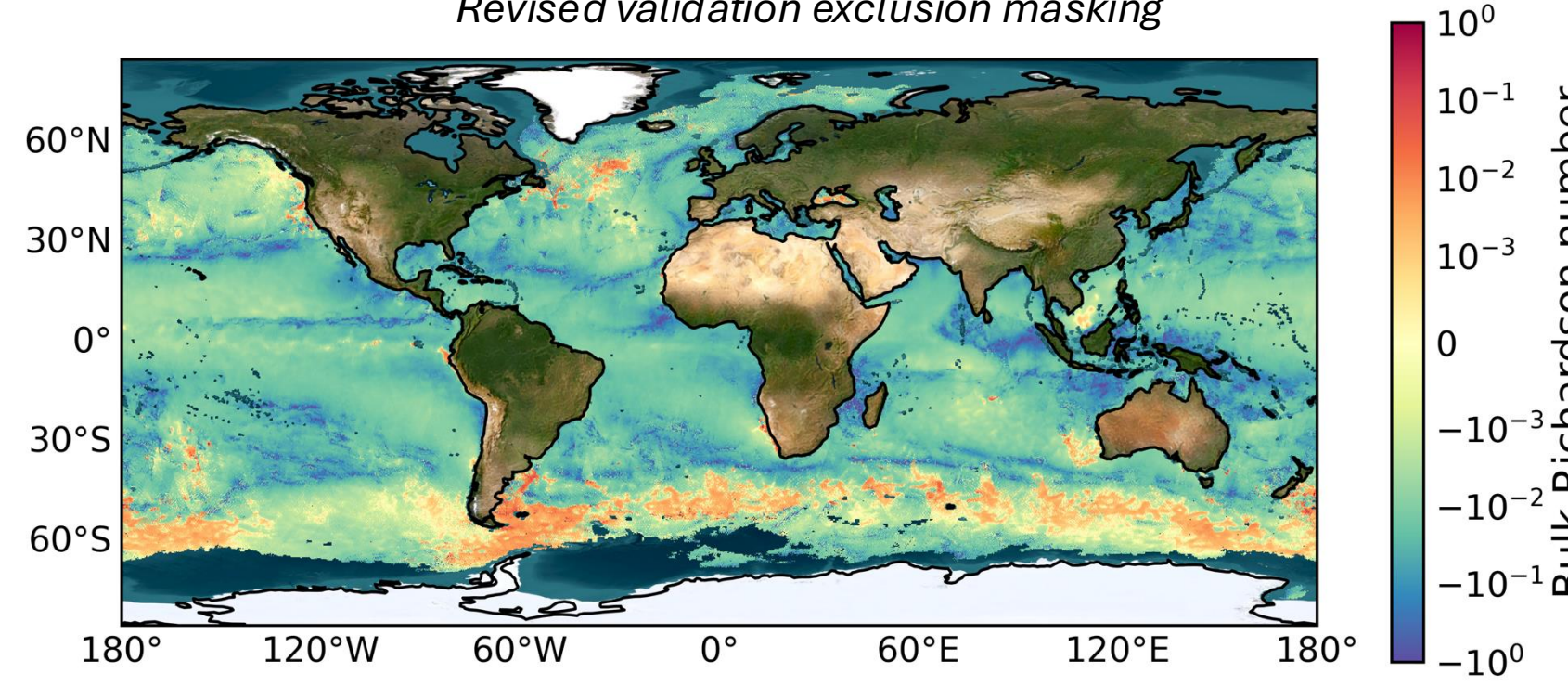
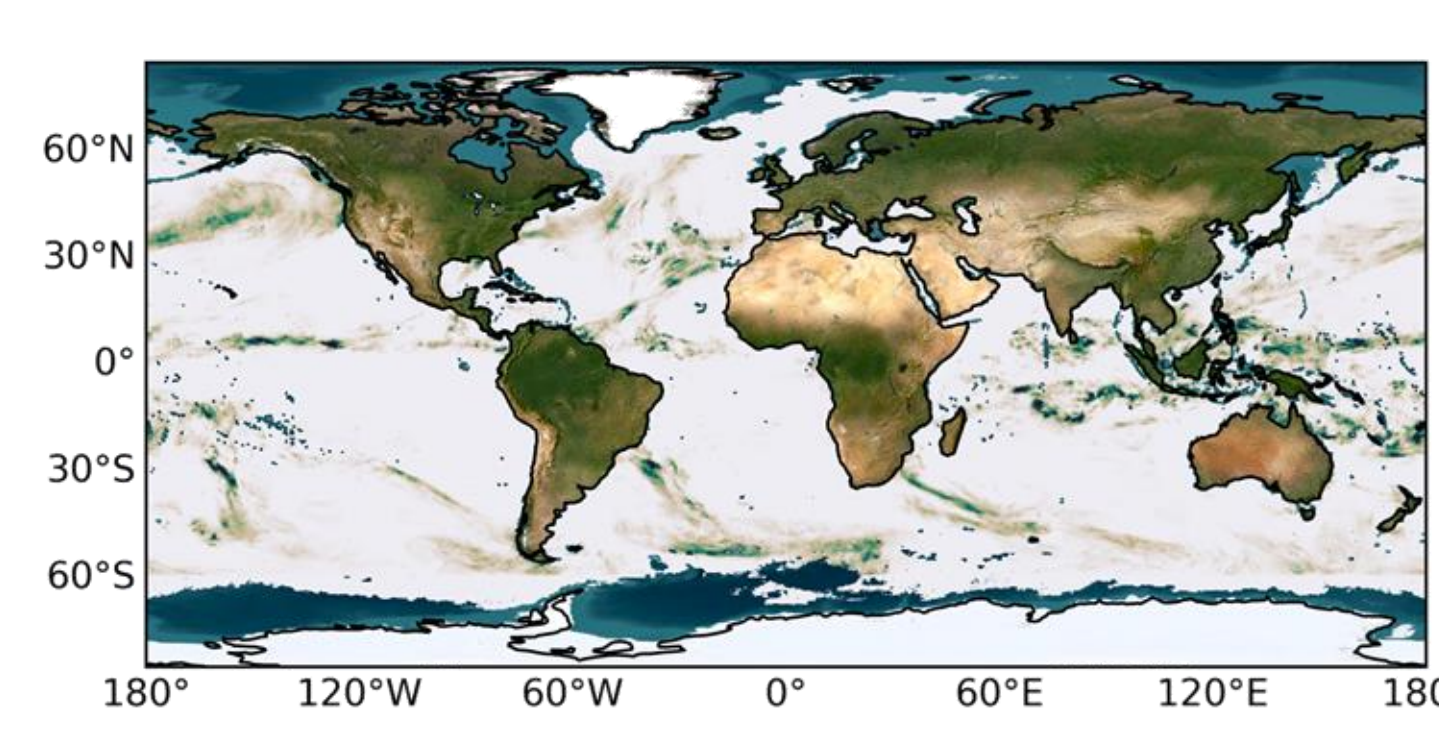
