The interest and challenges of using OPERA data
(in the flash flood hazard assessments and forecasting)

Shinju Park

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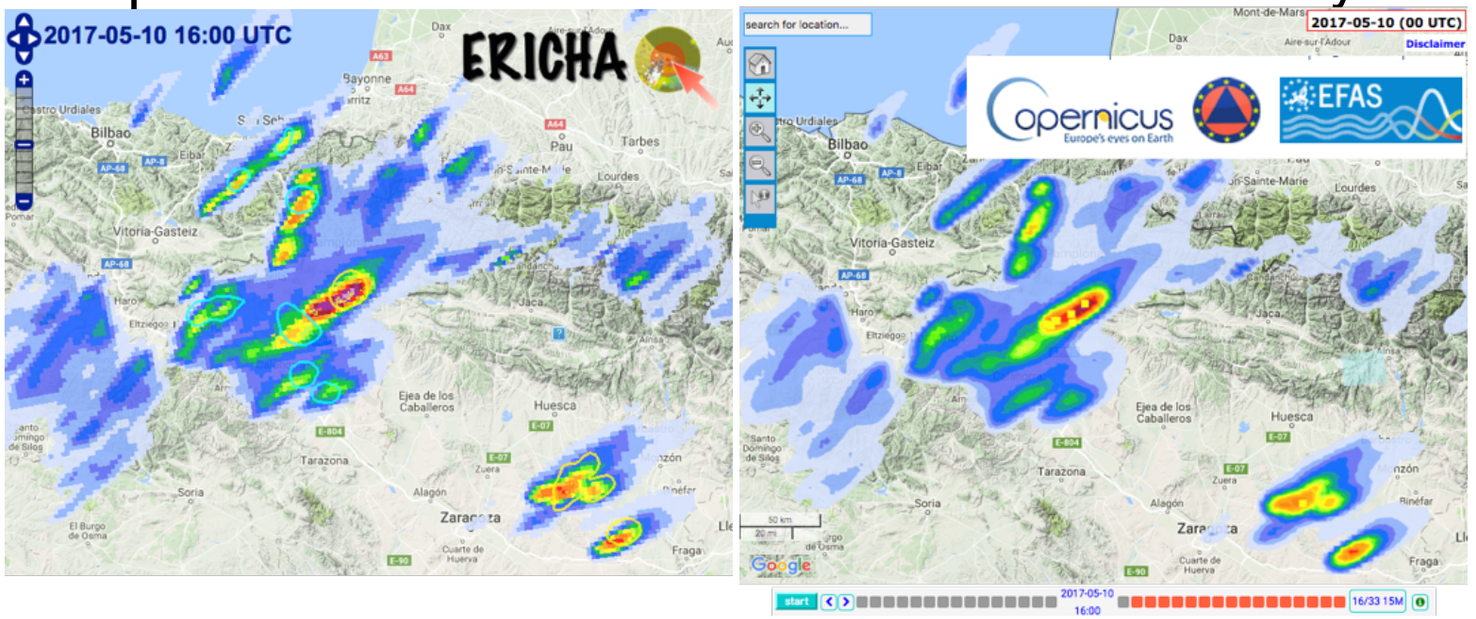
European Rainfall-InduCed Hazard Assessment system



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ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE

SISÄMINISTERIÖ
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European Civil Protection

DIRECCIÓN GENERAL DE PROTECCIÓN CIVIL Y EMERGENCIAS

OPERA
EIG EUMETNET PROGRAMME

JRC
EUROPEAN COMMISSION

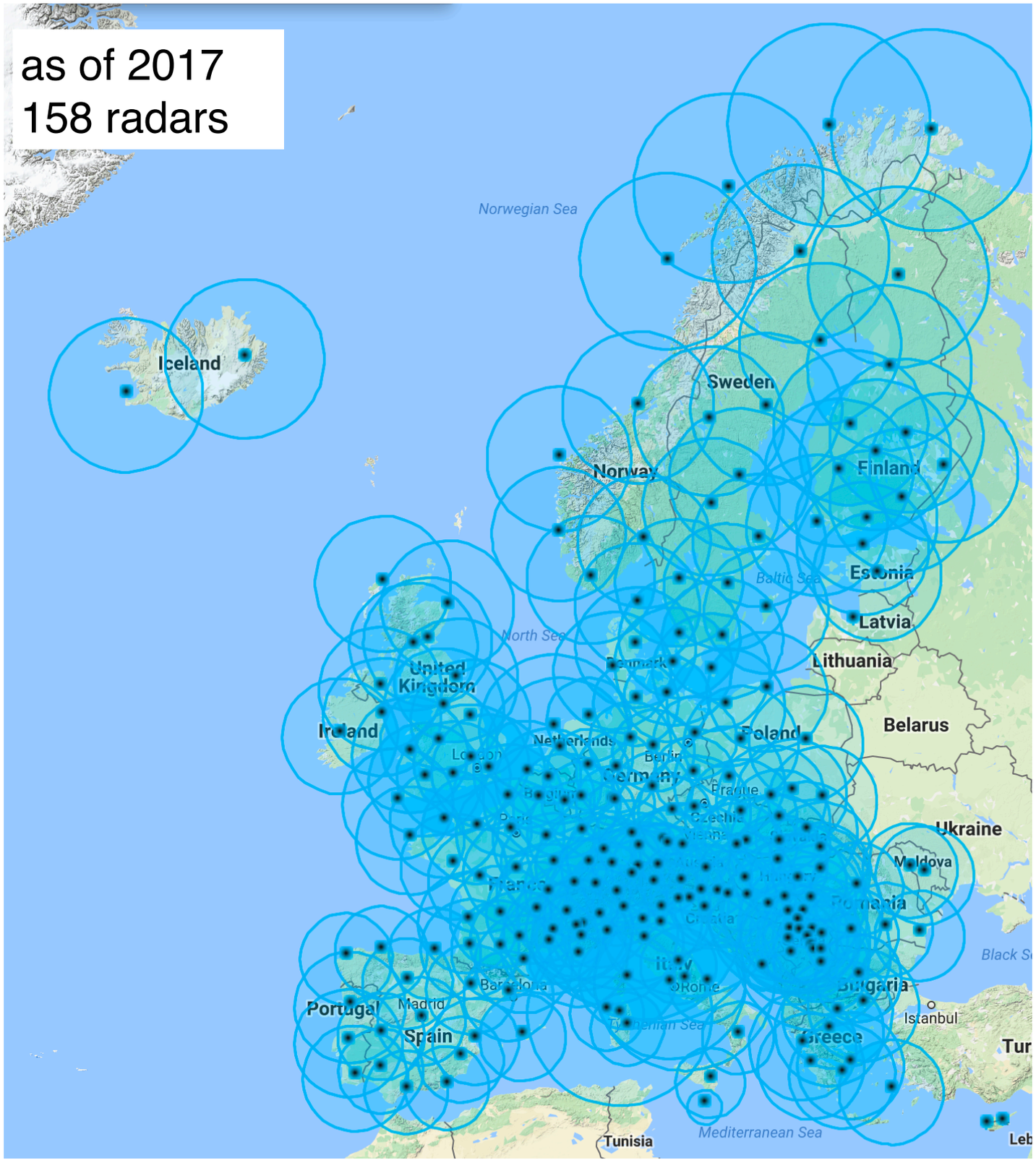
VAISALA

ECMWF

TECNIO
Be tech. Be competitive

Workshop on Supporting Civil Protections to manage hazards induced by heavy rainfall and storms in Europe
Brussels, Belgium, 14 June 2017

Operational Programme for the Exchange of Weather Radar Information



Why OPERA data?

