

Quality of radar data in Europe and its consequences for NWP

Elena Saltikoff, Annakaisa von Lerber, Asko Huuskonen, Laurent Delobbe, Hidde Leijnse, Maud Martet and Klaus Stephan.

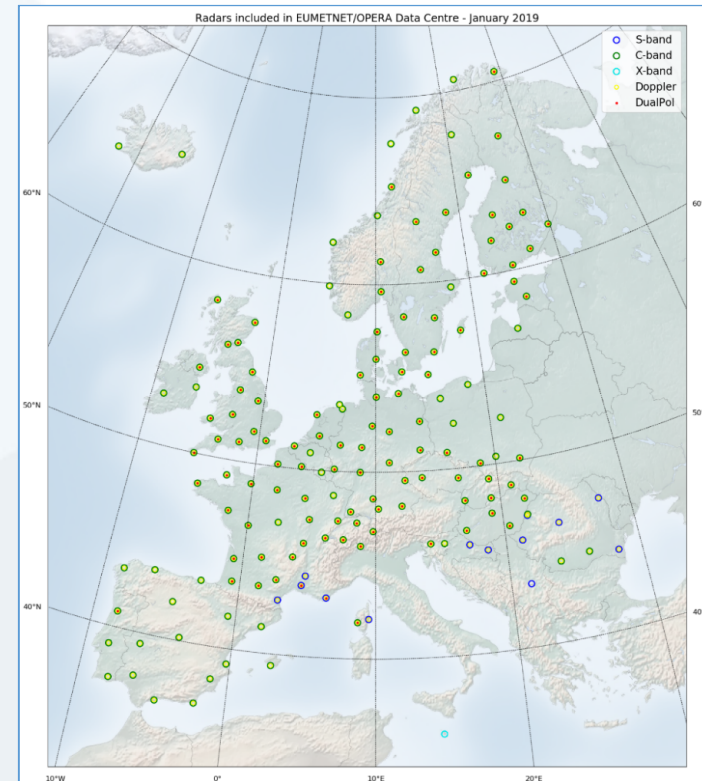
Narrator: Michal Nestiak



EUMETNET
EUROPEAN METEOROLOGICAL
SERVICES NETWORK

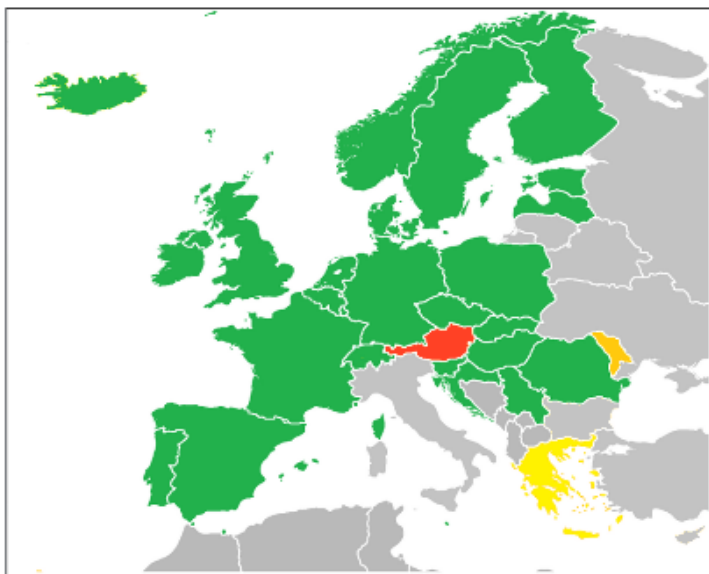
Opera in brief

