFR_CENTRE_OR	Originating/generating centre of BUFR file, defined in BUFR Common Code Table C-1. It is to be modified with the code related to the corresponding centre (e.g. 214 for Madrid).	Integer	`214`
BUFR_OUTPUT_FORMAT	BUFR output file format. Possible values: - NWC: two different BUFR files are generated (for AMVs & Trajectories) with the traditional SAFNWC/MSG PGE09 BUFR output format. . EUM: one BUFR file is generated (for AMVs) with the official EUMETSAT/MPEF AMV BUFR output format.	Chain of characters	`NWC`
QI_THRESHOLD	Quality Index threshold for the AMVs	Integer	`70`
QI_THRESHOLD_USEFORECAST	Option to show if the Quality index threshold used in the wind output filtering includes the Quality forecast test	Integer	`1`
QI_BEST_WIND_SELECTION	Criterion for Best wind selection (Values: 0/1), as defined in the ATBD document.	Integer	`1`
CLEARAIRWINDS	Flag to decide if Clear air AMVs are calculated (when positive).	Integer	`1`
CALCULATE_TRAJECTORIES	Flag to decide if Trajectories are calculated (when positive)	Integer	`1`
FINALFILTERING	Flag for a final filtering of the AMVs based on: - Their Height level (if > 0), - Their Cloud type (if > 1), - Their Quality spatial test (1,2 as invalid values if > 2; 0,1,2 as invalid values if > 3).	Integer	`2`
USE_TOPO	Flag for calculation of the orographic flag. (when positive).	Integer	`1`
USE_MEANWIND	Flag showing if the mean value of the latitude increment, longitude increment, speed, direction, temperature, pressure, pressure error and correlation related to an AMV and its predecessor (in case it exists) are provided (when positive).	Integer	`0`
MAXPRESSUREERROR	Maximum pressure error in the AMVs (hPa), when 'CCC height assignment method' is used.	Integer	`150`
VERYLOWINFRAREDAMVS	Flag to indicate if very low infrared AMVs (below 900 hPa) are to be admitted in the AMV output file	Integer	`0`
FINALCONTROLCHECK	Flag to indicate if the "Final Control Check" Option is to be used	Integer	`1`
Working area description parameters			
LAT_MIN	Latitude and longitude borders (in degrees) for the processing region (Basic AMVs)	Real	`-75.0`
LAT_MAX		Real	`75.0`
LON_MIN		Real	`-179.0`
LON_MAX		Real	`179.0`
LAT_MIN_DET	Latitude and longitude borders (in degrees) for the processing region (Detailed AMVs)	Real	`-75.0`
LAT_MAX_DET		Real	`75.0`

Keyword	*Description*	*Type*	*Default Value(s)*
LON_MIN_DET		Real	-179.0
LON_MAX_DET		Real	179.0
FRAC_DAY_SCENE	Minimum fraction of area illuminated by the sun needed to calculate the visible AMVs (HRVIS, VIS06, VIS08 channels)	Integer	8
ZEN_THRES	Sun zenith angle threshold (degrees)	Double	87.0
MSG_ZEN_THRES	Satellite zenith angle threshold (degrees)	Double	80.0
Tracer parameters			
MAX_TRACERS	Maximum number of tracers	Integer	120000
LSIZ_HRV	Basic tracer line/column dimension (to be applied with HRVIS AMVs)	Integer	24
ESIZ_HRV		Integer	24
LSIZ_OTHER	Basic tracer line/column dimension (to be applied with all other AMVs)	Integer	24
ESIZ_OTHER		Integer	24
MIN_BRIGHTNESS_VIS	Minimum acceptable 1 byte reflectance value in the search for targets (with visible AMVs)	Double	120.0
MIN_BRIGHTNESS_OTHER	Minimum acceptable 1 byte brightness temperature value in the search for targets (with infrared and water vapour AMVs).	Double	60.0
GVAL_VIS	Minimum acceptable 1 byte reflectance Contrast in the pixels of a target (with visible AMVs)	Double	60.0
GVAL_OTHER	Minimum acceptable 1 byte brightness temperature contrast in the pixels of a target (with infrared and water vapour AMVs)	Double	48.0
TRACER_SEARCH_STEP_HRV	Minimum separation (in pixels) between tracers (for HRVIS AMVs)	Integer	24
TRACER_SEARCH_STEP_OTHER	Minimum separation (in pixels) between tracers (for all other AMVs)	Integer	6
Tracking parameters			
TRACKING	Tracking method. Possible values: LP: Euclidean difference CC: Cross correlation	Chain of characters	CC
DEFINECONTRIBUTIONS	Flag to decide if “CCC height assignment method” is to be used (when positive; this option requires also TRACKING=CC)	Integer	1
DEFPOSCONTRIBUTIONS	Flag to decide if the position of the AMV in the target is relocated to the position of maximum correlation contribution defined by “CCC height assignment method” (when positive; this requires also TRACKING=CC and DEFINECONTRIBUTIONS=1)	Integer	1
USE_CLOUDTYPE	Flag to decide if the Tracer cloud type is used by the old “Brightness temperature interpolation height assignment method” (when positive).	Integer	1
WIND_GUESS	Flag to decide if the Wind guess is used for the definition of the Tracking area (when positive)	Integer	0
MIN_CORRELATION	Minimum correlation acceptable in the Tracking process (if Cross correlation method used)	Double	80.0
LLAG_HRV	Tracking line/column increment (to be applied with HRVIS AMVs) (This value is dependent of the time distance between satellite slots)	Integer	138(Nominal mode) 92(Rapid scan mode)
ELAG_HRV		Integer	138(Nominal mode) 92(Rapid scan mode)
LLAG_OTHER	Tracking line/column increment (to be applied with all other AMVs) (This value is dependent of the time distance between satellite slots)	Integer	46(Nominal mode) 30(Rapid scan mode)
ELAG_OTHER		Integer	46(Nominal mode) 30(Rapid scan mode)
USE_SUBPIXELTRACKING	Flag to decide if Subpixel tracking is to be used (when positive)	Integer	1

Keyword	*Description*	*Type*	*Default Value(s)*
Detailed tracer parameters			
CDET	It defines if a detailed set of tracers is required. The range can be equal to the initial scale (ALL) or only a subset of the initial region. When the range is smaller, the keywords LIN_D, NUML_D, ELE_D and NUME_D cannot be empty. Possible values: ALL: The range for the search of detailed tracers is the same as the basic scale. RANGE: Processes only a regional subset. <empty>: Detailed tracer search is not required.	Chain of characters	<empty>
LIN_D	Initial line/column of the region subset considered for detailed tracers. Possible values: - <empty> when CDET = ALL / empty - <A line/column number included in processing region> when CDET = RANGE	Integer	<empty>
ELE_D		Integer	<empty>
NUML_D	Number of lines/columns of the region subset considered for detailed tracers. Possible values: - <empty> when CDET = ALL / empty - <A number of lines/columns included in processing region> when CDET = RANGE	Integer	<empty>
NUME_D		Integer	<empty>
NWP parameters			
MIN_NWP_FOR_CALCULATION	Minimum number of NWP levels needed to consider NWP profile	Integer	4
NWP_PARAM01	NWP parameters requested by HRW algorithm: * NWP_PT: Temperature at several levels (K) * NWP_UW: Wind velocity at several levels, u component (m/s) * NWP_VW: Wind velocity at several levels, v component (m/s) * NWP_ST: Surface temperature (K) * NWP_GEOP: Geopotential height at several levels (m) Sampling rate used: 1 Interpolation method used: NEIGHBOUR	Chain of characters	NWP_PT,1,NEIGHBOUR
NWP_PARAM02		Chain of characters	NWP_UW,1,NEIGHBOUR
NWP_PARAM03		Chain of characters	NWP_VW,1,NEIGHBOUR
NWP_PARAM04		Chain of characters	NWP_ST,1,NEIGHBOUR
NWP_PARAM05		Chain of characters	NWP_GEOP,1,NEIGHBOUR

Table 26: HRW Model Configuration File Description

Two different reference Model Configuration Files have been included in the SAFNWC/MSG package, for their use with 'Nominal scan mode' (safnwc_pge09.cfm) and with 'Rapid scan mode' (safnwc_pge09_rss.cfm).

Users must edit the model configuration file, and modify the value of the keyword "BUFR_CENTRE_OR" with their corresponding meteorological centre code. Different centre codes can be found at BUFR Common Code Table C-1.

4.2.4.7 ASII PGE10 Model Configuration File

The model configuration file for the PGE10 is separated into two parts. The first section contains three parameters that can be set by the users. The entries in this part of the model configuration file are as follows:

Keyword	Description	Type	Possible Value(s)
NO_ASII__AMV_ONLY	Decide whether the ASII computations should be suppressed (choice of "YES" is appropriate if AMVs are the only desired output)	chain of characters	YES or NO
OUTPUT_IR_AMV	Decides whether there should be an explicit IR AMV output	chain of characters	YES or NO
OUTPUT_WV_AMV	Decides whether there should be an explicit WV AMV output	chain of characters	YES or NO

Table 27: ASII Model Configuration File Description (Part I)

Then, starting with the entry PGE_ID, the rest of the model configuration file is constituted by a section that should be touched only by the responsible for development/maintenance of PGE10, which at present is ZAMG. The content of this part of the file is schematically described by:

Keyword	Description	Type	Possible Value(s)
PGE_ID	PGE identification.	chain of characters	PGE10
<IR10.8 *or* WV6.2>.<Offset *or* Factor>	Parameters describing the linear relation between brightness temperature and internally used pixel values	float	any
<Group>.<Parameter>	Empirical parameters of pattern recognition modules of PGE10	integer or float	fixed integer or floating-point values (prescribed by developing/maintaining institution)

Table 28: ASII Model Configuration File Description (Part II)

4.2.4.8 RDT PGE11 Model Configuration File

The format of the Model Configuration File for the PGE11 is as follows:

Keyword	Description	Type	Possible Value(s)
PGE_ID	Identifier of the PGE11	chain of characters	PGE11
SEV_BANDS	SEVIRI bands to be used by the PGE algorithms	chain of characters	VIS06, IR87,IR120, WV62,WV73,IR108
NWP_PARAM01	Surface Pressure	Chain of characters	NWP_SP 1 BILIN
NWP_PARAM02	Temperature at 2m	Chain of characters	NWP_2T 1 BILIN
NWP_PARAM03	Dew point temp. at 2m	Chain of characters	NWP_2D 1 BILIN
NWP_PARAM04	Geopotential at surface	Chain of characters	NWP_SGEOP 1 BILIN
NWP_PARAM05	Temperature at various pressure levels	Chain of characters	NWP_PT 1 BILIN
NWP_PARAM06	Relative humidity at various pressure levels	Chain of characters	NWP_PR 1 BILIN
NWP_PARAM07	Relative humidity at 2m	Chain of characters	NWP_2RH 1 BILIN
NWP_PARAM08	Altitude	Chain of characters	NWP_ALTM 1 BILIN
NWP_PARAM09	Tropopause Temperature	Chain of characters	NWP_TT 1 BILIN
-Tcold	cold temperature threshold when multiple thresholding, deg Celsius, **default –37**	integer	Recommended value is –70
-Twarm	warm temperature threshold when multiple thresholding deg Celsius , **default -37**	integer	Recommended value is 5
-delta_tempe	temperature step between Tcold and Twarm, deg **(default=2)**	integer	The CPU time needed by the PGE11 software is only slightly correlated with the chosen value, so we recommend to set the finest value 1.
-Amin	min detection area , km2, default 1\	float	Recommended value 60 (tuning value)
-Amax	Max detection area, km2, default 400000	float	Recommended value 200000 (tuning value)

Keyword	Description	Type	Possible Value(s)
-cmask	**0 (default)** or 1 if using CT product for masking non cloud pixels	integer	0 or 1
-ctype	**0 (default)** or 1 if processing CT cell's attribute	integer	0 or 1
-ctth	**0 (default)** or 1 if adding top cloud attribute via CTTH product	integer	0 or 1
-crr	**0 (default)** or >=1 if adding rain rate attribute via CRR product	integer	0 or 1. A value >1 fixes the threshold (default 10mm/h) for considering significant rain rates and include the corresponding cell in BUFR version 3 output
-crrdiscri	**0 (default)** or >=1 if using rain rate attribute via CRR for forcing discrimination result	integer	0 or 1. A value >1 fixes the threshold (default 50mm/h) for considering relevant rain rate forcing convective characteristic
-WV62	0 or **1 (default)** if using WV6.2 channel (for the discrimination scheme and attributes)	integer	0 or 1
-WV73	0 or **1 (default)** if using WV7.3 channel into the discrimination scheme	integer	0 or 1
-IR87	0 or **1 (default)** if using IR8.7 into the discrimination scheme	integer	0 or 1
-IR120	0 or **1 (default)** if using IR12.0 into the discrimination scheme	integer	0 or 1
-VIS06	0 or 1 (**default**) if using VIS0.6 (for overshoot attributes)	integer	0 or 1
-otd	0 or 1 (**default**) for overshooting top detection	integer	0 or 1
-lightning	associating lightning flashes with cells: **0 (default)** : no association -1 : association without forcing discrimination result N : association with forcing discrimination result from Nth impact	integer	Default 0
-dt_light_before	time step (sec) before image date for associating lightning flashes, **default 15*60**	integer	Recommended value 600 if lightning managed
-dt_light_after	time step (sec) after image date for associating lightning flashes, **default 15*60**	integer	Recommended value 300 600 if lightning managed
-fichier_foudre	absolute filename of lightning data	Chain of characters	
-tolerance_foudre	maximum distance (nb. sat pixel) between cell and flash to associate both, **default 0**	integer	Default 0
-precocite	**0 (default)** or 1 if linear models of warmest categories shorter depth have to be activated	integer	0 or 1
-bufr	production of BUFR file, **versions 1(default)** , ±2(historical included), ±3(additional information and level), or ±4 (overshoot list and attributes).	integer	1 , ±2 , ±3, ±4 Negative value limits the output to significant cells in BUFR, but with additional historical information when needed
-bufr_histo	length in mn of historical content, bufr version 2 , -3 or -4 **(default=180)**	integer	Recommended value 180 if version 2 , -3 or -4 of BUFR
-info	Informations on program running **default 0** (no information)	integer	0 or 1
-debug	More precise Informations on program running **default 0** (no information)\	inteer	0 or 1
-contours_region	To process full contour of the domain (1) or only 4 characteristic points **(default 0)**	integer	0 or 1 Set the value at 0 to reduce cpu time of RDT process and size of BUFR
- max_nbpile	**Default =25000** Technical parameter used to manage the pile of local computer (equal to the	float	This value could be decreased depending of local computer capacity.

Keyword	Description	Type	Possible Value(s)
	maximum size in pixel of a cell).		
- num_prod	if necessary or requested, allows to encode a production number in BUFR	integer	User dependent (default 6881 if –bufr 3 or 4)
- lignes_sortie	Activation of trajectory file production by selecting the kind of information to be included included	character	Recommended TISLHX if trajectory file requested
- freq_traj	Frequency of production of in trajectory file 0 = monthly **1 = daily (default)** 2 = each slot	integer	0, 1 or 2 if trajectory file requested

Table 29: RDT Model Configuration File Description

4.2.4.9 SPhR PGE13 Model Configuration File

The SPhR model configuration file contains all the coefficients and some constant values required by PGE13 product. The model configuration file must be placed at the $SAFNWC/config directory.

The file contains the following information:

Keyword	Description	Type	Default Value(s)
PGE_ID	Identifier of the PGE	Chain of characters	PGE13
NWP_EXEC_MODE	Defines the type of NWP to be used by the PGE: **P**: NWP in Pressure levels **HYB**: NWP in Hybrid levels	Chain of characters	P
SEV_BANDS	SEVIRI channels to be used by PGE13	Chain of characters	WV62 WV73 IR87 IR108 IR120 IR134
BAND_CLOUDY	Band used when the pixel is cloudy	Integer	9
LSIZE_FOR	Number of lines of the Field Of Regard	Integer	3
CSIZE_FOR	Number of columns of the Field Of Regard	Integer	3
ZENITH_THRESHOLD	Sun zenith angle threshold	Integer	70
FOR_METHOD	Method to apply in the Field Of Regard box to obtain the pixel to process (1: Mean; 2: Max Temperature)	Integer	1
POST_PROC_METHOD	Method to apply during post processing	Integer	1
MAX_ITERATIONS	Max number of physical retrieval iterations (no bigger than 3)	Integer	3
MAX_RESIDUAL	Residual value to stop the iteration	Float	1.0
BT_RMS_THRESHOLD	BT threshold to run the physical retrieval	Float	2.0
RCF_FILENAME	Regression coefficients file	Chain of characters	MSG/Version/NWP dependent
PA_2_HPA	Conversion factor from Pa to hPa	Float	0.01
EOF_WV_FILENAME	Empirical ortogonal functions (Water Vapour)	Chain of characters	MSG/Version/NWP dependent
EOF_T_FILENAME	Empirical ortogonal functions (Temperature)	Chain of characters	MSG/Version/NWP dependent

Keyword	Description	Type	Default Value(s)
INV_COV_MATRIX	B^{-1} Auxiliary Filename (Inverse Covariance Matrix)	Chain of characters	`MSG/Version/NWP dependent`
BT_GLOBAL_SCALE_*bb*	Brightness temperature BIAS correction scale for each band *bb*: *where bb=05,06,07,09,10 and 11 (bands WV6.2, WV7.3, IR8.7, IR10.8, IR12.0, IR13.4)*	Float	`MSG/Version/NWP dependent`
BT_GLOBAL_OFFSET_*bb*	Brightness temperature BIAS correction offset for each band *bb*: *where bb=05,06,07,09,10 and 11 (bands WV6.2, WV7.3, IR8.7, IR10.8, IR12.0, IR13.4)*	Float	`MSG/Version/NWP dependent`
SAVE_PROF	Flag to store background and retrieved profile in the $SAFNWC/tmp directory (0: FALSE 1: TRUE bin 3D 2: TRUE at clear FOR)	Integer	`0`
SAVE_END_PROF	Flag to store the final retrieved profile in the $SAFNWC/tmp directory (0: FALSE 1: TRUE)	Integer	`0`

NWP_PARAM01(*)	Temperature at pressure levels	Chain of characters	`NWP_PT`
			`1`
			`BILIN`

NWP_PARAM02(*)	Humidity at pressure levels	Chain of characters	`NWP_PR`
			`1`
			`BILIN`

NWP_PARAM03(*)	Surface Temperature	Chain of characters	`NWP_ST`
			`1`
			`BILIN`

NWP_PARAM04(*)	Surface Pressure	Chain of characters	`NWP_SP`
			`1`
			`BILIN`

(*) Keywords not required if NWP_EXEC_MODE=HYB

Table 30: SPhR Model Configuration File Description

4.2.4.10 PPh PGE14 Model Configuration File

The PPh model configuration file contains all the coefficients and some constant values required by PGE14 product. The model configuration file must be placed at the $SAFNWC/config directory.

