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Abstract

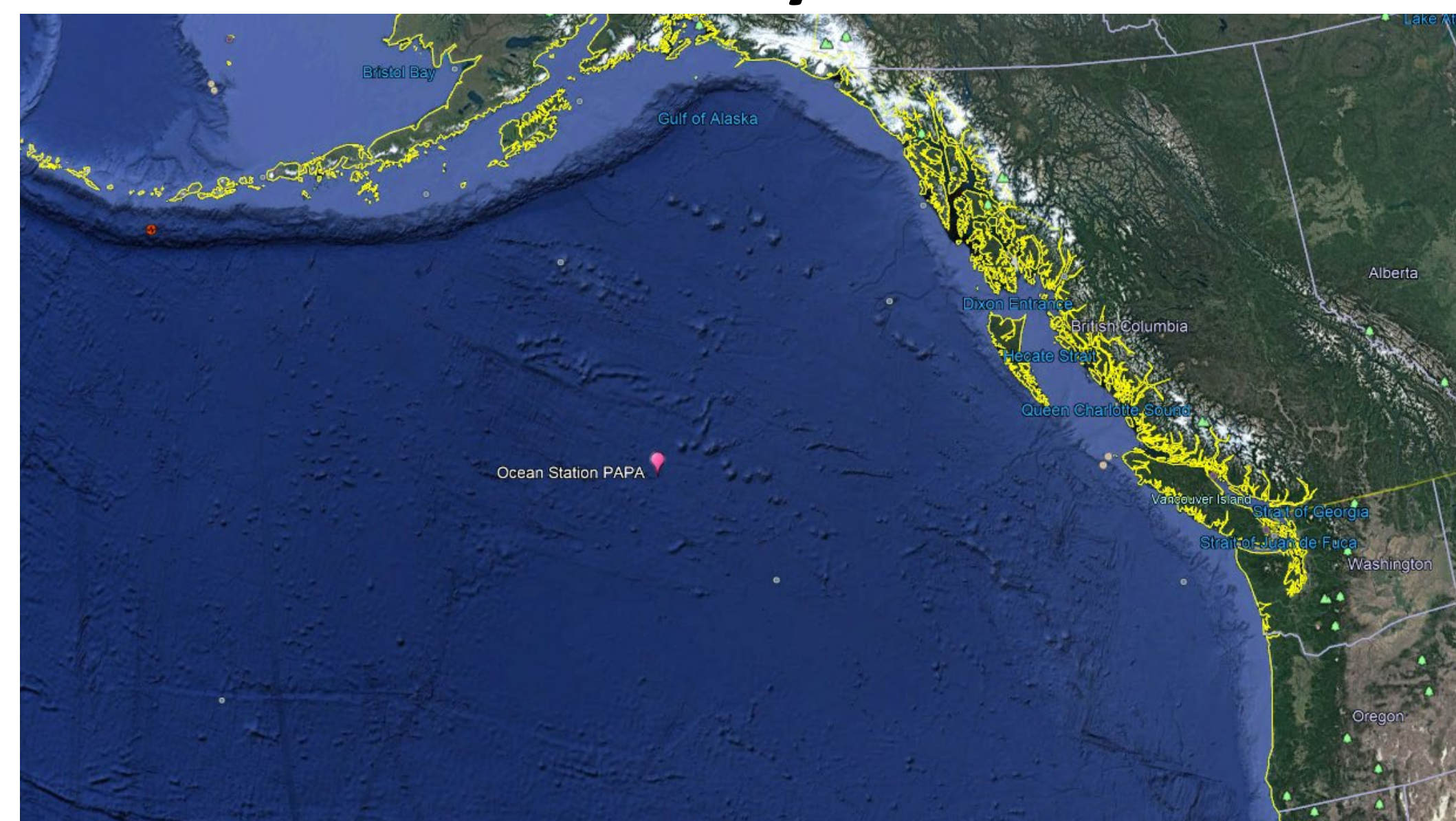
Remotely sensed wave data are potentially valuable for assimilating into spectral wave models. Data collected using Synthetic Aperture Radar (SAR) are of particular interest because they are expected to provide accurate measurements of long-period swell. Before using SAR spectra for assimilation into wave models, their quality must be evaluated.