- 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



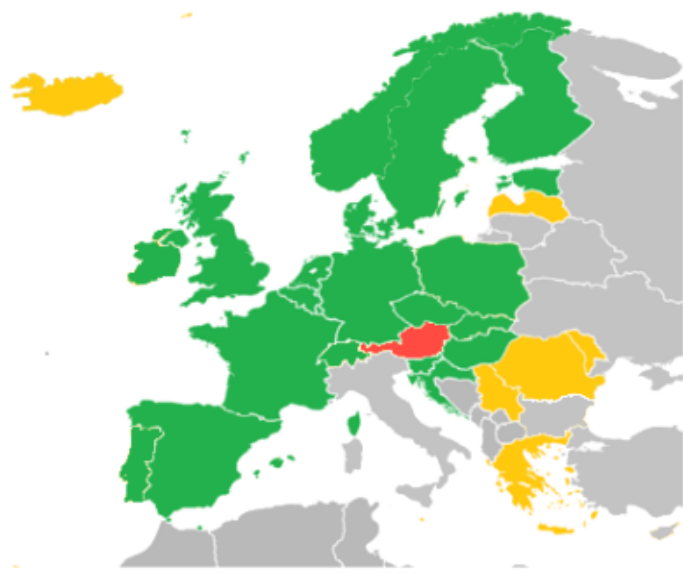
OPERA data supply

Reflectivity (dBZ)



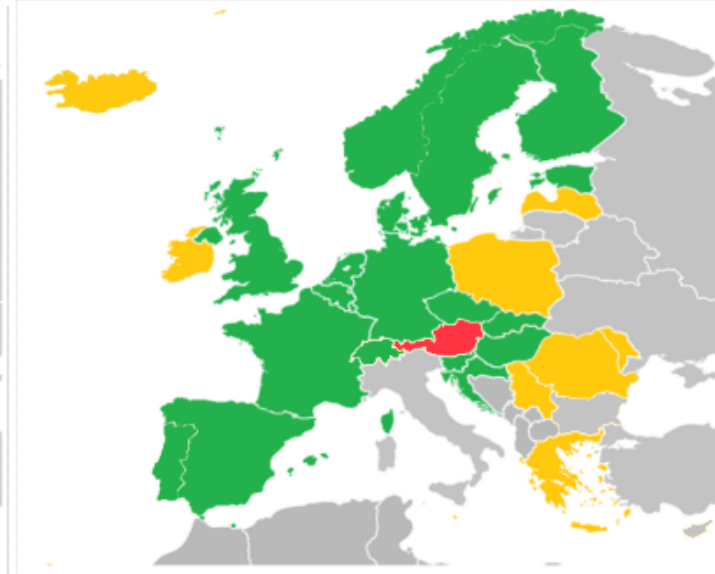
Fully integrated (or no radars) Testing underway Data promised Status open Non member

Radial Velocity (VRAD)



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

Uncorrected reflectivity (TH)



