



Royal Netherlands
Meteorological Institute
*Ministry of Infrastructure and the
Environment*

Oceansat-2 scatterometer winds by EUMETSAT

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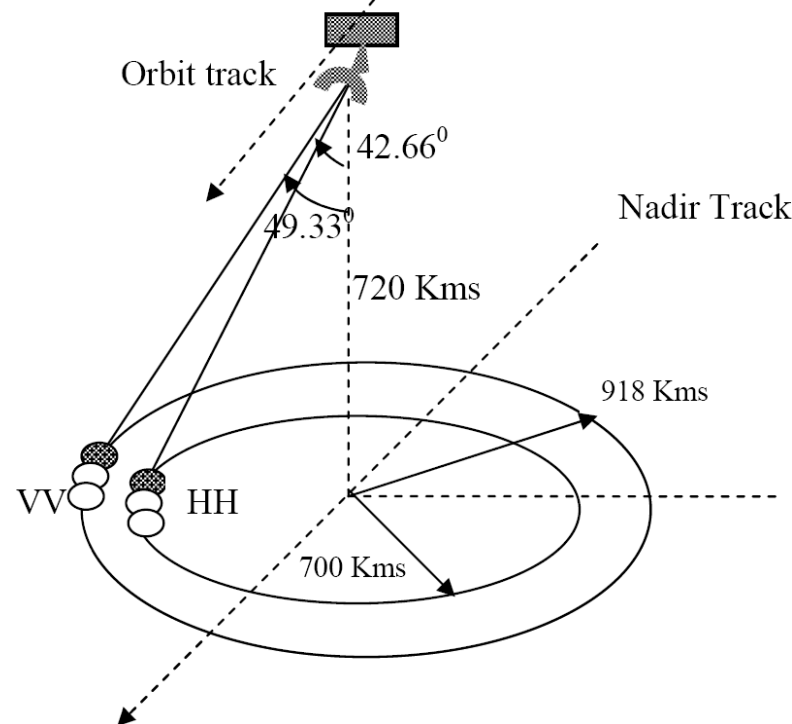
Outline

- Oceansat-2 scatterometer
- European, EUMETSAT and SAF activities
- Development of software and data products
- Validation results
- Conclusions and outlook



The OSCAT scatterometer

- Ku-band radar instrument onboard of the Indian Oceansat-2 satellite
- Platform also carries an Ocean Colour Monitor and a Radio Occultation Sounder
- Launched in September 2009; India plans to launch ScatSat in 2013 with an identical instrument
- Rotating pencil beam instrument with QuikSCAT-like configuration
- Two beams: outer beam with VV polarisation, inner beam with HH polarisation
- Default product resolution is set to 50 km, vs. 25 km for QuikSCAT





