

Overview of CNMCA activities and analysis of forecast case-studies

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Italian Air Force Met Service
CNMCA



COSMO General Meeting 2019 – Rome, Italy
9-13 September 2019



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Outline

- Italian Air Force Met Service – CNMCA
- Operational Numerical weather Prediction System
- Cases of model failure



Italian Air Force Met Service



CNMCA
Met for
civil
activities



COMET
Met for
operations



Met ITC
support

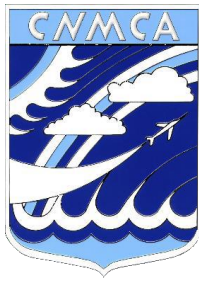


Italian Air Force
Meteorological
Service



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CNMCA mission

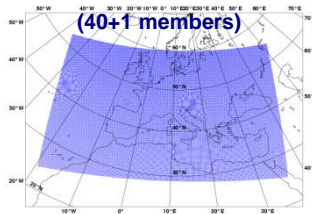
- To support as National Competence Centre the Civil Protection Department and the network of regional functional centres in the framework of the Hydrological risks management, through deliver data, products, services (according *Direttiva Presidenza del Consiglio dei Ministri del 2004*);



Operational Numerical Weather Prediction System

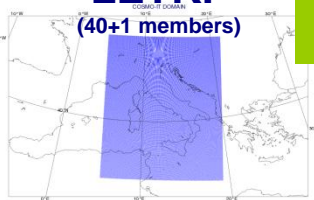
Ensemble Data Assimilation:

COMET-LETKF
(40+1 members)



7 km
49 v.l.

LETKF
(40+1 members)



2.2 km
65 v.l.

Observations

RAOB (also 4D), PILOT, SYNOP, ISPRa rep., SHIP, BUOY, Wind Profilers, AMDAR-ACAR-AIREP, Mode-S, MSG3-MET8 AMV, Metop scatt. winds, NOAA/Metop AMSUA/MHS and NPP/NOAA ATMS radiances



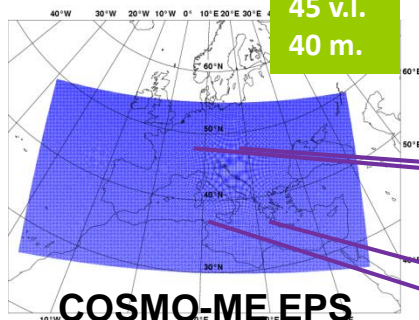
Boundary Conditions

(HRES, ENS also from BC Progr.)

Ensemble
Analysis

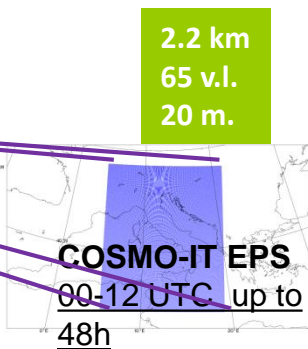
Deterministic
Analysis

Ensemble Prediction System:



7 km
45 v.l.
40 m.

COSMO-ME EPS
00-12 UTC up to
72h



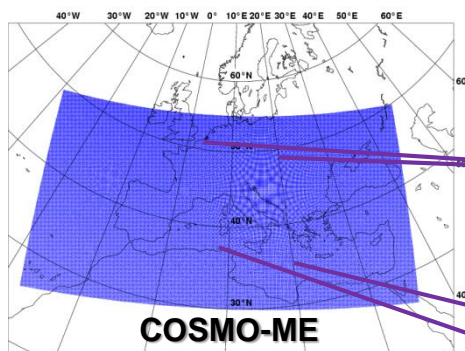
2.2 km
65 v.l.
20 m.

COSMO-IT EPS
00-12 UTC up to
48h

Local Area Modeling:

5 km
45 v.l.

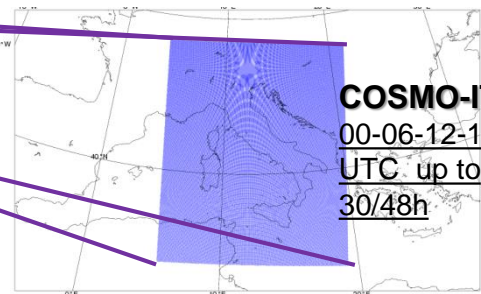
parameterized convection



COSMO-ME
00-06-12-18 UTC
up to 72h

2.2 km
65 v.l.

explicit convection



COSMO-IT
00-06-12-18
UTC up to
30/48h

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Comparison

COSMOIT (ITAF)

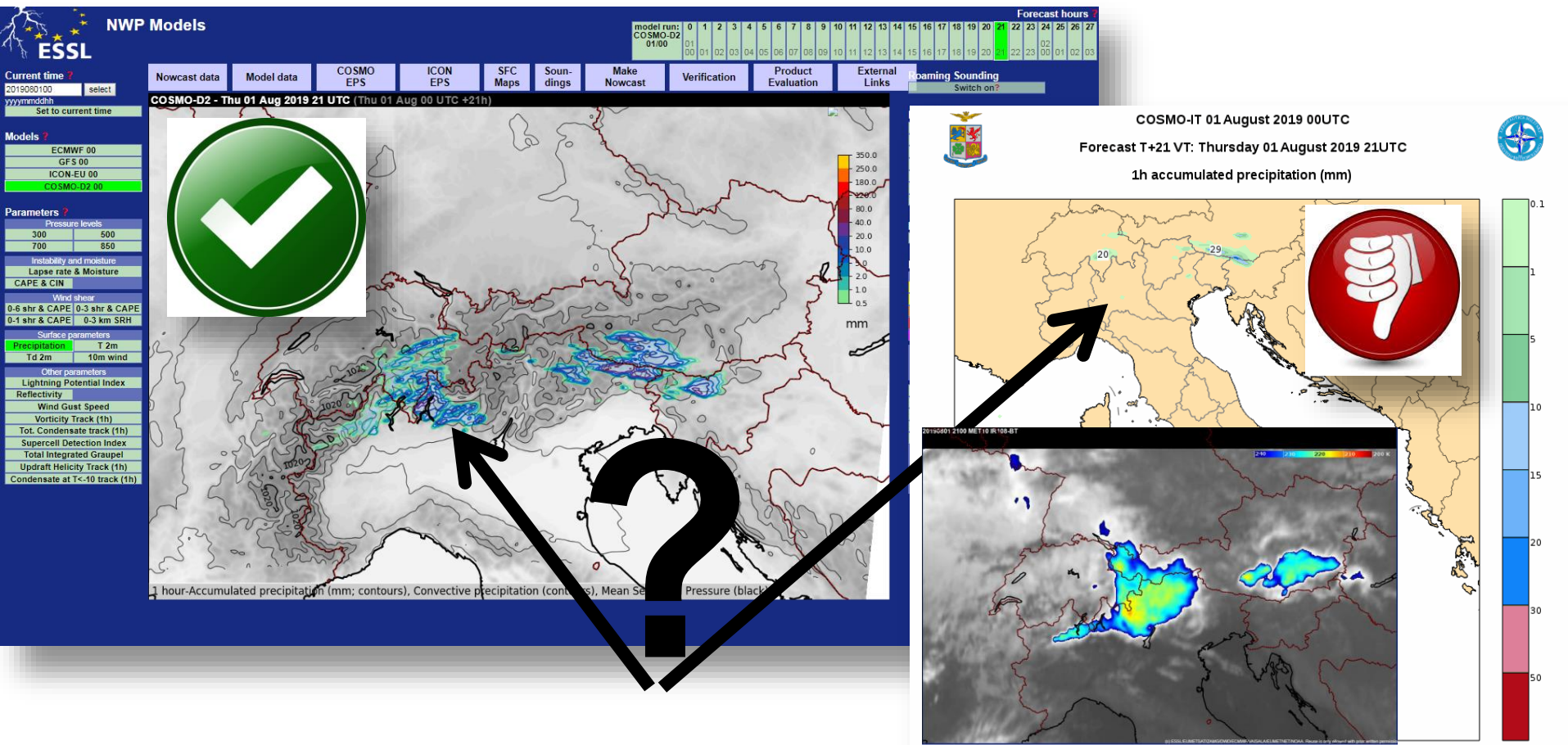
COSMO-D2 (DWD)

COSMO-1 (MeteoSwiss)



Comparison 1 Aug 2019

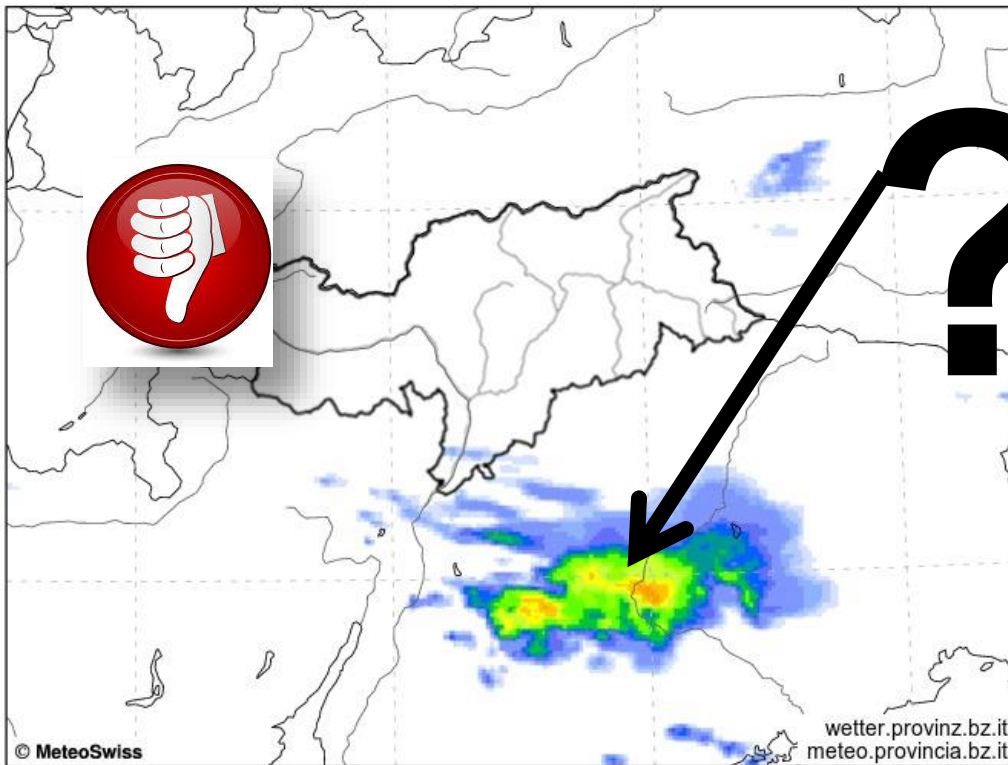
COSMO-D2 vs COSMOIT



Comparison COSMO-1 vs COSMOIT

COSMO-1 FORECAST
Hourly Sum of Total Precipitation

Wed-31.07.2019-23:00



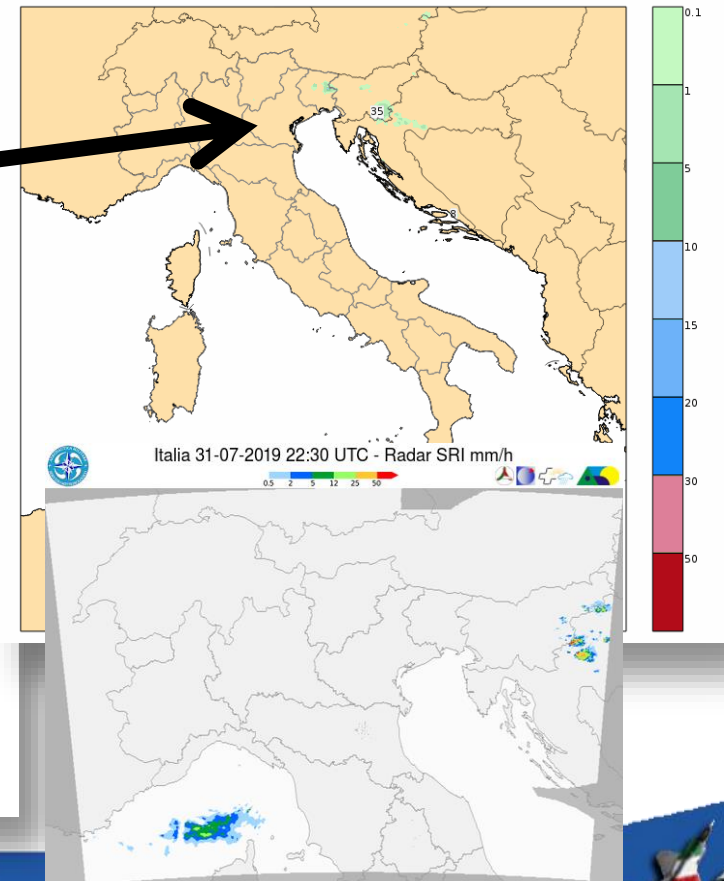
Total precipitation [mm/h]