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

Who are the users of OPERA products

Nowcasting

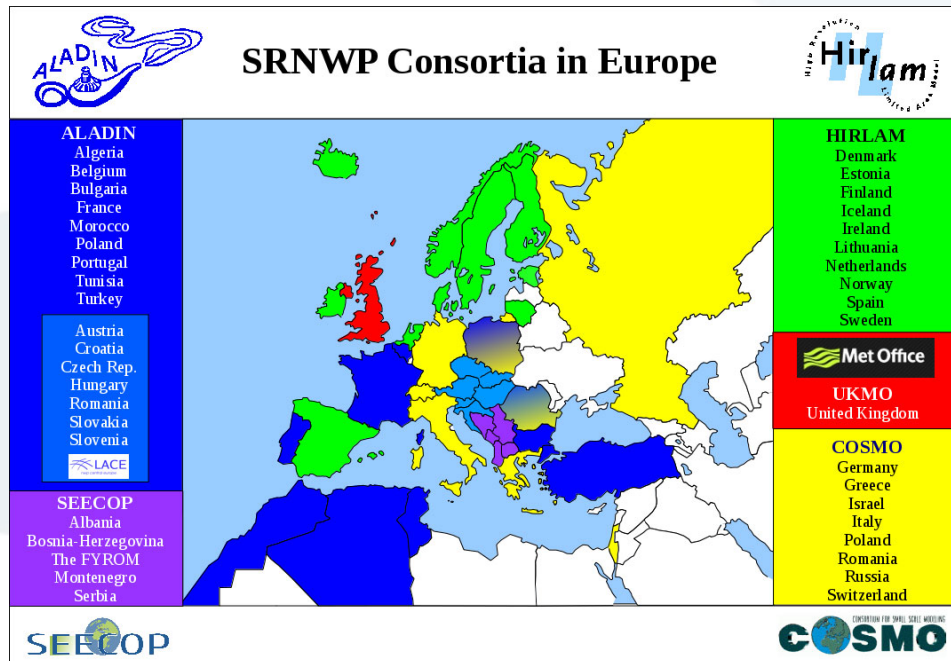
Air traffic safety

SRNWP

Bird migration

Hydrology

Use of radar data assimilation for NWP in Europe



Type of data :

2D surface composite :

- rainfall intensity
- rainfall amount

3D single radar data (polar volumes):

- Reflectivity Z
- Radial velocity V

Type of DA scheme

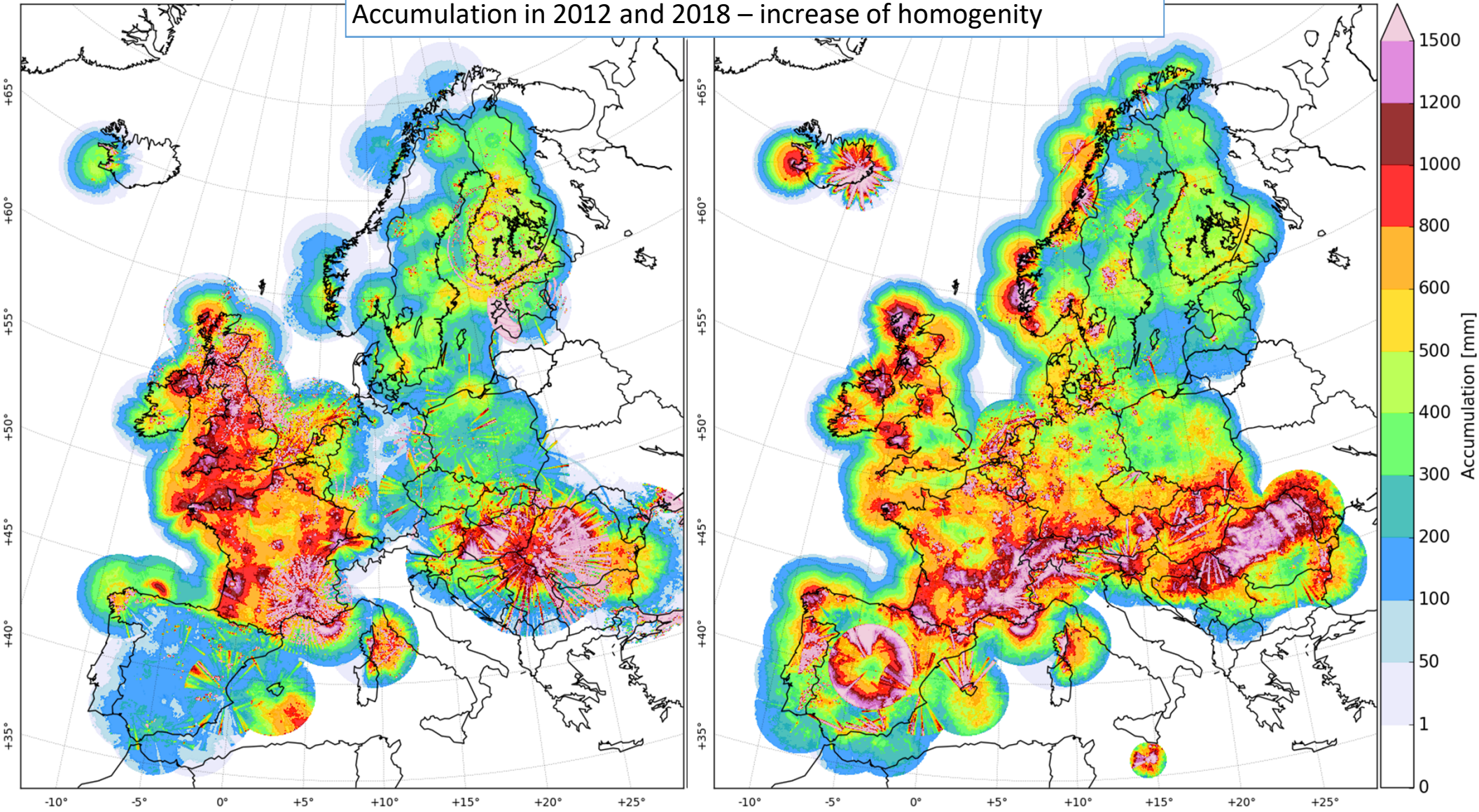
- Latent Heat Nudging
- 1D + 3D-var
- 3D-var
- 4D-var
- LETKF