European involvement in OSCAT

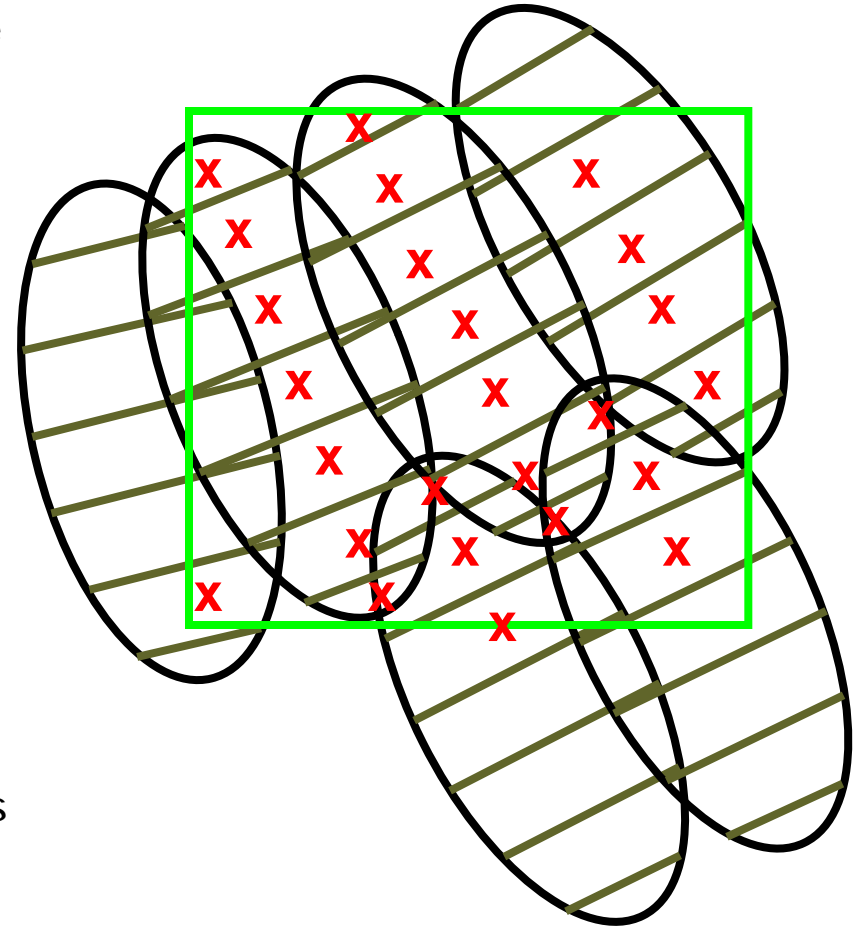
- KNMI is Principal Investigator in an Oceansat-2 AO project, other members are ECMWF, UK Met Office, Meteo France, Ifremer, CMIMA, DWD, ...
- KNMI contributes in the context of the EUMETSAT Ocean and Sea Ice SAF and Numerical Weather Prediction SAF
- Contributions in Cal/Val work, development of OSCAT Wind Data Processor (OWDP), provision of near-real time experimental wind products
- First test data (one orbit) was received in spring 2010, OWDP prototype was built using these data

- EUMETSAT is involved in Oceansat-2 ground segment: data acquisition of global orbits at Svalbard, processing in India with backup in Darmstadt
- Timeliness within 1 hour through EUMETCast (after end of full orbit)
- Near-real time data received since March 2012, development status OSI SAF wind product available since June 2011



OSCAT Wind Data Processor (OWDP)

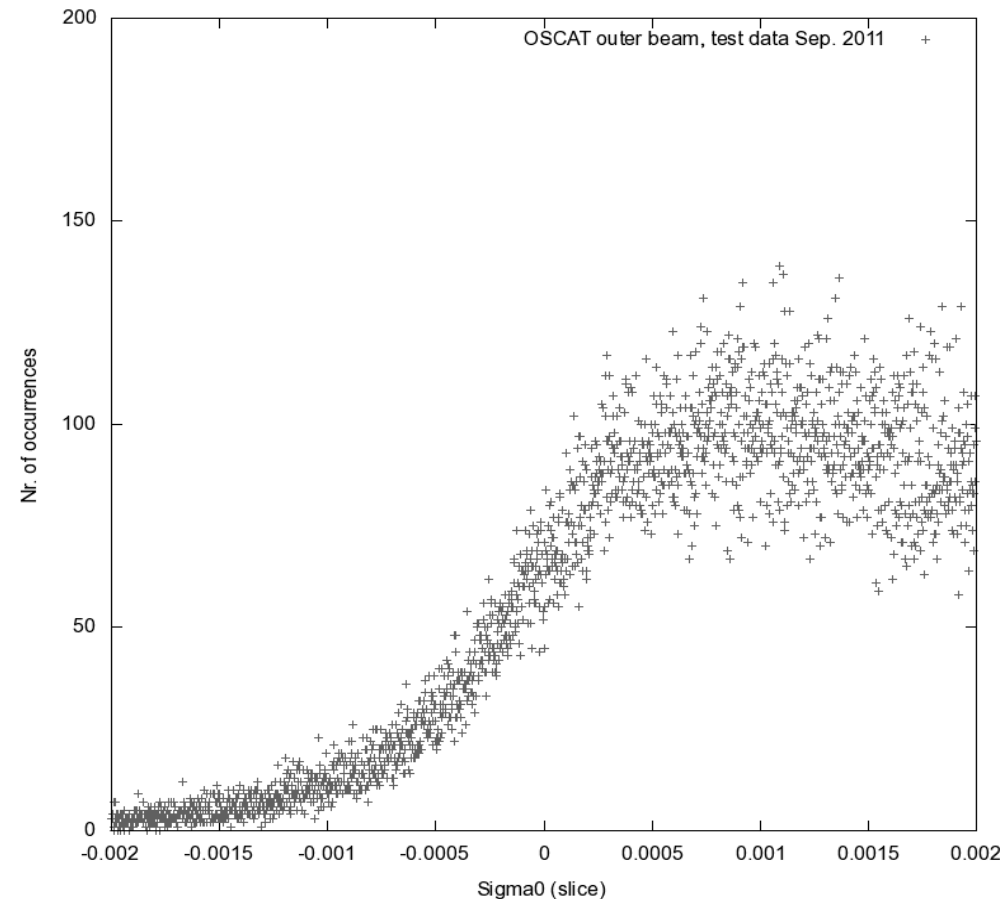
- Developed within the NWP SAF, available to beta users
- Based on the SDP processor for QuikSCAT
- Reads Level 2A data in HDF5 from ISRO
- The Level 2A data contains backscatter values from so-called slices, these are averaged over a Wind Vector Cell area
- Wind inversion, quality control and ambiguity removal are done on WVC level like in SDP
- NSCAT-2 Geophysical Model Function is used, like in SDP
- Output is written in the same BUFR format as QuikSCAT, NetCDF available as well