- European Scale - **Excellent for monitoring cross border precipitation**

- High spatial resolution - **2 km**
- High temporal resolution - **15 min**
  Excellent for monitoring evolution of precipitation

Select layers

2016-05-29 21 00

Meteorological layers (1/5)

- [ ] Radar reflectivity
- [ ] Multi-sensor rain rate
- [ ] Lightning Densities
- [x] Rainfall accumulation (1h)
- [ ] NWP Accumulated Rain (1h)

Hazard assesment layers (0/2)

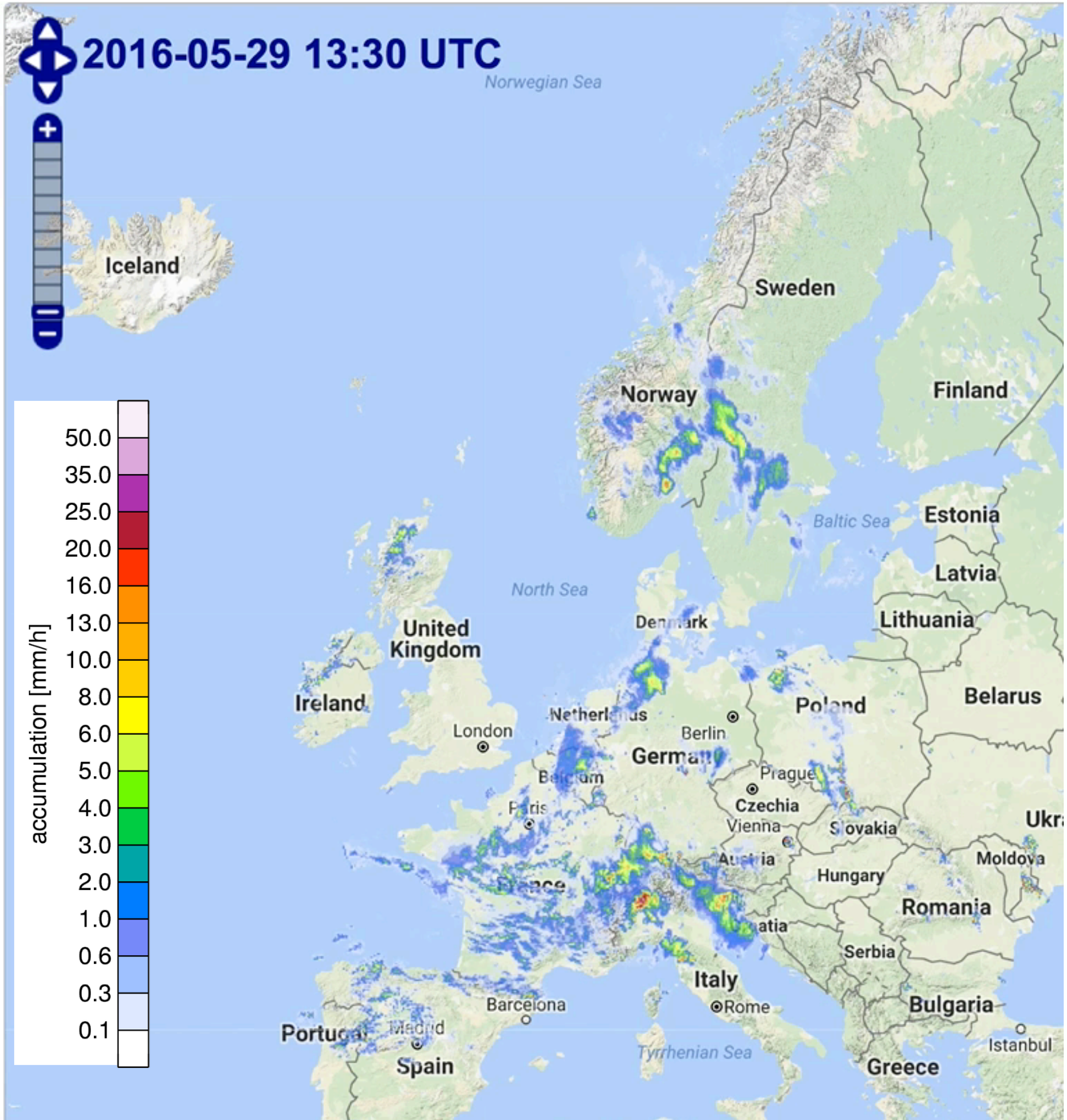
- [ ] Intense rain hazard level
- [ ] Flash flood hazard level

Convective weather layers (0/4)

- [ ] Storm clusters (3mm/h)
- [ ] Storm clusters (5mm/h)
- [ ] Storm clusters (8mm/h)
- [ ] Storm tracks

Daily products (0/5)

Background layers



ERICHA

OPERA Mosaic - ERICHA PROJECT

European Civil Protection

2016-05-29 24:00 UTC

Select layers

2016-05-29 24 00

Meteorological layers (0/3)

Convective weather layers (0/4)

Hazard assesment layers (0/1)

Daily products (1/3)

Rainfall accumulation (24h)

Raingauge accum. (24h)

Flash flood hazard summary (24h)

Background layers

accumulation [mm/day]

100.0
70.0
50.0
40.0
32.0
26.0
20.0
16.0
12.0
10.0
8.0
6.0
4.0
2.0
1.2
0.6
0.2

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2016-05-29 24:00 UTC

Select layers

2016-05-29 24 00

Meteorological layers (0/3)

Convective weather layers (0/4)

Hazard assesment layers (0/1)

Daily products (1/3)

Rainfall accumulation (24h)

Raingauge accum. (24h)

Flash flood hazard summary (24h)

Background layers

100.0
70.0
50.0
40.0
32.0
26.0
0.2

Railway in Schwäbisch Gmünd Baden-Württemberg

Jonas Heilgeist / dpa via AFP - Getty Images

Braunsbach

at a horse farm in Obernzenn

Vera Groeschl / dpa via AFP - Getty Images

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European Civil Protection

2016-05-29 24:00 UTC

Select layers

2016-05-29 24 00

Meteorological layers (0/3)

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Rainfall accumulation (24h)

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100.0
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26.0
20.0
16.0
12.0
10.0
8.0
6.0
4.0
2.0
1.2
0.6
0.2

Edinburgh
United Kingdom
Isle of Man
Dublin
Manchester
Liverpool
London
Berlin
Warsaw
Lithuania
Vilnius
Prague
Sarajevo
Montenegro
Kosovo
Bulgaria
Istanbul
Tirana
Rome
Barce
Black Sea

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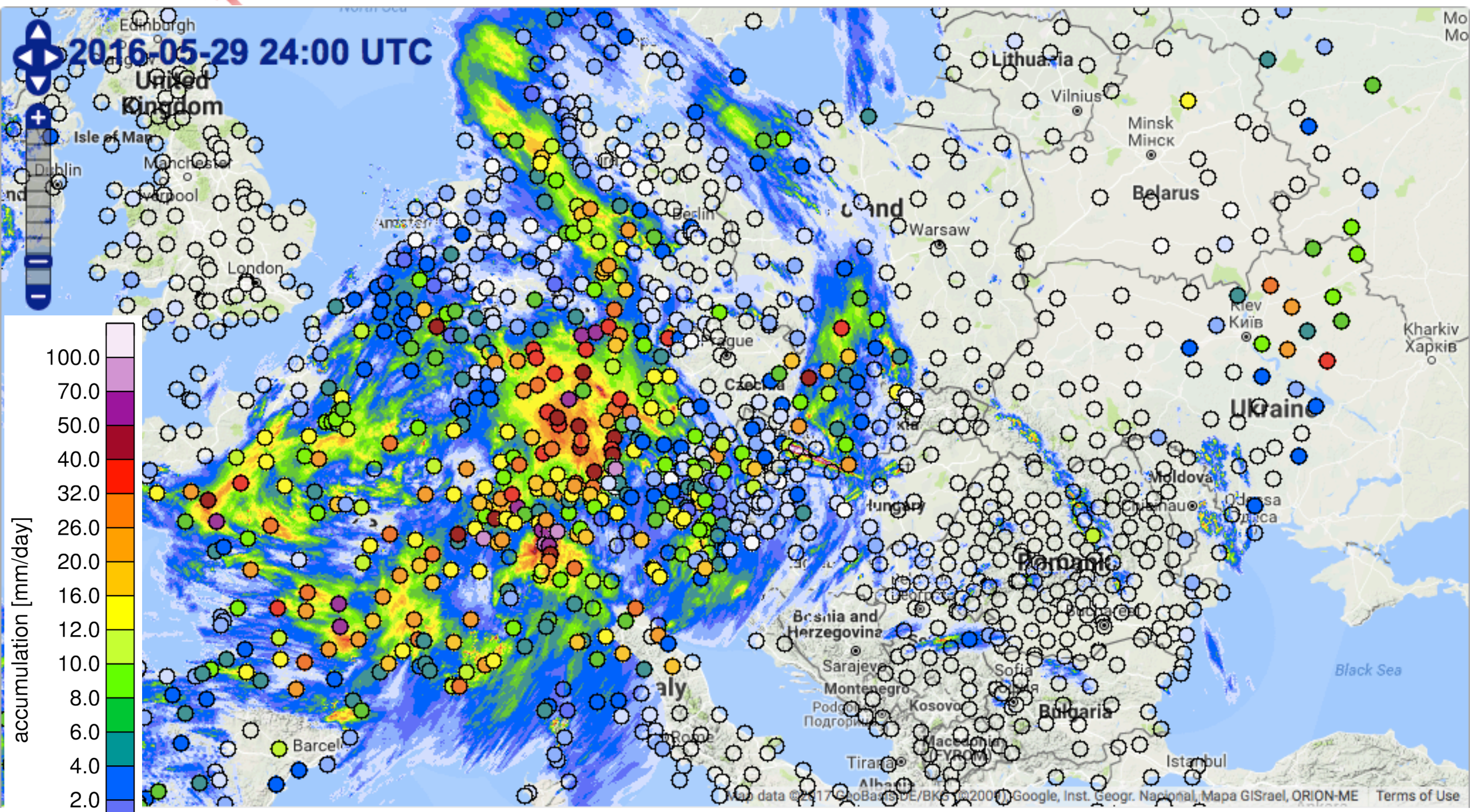
SYNOP rain gauge



