EUMETSAT
NWC SAF
SUPPORT TO NOWCASTING AND
VERY SHORT RANGE FORECASTING

AEMet
Agencia Estatal de Meteorología

The Nowcasting SAF Products and Services: Recent Improvements in the New SW Packages PPS v2018 and GEO v2018 and Future Plans

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3rd European Nowcasting Conference

24 - 26 April 2019

AEMET HQ, Madrid, Spain

Outline

- Nowcasting SAF (NWC SAF) concept
- NWC SAF services
- Improvements in new NWC SAF SW packages.
  - ✓ NWC SAF/GEO v2018
  - ✓ NWC SAF/PPS v2018
- NWC SAF future plans

NWCSAF concept

- ✓ To ensure the optimum use of meteorological satellite data in Nowcasting and Very Short Range Forecasting:
- ✓ The NWC SAF develops and maintains SW Packages (for GEO and POLAR Satellites) freely distributed to registered users to generate satellite products with a direct application in Nowcasting
- ✓ User support
- ✓ Training

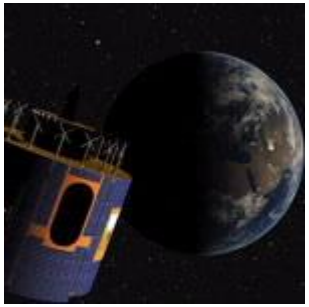
nwc-saf.eumetsat.int

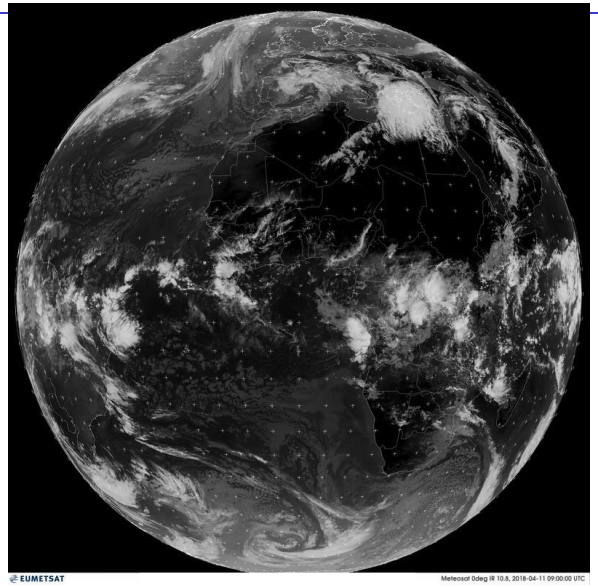
NWC SAF: From Space to NWC Products

EUMETSAT: Nowcasting SAF: from Space to Nowcasting Products

Space/Ground Segment

Satellite



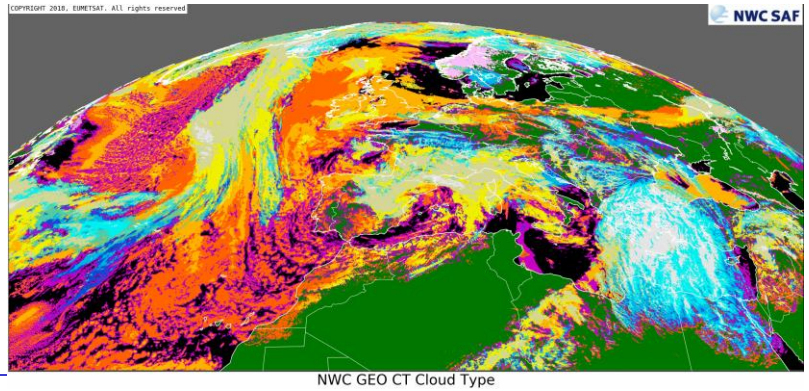


Radiances

+

NWP

NWC SAF Software



NWC SAF Products

NWC GEO CT Cloud Type

NWC SAF Consortium

Leading Entity. Winds, Precipitation and stability GEO products

Cloud and Convection GEO products

Extrapolation and meteorological features detection GEO products

PPS SW package. Clouds and precipitation products for polar satellites

GEO/PPS product comparison. Prototyping future MTG lightning products

NWC SAF services. (nwc-saf.eumetsat.int)