Backscatter data issues

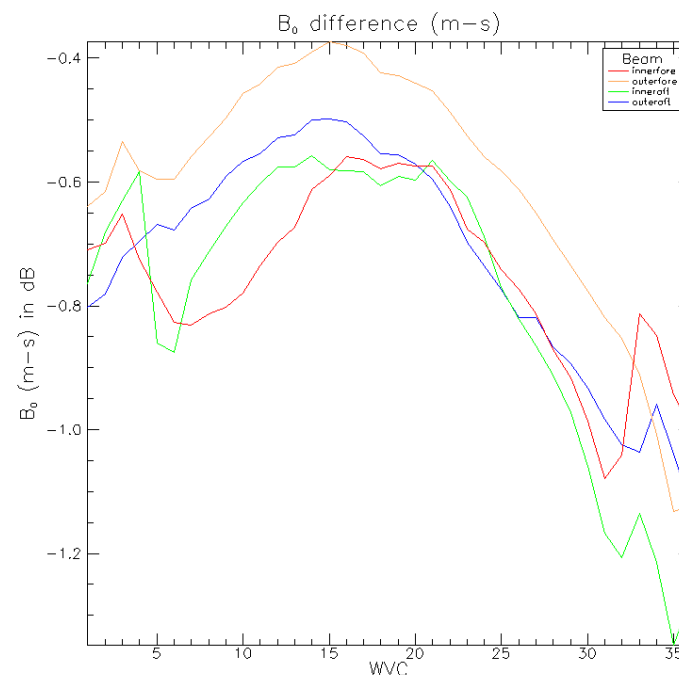
- Several batches of test data have been received from ISRO, each spanning several months
- Near-real time data are available since March 2011
- Older data versions show discontinuities at lower backscatter values, this causes problems in the wind retrieval for low winds
- Feedback was provided to ISRO
- Later data versions show improvements
- Problems are solved with ISRO upgrade to version 1.3, available since Dec. 2011





