THE OPERATIONAL WEATHER RADAR DATA

Radar Workshop 2017

08 / 09 Nov 2017
Monash University, Australia
Content

• Hardware consideration

• Software and data consideration

• Recommendation
Content

• Hardware consideration

• Software and data consideration

• Recommendation
We work for weather but the weather doesn't!
LIGHTNING
EXTREME WEATHER
AND WHEN WE TALK ABOUT WET RADOME EFFECTS!
SHARING LIFE
RADAR FROM DEAR TO DEER
CONTENT

• Hardware consideration

• Software and data consideration

• Recommendation
EXAMPLE: WHAT WE ARE FACING

Hydrometeor Classification Filter
EXAMPLE: WHAT WE ARE FACING

Hydrometeor Classification Filter
Filters are good BUT… with moderation
Heterogeneous radar networks (different manufacture and/or different wavelength) impose a challenge for the generation of high quality products.

- Consider a harmonized post-correction of radar moments.
- Consideration of inter alia distance from radar, height of radar beam, partial beam blocking, attenuation, S/N, meteo/non-meteo (Dual-Pol).
- Consideration of bandwidth and communication speed.
- Consideration of server capability.
TREX: TOOL FOR RADAR DATA EXTRACTION

Data extraction

Inter-comparison

Data inter-comparison
NETWORK MONITORING! STILL AN IDEA
PROCESSING OVERVIEW

Composite

Post Processing
- Merging type
- Timing adjustment
- Projection
- Conversion

DART
Web Server
Google Earth

ftp products
ftp
ftp
ftp

Real time
PROCESSING OVERVIEW

Volume Emitter

Composite

Post Processing

- Merging type
- Timing adjustment
- Projection
- Conversion

DART

Web Server

Google Earth
VALIDATION

• Raingauges
• Disdrometers
• Microwave Antennas
• Inter-Comparison
• Public Resources (Images, Videos, Reports, Insurance, Report-Apps, …)
CONTENT

• Hardware consideration

• Software and data consideration

• Recommendation
One Word

Maintenance

Hardware & Software

But it is costly
MAINTENANCE KEEPS RADARS RUNNING

Elena Saltikoff, Mikko Kurri, Hidde Leijnse, Sergio Barbosa, and Kjetil Stiansen

When radar data stop arriving, the problem is often because of the power or data connection, but well-maintained, modern radars are rather reliable pieces of equipment.
### Table 1. Summary of the survey. In this summary, only selected questions and the most popular options are shown. The full survey is available in the electronic supplement. Note that weather services that have radars from several decades filled the survey for each “generation.”

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>When were your radars installed (approximately)?</td>
<td>1980s</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>1990s</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>2000s</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>After 2010</td>
<td>8</td>
</tr>
<tr>
<td>Have you had a major upgrade since that?</td>
<td>New signal processor</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>New receiver</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>New transmitter</td>
<td>7</td>
</tr>
<tr>
<td>Maintenance and spare parts acquirement: Do you have the following?</td>
<td>Your own spare parts</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Your own technicians</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Membership in a spare part pool</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Outsourced maintenance service</td>
<td>6</td>
</tr>
<tr>
<td>What are the most frequent problems causing radar data unavailability?</td>
<td>Transmitter</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Data connection (not radar related)</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Electricity (not radar related)</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Pedestal electronics (motors, servos, etc.)</td>
<td>10</td>
</tr>
<tr>
<td>What are the problems causing the longest radar data unavailability periods?</td>
<td>Waiting for spare parts</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Data connection (not radar related)</td>
<td>11</td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>

Opera poll about Maintenance Practices 2015
• It is extremely important to take infrastructure, maintenance, and monitoring into account when purchasing a new radar. It is recommended that these aspects are explicitly budgeted. This will avoid a lot of frustration of having a radar network but not being able to use it to its full potential.

• Monitor the radar constantly, invest in infrastructure, recruit wisely, and work together to exchange information, as happens in the OPERA community.

Fig. 2. The Andøya radar with its new lightning protection arrangements.

• Annual operative costs of a radar network are typically on the order of 5%–10% of the radar purchase price. During the lifetime of a system (typically 10–20 years) the operative costs are more than double the initial price.

ROTARY JOINTS AND BIRDBATH SCANS? SOME RADAR TECHNICAL TERMINOLOGY EXPLAINED.

When a radar antenna is pointing straight up, the antenna looks like a birdbath. Raindrops falling toward it are rather symmetrical when looked at from below. Rotating the antenna and counting an average of
Human power
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