COSMO-IT 31 July 2019 00UTC

Forecast T+23 VT: Wednesday 31 July 2019 23UTC

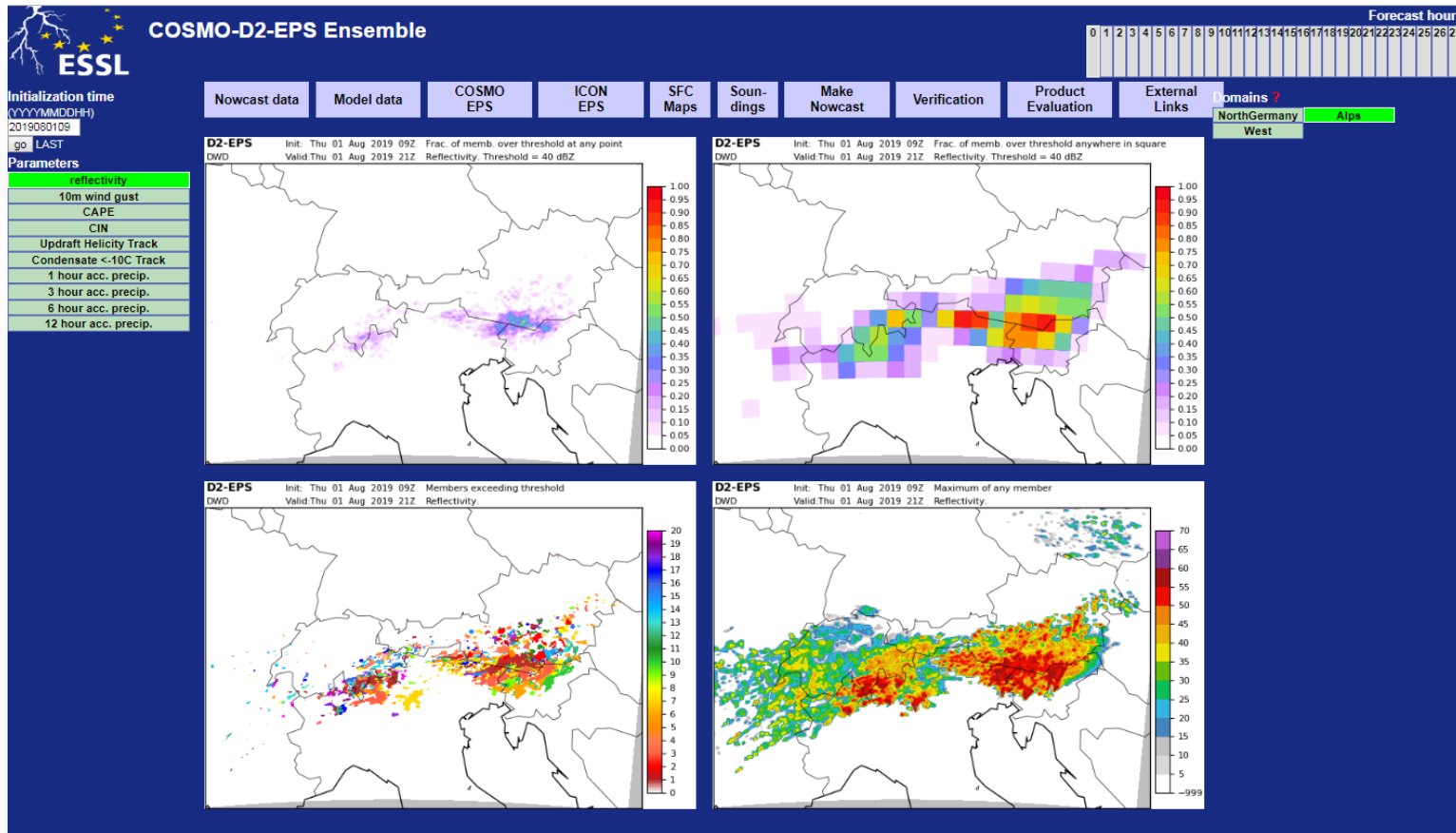
1h accumulated precipitation (mm)



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Comparison COSMO-D2 EPS vs COSMOIT EPS



Cases of model failures

- 2 july 2018 Piemonte (heavy rain)
- 28 july 2019 Rome (heavy rain and Tornado)
- 31 july 2019 Po valley (Supercell - large hail)
- 2 august 2019 Marche (Supercell – heavy rain and downburst)
- 7 august 2019 Genova (excessive rainfall)
- 8 august 2019 17-18 UTC Udine (Supercell – heavy rain and downburst)



2 july 2018 Piemonte
(heavy rain)
21.40 UTC – 2320 UTC



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2 July 2018 Piemonte (heavy rain)

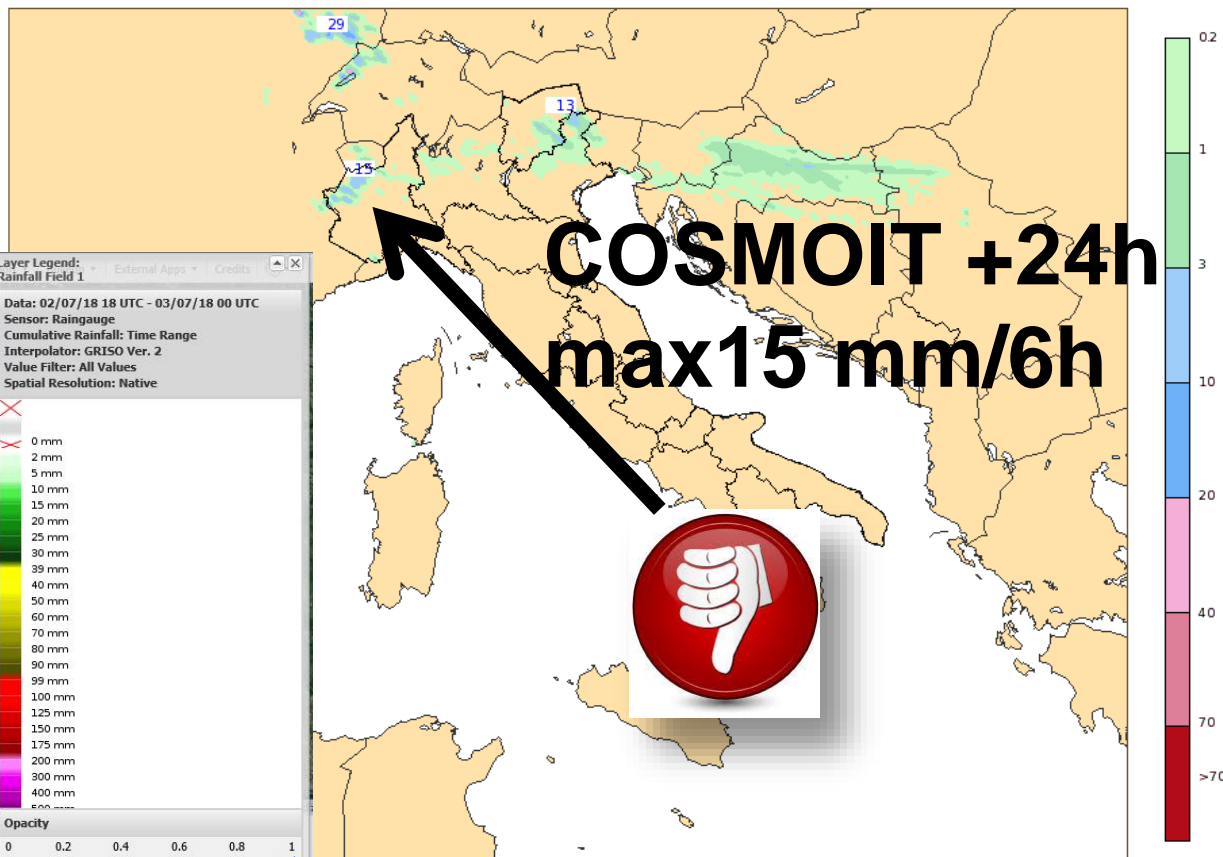
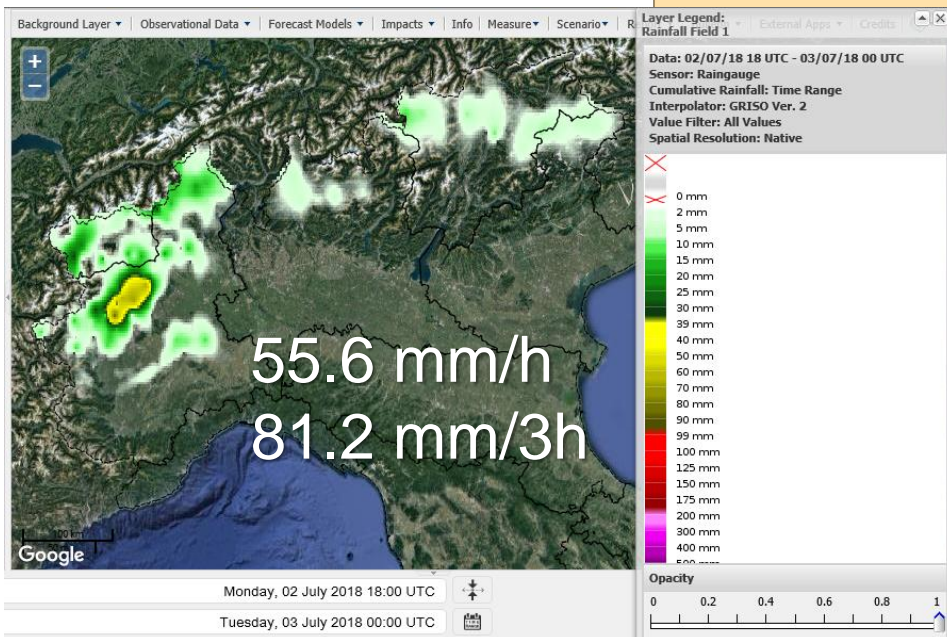
21.40 UTC – 2320 UTC



COSMOIT 02 July 2018 00UTC Forecast T+24 VT: Tuesday 03 July 2018 00UTC
ITALY - 6h accumulated precipitations (mm)



observed



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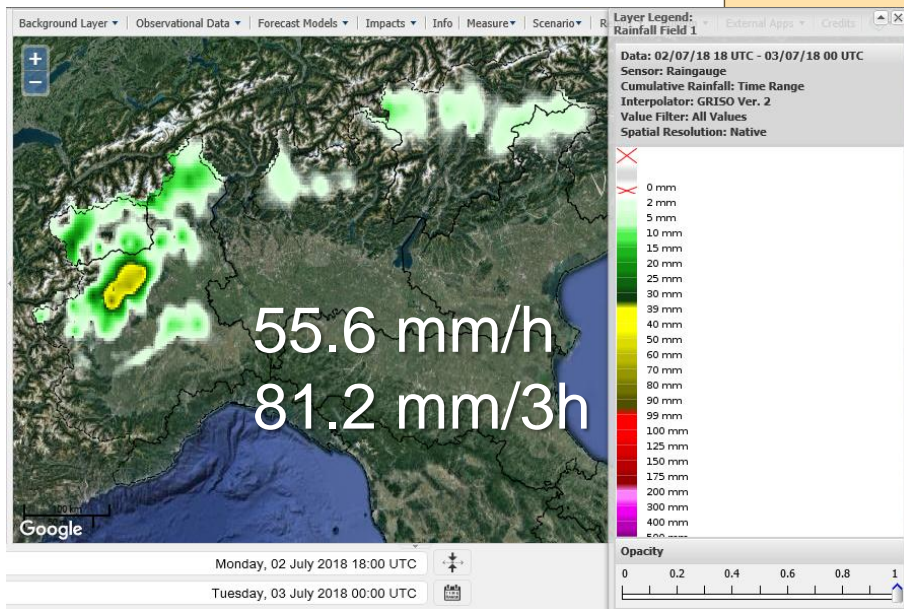
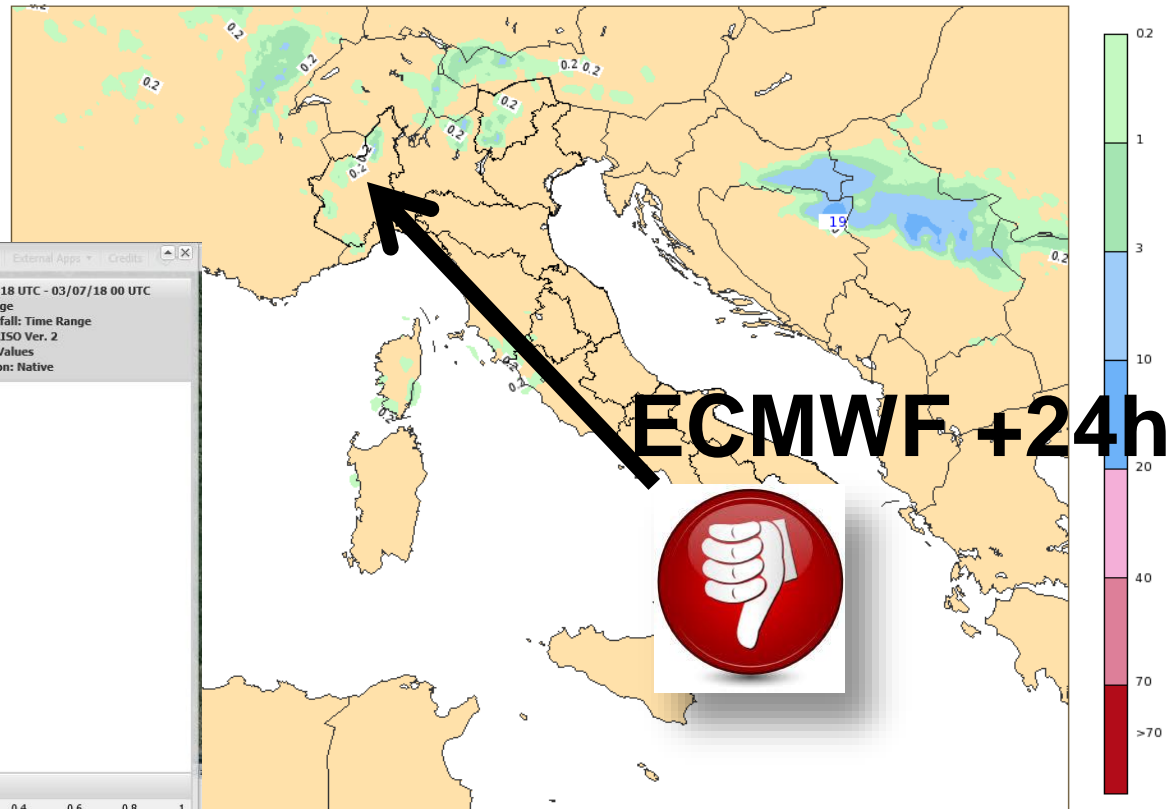
21.40 UTC – 2320 UTC



