



Instituto de Meteorologia

# The use of SAFNWC products at *Instituto de Meteorologia* (IM), Portugal

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SAFNWC Product Assessment Review Workshop

Madrid, 17-19 October 2005

- 1) IM experience as beta-user & Installation of SAFNWC software for MSG
- 2) SAFNWC product generation and visualization
- 3) Subjective analysis of some products
  - Cloud Type
  - Dust flag
  - Convective Rainfall Rate
  - Air Mass Analysis

# Experience & Installation

**Beta-user since end of 2002**

**Licensee since June 2004**

## **SUN ws sparc, 5.7, 2 x 400 MHz, 1Gb**

- March 2003 – v0.0
- May 2004 – v0.1
- November 2004 – v1.0

## **LINUX, RedHat 7.3**

- February 2005 – v1.1 – 2.8 GHz, 256 Mb
- July 2005 – v1.1 – 3.0 GHz, 1 Gb

## Contribution of IM as Beta-user

- Test of the 2 beta-versions
- Comments & questions
  - on the help-desk (after February 2003)
  - by e-mail before the help-desk
- 8 SPR (Software Problem Report) resulting in:
  - 4 BRR – Bug Reproduction Report
  - 5 SMR – Software Modification Report
  - 1 DCR – Document Correction Report



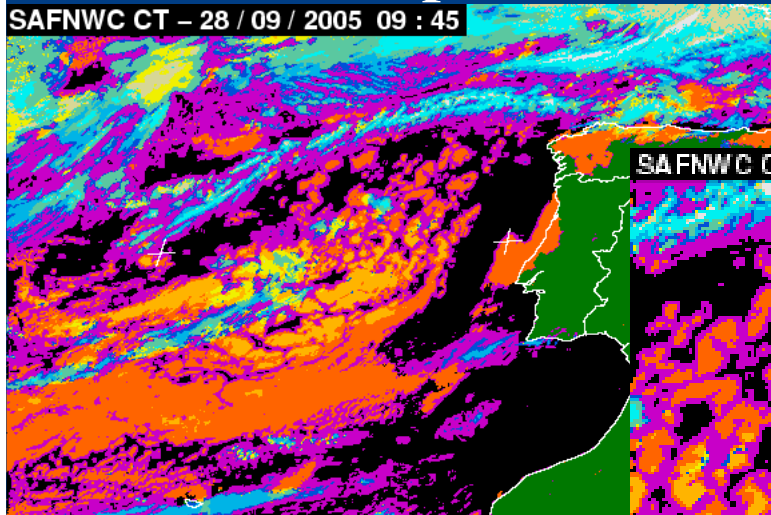
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# SAFNWC Products & Visualization

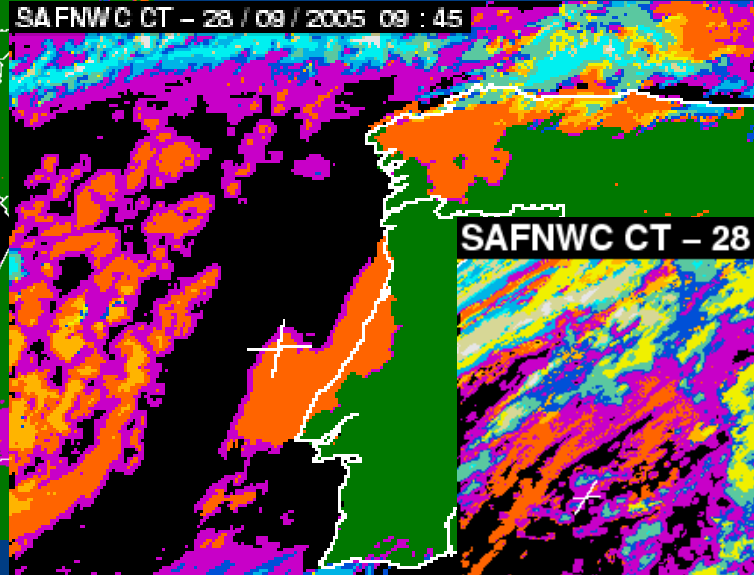
## Forecasting Centre – 3 areas

- hdf5 products

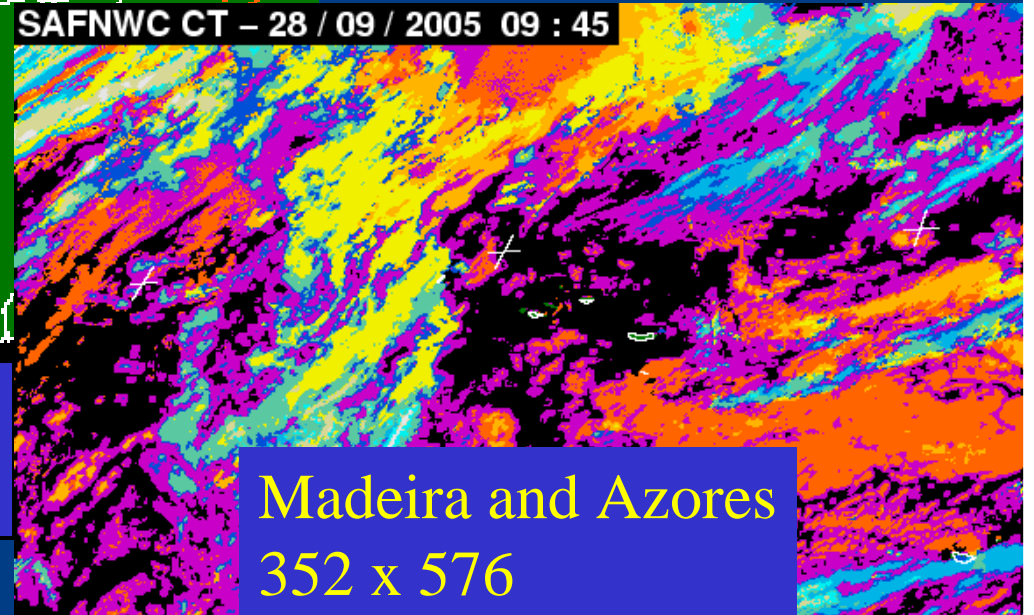
SAFNWC CT – 28 / 09 / 2005 09 : 45



SAFNWC CT – 28 / 09 / 2005 09 : 45



SAFNWC CT – 28 / 09 / 2005 09 : 45



mainland and Madeira  
512 x 576

Zoom mainland  
256 x 256

Madeira and Azores  
352 x 576

## Land Surface Analysis SAF – 4 areas

- Cloud mask & CTTH effective cloudiness
- CT is planned to be used to improve downwelling surface (long wave) fluxes
- TPW may also be used on LST and downwelling surface (long and short-wave) fluxes





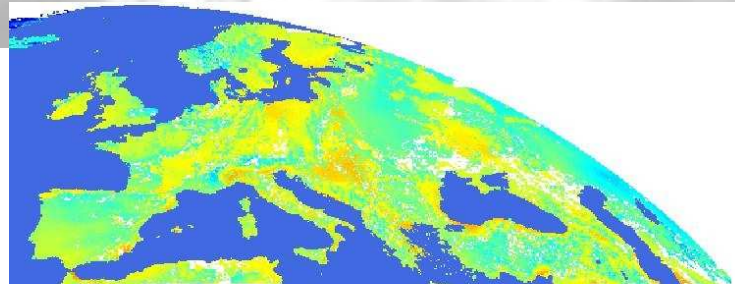
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# SAFNWC Products & Visualization