We developed a validation procedure for Sentinel-1 SAR wave spectra that includes quality control measures. The current routine for validating SAR wave spectra against buoy wave spectra is shown (center panel). Pairs of SAR and buoy wave spectra are spatially and temporally colocated (within 1° and 0.5 hours, respectively). Bulk parameters (e.g., significant wave height, various wave periods, measures of spectral bandwidth, and the fourth spectral moment) calculated from the SAR spectra are compared graphically and statistically to those calculated from the buoy spectra. The results of our validation routine are shown (top of right panel) for our study location, UW-APL Ocean Station PAPA. Except for wave period, the difference between SAR and buoy bulk parameters are rather significant. This discrepancy requires further investigation.

The validation of WaveWatch III (WW3) for our study location is shown (bottom of right panel). Spatial and temporal collocation are performed, and spectra and bulk parameters are compared. The WW3-buoy comparisons are very good overall. The fourth spectral moment discrepancy can most likely be attributed to biofouling causing the buoy to have a negative bias during the last half of the study period.

The next steps are to perform SAR-buoy and WW3-buoy comparisons in a number of locations and, once validated, begin using WW3 spectra for global comparison. Factors contributing to poor SAR performance will be identified and used to develop quality control algorithms for SAR data assimilation.

Study Location



**Specifications
Owned/
Maintained by:**
UW-APL

NDBC 46246
CDIP 166

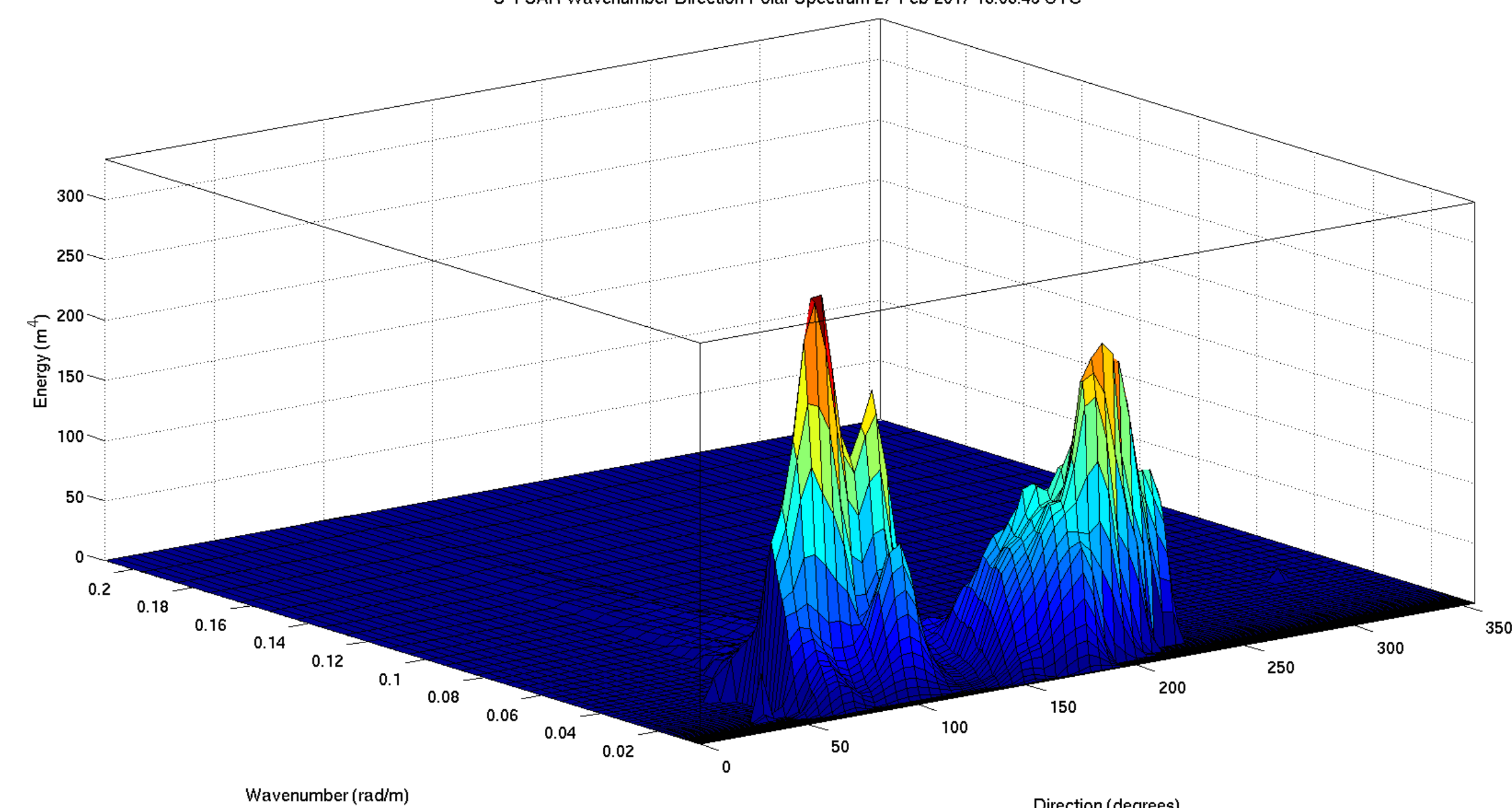
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145.20 W