- Register as a user (free and online)
- Access to the NRT NWCSAF GEO and PPS product images
- Access to GEO product images archive
- Some general information and documentation
- After registration:
  - ✓ Download NWCSAF SW and other tools
  - ✓ User support via ticketing system
  - ✓ Broader information and documentation

New NWC SAF Software Packages

Geostationary Satellites:

GEO v2018, available since February 2019

Applicable to MSG data, Himawari, GOES-N (limited to a few products)

Continuous monitoring, space resolution and illumination conditions good for low and middle latitudes

Polar Satelites:

PPS v2018: available to users since January 2019

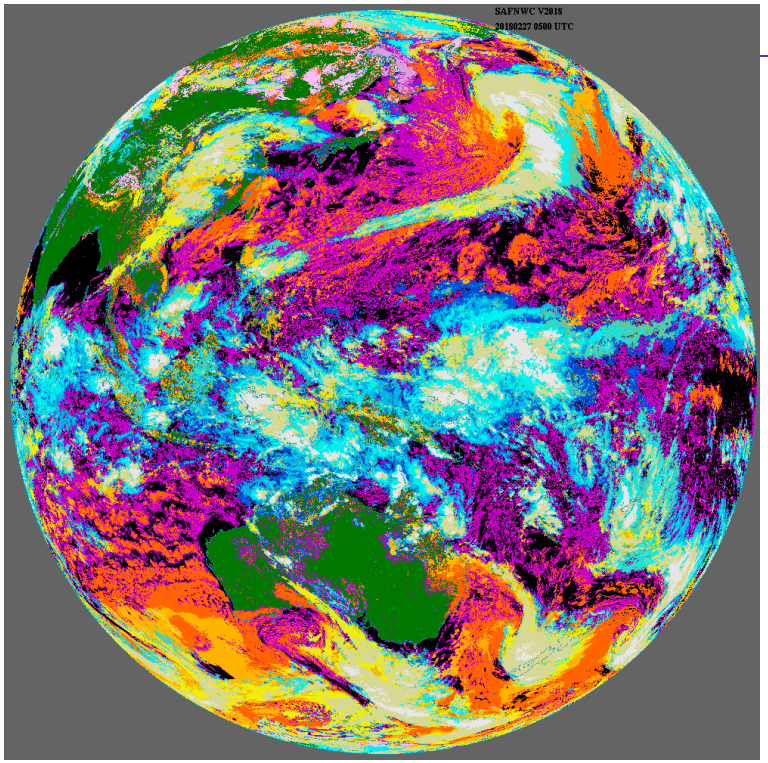
Process data from the joint polar system (EUMETSAT and NOAA polar satellites)

Relatively good coverage for high latitudes

New SW package: GEO v2018

- Available since 14 Feb 2019
- What is new:

Adaptation to Himawari8



NWC SAF products can be generated with Himawari data:

- Cloud products and HRW and RDT-CW are fully validated for Himawari
- iSHAI product has been preliminary validated for Himawari
- CI, Precipitation and ASII products are only technically adapted to Himawari

Exemple of CT 27 February 2018 5UTC

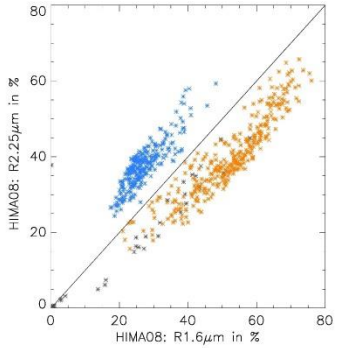
Adaptation to Himawari8: A preparation for MTG

