

The OPERA radar composites: An opportunity to provide high- resolution rainfall information at European scale.

July 2014

Elena Saltikoff, OPERA PM

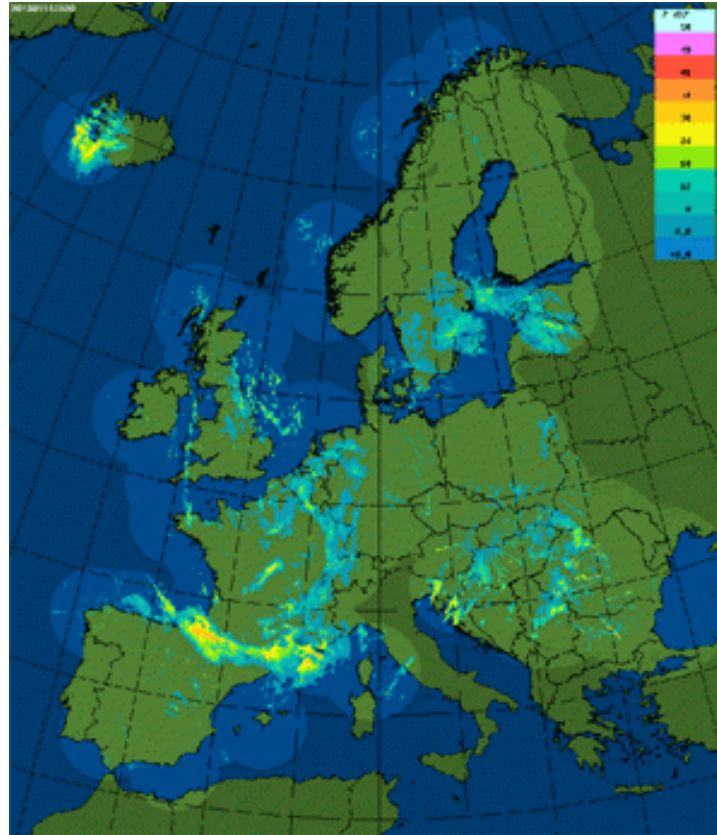
Laurent Delobbe, OPERA delegate for Belgium

Bojan Lipovscak, OPERA delegate for Croatia

Opera in brief

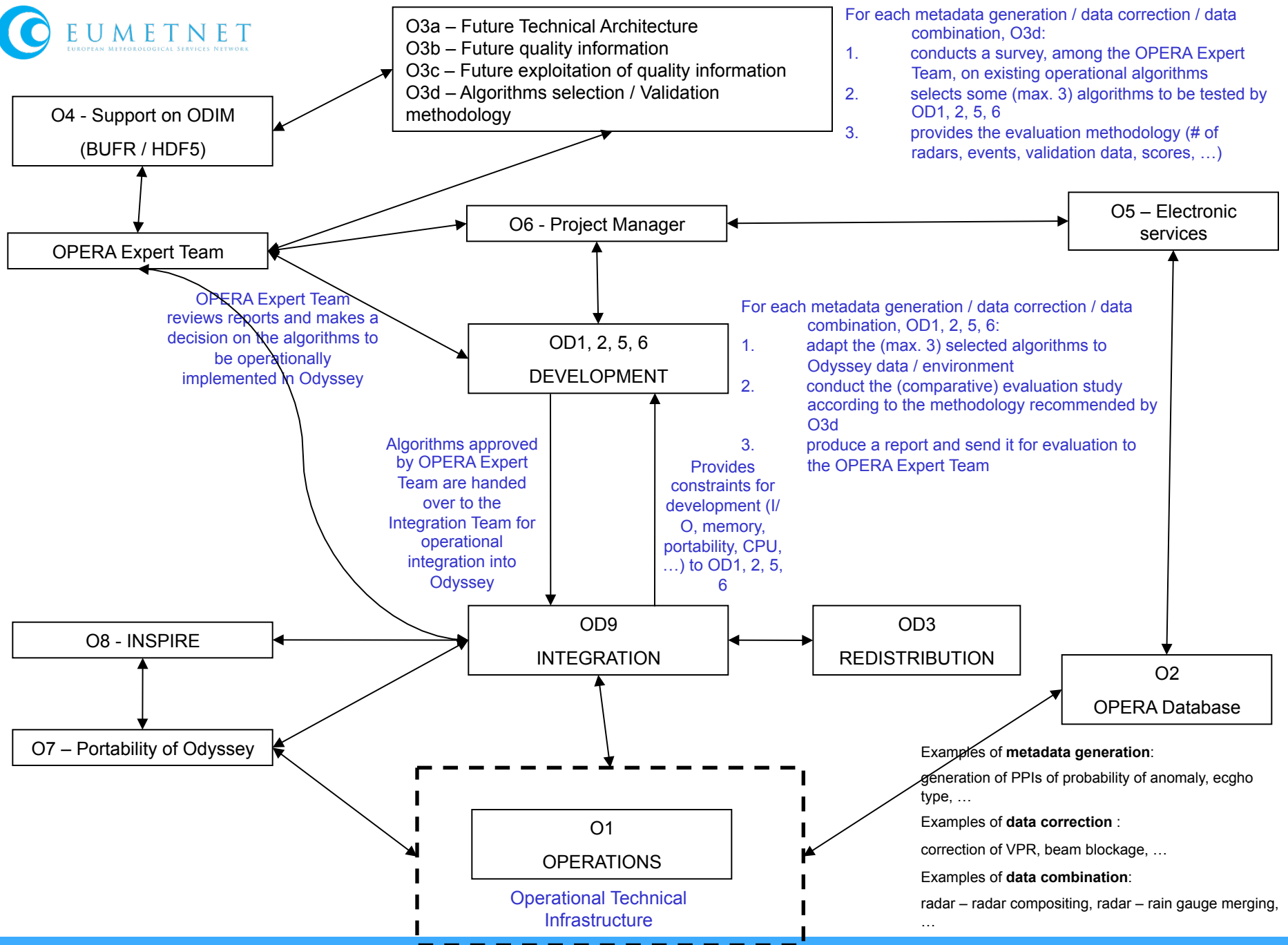
- Radar project of European NMS's within EUMETNET
- Objectives:
- to provide a European platform wherein expertise on operationally-oriented weather radar issues is exchanged.
- to develop, generate and distribute high-quality pan-European weather radar composite products on an operational basis