Need rainfall intensity adjustments

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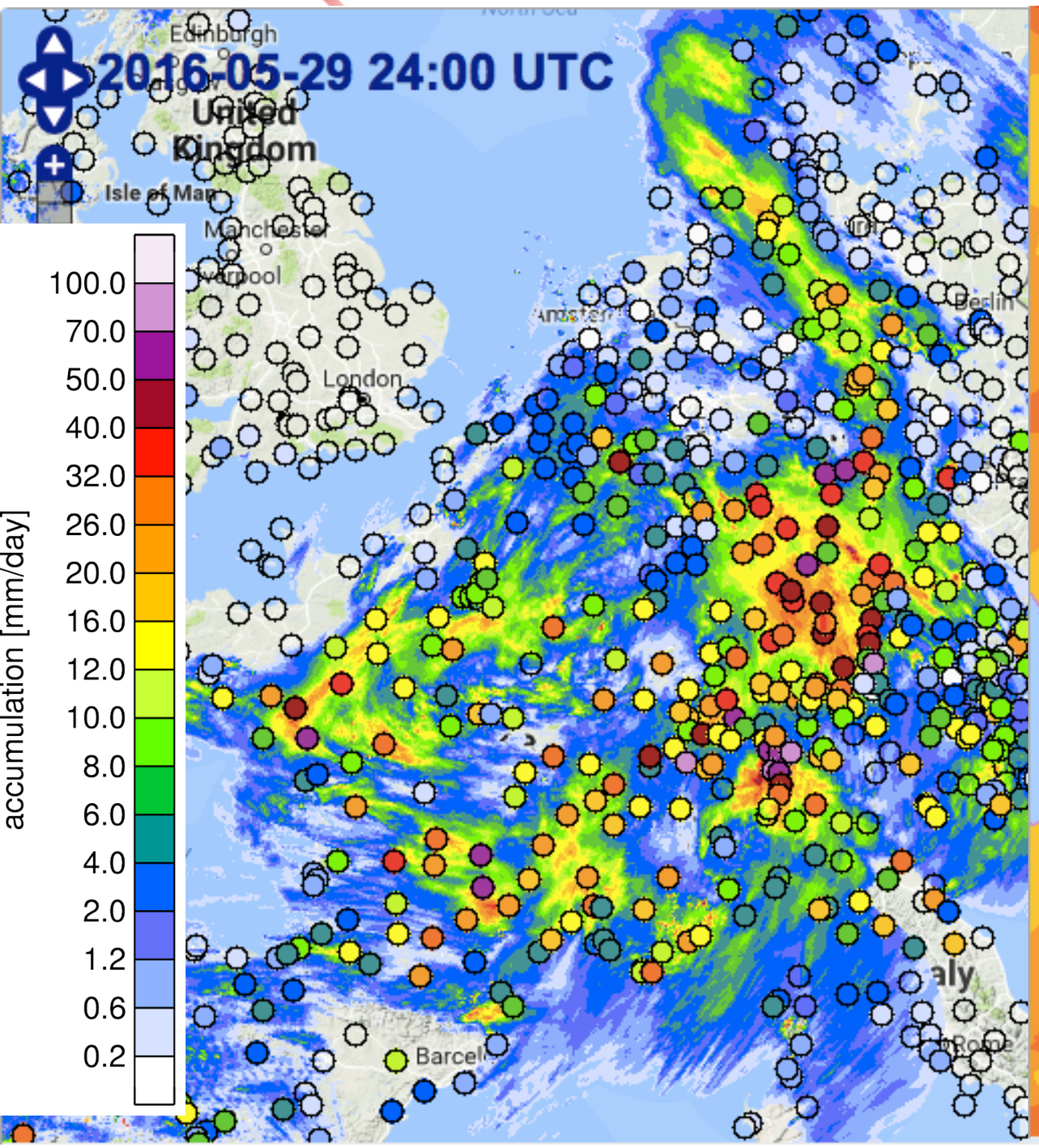