Himawari has some new channels similar to MTG

NWC SAF Cloud Products v2018 make use of the new channels

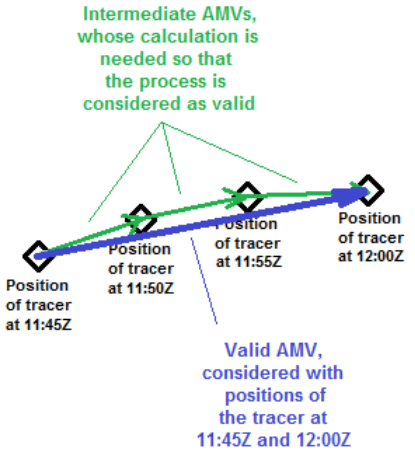
Example:

Use of 2.25 µm to identify water from ice clouds



Himawari has higher spatial/temporal Resolution similar to MTG

NWC SAF HRW v2018 has a new option "mixed scanning processing" very useful with high resolution images and Rapid scan imaging



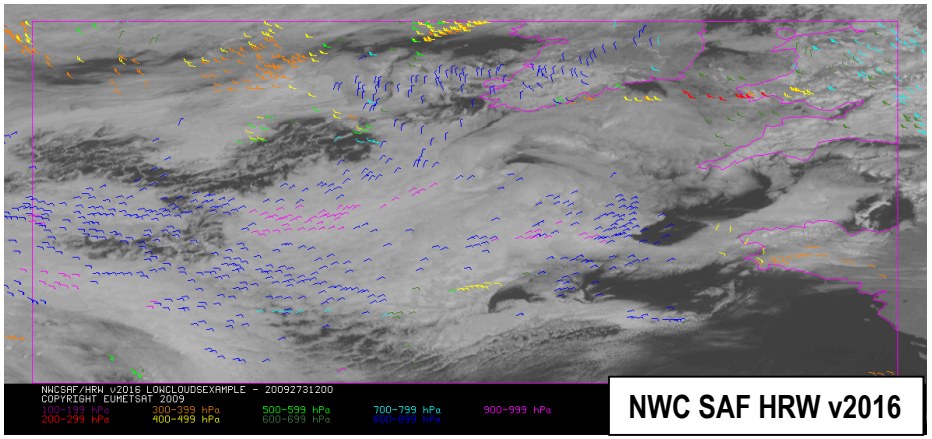
Option to increase the spatial density of AMV´s at low levels

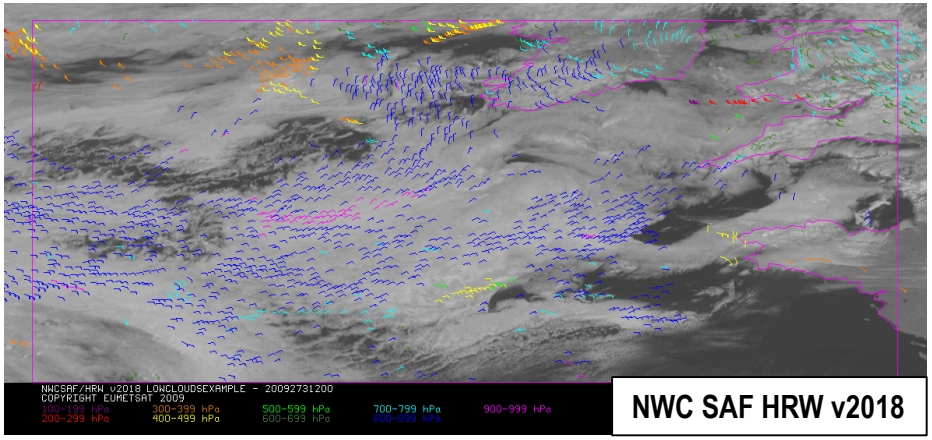
Distribution of AMVs in the different layers
High/Medium/Low:

