KNMI Wind Services

IOVWST Meeting

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User pull

• Higher temporal resolution, i.e., more instruments in space
  ▪ Scatterometer winds are known to improve forecasts when assimilated in NWP models and are popular for nowcasting
  ▪ Currently only one operational mission (ASCAT) and one with development status (OSCAT), many weather phenomena are missed
  ▪ Better coverage is particularly important for nowcasting and r-NWP

• Better spatial resolution
  ▪ Future NWP model grid sizes will be in the order of a few km
  ▪ Nowcasting of cyclones with hurricane force
  ▪ Eddy-scale ocean modeling (L3/L4 wind products, guidance for ocean stress)
  ▪ Coastal phenomena

• Climate data records, stable, complete and well (inter)calibrated
  ▪ Level 2
  ▪ Level 3, 4 (MyOcean, IFREMER)
Scatterometer missions

- For the ASCAT missions, the OSI SAF is primarily responsible for the L2 wind products, but for all these missions, users request:
  - Well calibrated and stable wind products
  - Continuous monitoring of the product quality
  - Data formats that can be handled by existing systems
  - Helpdesk support and service messages

- We want to support missions where necessary with standard services in order to achieve maximum profit for the users

- We also plan wind reprocessing of the ASCAT, SeaWinds, ERS and OSCAT missions
Ongoing R&D work

• Cal/Val: ocean calibration and development of quality flags
• Backscatter is considered a geophysical property of the ocean, so a particular radar wavelength/polarisation corresponds to one unique GMF
• Differences between instruments can be assigned to (small) calibration issues and subsequently be corrected
• This method has proven to be successful for ERS vs. ASCAT and for QuikSCAT vs. OSCAT
• Instrument intercalibration (MetOp-A&B / reprocessing)
Ocean Calibration Overview

- **Absolute reference**

- **σ° calibration**

- **Retrieval**

- **GMF**

- **Time**
- **WVC**
- **View type**
- **Etc.**

- **Time**
- **Speed**
- **Direction**

- **Time**
- **WVC**
- **Location**
- **Vector**

- **Calibration**
- **Errors**

- **Absolute reference**

Triple wind collocation
- Patterns identical to within 0.1 dB
- But vertically shifted
- Tested over sea ice

Verspeel et al., 2011
OSCat vs QScat

- Exclude rain
- v2010 biased
- Large fluctuations
- View dependent
- Corrections work
ASCAT wind calibration

- Triple collocation using all ASCAT-12.5 collocations from Oct 2008 to March 2012
- Error standard deviations in m/s w.r.t. scatterometer scales

<table>
<thead>
<tr>
<th>[m/s]</th>
<th>Buoy $\sigma_u$</th>
<th>Buoy $\sigma_v$</th>
<th>ASCAT $\sigma_u$</th>
<th>ASCAT $\sigma_v$</th>
<th>ECMWF $\sigma_u$</th>
<th>ECMWF $\sigma_v$</th>
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</thead>
<tbody>
<tr>
<td>Old</td>
<td>1.178</td>
<td>1.211</td>
<td>0.656</td>
<td>0.798</td>
<td>1.484</td>
<td>1.502</td>
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<tr>
<td>New</td>
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<td>1.203</td>
<td>0.647</td>
<td>0.764</td>
<td>1.482</td>
<td>1.503</td>
</tr>
</tbody>
</table>

- Wind calibration improves ASCAT wind quality
- Work in progress

Poster by Jur Vogelzang
Monitoring service

- Monitoring and control: improvement of methods for routine validation
- Buoy verifications
- Quality assurance of the production, see example of ASCAT anomaly
GMF development

- Improvement of Geophysical Model Functions
- CMOD6 for C-band: better fit around 4 m/s, fix underestimation of wind speed above 15 m/s
- NSCAT3 for Ku-band: fix overestimation of wind speed above 15 m/s
- Cross-polarisation GMF at C-band to support EPS-SG
MLE developments

- Cone distance analysis (incl. sign): screening for wind variability and rain, improving Quality Control
- Cooperation with Institut de Ciències del Mar and Unitat de Tecnologia Marina (Spain)
- Location of backscatter data w.r.t. the GMF cone depends on wind variability, ...
- Also important for quality assessment in coastal regions (incl. land contamination)
- Important asset in nowcasting and data assimilation
- Wave-like front with closed low to the left (ASCAT pass at 00:18 GMT)
- HiRLAM position (00 GMT) too far NW (run 18Z+6h)
- ASCAT ambiguity removal error
- All flags to the N of the black line should be turned by 180 degrees
- MLE evidence
MLE

- +ve MLE related to wind variation, e.g., front
- -ve MLE to stable flow
- +ve MLE likely aligned with front
Sri Lanka disaster

Note: 1) Times are GMT 2) Times along bottom correspond to measurement at 10N
3) Data buffer is 22 hrs from 20111125 4) Black circles indicate possible contamination

NOAA/NESDIS/Office of Research
• Complex convection
• Spatial inconsistency (red, yellow)
• Spatial consistency (black)
• ASCAT 12.5

Sri Lanka disaster
MLE and ASCAT winds

- MLE denotes convection in the low to the SW of Sri Lanka
- N-ly winds to the N of the low appear correct
- E-ly winds to the W of the low should be W-ly

➢ Meteorologists should be trained to use MLE
The future: 6.25 km grid?

- Left: coastal product at 12.5 km grid size, right: ultra-high resolution product at 6.25 km swath grid size
- Product still looks consistent but data quality not yet assigned
MyOcean L3 Wind product

- [http://www.myocean.eu](http://www.myocean.eu)
- access the catalogue and search for global wind:

Poster by Tilly Driesenaar
L3 Wind product example

Ascending passes

Descending passes

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MetOp-A & B

- MetOp-B succeeds MetOp-A
- Coverage doubled as long as both work well
- Gaps closed at latitudes > 60°, with revisit after 100 minutes everywhere
- Gaps remain in the tropics, with revisit after 50 minutes everywhere
Thank you!