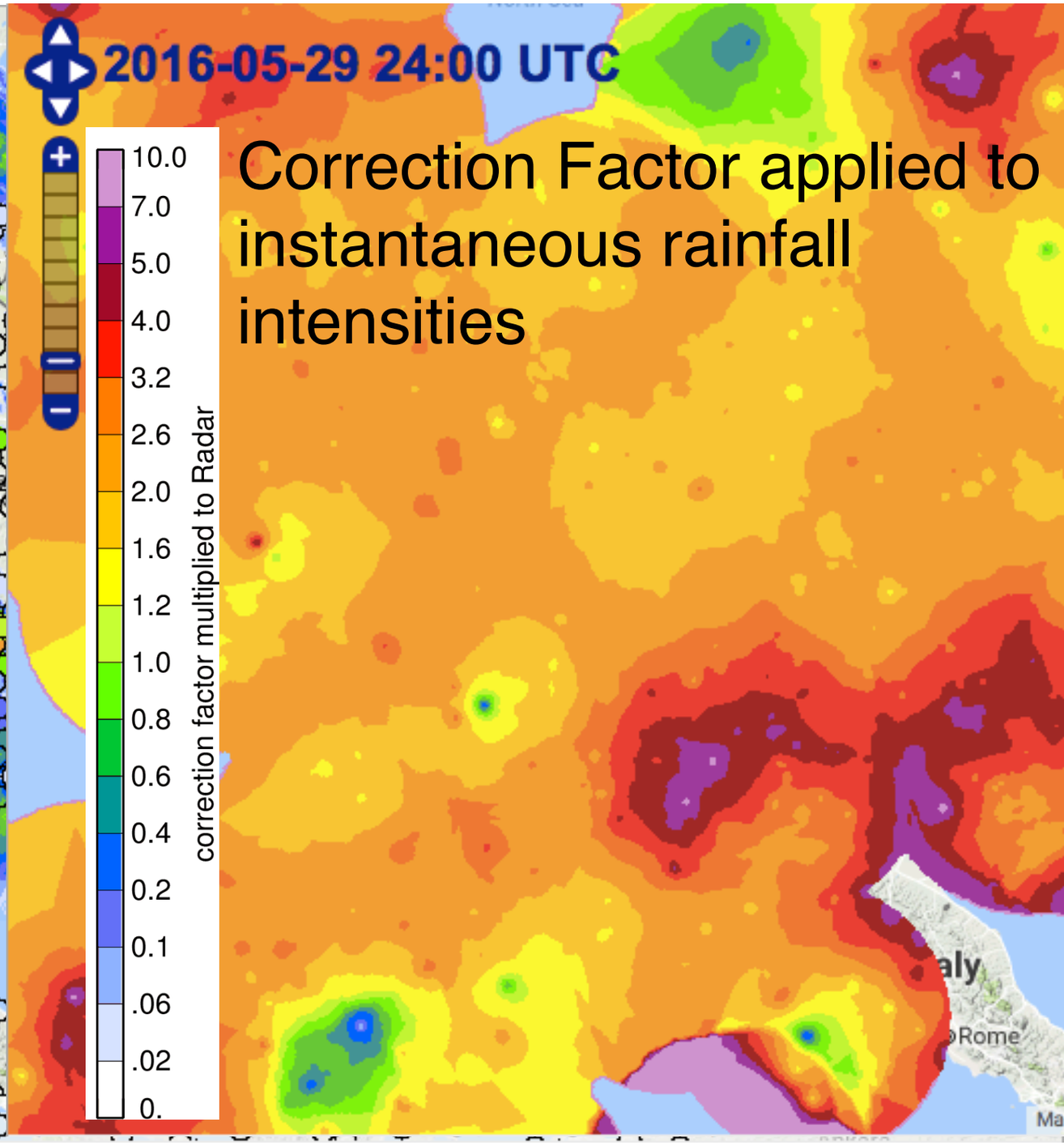

Correction Factor applied to instantaneous rainfall intensities

Estimated by comparison of radar-rain gauge (30-days) accumulations. Inverse distance interpolation of R-G differences