HRW v2016:
61%/25%/14%

HRW v2018:
52%/25%/23%

Better characterization of the winds in the different levels of the troposphere



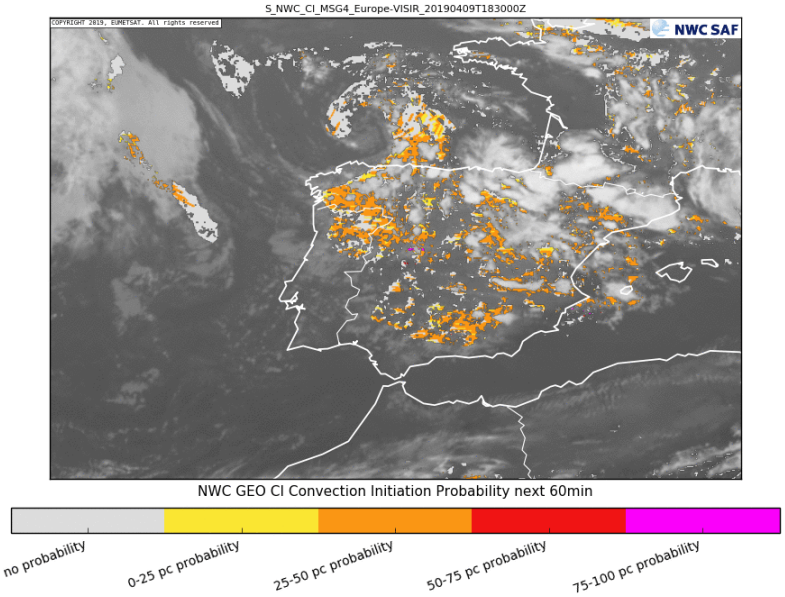


NEW/UPGRADED products in GEO v2018

CI Convection Initiation: Probability of a cloudy pixel to become convective

- **Technical and scientific improvements**
- **Quantitative validation (collaboration with TROPOS group)**

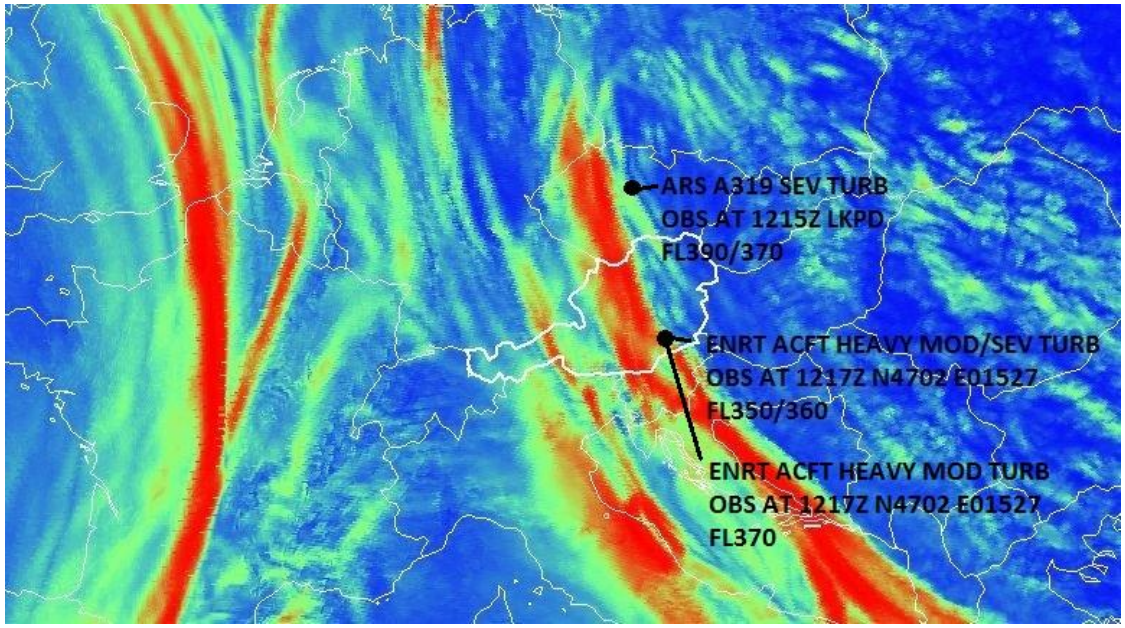
UPGRADED from demonstrational to pre-operational product