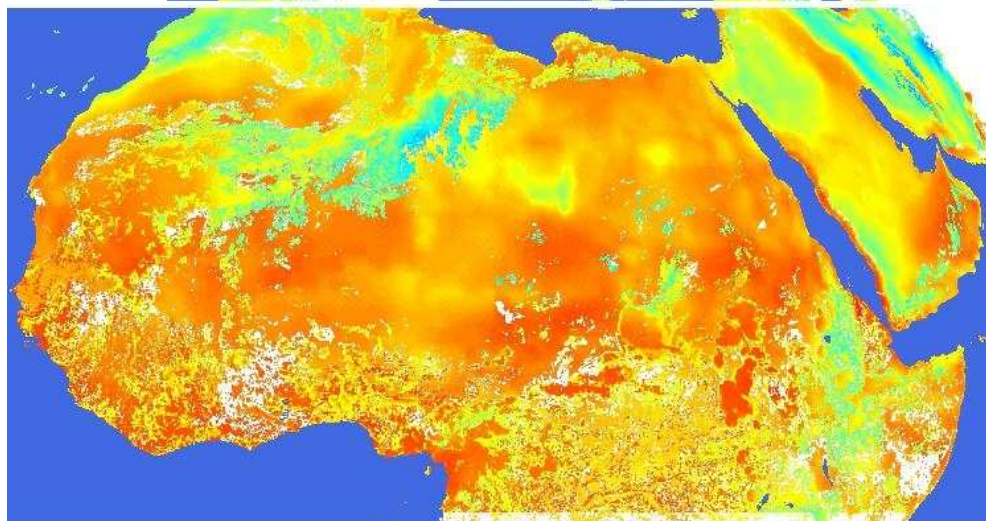
**Cloud Mask for LSASAF**

**LSASAF - LST**

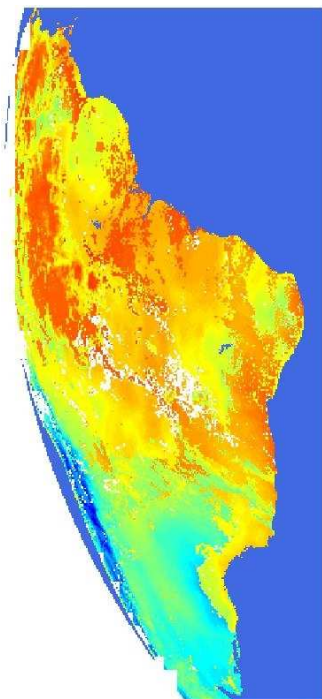
**LSASAF - DSLF**



**Europe**



**Africa**



**South  
America**



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# SAFNWC Products & Visualization

## Products - Intra-net

PRODUTOS - NOWCASTING  
INSTITUTO DE METEOROLOGIA



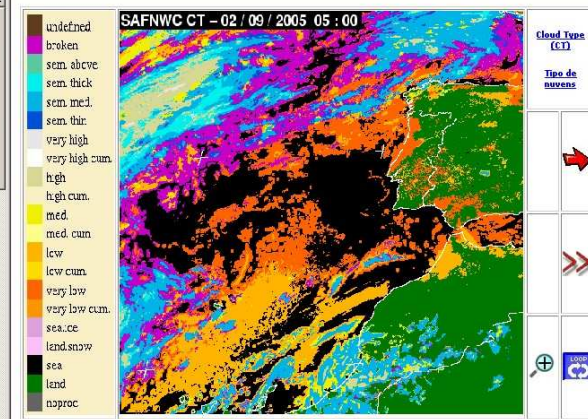
Produtos da SAF Nowcasting  
(v1.0)  
[CAPT](#) [LSASA](#) [TESTE\(v1.1\)](#)

[Imagens Meteosat/MSG](#)  
[Produtos da OSI SAF](#)  
[RADAR](#)  
[RAIOS](#)  
[Outros Produtos](#)  
[Formação](#)  
[NWP](#) (RELEVÂNCIA: B1)

atualizado em 12/08/2005  
[www.meteo.pt](#) [www.eumetsat.de](#) [nwcsafnm.es](#)

Produtos SAF Nowcasting [Met/MSG Outros](#) [RAIOS RADAR](#) [FORMAÇÃO OSISAF](#) [LSASAF NWP](#)

Validação & Casos de Estudo  
>>> v1.1 <<<  
CONT&M&D  
NUVENS  
MÁSCARA TIPO  
TEMP. TOPO  
PRESSÃO TOPO  
ALT. TOPO  
POEIRAS  
CINZAS VULC.  
PRECIPITAÇÃO & INSTABILIDADE  
FRACA / MOD. FORTE  
TAXA (CONVEC.)  
TPW  
PW > 850 hPa  
PW 470 - 850 hPa  
PW < 470 hPa  
TPW - CONTROLO  
INDICE INSTAB.  
TEMPESTADES  
VENTO



Deteccção de nevoeiros por satélite



Produtos SAF Nowcasting [Met/MSG Outros](#) [RAIOS RADAR](#) [FORMAÇÃO OSISAF](#) [LSASAF NWP](#)

>>> v1.0 <<<  
Validação & Casos de Estudo  
operacional:  
ASII  
ZAMS/FM/INMI  
RDT  
METEOPRANCE  
EPS/NDAA - SMH  
em teste:  
NUVENS  
MÁSCARA TIPO  
FASE  
TEMP. TOPO  
PRESSÃO TOPO  
ALT. TOPO  
POEIRAS  
CINZAS VULC.  
PRECIPITAÇÃO & INSTABILIDADE  
FRACA / MOD. FORTE  
TAXA (CONVEC.)  
TPW  
PW > 850 hPa

VALIDAÇÃO & CASOS DE ESTUDO

Limitações (v1.0)
Comparação entre versões (CMA, CT, CTH, FC e CER)
Comparação entre versões (TPW, LPW, SAI, HRW, ASII, RDT e AMA)
Incêndios - Julho/Agosto 2005
CMA e CT - Comparação entre as versões 0.1 e 1.0
CT - Desaparecimento espelho de nuvens (muito) baixas ao nascer/pôr-do-sol (v1.0)
CT - em situação de nevoeiro gelado? e smelcos? (v1.0)
Poeiras - CMA (v1.0&1.1)
Nevoeiros - CT (v1.1) e RGE
CTH - Validação Altitude do Topo das Nuvens com RADAR e LIDAR (v1.0) TABELA com resumo
CER - Falso alarme com nuvens altas (v1.1)
CER - Frente Quente (v1.1)
CER - Comma e Frente Fria (v1.1)
CER - Comparação com EMA e RADAR (v1.1)
TPW - Loop em situação de convecção (exemplo INM, v1.0 [igual a v1.1])
AMA - Validação (v1.1)





# Cloud Type (CT)

## Examples analysed

- Low and Very Low clouds
- Summer and Winter events

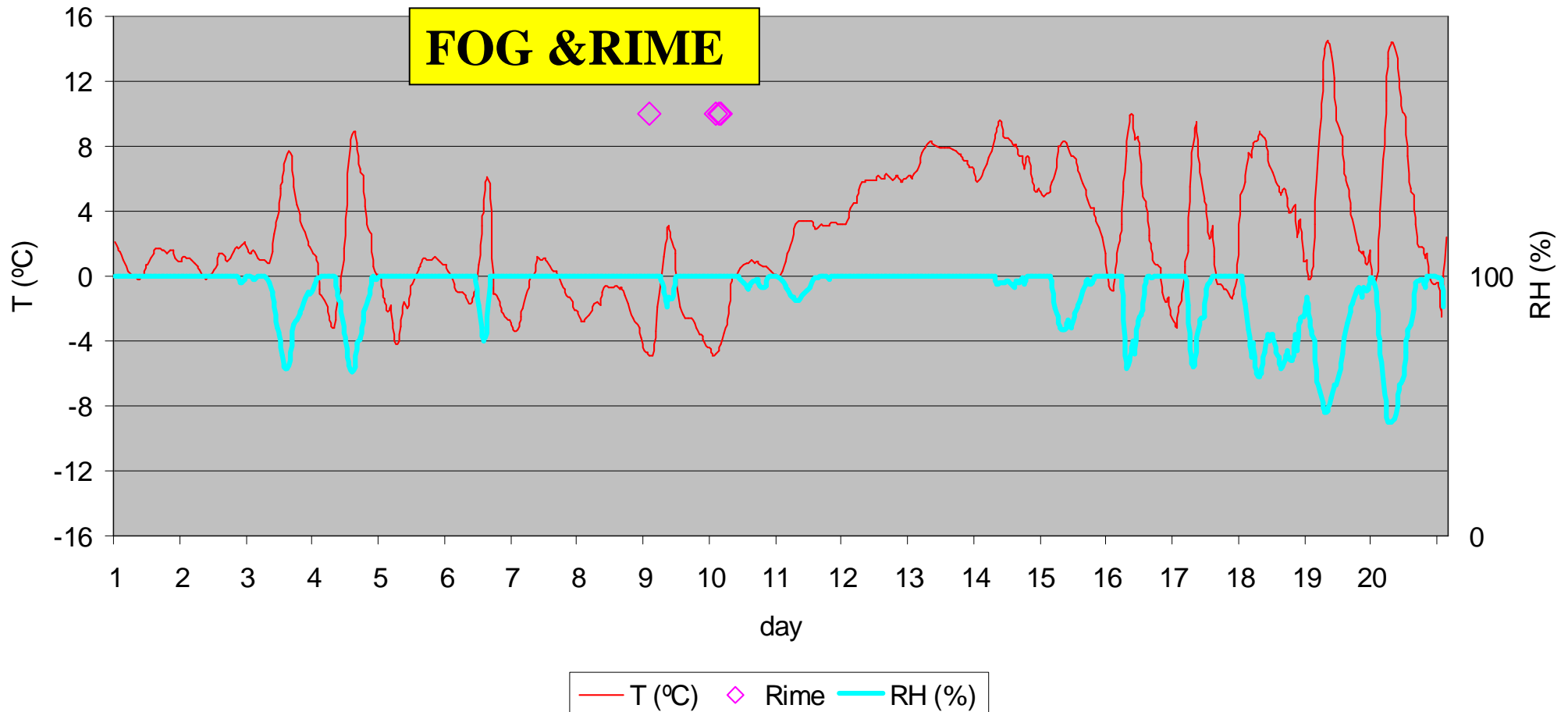


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# Cloud Type (CT)

