

Recent Improvements to the Quality Control of Radar Data for the OPERA Data Centre

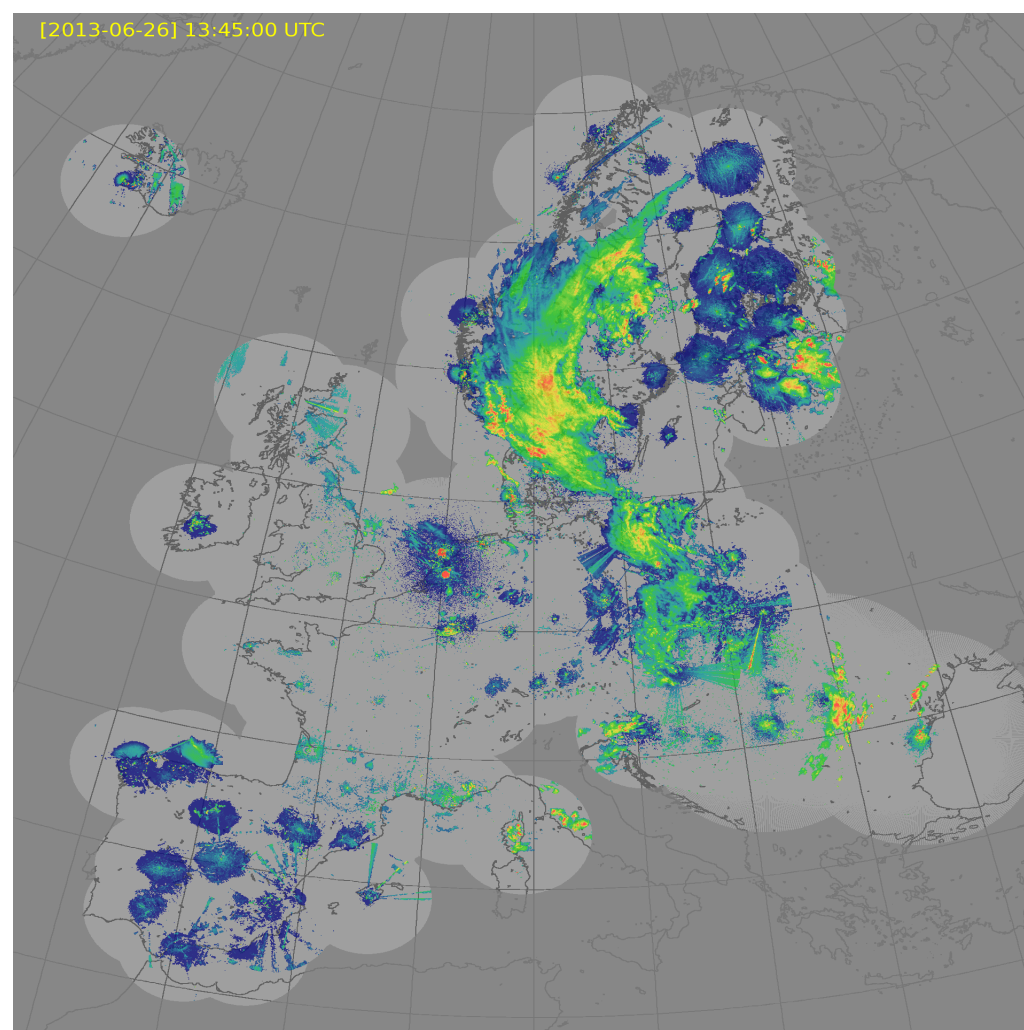
Robert Scovell, Nicolas Gaussiat, Marion Mittermaier
UK Met Office and Météo-France

