The EUMETSAT Network of Satellite Application Facilities

NWC SAF
Support to Nowcasting and Very Short Range Forecasting

SMHI

User Workshop, April 2010, Madrid

NWCSAF PPS package Overview

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Outline

- PPS package and products
- 2010 release news
- Plans for rest of CDOP (February 2012)
- Plans for CDOP 2 (2012-2012)
  - Satellites
  - products
- User requirement collection

PPS Package overview

- PPS – Processes Cloud and a Precipitation products from Polar orbiting satellites
- Current processing capabilities for NOAA15-19, Metop, MODIS
- Preparations for NPP under way
- Historic AVHRR data processing from GAC
- Designed for HRPT data streams, but also adapted to other data input

- Originally designed for Nowcasting, but also covering needs of wider user communities (climate, land and ocean applications)

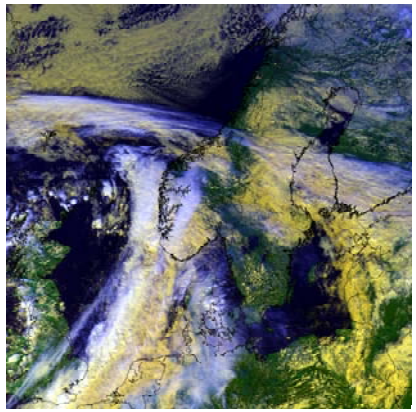
PPS Operational Products

Cloud Mask – **PGE01** Detects both cloud filled and cloud contaminated pixels. Additionally information on presence of snow and sea ice.

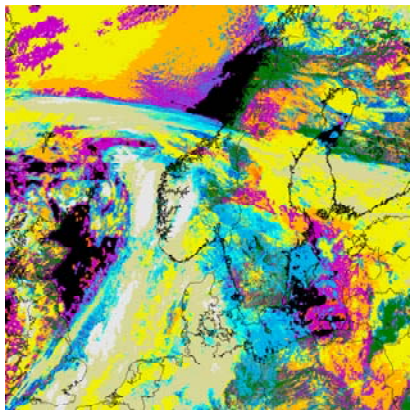
Cloud Type – **PGE02** Detailed cloud analysis with information on the major cloud classes: fractional clouds, semitransparent clouds, high, medium, low clouds including fog. Cloud mask and type based on grouped dynamic thresholding tecyhnique.

Cloud Top Temperature & Height (CTTH) – **PGE03**
Cloud top temperature, pressure, and height. The retrieval of semi-transparent clouds is based on AVHRR split-window histograms.

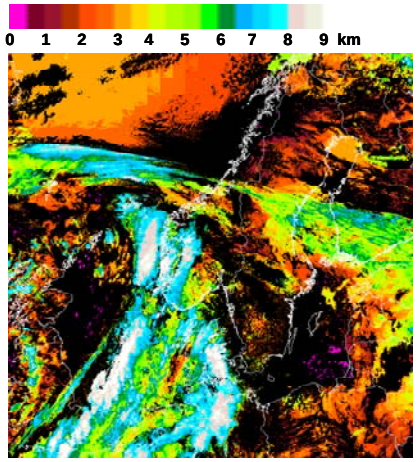
Precipitating Clouds – **PGE04**
Probability of precipitation intensities in predefined intensity intervals. Uses both AVHRR and AMSU-A/B (MHS).



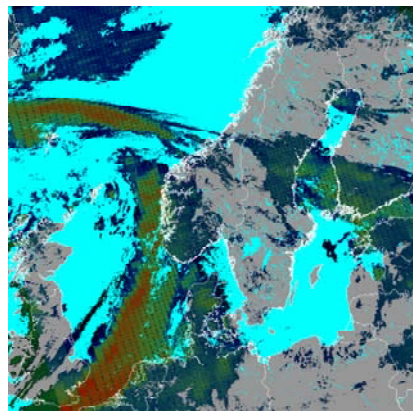
AVHRR ch1,2,4 RGB



Cloud Mask and Cloud Type



CTTH – Height (m)



Precipitating Clouds RGB

PPS v2010 summary

- New threshold calculation in Cloud mask and cloud type
  - Using ECMWF profiles database, spanning over a wider variety of atmospheric conditions to better suit global applications
  - Variable surface emissivity (improvements over arid areas and deserts)

- RTTOV 9 used (online and offline)

- Some bug corrections

- Some technical improvements

  Important: ECMWF GRIB API, capability to process GRIB 1+2

  (ECMWF will discontinue dissemination of GRIB1)

Remaining CDOP development (until February 2012, one or two releases)