Opera composite

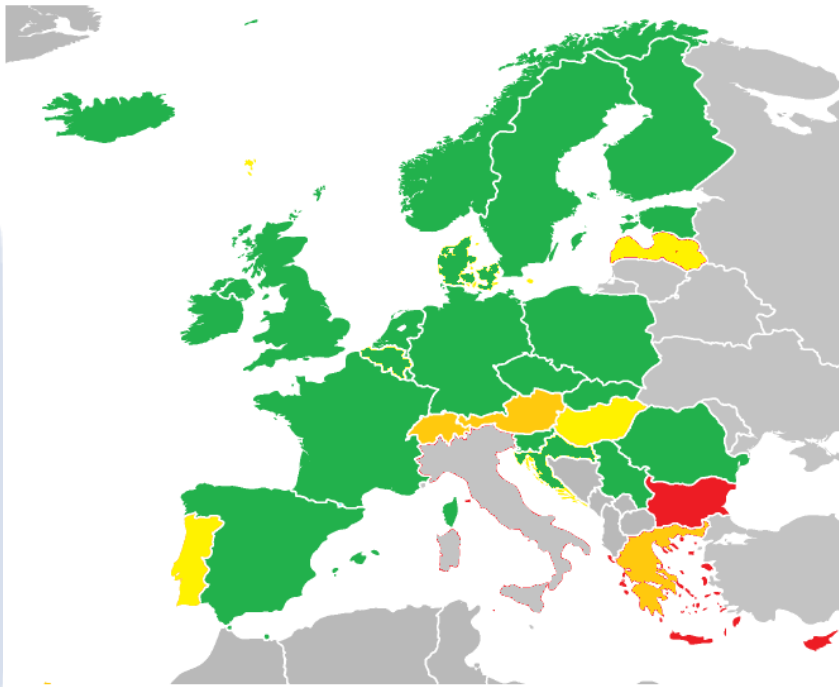


Opera Data Centre ODC = ODySsey

- Opera operates and develops the ODYSSEY data hub, which collects radar volume data, distributes quality flagged volume data to modellers and other radar data users, and produces quality controlled radar products;



Odyssey Input June 2013

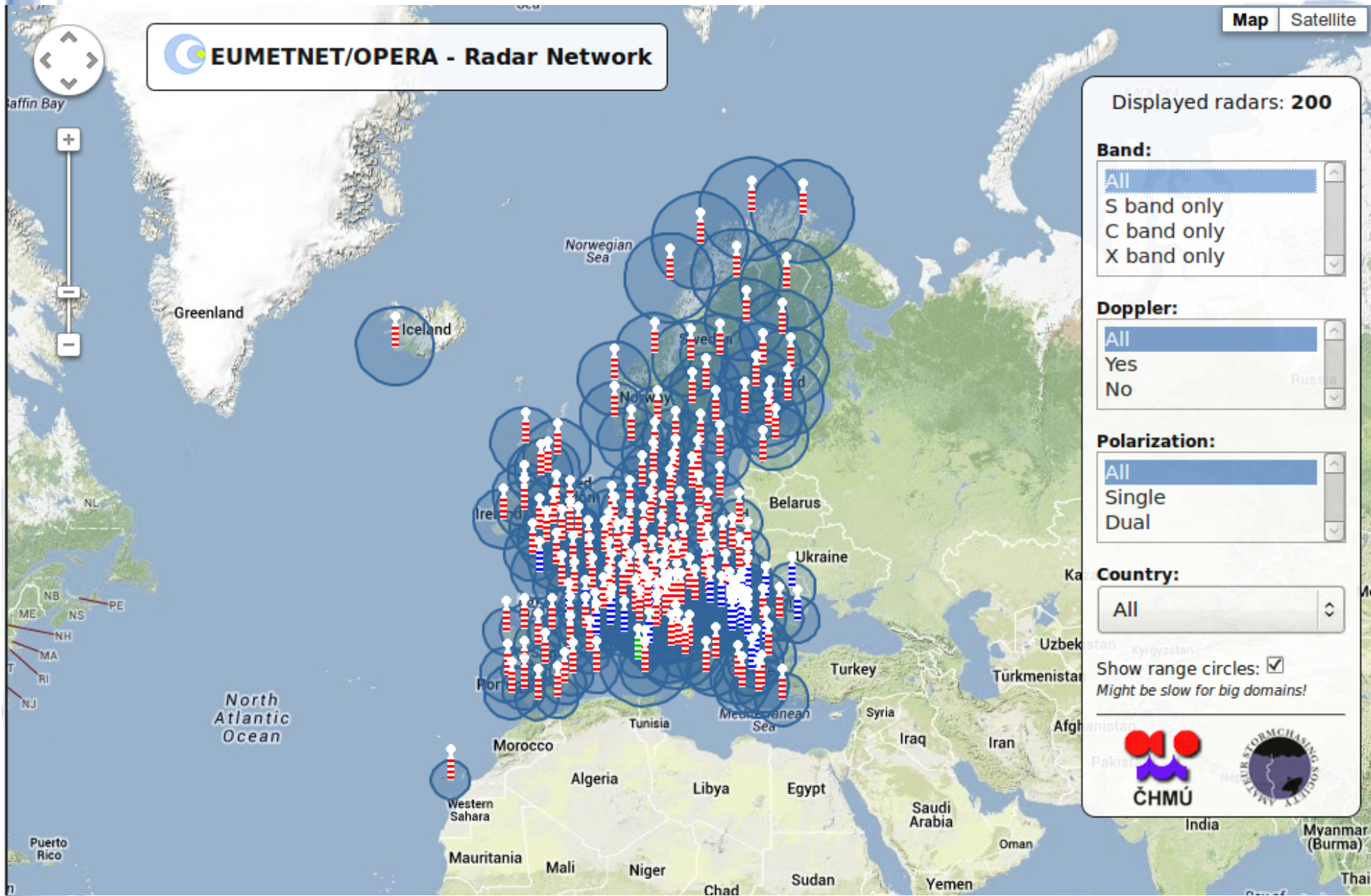


- Green: sending data
- Yellow: testing
- Orange: data promised
- Grey: not member

Fully integrated (or no radars) Testing underway Data promised Status open Non member

Map Satellite

EUMETNET/OPERA - Radar Network



Displayed radars: **200**

Band:

- All
- S band only
- C band only
- X band only

Doppler:

- All
- Yes
- No

Polarization:

- All
- Single
- Dual

Country:

- All

Show range circles:
Might be slow for big domains!