ECMWF 02 July 2018 00UTC Forecast T+24 VT: Tuesday 03 July 2018 00UTC
ITALY - 6h accumulated precipitations (mm)



observed



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28 july 2019

00-06UTC

Rome

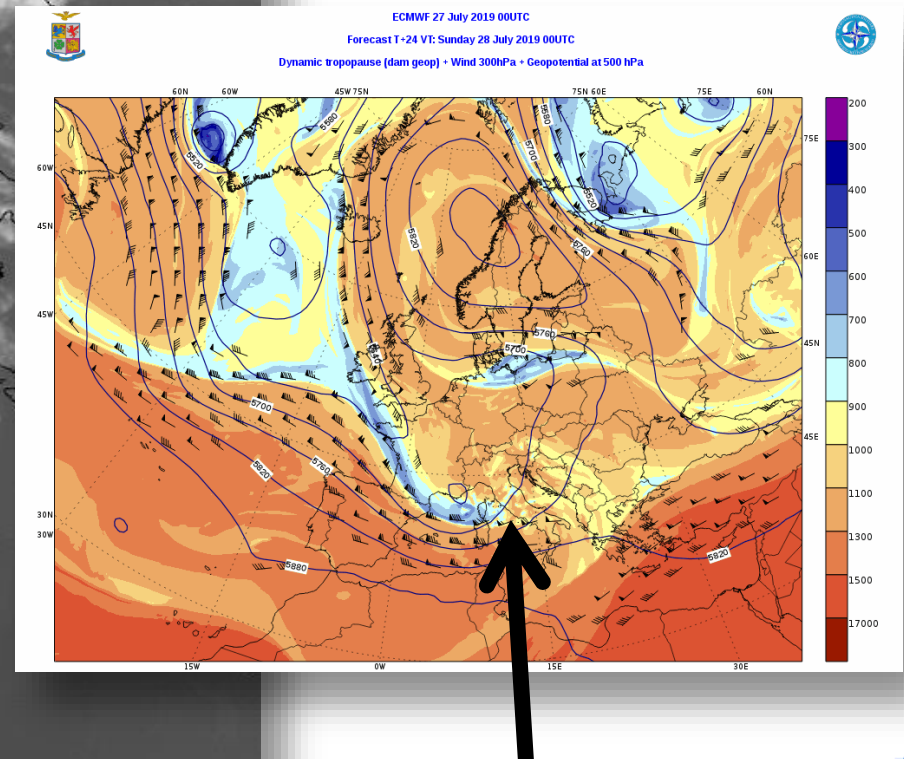
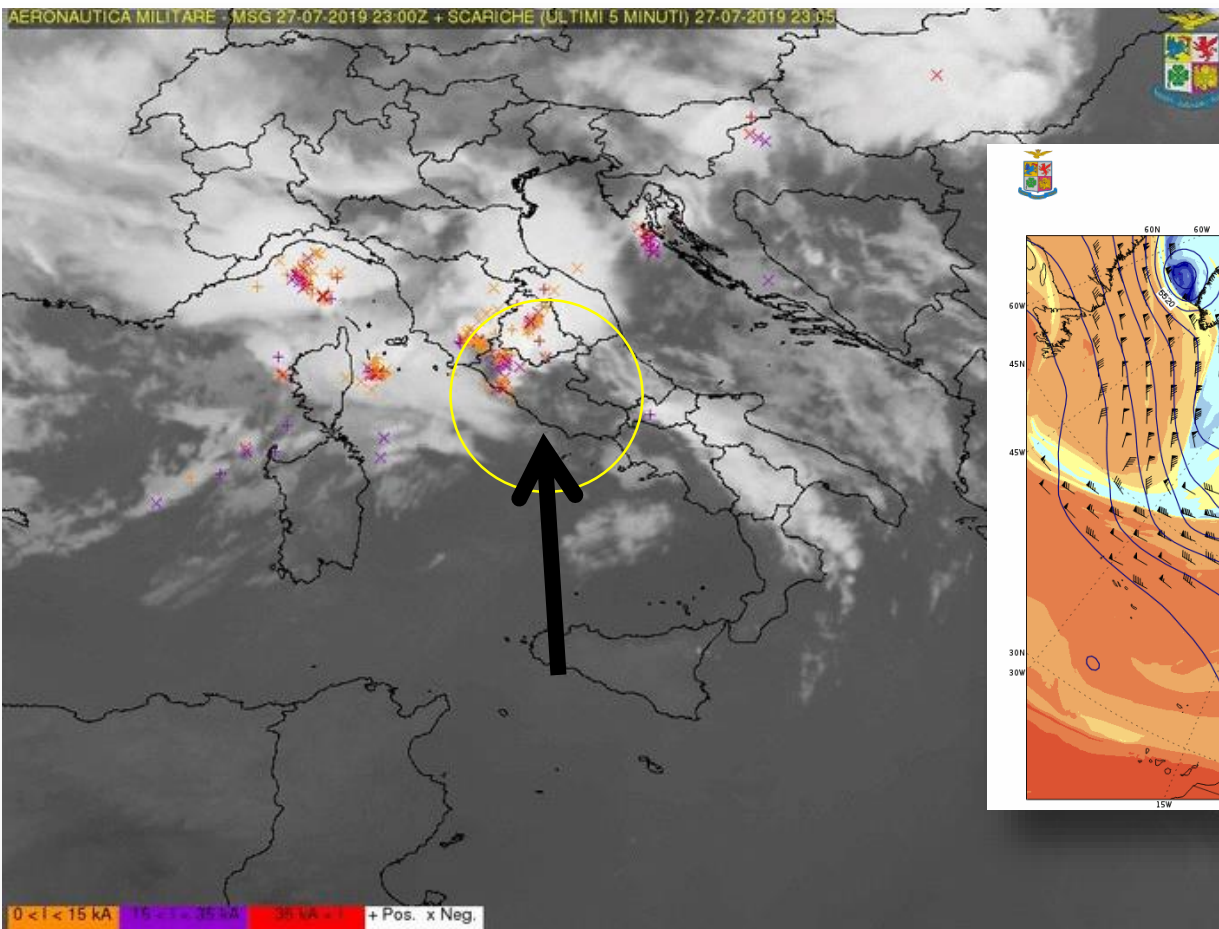
(heavy rain and a Tornado at
00.30UTC - 1 victim)



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28 july 2019 Rome (heavy rain and a Tornado 00.30UTC - 1 victim)

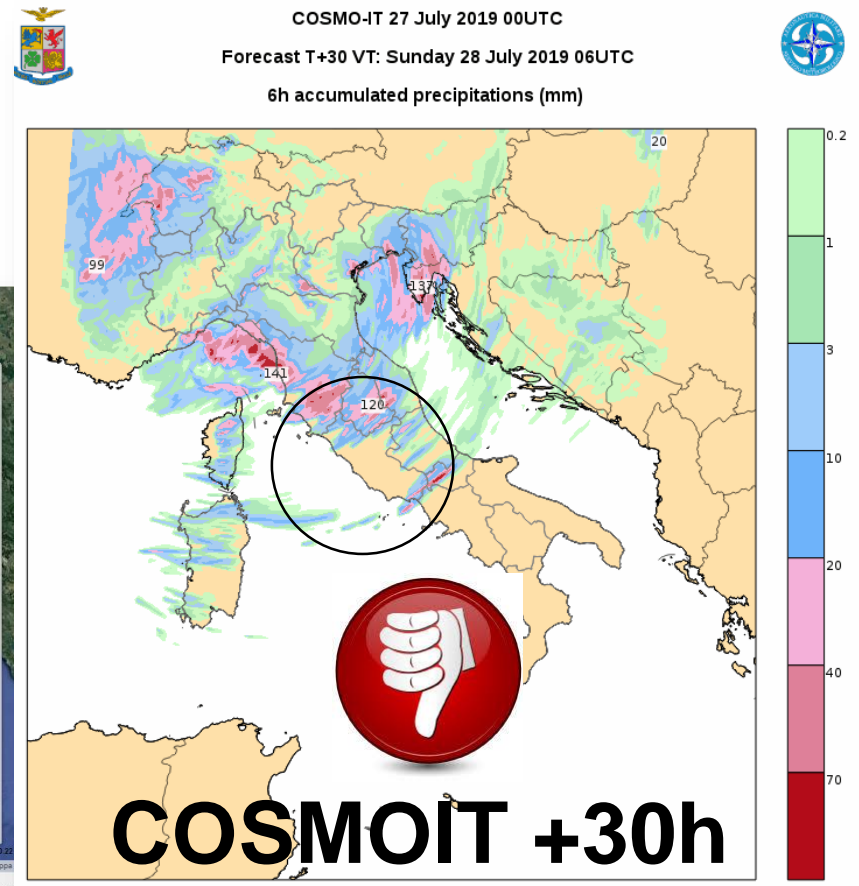
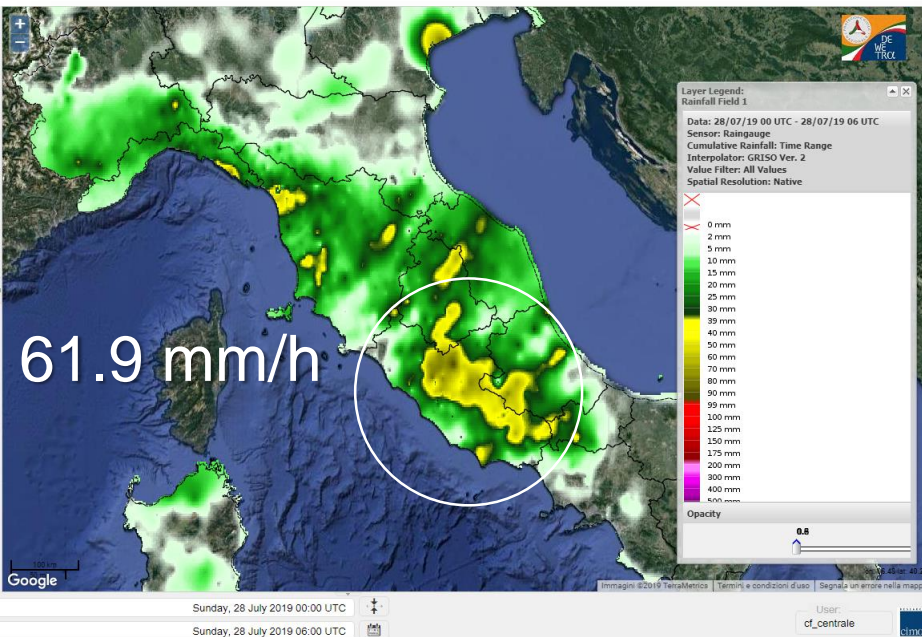


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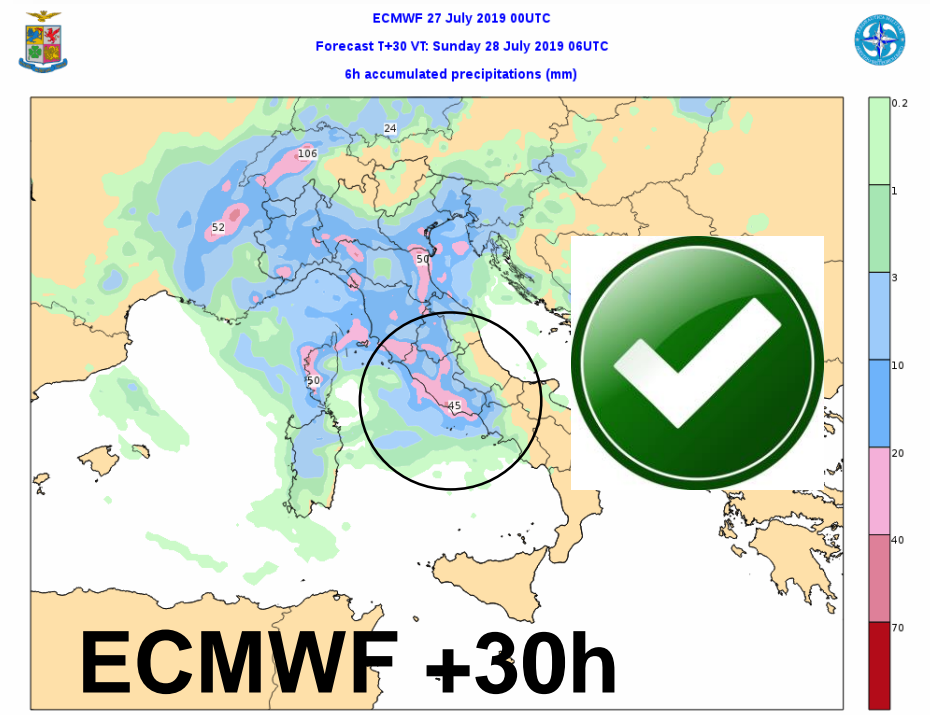
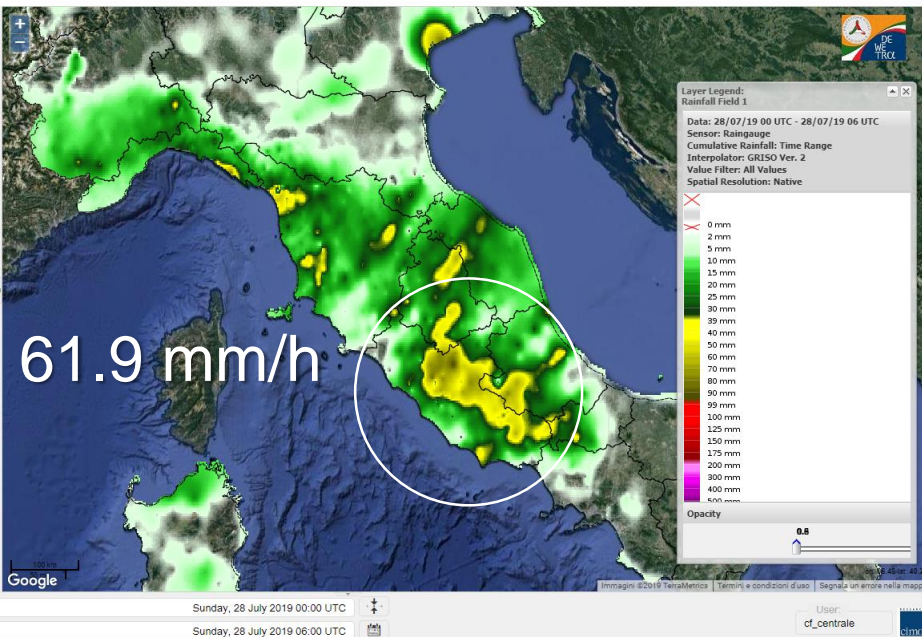
28 July 2019 Rome (heavy rain and a Tornado 00.30UTC - 1 victim)

observed



28 July 2019 Rome (heavy rain and a Tornado 00.30UTC - 1 victim)

observed



31 july 2019 Po valley (Supercell -
large hail)