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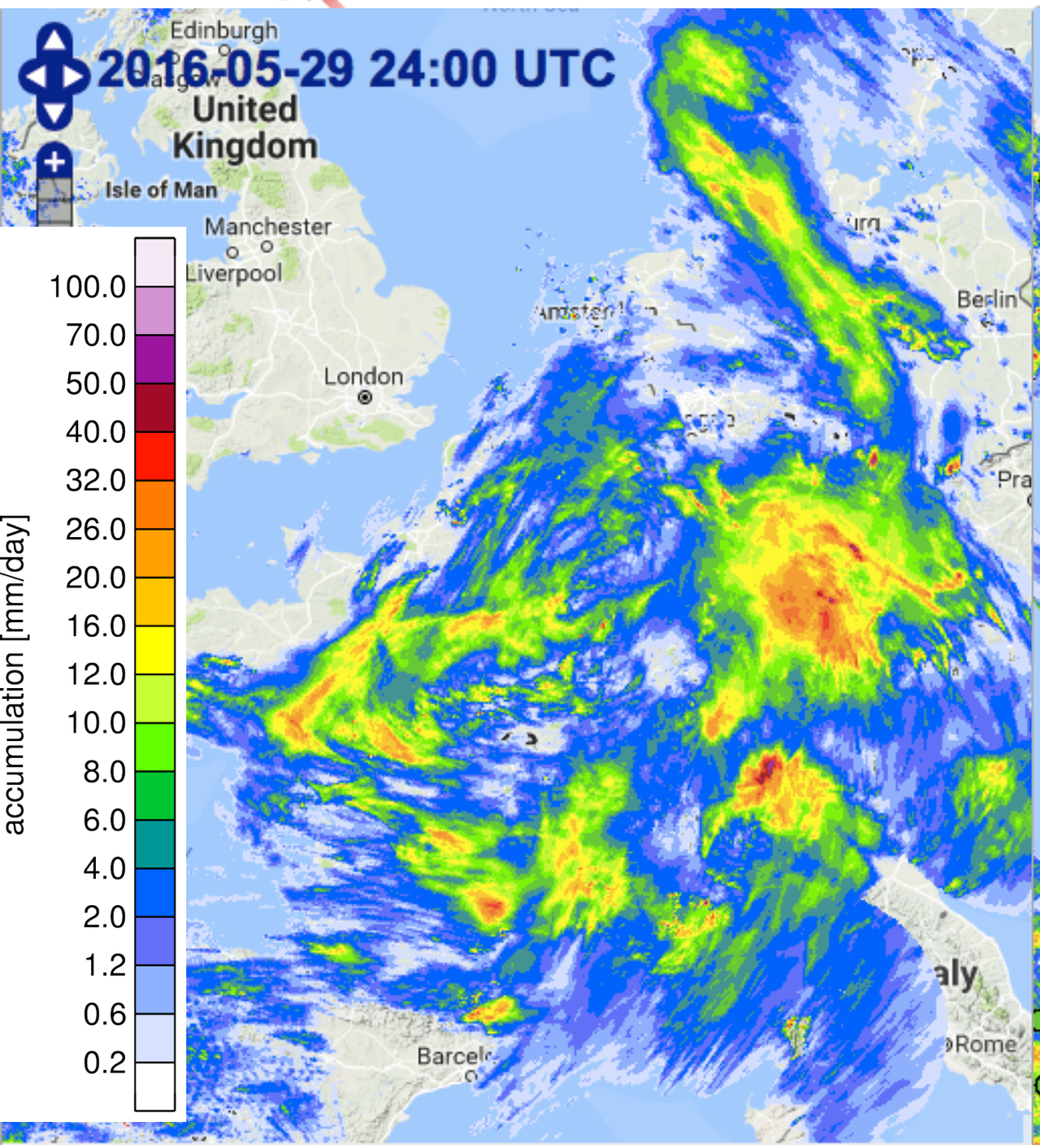
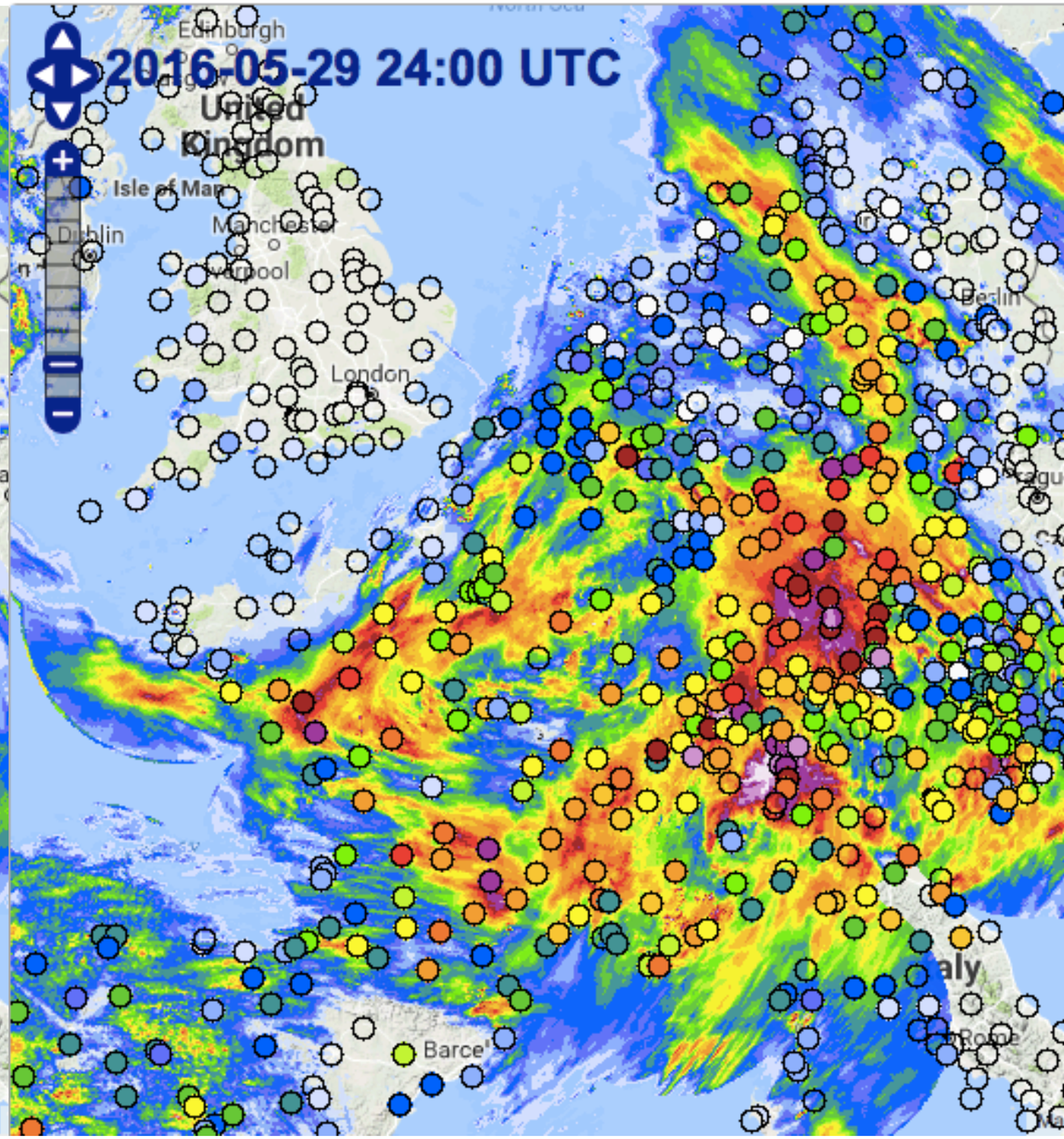
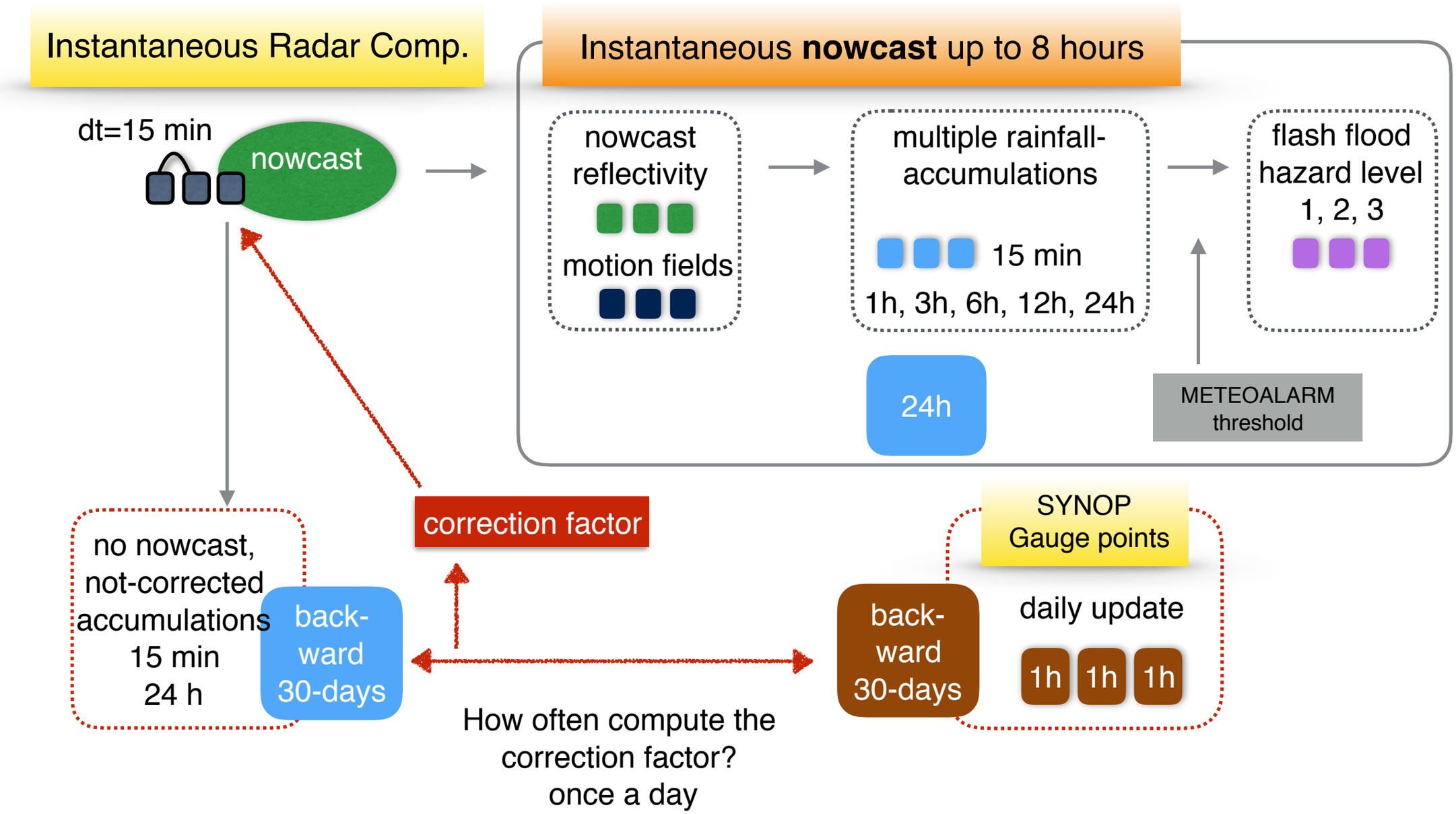