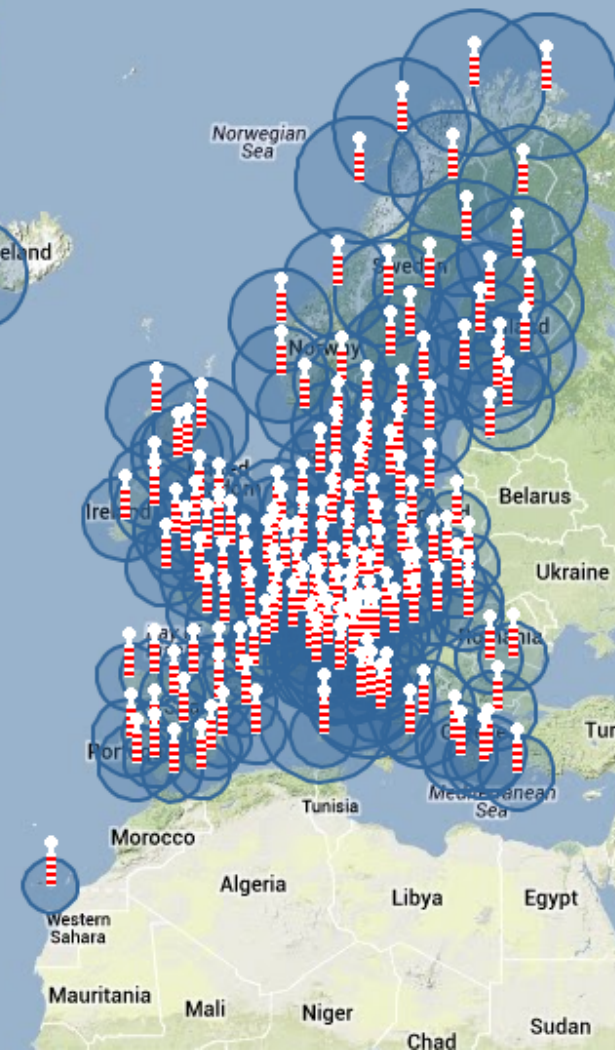


EUMETNET/OPERA - Radar Network

Map Satellite



affin Bay
Greenland
Iceland
NL
NB
ME
NS
NH
MA
RI
NJ
North Atlantic Ocean
Puerto Rico



Displayed radars: **163**

Band:

- All
- S band only
- C band only
- X band only

Doppler:

- All
- Yes
- No

Polarization:

- All
- Single
- Dual

Country:

- All

Show range circles:
Might be slow for big domains!



EUMETNET/OPERA - Radar Network

Displayed radars: **33**

Band:

- All
- S band only
- C band only
- X band only

Doppler:

- All
- Yes
- No

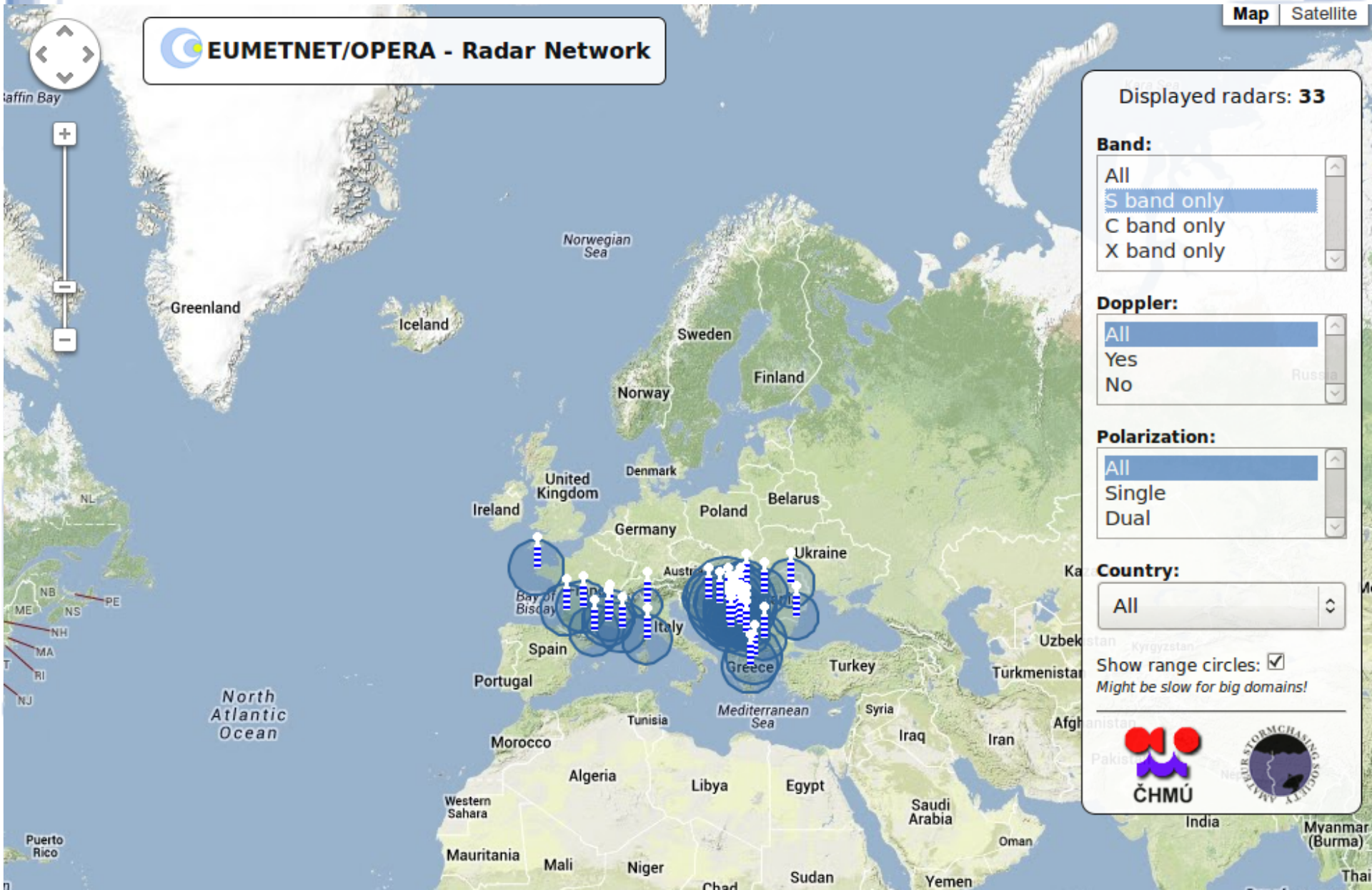
Polarization:

- All
- Single
- Dual

Country:

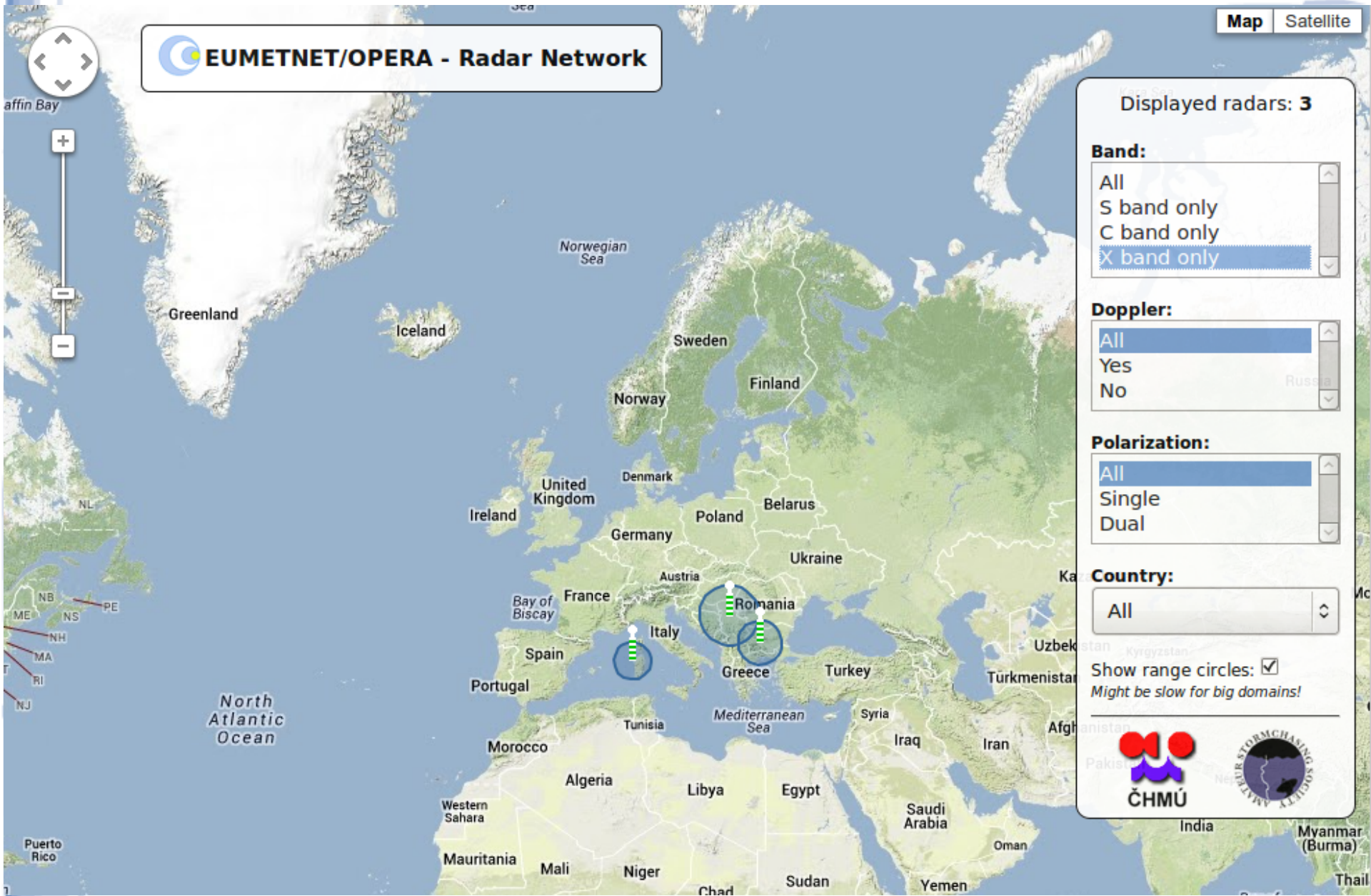
All

Show range circles:
Might be slow for big domains!



Map Satellite

EUMETNET/OPERA - Radar Network



Displayed radars: **3**

Band:

- All
- S band only
- C band only
- X band only

Doppler:

- All
- Yes
- No

Polarization:

- All
- Single
- Dual

Country:

- All

Show range circles:
Might be slow for big domains!



Odyssey Output: 3 composites

Surface rain rate composite (every 15 minutes):

Each composite pixel is a weighted average of the lowest valid pixels of the contributing radars, weighted by the inverse of the beam altitude. Polar cells within a search radius of 2.5 km of the composite pixel are considered. Data measured below 200 m altitude are not used.

Rainfall accumulation (every hour),

sum of the previous four 15-minute surface rain rate products.

Maximum reflectivity composite (every 15 minutes)