See Poster 5
"The CI and RDT NWC SAF Convection products"

NEW/UPGRADED products in GEO v2018:

ASII-TF: probability for occurrence of tropopause folding
UPGRADED from demonstrational to operational product



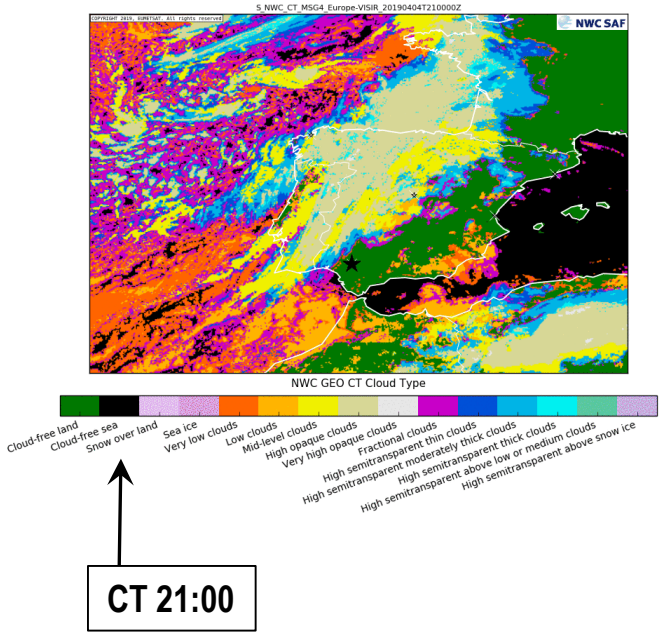
Red areas: tropopause folding → High Probability Turbulence
Black dots: position of the reported turbulence

Applications in Aviation

NEW/UPGRADED products in GEO v2018

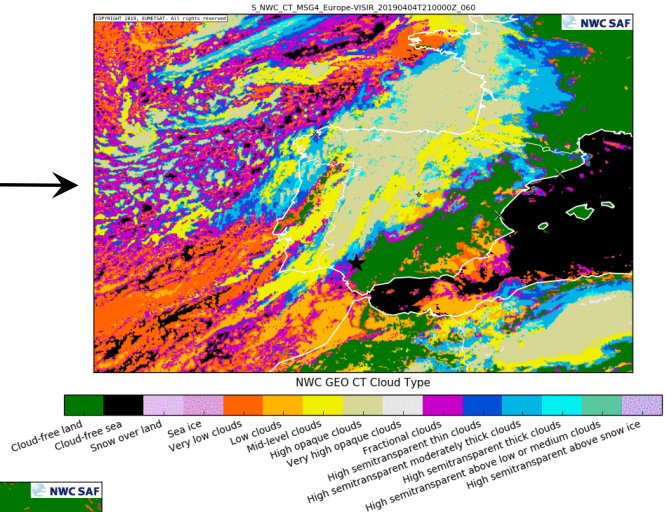
EXIM product: extrapolation of MSG images and NWC SAF products using the NWC SAF HRW winds

