PID0 and Beyond SWOT Wind Retrieval Performance

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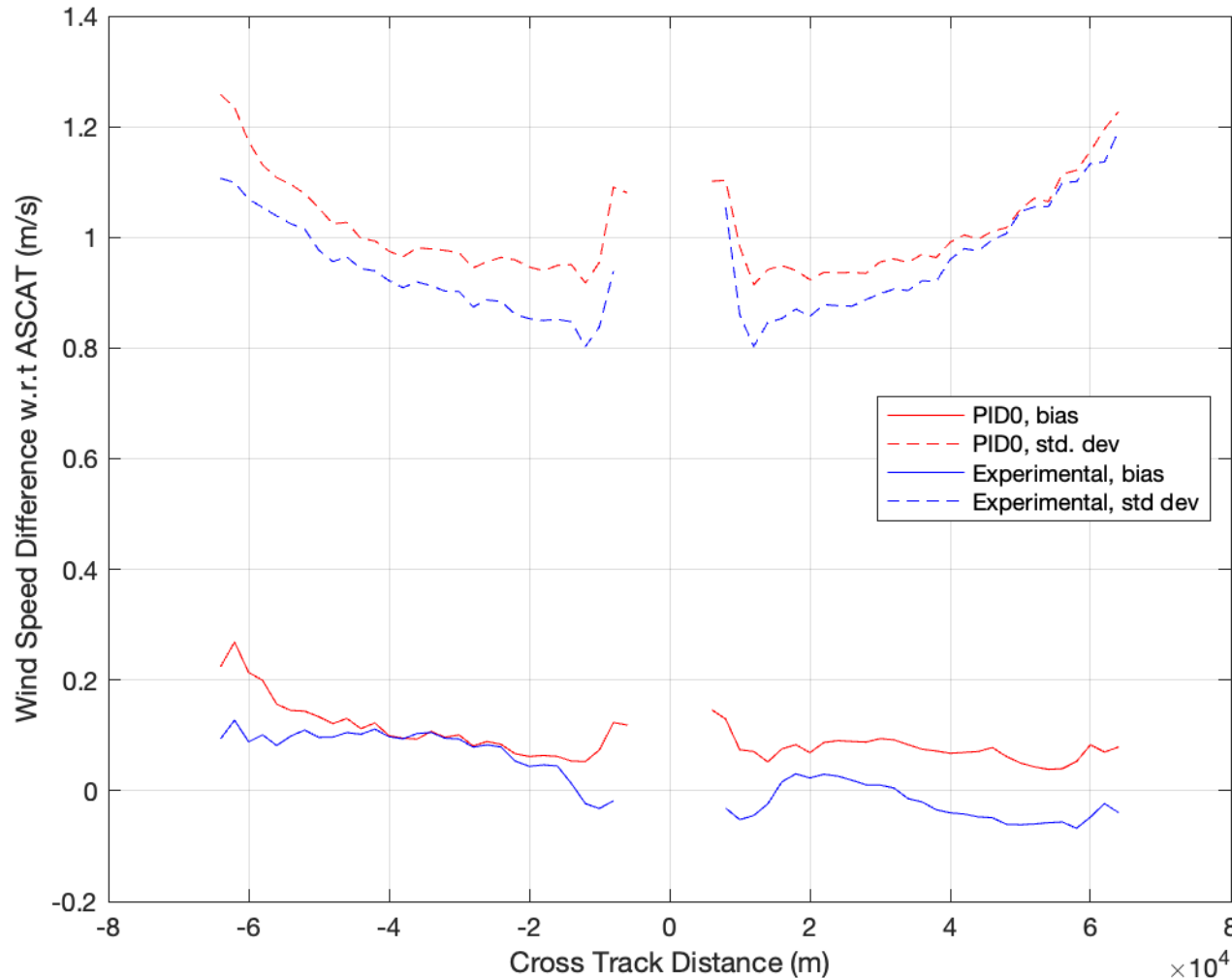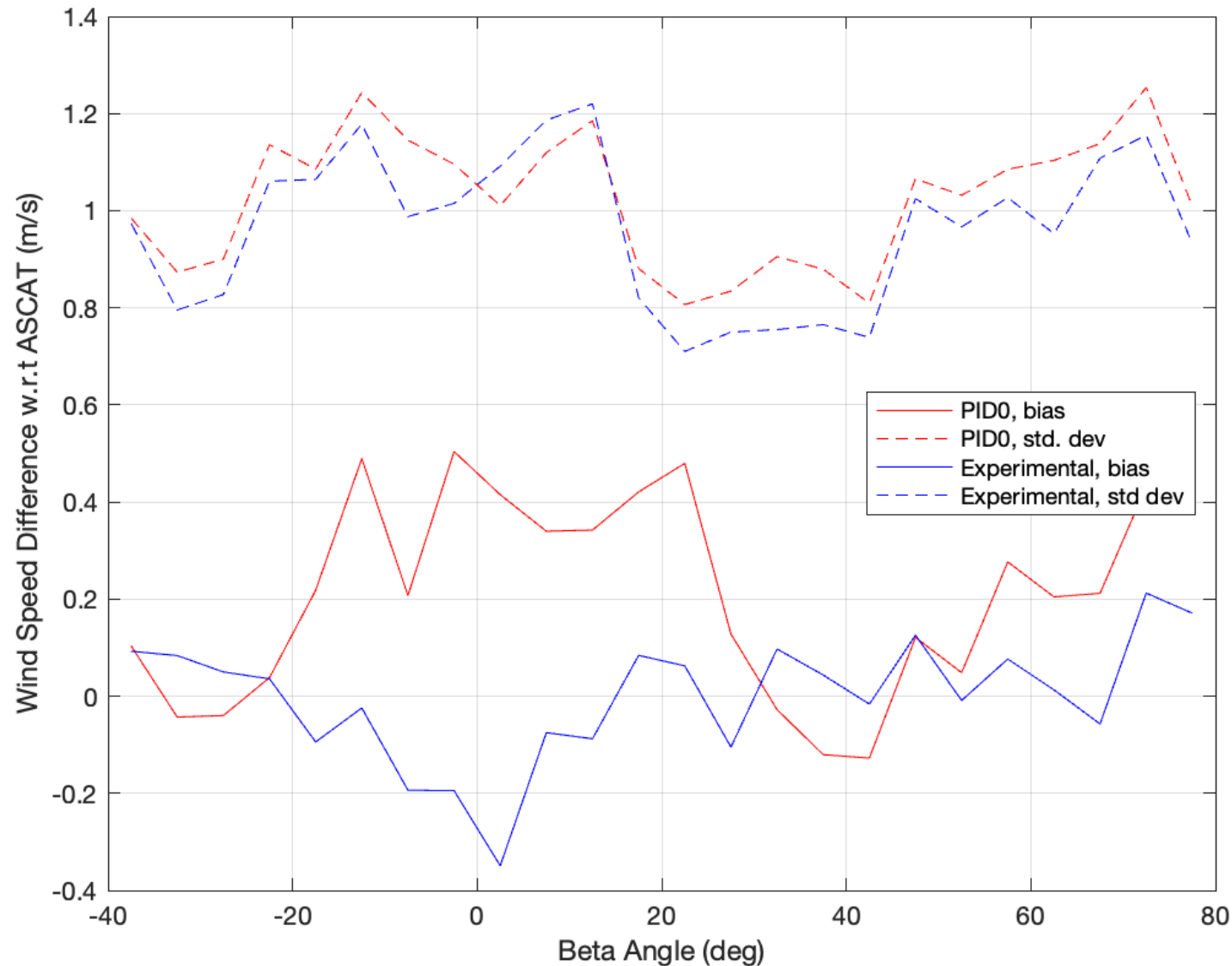
2025 SWOT Science Team Meeting