See next page

Odyssey Output: 3 composites

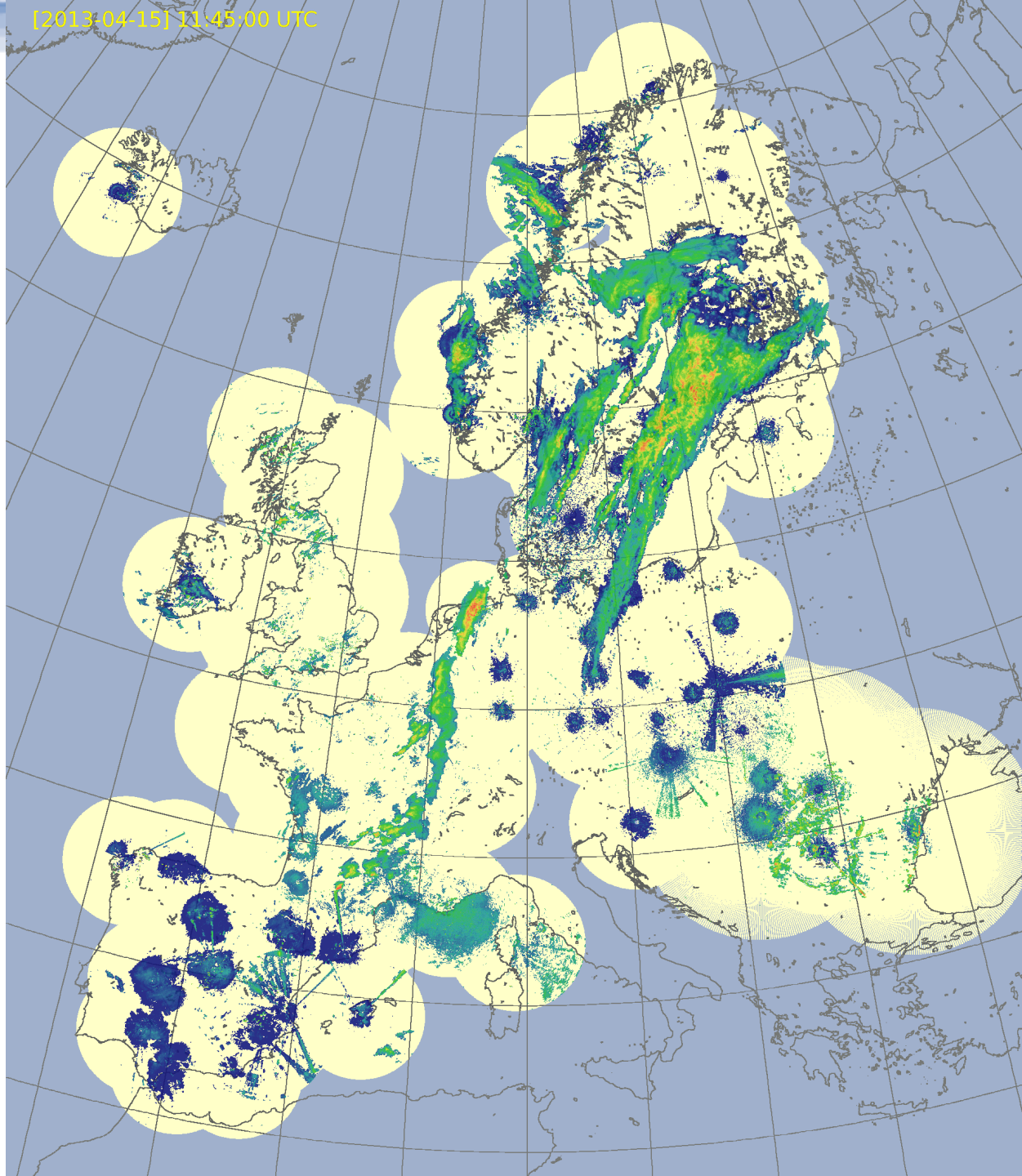
Maximum reflectivity composite (every 15 minutes):

Each composite pixel contains the maximum of all polar cell values of the contributing radars at that location.