5. dia

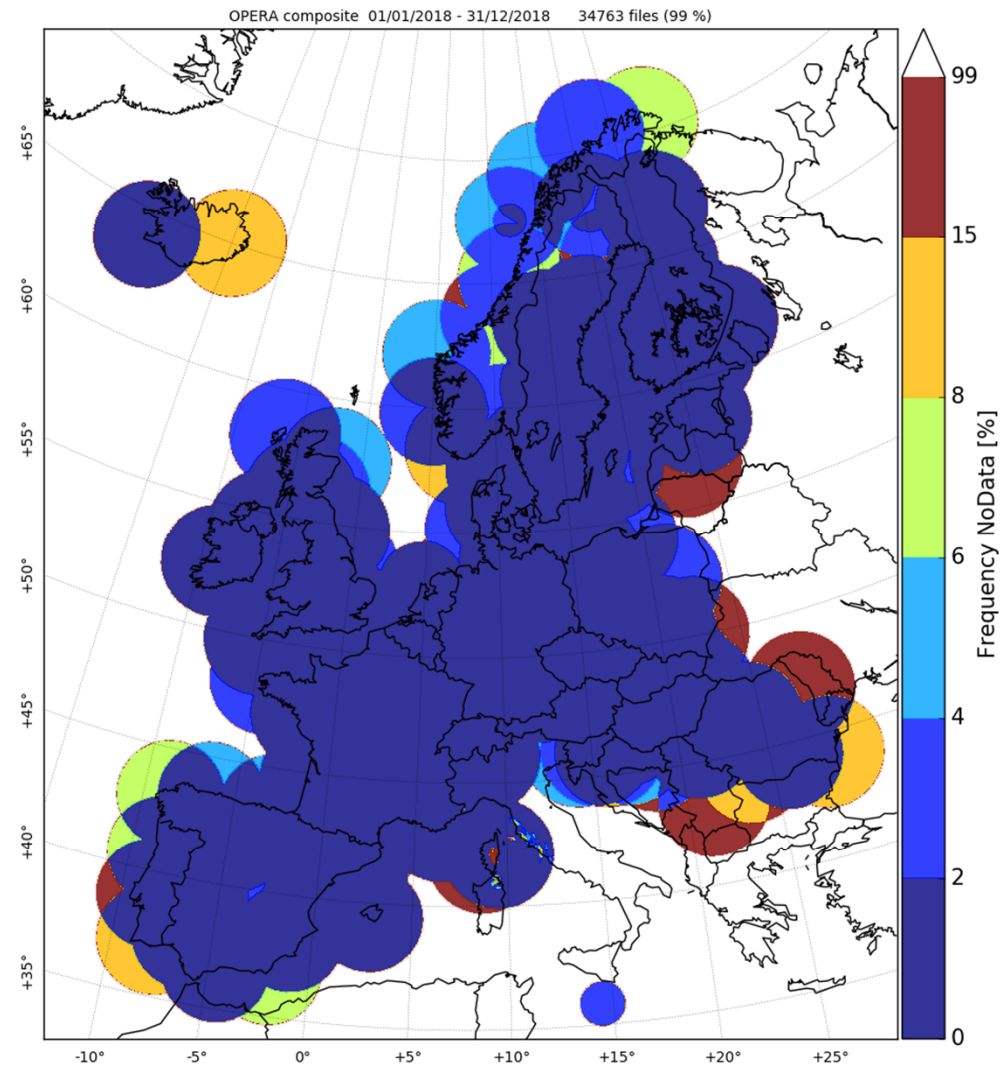
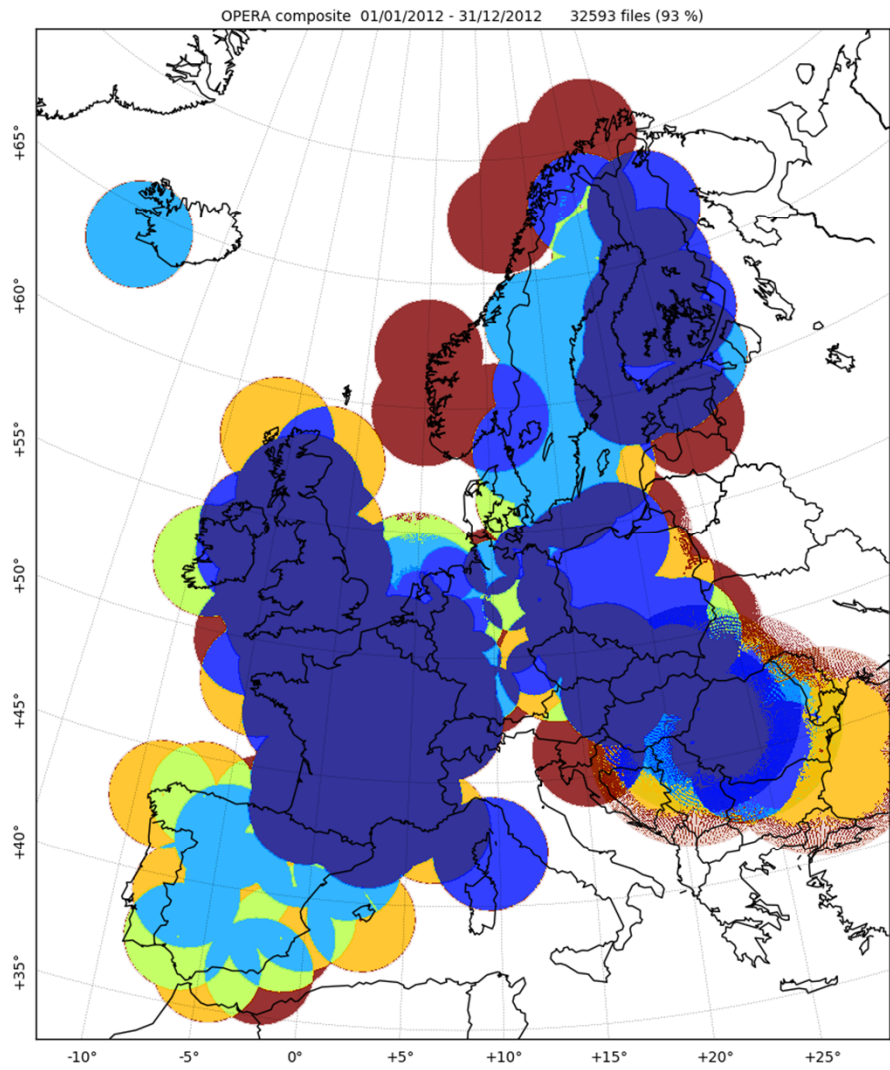
LD3 Is this an exhaustive list of the use of radar in NWP DA ? It's better not to forget anyone.

Laurent Delobbe; 2019. 08. 19.