OPERA Data Centre Project

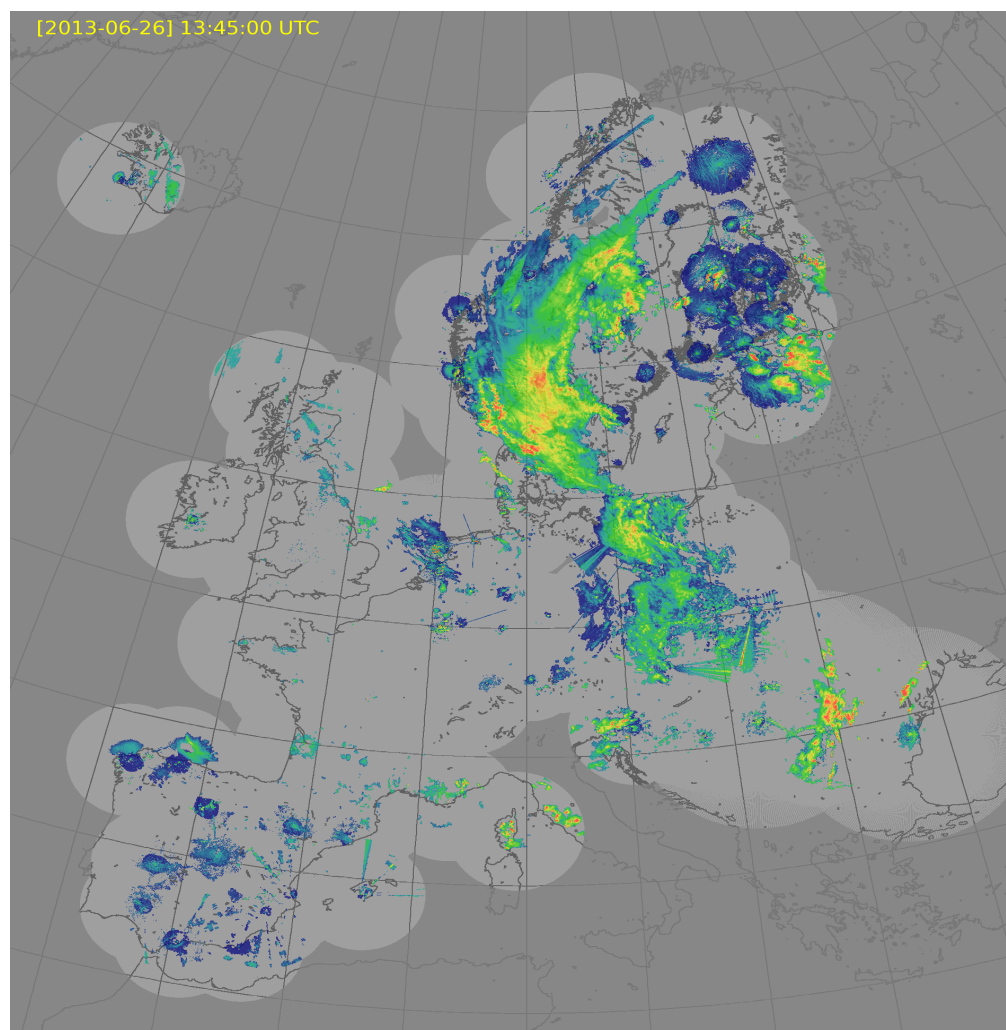
- Météo-France and UK Met Office equal partners.
- Started in 2009 as part of EUMETNET OPERA3 programme.
- Aim: to develop a radar composite covering whole of Europe.
- Resulted in operational service (Odyssey) starting in 2011.
- Successor to the OPERA Pilot Data Hub (2006-2011).

Odyssey operational service

- 3 product types: inst. rainfall rate, inst. max. dBZ, 1hr rainfall accumulation composites.
- 15-minute updates.
- 2km resolution.
- Covers all OPERA member countries.
- Volumetric data from 18 National Met Services providing data from 130+ radars at present.
- Hosted jointly at UK Met Office and Météo-France.
- Minimal pre-processing is applied to the data received but Quality Control is applied before production of composite.



