

NOAA CyGNSS Wind product: recent progress

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Service

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Outline

- Brief description of planned improvements for upcoming NOAA CyGNSS wind product version
 - 'High roll angle' data inclusion
 - High wind correction
 - Revised quality flag
- Performance assessment
- Summary





Current issues..

1. Worse performance when |roll|>5°



** Vertical bars represent the number of days where ALL eight spacecrafts were simultaneously rolled.

2. NOAA CyGNSS winds tend to be underestimated in the higher wind regime



3. Presence of outliers



Solutions

1. High roll angle data

- Compute and evaluate |pointwise σ_o bias| (i.e. $|\sigma_{o CYGNSS} - \sigma_{oGMF}|$) against set threshold
- Threshold is selected based on achieving a balance between acceptable overall performance (stde<1.2m/s) and minimal data loss (1-3%)

2. High wind correction

- collocated 0.25° HWRF/ECMWF winds (within AL/EP basins) are 'CDF matched' in order to apply a high wind correction to ECMWF
- a look-up table is then generated and subsequently used to correct ECMWF winds, which are then used as part of the NOAA track-wise σ_o algorithm

3. Revised quality flag

- All samples where |u_{10-cyg}-u_{10-mod}|>6m/s are evaluated where
- each sample is collocated with other samples within 80 km and 45 min, while excluding samples from same track
- overall median (*overall_med*) is compared against sample_u10, where an appropriate threshold is used to flag the data depending on the error (i.e. sample_u10 overall_med)
- collocation criteria are relaxed if no samples are found
- If collocated samples are still not found, then compare direct neighbors with *sample_u10* as a last resort_____



















Summary

- Following improvements to be included in upcoming NOAA CyGNSS wind product version:
 - 1. high roll angle data included with poor samples filtered out
 - 2. high wind correction based on a CDF matching technique applied to ECMWF
 - 3. updated quality flag which will more effectively remove wind speed outliers
- Overall performance against ECMWF shows
 - similar overall STDe performance compared to v1.1
 - CyGNSS winds are now noticeably higher than ECMWF when the latter is > ~17m/s
- Overall performance against HWRF shows
 - slightly increased overall STDe but,
 - improved overall bias

Publication providing details on the NOAA Track-wise algorithm:

F. Said, Z. Jelenak, J. Park, P. S. Chang, "The NOAA track-wise wind retrieval algorithm and product assessment for CyGNSS", Geoscience and Remote Sensing, IEEE Transaction on, July 2021, DOI: 10.1109/TGRS.2021.3087426