Accumulation in 2012 and 2018 – increase of homogeneity



Frequency of nodata 2012 and 2018 – increase of coverage and reliability



End of era of central quality control is approaching

Heterogenous network

- Radars, scanning, environment, applications are different
– this is Europe

Heterogenous problems

- Medicine tuned to fix sea clutter in Mediterranean
will remove snow in Scandinavia

National investment

- 20 members upgraded radars 2012-2018, it is time to make benefit
of this investment

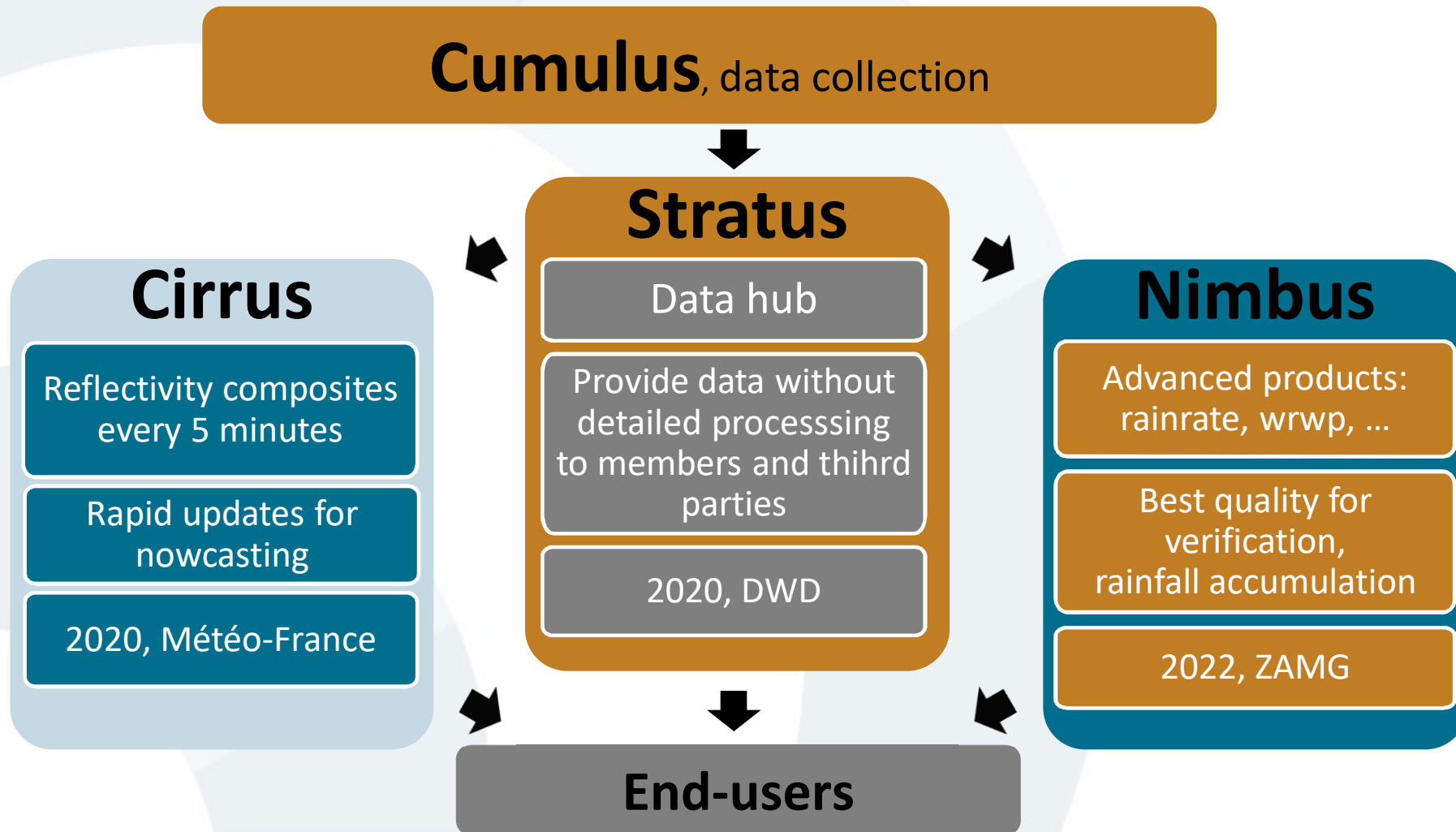
Requirements on radar data from end-users