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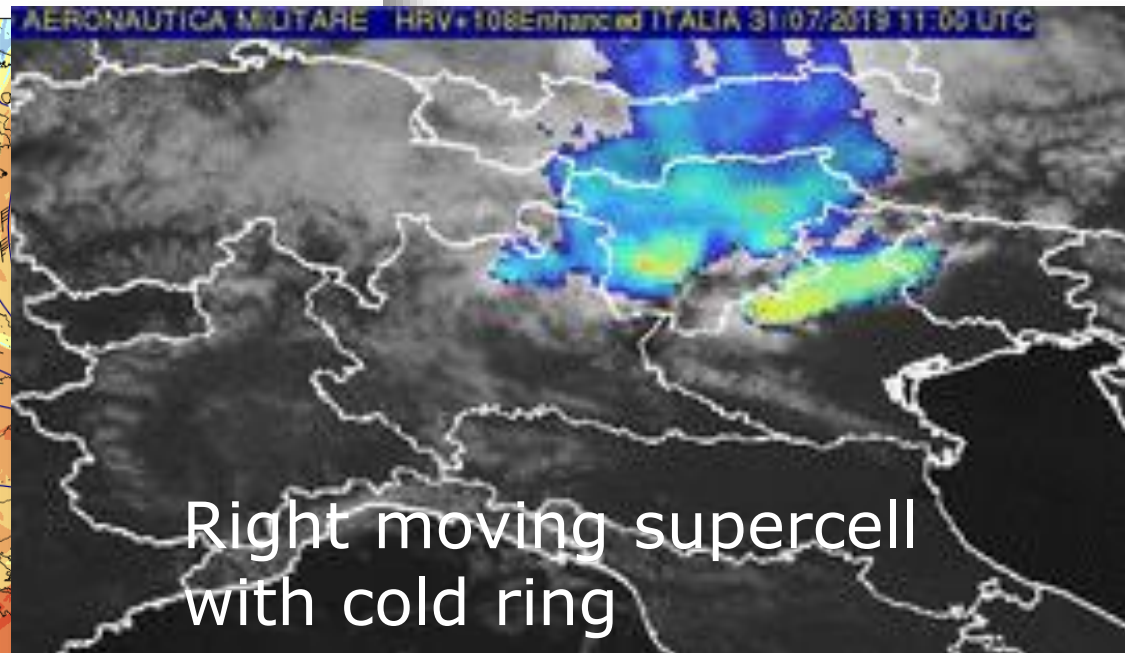
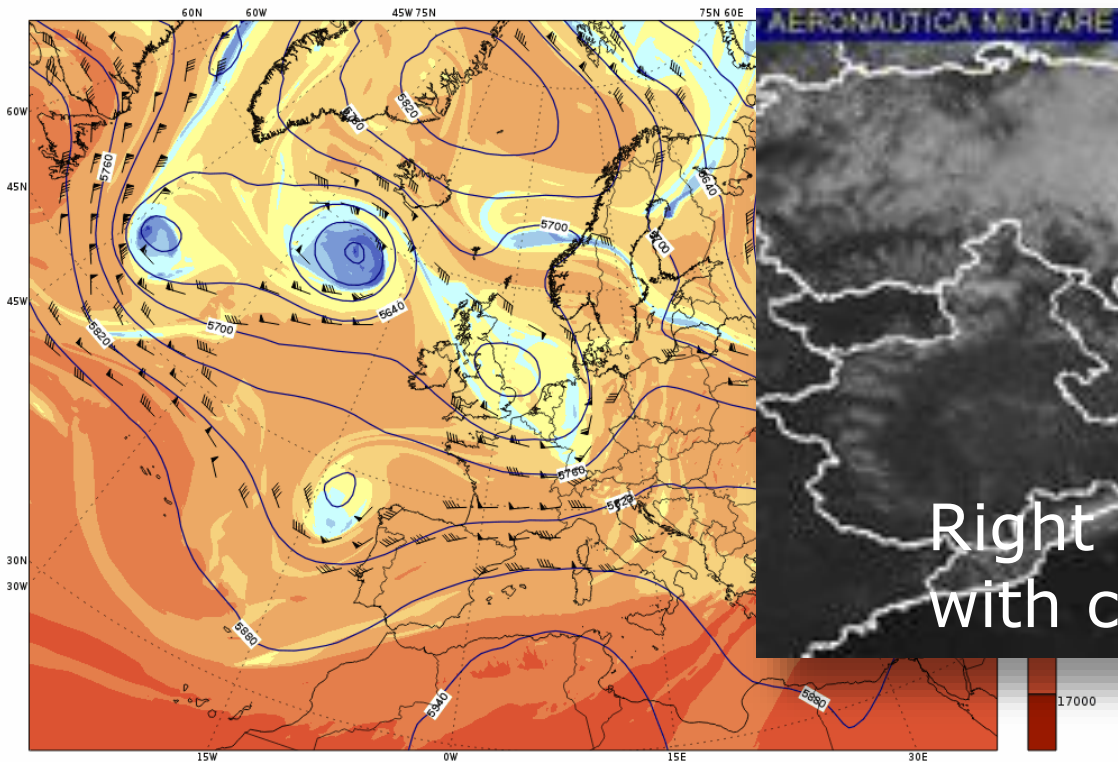
31 July 2019 Po valley 1230-1430UTC (Supercell - large hail+downburst)



ECMWF 31 July 2019 00UTC

Forecast T+12 VT: Wednesday 31 July 2019 12UTC

Dynamic tropopause (dam geop) • Wind 300hPa • Geopotential at 500 hPa



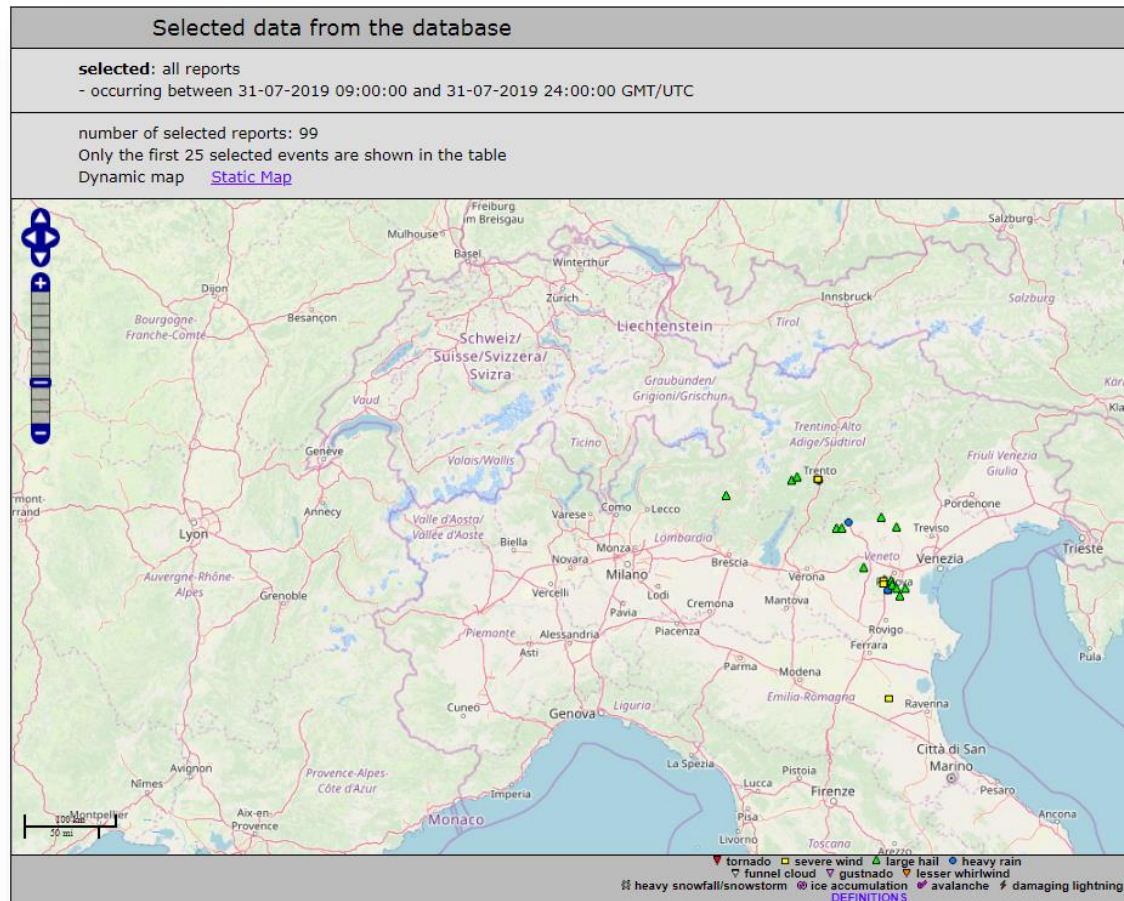
Right moving supercell
with cold ring



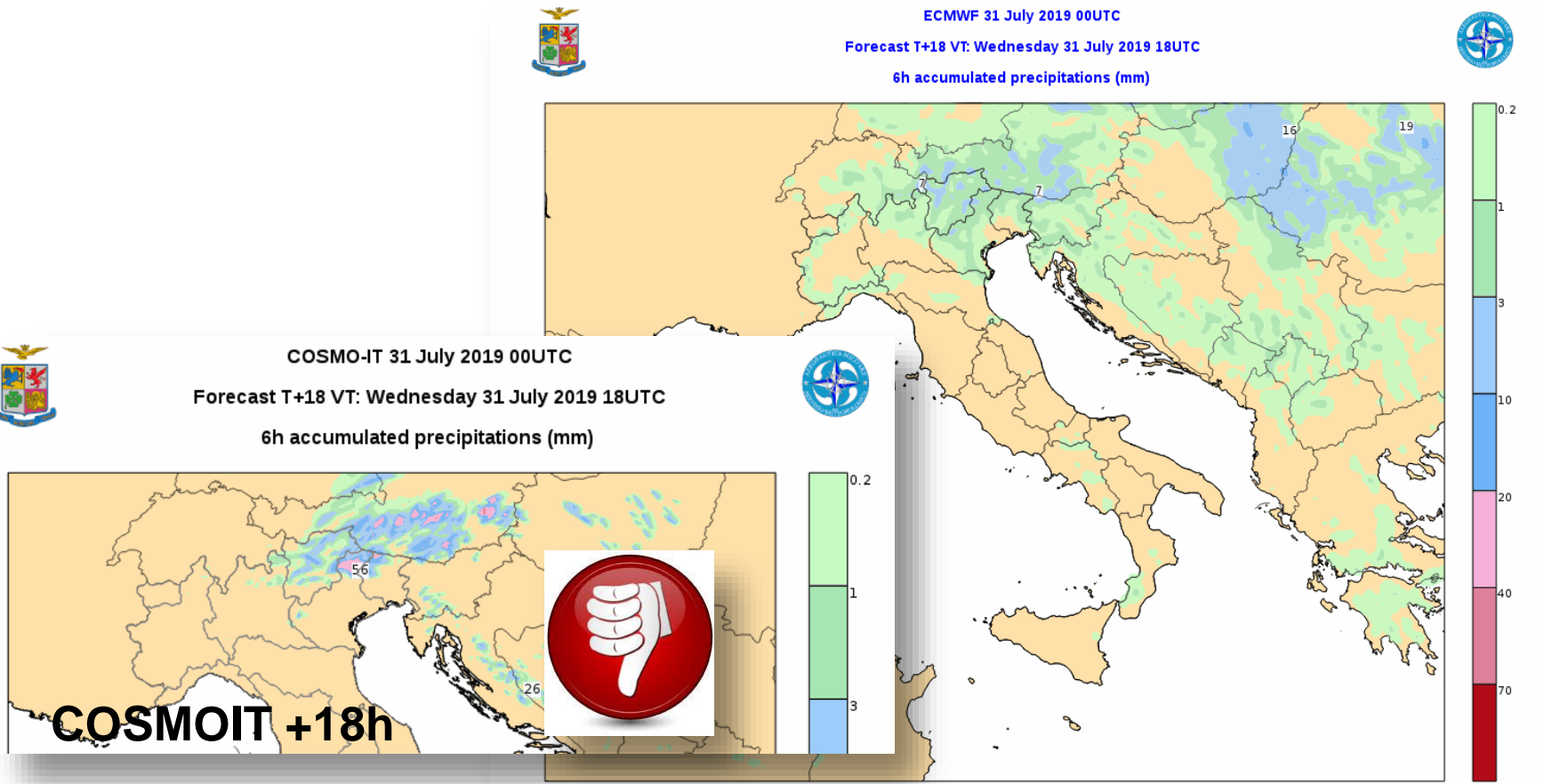
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31 july 2019 Po valley 1230-1430UTC (Supercell - large hail+downburst)