Depth:
4,252 m

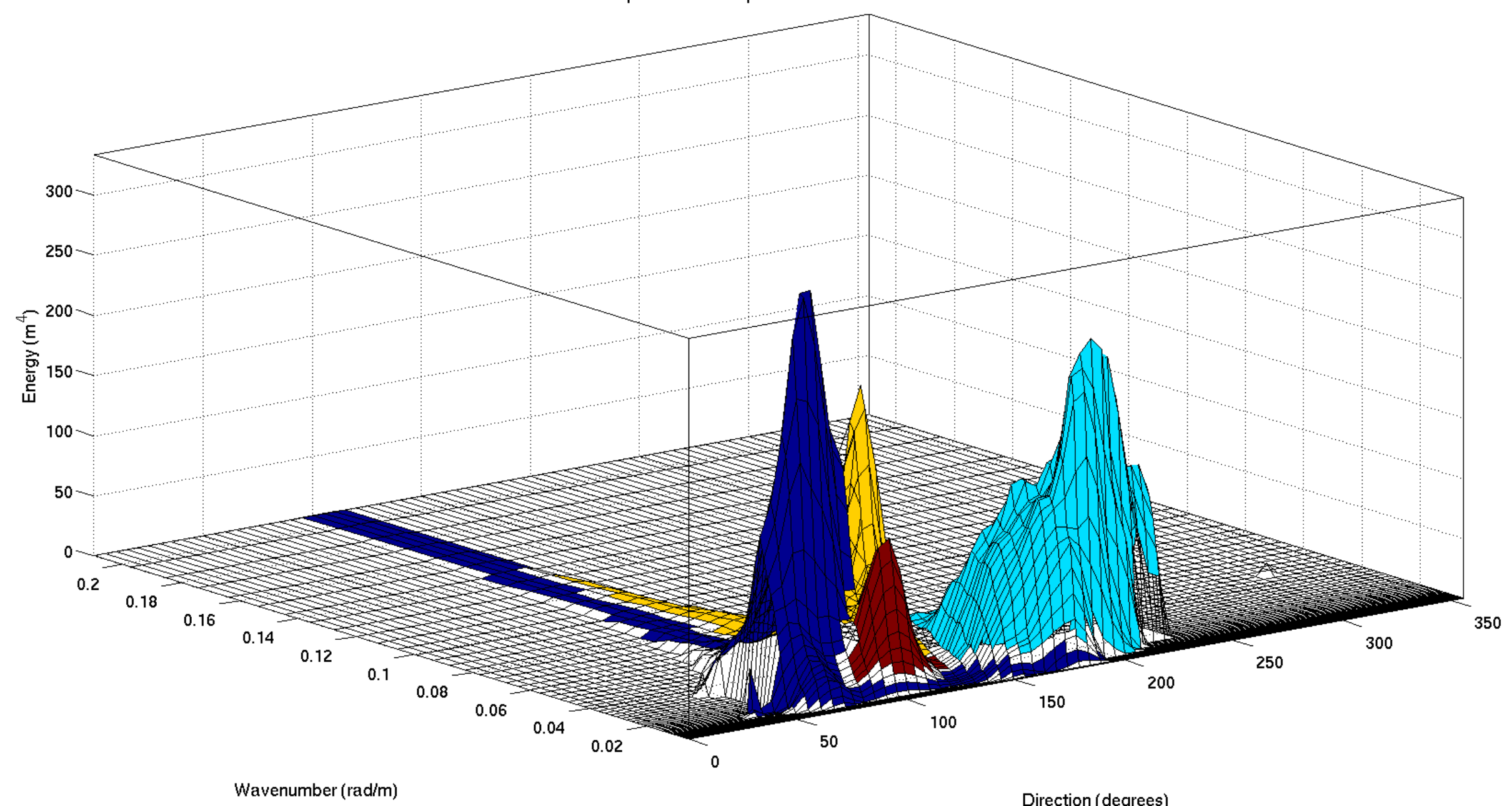
Broke free on
5 Oct. 2017.