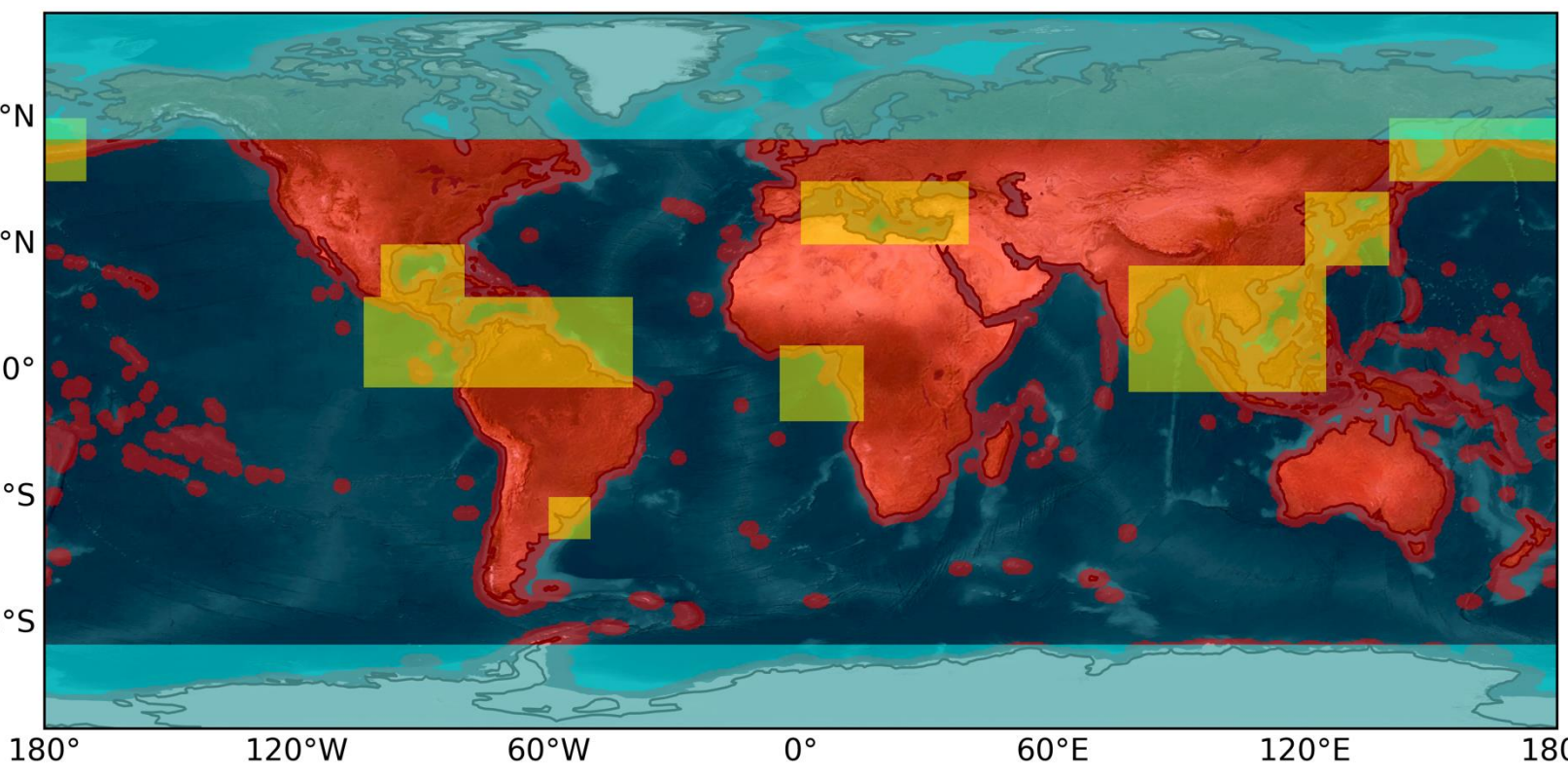