The file contains the following information:

Keyword	Decription	Type	Default Value(s)
PGE_ID	Identifier of the PGE	Chain of characters	`PGE14`
SEV_BANDS	SEVIRI channels to be used by PGE14	Chain of characters	`IR108`
APPLY_PARALLAX_CORR	Indicator whether the Parallax correction should be applied or not (1 yes: 0 no)	Integer	`1`

Keyword	Decription	Type	Default Value(s)
OUTPUT_PRODUCT	Defines the PPh products to be produced **ALL**: Both PCPh and CRPH are produced **PCPh**: Only PCPH produc is generated **PCPh**: Only PCPH produc is generated **CRPh**: Only CRPH produc is generated	Chain of characters	ALL
APPLY_LIGHTNING	Flag to use or not the lightning data 0: NO 1: YES	Integer	0
LIGHTNING_DELTA_TIME	Time interval to consider lightning data files	Integer	15
RAIN_LIGHTNING_RATE_1	Rain rate parameter 1 linked to observed lightning	Real	2.3
RAIN_LIGHTNING_RATE_2	Rain rate parameter 2 linked to observed lightning	Real	0.75
RAIN_LIGHTNING_RATE_3	Rain rate parameter 3 linked to observed lightning	Real	0.25
RAIN_LIGHTNING_RATE_4	Rain rate parameter 4 linked to observed lightning	Real	0.1
COEFF_N_LIGHTNING_A	Coefficient “A” to be applied during the lightning adjustment function	Real	0.45
COEFF_N_LIGHTNING_B	Coefficient “B” to be applied during the lightning adjustment function	Real	0.7
NWP_PARAM01	Parameter : Temperature at pressure levels sampling rate : (=segment size) interpolation method.	Chain of characters	NWP_PT 1 BILIN
NWP_PARAM02	Parameter : Geopotential at pressure levels sampling rate : (=segment size) interpolation method.	Chain of characters	NWP_GEOP 1 BILIN

Table 31: PPh Model Configuration File description

4.2.5 PGE Configuration File

The PGE configuration files are intended to be used by the Task Manager in order to know the dependency between PGEs. There will be one single file per PGE, which should be set once at the installation of the application, as it defines a generic properties of the PGE.

Those files will be placed into the $SAFNWC/config directory, with the following naming convention: *safnwc_pgexx.cfp*, xx being the number of the PGE the file corresponds to.

The contents of the PGE configuration file are described in Table .

Keyword	Description	Type	Possible Value(s)
PGE_ID	Identifier of the PGE described in this file; must be the same number as the one in the filename.	chain of characters	Any of: PGE01, PGE02, PGE03, PGE04, PGE05, PGE06, PGE07, PGE08, PGE09, PGE10, PGE11, PGE13, PGE14
DEPENDENCY(1)	Identifier of the PGEs which processing is mandatory for the execution of the described PGE.	chain of characters	Any combination of: PGE01, PGE02, PGE03, PGE04, PGE05, PGE09, PGE10, PGE11, PGE13, PGE14 or NONE
OPT_DEPENDENCY(2)	Identifier of the PGEs which processing is optional for the execution of the described PGE.	chain of characters	Any combination of: PGE01, PGE02, PGE03, PGE04, PGE05, PGE09, PGE10, PGE11, PGE13, PGE14 or NONE
PRIORITY	Execution priority associated to the described PGE. In case the PGE priority has been set in the SORT_KEY of the System Configuration file, the PGEs execution will be done in the priority order set in this parameter, but taking into account the dependency between them.	integer	From >0 (1 most prioritary)
MAXRUNTIME	Maximum time allocated to the execution of the PGE in seconds.	integer	Value in seconds

(1): Mandatory PGEs will be included automatically by the TM into the processing chain even if they have not been requested in the Run Configuration File (see Table)

(2): Dependent PGEs are not automatically included into the processing chain if they have not been specifically requested in the Run Configuration File

Table 32: PGE Configuration File Contents

4.2.6 Satellite Configuration File

The nominal satellite parameters are provided within the Satellite Configuration File. This file contains known information about the satellite before the arrival of the data. Usually this information is referred to the nominal satellite position and will not be valid if other position must be used. Therefore pre-processing based in this data must take into account this limitation. The factors used to compute the reflectance and brightness temperatures will be also stored in this file.

Only the Satellite Configuration File named as `sat_conf_file` is used by the SAFNWC/MSG application. This file must be available in the `$SAFNWC/config` directory and by default, it contains the MSG-3 satellite information.

In the current distribution, following files are available in the `$SAFNWWC/config` directory:

- `sat_conf_file.msg1` (Configuration file for MSG-1)
- `sat_conf_file.msg1.rss` (Conf. file for MSG-1 in Rapid Scan Mode))
- `sat_conf_file.msg2` (Configuration file for MSG-1)
- `sat_conf_file.msg2.rss` (Conf. file for MSG-3 in Rapid Scan Mode))
- `sat_conf_file.msg3` (Configuration file for MSG-3)

The user should copy/rename them as `"sat_conf_file"` depending on what satellite images wants to be processed.

The contents of these files are described in Table

Keyword	Description	Type	Default Value(s)
MSG	Satellite Identification	String	'MSG1' for MSG1 'MSG2' for MSG2 'MSG3' for MSG3
MODE	Scanning mode : -	String	'___' for nominal mode 'RSS' for rapid scan 'PAR' for parallel scanning
Instrumental Coefficients			
PROD_DIRECTION	Origin of the scan N or S (Nominal: S)	Character	S
PIXEL_SAMPLING	Pixel sampling to calculate the increment in a georeferenced system	Real	83.843333333333
PIXEL_SAMPLING_HRV	Pixel sampling for HRV to calculate the increment in a georeferenced system	Real	27.947777777778
SCAN_DELTA_T	Difference between real scanning time for first line (full SEVIRI frame) and the nominal time (in seconds).	Real	-464.2 for Rapid Scan configuration 0.0 for Nominal configuration
SCAN_RATE	Time used to scan one line (in milliseconds). Any real Value. Nominal value is 100 rpm equivalent to 600 ms per scan	Real	600.0
NB_COLS	Number of columns in the full resolution of visible coordinates	Integer	3712
NB_LINES	Number of lines in the full resolution of visible coordinates	Integer	3712
NB_COLS_HRV	Number of columns in the full resolution of HRV image	Integer	5568
NB_LINES_HRV	Number of lines in the full resolution of HRV image	Integer	11136
REPEATING_CYCLE	Time (in seconds) between two consecutive slots	Integer	900 for Nominal configuration 300 for Rapid Scan configuration
VIS_IR_RESOLUTION	Image resolution for visible and infra-red channels	Integer	3
HRV_RESOLUTION	Image resolution for HRV channel	Integer	1
SPIN_RATE	Spin rate of the MSG imaging satellite at the start of a repeat cycle in milliseconds	Integer	600
NB_SEV_DETECTORS	Number of detectors of the instrument for non-HRV channel.	Integer	3
NB_HRV_DETECTORS	Number of detectors of the instrument for HRV channel	Integer	9
Transmission Coefficients			
SEGMENT_LINES	Number of lines in HRIT segments	Integer	464
Navigation Coefficients [8]			
SAT_REF_LONG	Subsatellite nominal longitude in degrees	Real	0.0 for MSG3 9.5 for MSG2 3.5 for MSG1
PRJ_REF_LONG	Nominal centre longitude of projection of the SEVIRI images	Real	0.0 for Nominal configuration 9.5 for Rapid Scan configuration
REF_ALT	Subsatellite altitude in kilometers	Real	35785.831
CFAC	Column scaling factor (deg^{-1})	Integer	-13642337
LFAC	Line scaling factor (deg^{-1})	Integer	-13642337
COFF	Column scaling offset	Integer	1856
LOFF	Line scaling offset	Integer	1856
CFAC_HRV	Column scaling factor HRV resolution (deg^{-1})	Integer	-40927010

[8] Navigation coefficients in the satellite configuration file are expressed according the SEVIRI frame, as defined in Appendix E of [RD..]

LFAC_HRV	Line scaling factor HRV resolution (deg^{-1})	Integer	-40927010
COFF_HRV	Column scaling offset HRV resolution	Integer	5566
LOFF_HRV	Line scaling offset for HRV resolution	Integer	5566
Radiometric Coefficients			
ii_F	Solar constant weighted for band ii. (ii=HRVIS, VIS06, VIS08 and IR16) This factor is used to compute the reflectances from the SEVIRI 1.5 radiances.	Real	Provided by EUMETSAT. Depend on satellite
Vc_ii	Central wavenumber (in cm^{-1}) for band ii (ii=IR39, WV62, WV73, IR87, IR97, IR108, IR120, IR134). This value is used to convert from effective radiances to brightness temperature.	Real	Provided by EUMETSAT. Depend on satellite
L0_ii	Nominal Centre wavelength (μm) for band ii (ii=HRVIS, VIS06, VIS08, IR16, IR39, WV62, WV73, IR87, IR97, IR108, IR120, IR134). This value is used to convert from spectral radiances to brightness temperature.	Double	Provided by EUMETSAT. Depend on satellite
F0_ii	Nominal Centre frequency (s^{-1}) for band ii (ii=HRVIS, VIS06, VIS08, IR16, IR39, WV62, WV73, IR87, IR97, IR108, IR120, IR134).	Double	Provided by EUMETSAT. Depend on satellite
BW_ii	Nominal Band Width (μm) for band ii (ii=HRVIS, VIS06, VIS08, IR16, IR39, WV62, WV73, IR87, IR97, IR108, IR120, IR134).	Double	Provided by EUMETSAT. Depend on satellite
FW_ii	Nominal Band Width (s^{-1}) for band ii (ii=HRVIS, VIS06, VIS08, IR16, IR39, WV62, WV73, IR87, IR97, IR108, IR120, IR134).	Double	Provided by EUMETSAT. Depend on satellite
ALPHA_ii	Constant value used to convert from radiances to brightness temperature. (ii=IR39, WV62, WV73, IR87, IR97, IR108, IR120, IR134)	Real	Provided by EUMETSAT. Depend on satellite
BETA_ii	Constant value used to convert from radiances to brightness temperature. (ii=IR39, WV62, WV73, IR87, IR97, IR108, IR120, IR134)	Real	Provided by EUMETSAT. Depend on satellite
Brightness Temperature Polynomial Fit Coefficients			
BTFIT_A_ii	Constant value for brightness temperature calculated from spectral radiances. (ii=IR39, WV62, WV73, IR87, IR97, IR108, IR120, IR134)	Real	Provided by EUMETSAT. Depend on satellite
BTFIT_B_ii	Constant value for brightness temperature calculated from spectral radiances. (ii=IR39, WV62, WV73, IR87, IR97, IR108, IR120, IR134)	Real	Provided by EUMETSAT. Depend on satellite
BTFIT_C_ii	Constant value for brightness temperature calculated from spectral radiances. (ii=IR39, WV62, WV73, IR87, IR97, IR108, IR120, IR134)	Real	Provided by EUMETSAT. Depend on satellite

Table 33: Satellite Configuration File Contents

4.2.7 NWP Configuration File

The NWP parameters defined in the Model Configuration File use keywords to define the parameter and the type of level (optionally the level can also be defined). The NWP Configuration File associates each keyword to its corresponding GRIB table number. It also contains all the available levels of each type of level for the current NWP model.

The file will be placed at the $SAFNWC/config directory and it will have a fixed name "nwp_conf_file" without any suffix. As the name is fixed it is not necessary to store it in any configuration file. All the SAFNWC components (TM, PGEs, NWCLIB) can access it.

The file will contain the following information:

Keyword	Description	Type	Possible Value(s)
NWP_MFTERM[9]	The maximum allowed forecast term, in hours	Integer	Integer > 0 Default value: 24
NWP_YYYYY	The number corresponding in the GRIB tables to the parameter, type of level and level codes for the selected GRIB field (identified by keyword YYYYY) Special values: Field not provided in the GRIB: -99 -99 -99 Level code in pressure level parameters: 999	Integer[3]	It depends on the local GRIB tables
AV_PRESSURE_LEVELS	List of available pressure levels in the current NWP model. Levels must be provided ordered from high to low pressure levels	List of integers separated by comas	It depends on the NWP model

4.2.8 Palette Definition Files

Palette definition files are located in $SAFNWC/config directory named as:

`safnwc_pge`***`nn_NN`***`-PALETTE.pal`

where :

nn : is the PGE number

NN : is the palette number

These files define RGB palettes to be appended to SAFNWC/MSG image-like products in HDF5 format. See [AD.5.] for details in output product format.

Palette files are plain ASCII files with the following format:

[9] WARNING: The use of forecasted meteorological fields from a forecast with more than 24 hours can produce quality-degraded products

```
# Palette for PGEXX, PPPP parameter
# --------------------------------
#
# Number of different count values:
n
#
# Palette definition:
#
# Count    R       G      B
# -------------------------
      0     r1     g1     b1
      1     r2     g2     b2
      .     .      .      .
      .     .      .      .
      .     .      .      .
      .     .      .      .
     (n-1)  r(n-1) g(n-1) b(n-1)
```

where

n is the number of colours defined in the palette file

rx, *gx*, *bx* are the Red, Green and Blue values (0-255) for color index *x*

4.3 I3: AUXILIARY DATA FILES

The auxiliary data files are (quasi) static files that may either contain topography data, tables of climatologies of average or historical data provided for the whole globe or the SEVIRI area of interest, or specific coefficients tables used by particular algorithms.

Next table lists the required quasi-static data needed by each PGE.

Auxiliary data sets	PGE									
	01	02	03	04	05	09	10	11	13	14
	CMa	CT	CTTH	PC	CRR	HRW	ASII	RDT	SPhR	PPh
SST climatology[11]	✓	✓	✓							
Mean 0.6 µm reflect. clim.[12]	✓	✓	✓							
Land/sea/coast atlas	✓	✓	✓		✓				✓	
Elevation atlas	✓	✓	✓		✓					
Radiance bias correction matrices										
Climatological temperature & cloud height profiles					✓					✓
Climatological temperature & pressure atmospheric profiles						✓				
Surface reference minimum and maximum topographies						✷				
Specific LUT/Tables[13]					✓					
Neural Network Topology										
PGE04 product/algorithm configuration[14]				✓						
Files mapping precip. index to probabilities (10).				✓						
Tables for atmospheric corrections			✓							
Tables for threshold computation	✓	✓								
Monthly integrated WV content Climatology	✓	✓								
Monthly clim. Of air temperature (1000, 850, 700, 500 hPa)	✓	✓								
Rttov coefficient file			✓						✓	
BUFR descriptor file						✓	✓	✓		
RDT discrimination coefficients								✓		
Regression coefficients									✓	
Empirical ortogonal matrices									✓	
Brightness Temp. bias correction parameters									✓	

Table 34: Auxiliary data sets required

4.3.1 General Information file for PGE01-02-03

This file contains information that are required by PGE01, PGE02 and PGE03 and are mainly satellite/radiometer dependent.

Naming convention : Gen_Info_*satid*.asc

The file contains a header defining a set of variables according to “KEYWORD value” syntax, with the following keywords:

SAT_ID	PLATFORM_RTTOV	SATELLITE_RTTOV
INSTRUMENT_RTTOV	KUNIT_RTTOV	VIS_UTC_START

[11] Monthly minimum Sea Surface Temperature Climatology
[12] Monthly mean 0.6 µm atmospheric-corrected reflectances climatology (land)
[13] PGE05:
- Saturation vapour data (table and polynomial coefficients).

[14] Probability and coefficient tables.

MINTEMP_USE38 SATUR38 ZENSOL_NIGHT_LIMIT
ZENSOL_DAY_LIMIT ZENSOL_DAY_LIMIT_NORM ZENSOL_TWILIGHT_LIMIT_MAX
ZENSOL_TWILIGHT_LIMIT_MIN ZENSOL_TWILIGHT_MARGIN

A end of header mark:

EOH (END_OF_HEADER)

Followed by several tabulated sets structured as:

TAB_TYPE comprehensive_table_name

..... data.....

.....data.....

EOT

With the following *comprehensive_table_names*:

callrttov ir_noise_btref ir_noise_tempref nuc
beta alpha vis_wavelength vis_time_cor_offset
vis_time_cor_gain sst_coefs vis_snr

4.3.2 Climatology, Topography and Sea/Land data for PGE01-02-03

Climatological and atlas data used by PGE01, PGE02, PGE03 are available under import/Aux_data/disk directory. The fields are in GEOS<+000.0> and GEOS<+009.5> projection pre-computed using default navigation parameters provided by EUMETSAT. Monthly climatological information is available one file per month.