- Tuning cloud mask “offsets” for new threshold calculations
- IASI Cloud Top Temperature and height development to continue (separate module, user requirements for this software product need to be confirmed)
- Federation with CMSAF: Cloud microphysical Parameters developed by KNMI will become available as part of NWCSAF PPS software package
- NPP: remaining adaptation of PPS software as soon as specifications become available (launch now planned for late 2011)
- Consolidating plans for evolution of precipitation products in CDOP2, VSA
  Software package overhaul after more than 10 years with evolving requirements: better and more flexible interfaces, also for using internal PPS functionalities more easily in your own applications

CDOP: NPP

- "NPOESS" (now JPSS) Preparatory Project after NOAA satellite series, expected launch autumn 2011

- We are awaiting release of more detailed technical specifications

- **VIIRS** sensor (onboard NPP and JPSS): multi-spectral scanning radiometer
  - 22 bands between .4 and 12 microns
  - Swath width 3000km
  - 3 Imagery spatial resolutions, according to band:
    - Imagery resolution bands: 375 m at nadir
    - Moderate resolution bands: 750 m at nadir
    - Near constant contrast band: 750 m across full scan
  - 12 bit quantitisation
  - Suitable channels for ocean colour and aerosol retrieval

CDOP: Cloud microphysical parameters

- Federated activity with CMSAF(KNMI) approved
- Software developed within CMSAF will be released as part of NWCSAF PPS package
- Joint development for VIIRS
- Additional to NWCSAF original plans, microphysical parameters will also be available for AVHRR
- Coordination also with NWCSAF GEO part within this FA

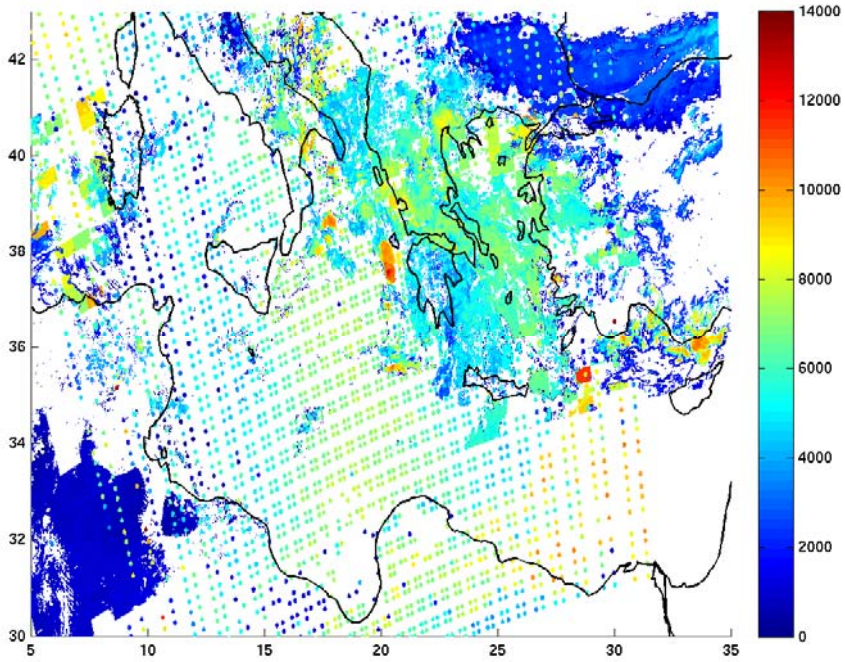
- Parameters available internally and in output files:
  - cloud phase
  - condensed water path
  - effective radius at cloud top
  - cloud optical thickness

- Which of those parameters should become operational NWCSAF productsTBD

CDOP: IASI

- IASI cloud top height product has been developed based on EUMETSAT CAF CO2 slicing algorithm which is part of the IASI level 2 product suite at CAF
- Stand alone processing package tecnically ready and documented
- More refinement needed to achieve clearly superior quality to AVHRR based CTTH product
- Development and validation will be assessed in autumn 2010 to decide future strategy (aiming for an operational product or dropping from NWCSAF plans).
- Potential benefit to have NWCSAF software for IASI available: potential to process CO2 slicing based CTTH also from other sounder data
- Possibility to process from locally received data (not ready yet)