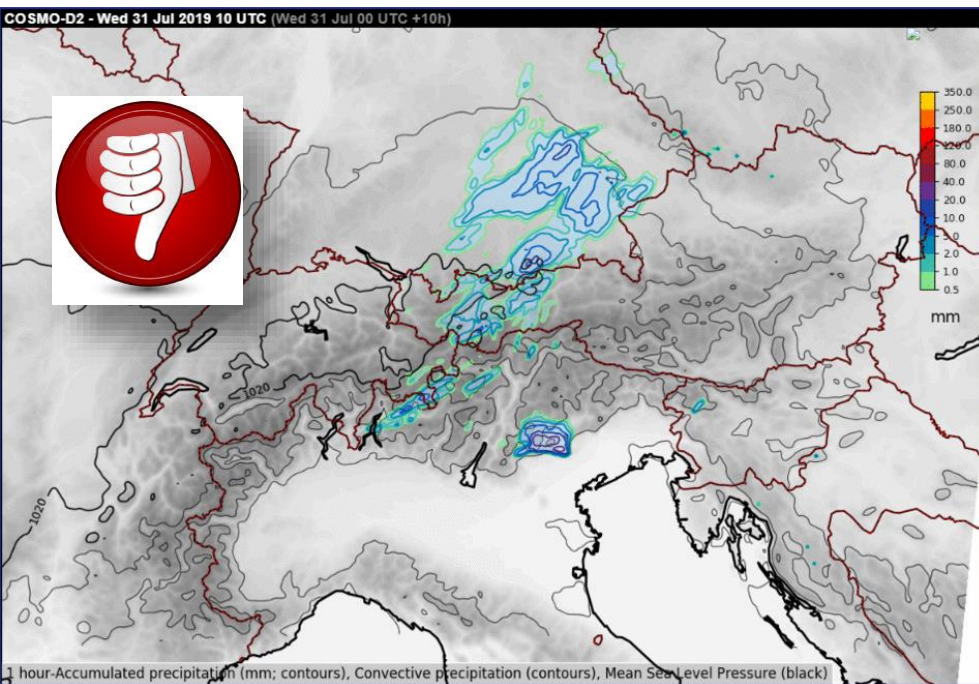


31 July 2019 Po valley 1230-1430UTC (Supercell - large hail+downburst)

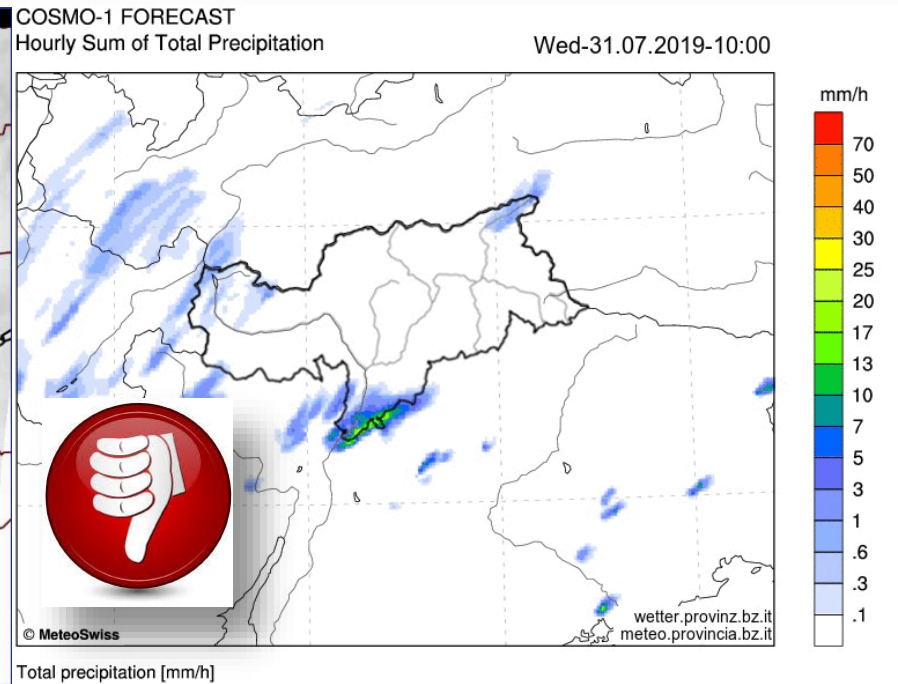


31 July 2019 Po valley 1230-1430UTC (Supercell - large hail+downburst)

COSMO D2



COSMO-1



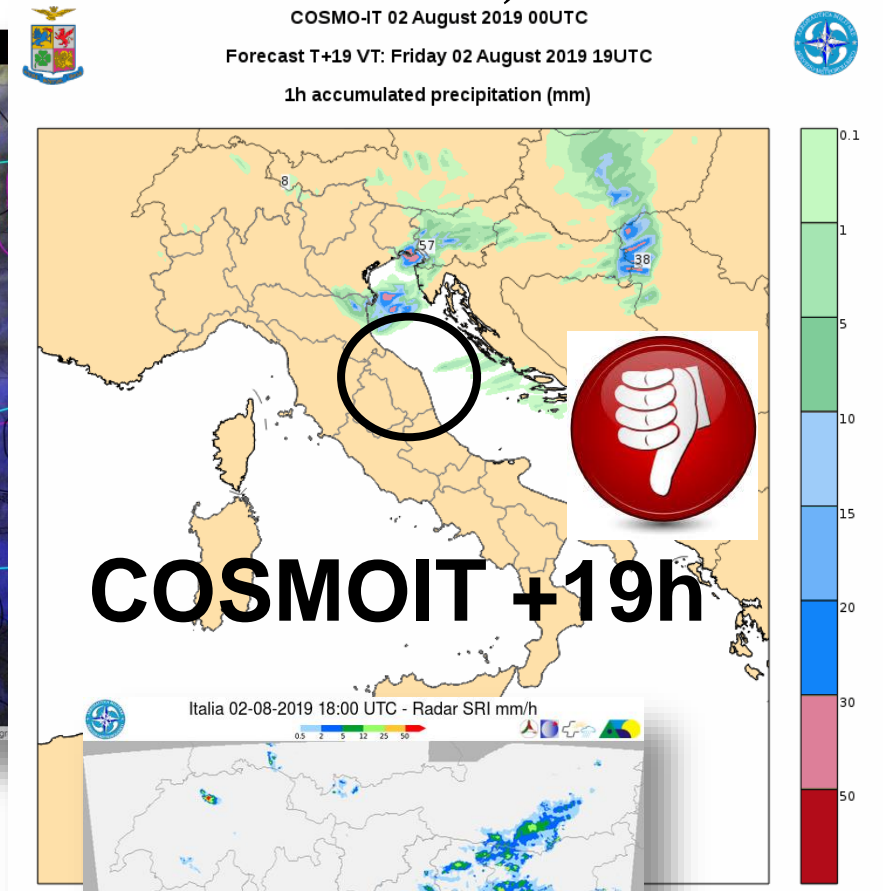
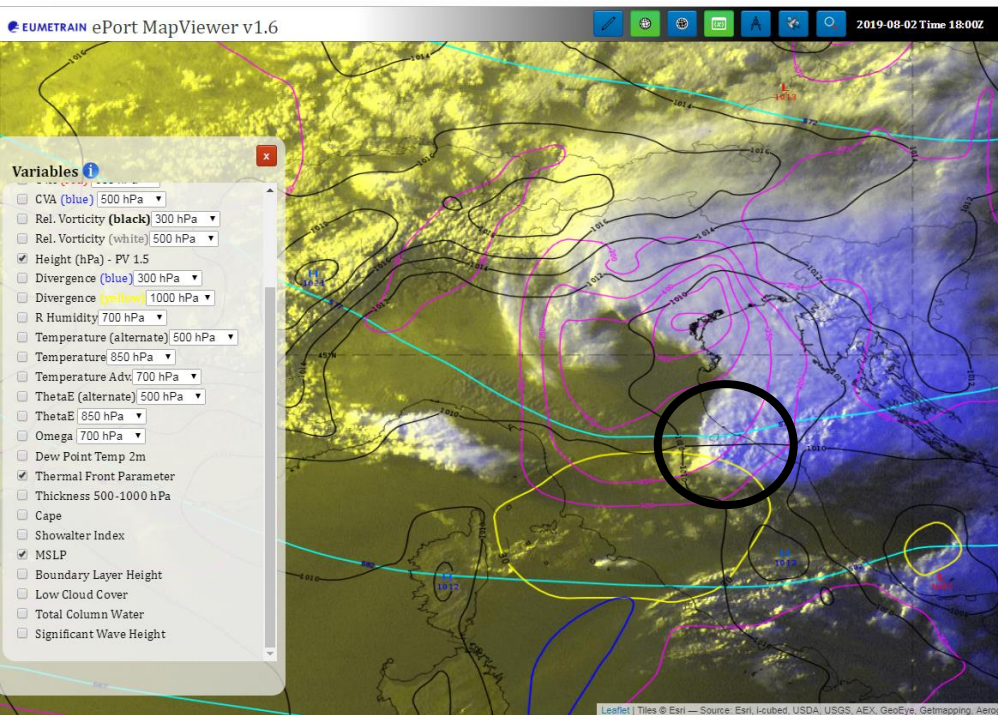
2 august 2019
Marche
(Comma - Supercell – heavy rain
and downburst)



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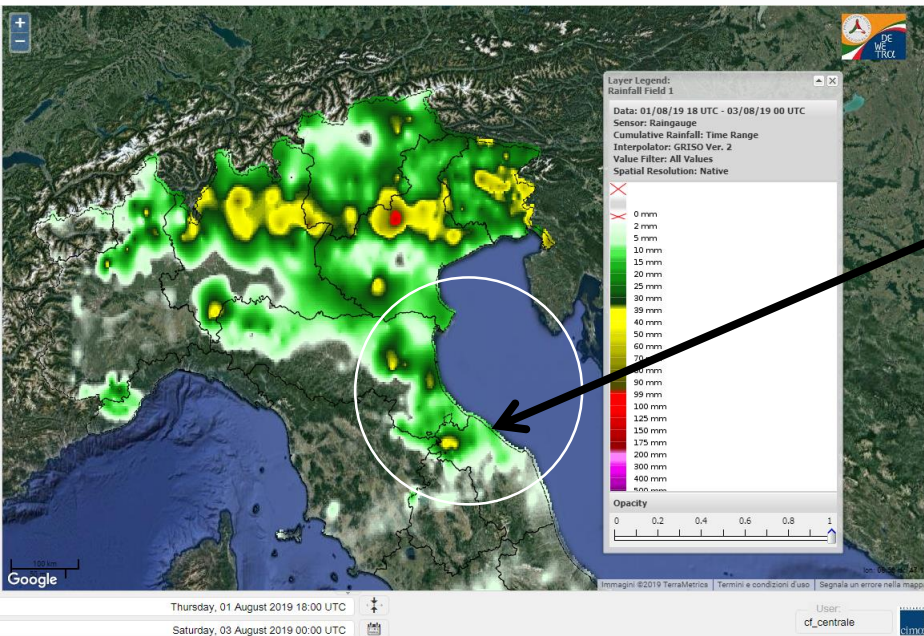


2 august 2019 Marche (Supercell – heavy rain and downburst)



2 august 2019 Marche (Supercell – heavy rain and downburst)

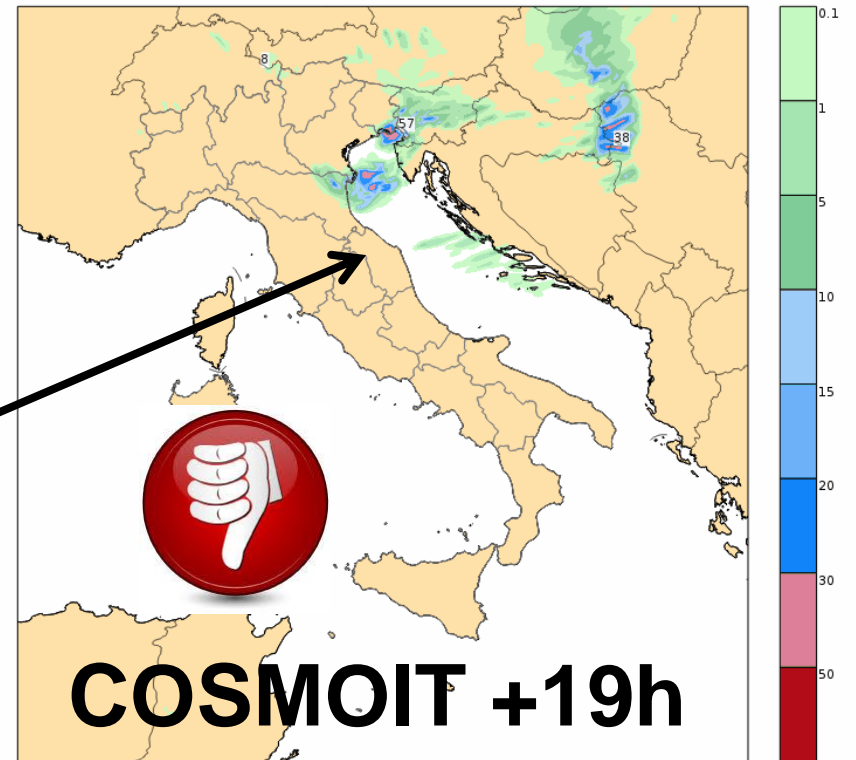
observed



COSMO-IT 02 August 2019 00UTC

Forecast T+19 VT: Friday 02 August 2019 19UTC

1h accumulated precipitation (mm)



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7 august 2019 Genova 21-22 UTC (excessive rainfall)



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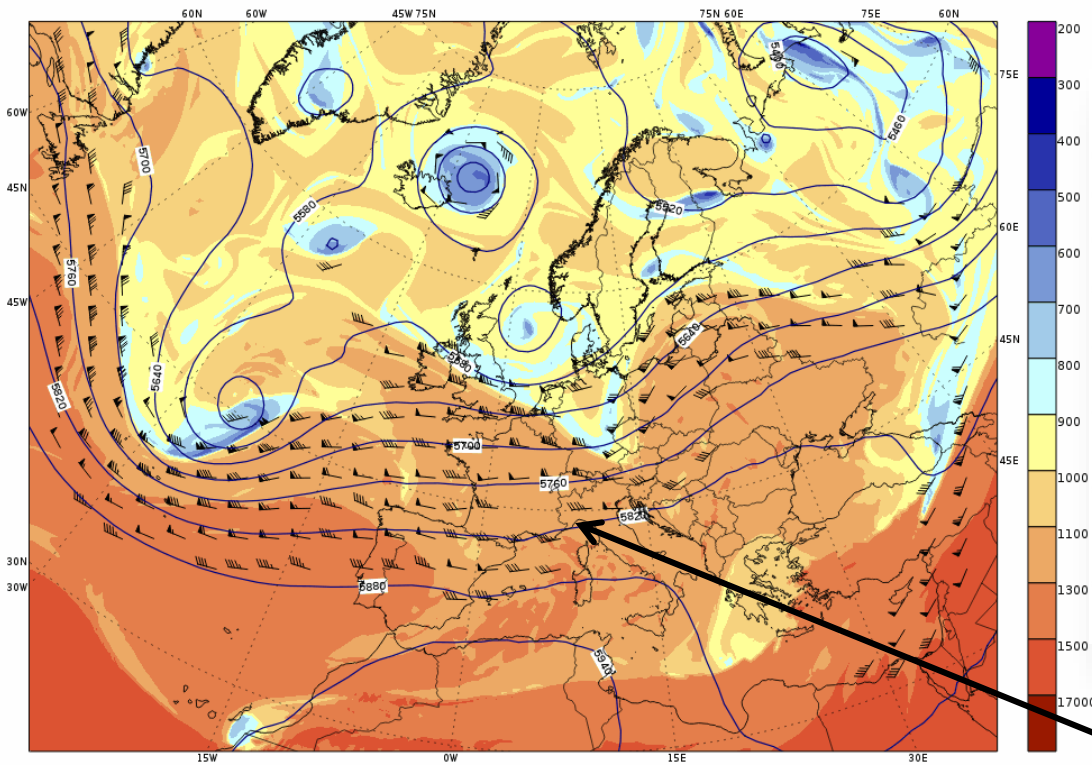
7 august 2019 Genova 21-22 UTC (excessive rainfall)