UPGRADED from demonstrational to pre-operational product

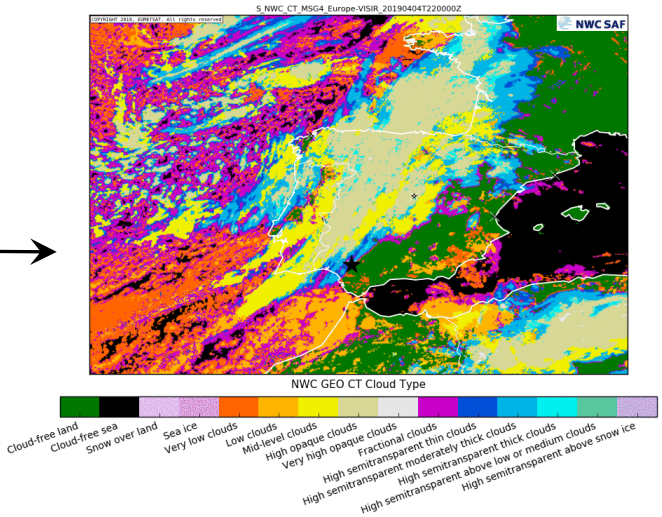


CT 21:00

Extrapolated product
21:00 → 22:00



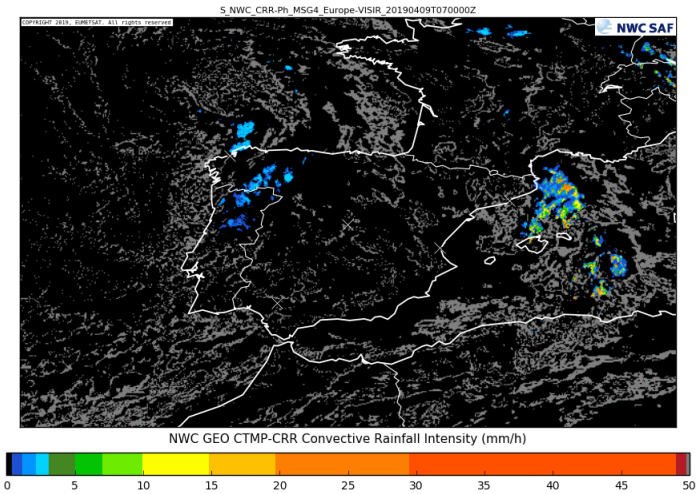
CT 22:00

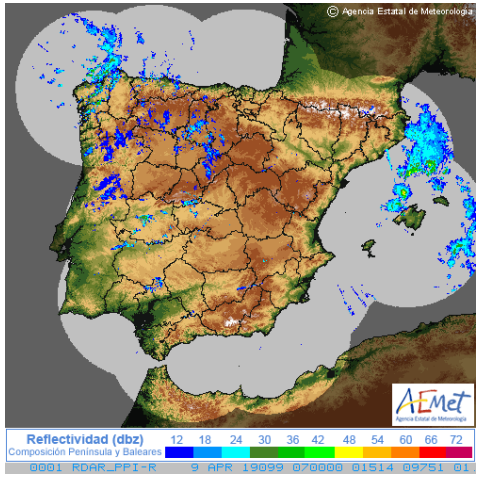


Cloud Type
4 April 2019

NEW/UPGRADED products in GEO v2018

PC-Ph and CRR-Ph : Probability of precipitation and Convective Rainfall Rate from Microphysical properties
V2018 includes a night time algorithm