## (Very) Low Clouds (or fog) – Winter

Bragança - January 2005





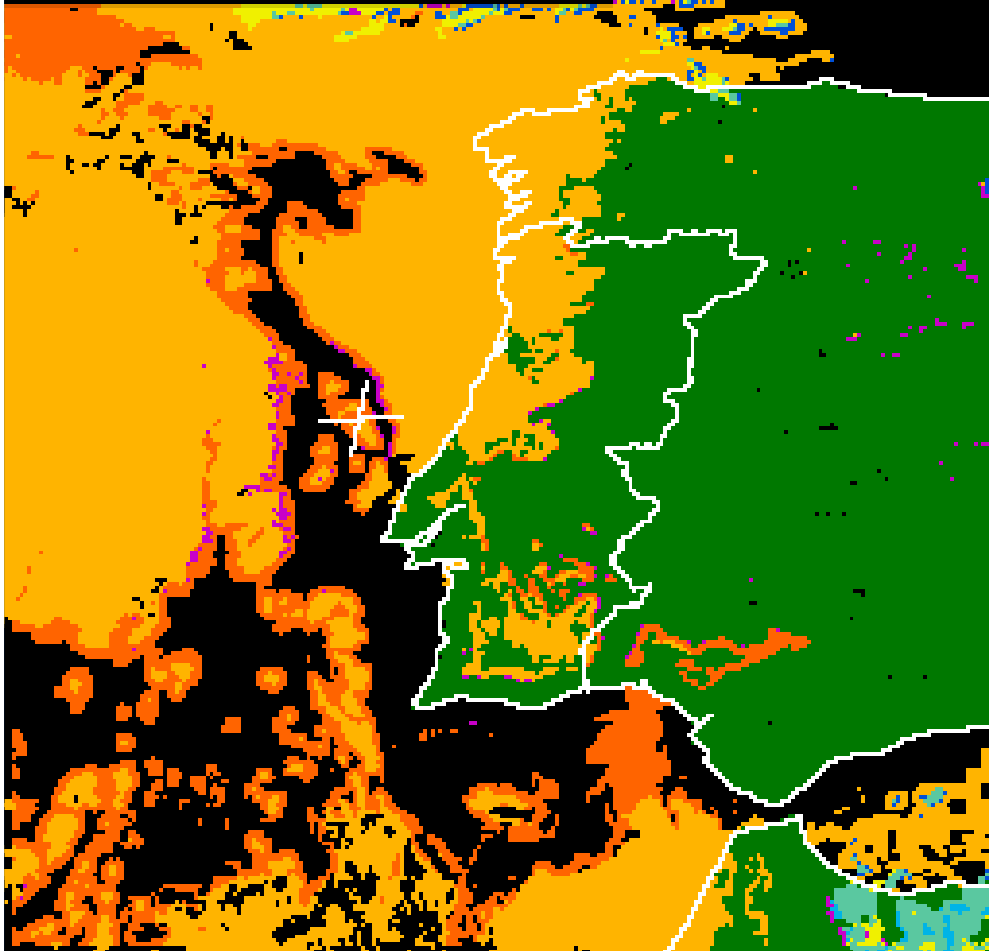
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# Cloud Type (CT)