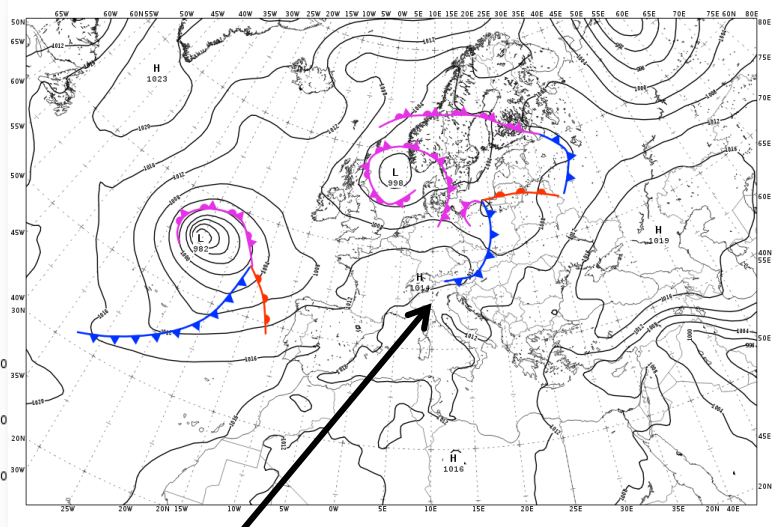
ECMWF 07 August 2019 00UTC

Forecast T+24 VT: Thursday 08 August 2019 00UTC

Dynamic tropopause (dam geop) • Wind 300hPa • Geopotential at 500 hPa



ANALISI AL SUOLO CON FRONTI del 08 08 2019 00UTC



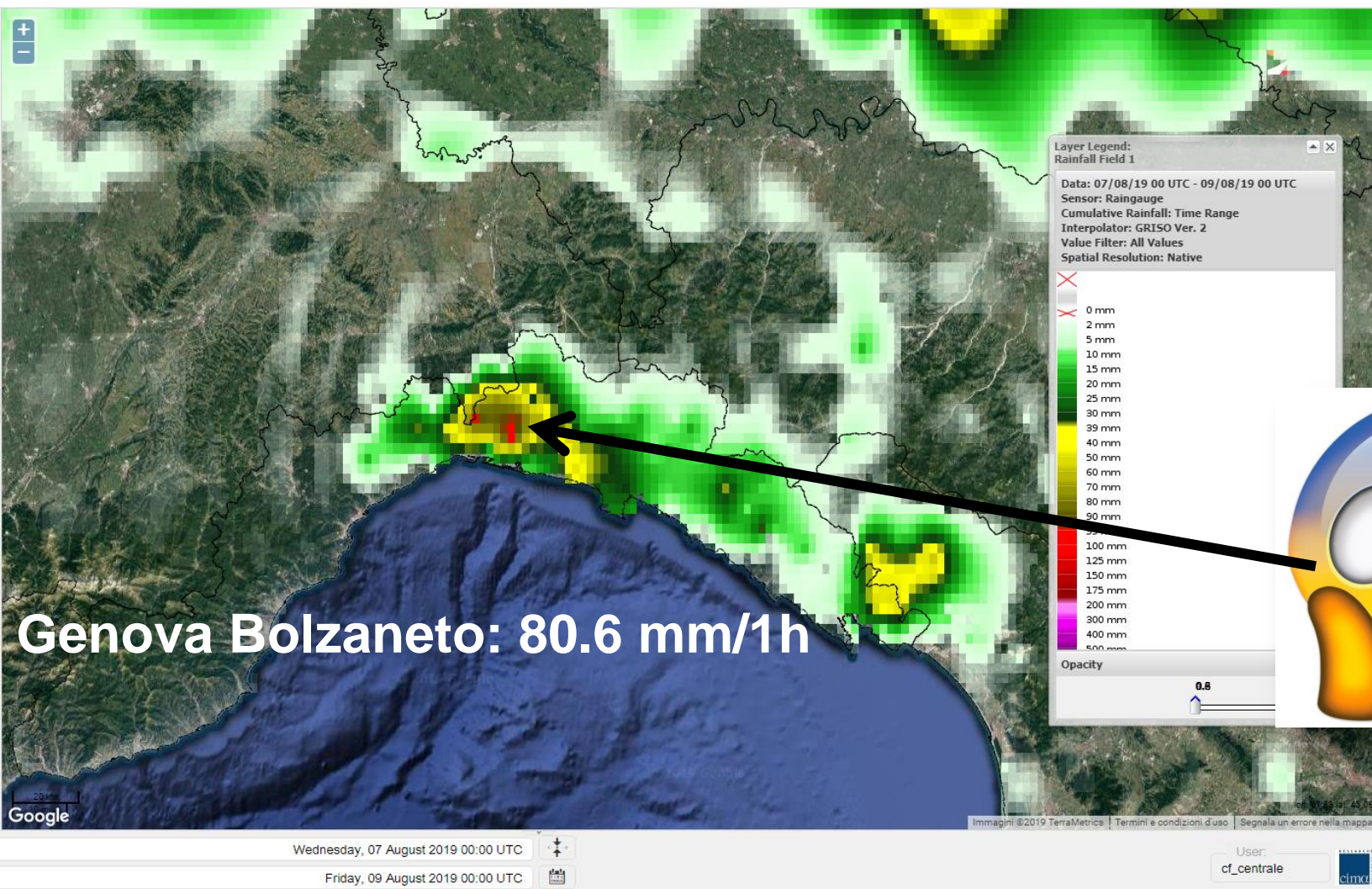
Genova



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7 august 2019 Genova 21-22 UTC (excessive rainfall)



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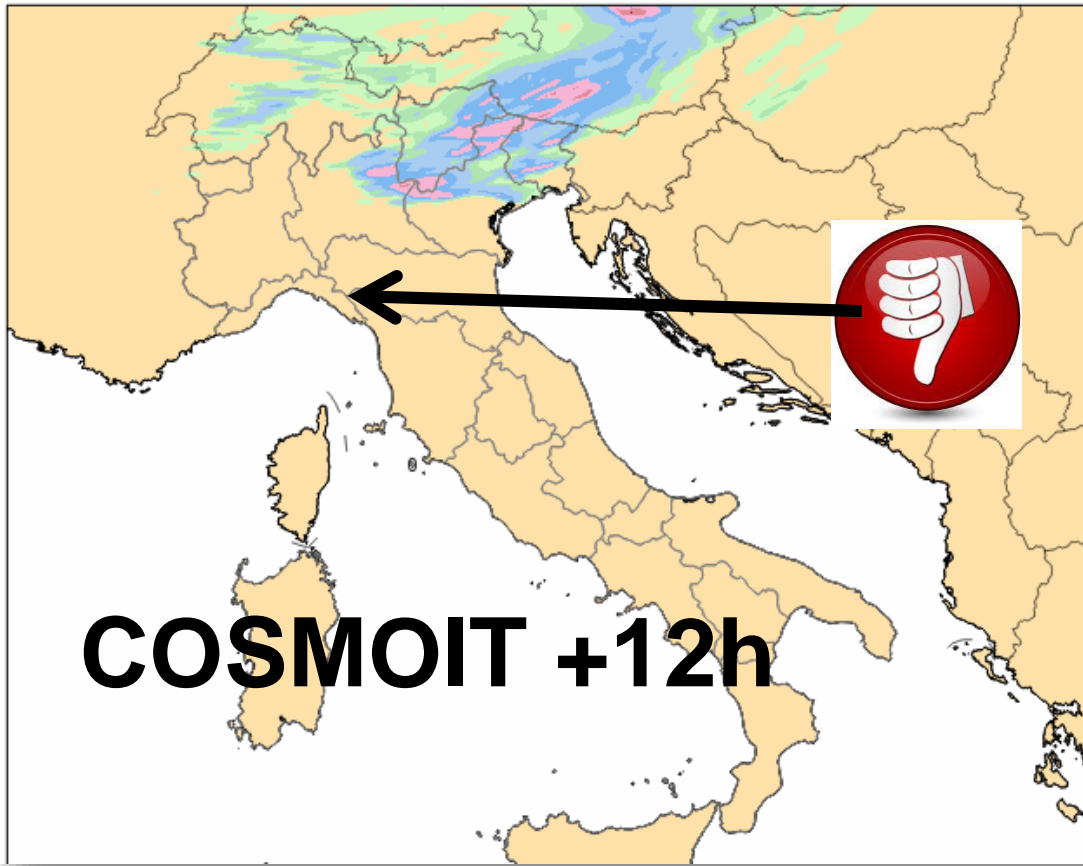
7 august 2019 Genova 21-22 UTC (excessive rainfall)



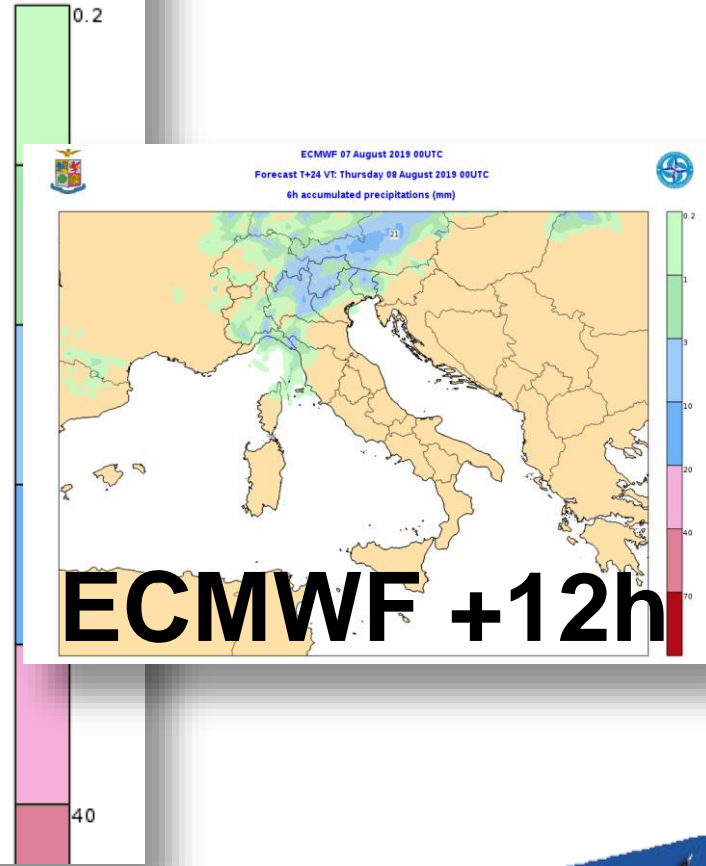
COSMO-IT 07 August 2019 12UTC

Forecast T+12 VT: Thursday 08 August 2019 00UTC

6h accumulated precipitations (mm)



COSMOIT +12h



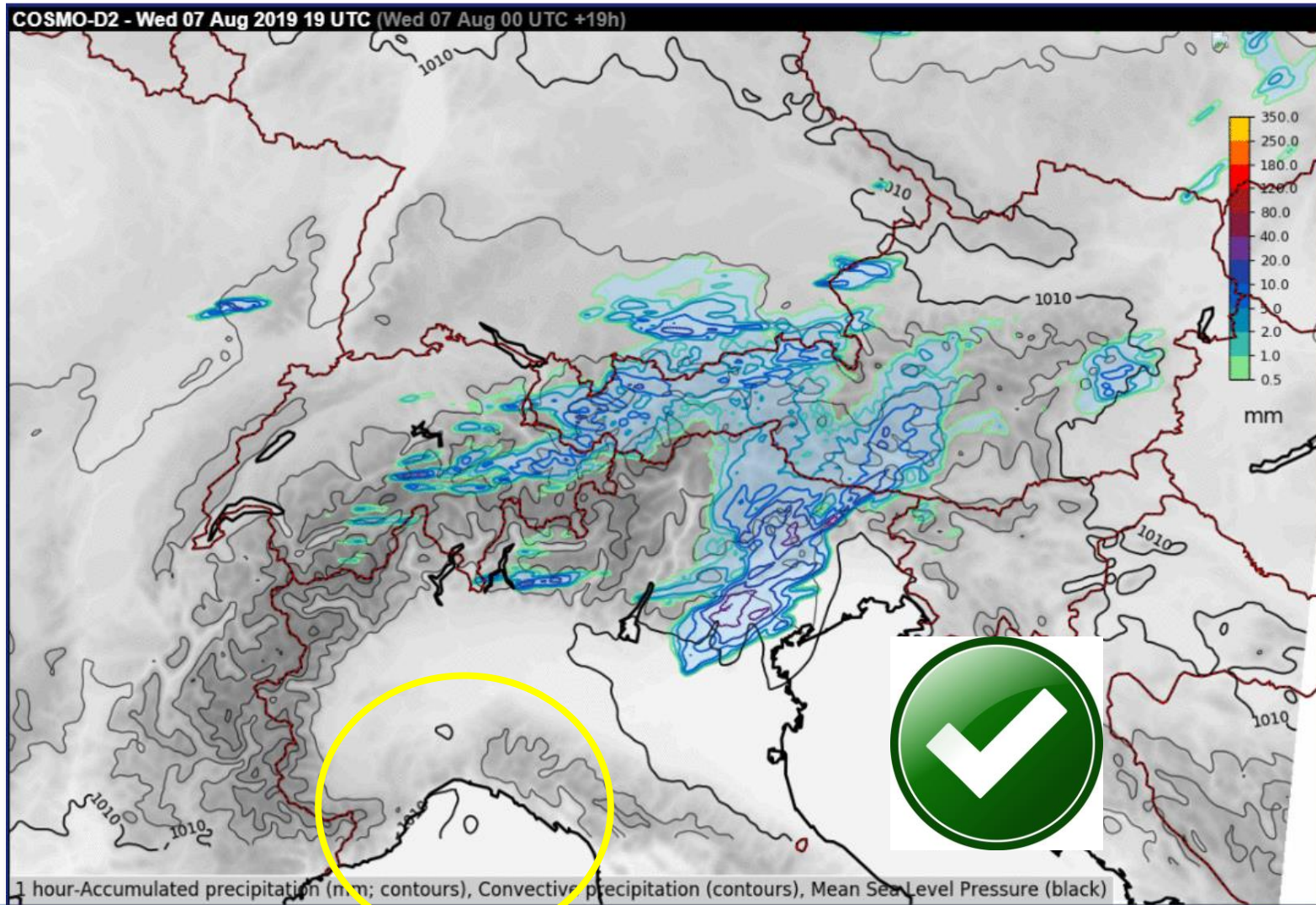
ECMWF +12h



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7 august 2019 Genova 21-22 UTC (excessive rainfall)



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8 august 2019 16-18 UTC
Udine
(Supercell – excessive rainfall and
downburst)