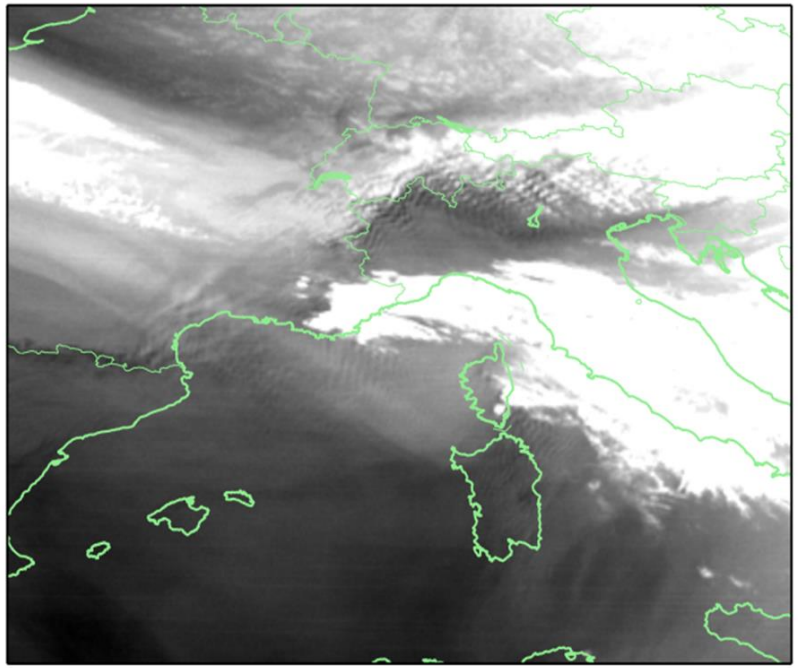
9 April 2019
7:00 UTC

Radar composite Reflectivity

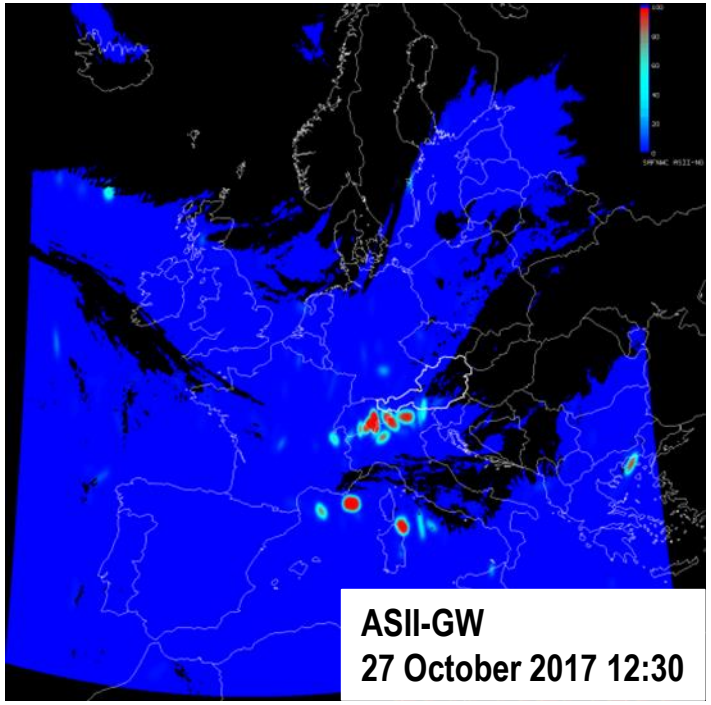
CRR-Ph
precipitation in Galicia generated with night time algorithm, precipitation in Baleares calculated with day time algorithm

NEW/UPGRADED products in GEO v2018

ASII-GW: probability for presence of gravity waves
New product in GEO v2018



WV7.3 image



Algorithm uses WV 7.3 µm channel
Jann, A. (2017): Detection of gravity waves in Meteosat imagery by grating cell operators. *Eur. J. Remote Sens.*, 50, 509-516