Each file contains a structure defined as:

U_Short N_cols,

U_short N_lines,

A pointer on N_cols x N_lines (Type of Data)

Auxiliary data content	Type of data	Unit	Size (bytes)
Elevation atlas	float	Metres (-9999 for sea and space) offset 10000	55117824
Landsea	U_Byte	0 space, 2 sea, 3 land	13780992
Landseacoast	U_Byte	0 space, 1 coast, 2 sea, 3 land	13780992
SST climatology	float	Kelvin (26915 when ice) -9999 for land and space	55117824
Mean 0.6 µm reflect. Clim.	float	% (2000 when no data)	55117824
Monthly integrated WV Clim.	float	KG/M2 (-9999 FOR SPACE)	55117824
Monthly Air Temperature Clim.	float	Kelvin (-9999 for space)	55117824

Table 35: Climatology, Topography and Sea/Land data for PGE01-02-03

4.3.3 Climatology profiles for PGE05 (CRR) and PGE14 (PPh)

Climatological profile (Climat_profiles.dat), are used to estimate the cloud height for the parallax correction: This file is in ASCII format and contains a structure defined as follow :

Keyword	Type	Value (s)
NUM_CLIMATE_PROFILES	S_int	9
NUM_CLIMATE_VARIABLES	S_int	2
NUM_CLIMATE_LEVELS	S_int	4
NUM_CLIMATE_LATITUDES	S_int	5
CLIMATE_LATITUDE_DELTA	S_int	15
Temperature profiles		
T15	S_int* NUM_CLIMATE_LEVELS	2997 2871 2870 1932
T30JAN	S_int* NUM_CLIMATE_LEVELS	2872 2812 2162 2032
T30JUL	S_int* NUM_CLIMATE_LEVELS	3012 2937 2662 2032
T45JAN	S_int* NUM_CLIMATE_LEVELS	2722 2617 2197 2082
T45JUL	S_int* NUM_CLIMATE_LEVELS	2942 2852 2612 2157
T60JAN	S_int* NUM_CLIMATE_LEVELS	2593 2592 2512 2172
T60JUL	S_int* NUM_CLIMATE_LEVELS	2872 2602 2252 2251
T75JAN	S_int* NUM_CLIMATE_LEVELS	2538 2537 2152 2137
T75JUL	S_int* NUM_CLIMATE_LEVELS	2782 2717 2262 2261
Geopotential profiles		
Z15	S_int* NUM_CLIMATE_LEVELS	0000 2300 2500 16500
Z30JAN	S_int* NUM_CLIMATE_LEVELS	0000 2000 12000 14000
Z30JUL	S_int* NUM_CLIMATE_LEVELS	0000 1000 6000 15000
Z45JAN	S_int* NUM_CLIMATE_LEVELS	0000 3000 10000 12600
Z45JUL	S_int* NUM_CLIMATE_LEVELS	0000 2000 6000 13000
Z60JAN	S_int* NUM_CLIMATE_LEVELS	0000 1000 3500 8500
Z60JUL	S_int* NUM_CLIMATE_LEVELS	0000 5000 10000 10100
Z75JAN	S_int* NUM_CLIMATE_LEVELS	0000 1500 8500 11500
Z75JUL	S_int* NUM_CLIMATE_LEVELS	0000 2500 9500 9600

Table 36: Climatology data for PGE05

Auxiliary data used by PGEs are available under the import/Aux_data/PGE*xx* directories (xx=05 and 14).

4.3.4 Saturation Vapour tables for PGE05 (CRR)

Saturation Vapour Table (SatVapTable.dat) is used to compute the saturation vapour pressure over water for the humidity correction. The file is in ASCII format and contains a structure defined as follow:

Keyword	Type	Value (s)
NELEMS	S_int	31
STEP	S_int	5
<none>	Float_32	0.648554685769663908E-01
<none>	Float_32	0.378319512256073479E-01
<none>	Float_32	0.222444934288790197E-01
<none>	Float_32	0.131828928424683120E-01
<none>	Float_32	0.787402077141244848E-02
<none>	Float_32	0.473973049488473318E-02
<none>	Float_32	0.287512035504357928E-02
<none>	Float_32	0.175743037675810294E-02
<none>	Float_32	0.108241739518850975E-02
<none>	Float_32	0.671708939185605941E-03
<none>	Float_32	0.419964702632039404E-03
<none>	Float_32	0.264524363863469876E-03
<none>	Float_32	0.167847963736813220E-03
<none>	Float_32	0.107285397631620379E-03

Keyword	Type	Value (s)
<none>	Float_32	0.690742634496135612E-04
<none>	Float_32	0.447940489768084267E-04
<none>	Float_32	0.292570419563937303E-04
<none>	Float_32	0.192452912634994161E-04
<none>	Float_32	0.127491372410747951E-04
<none>	Float_32	0.850507010275505138E-05
<none>	Float_32	0.571340025334971129E-05
<none>	Float_32	0.386465029673876238E-05
<none>	Float_32	0.263210971965005286E-05
<none>	Float_32	0.180491072930570428E-05
<none>	Float_32	0.124607850555816049E-05
<none>	Float_32	0.866070571346870824E-06
<none>	Float_32	0.605982217668895538E-06
<none>	Float_32	0.426821197943242768E-06
<none>	Float_32	0.302616508514379476E-06
<none>	Float_32	0.215963854234913987E-06
<none>	Float_32	0.155128954578336869E-06

Table 37: Saturation Vapour Table data for PGE05

Saturation Vapour Polynomial Coefficients (SatVapPolynomialCoeff.dat) is used to compute the saturation vapour pressure over water for the humidity correction. This file is in ASCII format and contains a structure defined as follow (next table is an example)

Keyword	Type	Value (s)
NCOEFF	S_int	8
<none>	Float_32	6.1104546
<none>	Float_32	0.4442351
<none>	Float_32	1.4302099e-2
<none>	Float_32	2.6454708e-4
<none>	Float_32	3.0357098e-6
<none>	Float_32	2.0972268e-8
<none>	Float_32	6.04487594e-11
<none>	Float_32	-1.469687e-13

Table 38: Saturation Vapour Coefficients data for PGE05

These data are available under the import/Aux_data/PGE05

4.3.5 Climatology profile for PGE09 (HRW)

Auxiliary data used by PGE09 are available under the import/Aux_data/PGE09 directory.

Climatological profile (Climat_profiles.dat): This file is in ASCII format and contains a structure defined as follow :

Keyword	Type	Value (s)
NUM_CLIMATE_PROFILES	S_int	9
NUM_CLIMATE_VARIABLES	S_int	3
NUM_CLIMATE_LEVELS	S_int	18
NUM_CLIMATE_LATITUDES	S_int	5
CLIMATE_LATITUDE_DELTA	S_int	15
STD_ATM_MAX_PRESSURE	S_int	1013
Temperature profile		
T15	S_int* NUM_CLIMATE_LEVELS	2997 2942 2888 2824 2732 2639 2547 2454 2362 2269 2177 2084 2056 2028 2001 1973 1946 1932
T30JAN	S_int* NUM_CLIMATE_LEVELS	2872 2842 2812 2741 2669 2598 2526 2455 2384 2312 2241 2169 2162 2097 2032 2032 2032 2032

Keyword	Type	Value (s)
T30JUL	S_int* NUM_CLIMATE_LEVELS	3012 2937 2882 2827 2772 2717 2662 2563 2464 2366 2267 2168 2133 2100 2066 2032 2032 2032
T45JAN	S_int* NUM_CLIMATE_LEVELS	2722 2687 2652 2617 2557 2497 2437 2377 2317 2257 2197 2113 2093 2082 2082 2082 2082 2082
T45JUL	S_int* NUM_CLIMATE_LEVELS	2942 2897 2852 2792 2732 2672 2612 2529 2445 2362 2278 2195 2175 2157 2157 2157 2157 2157
T60JAN	S_int* NUM_CLIMATE_LEVELS	2593 2592 2560 2528 2479 2411 2343 2275 2207 2172 2172 2172 2172 2172 2172 2172 2172 2172
T60JUL	S_int* NUM_CLIMATE_LEVELS	2872 2818 2764 2710 2656 2602 2532 2462 2392 2322 2252 2251 2251 2251 2251 2251 2251 2251
T75JAN	S_int* NUM_CLIMATE_LEVELS	2538 2538 2510 2455 2400 2345 2290 2235 2180 2145 2129 2113 2113 2113 2113 2113 2113 2113
T75JUL	S_int* NUM_CLIMATE_LEVELS	2782 2756 2730 2685 2620 2555 2490 2425 2360 2295 2261 2261 2261 2261 2261 2261 2261 2261
Geopotential profile		
Z15	S_int* NUM_CLIMATE_LEVELS	0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170
Z30JAN	S_int* NUM_CLIMATE_LEVELS	0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170
Z30JUL	S_int* NUM_CLIMATE_LEVELS	0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170
Z45JAN	S_int* NUM_CLIMATE_LEVELS	0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170
Z45JUL	S_int* NUM_CLIMATE_LEVELS	0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170
Z60JAN	S_int* NUM_CLIMATE_LEVELS	0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170
Z60JUL	S_int* NUM_CLIMATE_LEVELS	0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170
Z75JAN	S_int* NUM_CLIMATE_LEVELS	0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170
Z75JUL	S_int* NUM_CLIMATE_LEVELS	0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170
Pressure profile		
P15	S_int* NUM_CLIMATE_LEVELS	1013 905 807 711 626 550 481 420 365 316 273 235 202 173 149 128 111 96
P30JUL	S_int* NUM_CLIMATE_LEVELS	1013 904 804 710 625 549 481 421 366 317 274 236 203 172 145 121 101 83
P30JAN	S_int* NUM_CLIMATE_LEVELS	1013 905 804 713 631 558 493 431 375 325 281 243 209 180 155 133 115 99
P45JAN	S_int* NUM_CLIMATE_LEVELS	1018 900 792 694 609 533 465 404 349 300 257 220 188 160 137 117 101 86
P45JUL	S_int* NUM_CLIMATE_LEVELS	1013 903 802 710 627 553 487 426 371 322 278 240 207 179 155 134 117 101
P60JAN	S_int* NUM_CLIMATE_LEVELS	1013 888 780 681 594 517 449 388 332 283 239 201 168 139 115 93 76 61
P60JUL	S_int* NUM_CLIMATE_LEVELS	1010 897 794 700 616 541 474 414 359 311 269 232 200 172 149 129 113 99
P75JAN	S_int* NUM_CLIMATE_LEVELS	1013 887 776 680 593 515 445 382 325 276 236 201 170 145 124 105 91 79

Keyword	Type	Value (s)
P75JUL	S_int* NUM_CLIMATE_LEVELS	1012 896 791 696 611 536 468 407 353 304 261 223 191 163 139 119 102 87
Latitude gaps for profile interpolation[15]		
<none>	S_int* 4	0 0 0 0
<none>	S_int* 4	0 0 1 2
<none>	S_int* 4	1 2 3 4
<none>	S_int* 4	3 4 5 6
<none>	S_int* 4	5 6 7 8

Table 39: Climatology data for PGE09

4.3.6 Topography and Sea/Land mask for PGE05, PGE09 and PGE13

Several PGEs use information about the altitude of the processing pixels and the discrimination between land and sea pixels. These data are submitted in auxiliary files remapped to the appropriate projection in VIS_IR resolution.

The Global Topography Data (GTOPO30) has been used as data source. GTOPO30 is a global digital elevation model (DEM) with a horizontal grid spacing of 30 arc seconds (approximately 1 kilometre). GTOPO30 was derived from several raster and vector sources of topographic information. See details in http://edcdaac.usgs.gov/gtopo30/gtopo30.html. Figure presents the source data in a regular grid (30 arcsec). These data are remapped to standard SEVIRI projectionat VIS_IR resolution. As result, two raw files are generated (0º and 9.5ºE) with the following characteristics:

Name: Topo_±*ddd.dd*.dat

where ±*ddd.dd* is the image projection degrees (+ towards East, - towards West)

Location: $SAFNWC/import/Aux_data/TOPO

Contents: Elevation (in meters) for land pixels, or

-9999 for pixels over sea, and

-9998 for space pixels

Indexing: topo[line_index][col_index]

Format: Signed Short Integer (2 byte)

Size: 3712 * 3712 * 2 bytes/data = 27. 557.888 bytes

Important Note: If the navigation parameters (COFF, LOFF, CFAC, LFAC in the Satellite Configuration File section 4.2.6) change, the Topographic files containing the remapped data must be re-computed. A Topographic File has only sense together with the navigation parameters used to remap original data.

[15] *Array indices needed to perform the profile interpolation. Each row is referred to a latitude (X15, X30, X45, X60 or X75) and each column is referred to the vector position to be used in the interpolation (X15, X30JUL, X30JAN, X45JAN, X45 JUL, X60JAN, X60JUL, X75JAN, X75JUL)*

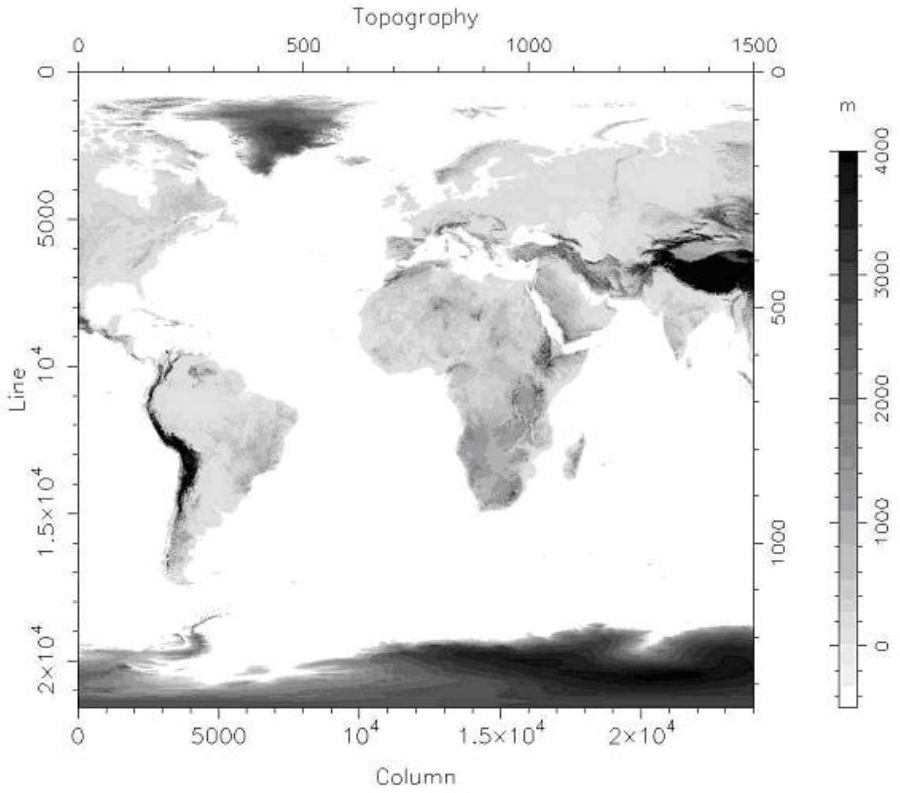


Figure 4: GTOPO30 topographic data (regular grid)

In the SAFNWC/MSG v2013 two different matrices are provided: one re-projected to 0º for normal SEVIRI images and other one re-projected to 9.5ºE for Rapid Scan images. If a new image projection has to be used, (depending on the PRJ_REF_LONG parameter in the satellite configuration file) a new topographic matrix have to be created.

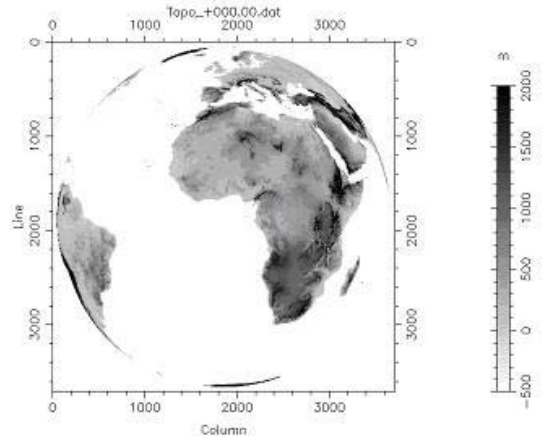


Figure 5: Topographic data (0º projection)

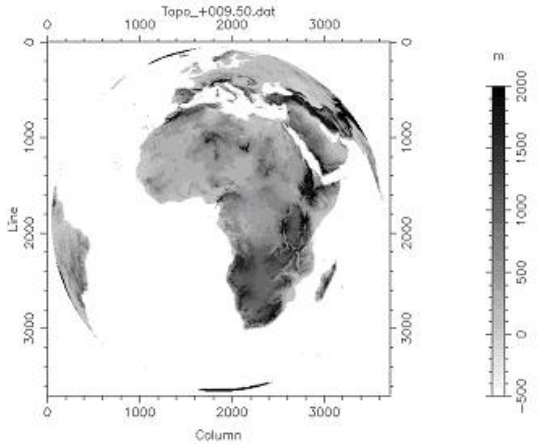


Figure 6: Topographic data (9.5ºE projection)

4.3.7 Minimum and Maximum surface matrices for PGE09

PGE09 provides an option to filter winds after an orographic correction. This correction is performed using two static matrices containing a minimum (Sfc_min.dat) and maximum (Sfc_max.dat) surface levels calculated from the topography matrix described in previous section.

The generation of the matrices has been performed defining a window with 1 degree interval (corners ± 1/2 latitude/longitude from the central pixel) which is used for all pixels of the topographic matrix.

For each window, the values storing the 3% and 97% of the distribution of topographic data are computed and stored in the appropriate matrix.

Name: Sfc_min.dat

Location: $SAFNWC/import/Aux_data/PGE09

Contents: Minimum surface level (3%) of the topography matrix

Indexing: sfc_min[line_index][col_index]

Format: Signed Short Integer (2 byte)

Size: 3712 * 3712 * 2 bytes/data = 27. 557.888 bytes

Name: Sfc_max.dat

Location: $SAFNWC/import/Aux_data/PGE09

Contents: Maximum surface level (97%) of the topography matrix

Indexing: sfc_min[line_index][col_index]

Format: Signed Short Integer (2 byte)

Size: 3712 * 3712 * 2 bytes/data = 27. 557.888 bytes

Important Note: If the topography matrix change, the surface matrices must be re-computed

4.3.8 Threshold computation tables for PGE01

For PGE01 Thres_Cma_Vis_msg1.asc and Thres_Cma_Ir_msg1.asc are ASCII files containing tables required to compute thresholds related respectively to Visible and IR bands. These files are satellite dependent. They are made of a header defining variables using KEYWORD value syntax, followed by table initialisation.