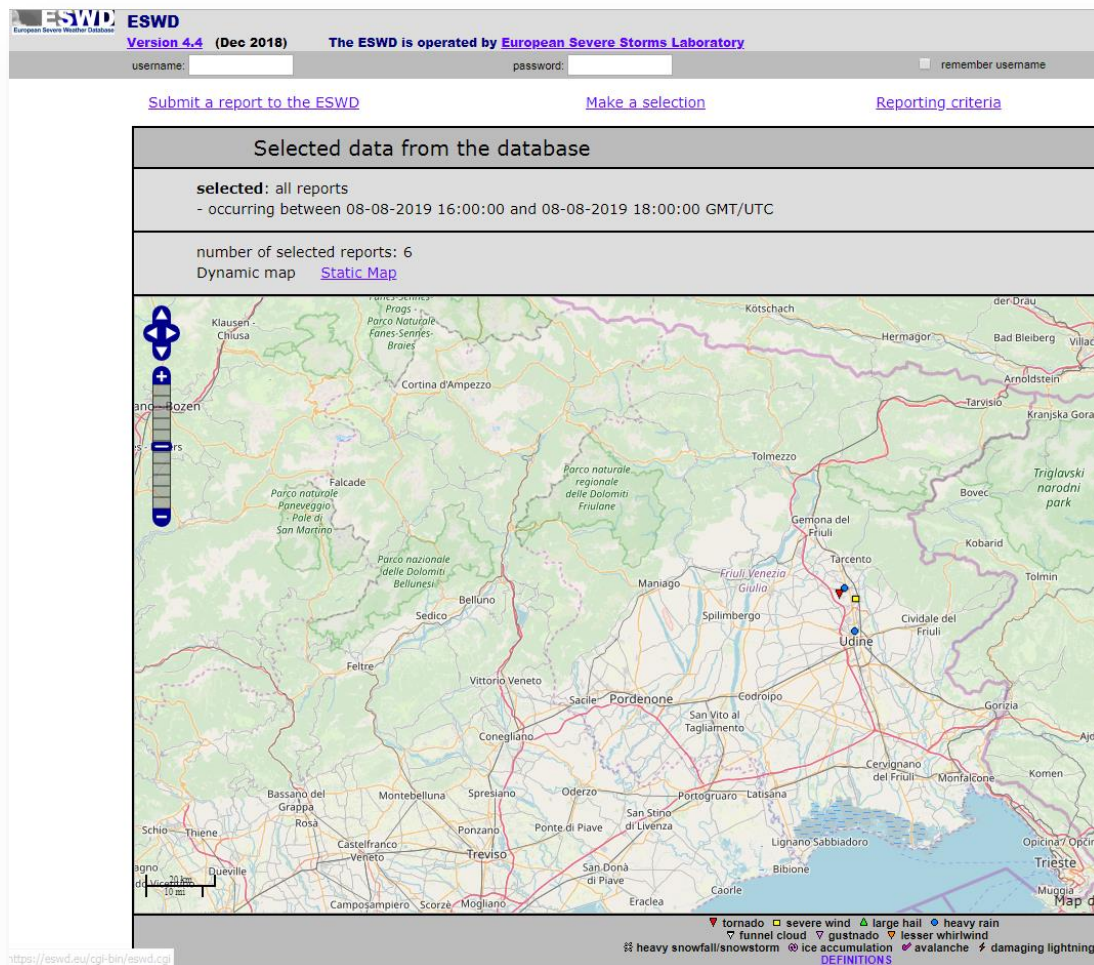


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8 august 2019 16-18 UTC

Udine (Supercell – excessive rainfall and downburst)

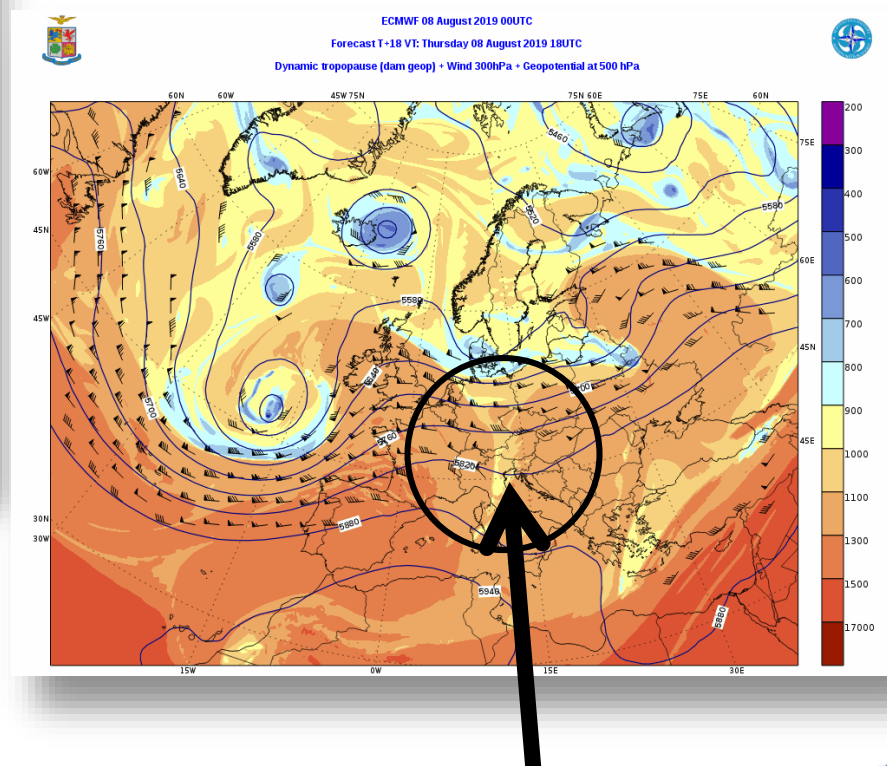
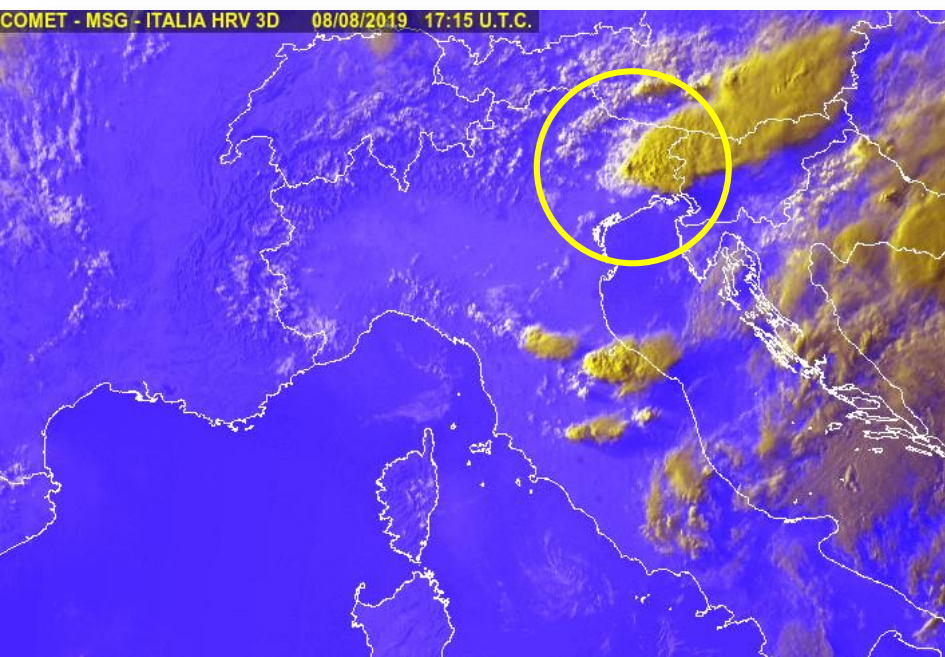


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8 august 2019 16-18 UTC

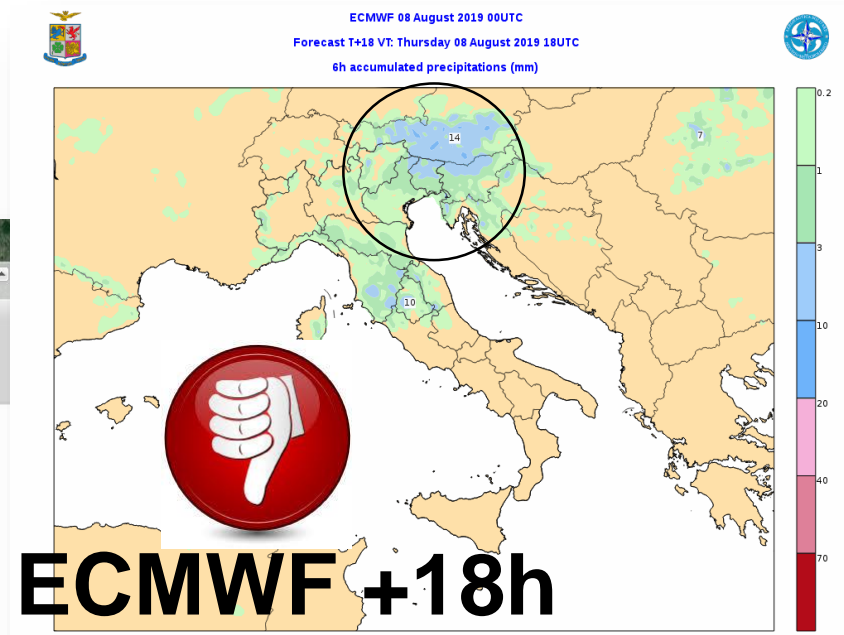
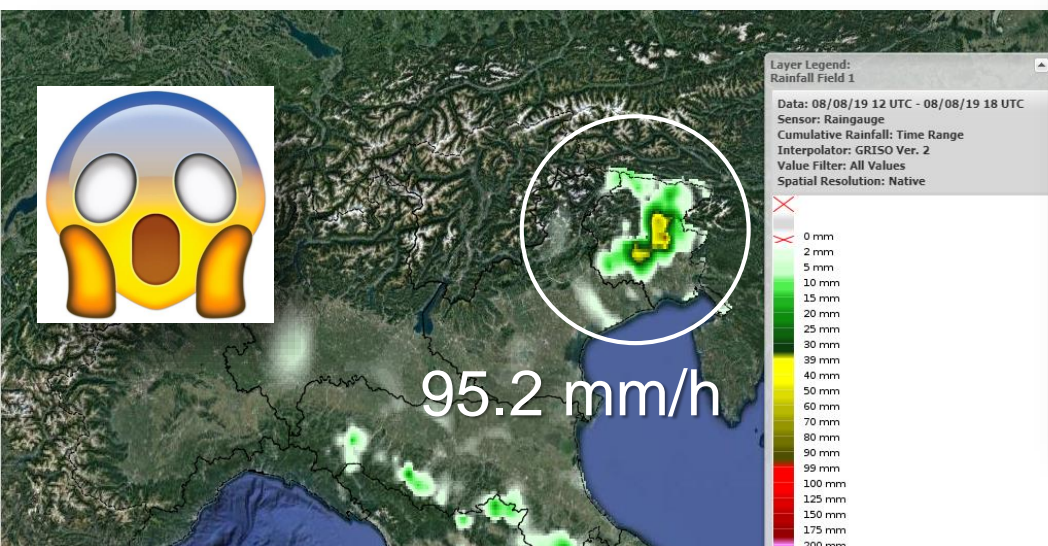
Udine (Supercell – excessive rainfall and downburst)



8 august 2019 16-18 UTC

Udine (Supercell – excessive rainfall and downburst)

Observed 12-18 UTC



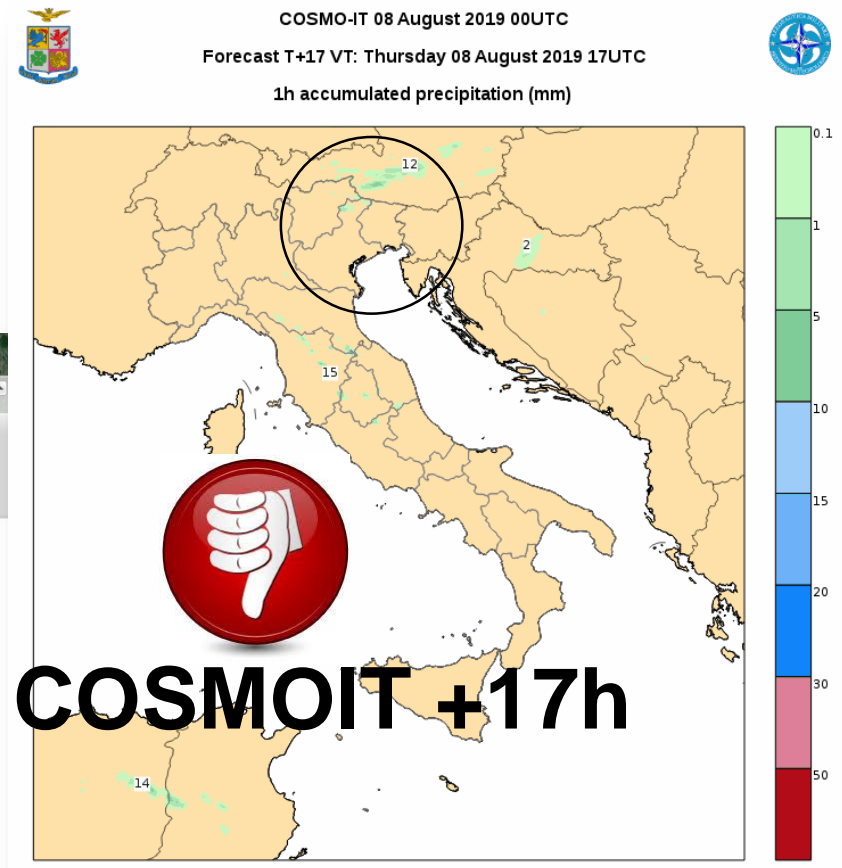
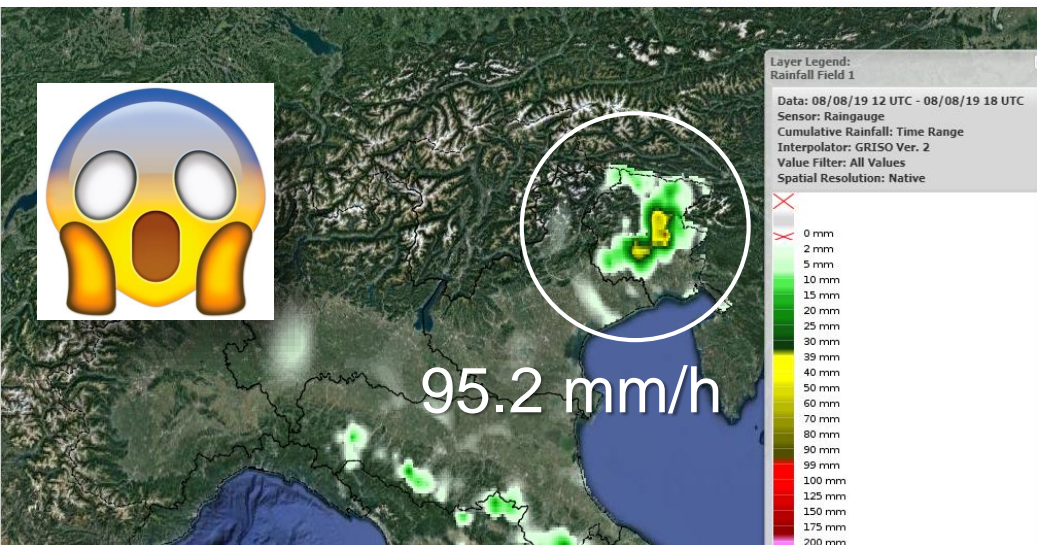
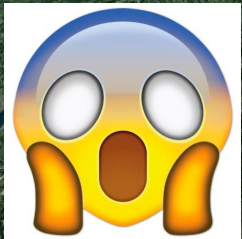
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8 august 2019 16-18 UTC