Improvements in wind processing

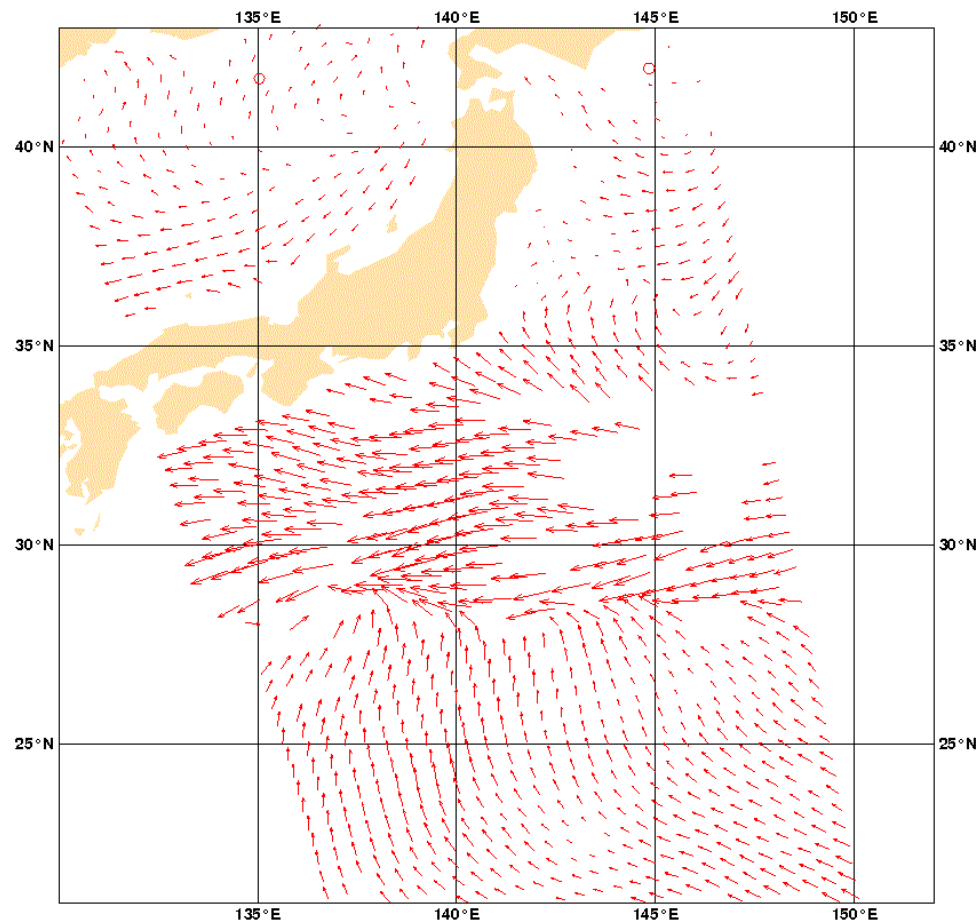
- We assume that OSCAT has the same backscatter PDF as other Ku-band instruments and comply with the same Geophysical Model Function for wind inversion (NSCAT-2)
- Ocean Calibration was developed for ASCAT ar QuikSCAT, the same method is used now for OSCAT
- In this way intercalibration of OSCAT and QuikSCAT can be achieved and stable FCDR's can be obtained
- Calibration coefficients vary significantly as function of WVC (contrary to QuikSCAT), see also the poster of Yun Risheng
- Further analysis is necessary
- Tuning of Quality Control
- Outer swath processing