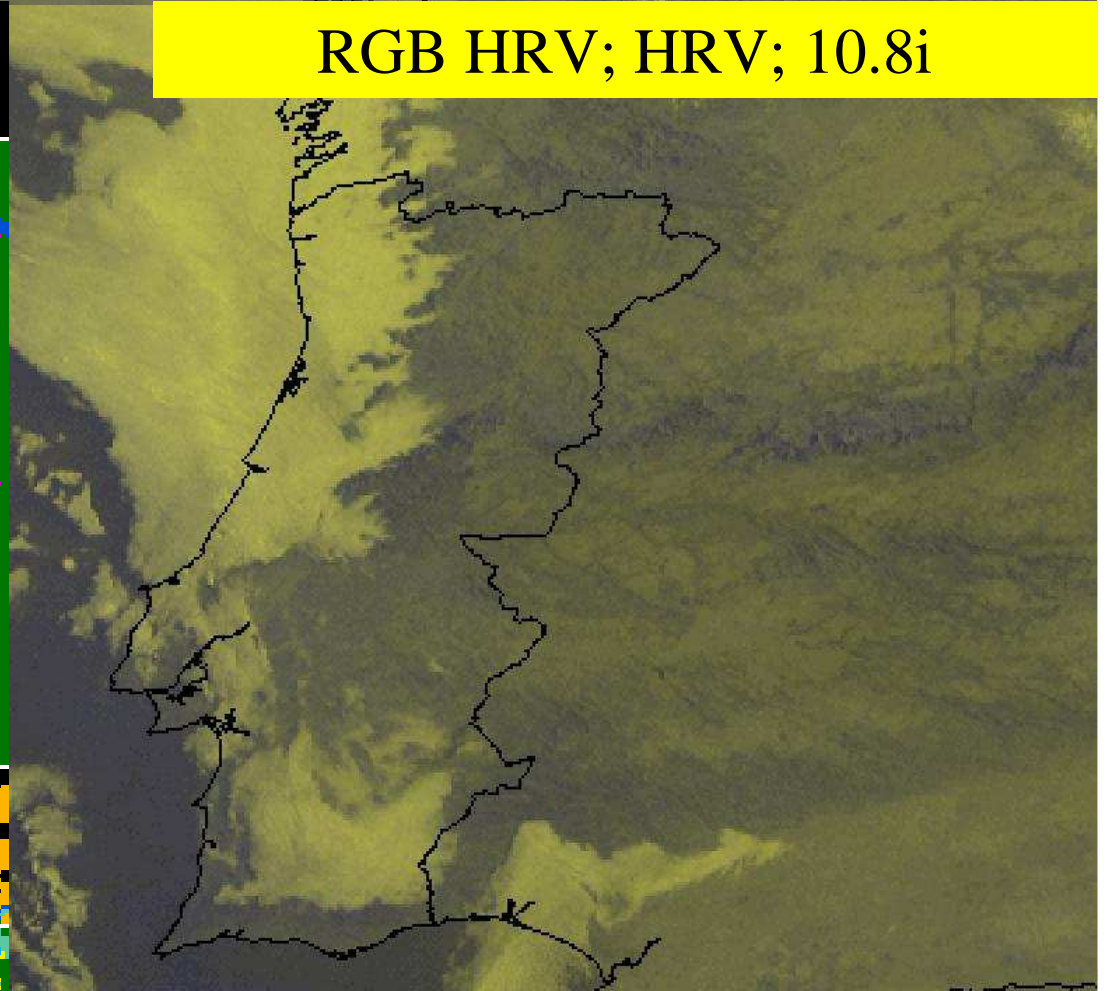
## (Very) Low Clouds (or fog) – Summer

0615 UTC – DAY

SAFNWC CT – 14 / 07 / 2005 06 : 15



RGB HRV; HRV; 10.8i



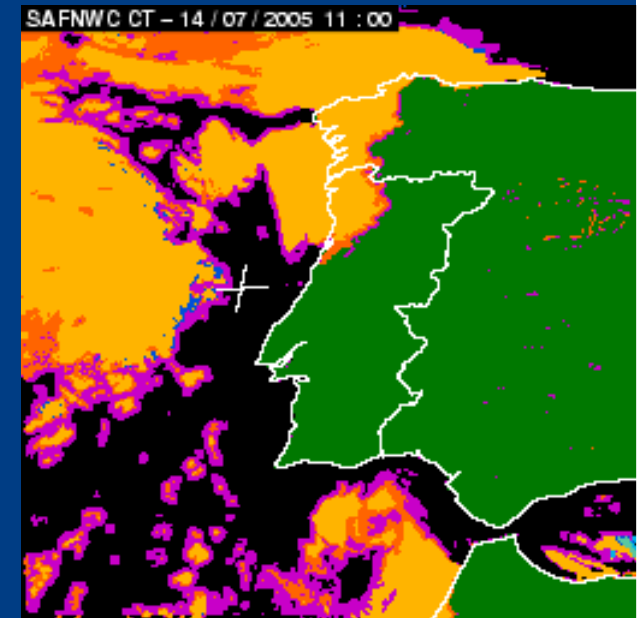
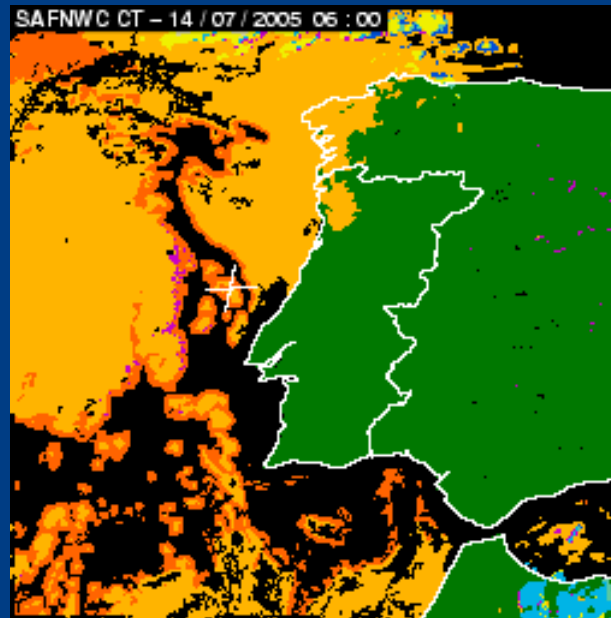
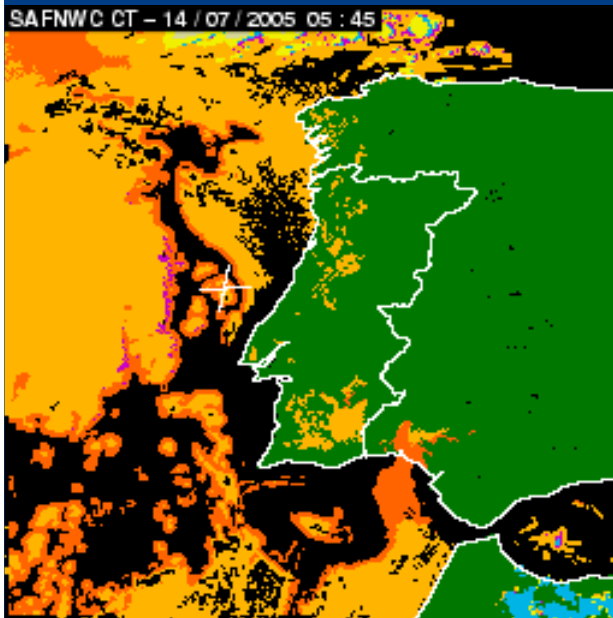
# Cloud Type (CT)

## (Very) Low Clouds (or fog) – Summer

**TWILIGHT**

**AFTER-TWILIGHT**

**END OF MORNING**



**SPURIOUS  
DISSAPPEARING OF  
(VERY) LOW CLOUDS**

**(VERY) LOW CLOUDS  
THAT “APPEAR “ FIRST**

**CORRESPOND TO FOG  
THAT PERSISTS  
LONGER**



# Cloud Mask (Cma) - Dust Flag

## Examples analysed

- Dust events with version 0.1 and 1.1





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# Cloud Mask (Cma) - Dust Flag

**22 / 07 / 2004**

**1215-1800 UTC**

**MODIS - 25 / 07 / 2004**

**V0.1**



10 de Novembro  
de 2011



**Abs. Maximum Temp.  
in Faro (Algarve): 44.3°C**

<http://earthobservatory.nasa.gov/NaturalHazards/>

# Cloud Mask (Cma) - Dust Flag

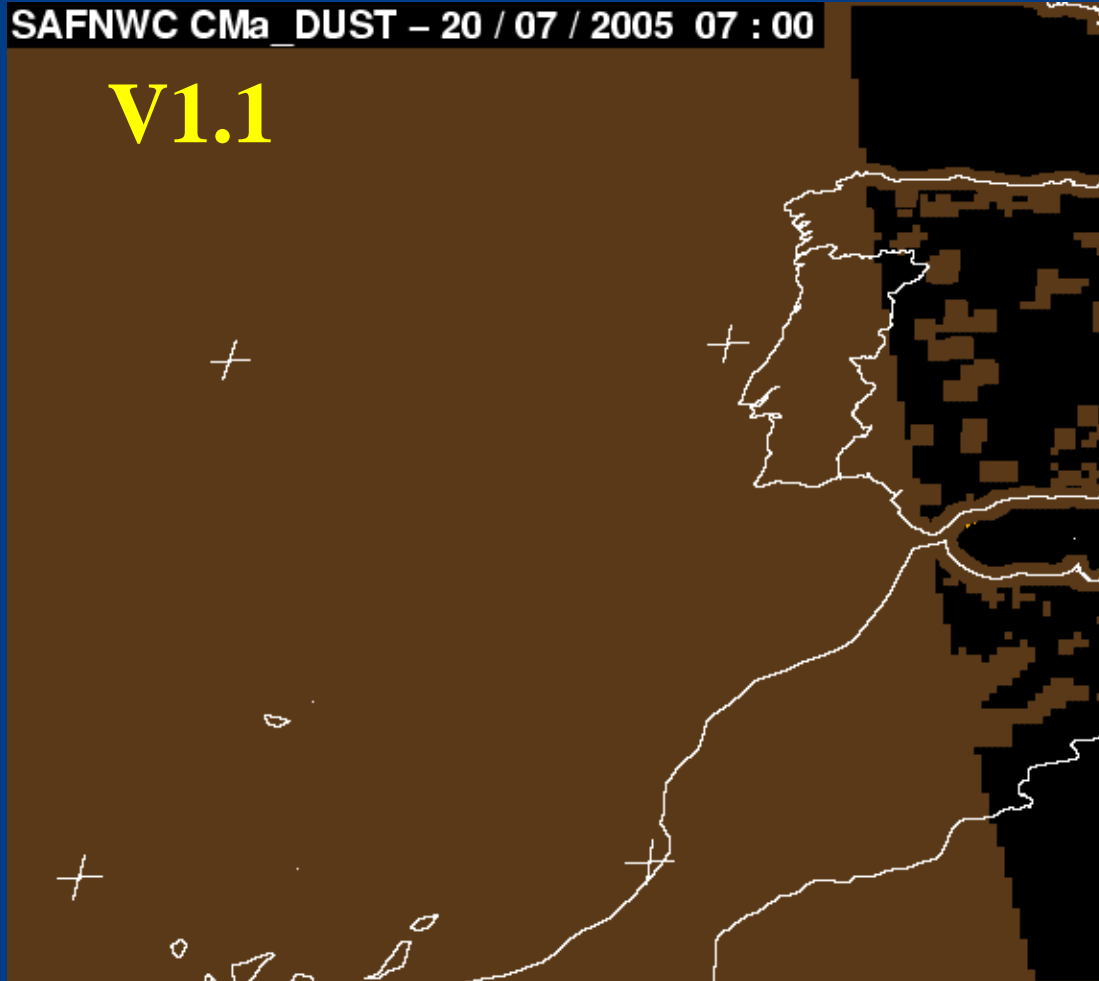
20 / 07 / 2005

0700-1900 UTC

*(1 year later)*

SAFNWC CMa\_DUST - 20 / 07 / 2005 07 : 00

V1.1



10 de Novembro  
de 2011

- Spurious disappearing in the peak of the day;
- Dust is “less dense” than in v0.1
- Can be related to thresholds change from v0.1 to v1.0 to prevent false detections
- Maybe some false detections are preferable as they should not be so spatially consistent