Surface rainfall rate composite before QC



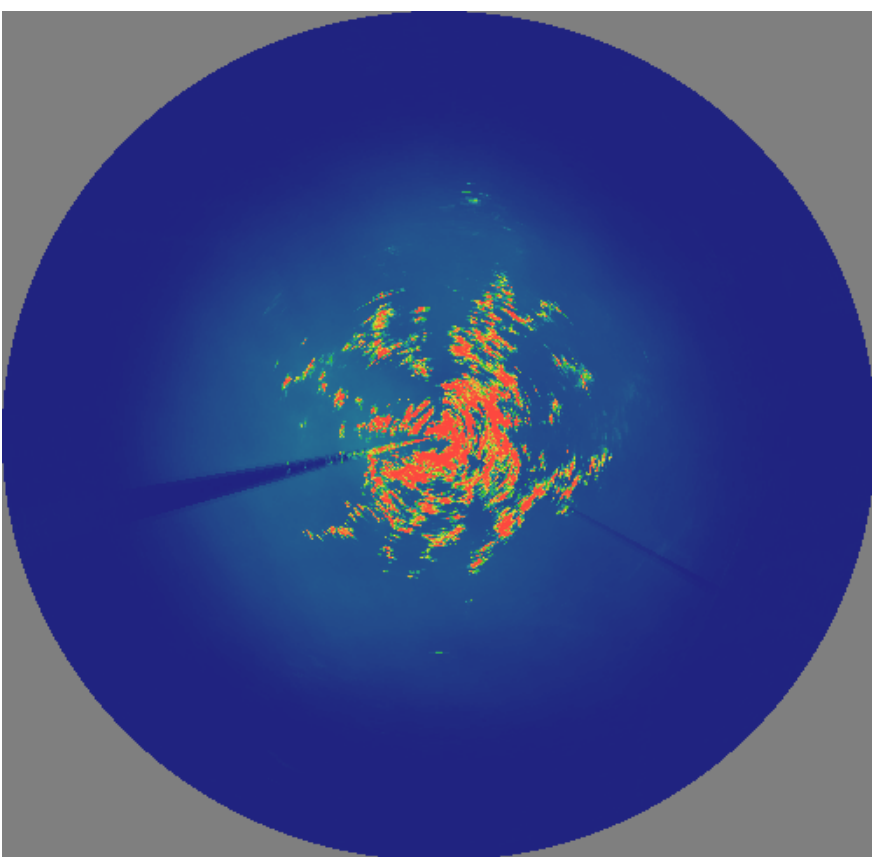
Surface rainfall rate composite after QC

Introduction of Quality Control

- Clutter filter** deployed on operational Odyssey system in 2011.
- ”bRopo” anomaly detection algorithms** introduced in March 2013.
 - Provided by BALTRAD (Baltic Sea Region) consortium.
 - Based on algorithms developed at FMI.
 - Provides speckle, emitter / RLAN interference, ship and wave echo identification.

Odyssey clutter filter

- Monthly echo count in each radar pixel accumulated from successive radar PPI scans.
- Normalized by maximum echo count for a given month.
- Pixels rejected based on threshold (90% was used in initial version).
- Rejected pixels are not used in the composite.



Monthly echo count for UK Met Office Clee Hill radar (1.0 degrees elevation)

Evaluation

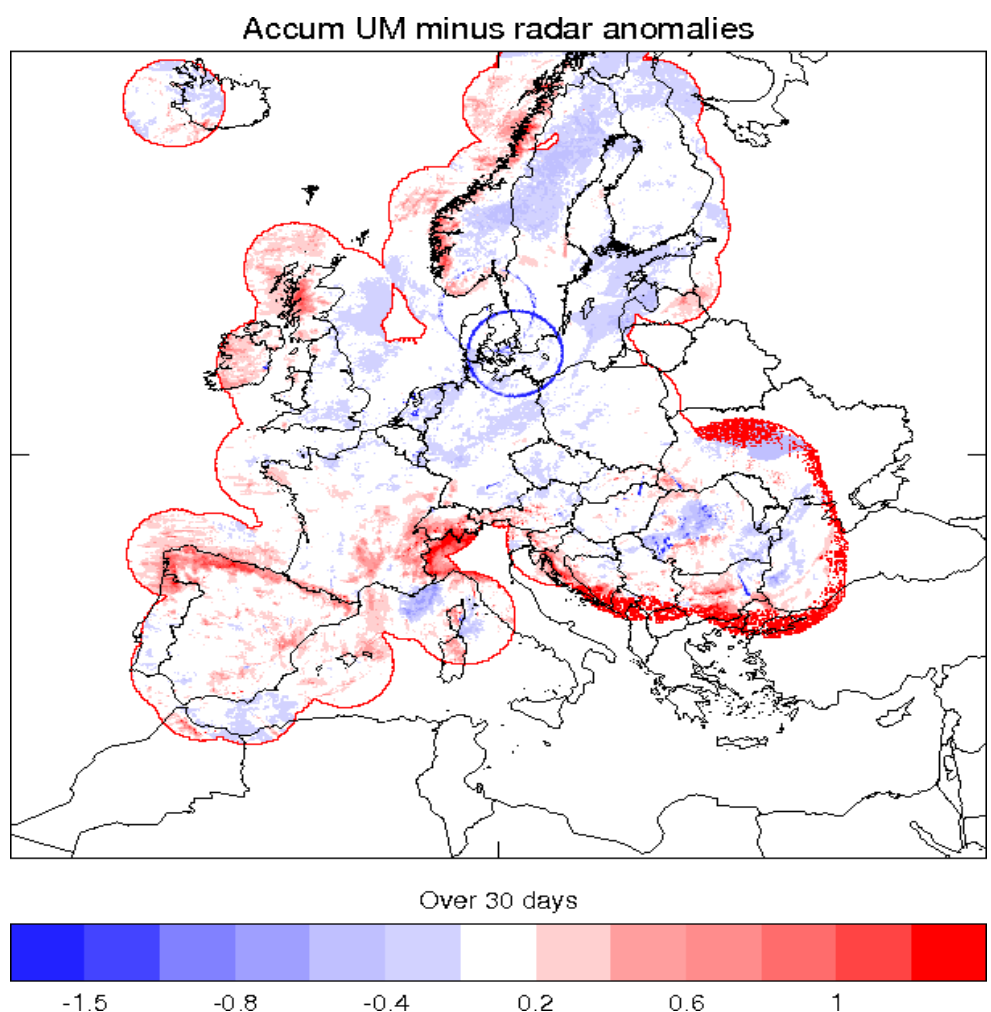
- 3 month trial of UK radars vs. gauges.
- Quantify benefits using Peirce’s skill score.
- 60% threshold found to be optimal for UK.
- Different thresholds will be appropriate elsewhere.
- Clutter threshold needs to be tuned on a site-by-site basis.