OSCAT winds from OWDP

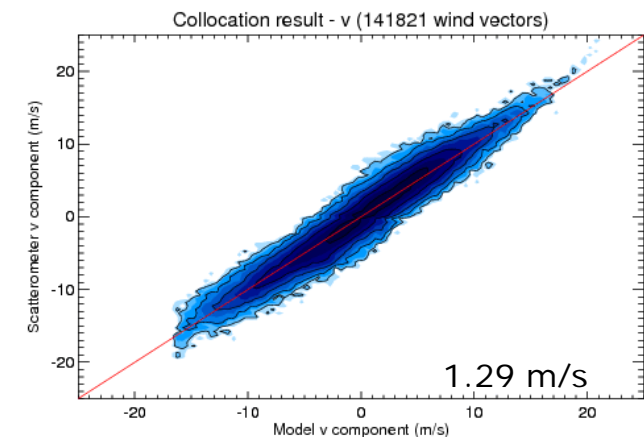
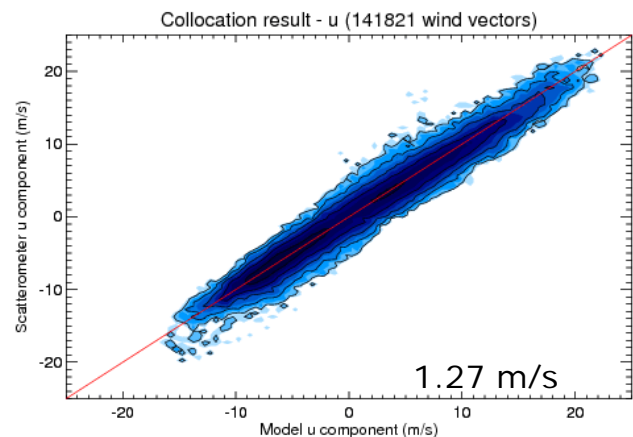
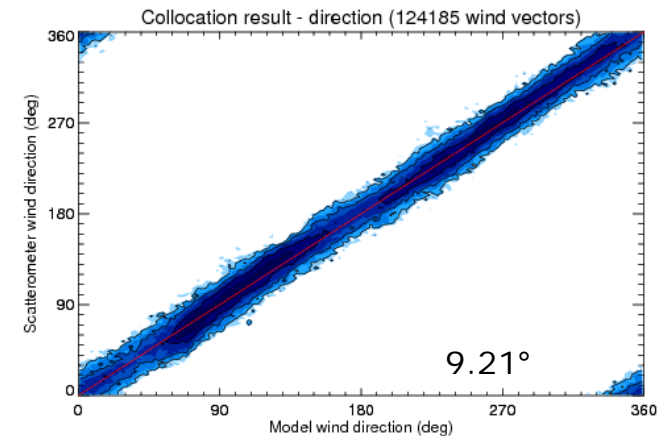
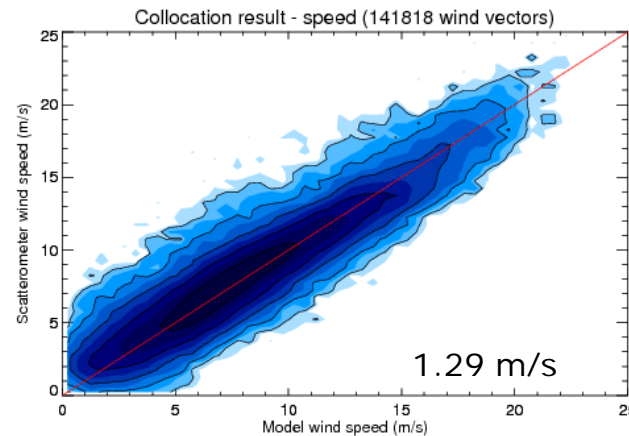
- Currently the outer swath (where only VV information is available) is excluded in the wind products
- We have tested with outer swath processing and results look promising
- Wind component standard deviations w.r.t. ECMWF are ~ 0.1 m/s higher in the outer swath as compared to nadir





OWDP winds vs. ECMWF

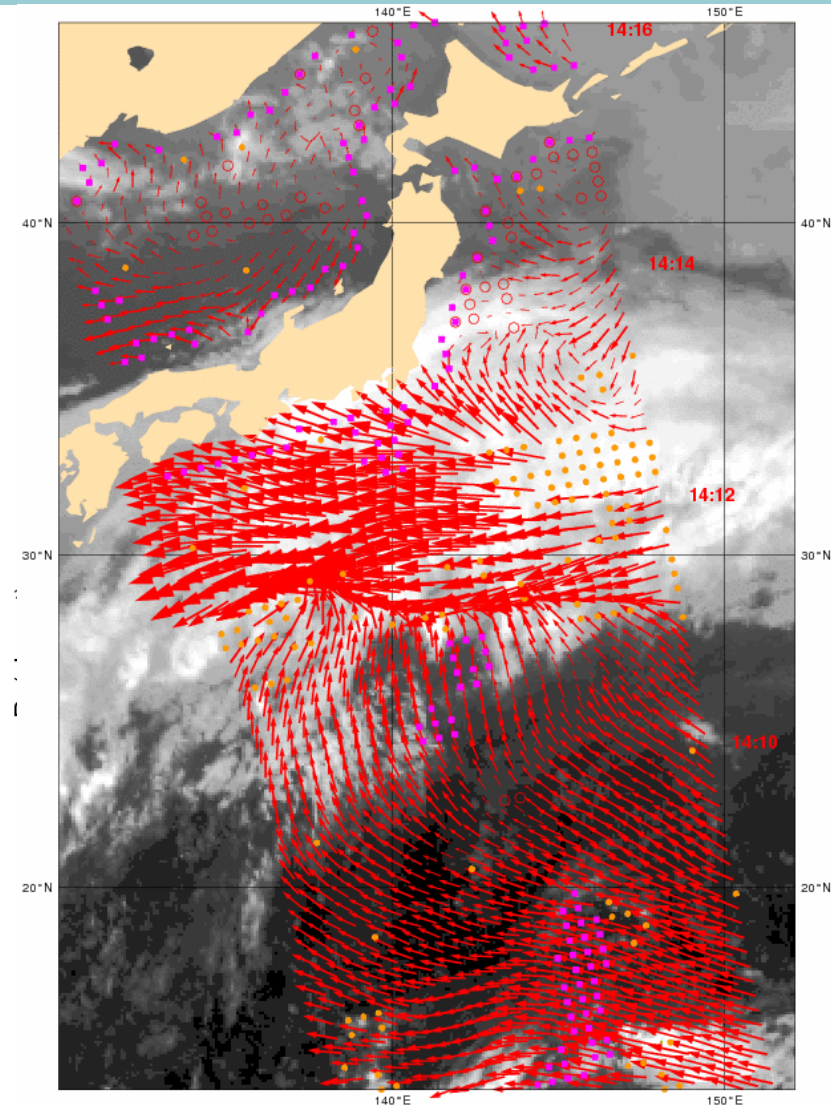
- Ocean calibration correction of the backscatter values was applied
- Wind component standard deviations are well within OSI SAF requirements