Sentinel-1 SAR Spectra

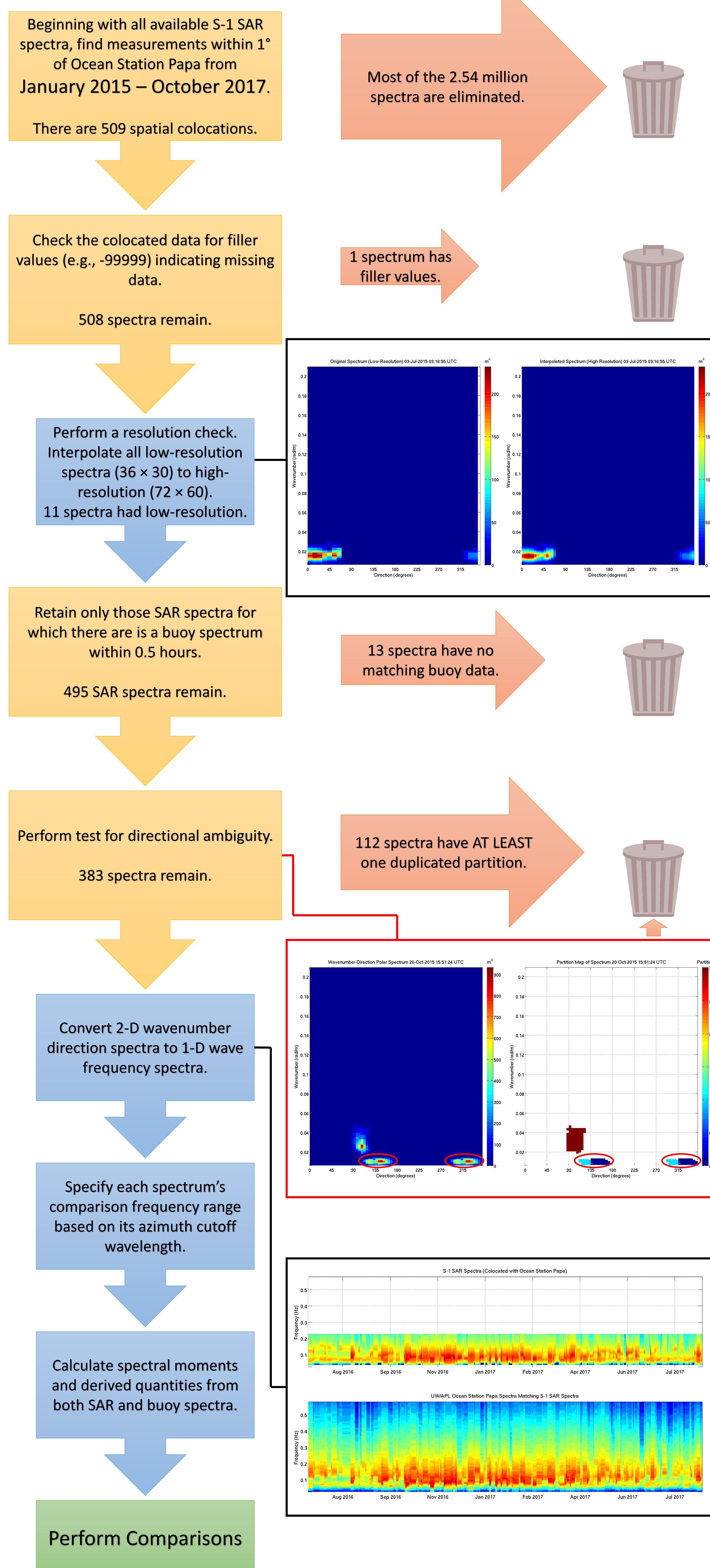
S-1 SAR Wavenumber Direction Polar Spectrum 27-Feb-2017 16:06:43 UTC