4.3.8.1 General format of the IR thresholds files:

Naming convention : Thres_Cma_Ir_*satid*.asc

Structure of the file:

A header containing the definition of a set of variables according to “KEYWORD value” syntax, with the following keywords:

SAT_ID	SEC_NB	SEC_DEB
SEC_STEP	SEC_MAXVAL	W_NB
W_DEB	W_STEP	W_MAXVAL
MAX_NOISE	HEIGHT_MOUNTAIN	VEG_MAX_ALB
DES_MIN_ALB	USED6S_MAXSOL	USED6S_MAXSAT
SSTDELTA	SSTDELTA_NIGHT_SATZENMIN	SSTDELTA_NIGHT_SATZENMAX
SSTDELTA_NIGHT_OFFSET	SSTDELTA_NIGHT_COASTOFFSET	SSTDELTA_NIGHT_SLOPE
	TEMPCOLD	TEMPWARM
SSTCOLD	SSTWARM	SOLNIGHT
SOLHIGH	VISMAXCOSOL_SEA	VISMAXCOSOL_LAND
VISMAXCOSOL_SNOW	VISMAXCOSOL	T108_LAND_ADDOFFSET
T108_LANDINVERSION_ADDOFFSET	T108_APPT108T120_MAX	VIS_COAST_ADDOFFSET_SSCOSOL
VIS06_SEA_OFFSET_SSCOSOL	VIS08_SEA_OFFSET_SSCOSOL	IR16_SEA_OFFSET_SSCOSOL
VIS06_LAND_OFFSET_SSCOSOL	IR16_SNOW_OFFSET_SSCOSOL	VIS_COAST_ADDOFFSET
VIS06_SEA_OFFSET	VIS08_SEA_OFFSET	IR16_SEA_OFFSET
VIS06_LAND_OFFSET	IR16_SNOW_OFFSET	VIS06_LAND_CORR_OFFSET

VIS06_LAND_CORR_SLOPE_SCATANG
VIS06_LAND_CORR_OFFSET_SCATANG
VART108_SEA_MAX
VARVIS06_SEA_MAX
VARVIS08_SEA_MAX
VARVIS08_SEA_SLOPE
VART108T38_NIGHT_SEA_MAX
VART108T38_DAY_SEA_MAX
VART108_DAY_LAND_MAX
VART108_NIGHT_LAND_MAX
VART108T38_NIGHT_LAND_MAX
VART108T38_DAY_LAND_MAX
DT108DVIS06_LAND_COEF1
DVIS06_LAND_COEF1
DT108DVIS06_LAND_COEF2
DVIS06_LAND_COEF2
DT108DVIS06_LAND_COEF3
DVIS06_LAND_COEF3
T87T108_LOWCLOUDS_MIN_OFFSET
T87T108_LOWCLOUDS_MIN_SLOPE
T108T120_LOWCLOUDS_MIN
VIS06_CLOUDGLINT_MIN
T38T108_CLOUDGLINT_MIN
VIS06T38T108_GLINT_SLOPE
T38T108_COXMUNCK_SLOPE
T38T108_COXMUNCK_OFFSET
T38T108_COXMUNCK_OFFSET_FACTOR
T38T108_CLIMALB_SLOPE
T38T108_CLIMALB_OFFSET
T38T108_LAND_ADDOFFSET
T38T108_LAND_CORR_SLOPE_SCATANG
T38T108_LAND_CORR_OFFSET_SCATANG
T108T38_LAND_CORR_T108T134_MIN
T108T38_LAND_CORR_T108T134_MAX
T108T38_LAND_CORR_T108T134_OFFSET
T108T38_LAND_CORR_T108T134_SLOPE
T108T38_VEGET_FORAFRICA_OFFSET
SSTCLIM_ICE_MAX
T38T108_SNOW_MAX
VIS08_SNOW_MIN
T108T120_SNOW_MAX
T108_SNOW_MAX
T108_SNOW_OFFSET
SOLZEN_SNOW_MAX16
SOLZEN_SNOW_MAX38
VIS06_SNOW_MAXMIN_OFFSET
VIS06_SNOW_MAXMIN_SLOPE_SCATANG
VIS06_SNOW_MAXMIN_OFFSET_SCATANG
NDVI0616_SNOW_MIN_OFFSET
NDVI0616_SNOW_MIN_SLOPE_SCATANG
NDVI0616_SNOW_MIN_OFFSET_SCATANG
NDVI0616_ICE_MIN_OFFSET
NDVI0616_ICE_MIN_SLOPE_SCATANG
NDVI0616_ICE_MIN_OFFSET_SCATANG
T108T120_BB_MAX
VART108_BB_MAX
SOLZEN_SANDLAND_MAX
T108_SANDLAND_MIN
T108_SANDLAND_MAX
VIS06_SANDLAND_OFFSETMIN
VIS06_SANDLAND_OFFSETMAX
T38T108_SANDLAND_MIN1
T120T108_SANDLAND_MIN1
T38T108_SANDLAND_MIN2
T120T108_SANDLAND_MIN2
VARVIS06_SANDLAND_MAX
VART108_SANDLAND_MAX
T87T108_SANDLAND_ADDOFFSET
T120T108_SANDLAND_ADDOFFSET
T120T108_SANDLAND_MINROUGH
T87T108_SANDLAND_MINROUGH
VIS06VIS16_SANDLAND_MAXROUGH
T87T108_SANDLAND_MINACCURATE
T87T108_SANDLAND_OFFSETACCURATE_VIS06
T87T108_SANDLAND_SLOPEACCURATE_VIS06
VIS06VIS16_SANDLAND_MAXACCURATE
SOLZEN_SANDSEA_MAX
T108_SANDSEA_OFFSET
T108_SANDSEA_SLOPE
VIS06_SANDSEA_OFFSETMIN
VIS06_SANDSEA_OFFSETMAX
VIS06_SANDSEA_OFFSETTHICK
VARVIS06_SANDSEA_MAX
VART108_SANDSEA_MAX
T87T108_SANDSEA_ADDOFFSET
VART108T39_SANDSEA_NIGHT_MAX
T87T108_SANDSEA_NIGHT_MINROUGH_SLOPE
VART108_SANDSEA_NIGHT_MAX
T87T108_SANDSEA_NIGHT_MINROUGH
T120T108_SANDSEA_NIGHT_MINROUGH
SDI_SLOPE_T39T87_SANDSEA_NIGHT
SDI_SLOPE_T108T120_SANDSEA_NIGHT
SDI_OFFSET_SANDSEA_NIGHT
SDI_THRES_SANDSEA_NIGHT
SDI_THRES_ACCURATE_SANDSEA_NIGHT
T108_SANDSEA_OFFSET_ACCURATE
VART108T39_SANDSEA_DAY_MAX
VART108T39_SANDSEA_DAY_MAXCUMULUS
VARVIS08_SANDSEA_MAX
VARVIS06_SANDSEA_MAXTHICK
T87T108_SANDSEA_DAY_MINROUGH_SLOPE
VIS16VIS06_SANDSEA_MINROUGH
VIS16VIS06_SANDSEA_MINACCURATE
VIS16_SANDSEA_OFFSETROUGH
VIS16_SANDSEA_OFFSETACCURATE
VIS06_SANDSEA_OFFSETMAXACCURATE
T87T108_SANDSEA_DAY_MINTHICK
T87T108_SANDSEA_DAY_MINACCURATE
T87T108_SANDSEA_DAY_MINROUGH
T120T108_SANDSEA_DAY_MINROUGH
SAND_SEA_16USE
VARVIS16_SANDSEA_OFFSET
VARVIS16_SANDSEA_SLOPE
VARVIS16VARVIS06_SANDSEA_RATIO
VARVIS16VARVIS06_SANDSEA_MINVARVIS06
T87T108_SANDSEA_NIGHT_MINVERYROUGH
T120T108_SANDSEA_ADDOFFSET
T108_VOLCANSEA_OFFSETCOLD
T108_VOLCANLAND_OFFSETCOLD
T108_VOLCANLAND_OFFSETWARM
T108_VOLCAN_VERYCOLD
VIS06_VOLCANSEA_BRIGHT
VIS06_VOLCANLAND_BRIGHT
T120T108_VOLCAN_SLOPESATSEC
T120T108_VOLCANSEA_OFFSETBRIGHT
T120T108_VOLCANLAND_OFFSETBRIGHT
T120T108_VOLCANSEA_ADDOFFSETVERYCOLD
T120T108_VOLCANLAND_ADDOFFSETVERYCOLD
R06R16_VOLCAN_ABSRELAXED
T38T108_VOLCANLANDDAY_RELAXED
T120T108_VOLCANLAND_ADDOFFSET
T120T108_VOLCANSEA_ADDOFFSET
T120T108_VOLCANLAND_ROUGHTHR
T120T108_VOLCANSEA_ROUGHTHR
R06R16_VOLCAN_ABSMAX
R06_VOLCANSEA_ADDOFFSET
T38T108_VOLCANLANDDAY_ROUGHTHR
T38T108_VOLCANSEADAY_ROUGHTHR
T108T38_AFRICAN_OFFSET
T108T38_EUROPEAN_CORR_SECLIM
TAB_T108T38_EUROPEAN_CORR_COEF
T87T108_VEG_MINSEC
T87T108_VEG_SLOPE
T87T108_VEG_OFFSET
T108_AFRICAN_NIGHTOFFSET
T108T120_AFRICAN_OFFSET
LAND_TSURF_INTERP_FLAG
LAND_TSURF_INTERP_MIDDAY_FACTOR
LAND_TSURF_INTERP_RISET_FACTOR
DELTA_TIME_SUNRISE
DELTA_TIME_SUNSET
ROUJEAN_ALB_VEG
ROUJEAN_ALB_DES
TAB_ROUJEAN_K0_VEG
TAB_ROUJEAN_K1_VEG
TAB_ROUJEAN_K2_VEG
TAB_ROUJEAN_K0_DES
TAB_ROUJEAN_K1_DES
TAB_ROUJEAN_K2_DES
COX_MAX_REFLECT
MAXALBREF_FORSPHERIC
MINALB_ARID
EUROPEAN_LOWCLOUD_LIMIT_NORTH
EUROPEAN_LOWCLOUD_LIMIT_SOUTH
EUROPEAN_LOWCLOUD_LIMIT_EAST
EUROPEAN_LOWCLOUD_LIMIT_WEST
AFRICAN_LOWCLOUD_LIMIT_NORTH
AFRICAN_LOWCLOUD_LIMIT_SOUTH
AFRICAN_LOWCLOUD_LIMIT_EAST
AFRICAN_LOWCLOUD_LIMIT_WEST
DT_STRONG_THERMAL_INVERSION
THR_T108T120_ADD_QUAL
THR_T87T108_ADD_QUAL
THR_T108T38NIGHT_ADD_QUAL
THR_T120T38NIGHT_ADD_QUAL
THR_T87T38NIGHT_ADD_QUAL
THR_T38T108NIGHT_ADD_QUAL
THR_SST_ADD_QUAL
THR_T108LAND_ADD_QUAL
THR_VIS06_POU_QUAL
THR_VIS08_POU_QUAL
THR_VIS16_POU_QUAL
THR_VAR_POU_QUAL
THR_T38T108SNOW_POU_QUAL
THR_VIS16SNOW_POU_QUAL
SSTCLIM_T108_OFFSET
SSTCLIM_FROZEN
TOO_LONG_DAY_DURATION
TOO_SHORT_DAY_DURATION
T108TEMPORAL_RISE
T108TEMPORAL_SET
T108TEMPORAL_MEAN
T108TEMPORAL_SEA
TIME_DIFF_TWILIGHT
TIME_DIFF_TEMPORAL
TWIL_TEMP_THR_T108T120
TWIL_TEMP_THR_T108T87
TWIL_TEMP_THR_T108
MAX_PC_TEMPORAL_DETECTION
TAB_VIS_LI_CORR_COEF
MAX_EXPANSION_SIZE
TWIL_MIN_SEED_SIZE
TWIL_MIN_SEED_SMALL_SIZE
TWIL_MIN_SEED_LARGE_SIZE
TWIL_SEED_VIS_FACTOR
TWIL_SEED_T108_WARM_OFFSET
TWIL_SEED_T108_WARM_OFFSET
TWIL_SEED_T108_COLD_OFFSET
MAX_VISCOR_LARGE_GROUP_DESERT
MAX_VISCOR_SMALL_GROUP_DESERT
MAX_VISCOR_LARGE_GROUP
MAX_VISCOR_SMALL_GROUP
MAX_DAZ_FOR_EXPANSION
MAX_SCAT_FOR_EXPANSION
SMALL_WATER_GROUP_SIZE
MIN_LOCAL_DIFFT108_SEA
HRV_LAND_SLOPE
HRV_LAND_OFFSET
HRV_LAND_CORR_SLOPE_SCATANG
HRV_LAND_CORR_OFFSET_SCATANG
HRV_HIGH_SUNZEN_THR
HRV_STDEV_LAND_GROSSTHR
HRV_STDEV_LAND_THR
HRV_STDEV_SEA_THR
HRV_MIN_LAND_THR
HRV_MEANRATIO_LAND_CHANGE_THR
HRV_MEANRATIO_SEA_CHANGE_THR
HRV_CV_LAND_CHANGE_THR
HRV_STDEV_LAND_CHANGE_THR
HRV_CV_SEA_CHANGE_THR
HRV_CV_SEA_THR
HRV_CV_LAND_THR
HRV_SEV_BOX_SIZE
HRV_NB_SEVBOX_MIN
NB_IRTAB
THR_VAR_NOISE_VIS_FACTOR
THR_VAR_NOISE_IR_FACTOR
MAX_SNOW_HITS_PER_DAY
VERYCOLD_NWP_TSURF_LAND
COLD_NWP_TSURF_LAND
COLD_T108_MIN_RANGE1_LAND
COLD_T108_MIN_RANGE2_LAND
COLD_T108_MIN_RANGE3_LAND
T38T108_RANGE1_LAND_SLOPE
T38T108_RANGE1_LAND_OFFSET
T38T108_RANGE2_LAND_SLOPE
T38T108_RANGE2_LAND_OFFSET
T87T108_COLDEST_LAND_OFFSET
T73T108_CLEARSKY_INVERSION_LAND
COLDEST_T108_MIN_LAND_OFFSET
COLDEST_T108_MIN_LAND_SLOPE

A end of header mark:

EOH (END_OF_HEADER) ######

Followed by *nb_irtab* tabulated sets structured as:

TAB_TYPE comprehensive_table_name

..... data.....

.....data.....

EOT

With the following *comprehensive_table_name*s:

t108t120_tab_land_day	t108t120_tab_land_night	t108t120_tab_land_cold
t120t108_tab_land_day	t120t108_tab_land_night	t120t108_tab_land_cold
t87t108_tab_land_day_veg	t87t108_tab_land_night_veg	t87t108_tab_land_day_des
t87t108_tab_land_night_des	t108t87_tab_land_day_veg	t108t87_tab_land_night_veg
t108t87_tab_land_day_des	t108t87_tab_land_night_des	t108t38_tab_land_warm_veg
t108t38_tab_land_cold_veg	t108t38_tab_land_warm_des	t108t38_tab_land_cold_des
t87t38_tab_land_warm_veg	t87t38_tab_land_cold_veg	t87t38_tab_land_warm_des
t87t38_tab_land_cold_des	t38t108_tab_land_warm_veg	t38t108_tab_land_cold_veg
t38t108_tab_land_warm_des	t38t108_tab_land_cold_des	tst108_tab_land_day_veg
tst108_tab_land_night_veg	tst108_tab_land_day_des	tst108_tab_land_night_des
t108t120_tab_sea_warm	t108t120_tab_sea_cold	t120t108_tab_sea_warm
t120t108_tab_sea_cold	t87t108_tab_sea_warm	t87t108_tab_sea_cold
t108t87_tab_sea_warm	t108t87_tab_sea_cold	t108t38_tab_sea_warm
t108t38_tab_sea_cold	t120t38_tab_sea_warm	t120t38_tab_sea_cold
t38t108_tab_sea_warm	t38t108_tab_sea_cold	tst108_tab_sea_warm
tst108_tab_sea_cold		

4.3.8.2 General format of the VIS thresholds files:

Naming convention : Thres_CmaVis_*satid*.asc

Structure of the file:

A header containing the definition of a set of variables according to "KEYWORD value" syntax, with the following keywords:

SAT_ID	H2O_MIN	H2O_MAX
H2O_STEP	H2O_NB	OXY_MIN
OXY_MAX	OXY_STEP	OXY_NB
DIFFTRANS_MIN	DIFFTRANS_MAX	DIFFTRANS_STEP
DIFFTRANS_NB	DIFFEMISSAT_MIN	DIFFEMISSAT_MAX
DIFFEMISSAT_STEP	DIFFEMISSAT_NB	DIFFEMISSOL_MIN
DIFFEMISSOL_MAX	DIFFEMISSOL_STEP	DIFFEMISSOL_NB
DIFFEMISAZI_MIN	DIFFEMISAZI_MAX	DIFFEMISAZI_STEP
DIFFEMISAZI_NB	LEROUXSAT_MIN	LEROUXSAT_MAX
LEROUXSAT_STEP	LEROUXSAT_NB	LEROUXSOL_MIN
LEROUXSOL_MAX	LEROUXSOL_STEP	LEROUXSOL_NB
LEROUXAZI_MIN	LEROUXAZI_MAX	LEROUXAZI_STEP
LEROUXAZI_NB	NB_VISTAB	

A end of header mark:

EOH (END_OF_HEADER) ######

Followed by *nb_visrtab* tabulated sets structured as:

TAB_TYPE *comprehensive_table_name*

..... data.....