Overview

- Wind speed accuracy w.r.t to colocated ASCAT wind speed is presented for the PID0 SWOT retrieved winds (karin_wind_speed_2) as a function of
  - Cross track distance
  - Beta Angle
  - SST
  - Ice concentration (SWOT autonomous and model values)
- Wind speed accuracy is also presented for a different SWOT wind speed estimation planned for release later this year as part of NASA's Multisensor Worldwide Ocean Wind data product (Contact Bryan.W.Stiles@jpl.nasa.gov for details)
- Changes to wind retrieval from PID0 to MWOW version 0
  - Wind retrievals were corrected for SST and Beta angle variation.
  - Instead of using the model SWH value in the SWOT product as an input to wind retrieval, the volumetric correlation itself was used.
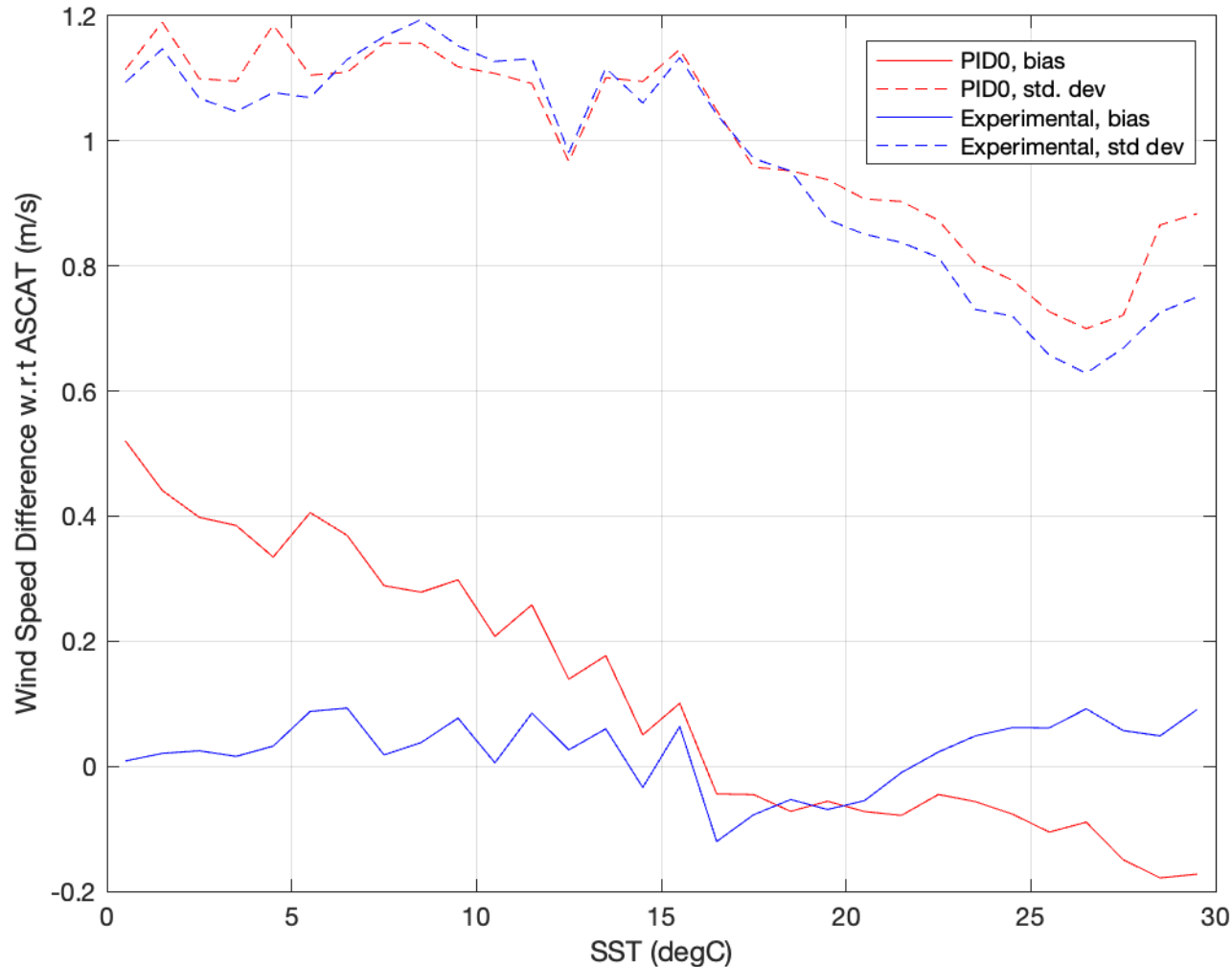
SWOT wind speed performance vs Cross Track

- The red "Experimental" curves are preliminary MWOW wind speed performance
- Unless otherwise stated, all data used to produce this figure and other slides in this presentation meet the following criteria
  - From granules (cycle and pass) that were not used to tune wind retrieval parameters.
  - Acquired between 6-May-2025 and 6-August 2025
  - Within 30 minutes of co-located ASCAT
  - Ice Concentration less than 1%.
  - ASCAT and SWOT data differ by less 10 m/s (>99.9% of data)
  - ASCAT wind speeds < 20 m/s.(99.75% of data)
- Both MWOW and SWOT PID0 data sets have standard deviation of ~ 1 m/s and biases les than 0.2 m/s.