Before correction



After correction

ERICHA system (real-time)



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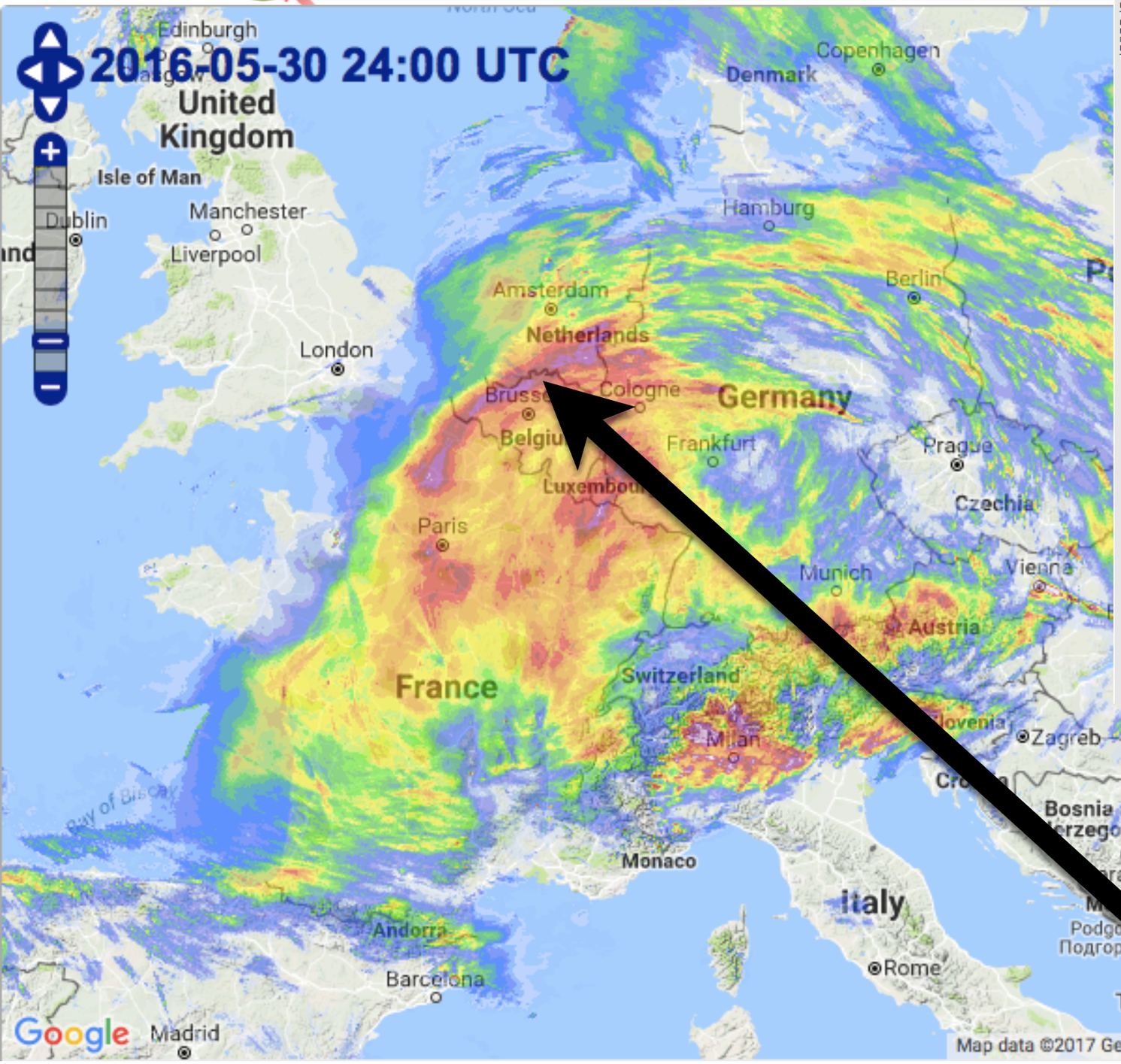
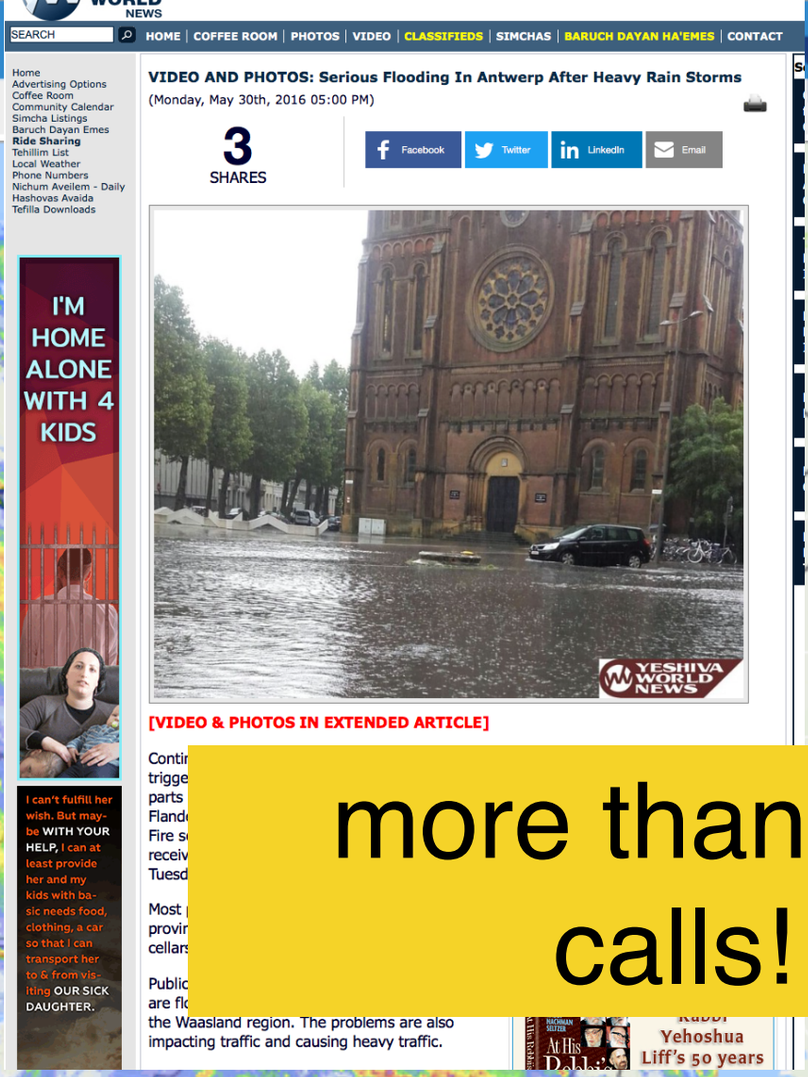
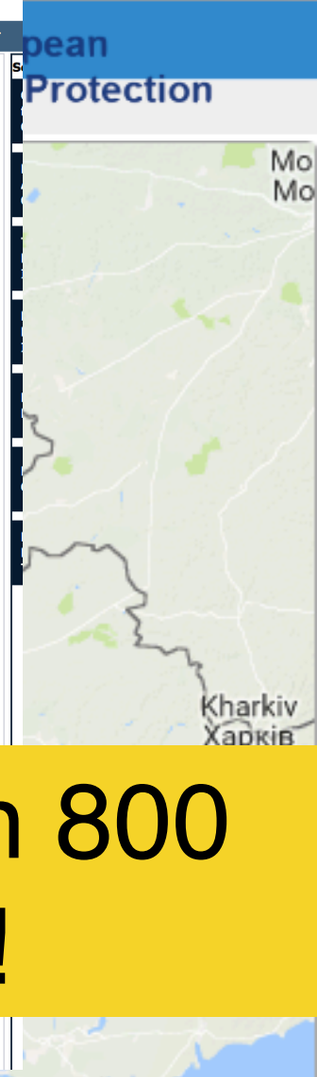
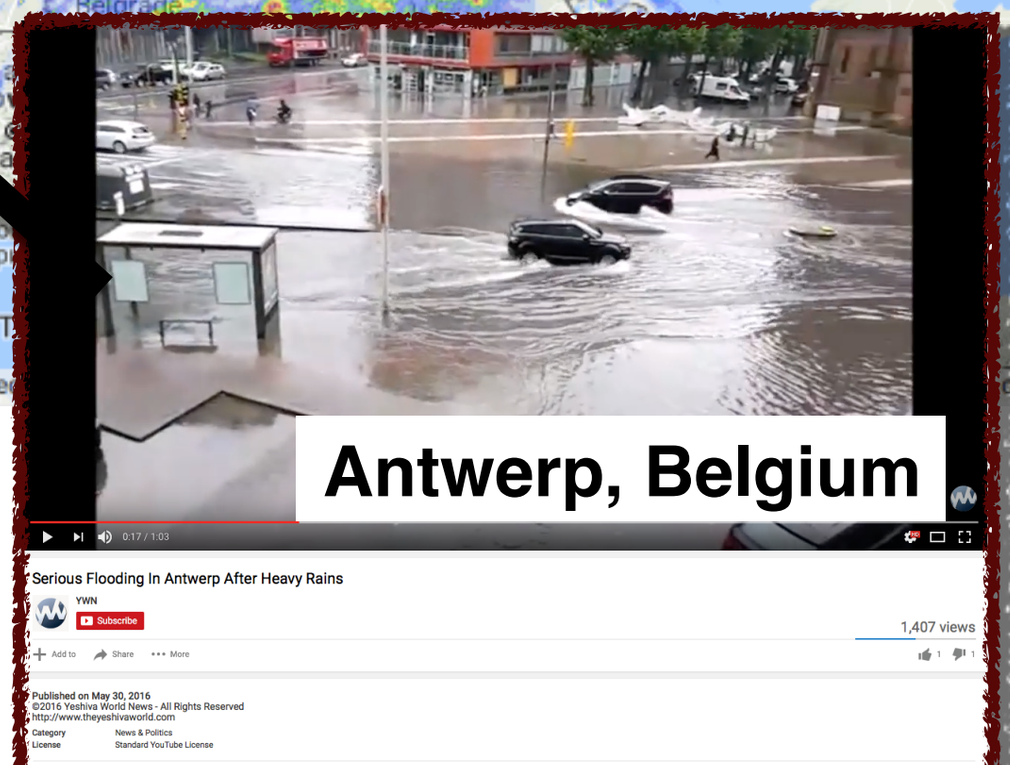
2016-05-30 24:00 UTC







more than 800 calls!



