Improving OPERA radar data for nowcasting

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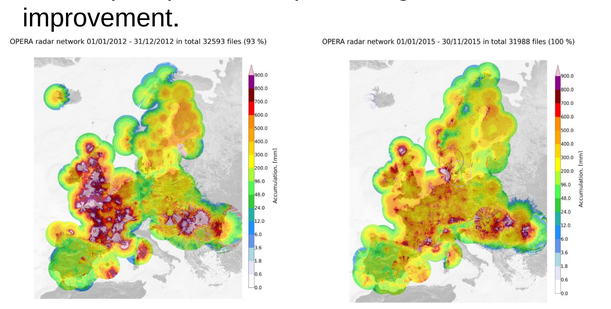
Introduction

Radar data is an essential element in nowcasting by extrapolation. Edges of the radar image dictate the maximum length of nowcasts. International radar composites, such as the Pan-European composite by OPERA, can extend the range. For NWP based NWC, having an uniform data format is a relief.

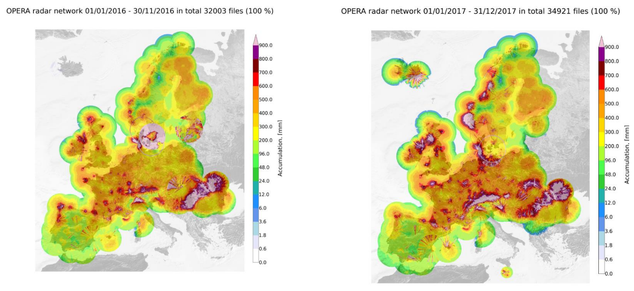
Park & al. (projects ERICHA, SMUFF) have used the OPERA composite for European-scale forecasting because of its superior coverage, but they noticed the quantitative accuracy is not good enough for hydrological purposes. On the other hand, those running nowcasting models in national scale have not always been happy in timeliness of the product.

The rainfall accumulation composites in OPERA are computed by using the instantaneous rain rate composites generated every 15 minutes. Using rain rate composites with increased time resolution (e.g. 1 minute) is expected to give more reliable rainfall accumulation estimates. For this purpose, a software package using Farnebäck method and OPERA rainrate composites as input, has been published in github (but not yet implemented in the OPERA processing chain).

Annual precipitation maps show gradual improvement.



Left: 2012. First year of OPERA hub. Right: 2015. Visible improvement due to national development.



Left: 2016. Right: 2017. Correction methods implemented in end of 2015 (beam blocking and removal of non-precipitating echoes with help of SAF satellite products) show some improvement but not a perfect result. Still some residual clutter, and disturbances from other devices at radar frequency. Data from Italian and Austrian radars not included.

You can use OPERA now

- Display to forecaster
- Assimilate in NWC system
- Verification

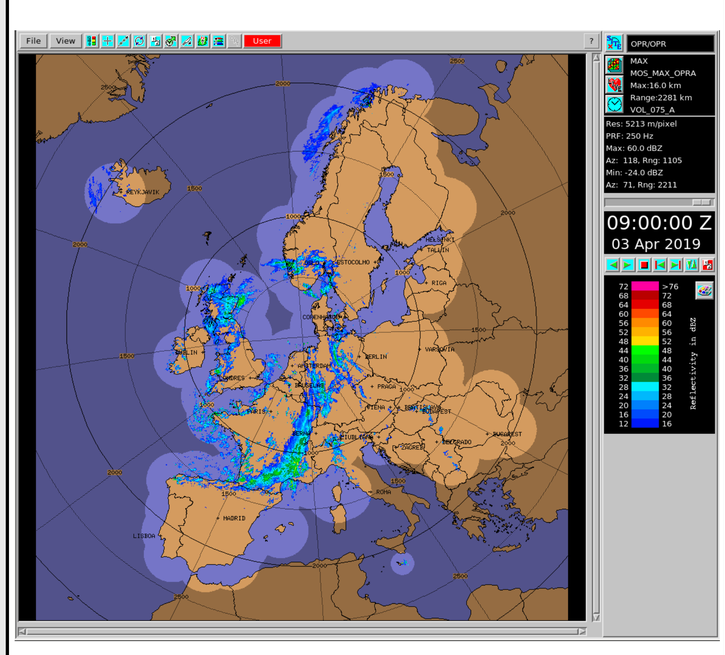
In future you get

- Reflectivity composites every 5 min
- Single site data from one door, fast
- Improved composites for verification

Available now

OPERA is producing 3 different composites
- Maximum reflectivity
- Rain rate
- Accumulated precipitation

and QC'd single site data.

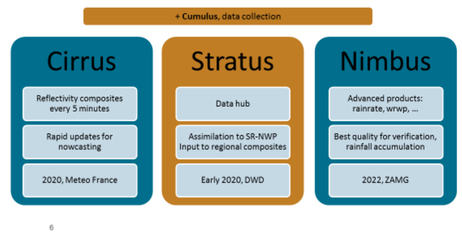


Above: OPERA composite on workstation of Spanish forecaster.
Data are in hdf files, format documented in http://eumetnet.eu/OPERA
National weather services can use the composites for official duties. Others can get a licence from ECOMET.

Next Steps

Because of the disparate needs of different users, OPERA is now developing three separate production lines: for the good, for the fast and for the independent ones.

We will also utilize the large investments made in national networks in 2010-2018 by shifting the focus of quality control to national level.



Cirrus will be producing reflectivity composites every 5 minutes, cutting the delivery time remarkably,

Stratus will act as a data hub, delivering original radar volumes for input to national nowcasting and nowcasting systems. These remain the property of the originating radar owners, and distribution follows their data policy.

Nimbus will implement quality control methods and produce more accurate rainrates than before. It will also process the Doppler data.

While the three new lines are in development, the **Odyssey** data hub is still running.

Further information

Email
support.opera@eumetnet.eu
Website
http://eumetnet.eu/opera

Literature

Huuskonen A., E. Saltikoff and Holleman (2014): The Operational Weather Radar Network in Europe *BAMS* 95, No. 6 pp. 897-907

Park, S., M. Berenguer, and D. Sempere-Torres, (2019): Long-term analysis of gauge-adjusted radar rainfall accumulations at European scale, *J. Hydrol.*

Acknowledgments

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