SWOT wind speed performance vs beta angle
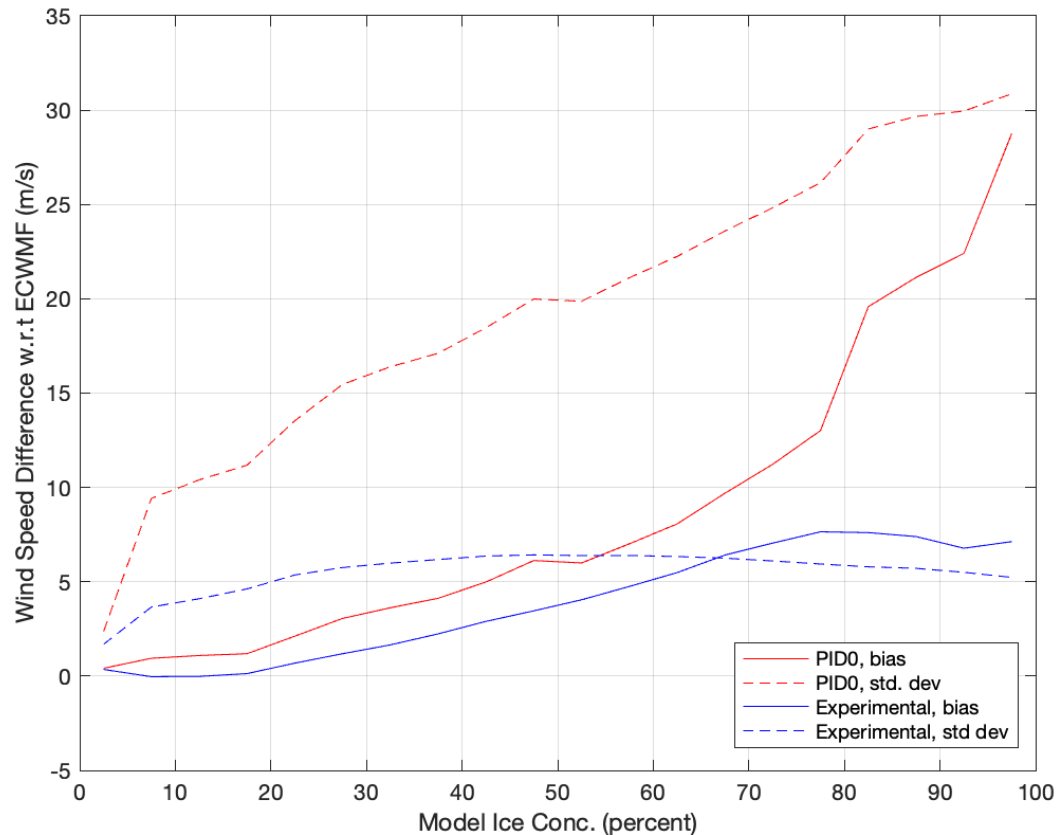
SWOT wind speed performance vs SST