CDOP: IASI



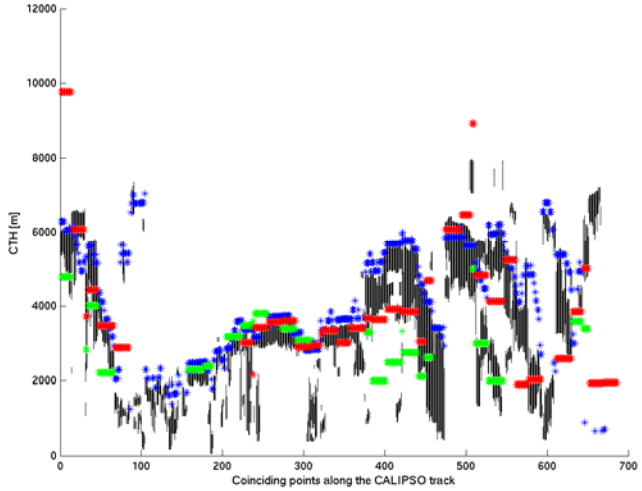
AVHRR and IASI Cloud top height

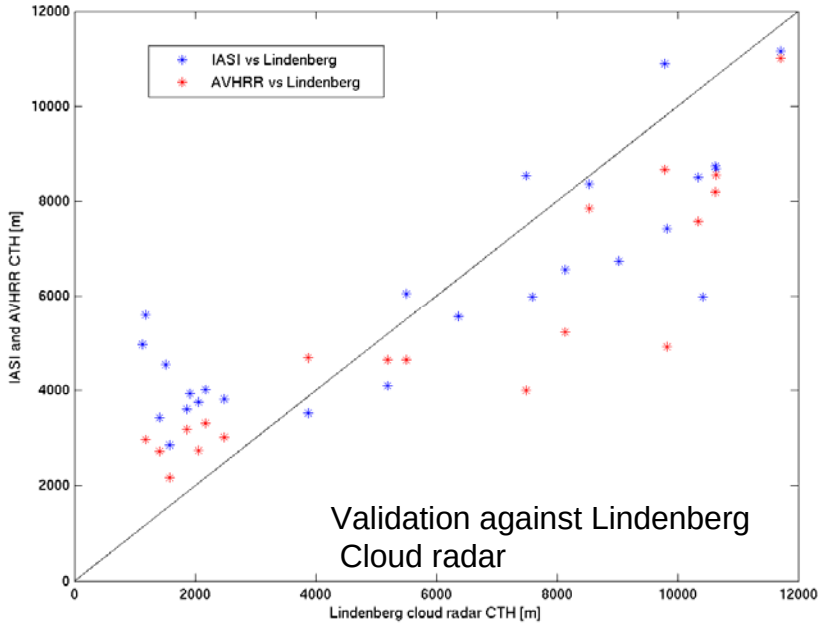
CALIPSO

IASI

CloudSat

AVHRR





Validation against Lindenberg Cloud radar

CDOP2: committed additional satellites JPSS + post EPS

Preparation for

- JPSS: VIIRS sensor
- Post EPS: exact channel definitions TBD, additional capabilities as compared to VIIRS expected

Microwave instrumentation (precipitation retrieval) on both satellite programs TBD

CDOP2: FY-3 satellite series

Adaptation to FY-3 interesting for both NWC purposes, ocean, land and climate applications

- Satellites already up and ensuring continuity over time

- Interesting imaging missions:
  - VIRR: spectral range 0.44-12.5 micron,
    spatial resolution1.1km
  - MERSI: spectral range 0.41-12.5 micron,
    spatial resolution 0.25-1km
  - MWIRI: Microwave imager, 15-80km spectral resolution, conically scanning, spectral range 10.65 – 89GHz

CDOP2: PCW?

Canadian meteorological satellite mission in Molnyia orbit

- Potential launch within CDOP2
- Constellation of 2 satellites covers Arctic and down to 45N with 15 minute imagery
- At least covering SEVIRI spectral channels
- Mission not fully committed yet
- Real time access to full resolution datasets still uncertain for Europe

- …but what a difference it would make for nowcasting at northern latitudes!

CDOP2 products development

- CDOP product continuity with improvements to all products
- Global application

Special emphasis:

- Concentrate development on high quality cloud masking covering different user needs (probablistic cloud mask/error estimates…)
- Improved aerosol flagging
- Further development of precipitation product

Summary

- Global application
- Microphysics coming
- IASI requirements collection!
- More Satellites to come, interesting also for ocean and aerosol applications
- CDOP2: product development emphasis on Cloud Mask (probablistic/error estimates) and precipitation

- Software package overhaul after more than 10 years with evolving requirements: better and more flexible interfaces, also for using internal PPS functionalities more easily in your own applications

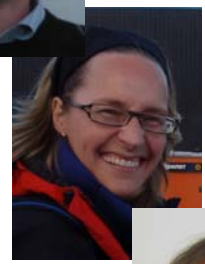
User requirement collection

let us know what you need

and discuss about what you might need!

- **Nowcasting:**
  - Product and quality requirements
  - Satellites you want to process
  - Functionality requirements

- **Any application using PPS (cloud masking ...):**
  - Product and quality requirements
  - Satellites you want to process
  - Functionality requirements on software
  - Input/output/metadata…
  - Anything else….



please use the flip charts set up and talk to us!

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