[2013-04-15] 11:45:00 UTC

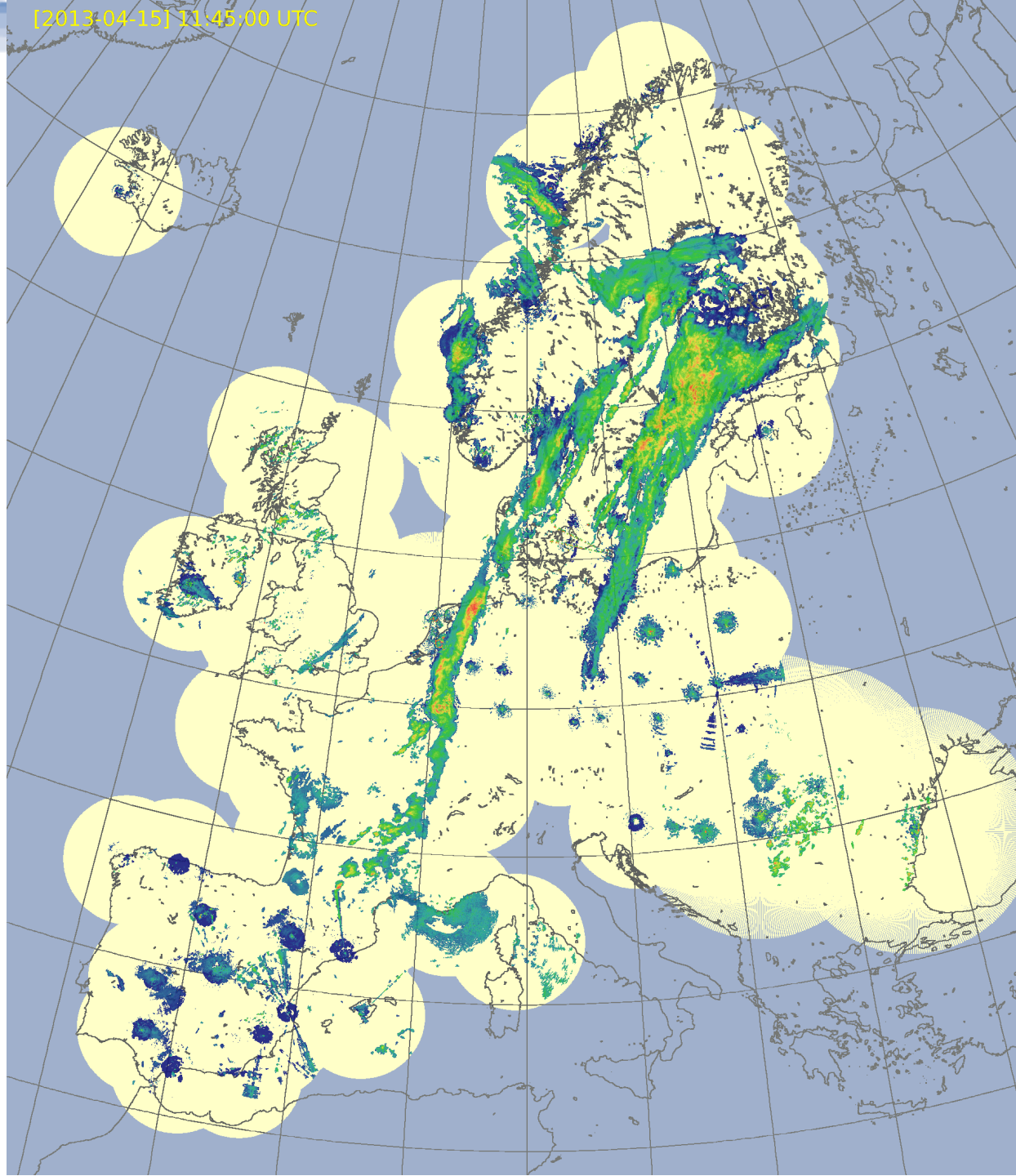
15 Apr 10z

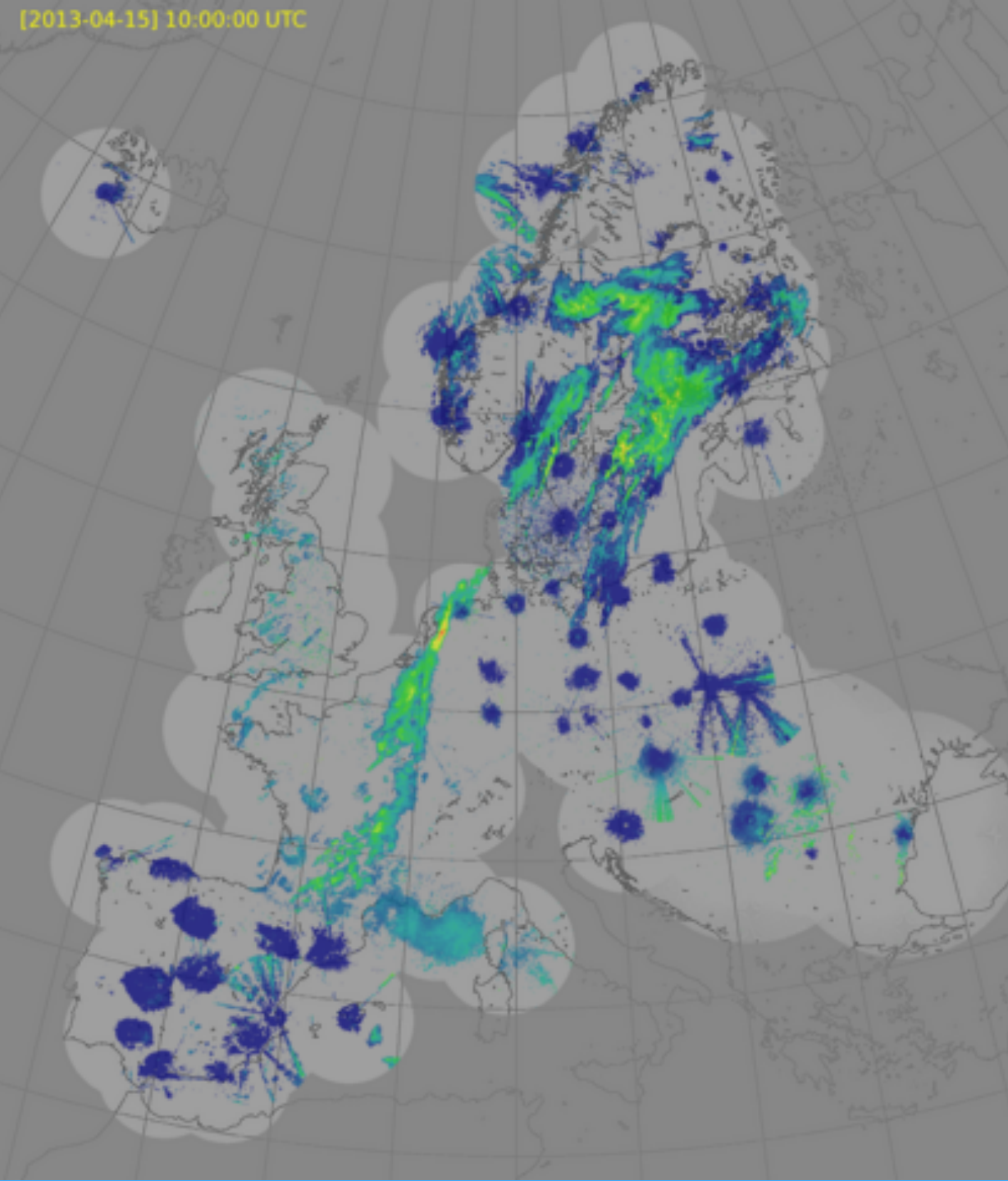
- Max reflectivity
- "dirty"
- = data as it came to Odyssey