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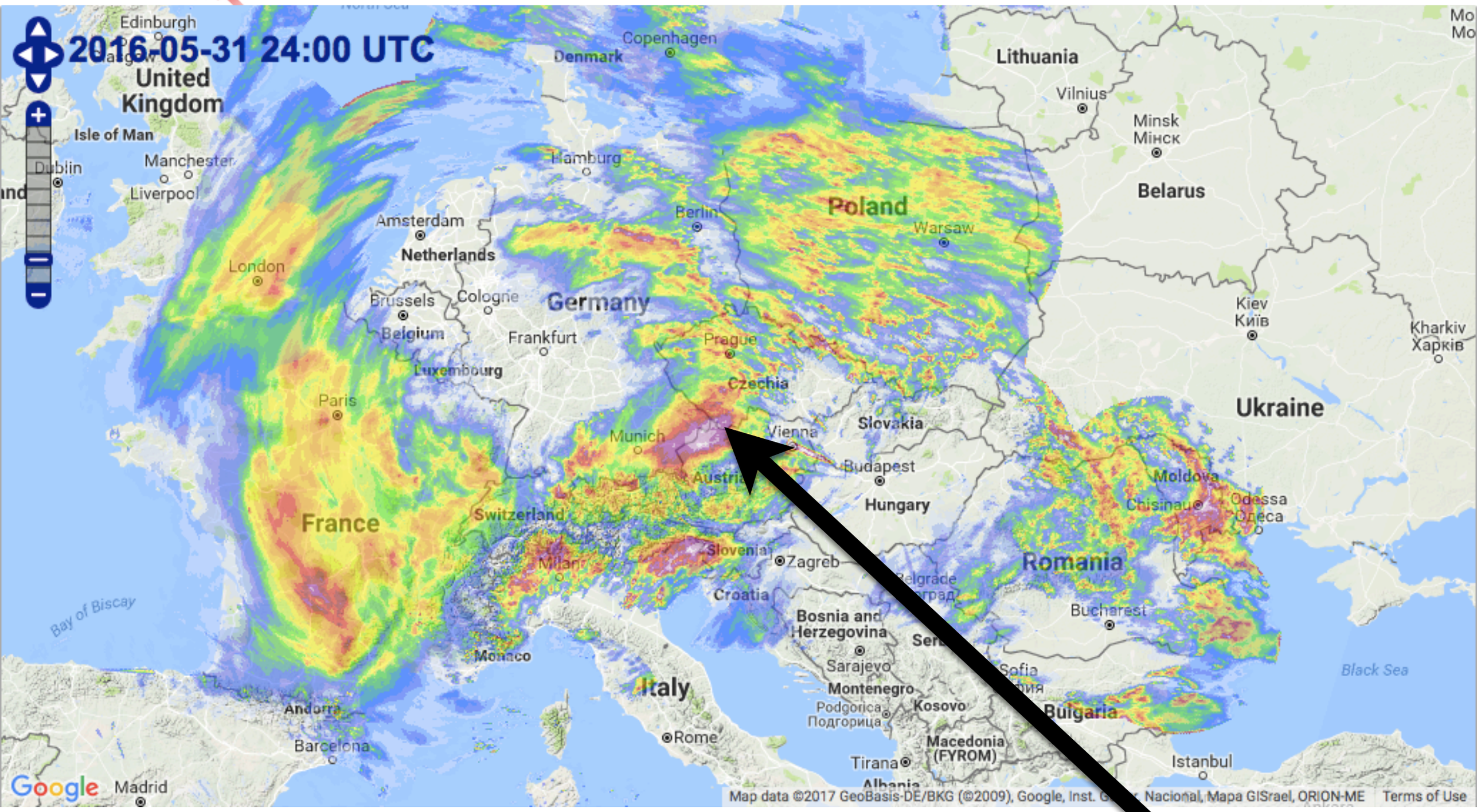

Near Passau, Inn river
Border between
Austria and Germany

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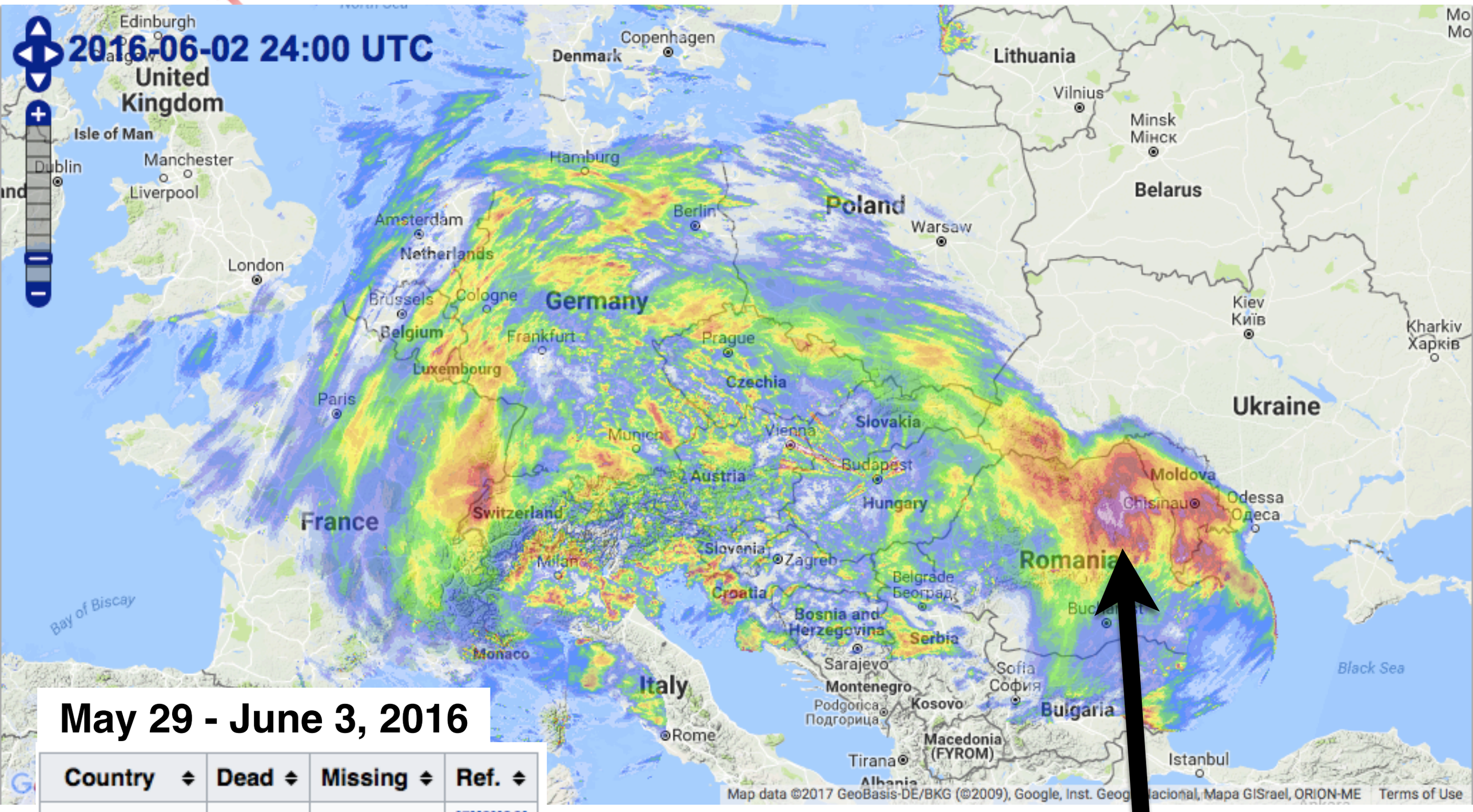
2016-06-01 24:00 UTC

Simbach am Inn on 01 June



May 29 - June 3, 2016

Country	Dead	Missing	Ref.
Germany	11	4	[5][8][26]
France	4		[9][10]
Belgium	3		[7][11]
Romania	2		[6]

Bacau county, Romania

https://en.wikipedia.org/wiki/2016_European_floods

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European Civil Protection

16-06-02 24:00 UTC

United Kingdom

Manchester

Liverpool

London

Copenhagen

Denmark

Lithuania

Vilnius

Minsk
Минск

Belarus

Warsaw

Kiev
Київ

Ukra

Barcelona

Rome

Sarajevo

Montenegro

Podgorica
Подгорица

Kosovo

Macedonia
(FYROM)