.....data.....

EOT

With the following *comprehensive_table_name*s:

h2o_tab	oxy_tab	o3_tab	difftrans_land_tab
difftrans_sea_tab	diffemis_land_tab	diffemis_sea_tab	diffsphere_land
diffsphere_sea	leroux_tab		

4.3.9 Threshold computation tables for PGE02

For PGE02 Thres_Ct_msg1.asc is an ASCII file containing tables used to compute thresholds. This file is satellite dependent and made of a header defining variables using KEYWORD value syntax, followed by table initialisation.

The general format of the Ct thresholds files is the following:

Naming convention : Thres_Ct_*satid*.asc

Structure of the file:

A header containing the definition of a set of variables according to “KEYWORD value” syntax, with the following keywords:

SAT_ID	SEC_NB	SEC_DEB
SEC_STEP	SEC_MAXVAL	W_NB
W_DEB	W_STEP	W_MAXVAL
MAXT108_LO_C850	MAXT108_LO_C700	MAXT108_LO_OFFSET
MAXT108_ME_C850	MAXT108_ME_C700	MAXT108_ME_OFFSET
MAXT108_HI_C700	MAXT108_HI_C500	MAXT108_HI_OFFSET
MAXT108_VH_C500	MAXT108_VH_CTROPO	MAXT108_VH_OFFSET
HIGH_ALB_REFERENCE	LAND_ALB_DEFAULT	SEA_ALB_DEFAULT
LAND_ALB_SAFETY_OFFSET	SEA_MIN_LOW_VIS06	LAND_MIN_LOW_VIS06
SEA_LOGVAR_TUNIN	LAND_LOGVAR_TUNING	T108T120_OPAQ_MAX
T38T108_SEMI_MAX	T38T108_LOW_DELTA	LANDMIN_TEMP_REFERENCE
SEA_MIN_TEMP_REFERENCE	OFFTHR_VH_HI	MINTEMP_USE87_CT
MAXHEIGHT_INVERSION	OFFTHR_ME_LOW_INVERSION_OFFSET	OFFTHR_ME_LOW_INVERSION_MAX
OFFTHR_ME_LOW_INVERSION_SLOPE	OFFTHR_ME_LOW_INVERSION_MAX00	OFFTHR_ME_LOW_INVERSION_MAX0
OFFTHR_ME_LOW_INVERSION_MAX1	OFFTHR_ME_LOW_INVERSION_MAX2	DT_STRONG_THERMAL_INVERSION
DT1_STRONG_THERMAL_INVERSION	DT2_STRONG_THERMAL_INVERSION	T87T108_MEDCLOUDS_MIN_OFFSET0
T87T108_MEDCLOUDS_MIN_SLOPE0	T87T108_MEDCLOUDS_MIN_OFFSET1	T87T108_MEDCLOUDS_MIN_SLOPE1
T87T108_MEDCLOUDS_MIN_OFFSET2	T87T108_MEDCLOUDS_MIN_SLOPE2	T87T108_MEDCLOUDS_MAX_ALB
	T108T73_SLOPE_LOWCLOUD	DELTA_T108T120OPAQUE
T108T73_OFFSET_LOWCLOUD	T38T108_THIN_HIGH_FACTOR	T38T108_THIN_LOW_FACTOR
DT_STRONG_THERMAL_INVERSION	THR_T108T120_ADD_QUAL	THR_T38T108_ADD_QUAL
THR_T87T108_ADD_QUAL	THR_VAR_POU_QUAL	THR_VIS_POU_QUAL
MINALB_ARID	LOGVAR_REFL_DIV	LOGVAR_T108_FACT
LOGVAR_VIS_FACT	THINNEST_CLOUD_FACT	SOLZEN_REFF_MAX
SEA_WHITESKY06	SEA_WHITESKY16	SEA_WHITESKY39
LAND_WHITESKY39	SOLAR_IRRADIANCE_39	T87T108_WATERCLOUDS_MAX_OFFSET
T87T108_WATERCLOUDS_MAX_SLOPE	T87T108_ICECLOUDS_MIN_OFFSET	T87T108_ICECLOUDS_MIN_SLOPE
T87T108_WATERCLOUDS_MAX_ROUGH	TEMP_ICE_CERTAIN	TEMP_WATER_CERTAIN
REFFSIZE_ICE_CERTAIN	REFFSIZE_WATER_CERTAIN	REFFSIZE_ICE_PROBABLE
REFFSIZE_WATER_MAXOUTPUT	REFFSIZE_WATER_MINOUTPUT	REFFSIZE_ICE_MINOUTPUT
RATIO_DEFFREFF_ICE	NBMODELABOVE_ICE_CERTAIN	NBMODELABOVE_ICE_PROBABLE
SOLIR39_MPEF	R39R134_RATIO	MAX_R39
MIN_R39	PW_T108T120	PW_SAT
MAX_WVABS39	NB_IRTAB	

An end of header mark:

EOH (END_OF_HEADER) ######

Followed by tabulated sets structured as:

TAB_TYPE comprehensive_table_name

..... data.....

.....data.....

EOT

With the following *comprehensive_table_name*s:

manalo_a	manalo_b	manalo_g	manalo_k
manalo_om	manalo_c2	manalo_c3	t108t120_tab_cld
t38t108_tab_cld	t87t108_tab_cld		

4.3.10 Atmospheric corrections tables for PGE03

It is an ASCII file containing tables used to compute atmospheric corrections. This file is satellite dependent and made of a header defining variables using KEYWORD value syntax, followed by tables initialisation.

Naming convention : TabCor_Ctth_*satid*.asc

Structure of the file:

A header containing the definition of a set of variables according to “KEYWORD value” syntax:

SAT_ID	SEC_NB	SEC_DEB
SEC_STEP	SEC_MAXVAL	T_NB
T_DEB	T_STEP	T_MAXVAL
EXTRAPOLATION_RTM_MIN_PRES		
MINDIFPRES_SURF_INVERS	SENSITIV_MINPRES	SENSITIV_NB_NOISE
MIN_CLOUDFREE_CLUSTER	MIN_OPAQ_CLUSTER	CFKERNEL_NB_RMS
CFKERNEL_NB_NOISE	RATIO_NB_NOISE	RATIO_MAX_COR_PERCENT
SMOOTHING_MINNB_FORAVG	SMOOTHING_SIZE_SEG	INTERCEPT_SIZE_SEG
INTERCEPT_R108_MINDIF	INTERCEPT_R108_GOODDIF	INTERCEPT_TROPO_R108_MINDIF
INTERCEPT_MINNB	INTERCEPT_GOODNB	INTERCEPT_TROPO_MINNB
INTERCEPT_MINREGCOEF	INTERCEPT_GOODREGCOEF	INTERCEPT_TROPO_MINREGCOEF
INTERCEPT_TROPO_AJUST_PRES		
INTERCEPT_AVERAGE_DIFPRES	INVERSION_DT_SAFETY	INVERSION_SUBSIDENTE_DT_SAFETY
INVERSION_SUBSIDENTE_PRES_LOOKTMIN	INVERSION_SUBSIDENTE_PRES_TMIN	INVERSION_SUBSIDENTE_PRES_HUMAX
INVERSION_SUBSIDENTE_PRES_HUMIN	INVERSION_SUBSIDENTE_HUMAX	
INVERSION_PRES_COEF1	INVERSION_PRES_COEF2	INVERSION_PRES_COEF3
INVERSION_PRES_COEF4	QUAL_OPAQ_MAXDT	
RTTOV_MAXZENSAT	DEFAULT_TROPO	PRESLEV_MAXDIF
LAND_EMISSIVITY	SUNGLINT_MIN_REFLECT	SUNGLINT_MAX_ZENSOL
COX_MAX_WINDSPEED	COX_MAX_REFLECT	NB_IRTAB

A end of header mark:

EOH (END_OF_HEADER) ######

Followed by tabulated sets structured as:

TAB_TYPE *comprehensive_table_name*

..... data.....

.....data.....

EOT

With the following *comprehensive_table_name*s:

min_slope min_slope_tropo max_curve_slope_separation t108climabs

4.3.11 PGE04 Product/Algorithm configuration file

This Product configuration file enables to configure the Precipitating cloud Algorithm and provides a simple interface for users which want to tune the PGE04 algorithm to local or seasonal conditions. The contents and format is explained in the file itself. Note that after each key word the parameters are read in from that line only (i.e. no carriage return as in the following listing):

```
########################################################################
# PGE04 Algorithm configuration
########################################################################
# IMPORTANT, EACH BLOCK START
# MUST BE SPECIFIED AT A SINGLE LINE
# AND EACH BLOCK END MUST BE AT A SINGLE LINE
#
# i.e.
# <BLOCK NAME>: <BLOCK ID> {
#     block specific data
# };
#
# IF IT IS DEFINED IN ANY OTHER WAY THE CONFIGURATION WILL NOT WORK!
#
# All files given reside in $SAFNWC/import/Aux_data/PGE04
#
########################################################################
# GLOBAL_PARAM: These are PGE04 static data that does not change depending
# on algorithm usage, etc.
#
# SUNZEN_ANGLE specifies when to use the daytime or nighttime
# algorithm. If the actual sun zenith angle is less than SUNZEN_ANGLE, the
# daytime algorithm will be used, otherwise the nighttime algorithm
# will be used. So if for example the night algorithm
# should always be used,  SUNZEN_ANGLE can be set to a negative value.
# It is not recommended (though formally possible) to use the day time
# algorithm beyond values of 80 degrees.
#
# PROBABILITY_THRESH: if the probability for "no rain" is lower or equal
# PROBABILITY_THRESH, the pixel will be processed as potentially raining,
# otherwise the probability of rain is set to zero for both class1 (light
to moderate
# precipitation) and class2 (heavy precipitation)
#
GLOBAL_PARAM: GLOBALS {
      SUNZEN_ANGLE:           80.0
      PROBABILITY_THRESH:     90
};

#
# Define the different algorithms to be used:
# The BLOCK ID has to be an integer between 0 and 255 to
# be valid, otherwise the result will be unpredicatable
# Each ALGORITHM block must define PROB_DAY and PROB_NIGHT,
# where each attribute points to a filename (including path) giving
# the Precipitation Index to likelihood mapping.
# It is also possible to expand environment variable into
# the path by using ${ENVIRONMENT_VARIABLE}.
```

```
# DAY_FORMULA_COEFF and NIGHT_FORMULA_COEFF: Five coefficients (float)
# expected by the current algorithms, for the computation of the
# Precipitation Index.
# Example:
#ALGORITHM: 0 {
#        PROB_DAY:               pge04_msg_PI_day_alg_0.dat
#        PROB_NIGHT:             pge04_msg_PI_night_alg_0.dat
#        DAY_FORMULA_COEFF:      50.0 0.322 -0.322 3.0 -2.42 -7.5 4.45
#                                 0.248 0.0 0.0 0.0
#        NIGHT_FORMULA_COEFF:    22.0 0.863 -0.863 0.0 -6.04 0.0 0.0 0.0
#                                 0.0 0.0 0.0
#};
# THE COEFFICIENTS, AS WELL AS THE CONTENT OF THE DATA FILES, SHOULD NOT
# BE CHANGED BY THE USER UNLESS OWN TUNING ACTIVITIES HAVE BEEN PERFORMED!
#
# Currently the algorithms are valid for the following cloud types:
# ALGORITHM0: derived for all precipitating cloud types (9-14,16-18)
# ALGORITHM1: derived for medium level clouds (CT 09,10)
# ALGORITHM2: derived for opaque high to very high clouds (CT 11-14)
# ALGORITHM3: derived for moderate to thick cirrus (CT 16,17)
# ALGORITHM3: derived for cirrus over lower clouds (CT 18)
# In the current implementation the Pi calculation is cloud type
# independent, whereas the mapping between PI and precipitation probability
# can either be configured as cloud type dependent or independent
# (algorithm0), as set in block CLOUDTYPE_DEFINITION.
ALGORITHM: 0 {
        PROB_DAY:               pge04_msg_PI_day_alg_0.dat
        PROB_NIGHT:             pge04_msg_PI_night_alg_0.dat
        DAY_FORMULA_COEFF:      130. -1.17841 0.193517 1.34862 -0.403661
                                3.2 1.21913 -1.14646 1.0137 -0.729214
                                0.482047
        NIGHT_FORMULA_COEFF:    130. -0.808931 -0.660192 -1.3209 0.0 0.0
                                0.0 0.0 1.56148 -0.146149 0.0};
ALGORITHM: 1 {
        PROB_DAY:               pge04_msg_PI_day_alg_1.dat
        PROB_NIGHT:             pge04_msg_PI_night_alg_1.dat
        DAY_FORMULA_COEFF:      130. -1.17841 0.193517 1.34862 -0.403661
                                3.2 1.21913 -1.14646 1.0137 -0.729214
                                0.482047
        NIGHT_FORMULA_COEFF:    130. -0.808931 -0.660192 -1.3209 0.0 0.0
                                0.0 0.0 1.56148 -0.146149 0.0};
ALGORITHM: 2 {
        PROB_DAY:               pge04_msg_PI_day_alg_2.dat
        PROB_NIGHT:             pge04_msg_PI_night_alg_2.dat
        DAY_FORMULA_COEFF:      130. -1.17841 0.193517 1.34862 -0.403661
                                3.2 1.21913 -1.14646 1.0137 -0.729214
                                0.482047
        NIGHT_FORMULA_COEFF:    130. -0.808931 -0.660192 -1.3209 0.0 0.0
                                0.0 0.0 1.56148 -0.146149 0.0};
ALGORITHM: 3 {
        PROB_DAY:               pge04_msg_PI_day_alg_3.dat
        PROB_NIGHT:             pge04_msg_PI_night_alg_3.dat
        DAY_FORMULA_COEFF:      130. -1.17841 0.193517 1.34862 -0.403661
                                3.2 1.21913 -1.14646 1.0137 -0.729214
                                0.482047
        NIGHT_FORMULA_COEFF:    130. -0.808931 -0.660192 -1.3209 0.0 0.0
                                0.0 0.0 1.56148 -0.146149 0.0};
ALGORITHM: 4 {
        PROB_DAY:               pge04_msg_PI_day_alg_4.dat
        PROB_NIGHT:             pge04_msg_PI_night_alg_4.dat
        DAY_FORMULA_COEFF:      130. -1.17841 0.193517 1.34862 -0.403661
                                3.2 1.21913 -1.14646 1.0137 -0.729214
                                0.482047
```

```
        NIGHT_FORMULA_COEFF:    130. -0.808931 -0.660192 -1.3209 0.0 0.0
                                0.0 0.0 1.56148 -0.146149 0.0};

# CLOUDTYPE_DEFINITION:Table defining what cloudtype values that are
# precipitating or not, and which algorithm to use.
#
#- First column is the cloudtype value, currently there are 21,
# but this table can be expanded with up to 255 different values.
#
#- Second column indicates whether the cloudtype is potentially
#  precipitating: 0 : probability for no rain 100% assigned apriori,
#  1: go through processing steps to determine probabilities
#
#- Third column indicates what algorithm number x should
# be used. The algorithmx must exist as a defined algorithm (see above)

CLOUDTYPE_DEFINITION: CLOUDTYPES {
0     0     0        # Not processed
1     0     0        # Cloud free land
2     0     0        # Cloud free sea
3     0     0        # Snow/Ice contaminated land
4     0     0        # Snow/Ice contaminated sea
5     0     0        # Very low cumiliform cloud
6     0     0        # Very low stratiform cloud
7     0     0        # Low cumiliform cloud
8     0     0        # Low stratiform cloud
9     1     1        # Medium level cumiliform cloud
10    1     1        # Medium level stratiform cloud
11    1     2        # High and opaque cumiliform cloud
12    1     2        # High and opaque stratiform cloud
13    1     2        # Very high and opaque cumiliform cloud
14    1     2        # Very high and opaque stratiform cloud
15    0     0        # High semi-transparent thin clouds
16    0     0        # High semi-transparent meanly thick clouds
17    1     3        # High semi-transparent thick clouds
18    1     4        # High semi-transparent above low or medium clouds
19    0     0        # Fractional clouds
20    0     0        # Undefined (Undefined by CMa)
};
```

4.3.12 Files mapping precipitation index to probability for PGE04

Depending on cloud type, PGE04 uses different algorithms. For each of the algorithms, data needed for mapping precipitation index to precipitation probability is supplied for the daytime and nighttime algorithm. Currently five different algorithms are defined, adding up to 10 files of the following format:

- Any number off comment lines starting with #
- Regular table, each row containing 4 integer values: PI, probability class 0, probability class 1,probability class2
- The total number of rows may not exceed 512

4.3.13 Orographyinformation tables for PGE10

This file is used by PGE10 to have at every MSG pixel the information whether a mountain chain prone to lee cloud formation is present or not. The name of the file is "mountains", it has a size of 13 778 944 bytes (3712 x 3712 entries, 1 byte per value (C-type *unsigned char*)), and is located in the directory $SAFNWC/import/Aux_data/PGE10.

4.3.14 Grid descriptor tables and projection information tables for PGE10

5 auxiliary data files are computed by PGE10 in case a new region configuration file is faced by it. These files are dumped in the directory $SAFNWC/import/Aux_data/PGE10. Their names start with the region coordinates (i.e. center pixel and region size) and bear individual extensions. To provide an example filename: C0486_2249_S0973_1562.DIM.

Specifics of the files: Most computations of PGE10 are done on a regular grid. The grid is described in two files with extensions ".DIM" and ".CRD". The original image is reprojected to cylindric projection: the transformation table for this process is held in a file with extension ".XY", the geographical coordinates of the reprojected images are stored in two files with extensions ".LON" and ".LAT", respectively.

The auxiliary files are binary dumps or ASCII files. A detailed description is not deemed necessary since they are produced automatically by PGE10 and the user is not allowed to modify them afterwards. Note, however, that the binary files should not be copied between different platforms because of byte order issues. It is strongly recommended to let PGE10 produce them locally in the first run of PGE10.