15 Apr 10z

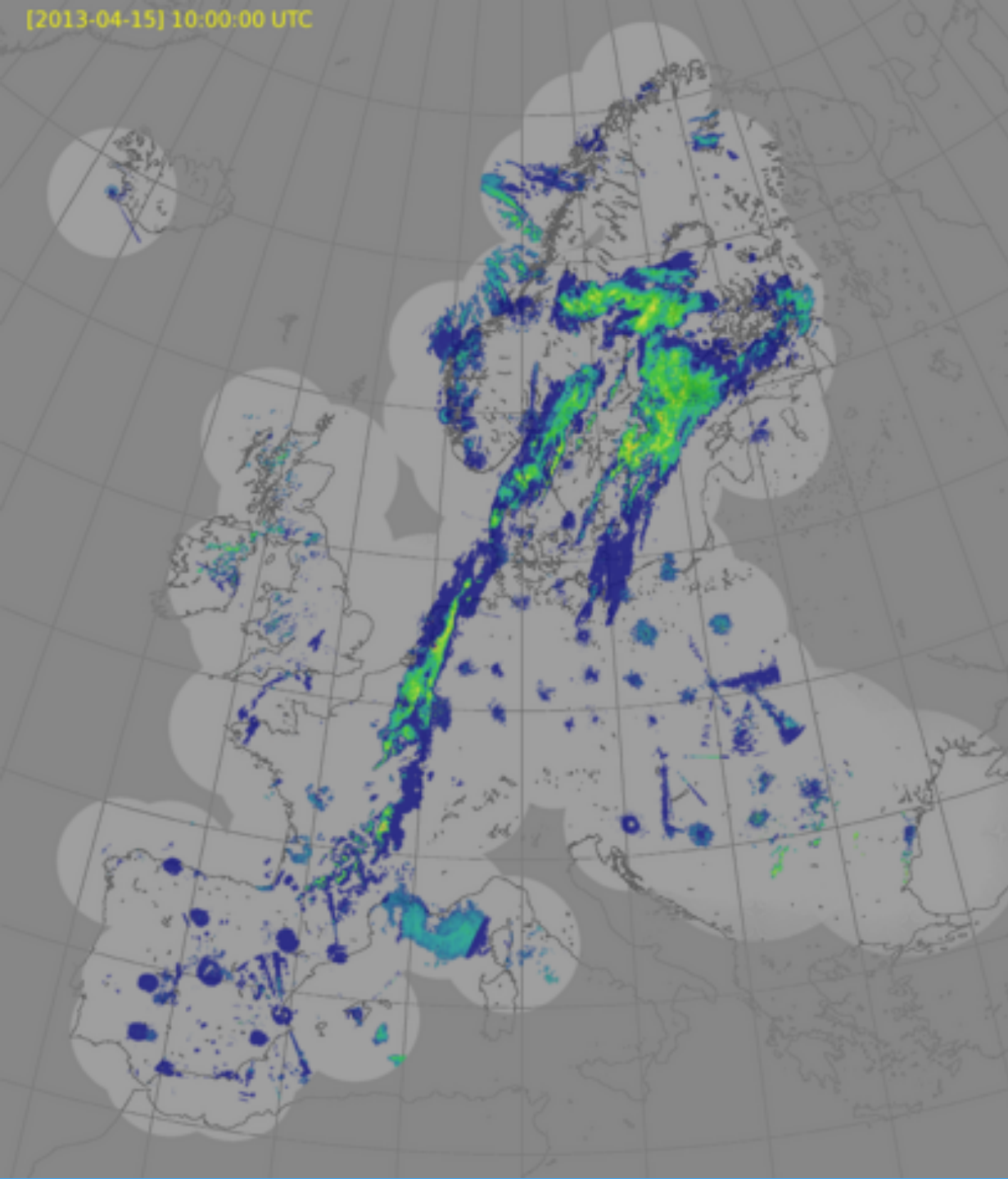
- Max reflectivity
- Central "cleaning" applied