Tirana

Istanbul

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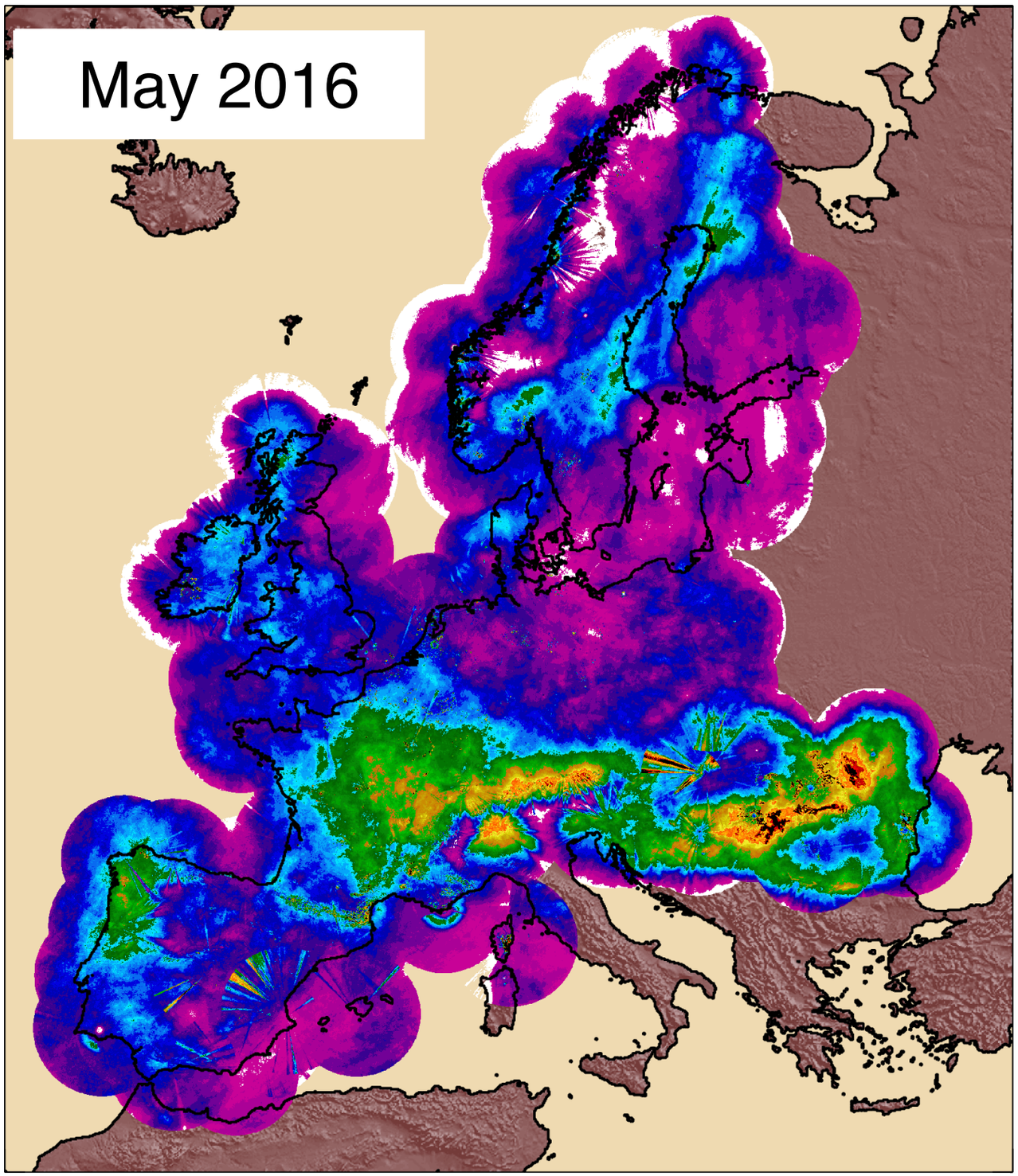
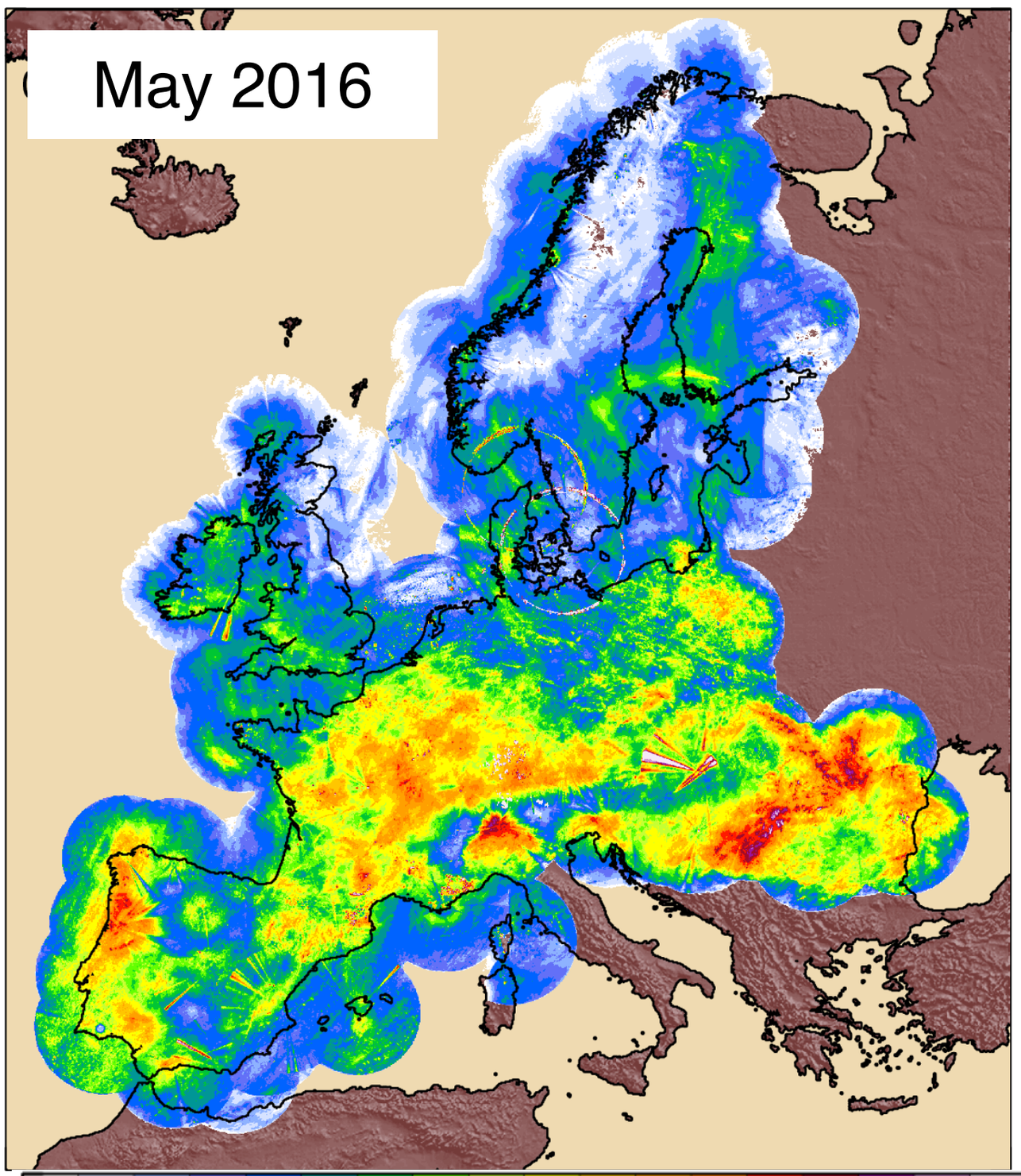
Monitoring OPERA data

Reflectivity > 10 dBZ

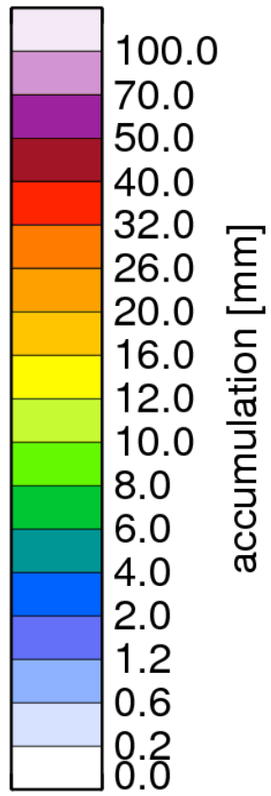


Monthly accumulation



Dry (no-rain) days
over SPAIN

a. Orographic beam blockage in the mountain ranges
b. Ground clutter
c. Sea clutter / Anomalous Propagation
d. Severe interferences
e. Other artifacts



Summary

- Interests of using OPERA data
  - **European Scale - Excellent for monitoring cross border precipitation**
  - **Excellent for monitoring evolution of precipitation (2 km, 15 min)**
  - **Nowcasting of precipitation (0 to 6 h lead time)**
  - **Applications of nowcasting rainfall-induced hazards such as flash flood**
  - **Complementary to EFAS (7 km, updated 12 hrs)**

- Challenges of using OPERA data
  - **Better Quantitative Precipitation Estimation (QPE) is required.**