Outlook into new MTG Nowcasting products and towards an integrated approach

9 March 2020 Xavier Calbet (AEMET) and Nowcasting SAF Team







Summary

- 1. New foreseen products
- 2. Product limitations and solutions
- 3. Integration/Visualization of products



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NWC SAF SW IN THE MTG ERA



The NWC SAF will provide to the users SW that provides services and generates products for the 3 MTG instruments and will allow to combine data of all of them with the aim of exploiting the synergies of all the MTG instruments



In-Flight / Airframe Icing

- "Normal" icing from ice accretion process on the aircraft airframe by supercooled water
- •A prototype product for classical icing, derived from the cloud products (cmic_phase, ctth_tempe, ct) will be tested
- More info: Alexander Jann and Pilar Ripodas



New «Accumulated» LI Products

- Lightning Flash Rate
- More info: Andrei Diamandi





IASI dust RGB on Eruption from the Cordon-Caulle volcano 9th June 2011 22:24Z to 10th June 2011 10:35Z



Volcanic ash and SO₂

qIRS: Quick IRS product

- Principal Components to BTs conversion and IRS L1 images generation on NWC SAF region: PC to BTs at dwells, combination and reprojection of users selected MTG-S L1 BTs from dwells to user NWC SAF defined regions.
- Generation of IRS L1 imagery related products; as example RGB images.



SSHAI_ES: sounder Satellite Humidity And Instability from Eumetsat Secretariat

- EUMETSAT Secretariat(ES) MTG-IRS L2 service
- All cloud piecewise linear regression retrievals
- Constant coefficients applied
- NPW forecast free
- Useful for Nowcasting, Climate and NWP assimilation
- NWC SAF will evaluate humidty and instability
- NWC SAF will reproject to FCI grid





SSHAI: sounder Satellite Humidity

- NWC SAF locally generated retrievals
- All cloud non-linear Kernel Ridge Regression retrievals
- Coefficients calculated daily
- With and without NPW forecast as input
- Targetted toward Nowcasting
- NWC SAF will evaluate humidty and instability
- NWC SAF will reproject to FCI grid

More info: M.A. Martínez, Niobe Peinado



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Combining Radar and Satellite precipitation

•Combining Radar and Satellite precipitation is not easy because they are often **inconsistent**

•Long term project to try to find the physical reasons behind this inconsistency

•Which links with a more long term goal of finding the dynamics of convection via satellite data



Combining Radar and Sat precipitation



•Satellite precipitation in green

•Radar precipitation in red

Three velocities: wind mean, right and left Bunkers
More info: Arantxa

AEmet

Easier mid-term solution: Integral QPE

- AEMET has prototype QPE using rain gauges, satellite and radar
- Needed for flash flood identification





Prototype AEMET Integral QPE

New method: QPE based on (geo-)statistical techniques and local approach

Temporal and spatial high resolution precipitation fields (1 hour – 1 sq. km) obtained by applying local geostatistical approaches :

1. KED scheme:



In addition to radar (*sri*), satellite-based estimation product (*crr* from NWC SAF) is also used as ancillary information for KED.

2. mMFB ("modified" Mean field bias)

Similar to MFB approach but bias is spatially interpolated .



Local approach: the estimation is improved through the use of as many as possible rain data (networks of AWS belonging to official institutions: hydrological, agriculture, regional networks, crowdsourcing (future)). The approach provides a precipitation field for hydrological purposes (flash-flood forecast, early-warnings, etc.)

More info: Peio Oria





CAPE varies a lot from one profile to another!





CAPE distribution varies significantly! More info: Jana Campa



•NWC SAF will try to complement Infrared Sounder profile data with surface based

•Tests will be carried out this year



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Convective Initiation (CI)

• CI has significantly improved in v2018. It can be further improved



NWC GEO v2018 CI Convection Initiation Probability next 30min





Dynamics from Satellite?

Could a more precise determination or modelling of cloud dynamics from satellite data help in these situations?

• Winds from RSS:

 \rightarrow Potential to determine kinematics at cloud top (Apke et al., CWG 2016)

• Determination of updraft strengths:

 \rightarrow From anvil or cloud top area determination (Senf and Deneke, CWG 2018)



20140520 23:37 UTC

0

-20 -10

MVs calculated at a 1

inute super rapid scar

RSOR mAMVs)

-30

low vorticity, same contouring

is blue. We call this signature a

VORTICITY

20 30

10

Cloud Top Vorticity (CTV) "Couple (Apke et al. 2016)

40

50

scheme, cyclonic is red, anticyclonic

NWC SAF via CI/RDT will most likely explore this



20140520 23:37 UTC

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Combination/Simplification of products

- Too many products for a forecaster!!!
- Need to simplify or combine products: complicated
- Mid-term solution: improve visualization



Visualization/Distribution with ADAGUC

18th September 2019

Three products

- RDT-CW
- CRR-Ph
- HRW

On OpenStreetMap



http://nwcsaf-adaguc-proofs.aemet.es/adaguc-viewer/

nwc-saf.eumetsat.int



Visualization/Distribution with ADAGUC

- Developed by KNMI (Netherlands)
- Completely Open Source
- Has two server components: ADAGUC services and ADAGUC server
- Has two clients which are web visualizers: ADAGUC viewer and GeoWeb
- Will be operational for NWC SAF in a few weeks
- Inputs are HDF5, NetCDF4, GeoJSon and CSV
- Outputs are Web Mapping Services (WMS) for online visualization, Web Feature Services (WFS) for downloading vector data, Web Coverage Services (WCS) for downloading raster data and OpenDAP

KNMI ADAGUC - <u>http://adaguc.knmi.nl/</u>



Integration with Nowcasting com-SWIRLS suite

- Developed by Hong Kong Observatory
- Nowcasting suite integrating radar and surface station data
- Integrating it to NWC SAF



HKO com-SWIRLS - https://docs.com-swirls.org/

nwc-saf.eumetsat.int



Conclusions

- NWC SAF Products are useful for Nowcasting and other applications
- More information at nwc-saf.eumetsat.int
- More detailed practical guide at http://www.nwcsaf.org/web/guest/practical-guide
- Products in near real time at http://nwcsaf-adagucproofs.aemet.es/adaguc-viewer/