Rain rate

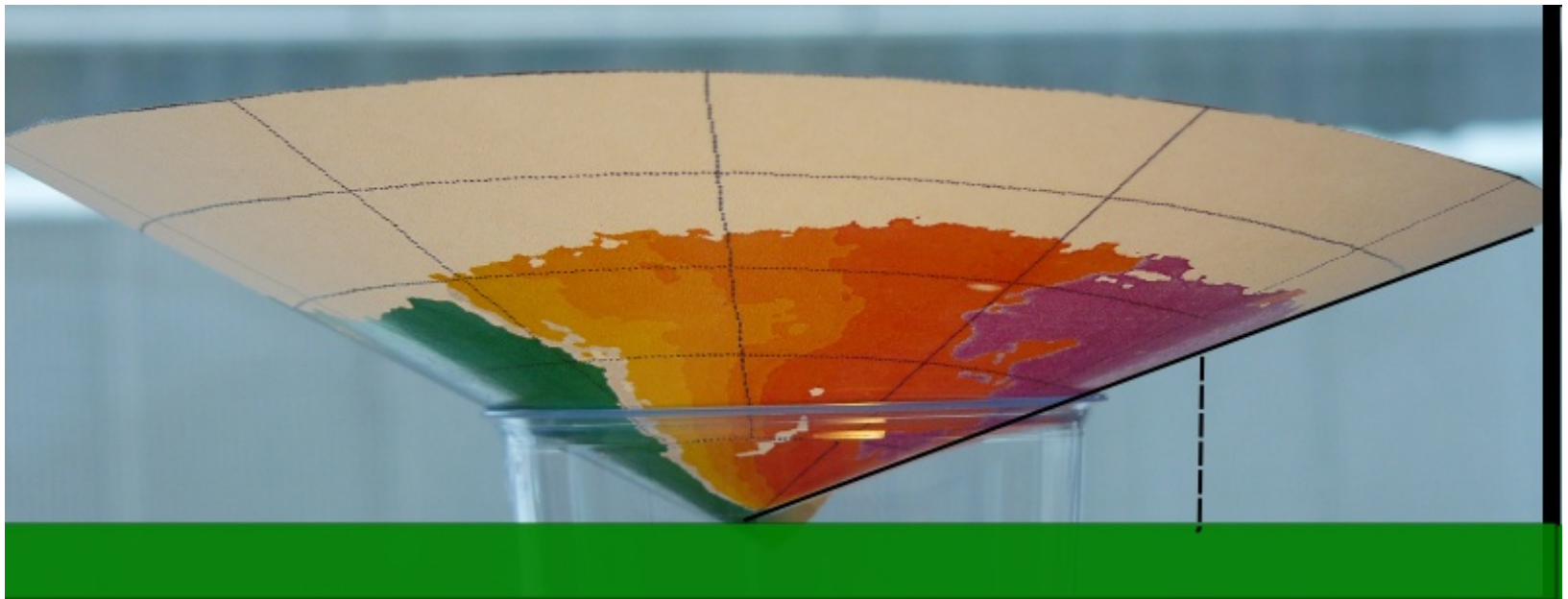
[2013-04-15] 10:00:00 UTC



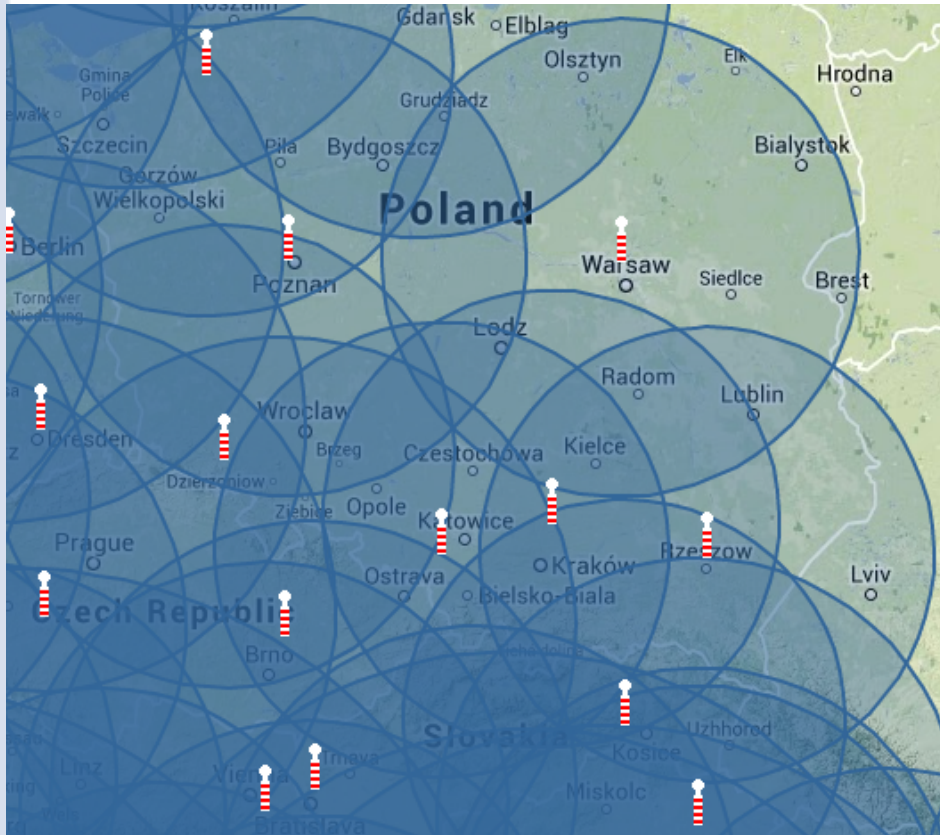
Rain rate

Why composites ?

- Radar measurements are made on conical surface: edges are rather high (because Earth is a ball)

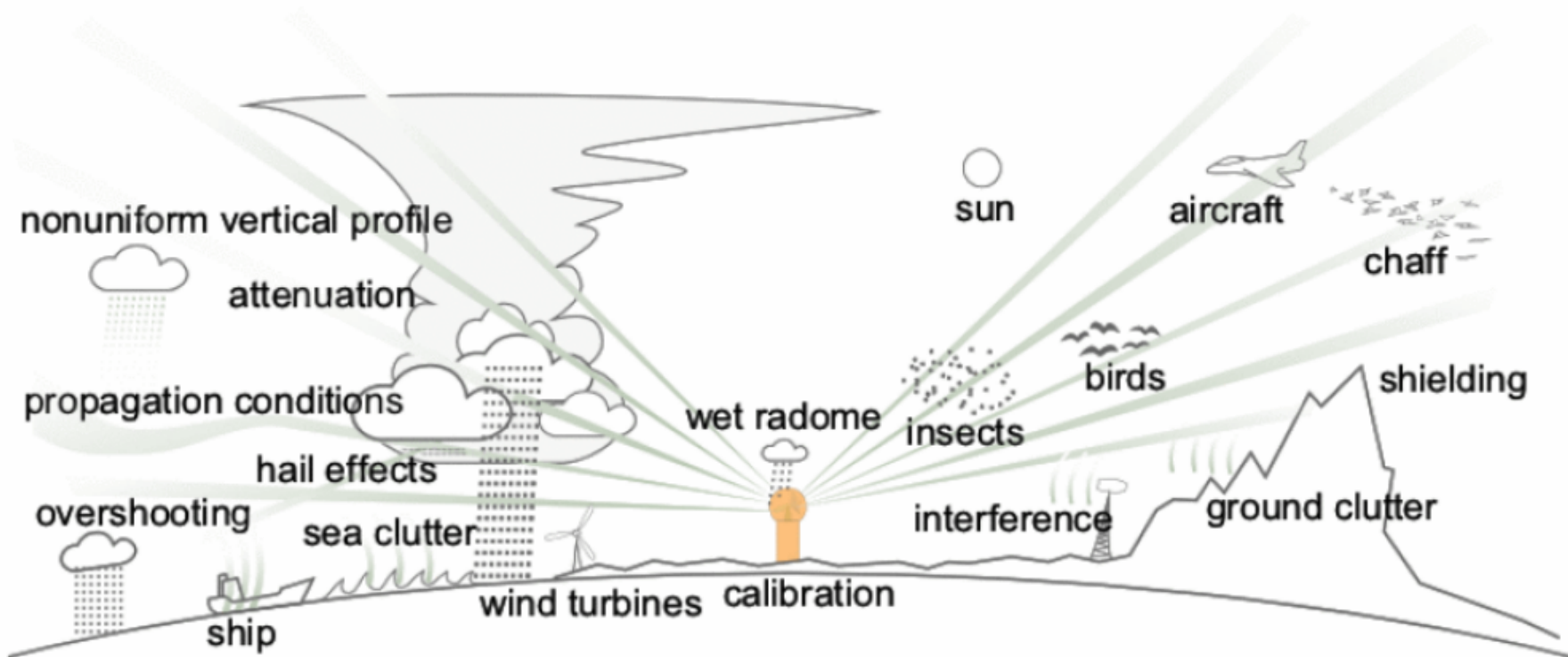


Why composites ?



- Average radar measurement range (226 km) is usually larger than the distance between radars (median distance within Opera is 128 km)
- In overlapping areas we can select the best data.

Example from Poland - Czech Rep - Slovakia



Daniel Michelson, SMHI

Why not always composites ?

- Data transfer to central server, cleaning, waiting for the last arrivals takes time – some time-critical issues manage better with local radar data only

Composites for nowcasting

- Simple nowcasting methods are based on extrapolation: observed storms move with observed speed
- Quality deteriorates with time:
 - New storms emerge, which did not exist
 - New storms emerge, which were "behind the border"
- Use of composite solves the latter issue

Opera in Europe, Nexrad in USA

- Opera is sometimes referred as "Nexrad of Europe"
- the big difference:
- Opera network is extremely heterogeneous
 - installation date,
 - manufacturers,
 - scanning strategy
 - signal processing
 - and product generation.
- Opera radar density is about twice that of Nexrad.

Data policy

- Composite distributed to members of OPERA and EUMETNET for official duties
- Licences given for Research and education
- Inclusion to ECOMET catalogue under preparation

Contact Details

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