- **Aviation and nowcasting**
 - Rapid update time
 - Precipitation type
- **Hydrology**
 - Good - quality quantitative precipitation estimation
- **Quality control Doppler data**
- **Information of the data processing (metadata) and data quality**
- **Monitoring statistics**
- **Support**

Requirements on radar data by SRNWP in Europe

- **3d volume data are more important than 2d precipitation composite**
- **Quality control and overall information about data quality**
- **Timeliness: should be faster ~ 10 minutes**
- **Data Frequency: should be higher ~ 5 minutes**
- **Spatial resolution: fine as it is**
- **Fill data gaps: Austria, Italy, Greece**
- **Missing Meta data: Nyquist Velocity, ...**

The three new production lines to satisfy user needs:



Stratus

- **Data hub**
 - Provide data without detailed processing back to all members, OPERA-production lines and third parties as agreed in licenses
- **Monitoring of incoming data**
 - Distribute error reports
 - Correct metadata

Nimbus

- **Producing quality-controlled radar products**
 - **Quantitative Precipitation Estimates (QPE)**
 - **Weather radar wind profiles**
 - **Quality-controlled reflectivity and radial velocity data**
- **Nimbus will be developed in such a way that implementation of new algorithms is straightforward**
 - **New products, when they emerge**
 - **Improved quality control**
- **Nimbus should be designed to be operational for the next 10-15 years**
 - **Cloud-ready**

Nimbus

Py-ART

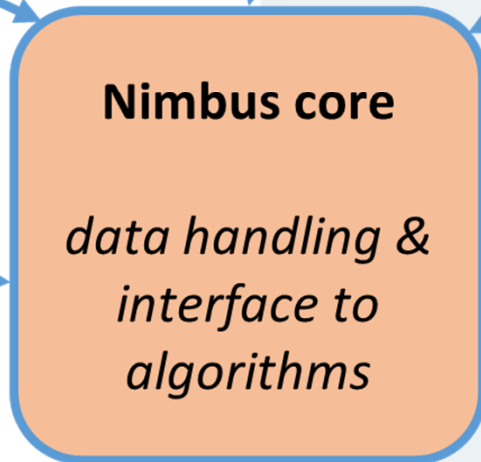
The Python ARM Radar Toolkit



baltrad



radlib



OPERA
algorithms



Development Tasks

- **Harmonizing the metadata of single site volume data**
 - includes ability of Stratus to correct or set missing metadata
 - by end of 2020
- **Quality management**
 - Monitoring tools: sun scans, pair comparison, RFI monitoring and removal
- **ODIM development**
 - Current version 2.3 - > 3.0
 - Survey of the user needs

Conclusions and perspectives

- **Radar network in Europe**
 - key component of European meteorological infrastructure
 - very extended but heterogeneous by nature
- **Much effort in NMS and within Eumetnet for harmonizing and improving quality**
- **Requirements and expectations from NWP community are challenging but high on list of priorities**
- **OPERA 5 (2019-2023) on track. Towards 3 production lines**

Handover of PM tasks to Annakaisa von Lerber (FMI)



CONTACT DETAILS

Annakaisa von Lerber
OPERA Programme Manager

EIG EUMETNET
European Meteorological Services' Network
www.eumetnet.eu

EIG EUMETNET Secretariat
c/o L'Institut Royal Météorologique de Belgique
Avenue Circulaire 3
B-1180 Brussels, Belgium

Registered Number 0818.801.249 - RPM Bruxelles

annakaisa.von.lerber@fmi.fii





EUMETNET
EUROPEAN METEOROLOGICAL
SERVICES NETWORK