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#### Inconsistencies in scatterometer wind products based on ASCAT and OSCAT-2 collocations



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Highlights

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- •Remarkable inconsistencies exist among scatterometer wind vector products.
- •Calibration, wind retrieval algorithm and the GMF constitute the main causes.
- •Wind direction errors from rotating scatterometers are verified and discussed.
- •Different scatterometer wind products show different QC performance and merits.



Fig. A wind front case captured by scatterometers. The O2/JPL data are down sampled (no averaging) for plotting. The wind vectors flagged by quality control are shown in red.

| Data  | Sensor             | Producer | Cridaiza                                | Wind retrieval processing |        |                          |  |
|-------|--------------------|----------|---|---------------------------|--------|--------------------------|--|
|       |                    |          | Grid size                               | GMF                       | $AR^1$ | $\mathrm{B}\mathrm{W}^2$ |  |
| winds | OSCAT-2            | JPL      | 12.5 km × 12.5 km                       | QSCAT2012                 | DIR    | NCEP                     |  |
| winds | OSCAT-2            | KNMI     | 25 km × 25 km                           | NSCAT-4                   | 2DVAR  | ECMWF                    |  |
| winds | ASCAT-A            | KNMI     | 25 km × 25 km                           | CMOD5.N                   | 2DVAR  | ECMWF                    |  |
| winds | ASCAT-B            | KNMI     | 25 km × 25 km                           | CMOD5.N                   | 2DVAR  | ECMWF                    |  |
| rain  | GMI                | RSS      | $0.25^{\circ} 	imes 0.25^{\circ}$       | /                         | /      | /                        |  |
| SST   | MW_IR <sup>3</sup> | RSS      | $\sim 9 \text{ km} \times 9 \text{ km}$ | /                         | /      | /                        |  |

<sup>1</sup>AR is short for ambiguity removal

<sup>2</sup>BW is short for background winds

<sup>3</sup>a number of microwave and infrared sensors, see <u>http://www.remss.com</u>

#### Quality control flag comparisons



**Fig.** The fraction of WVCs with rain flag against GMI rain rate for O2/JPL (red) andO2/KNMI (blue) wind products.

#### Quality control flag comparisons

| QC       |          | Doveortogo | O2/JPL – O2/KNMI |      | O2/JPL - ASCAT |      | O2/KNMI – ASCAT |      |  |
|----------|----------|------------|------------------|------|----------------|------|-----------------|------|--|
| O2/KNMI  | O2/JPL   | Percentage | Bias             | SD   | Bias           | SD   | Bias            | SD   |  |
| Accepted | Accepted | 94.57%     | -0.22            | 0.86 | -0.23          | 1.02 | -0.02           | 0.73 |  |
| Accepted | Rejected | 0.47%      | 2.49             | 5.93 | 3.08           | 6.01 | 0.59            | 1.50 |  |
| Rejected | Accepted | 3.71%      | 0.86             | 4.15 | 1.31           | 4.32 | 0.45            | 1.75 |  |
| Rejected | Rejected | 1.25%      | 4.36             | 5.23 | 7.13           | 5.40 | 2.77            | 2.60 |  |

TABLE Wind comparisons for each of the four QC categories



**Fig.** Scatter plots for O2/JPL (a) and O2/KNMI (b) wind speeds versus ASCAT-B wind speeds for the collocated WVCs that are rejected by KNMI QC but accepted by JPL rain flag.

# 2DVAR speeds for QC?



- The 2DVAR wind is essentially rain free due to KNMI QC
- 2DVAR speeds are very close to ASCATB
- 2DVAR-OSCAT speed may be used to indicate singularities due to rain
- It effectively segregates the many data in the rejected category with low rain rate and VRMS
- Work in progress

Xingou Xu, visiting KNMI



## Wind speed differences



**Fig.** Wind speed biases between OSCAT-2 (O2/JPL and O2/KNMI) and ASCAT-B as a function of average wind speed.

If the number of collocated WVCs in a bin is less than 1000, then it is masked as blank.

#### Wind speed differences



**Fig.** Scatter plots for O2/JPL (a) and O2/KNMI (b) versus ASCAT-B wind speeds. The plots are made based on the triple collocated WVCs of ASCAT-B, O2/JPL and O2/KNMI.

| QC       |          | Deveentere | O2/JPL – O2/KNMI |      | O2/JPL - ASCAT |      | <b>O2/KNMI – ASCAT</b> |      |
|----------|----------|------------|------------------|------|----------------|------|------------------------|------|
| O2/KNMI  | O2/JPL   | Fercentage | Bias             | SD   | Bias           | SD   | Bias                   | SD   |
| Accepted | Accepted | 94.57%     | -0.22            | 0.86 | -0.23          | 1.02 | -0.02                  | 0.73 |

### Wind speed differences



**Fig.** Wind speed biases between OSCAT-2 and ASCAT-B as a function of average wind speed and SST, for collocations with O2/JPL (a) and O2/KNMI (b). If the number of collocated WVCs in a bin is less than 500, it is masked as blank..

#### Wind direction differences (w.r.t. OSCAT ground satellite propagation)

**O2/JPL** - ASCATB **O2/KNMI** - ASCATB deg Relative wind direction (deg) Relative wind direction (deg) wind direction bias (deg) **Bias** -60-60 -120-120-9 -180-180Wind vector cell number Wind vector cell number deg Relative wind direction (deg) Relative wind direction (deg) wind direction SD (deg) SD -60 -60 -120 -120-180-180Wind vector cell number Wind vector cell number

# Thanks!

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