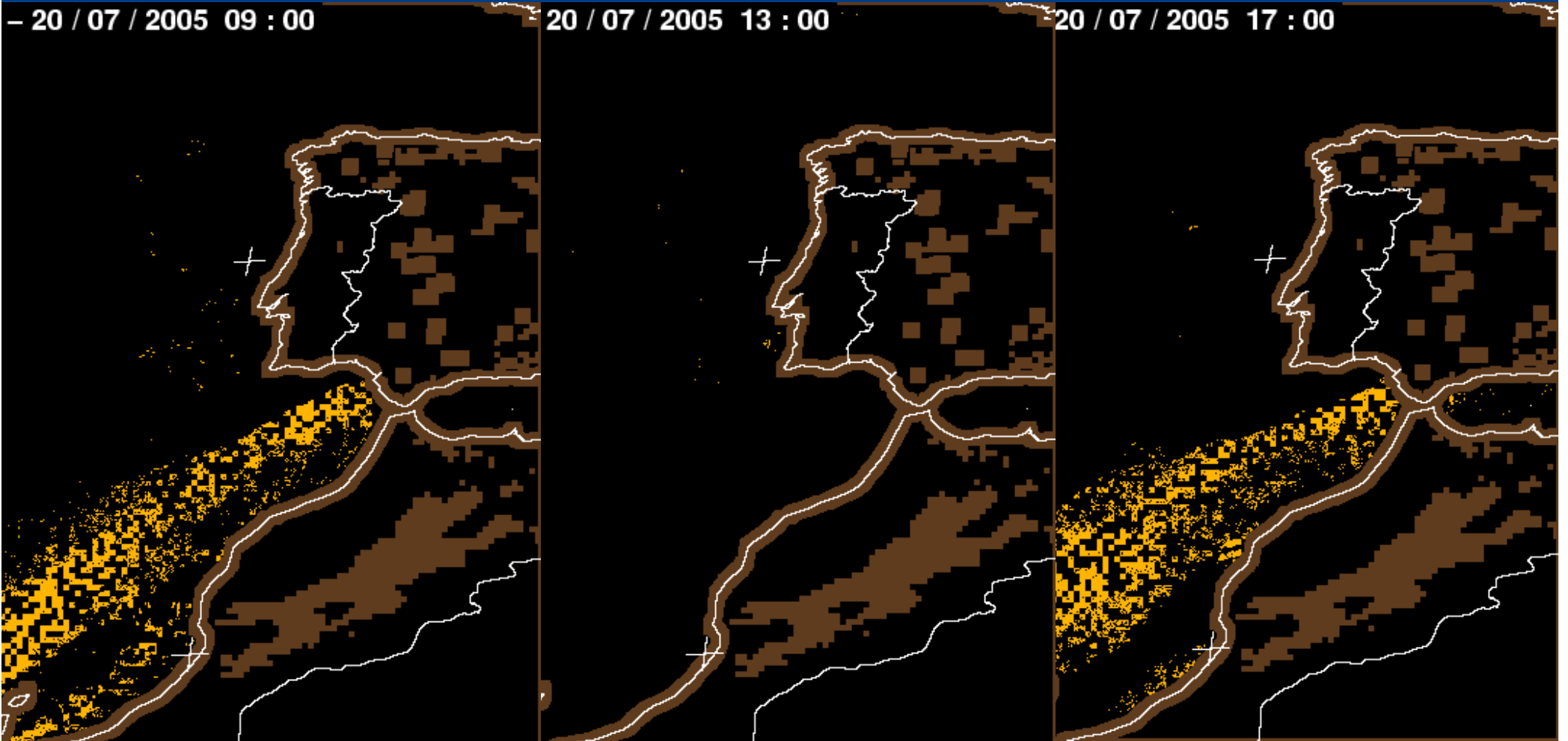
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# Cloud Mask (Cma) - Dust Flag

- 20 / 07 / 2005 09 : 00

- 20 / 07 / 2005 13 : 00

- 20 / 07 / 2005 17 : 00



*Image can be misleading if only 3-hour loops are displayed*

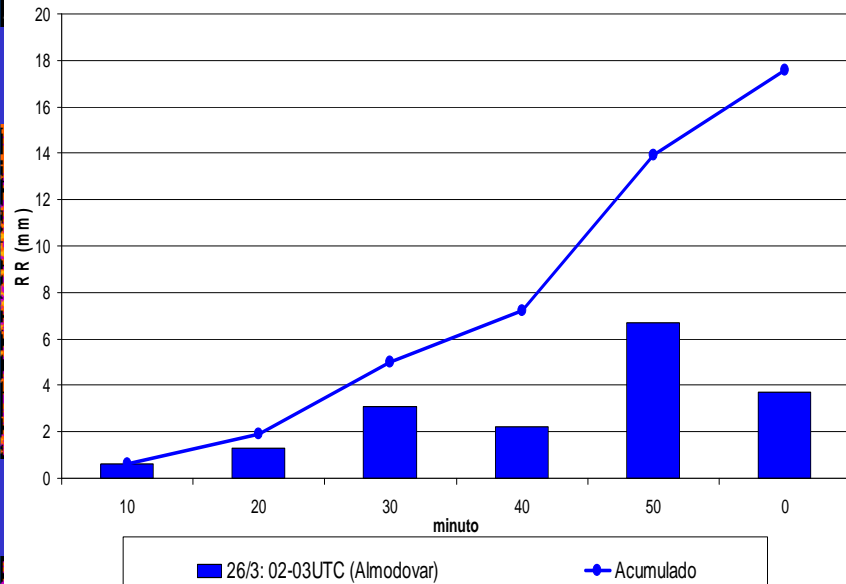
# Convective Rainfall Rate (CRR)

## Examples analysed

- Only 10 cases of precipitation  $> 10$  mm in 1 hour in AWS
- Between 26 March – 19 June 2005
- CRR with no corrections
- Cases of “Pure” Convection
- & embedded Convection (cold front and a comma)

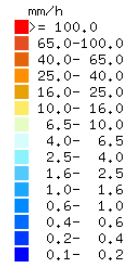


# Convective Rainfall Rate (CRR)

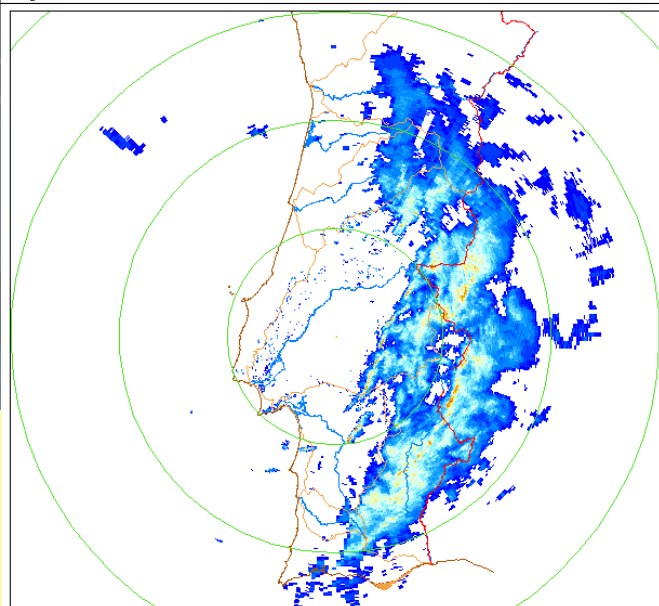


File : 2005032602502240.pcr  
 Type: PCAPPI(R)  
 Range: 300,0 km

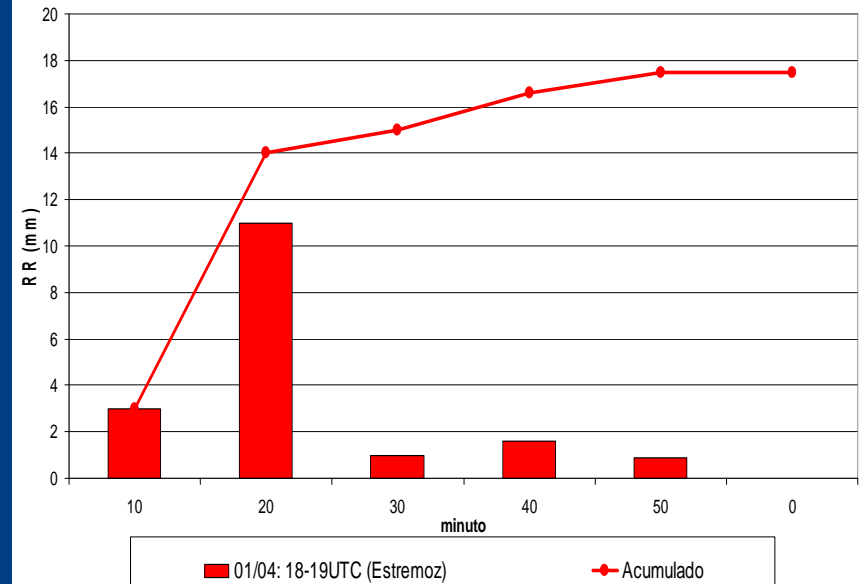
26.03.2005  
 02:50:22



CRUZ\_DO\_LEAD  
 R:300km, RES:1,000  
 H : 1,000 km  
 PRF: 365 / 0  
 TS: 8  
 RS: 4  
 NO CC  
 Rainbow 3.3  
 (c)Gematronik GmbH