Quality Control

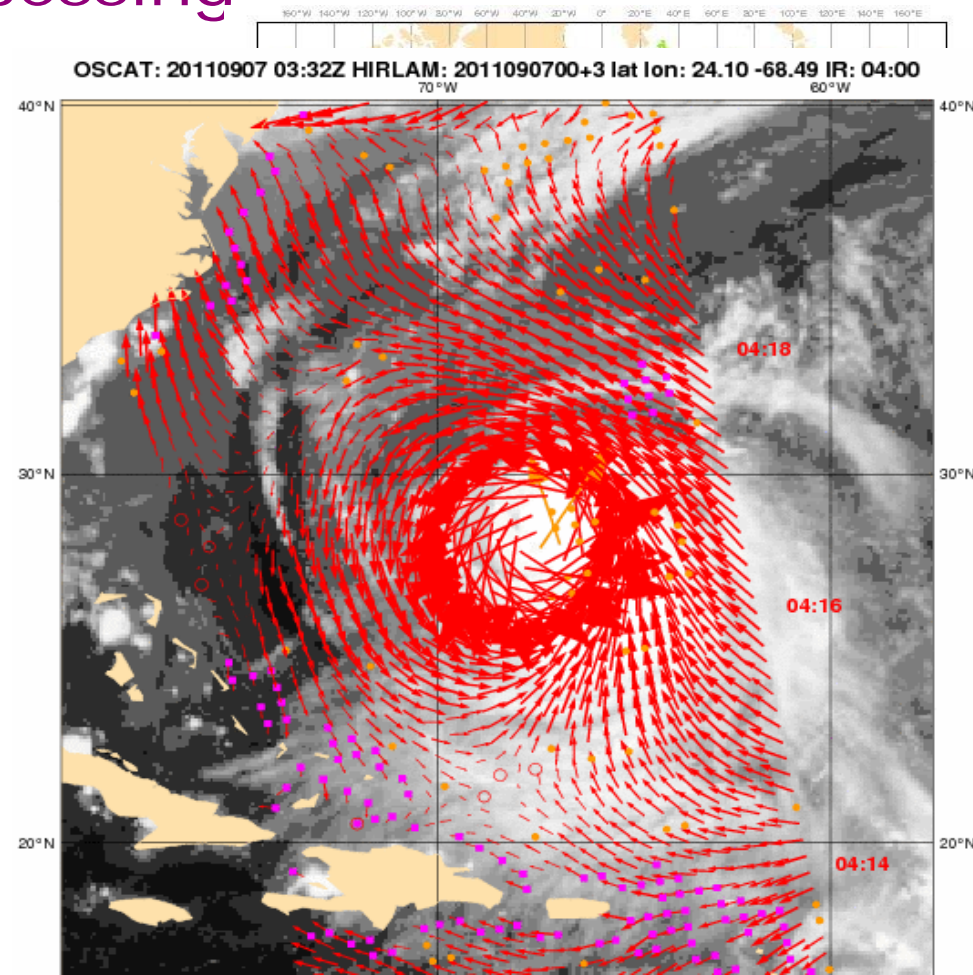
- Ku band is very sensitive to rain
- Quality control is tuned in the same way as was done for QuikSCAT
- MLE vs. wind speed, segregated w.r.t. TRMM/TMI rain rate
- Winds with a high MLE are rejected, threshold is dependent on wind speed
- Algorithm appears to work well in cloudy/rainy conditions
- Rejection rate is approx. 7% (was ~5% for QuikSCAT)