- A wind speed bias as a function of SST is present in the SWOT PID0 data
- This bias is removed in the MWOW data because an external source of Sea Surface Temperature is used as an input to wind retrieval
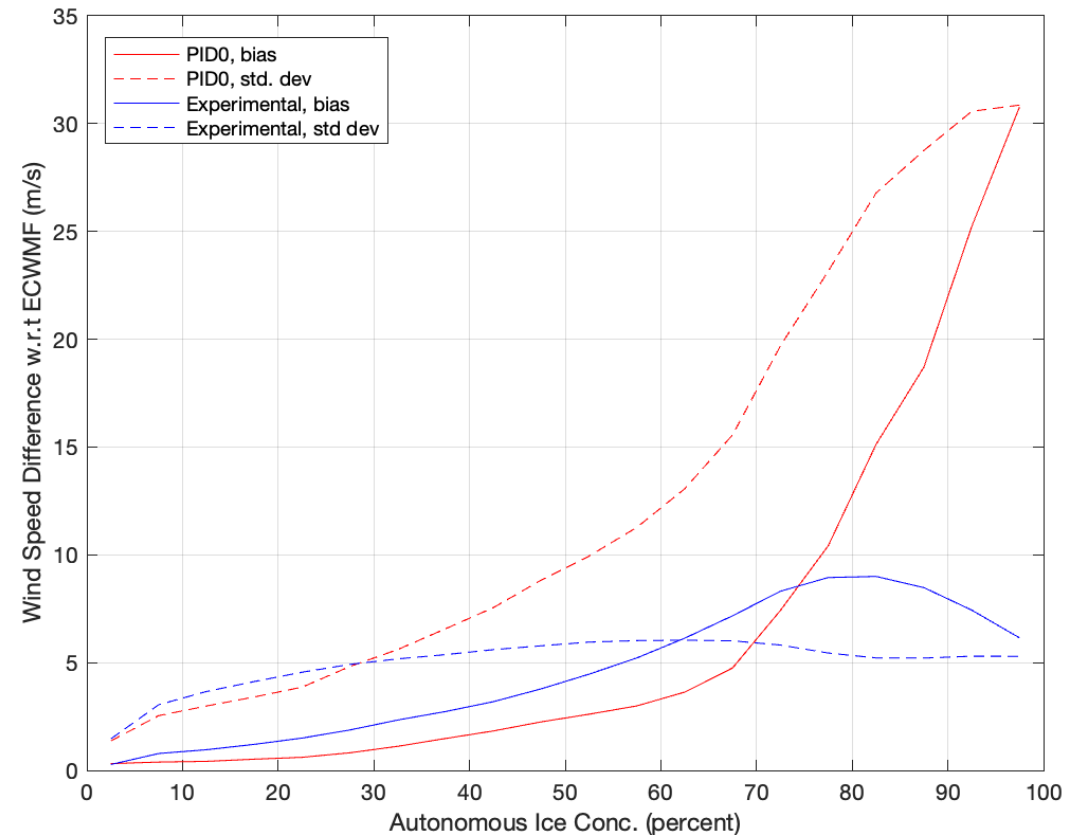
SWOT wind speed performance w.r.t ECWMF vs ice concentration

ECMWF is used for comparison instead of ASCAT because ASCAT wind data is not typically valid near sea ice.
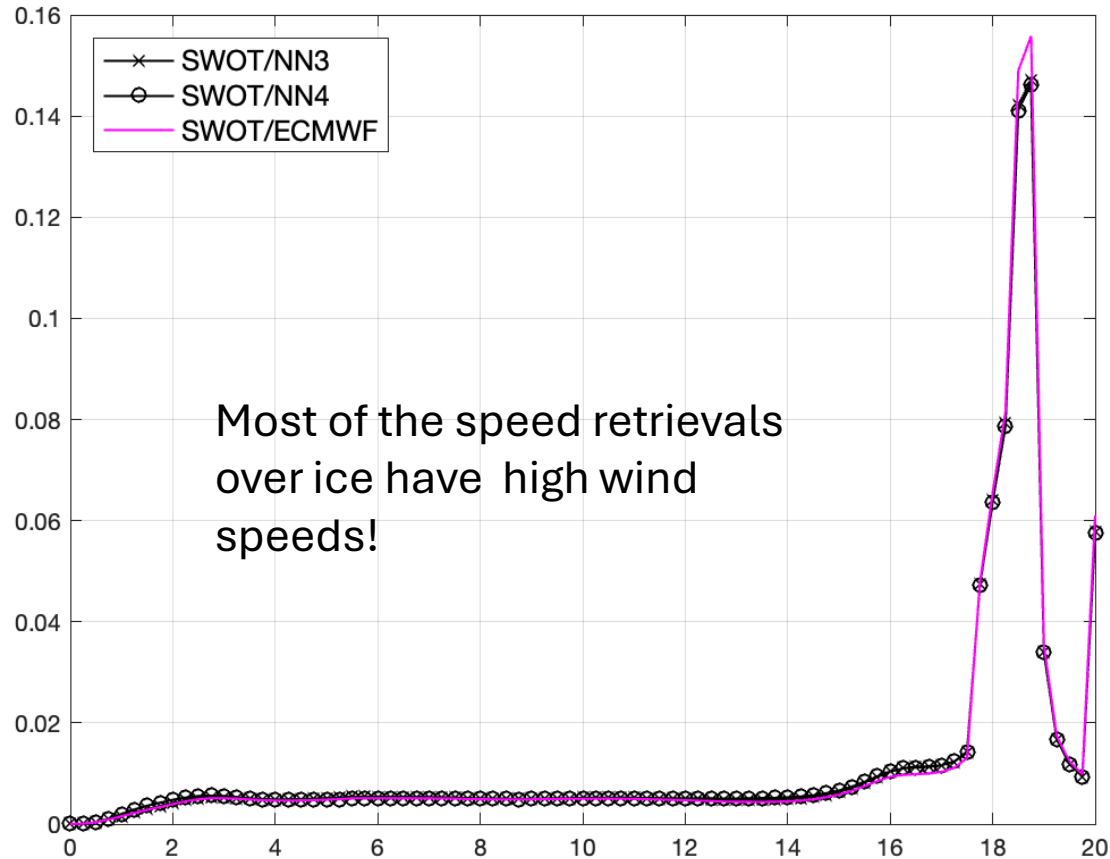