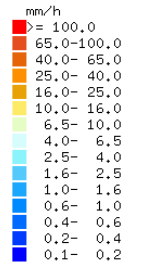


COMMA  
 VS  
 COLD  
 FRONT

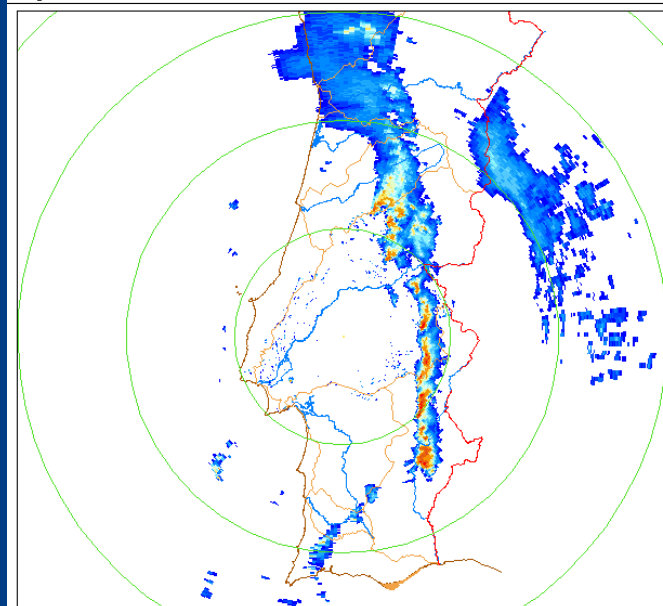


File : 2005040118103217.per  
 Type: PCAPPI(R)  
 Range: 300,0 km

01.04.2005  
 18:10:32



CRUZ\_DO\_LEAD  
 R:300km, RES:1,000  
 H : 1,000 km  
 PRF: 365 / 0  
 TS: 8  
 RS: 4  
 NO CC  
 Rainbow 3.3  
 (c)Gematronik GmbH





# Air Mass Analysis (AMA)

## Subjective comparison with NWP

- Using an empirical criteria based on wet bulb pseudo-potential temperature at 850 hPa ( $\theta_{850}$ ):

Artic:  $< 6^{\circ}\text{C}$

Polar:  $6-12^{\circ}\text{C}$

Tropical:  $12-18^{\circ}\text{C}$

Equatorial:  $>18^{\circ}\text{C}$

- Time - Day, Night, Twilight
- Surface – Sea & Land
- Regions - Atlantic, Iberian Peninsula, North of Africa

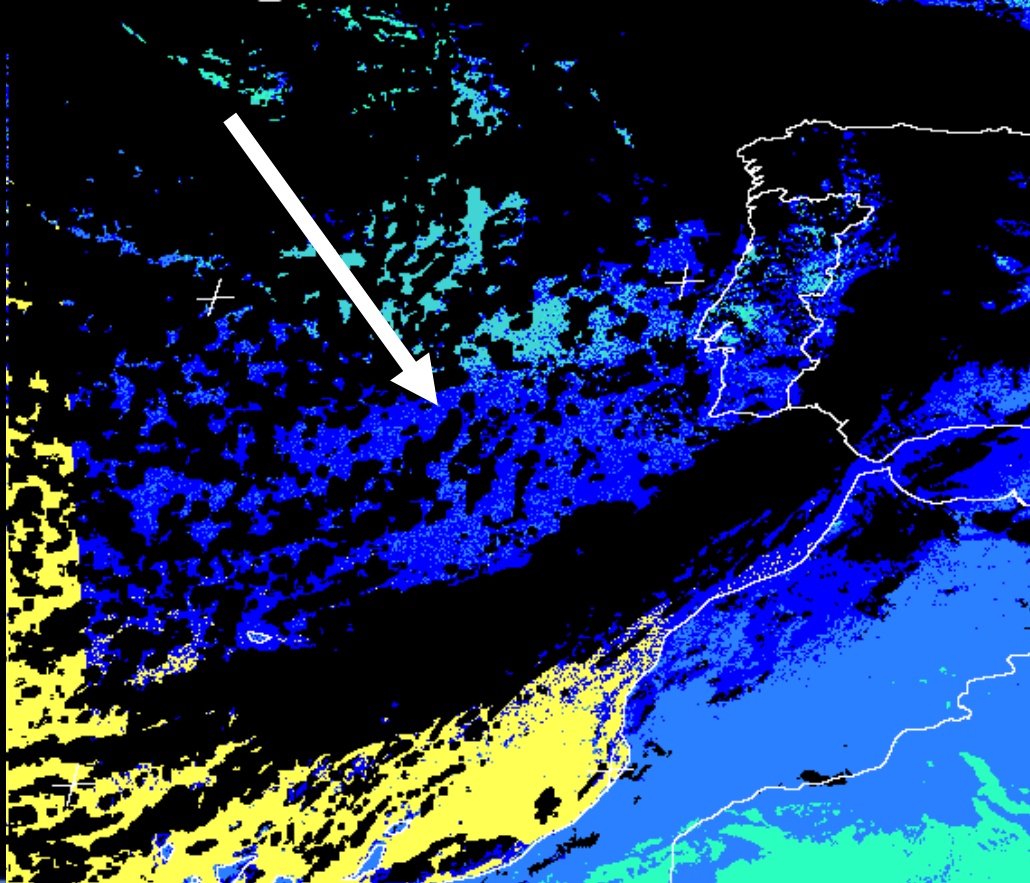
# Air Mass Analysis (AMA)