Near-real time data processing

- Satellite data are acquired at Svalbard, sent to India and then to Darmstadt
- Level 2A data are received at KNMI through EUMETCast with a latency of typically 1 hour (orbit files)
- Coverage is good, although sometimes orbits are delayed or missing
- Issue with coverage over North Atlantic
- Example of 7 September 2011, hurricane Katia
- Data are available for European non-commercial users at the moment; extension being negotiated
- Feedback received from ECMWF, Met Office, Meteo France, DWD

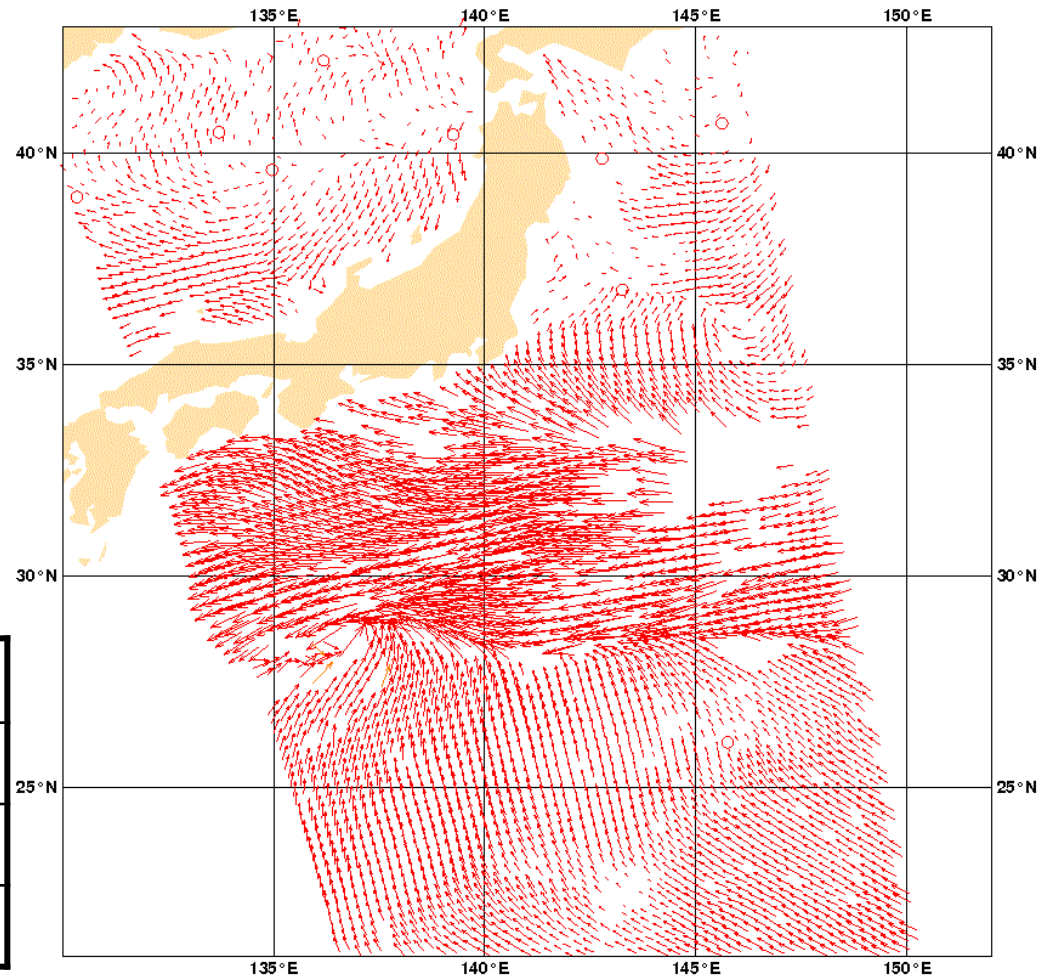




25 km product

- Development of 25 km product based on Level 1B from ISRO (cooperation with NOAA)
- Statistics against ECMWF