Threshold	KSS
100%	0.51
90%	0.59
60%	0.6
40%	0.59
20%	0.55

Peirce’s Skill Scores, for UK trial, using 5 different clutter thresholds.

Comparative assessment to UK Met Office EURO4km NWP model

- Look at differences between 24hr accumulation anomalies (model anomaly – radar anomaly).
- Red indicates strong model anomaly or weak radar anomaly.
- Blue indicates strong radar anomaly or weak model anomaly.
- 30 day average – get rid of transient model forecast error anomalies.



Further information

All OPERA documents and deliverables can be downloaded from:
<http://eumetnet.eu/OPERA>
Contact e-mail: robert.scovell@metoffice.gov.uk or nicolas.gaussiat@meteo.fr

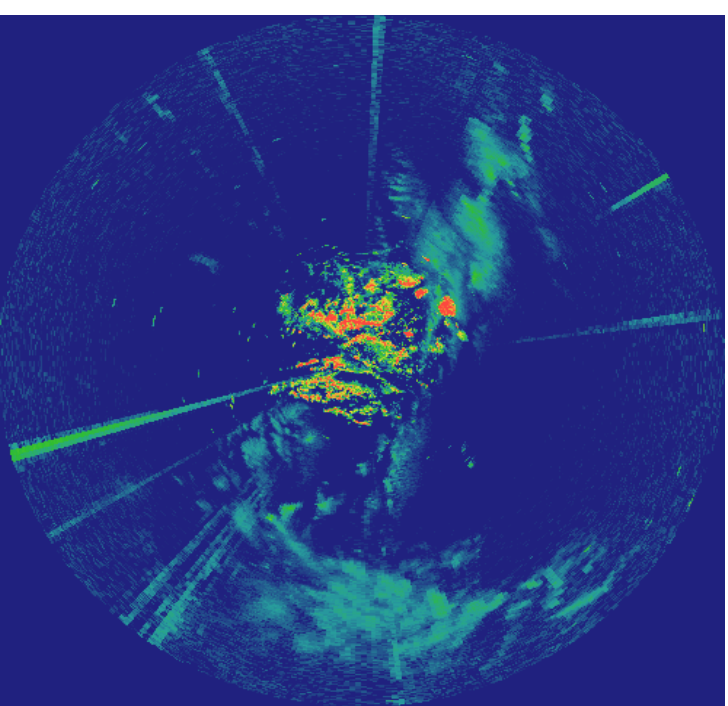


OPERA is the operational programme for weather radar networking of EIG EUMETNET, the grouping of European Meteorological Services.