For the files described in this section, there is no mechanism in place to remove them automatically. If the need arises to clean the directory $SAFNWC/import/Aux_data/PGE10, it is risk-free to remove those files manually in the sense that all 5 files are automatically recomputed for a certain region configuration file if just one of them cannot be found.

4.3.15 Classification Reference Table for PGE10

PGE10 contains a classification of satellite image sectors on the basis of the evaluation of certain statistical parameters. Reference values of classes (the "centers of gravity" of the class) are given in the external file called "ZA_cluster_def". It is located in the directory $SAFNWC/import/Aux_data/PGE10.

The auxiliary file is an ASCII file. A detailed description of the content is not deemed necessary since the user is not allowed to modify the files.

4.3.16 Conceptual Model Classification Rules File for PGE10

PGE10 evaluates input parameters in order to arrive at conclusions about the presence of conceptual models. The evolution of the software was such that certain basic pattern recognition modules were programmed in a high-level language (C) which are callable through commands of an internal low-level language (so that developers dealing only with finding the proper pattern recognition sub-module for each conceptual model were relieved of actual programming tasks). The sequence of "low-level" commands is submitted to the PGE10 executable in form of ASCII files, which are interpreted by the main program such that the right subroutines are called. The external ASCII input files are provided in the directory $SAFNWC/import/Aux_data/PGE10 under the names "ZA_10_SAT.PRcommands" and "ZA_10_SATNWP.PRcommands". A detailed explanation of the "low-level language" or other features of the files is not deemed necessary since it is not foreseen that users modify the files.

4.3.17 BUFR descriptor file for PGE09

Six ASCII files containing the BUFR descriptors are provided in the $SAFNWC/import/Aux_data/PGE09 directory:

- B0000000000214012094.TXT; D0000000000214012094.TXT
- B0000000000214012097.TXT; D0000000000214012097.TXT

- B0000000000000012000.TXT; D0000000000000012000.TXT

These ASCII files are copied to the proper BUFR library directory during the PGE09 compilation in order to be used by this library.

The files are used as input by PGE09 in order to code HRW product following the BUFR format described in [AD.5.]. The user is not allowed to modify the files.

4.3.18 BUFR descriptor files for PGE10

PGE10 uses the following two standard BUFR descriptors files provided by the BUFREX library:

- B0000000000098002001.TXT
- D0000000000098002001.TXT

The files are used as input by PGE10 in order to code ASII products following the BUFR format described in ICD/3. The user is advised not to modify those files.

4.3.19 BUFR descriptors files for PGE11

The name of these files are “PGE11_BUFR_table”, “PGE11_BUFR_table_Nprod” , “PGE11_BUFR_table2” “PGE11_BUFR_table2_Nprod”, “PGE11_BUFR_table3” and “PGE11_BUFR_table4”. They are located in the directory $SAFNWC/import/Aux_data/PGE11.

Only one of these files is used as input by PGE11 in order to code RDT product following the BUFR format described in ICD/3. The choice is automatically made by the software depending ofthe values of the following arguments:

⇨ -bufr (tunable in the model configuration file), corresponding to the BUFR version of RDT. A value of 1 leads to choose the “PGE11_BUFR_table” file, a value of 2 or –2 leads to choose the “PGE11_BUFR_table2” file, and a value of 3 or -3 lead to “PGE11_BUFR_table3”, and 4 or -4 lead to “PGE11_BUFR_table4”.

⇨ -num_prod (tunable in the model configuration file), corresponding to a production number that user wants to affect to the processed RDT (this option is useful to distinguish products when RDT is processed on various regions and/or satellites). When activated, leads to choose the the “PGE11_BUFR_table_Nprod” or “PGE11_BUFR_table2_Nprod” depending on –bufr argument. Version ≥3 of BUFR directly includes this additional descriptor (tunable, default value for internal production number in MF - 6881).

The user is allowed to modify these files, essentially in order to change the default values of local descriptors and to choose his own local descriptors (the list of local descriptors used to code the RDT product is given in section 3.13 of ICD/3.

The format of these ASCII files is as follows:

The first four lines, composed of one KEYWORD and its value, have to be updated whenever necessary:

- Keyword “NUM_BUFR_EDITION” is the BUFR edition number.
- Keyword “NUM_BUFR_MAIN_TABLE” is the version number of master tables used.
- Keyword “NUM_BUFR_LOCAL_TABLES” is the version number of local tables used.
- Keyword “NUM_ORIGINATING_CENTRE” is the code of the originating centre (see code table 001033).

The lines following this sequence contains the definition of descriptors (one per line):

```
#
#N°  Descriptor  Scale  Ref.    Data bit    Unit          Significance
#                       value   width
#
```

The format of these lines is as follows (fields separated with blank characters):

- The number of the descriptor in the BUFR format of the RDT. These numbers are coherent with the table included in the BUFR format description for the RDT (see relevant section of ICD/3)
- The value of the descriptor (format FXY)
- The scale of this descriptor
- The reference value of this descriptor
- The data bit width of this descriptor
- The unit of this descriptor
- The significance of the descriptor (see also BUFR format of the RDT described in section 3.13 of ICD/3)

4.3.20 Parameter files for the discrimination of convective systems for PGE11

These files are used as input by PGE11 in order to perform an automated discrimination between convective and non-convective systems.

These files must not be modified by the user.

The name of these files are:

- ConvCoeffRegr: coefficients of logistic regression defined on MSG
- ConvCoeffRegr_mask: statistical models available for MSG data
- ConvCoeffRegr_5: coefficients of logistic regression defined on Rapid Scan
- ConvCoeffRegr_mask_5: statistical models available for Rapid Scan data

4.3.21 PGE13 Emissivity Atlases.

These emissivity atlases are used over land pixels to fix the emissivity at the pixel. There are one fix emissivity atlas for every SEVIRI channel and month.

These binary emissivity atlases cover the full SEVIRI frame (3712x3712) and were calculated from MODIS IREMIS dataset developed at CIMSS. Some information about the emissivity database can be obtained from the following link:

http://cimss.ssec.wisc.edu/iremis/ .

The database can be used for SEVIRI physical retrieval of profile using emissivities spectrally, temporally and spatially interpolated. A global database of monthly infrared land surface emissivity derived using input from the Moderate Resolution Imaging Spectroradiometer (MODIS) operational land surface emissivity product (MOD11). Emissivity is available globally at ten wavelengths (3.6, 4.3, 5.0, 5.8, 7.6, 8.3, 9.3, 10.8, 12.1, and 14.3 microns) with 0.05 degree spatial resolution (Seemann et al. 2007). Monthly emissivities have been integrated over the SEVIRI spectral response functions to match the SEVIRI bands. IREMIS database for 2012

datasets have been used (Eva Borbas personal communication). They have been remapped to SEVIRI projection at 0.0º W and 9.5ºE. It has been created an IDL procedure that makes bilinear interpolation when SEVIRI pixel is surrounded by four neighbours with value not equal to IREMIS missing code, and just the nearest neighbour in case SEVIRI pixel location hasn't four neighbours not equal to missing code in IREMIS dataset.

The emissivity matrices (for 0º W and 9.5º E) for each IR channel (from 6.2 to 13.4μm) are saved on 2 bytes integer binary files. Emissivity files are available for months, SEVIRI channels and re-projection longitude point. The files are named:

*global_emis_**month**_ **DDD.Dc**_**channel**.dat*

where

- *DDD.D* is the image projection degree. Example: 000.0 for 0º W.
- *c* is the image projection direction (w – west, e – east)
- *channel* is the name of the channel. Example: WV_62, IR108, etc.

Location: $SAFNWC/import/Aux_data/PGE13

Contents:

Emissivity atlas. At every pixel it contains emissivity multiplied by 1000 written as a short integer. Sea pixels are masked with -9999 values.

Indexing: [line_index][col_index]

Format: Short Integer (2 bytes)

Size: 3712 * 3712 * 2 bytes/data = 27557888 bytes

These emissivity atlases are on MSG full disk (3712x3712) in the default satellite projection at full IR resolution.

4.3.22 PGE13 Fist guess regression coefficients

This file contain the first guess regression coefficients. The name of the file appears in the PGE13 configuration file (keyword RCF_FILENAME).

There are different First guess regression coefficients for different MSG satellites.

The files are named:

RC_m***S***_SFOV_6ch_***mmmYYYY***.bin

where

- ***S*** is the Meteosat number (8 or 9) for which the coefficients included in the file has been adapted.
- ***mmmYYYY*** *is the date when the file was generated i.e. mmm = month YYYY = year*

The files contain regression coefficients for every zenith degree between 0º to 75º. More details can be found in the Algorithm Theoretical Basis Document for PGE13 "SEVIRI Physical Retrieval Product" (SPhR) v0.1 section "2.2.4 Use regression as first guess".

The file structure is:

Indexing: [zenith angle 0-based][output variable index][input variable]

Format: Float (4 bytes)

Size: (138 x 63 x 76) * 4 bytes = 2,642,976 bytes

The output variable index can be one of the follow:

- **001:043 the FG T profile in Kelvin.**
- **044:086 the FG log(q) where q is ppmv.**
- 087:129 the FG ozono profile in ppmv. (set to 0; not used)
- **130:130 is the FG Skin Temperature in Kelvin**
- 131:131 is the FG TPW. (set to 0; not used)
- 132:132 is the FG Total ozone. (set to 0; not used)
- 133:138 the FG emissivity values for SEVIRI channels (WV6.2, WV7.3, IR8.7, IR10.8, IR12.0 and IR13.4). (set to 0; not used)

Each one of the non linear regression has as independent variable (input) the 63 fields following:

- **01:06 SEVIRI BT: the bias corrected SEVIRI BT** in Kelvin for channels WV6.2, WV7.3, IR8.7, IR10.8, IR12.0 and IR13.4.
- **07:12 SEVIRI_BT*(SEVIRI_BT/250): the square bias corrected SEVIRI BT divided by 250** in Kelvin for channels WV6.2, WV7.3, IR8.7, IR10.8, IR12.0 and IR13.4.
- **13:13 $P_{surface}$: Pressure at surface from the NWP data.**
- **14:14 Percentage of land:** the percentage of land in pixels. Due to MSG resolution it has been chosen as 0.0 for sea pixels and 1.0 for land pixels.
- **15:15 latitude of pixel:** the percentage of land in pixels. Due to MSG resolution it has been chosen as 0.0 for sea pixels and 1.0 for land pixels.
- **16:43 T from background NWP for RTTOV pressure levels with pressure greater than 100 (27 levels for 102.5 hPa to 1013.25 hPa):** from the background NWP profiles of temperature that has been temporal, spatial and vertically interpolated to the 43 RTTOV pressure and that has been passed as input, the T profile for pressure levels from 102.5 to 1013.25 are used as input to the regression.
- **44:62 log(q) from background NWP for RTTOV pressure levels with pressure greater than 286.000 (20 levels for 286.600 hPa to 1013.25 hPa):** from the background NWP profiles of q (in ppmv) that has been temporal, spatial and vertically interpolated to the 43 RTTOV pressure and that has been passed as input, the log(q) profile for pressure levels from 286.600 to 1013.25 are used as input to the regression. Note: all values of q less than 0.02 ppmv are fixed to 0.02 before the logarithm is calculated.
- **63:63 regressions constant:** column contains the independent constant of the regression.

The files with the FG regression coefficients must be located in $SAFNWC/import/Aux_data/PGE13.

In the case of PGE13Hyb the files are named:

RC_hybrid_m***S***_SFOV_6ch_***mmmYYYY***.bin

where

- ***S*** is the Meteosat number (8 or 9) for which the coefficients included in the file has been adapted.
- ***mmmYYYY*** *is the date when the file was generated i.e. mmm = month YYYY = year*

The files contain regression coefficients for every zenith degree between 0º to 75º. More details can be found in the Algorithm Theoretical Basis Document for PGE13 “SEVIRI Physical Retrieval Product” (SPhR) v0.1 section “2.2.4 Use regression as first guess”.

The file structure is:

Indexing: [zenith angle 0-based][output variable index][input variable]

Format: Float (4 bytes)

Size: (138 x 63 x 76) * 4 bytes = 2,642,976 bytes

The output variable index can be one of the follow:

- **001:043 the FG T profile in Kelvin.**
- **044:086 the FG log(q) where q is ppmv.**
- 087:129 the FG ozono profile in ppmv. (set to 0; not used)
- **130:130 is the FG Skin Temperature in Kelvin**
- 131:131 is the FG TPW. (set to 0; not used)
- 132:132 is the FG Total ozone. (set to 0; not used)
- 133:138 the FG emissivity values for SEVIRI channels (WV6.2, WV7.3, IR8.7, IR10.8, IR12.0 and IR13.4). (set to 0; not used)

Each one of the non linear regression has as independent variable (input) the 63 fields following:

- **01:06 SEVIRI BT: the bias corrected SEVIRI BT** in Kelvin for channels WV6.2, WV7.3, IR8.7, IR10.8, IR12.0 and IR13.4.
- **07:12 SEVIRI_BT*(SEVIRI_BT/250): the square bias corrected SEVIRI BT divided by 250** in Kelvin for channels WV6.2, WV7.3, IR8.7, IR10.8, IR12.0 and IR13.4.
- **13:13 $P_{surface}$: Pressure at surface from the NWP data.**
- **14:14 Percentage of land:** the percentage of land in pixels. Due to MSG resolution it has been chosen as 0.0 for sea pixels and 1.0 for land pixels.
- **15:15 latitude of pixel:** the percentage of land in pixels. Due to MSG resolution it has been chosen as 0.0 for sea pixels and 1.0 for land pixels.
- **16:16+43 T from background NWP for RTTOV pressure levels:** from the background NWP profiles of temperature that has been temporal, spatial and vertically interpolated to the 43 RTTOV pressure and that has been passed as input, the whole T profile is used as input to the regression.
- **60:60+43 log(q) from background NWP for RTTOV pressure levels:** from the background NWP profiles of q (in ppmv) that has been temporal, spatial and vertically interpolated to the 43 RTTOV pressure. The log(q) profile for the 43 RTTOV pressure levels are used as input to the regression. Note: all values of q less than 0.02 ppmv are fixed to 0.02 before the logarithm is calculated.
- **104:104 Skin temperature from ECMWF SKT field.**
- **105:105 regressions constant:** column contains the independent constant of the regression.

The files with the hybrid FG regression coefficients must be located in $SAFNWC/import/Aux_data/PGE13

4.3.23 PGE13 Empirical ortogonal functions (EOF) for temperature and specific humidity

These files contain EOFs coefficients for temperature and specific humidty. The name of the file appears in the PGE13 configuration file (keywords EOF_WV_FILENAME for logarithm of specific humidity and EOF_T_FILENAME for temperature).

Each EOF file is double (8 bytes) array of 43 x 43 dimensions. It size is 14,792 bytes (43 x 43 x 8).

The order is 43 elements of the first EOF T (the EOF with largest eigenvalue), then the 43 elements of the second, and so on. Same structure is on EOF log(q) file but for log(q).

The files with the EOF vectors are in $SAFNWC/import/Aux_data/PGE13

4.3.24 PGE13 B^{-1} Matrix

The coefficients of the inverse of the covariance matrix (B^{-1}) are stored in an auxiliary file located in $SAFNWC/import/Aux_data/PGE13. The file is referred in the PGE model configuration file using the key INV_COV_MATRIX.

The characteristics of the B^{-1} file are:

- Format: ASCII
- Content: 84x84 lines each containing an element of the B^{-1} matrix

4.4 I4: NWCLIB

The interfaces provided by the NWCLIB library are described in the ICD for NWCLIB [AD.4.].

4.5 I5: DATBUF

The files referenced in this section are input/output files needed by some processors. Those files are generated by a given processor, and reused by the same processor, at a different moment in the processing. Those files may be produced for a given time slot, and need to be reused in a following time slot.

When a PGE or a pre-processing interface generates intermediate files they will be stored into this data buffer ($SAFNWC/tmp directory). In the case a SAFNWC/MSG product is needed as input for another PGE, and it is not requested as to be output by the application, all necessary data will be kept in DATBUF, and accessed through the interfaces provided for reading of SAFNWC/MSG output products. This enables the PGE to access to file data in the same way through the provided interfaces independently whether it is output or kept internally.

Following sections describes the formats/contents of the files created and stored in the DATABUF.