## Over Sea – Day & Twilight

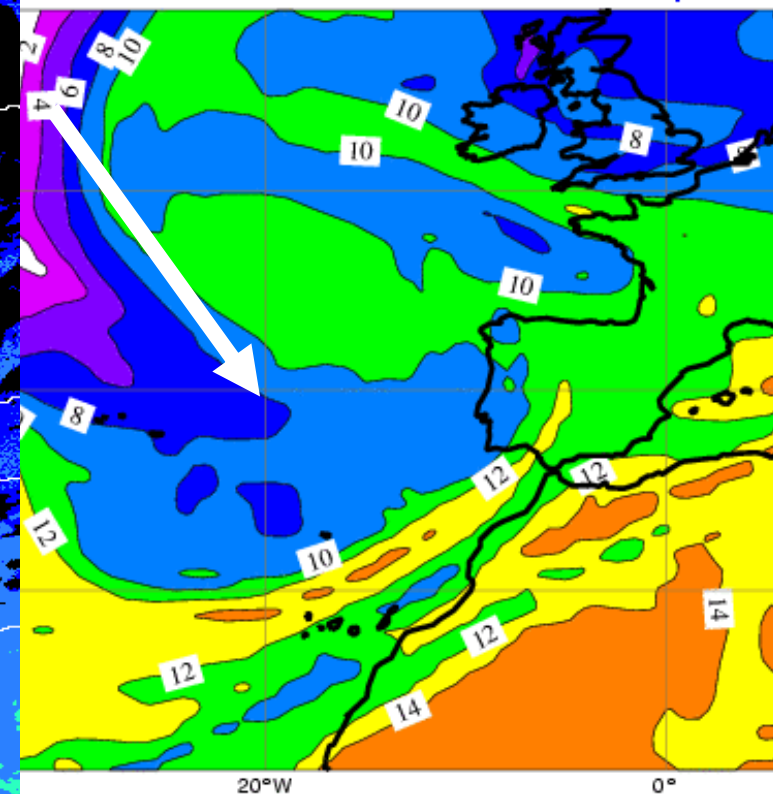
- AMA's Polar Air *agrees* with teta850



SAFNWC AMA\_CL - 26 / 03 / 2005 05 : 45



/F 20050326 0600UTC step=0



20°W

0°

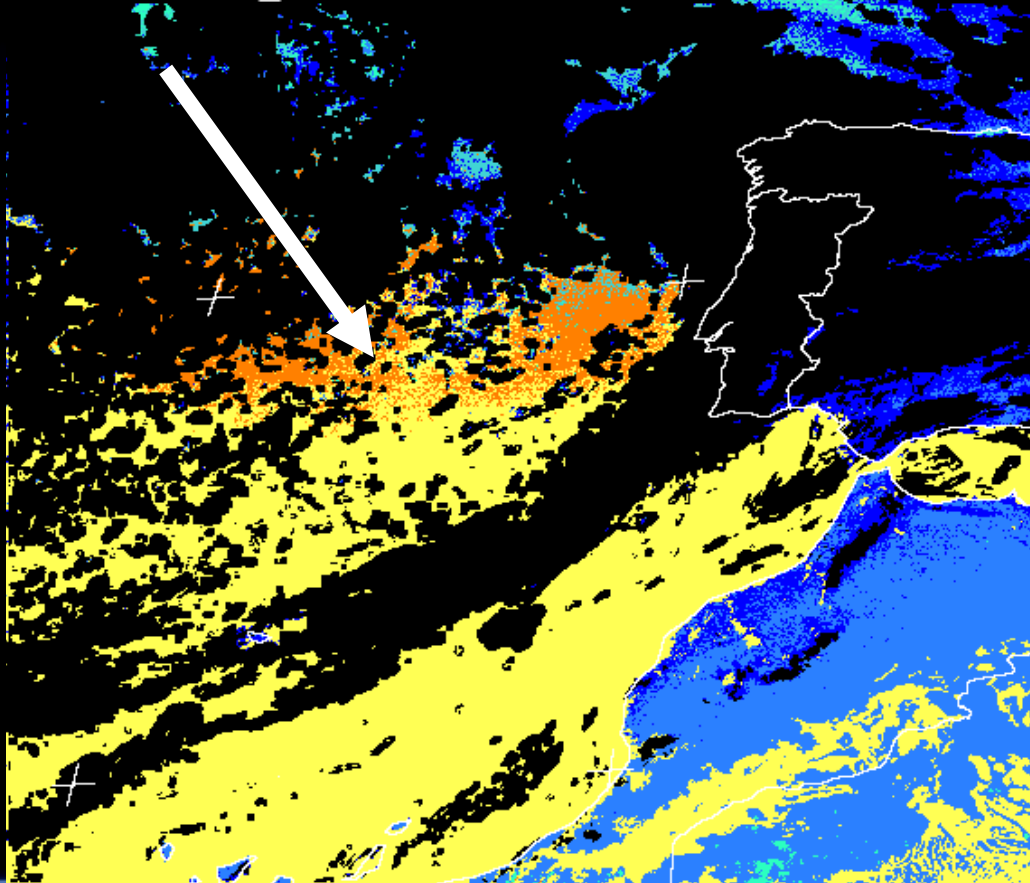
# Air Mass Analysis (AMA)

## Over Sea - Night

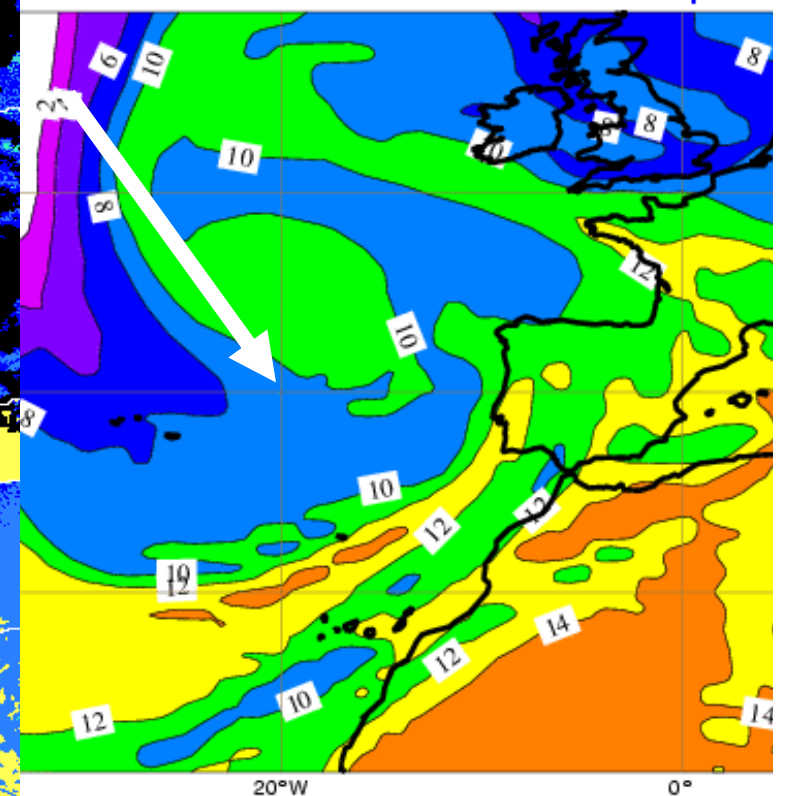
- AMA's Tropical Air does *not agree* with teta850



SAFNWC AMA\_CL - 26 / 03 / 2005 00 : 00



VF 20050326 0000UTC step=0





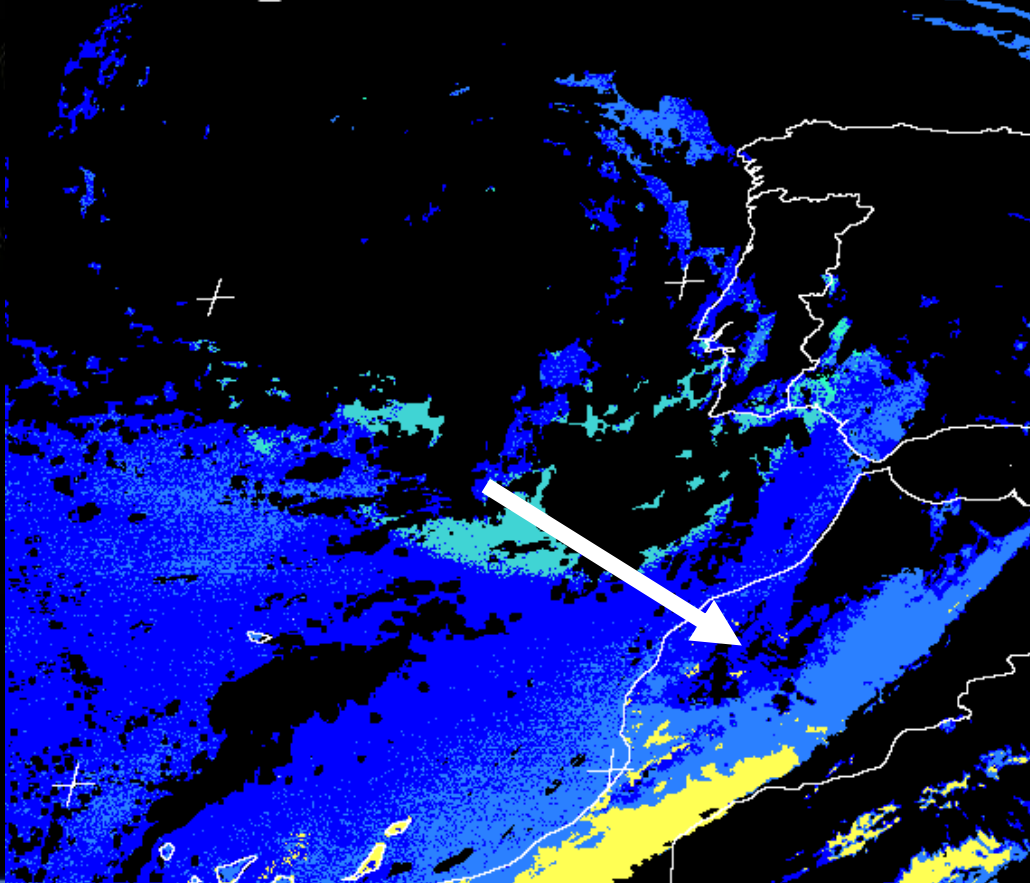
# Air Mass Analysis (AMA)