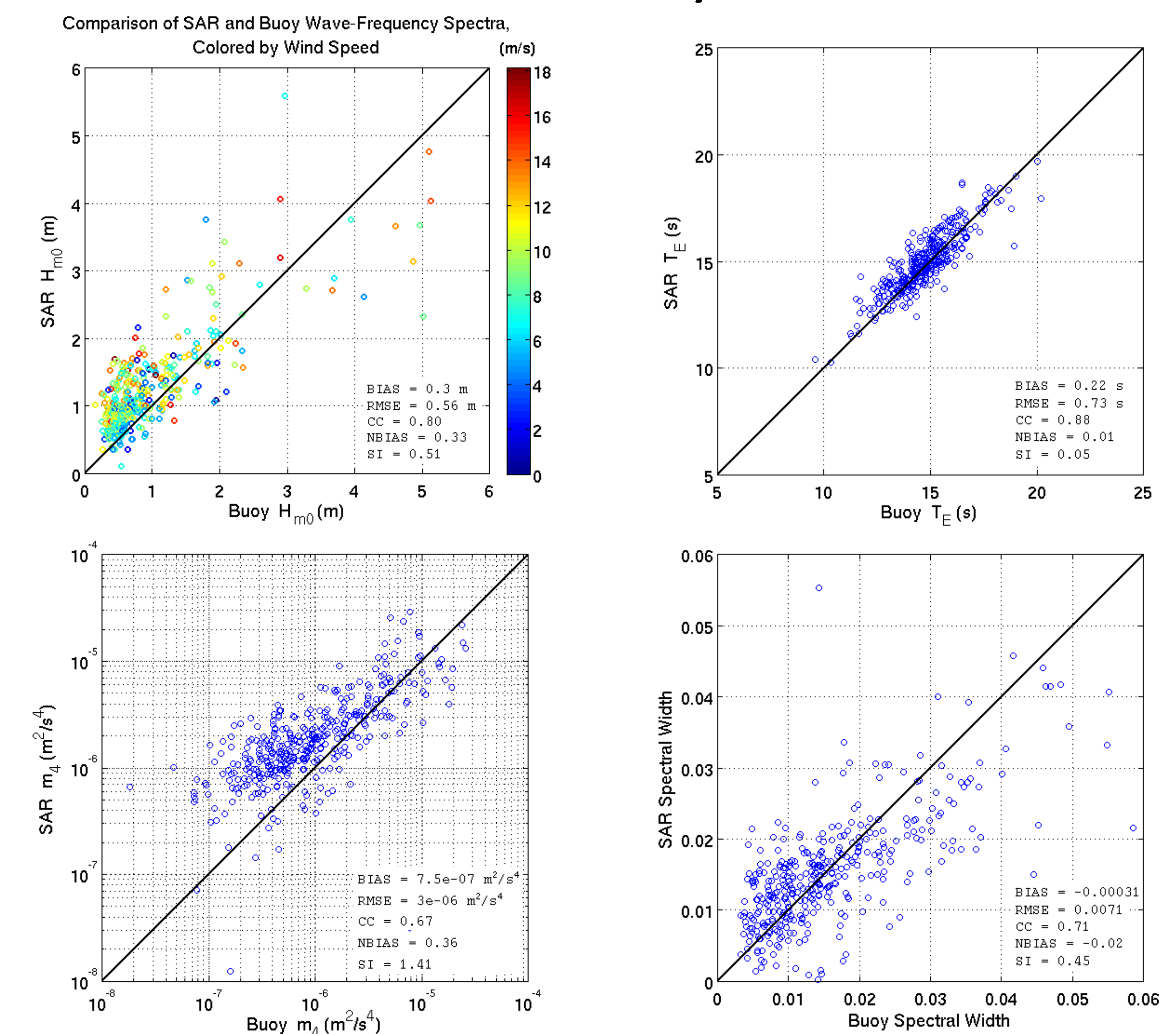
Partition Map of S-1 SAR Spectrum 27-Feb-2017 16:06:43 UTC



SAR Spectral Validation Routine (Including Quality Control Algorithm)



Bulk Parameter Comparisons SAR-Buoy



Bulk Parameter and Spectral Comparisons WW3-Buoy