	Stdev u	Stdev v
OSCAT 50 km	1.27	1.29
OSCAT 25 km	1.44	1.46
QuikSCAT 25 km	1.45	1.43





Buoy verification

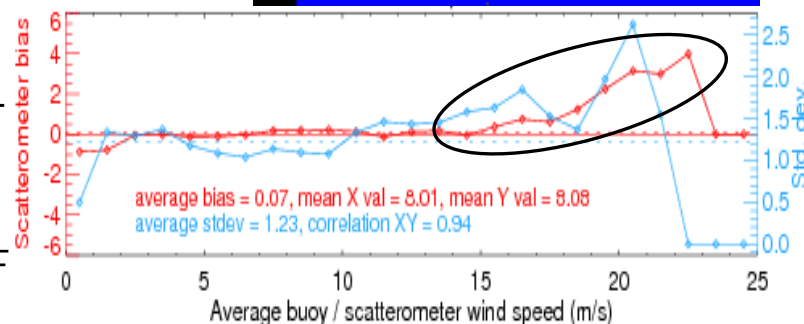
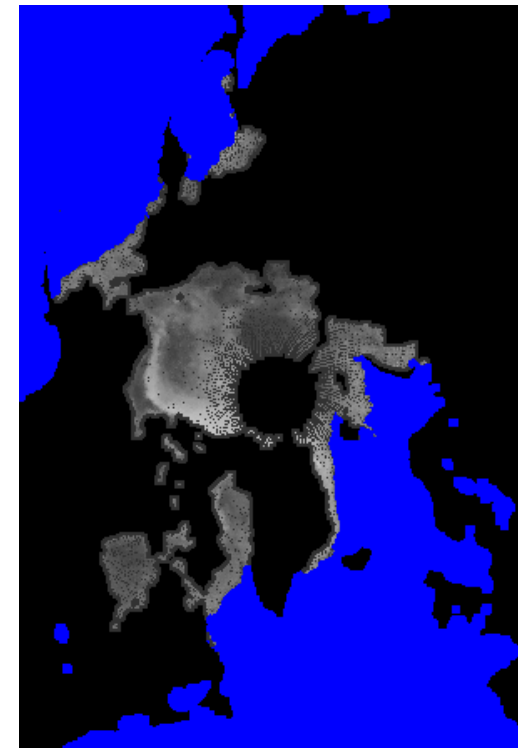
- Three months of data (but not the same set of buoys in all cases)
- OSI SAF QuikSCAT product had a negative bias that will be corrected in the reprocessing (planned as OSI SAF work)
- OSCAT is not yet at the same level as ASCAT or QuikSCAT
- OSCAT 25 km is of comparable quality as OSCAT 50 km and will provide useful details for nowcasting extreme events

	Speed bias	Stdev u	Stdev v
OSCAT 50 km	0.07	1.91	2.07
OSCAT 25 km	0.03	1.94	1.96
ASCAT 25 km	0.03	1.65	1.84
ASCAT coastal	0.04	1.68	1.83
QuikSCAT 25 km	-0.45	1.75	1.71



Current status and next steps

- Improvement of backscatter calibration and quality control
- Improvement of ice screening model
- Outer swath processing
- Reduction of wind speed biases vs. model and buoys above 15 m/s (also present in QuikSCAT): GMF adjustment
- Development of automatic orbit-wise product monitoring flag
- OSI SAF PCR (Product Consolidation Review) currently running, ORR foreseen for the next months
- Distribution only permitted to European, non-commercial users, but under negotiation with ISRO (ISRO approved NOAA wind release)
- Official release of OWDP software in NWP SAF





Conclusions and outlook

- OSCAT wind products are available in near-real time with development status, (pre)operational status achieved soon hopefully
- Data are available to European users only, but we get requests from all over the world so extension is highly desirable
- OWDP processing software is available for beta testers
- OWDP wind quality is within requirements
- Some issues require more analysis, e.g., variation of backscatter calibration over the swath
- Looking into outer swath processing and 25 km product
- Characteristics and performance of OSCAT appear to be comparable to QuikSCAT