Model Ice Concentration in SWOT data files

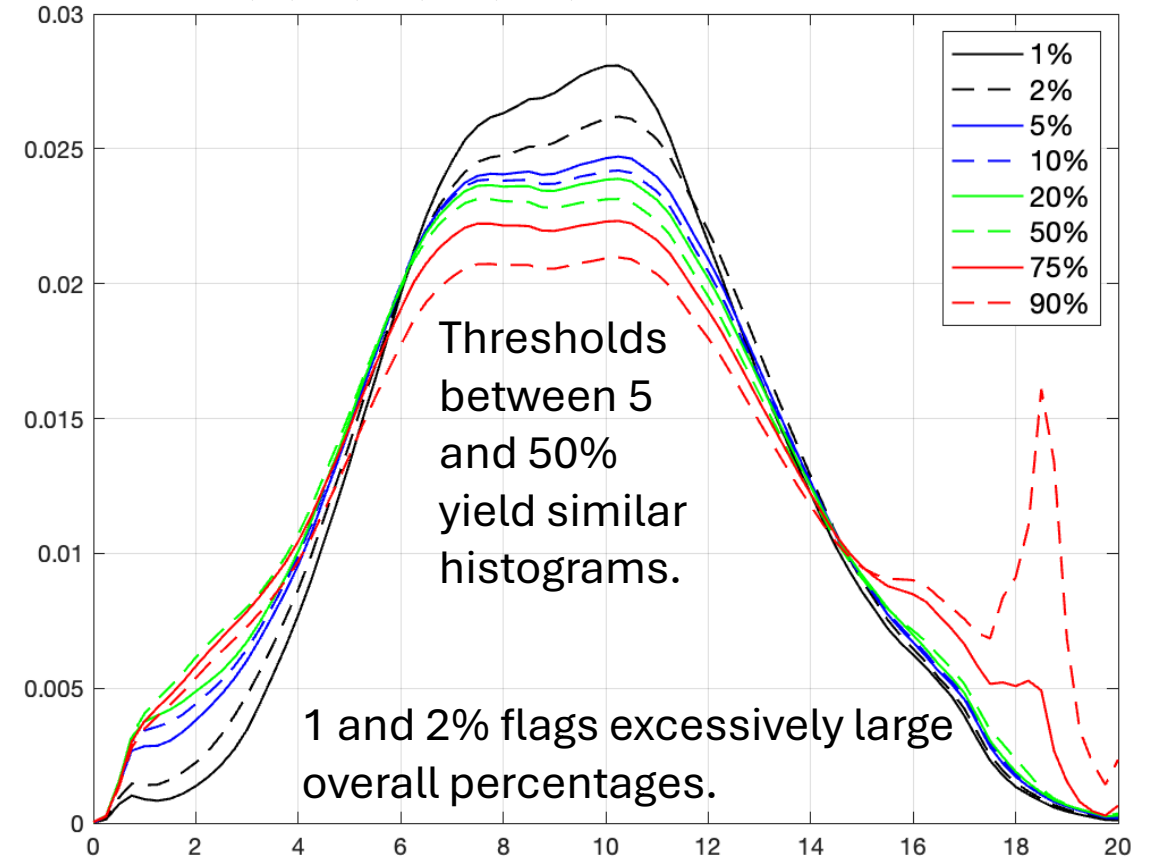Autonomous Ice Concentration used for QC by MWOW

Histogram of SWOT speeds for varying QC

SWOT speed histograms for NN3, NN4, and ECMWF ice concentration **greater** than 10%

Most of the speed retrievals over ice have high wind speeds!

SWOT speed histograms for ice NN3 ice concentration **less than** 1,5,10,20, 50, 75, and 90%

Thresholds between 5 and 50% yield similar histograms.

1 and 2% flags excessively large overall percentages.

Sponsor Acknowledgment