## Over Land

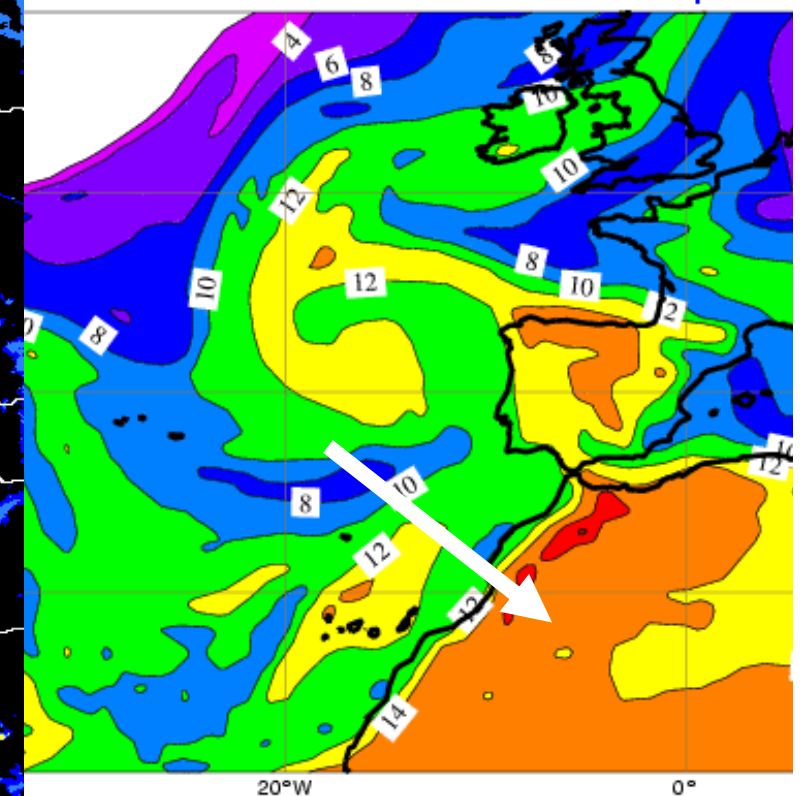
- AMA classifies Polar Air over North of Africa when according to  $t_{850}$  the air is Tropical



SAFNWC AMA\_CL - 01 / 04 / 2005 18 : 00



VF 20050401 1800UTC step=0



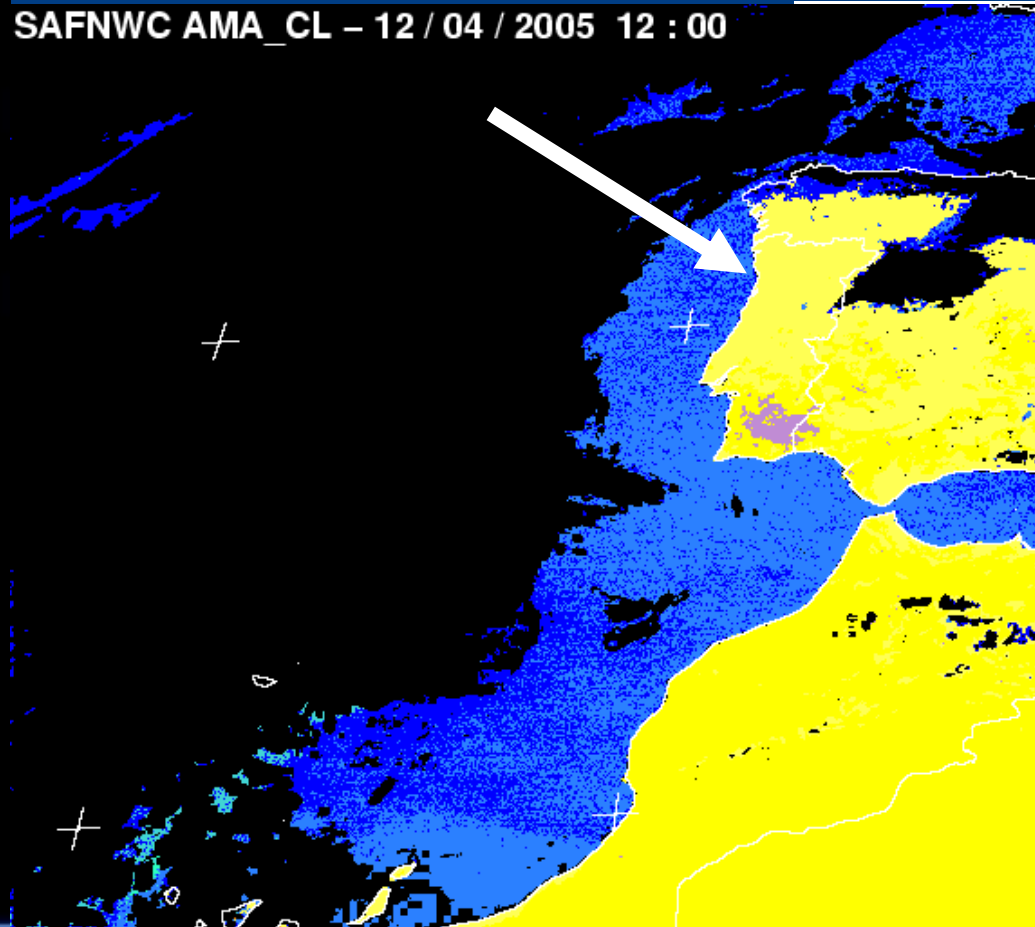
# Air Mass Analysis (AMA)

## Over Land

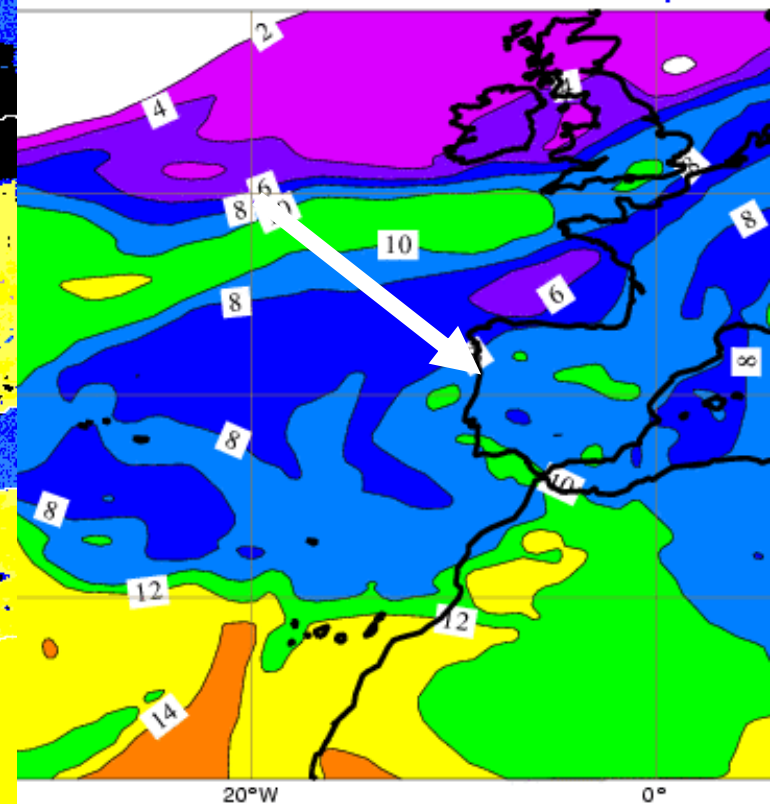
- AMA classifies Tropical Air over Iberian Peninsula when according to  $\theta_{850}$  the air is Polar



SAFNWC AMA\_CL - 12 / 04 / 2005 12 : 00



F 20050412 1200UTC step=0





## Remarks and suggestions - CT and Dust:

- 1) Spurious disappearing of (very) low clouds in twilight could be solved with (very) low cloud **memory** from previous CT checked against **visible** channels
- 2) First clouds “appearing” in CT after twilight may help discriminating **thick fog** from **thin fog** ?
- 3) Maybe some **false detections** of dust are preferable as they should not be so spatially consistent and are easy to identify “by eye inspection“

## Remarks and suggestions – CRR and AMA:

- 1) Precipitation in **excess of 10 mm in 1h** may correspond to **CRR=0** if precipitation is distributed along the hour
- 2) CRR ~ **3-7 mm/h** can correspond to **10-20 mm (in 1h)** in AWS (when precipitation is concentrated in some minutes)
- 3) AMA is sensible to daily variation of Surface Temperature - **LST** from LSASAF could be used as input;

## **Suggested Improvements for software:**

- 1) Land/sea mask to reduce time for LSASAF products;
- 2) Possibility of processing slots after needed segments are available;
- 3) Possibility to use forecasts with steps  $> 24\text{h}$ , in case recent NWP data is missing.



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# SAFNWC Products & Visualization

**Thank You**