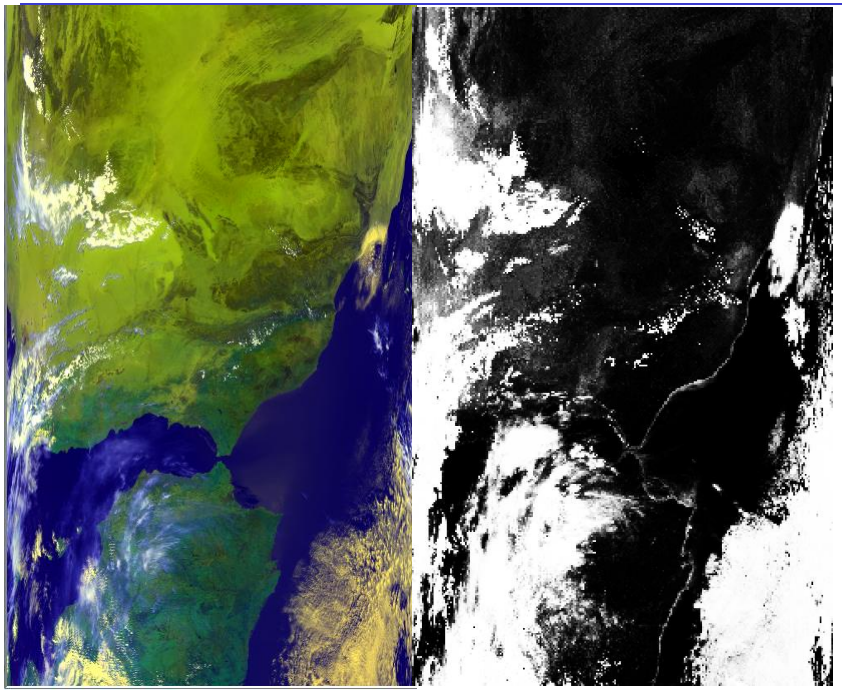
New SW package: PPS v2018

- Available since January 2019
- What is new:

New SW package: PPS v2018

- CTTH quality significantly improved with New Neural Network based algorithm
- Improved Cloud Type by using CTTH as input
- New Product CMa-Prob: Probabilistic Cloud Mask for AVHRR, VIIRS and MODIS
- Support Metop-C and NOAA20 satellites
- Does not require RTTOV or HL-HDF SW any more
- Processing option for high resolution VIIRS

CMa-Prob example: *16 May 2007*



Left: NOAA-18 AVHRR GAC scene in satellite projection. Colour composite with AVHRR channel 1 (red), channel 2 (green) and channel 4 (blue).

Right: Corresponding CMa-Prob cloud probabilities (as greyscale image with range 0-100 %).

Source: ATBD CMa-Prob

Despite observing over relatively bright desert surfaces the resulting cloud probabilities are distinctly at the zero level (black areas) for cloud free areas and close to 100 % (white areas) for cloudy areas.

NWC SAF Future plans:

- Support to GOES-R satellites: a patch for GEO v2018, to be delivered end of 2019
- Support of NWC SAF PPS products to Chinese satellites in the Fung Yun 3 series, carrying the MERSI-2 instrument

- Delivery of MTG day-1 SW, to generate MTG NWCSAF products from the first day of MTG operation (~ Q1 2022)

- Delivery of EPS-SG day-1 SW, to generate EPS-SG (A) NWCSAF products from the first day of EPS-SG (A) operation (~ Q2 2023)

- Continuous improvement and NWC SAF Products
- Prototyping of new products for new satellites/instruments: MTG-LI on board of MTG-I , MTG-IRS on board of MTG-S, MWI/ICI on board of EPS-SG B

Presentations and Posters related to NWC SAF

- **Presentation M.A. Martínez (Thursday 16:30)**

"iSHAI and PGE00: key tools for preconvective monitoring and for the preparation of the MTG era"
Miguel Angel Martinez; Xavier Calbet, AEMET, Spain

- **Poster 5**

"The CI and RDT NWCSAF Convection Products"
Jean-Marc Moisselin; Michaël Claudon; Frédéric AutonèsMétéo-France, France

- **Poster 11**

"Shaping the future portfolio of the "Extrapolated Imagery" product of the Nowcasting-SAF"
Alexander Jann, ZAMG, Austria

- **Poster 22**

"Construction of a krigged precipitation field based on surface observations and remote sensing tools. Application to the flash-flood event of October 9, 2018, over the east part of Majorca"
Peio Oria; Xavier Calbet; Pilar Ripodas; Llorenç Lliso, AEMET, Spain

Thank you for your attention!

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