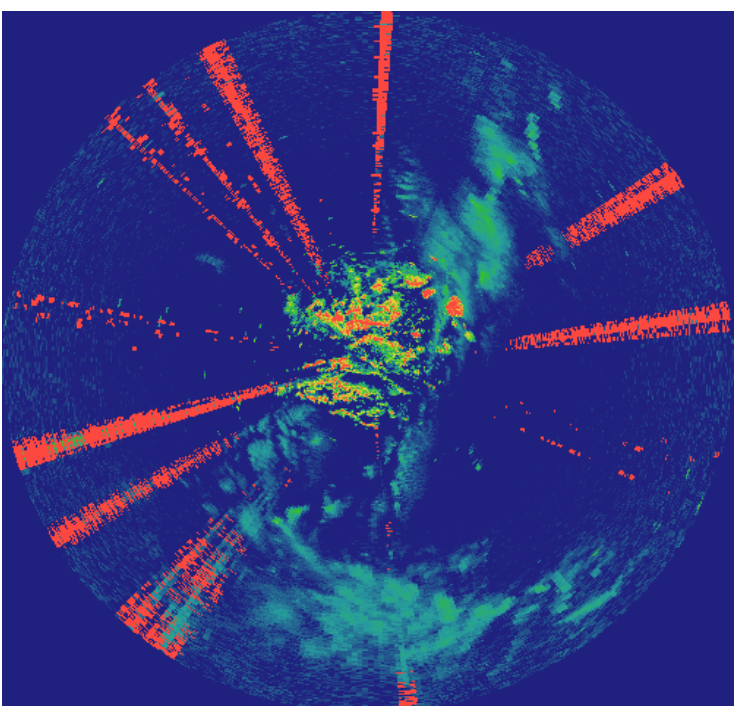
bRopo – identification of RLAN interference

- Deals with RLAN interference well.
- Can preserve genuine rain echoes, in most cases.
- Requires tuning to be effective.
- So far only properly tuned for BALTRAD radars (in Baltic Sea region).

Radar image showing RLAN interference spokes.

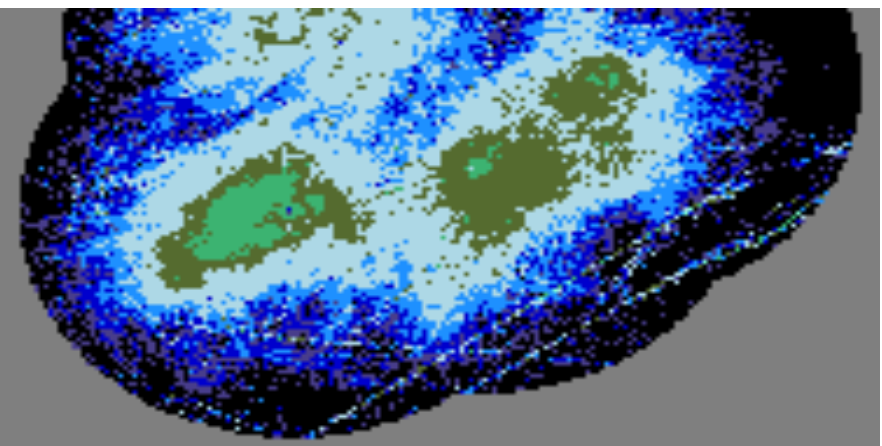


Radar image with RLAN spoke identification.

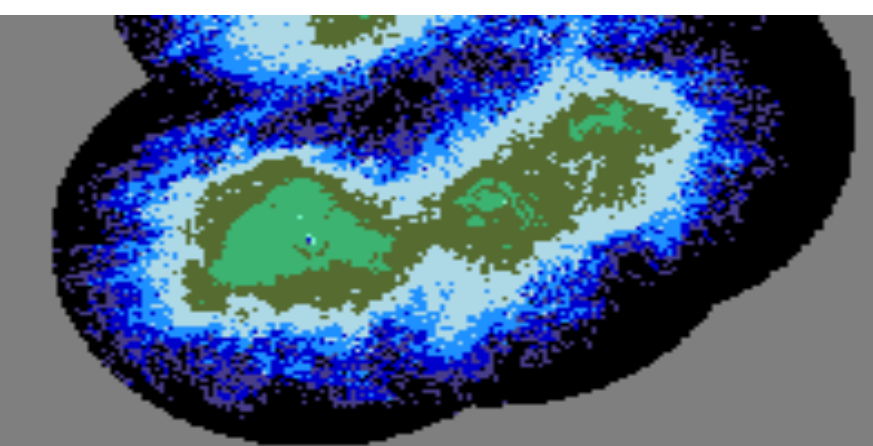


bRopo – identification of ships

- Busy shipping lanes in Gulf of Finland visible in monthly accumulations.
- Accumulation images suggest bRopo performs well.
- Further tuning may give benefits elsewhere.



Monthly accum. without QC



Monthly accum. with bRopo

Summary & further work

- Odyssey clutter filter improves the composite.
- Anecdotal evidence suggests bRopo is beneficial.
- Effect of QC is localized and often quite subtle.
- Further tuning on a site-by-site basis would improve the QC.
- Full verification study needed to establish a baseline.
- OPERA4 is the current programme of OPERA work activities, which includes work packages to develop the QC further.
- OPERA4 is described in a poster (P364) by Saltikoff *et al.* at this conference.