The impact of NEFODINA convective clouds identification in the rain rate retrieval of H-SAF

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Outline

- H-Saf overview
- NEFODINA software
- H15 algorithm
- Case study: 1st October 2009
- Outlooks: RELASE/H50 algorithm
The "EUMETSAT Satellite Application Facility on Support to Operational Hydrology and Water Management (H-SAF)" was established by the EUMETSAT Council on 3 July 2005, and kicked-off on 16 September 2005.

- to provide satellite-derived products from existing and future satellites with sufficient time and space resolution to satisfy the needs of operational hydrology;

- to perform independent validation of the usefulness of the new products for fighting against floods, landslides, avalanches, and evaluating water resources.
Precipitation from Microwave Conical scan satellite (SSMI/S)
Precipitation from Microwave Cross scan satellite (AMSU/MHS)
Multi-platform algorithm: **BLENDING** Technique

The PR-OBS3 algorithm is based on a collection of time and space overlapping SEVIRI IR images and Low Earth Orbit (LEO) MW radiometers. As a new MW swath is available, the MW-derived pixels are paired with the time and space coincident geostationary (GEO) TB at 10.8 mm. Coincident data are subsequently located in a geographical latitude-longitude grid (2.5° x 2.5°), and for each grid box the histogram of the IR TBs and that of the corresponding MW rain rates is built.
Propagation vector matrices are produced by computing spatial lag correlations over successive images of GEO/IR and then used to propagate the MW-derived precipitation estimates in time and space when updated MW data are unavailable.
Accumulated Precipitation
Intrinsic Underestimation

Comparison between precipitation retrieval by microwave sensor on polar satellite (AMSU) and radar.
With red shades are indicated the cloud top of the detected convective cell in growing phase.

With pink shades are indicated the cloud top of the detected convective cell in decreasing phase.
Rain redistribution based on convective cell’s area
H15 algorithm

HSAF PR-OBS6: BLENDING Technique + NEFODINA
Case study: 1st October 2009

The Department of Civil Protection measured 190/200 mm in 5h.
Case study: 1st October 2009

The Department of Civil Protection measured 190/200 mm in 5h

Heavy rain triggered normal instability along the sides that can turn into disasters and catastrophes when affecting areas deforested and inhabited.

The mud flows evolved along the slope have reached speeds of several tens of kilometers per hour and large volumes (estimated at between 60,000 and 80,000 cubic meters).
Case study: 1st October 2009

The mud has incorporated the vegetation, dry stone walls and boulders of the substrate acquiring a considerable destructive power evidenced by the effects on this area.
Case study: 1st October 2009
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Accumulated precipitation in the previous 3 hours: 20091001 2100
Outlooks

The position of convective precipitation is almost entirely seen by means of lightning rate and locations.
Outlooks - RELASE

Blue: 0.5 ≤ SRI < 12 mm/h
Green: 12 ≤ SRI < 25 mm/h
Yellow: 25 ≤ SRI < 50 mm/h
Red: SRI > 50 mm/h

RADAR

07 Sept 2005 02:30 UTC

Lightning
Rainfall Estimation from Lightning And Seviri data

A rainfall retrieval technique that uses geostationary satellite Infrared (IR) observations and lightning information retrieved from LAMPINET (lightning network of the Italian Air Force Meteorological Service)

A quantitative relationship for rainfall estimation using lightning and Seviri data has been developed using a bivariate linear regression for the cluster's rain volume:

\[ RR = (b_0 + b_1 S/N + b_2 T)N \]
Outlooks - RELASE

Accumulated precipitation from RADAR observations

Accumulated precipitation from Lightning observations

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Outlooks - RELASE

EUMETSAT H-SAF PR-OBS-6 Blended SEVIRI Convection area / LEO MW Convective

50° N
5° E

5° N
5° E

50° N
5° E

5° N
5° E

SOI (mm/d)

0.0 0.5 2.0 5.0 12.0 25.0 50.0 100.0

Oceanic Hydrology and Water Management
Outlooks – H50

Future Lightning
Space-based obs.
MTG-LI

Reconstructed rainfall rate
(mm/h)

Lightnings
RADAR
Thank you for your attention!

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