## SYNOPSIS

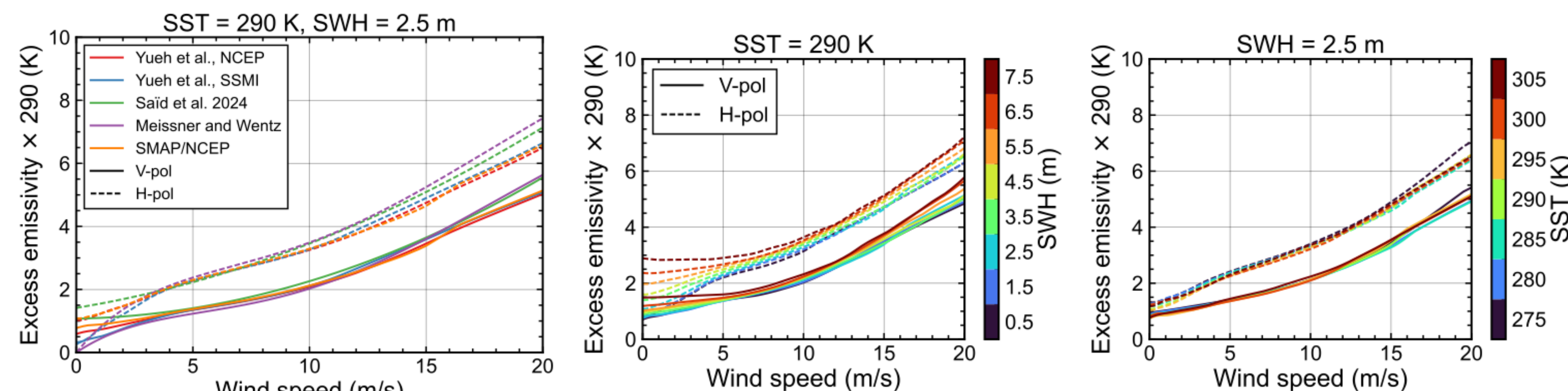
The JPL SMAP L2/L3 SSS/winds product currently employs the wind-roughened ocean L-band model function of Yueh et al. (2013, 2015). We revisit the isotropic component of this model using SMAP observations from 2016-2025. This model function will be applied to the upcoming version of the JPL product, and revised documentation/validation reporting is ongoing. We expect the revision will be available this summer.