4.5.1 Latitude and Longitude

Generating function:

GetLatLon() (LIBNWC module)

FileName criteria:

C*linc_colc*_S*sizl_sizc*.LAT (latitude file)
C*linc_colc*_S*sizl_sizc*.LON (longitude file)

where:

linc, *colc* are the line and column coordinates of the center of the region (0-based)
sizl, *sizc* are the size of the region (lines and columns)

Contents:

.LAT file: latitudes for each pixel, in degrees (positive towards N)
.LON file: longitudes for each pixel, in degrees (positive towards E)

Format:

Raw FLOAT*4 format IEEE representation

Indexing: x[0][0]; x[0][1]; …; x[0][sizc-1];x[1][0]; …;x[sizl-1][sizc-1]

Size:

sizl * sizc * 4 bytes/data

4.5.2 Satellite Angles (zenith and azimut)

Generating function:

GetSatAngles() (LIBNWC module)

FileName criteria:

C*linc_colc*_S*sizl_sizc*.SAT_ZEN (satellite zenith file)
C*linc_colc*_S*sizl_sizc*.SAT_AZI (satellite azimuth file)

where:

linc, colc are the line and column coordinates of the centre of the region (0-based)
sizl, sizc are the size of the region (lines and columns)

Contents:

.SAT_ZEN file: satellite zenithal angles for each pixel, in degrees. [0,180]
(0: Zenith; 180: Nadir)
.SAT_AZI file: satellite azimuth angles for each pixel, in degrees [0,360].
(0: Local North direction; angle increments clockwise: NESW)

Format:

Raw FLOAT*4 format IEEE representation

Indexing: x[0][0]; x[0][1]; …; x[0][sizc-1];x[1][0]; …;x[sizl-1][sizc-1]

Size:

sizl * sizc * 4 bytes/data

4.5.3 Solar Angles (zenith and azimut)

Generating function:

GetSunAngles() (LIBNWC module)

FileName criteria:

*YYYYMMDDhhmm*_Clinc_*colc*_S*sizl_sizc*.SAT_ZEN (solar zenith file)
*YYYYMMDDhhmm*_C*linc_colc*_S*sizl_sizc*.SAT_AZI (solar azimuth file)

where:

YYYYMMDDhhmm is the nominal slot
linc, colc are the line and column coordinates of the centre of the region (0-based)
sizl, sizc are the size of the region (lines and columns)

Contents:

.SUN_ZEN file: solar zenithal angles for each pixel, in degrees. [0,180]
(0: Zenith; 180: Nadir)
.SUN_AZI file: solar azimuth angles for each pixel, in degrees [0,360].
(0: Local North direction; angle increments clockwise: NESW)

Format:

Raw FLOAT*4 format IEEE representation

Indexing: x[0][0]; x[0][1]; …; x[0][sizc-1];x[1][0]; …;x[sizl-1][sizc-1]

Size:

sizl * sizc * 4 bytes/data

4.5.4 NWP data

Generating function:

RemapNWP() (NWP module)

FileName criteria:

NWP_*YYYYMMDDhhmm_hh_param_ltype_level_s_m_C*linc_colc_*S*sizl_sizc

where:

YYYYMMDDhhmm_hh is the NWP date (run time + forecast-term)
param is the parameter identification (model-dependent)
ltype is the level type identification (model_dependent)
level is the level according *ltype*
s is the sampling, in pixels and SEVIRI resolution
m is the interpolation method:

0: Maximum	2: Bi-linear masked
1: Bi-linear	3: Nearest neighbour

linc, *colc* are the line and column coordinates of the centre of the region (0-based)
sizl, *sizc* are the size of the region (lines and columns)

Contents:

NWP data for each pixel in the re-sampled region (according to *s*)

Format:

Raw FLOAT*4 format IEEE representation

Indexing: x[0][0]; x[0][1]; …; x[0][sizc-1];x[1][0]; …;x[sizl-1][sizc-1]

Size:

(int) ((sizl * sizc)/s^2) * 4 bytes/data

4.5.5 SEVIRI raw counts .CNT

Generating function:

SevRead()/SevReadHRV() (SEVEXT module)

FileName criteria:

*b_YYYYMMDDhhmm_C*linc_colc_*S*sizl_sizc.CNT

where:

b is the band id

0: HRVIS	3: IR16	6: WV73	9: IR108
1: VIS06	4: IR39	7: IR87	10: IR120
2: VIS08	5: WV62	8: IR97	11: IR134

YYYYMMDDhhmm is the date
linc, *colc* are the line and column coordinates of the centre of the region (0-based)
sizl, *sizc* are the size of the region (lines and columns)

Contents:

Line quality information for all lines

Raw SEVIRI counts for each pixel in the region.

INVALID_COUNT for invalid pixel value or invalid/missing line.

Counts = 0 for pixels in space.

Format:

Line quality. For each *sizl* lines, the following information is stored:
- Line Number in VIS_IR GRID (INTEGER*4)
- Line Mean Acquisition Time (INTEGER*4+INTEGER*4)
- Line Validity (INTEGER*4)
- Line Radiometric Quality (INTEGER*4)
- Line Geometric Quality (INTEGER*4)

Raw SEVIRI counts (INTEGER*2)

Indexing: line_quality[0]; …; line_quality[sizl-1];
c[0][0]; c [0][1]; …; c[0][sizc-1];c[1][0]; …;c[sizl-1][sizc-1]

Size:

sizl*24(bytes/line_quality) + (sizl * sizc) * 2 bytes/raw_counts

4.5.6 SEVIRI Radiances .RAD

Generating function:

SevCalibrate (SEVEXT module)

FileName criteria:

b_YYYYMMDDhhmm_Clinc_colc_Ssizl_sizc.RAD

where:

b is the band id

0: HRVIS	3: IR16	6: WV73	9: IR108
1: VIS06	4: IR39	7: IR87	10: IR120
2: VIS08	5: WV62	8: IR97	11: IR134

YYYYMMDDhhmm is the date
linc, colc are the line and column coordinates of the centre of the region (0-based)
sizl, sizc are the size of the region (lines and columns)

Contents:

* Effective Radiances for each pixel in the region in mW m^{-2} sr^{-1} $(cm^{-1})^{-1}$, or
* SEVIRI_MISSING_VALUE if radiance can not be computed, or
* SEVIRI_MISSING_VALUE for pixels in space, or
* 0 if radiance calculation is negative

Format:

Radiances (FLOAT*4)

Indexing: r[0][0]; r[0][1]; …; r[0][sizc-1];r[1][0]; …;r[sizl-1][sizc-1]

Size:

sizl * sizc * 4 bytes/pixel

4.5.7 SEVIRI Reflectances .REF

Generating function:

SevCalRefl (SEVEXT module)

FileName criteria:

b_YYYYMMDDhhmm_Clinc_colc_Ssizl_sizc.REF

where:

b is the band id

0: HRVIS 1: VIS06 2: VIS08 3: IR16

YYYYMMDDhhmm is the date
linc, colc are the line and column coordinates of the centre of the region (0-based)
sizl, sizc are the size of the region (lines and columns)

Contents:

* Reflectances for each pixel in the region in %, or
* SEVIRI_MISSING_VALUE if reflectance can not be computed, or
* SEVIRI_MISSING_VALUE for pixels in space, or
* 0 if radiance calculation is negative

Format:

Reflectances (FLOAT*4)

Indexing: r[0][0]; r[0][1]; …; r[0][sizc-1];r[1][0]; …;r[sizl-1][sizc-1]

Size:

sizl * sizc * 4 bytes/pixel

4.5.8 SEVIRI Brightness Temperatures .BT

Generating function:

SevConvert (SEVEXT module)

FileName criteria:

b_YYYYMMDDhhmm_Clinc_colc_Ssizl_sizc.BT

where:

b is the band id

4: IR39 5: WV62 6: WV73 7: IR87
8: IR97 9: IR108 10: IR120 11: IR134

YYYYMMDDhhmm is the date
linc, colc are the line and column coordinates of the centre of the region (0-based)
sizl, sizc are the size of the region (lines and columns)

Contents:

* Brightness Temperatures for each pixel in the region in K, or
* SEVIRI_MISSING_VALUE if BT can not be computed, or
* SEVIRI_MISSING_VALUE for pixels in space, or
* 0 if radiance calculation is negative

Format:

BT (FLOAT*4)

Indexing: bt[0][0]; bt[0][1]; …; bt[0][sizc-1];bt[1][0]; …;bt[sizl-1][sizc-1]

Size:

sizl * sizc * 4 bytes/pixel

4.5.9 PGE01 internal control result

For each region processed by PGE01 the file is placed under tmp directory with the naming convention:

stat_PGE01_*regionname_YYYYMMDDhhmm*.txt

With the following format:

---------- CMa Internal Quality Check Results ----------
Region processed : *region_name*
Region channel flag : VIS_IR
Region centre : line *llll* column *cccc*
Product size : lines *LLLL* cols *CCCC*
Product time slot : *yyyymmddhhmm*

NWP availability *ppp.ccc*%
SEVIRI availability *ppp.ccc*%

CMa quality *ppp.ccc*%
CMa completeness *ppp.ccc*%
Clear FOVS *ppp.ccc*%
Cloud contaminated FOVS *ppp.cc*%
Cloud filled FOVS *ppp.ccc*%
Snow or Ice FOVS *ppp.ccc*%
Undefined FOVS *ppp.ccc*%
twilight detection FOVS *ppp.ccc*%
temporal detection FOVS *ppp.ccc*%
HRV detection FOVS *ppp.ccc*%

Processed FOVS with dust non processed *ppp.ccc*%
Processed FOVS with dust detected *ppp.ccc*%
Processed FOVS with dust not detected *ppp.ccc*%
Processed FOVS with dust undefined *ppp.ccc*%

Processed FOVS with volcanic plume non processed *ppp.ccc*%
Processed FOVS with volcanic plume detected *ppp.ccc*%
Processed FOVS with volcanic plume not detected *ppp.ccc*%
Processed FOVS with volcanic plume undefined *ppp.ccc*%

Processed FOVS with NWP quality information *ppp.ccc*%
Processed FOVS with SEVIRI quality information *ppp.ccc*%
Processed FOVS with View cond. quality information *ppp.ccc*%

Cloudy FOVS with threshold test information *ppp.ccc*%
Snow/Ice FOVS with threshold test information *ppp.ccc*%

4.5.10 PGE02 internal control result

For each region processed by PGE02 the file is placed under tmp directory with the naming convention:

stat_PGE02_*regionname_YYYYMMDDhhmm*.txt

With the following format:
---------- CT Internal Quality Check Results ----------
Region processed : *region_name*
Region channel flag : VIS_IR
Region centre : line *llll* column *cccc*
Product size : lines *LLLL* cols *CCCC*
Product time slot : *yyyymmddhhmm*

NWP availability *ppp.ccc*%
SEVIRI availability *ppp.ccc*%

CT quality *ppp.ccc*%
CT completeness *ppp.ccc*%
---
clear_land *ppp.ccc*%
clear_sea *ppp.ccc*%
snowice_land *ppp.ccc*%
snowice_sea *ppp.ccc*%
vlow_cum *ppp.ccc*%
vlow_nocum *ppp.ccc*%
low_cum *ppp.ccc*%
low_nocum *ppp.ccc*%
med_cum *ppp.ccc*%
med_nocum *ppp.ccc*%
hi_opaq_cum *ppp.ccc*%
hi_opaq_nocum *ppp.ccc*%
vh_opaq_cum *ppp.ccc*%
vh_opaq_nocum *ppp.ccc*%
semitr_thin *ppp.ccc*%
semitr_mean *ppp.ccc*%
semitr_thick *ppp.ccc*%
semitr_above *ppp.ccc*%
fractional *ppp.ccc*%
undefined *ppp.ccc*%

Processed FOVS with NWP quality information *ppp.cc*%
Processed FOVS with SEVIRI quality information *ppp.cc*%
Processed FOVS with View cond. quality information *ppp.cc*%

Processed FOVS with phase non processed *ppp.cc*%
Processed FOVS with water phase *ppp.cc*%
Processed FOVS with ice phase *ppp.cc*%
Processed FOVS with undefined phase *ppp.cc*%

4.5.11 PGE02 Microphysics Data

Microphysics data, internally used by PGE02, are stored in temporary files to make them available to other PGEs. In particular, precipitation products PC y CRR in version 2013 include a new algorithm taking advantage of the use of microphysics data.

4.5.11.1 Effective Radius computed with the 1.6μm channel

FileName criteria:

YYYYMMDDhhmm_Clinc_colc_Ssizl_sizc.REFF16

where:

YYYYMMDDhhmm is the date
linc, colc are the line and column coordinates of the centre of the region (0-based)
sizl, sizc are the size of the region (lines and columns)

Contents:

Effective Radius computed with 1.6 μm channel, in microns

Format:

INTEGER*2 array

Indexing: reff16[0][0]; reff16[0][1];…. reff16[0][sizc-1]; reff16[1][0]; …; reff16[sizl-1][sizc-1]

Size:

sizl * sizc * 2 bytes/pixel

4.5.11.2 Cloud Optical Thickness

FileName criteria:

YYYYMMDDhhmm_Clinc_colc_Ssizl_sizc.COT

where:

YYYYMMDDhhmm is the date
linc, colc are the line and column coordinates of the centre of the region (0-based)
sizl, sizc are the size of the region (lines and columns)

Contents:

Cloud Optical Thickness

Format:

INTEGER*2 array

Indexing: cot[0][0]; cot[0][1];…. cot[0][sizc-1]; cot[1][0]; …; cot[sizl-1][sizc-1]

Size:

sizl * sizc * 2 bytes/pixel

4.5.12 PGE03 internal control result

For each region processed by PGE03 the file is placed under tmp directory with the naming convention:

stat_PGE03_regionname_YYYYMMDDhhmm.txt

With the following format:
---------- CTTH Internal Quality Check Results ----------
Region processed : *region_name*
Region channel flag : VIS_IR
Region centre : line *llll* column *cccc*
Product size : lines *LLLL* cols *CCCC*
Product time slot : *yyyymmddhhmm*

NWP availability *ppp.cc*%
RTTOV availability *ppp.cc*%
SEVIRI availability *ppp.cc*%

CTTH quality *ppp.cc*%
CTTH completeness *ppp.cc*%
---
opaq_rttov *ppp.cc*%
opaq_norttov *ppp.cc*%
Intercept_11_134 *ppp.cc*%
Intercept_11_62 *ppp.cc*%
Intercept_11_73 *ppp.cc*%
Ratio_11_134 *ppp.cc*%
Ratio_11_62 *ppp.cc*%
Ratio_11_73 *ppp.cc*%
spare *ppp.cc*%
spare *ppp.cc*%
spare *ppp.cc*%
spare *ppp.cc*%
opaq_rttov_inversion *ppp.cc*%
spatial_smoothing *ppp.cc*%
spare *ppp.cc*%

Processed FOVS with NWP quality information *ppp.cc*%
Processed FOVS with SEVIRI quality information *ppp.cc*%

4.5.13 Tracers features file for PGE09

PGE09 uses a file containing the tracer data obtained from the image of the previous slot, as input to compute the AMVs for the corresponding MSG/SEVIRI channel. At the end of the process, these data are updated and stored in a file placed at `$SAFNWC/tmp` directory.

The name format that follow these files are as follows:

`PGE09_<channel>_tracers_<region>_<slot>`

where <channel>=HRVIS/VIS06/VIS08/WV062/WV073/IR108/IR120, depending on the satellite channel with which winds have been calculated, and it stores the following parameters:

Param #	Description	Data type
1	Total number of Tracers obtained from the image	S_int
2	Total number of Basic scale tracers	S_int
3	Flag showing if “Gradient method” (or else “Tracer characteristics method)” was used for the tracer definition	S_short
4	Tracer line (relative coordinates)	S_short
5	Tracer column (relative coordinates)	S_short
6	Tracer latitude	Float_64
7	Tracer longitude	Float_64
8	Tracer line modification inferred by “CCC method” (when used)	S_short
9	Tracer column modification inferred by “CCC method” (when used)	S_short
10	Tracer line modification inferred by “CCC method” (when used)	Float_64
11	Tracer column modification inferred by “CCC method” (when used)	Float_64
12	Tracer characterization as Detailed tracer	S_int
9	Tracer centile value	S_short
10	Tracer frontier value	S_short
11	Tracer temperature mean	Float_32
12	Tracer temperature normal deviation	Float_32
13	Number of pixels for temperature mean/deviation	S_short
14	Tracer temperature mean (using Cloud type)	Float_32
15	Tracer temperature normal deviation (using Cloud type)	Float_32
16	Number of pixels for temperature mean/deviation (using Cloud type)	S_short
17	Identifier of the predecessor tracer_wind the tracer is related to	S_int
18	Identifier of the predecessor valid wind the tracer is related to	S_int
19	Classification of the “Big pixels” inside the tracer considering their brightness variabilility (values from 0 to 2).	Array of 4x4 S_short

**Parameters from 3 to 19 are stored for n tracers (where n is the value for Param#1).*

Table 40: PGE09 tracer parameters

4.5.14 Predecessor Winds for PGE09

Before writing the BUFR bulletin of the PGE09 HRW, a file is created at `$SAFNWC/tmp` directory containing the main features of those winds that have passed the Quality control. They will be used in the processing of the following slots as persistent winds.

The name format that follow these files is:

`PGE09_<channel>_predwinds_<region>_<slot>`

where <channel>=HRVIS/VIS06/VIS08/WV062/WV073/IR108/IR120, depending on the satellite channel with which winds have been calculated, and it stores the following parameters:

Param #	Description	Data type
1	Total number of Winds	S_int
2	Total number of Basic Winds	S_int
3	Final relative line position of the Wind	S_short
4	Final relative column position of the Wind	S_short
5	Initial relative line position of the Wind	S_short
6	Initial relative column position of the Wind	S_short
7	Final latitude of the Wind	Float_64
8	Final longitude of the Wind	Float_64
9	Initial latitude of the Wind	Float_64
10	Initial longitude of the Wind	Float_64
11	Line modification inferred by “CCC method” (when used)	S_short
12	Column modification inferred by “CCC method” (when used)	S_short
13	Line modification inferred by “CCC method” (when used)	Float_64
14	Column modification inferred by “CCC method” (when used)	Float_64
15	Characterization as Detailed predecessor wind	S_int
16	Wind horizontal component	Float_64
17	Wind vertical component	Float_64
18	Wind speed	Float_64
19	Wind direction	Float_64
20	Quality indicator (using forecast)	Float_64
21	Quality indicator (not using forecast)	Float_64
22	Quality indicator (only using forecast)	Float_64
23	Correlation	Float_64
24	Pressure	S_int
25	Pressure error	S_int
26	Temperature	S_short
27	Tracer type	S_short
28	Orographic flag	U_short
29	Number of predecessors	S_int
30	Identifier of the predecessor tracer_wind the wind is related to	S_int
31	Identifier of the predecessor valid wind the wind is related to	S_int
32	Flag showing if “CCC method” was used for the height assignment	S_short
33	Number of NWP levels with wind data available	S_short
**Parameters from 3 to 33 are stored for n winds (where n is the value for Param#1).*		

Table 41: PGE09 predecessor wind parameters

4.5.15 Trajectories for PGE09

Before writing the BUFR bulletin of the PGE09 HRW, a file is created at `$SAFNWC/tmp` directory containing the main features of those trajectories calculated tracking the same tracer at several consecutive slots. They will be used in the processing of the trajectories at the following slots.