Udine (Supercell – excessive rainfall and downburst)

Observed 12-18 UTC



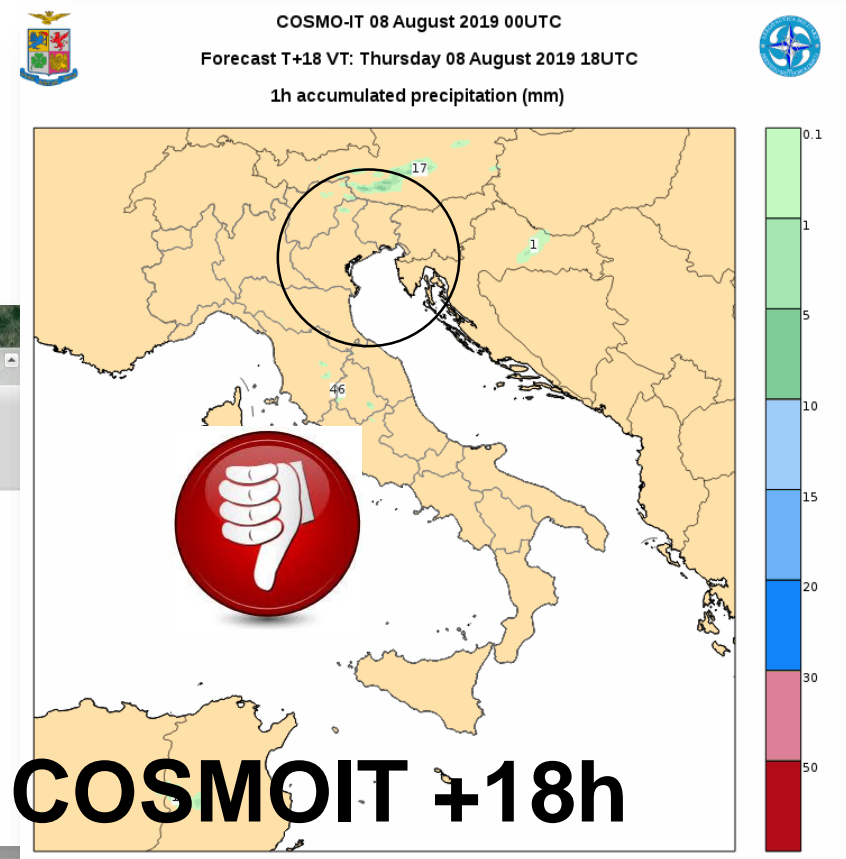
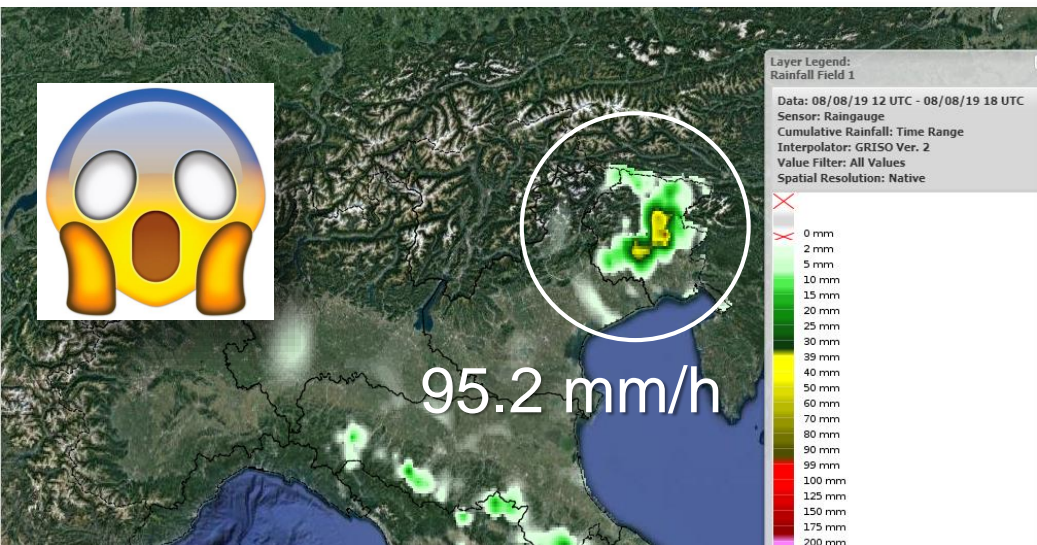
Aeronautica Militare



8 august 2019 16-18 UTC

Udine (Supercell – excessive rainfall and downburst)

observed



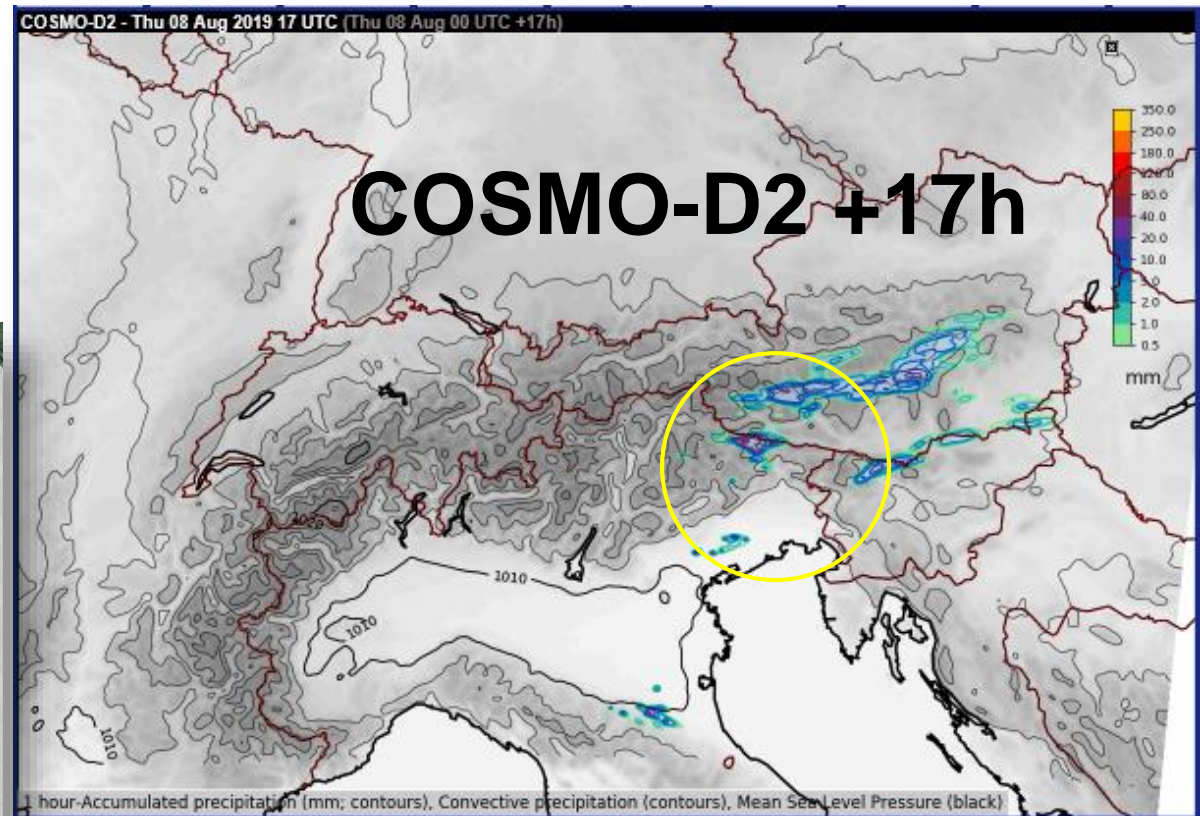
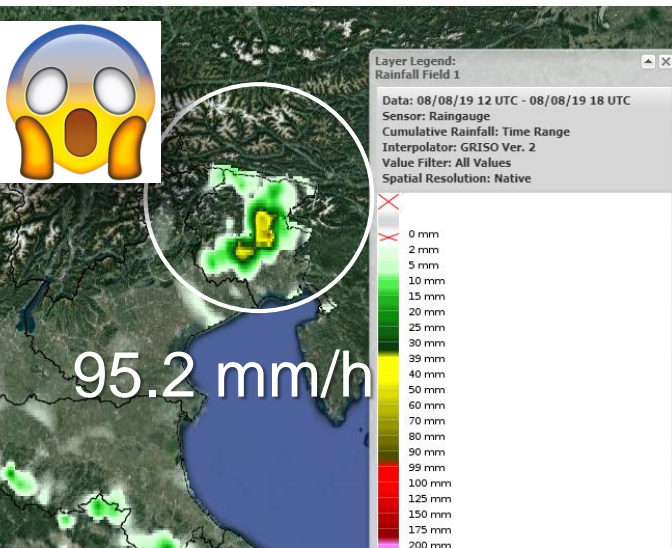
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8 august 2019 16-18 UTC

Udine (Supercell – excessive rainfall and downburst)

Observed 12-18UTC



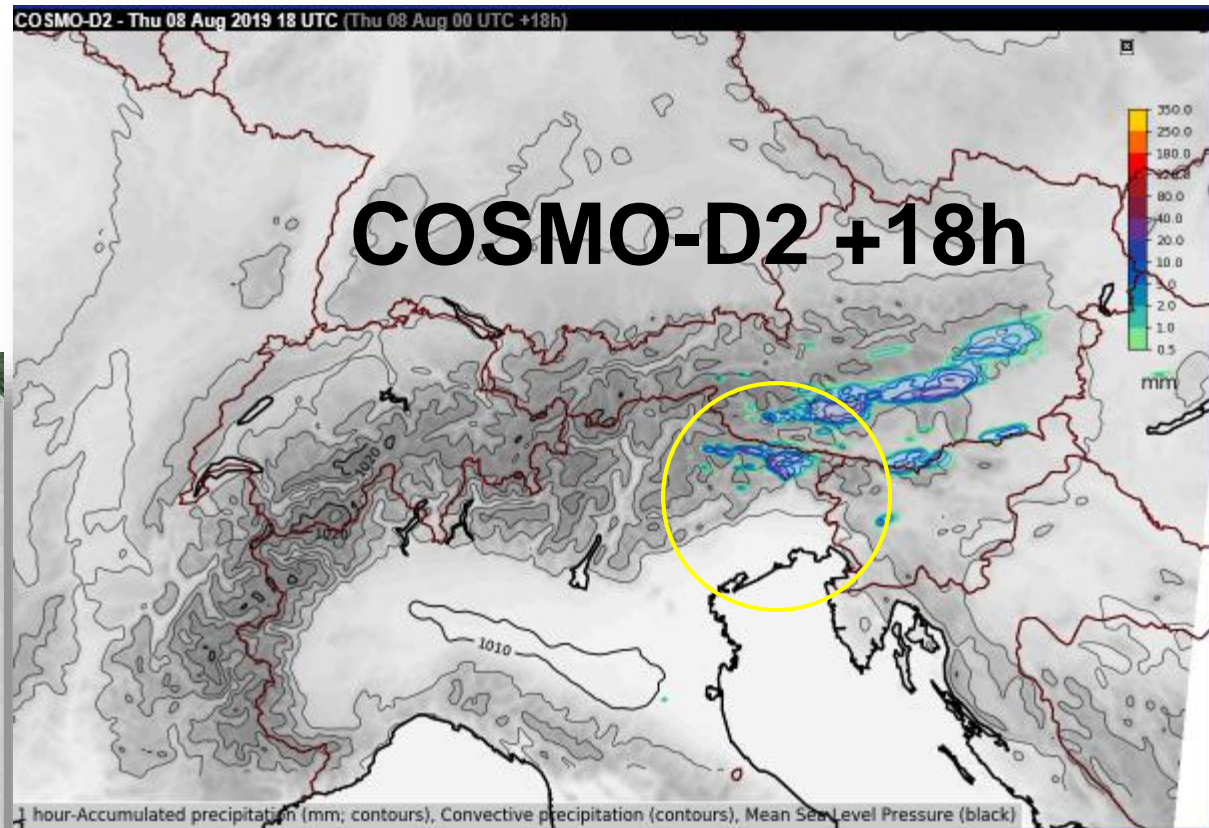
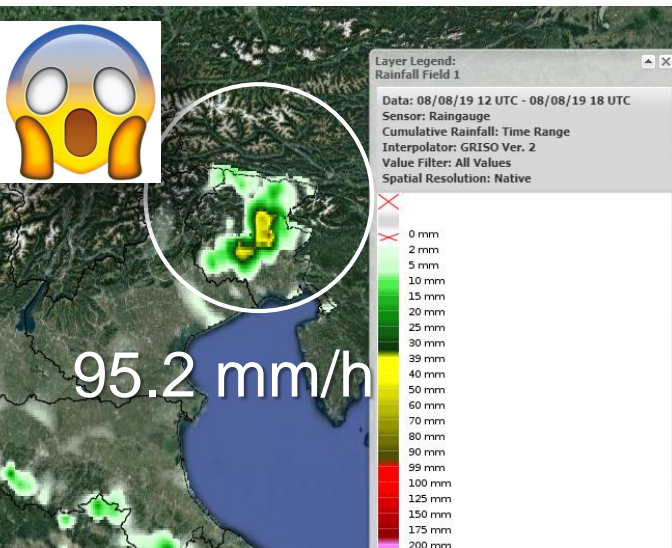
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8 august 2019 16-18 UTC

Udine (Supercell – excessive rainfall and downburst)

Observed 12-18UTC



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Thank you



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