The name format that follow these files is:

`PGE09_<channel>_trajectories_<region>_<slot>`

where <channel>=HRVIS/VIS06/VIS08/WV062/WV073/IR108/IR120, depending on the satellite channel with which winds have been calculated, and it stores the following parameters:

Param #	Description	Data type
1	Total number of Trajectories	S_int
2	Total number of Basic Trajectories	S_int
For each trajectory:		
3	Numeric code of the SEVIRI channel used	S_short
5	Tracking method used	char
6	Quality index threshold	S_short
7	Flag showing if the Forecast test was used in the Quality index	S_short
8	Number of winds in the trajectory	Float_64
And now for each wind in the current trajectory:		
9	Date and time to which the wind is related in the initial image	YYYYMMDDhhmm
10	Initial latitude of the Wind	Float_64
11	Initial longitude of the Wind	Float_64
12	Initial relative line position of the Wind	S_short
13	Initial relative column position of the Wind	S_short
14	Final latitude of the Wind	Float_64
15	Final longitude of the Wind	Float_64
16	Final relative line position of the Wind	S_short
17	Final relative column position of the Wind	S_short
18	Satellite zenith angle of the Wind	Float_32
19	Line modification inferred by “CCC method” (when used)	S_short
20	Column modification inferred by “CCC method” (when used)	S_short
21	Line modification inferred by “CCC method” (when used)	Float_64
22	Column modification inferred by “CCC method” (when used)	Float_64
23	Wind horizontal component	Float_64
24	Wind vertical component	Float_64
25	Wind speed	Float_64
26	Wind direction	Float_64
27	Pressure	S_int
28	Temperature	S_short
29	Pressure error	S_int
30	Cloud type related to the wind	S_short
31	Flag showing if “CCC method” was used for the height assigment	S_short
32	Flag showing if the wind is a clear air wind	S_short
33	Quality indicator (using forecast)	Float_64
34	Quality indicator (not using forecast)	Float_64
35	Quality indicator (only using forecast)	Float_64
36	Correlation	Float_64
37	Orographic flag	U_short
38	Tracer type	S_short
*Parameters from 3 to 8 are stored for n trajectories (where n is the value for Param#1).		
*Parameters from 9 to 38 are stored for m winds in a trajectory (where m is the value for Param#8).		

Table 42: PGE09 trajectory parameters

4.5.16 PGE09 Minimum and maximum Surface matrices

Generating function:

hrw_ReadSfcMatrix() (PGE09 function)

FileName criteria:

C*linc_colc*_S*sizl_sizc*_Sfc_min.dat (minimum surface)

C*linc_colc*_S*sizl_sizc*_Sfc_max.dat (maximum surface)

where:

linc, *colc* are the line and column coordinates of the centre of the region (0-based)
sizl, *sizc* are the size of the region (lines and columns)

Contents:

Minimum surface level (centile 3%) of the topography matrix applied to the used region

-9998 for space pixels

0 for pixels over sea

Maximum surface level (centile 97%) of the topography matrix applied to the used region

-9998 for space pixels

0 for pixels over sea

Format:

SFC (INTEGER*2)

Indexing: sfc[0][0]; sfc[0][1]; …; sfc[0][sizc-1]; sfc[1][0]; …;sfc[sizl-1][sizc-1]

Size:

sizl * sizc * 2 bytes/pixel

4.5.17 Topography matrix

Generating function:

ReadTOPO() (PGE05_06_07_08 lib)

FileName criteria:

C*linc_colc*_S*sizl_sizc*_±*ddd.dd*.TOPO

where:

linc, *colc* are the line and column coordinates of the centre of the region (0-based)
sizl, *sizc* are the size of the region (lines and columns)
±*ddd.dd* is the image projection degrees (+ towards East, - towards West)

Contents:

Elevation (in meters) for land pixels, or

-9999 for pixels over sea, and

-9998 for space pixels

Format:

TOPO (INTEGER*2)

Indexing: topo[0][0]; topo[0][1]; …; topo[0][sizc-1]; topo[1][0]; …;topo[sizl-1][sizc-1]

Size:

sizl * sizc * 2 bytes/pixel

4.5.18 First Guess profiles for PGE13

Generating function:

createTmpOutputFiles

FileName criteria:

PGE13_fg_____*YYYYMMDDhhmm*_C*linc_colc*_S*sizl_sizc*

where:

YYYYMMDDhhmm is the nominal slot
linc, *colc* are the line and column coordinates of the centre of the region (0-based)
sizl, *sizc* are the size of the region (lines and columns)

Contents:

Temperature + Humidity + Skin Temperature (First Guess after regression step)

Format:

Raw FLOAT*4

Indexing:

fg[0][0][0]; …fg[0][0][42]; fg[0][0][43]; …fg[85]; fg[0][0][86];

fg[0][1][0]; …fg[0][1][42]; fg[0][1][43]; …fg[85]; fg[0][1][86];

…

fg[0][sizc-1][0]; …fg[0][sizc-1][42]; fg[0][sizc-1][43]; …fg[85]; fg[0][sizc-1][86];

…

fg[sizl-1][sizc-1][0] …fg[sizl-1][sizc-1][42]; fg[sizl-1][sizc-1][43]; …fg[85]; fg[sizl-1][sizc-1][86]

where

fg[x][y][0] … fg[x][y][42]:	*Temperature first guess at rttov levels*
fg[x][y][43] … fg[x][y][85]:	*Humidity first guess at rttov levels*
fg[x][y][86]:	*Skin temperature first guess at rttov levels*

Size:

sizl * sizc * (43* (4 bytes/pixel) + 43* (4 bytes/pixel) + (4 bytes/pixel))

4.5.19 Final profile used for PGE13 output product calculation

Generating function:

createTmpOutputFiles

FileName criteria:

PGE13_end_prof____*YYYYMMDDhhmm_Clinc_colc_Ssizl_sizc*

where:

YYYYMMDDhhmm is the nominal slot
linc, *colc* are the line and column coordinates of the centre of the region (0-based)
sizl, *sizc* are the size of the region (lines and columns)

Contents:

Temperature, Humidity and Skin Temperature used for humidity and stability indices to be stored in the final PGE13.

Format:

Raw FLOAT*4

Indexing:

prof[0][0][0]; …prof[0][0][42]; prof[0][0][43]; …prof[85]; prof[0][0][86]

prof[0][1][0]; …prof[0][1][42]; prof[0][1][43]; …prof[85]; prof[0][1][86]

…

prof[0][sizc-1][0]; …prof[0][sizc-1][42]; prof[0][sizc-1][43]; …prof[85]; prof[0][sizc-1][86]

…

prof[sizl-1][sizc-1][0] …prof[sizl-1][sizc-1][42]; prof[sizl-1][sizc-1][43]; …prof[85]; prof[sizl-1][sizc-1][86]

where

prof[x][y][0] … prof[x][y][42]:	*Temperature profile at rttov levels*
prof[x][y][43] … prof[x][y][85]:	*Humidity profile at rttov levels*
prof[x][y][86]:	*Skin temperature profile at rttov levels*

Size:

sizl * sizc * (43* (4 bytes/pixel) + 43* (4 bytes/pixel) + (4 bytes/pixel))

4.5.20 Retrieved Brightness Temperature for PGE13

Generating function:

createTmpOutputFiles (file creation)

FileName criteria:

PGE13_retr_bt_____*YYYYMMDDhhmm_Clinc_colc_Ssizl_sizc*

where:

YYYYMMDDhhmm is the nominal slot
linc, colc are the line and column coordinates of the centre of the region (0-based)
sizl, sizc are the size of the region (lines and columns)

Contents:

Simulated brightness temperature for WV6.2, WV7.3, IR10.8, IR12.0, IR13.4 channels, obtained once the radiative transfer forward model is applied

Format:

Raw FLOAT*4

Indexing:

bt[0][0][0]; bt[0][0][1]; … bt[0][0][4];

bt[0][1][0]; bt[0][0][1]; … bt[0][1][4];

…

bt[0][sizec-1][0]; bt[0][sizec-1][1]; … bt[0][sizec-1][4];

…

bt[sizel-1][sizec-1][0]; bt[sizel-1][sizec-1][1]; … bt[sizel-1][sizec-1][4];

Size:

sizl * sizc * (5 channels) * (4 bytes/pixel)

4.5.21 Intermediate profiles for PGE13 at different iteration steps

Generating function:

createTmpOutputFiles (file creation)

FileName criteria:

PGE13_retr_iter_p_*YYYYMMDDhhmm*_C*linc_colc*_S*sizl_sizc*

where:

p is the number of internal iterations into the retrieval
YYYYMMDDhhmm is the nominal slot
linc, *colc* are the line and column coordinates of the centre of the region (0-based)
sizl, *sizc* are the size of the region (lines and columns)

Contents:

Temperature, Humidity and skin temperature profiles retrieved during the iteration *p*

Format:

Raw FLOAT*4

Indexing:

prof[0][0][0]; …prof[0][0][42]; prof[0][0][43]; …prof[85]; prof[0][0][86];

prof[0][1][0]; …prof[0][1][42]; prof[0][1][43]; …prof[85]; prof[0][1][86];

…

prof[0][sizec-1][0]; …prof[0][sizec-1][42]; prof[0][sizec-1][43]; …prof[85]; prof[0][sizec-1][86];

…

prof[sizl-1][sizc-1][0] …prof[sizl-1][sizc-1][42]; prof[sizl-1][sizc-1][43]; …prof[85]; prof[sizl-1][sizc-1][86]

where

prof[x][y][0] … prof[x][y][42]:	Temperature profile at rttov levels
prof[x][y][43] … prof[x][y][85]:	Humidity profile at rttov levels
prof[x][y][86]:	Skin temperature profile at rttov levels

Size:

sizl * sizc * (43* (4 bytes/pixel) + 43* (4 bytes/pixel) + (4 bytes/pixel))

4.5.22 PGE13 NWP background temporal files

Generating function:

saveNWP

FileName criteria:

PGE13_nwp_q_____*YYYYMMDDhhmm*_C*linc_colc*_S*sizl_sizc*

PGE13_nwp_sk_____*YYYYMMDDhhmm*_C*linc_colc*_S*sizl_sizc*

PGE13_nwp_sp_____*YYYYMMDDhhmm*_C*linc_colc*_S*sizl_sizc*

PGE13_nwp_t_____*YYYYMMDDhhmm*_C*linc_colc*_S*sizl_sizc*

where:

YYYYMMDDhhmm is the nominal slot
linc, *colc* are the line and column coordinates of the centre of the region (0-based)
sizl, *sizc* are the size of the region (lines and columns)

Contents:

PGE13_nwp_sk_____: Skin temperature background retrieved from the NWP model with spatial and temporal interpolation applied

PGE13_nwp_sp_____: Surface pressure background retrieved from the NWP model with spatial and temporal interpolation applied

PGE13_nwp_t_____: Temperature background retrieved from the NWP model with spatial and temporal interpolation applied

PGE13_nwp_q_____: Humidity background retrieved from the NWP model with spatial and temporal interpolation applied

Format:

Raw FLOAT *4

Indexing:

sk[0][0]; sk[0][1]; …; sk[0][sizc-1];sk[1][0]; …;sk[sizl-1][sizc-1]

sp[0][0]; sp[0][1]; …; sp[0][sizc-1];sp[1][0]; …;sp[sizl-1][sizc-1]

t[0][0][0]; t[0][0][1]; …; t[0][0][sizc-1];t[0][1][0]; …;t[0][sizl-1][sizc-1] ;t[1][0][0] ;t[1][0][1]…t[p][sizl-1][sizc-1]

q[0][0][0]; t[0][0][1]; …; q[0][0][sizc-1];q[0][1][0]; …;q[0][sizl-1][sizc-1] ;q[1][0][0] ;t[1][0][1]…q[p][sizl-1][sizc-1]

where p is the number of pressure levels

Size:

Skin temperature:	sizl * sizc * (4 bytes/pixel)
Surface pressure:	sizl * sizc * (4 bytes/pixel)
Temperature:	n_levels*sizl * sizc * (4 bytes/pixel)
Humidity:	n_levels*sizl * sizc * (4 bytes/pixel)

where n_levels is the number of pressure levels associated to the SPHR_NWP_LEVELS keyword in the .cfm file

4.5.23 PGE13 HYB optional binary files

In the case of the PGE13Hyb binary files for every written FOR the structure has always the same fields. In the case of only clear pixels instead for all the FORs just clear FORs are written.

FileName criteria:

PGE13Hyb writing of all FORs

PGE13_hyb_background__*YYYYMMDDhhmm_Clinc_colc_Ssizl_sizc*

PGE13_hyb_fg_____YYYYMMDDhhmm_Clinc_colc_Ssizl_sizc

PGE13_hyb_end_prof____YYYYMMDDhhmm_Clinc_colc_Ssizl_sizc

PGE13Hyb writing of just clear FORs

PGE13_hyb_clear_FOR_background__YYYYMMDDhhmm_Clinc_colc_Ssizl_sizc

PGE13_hyb_clear_FOR_fg_____YYYYMMDDhhmm_Clinc_colc_Ssizl_sizc

PGE13_hyb_clear_FOR_end_prof____YYYYMMDDhhmm_Clinc_colc_Ssizl_sizc

where:

YYYYMMDDhhmm is the nominal slot
linc, *colc* are the line and column coordinates of the centre of the region (0-based)
sizl, *sizc* are the size of the region (lines and columns)

Contents:

In all the case the profile and parameters has the same structure.

Format:

```
struct {
   float bt_rttov[5];      // Synthetic RTTOV (WV6.2,WV7.3, IR10.8, IR12.0 ,IR13.4) (K)
   float skt;              // Skin Temperature (K)
   float psfc;             // Surface Pressure (hPa)
   float p[43];            // Pressure levels at 43 RTTOV Pressure levels (hPa)
   float t[43];            // Temperature profile (K)
   float q[43];            // Specific Humidity (ppmv)
   float bl;               // Bottom Layer Precipitable Water (kg/m2)
   float ml;               // Medium Layer Precipitable Water (kg/m2)
   float bl;               // Upper Layer Precipitable Water (kg/m2)
   float li;               // Lifted Instability Index (K)
   float ki;               // K-Index
   float shw;              // Showalter Index
   float bt_rms            // Distance between SEVIRI bias corrected and
                           // RTTOV BTs in channels (WV6.2,WV7.3, ,IR13.4) channels
   float residual;         // Distance between SEVIRI bias corrected and
                           // RTTOV BTs in (WV6.2,WV7.3, IR10.8, IR12.0 ,IR13.4)
   }
```

Indexing:

data[0][0]; data[0][1]; …; data[0][sizc-1];data[1][0]; …;data[sizl-1][sizc-1]

Size:

PGE13Hyb writing of all FORs

If the FOR is defined as a pixel in a window of *m* x *m* the size is:

sizl/*m* * sizc/*m* * (sizeof(struct) = 580 bytes)

PGE13Hyb writing of just clear FORs

In this case the size is:

Number_of_clear_FOR * (sizeof(struct) = 580 bytes)

4.5.24 PGE13 NWP clear air optional output

Generating function:

createTmpOutputFiles (file creation)

FileName criteria:

PGE13_clear_FOR_fg_____*YYYYMMDDhhmm_Clinc_colc_Ssizl_sizc*

PGE13_clear_FOR_retr_bt_____*YYYYMMDDhhmm_Clinc_colc_Ssizl_sizc*

PGE13_clear_FOR_retr_iter_*p_YYYYMMDDhhmm_Clinc_colc_Ssizl_sizc*

PGE13_clear_FOR_end_prof____*YYYYMMDDhhmm_Clinc_colc_Ssizl_sizc*

PGE13_clear_FOR_background__*YYYYMMDDhhmm_Clinc_colc_Ssizl_sizc*

where:

p is the number of internal iterations into the retrieval

YYYYMMDDhhmm is the nominal slot
linc, colc are the line and column coordinates of the centre of the region (0-based)
sizl, sizc are the size of the region (lines and columns)

Contents:

The number of records depends on the number of clear FOR processed. There are so many records as clear air FOR processed this is why the region coordinates are included in every record,

fg: Region coordinates + Temperature + Humidity + Skin Temperature profiles

retr_bt: Region coordinates + Simulated brightness temperature for WV6.2, WV7.3, IR10.8, IR12.0, IR13.4 channels, obtained once the radiative transfer forward model is applied

retr_iter_p: Region coordinates + Temperature, Humidity and skin temperature profiles retrieved during the iteration *p*

end_prof: Region coordinates + Temperature, Humidity and Skin Temperature used for humidity and stability indices to be stored in the final PGE13.

background: Region coordinates + Temperature, Humidity, Ozone (empty), 2m Temperature + 2m Humidity + Surface pressure + skin temperature

Format:

Raw INTEGER*4 (line, element) / Raw FLOAT*4 values

Indexing:

fg[j][i][temp*0..42*][q*0..42*][sk];

retr_bt[j][i][0]; retr_bt[j][i][0]; retr_bt[j][i][1]; … retr_bt[j][i][4];

retr_iter_p[j][i][temp*0..42*][q*0..42*][sk]

end_prof[j][i][temp*0..42*][q*0..42*][sk]

background[j][i][temp*0..42*][q*0..42*][o*0..42*][2mt][2mq][sp][sk];

4.5.25 PGE13 Emissivity Atlases temporal files

Generating function:
readEmissivityFile (file creation)

FileName criteria:

PGE13_C*linc_colc*_S*sizl_sizc_MM_ DDD.Dc_channel*.EMI

where:

linc, colc are the line and column coordinates of the centre of the region (0-based)
sizl, sizc are the size of the region (lines and columns)
MM is the month.
DDD.D is the image projection degree. Example: 000.0 for 0º
c is the image projection direction (w – west, e – east).
channel is the name of the channel. Example: WV_62, IR108, etc

Contents:

Emissivity atlas. At every pixel it contains emissivity multiplied by 1000 written as a short integer. Sea pixels are masked with -9999 values.

Format:

Short Integer (2 bytes)

Indexing:

[line_index][col_index]