## MATCHUP ANALYSIS

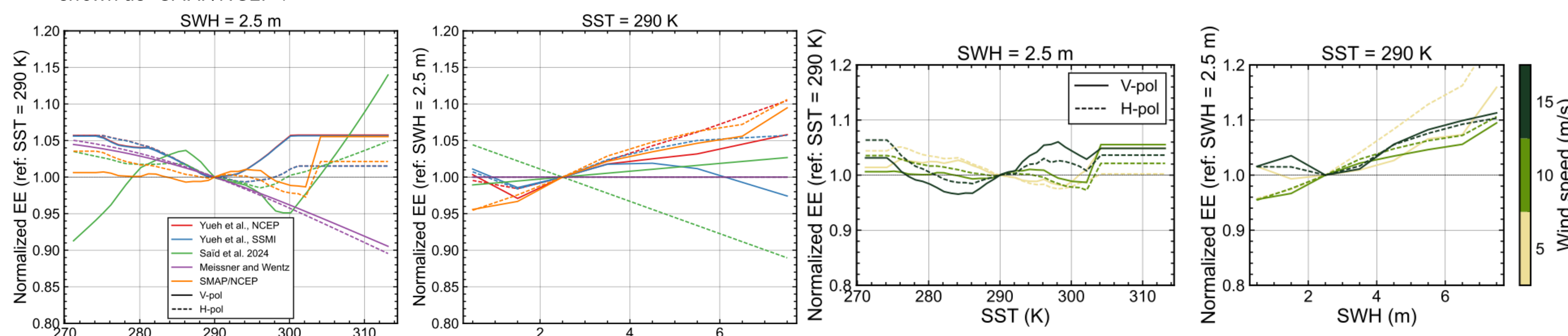
The data are matched against NCEP winds, NOAA/AVHRR SST, and HYCOM SSS, available as ancillary fields in the JPL product. Further matches are made with the Scripps gridded Argo product, CMORPH rain rate (via a rain impact model (Jacob et al. 2019)), and 2-m air temperature and relative humidity, which are used to compute the Bulk Richardson number. We use a revised validation exclusion mask, as well as filtering for L1/L2 quality flags, land/ice proximity, and solar incidence angle.



## EXCESS EMISSIVITY

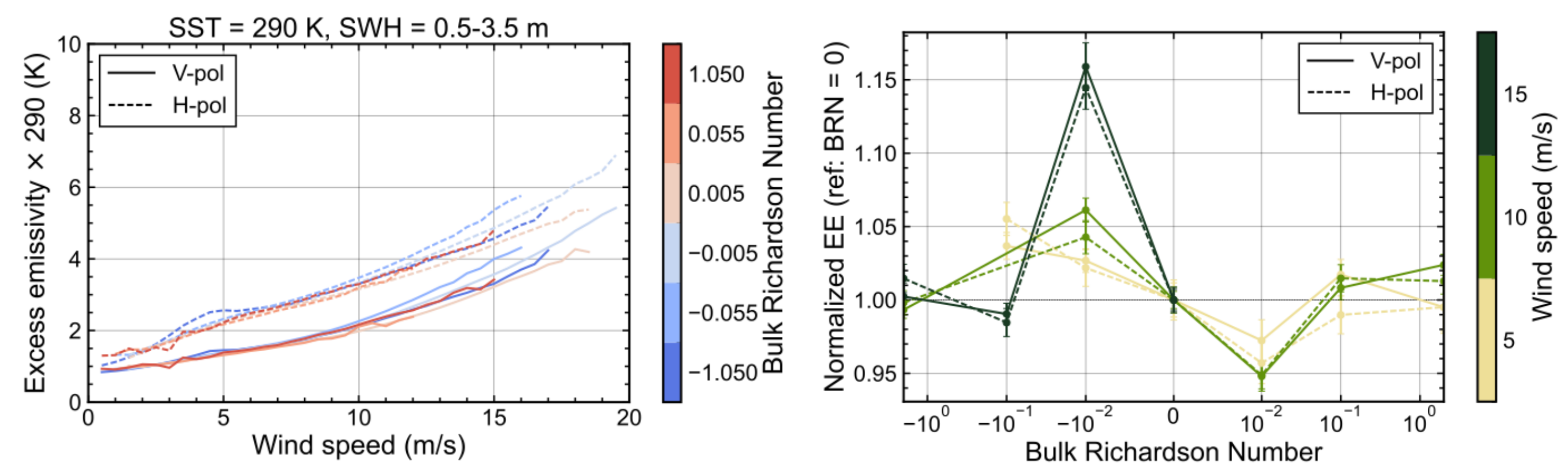


Comparison between different L band ocean model functions near 290 K. Our binned excess emissivity is shown as "SMAP/NCEP".  
Examples of the SST and SWH response of the binned excess emissivity. Swell-dominated seas lose sensitivity to wind speed (Yueh et al. 2015).



SST and SWH responses at 10 m/s for different L band ocean model functions and our binned excess emissivity, normalized to 290K/2.5m values  
SST and SWH responses for our binned excess emissivity, normalized to 290K/2.5m values and shown for different wind speeds.

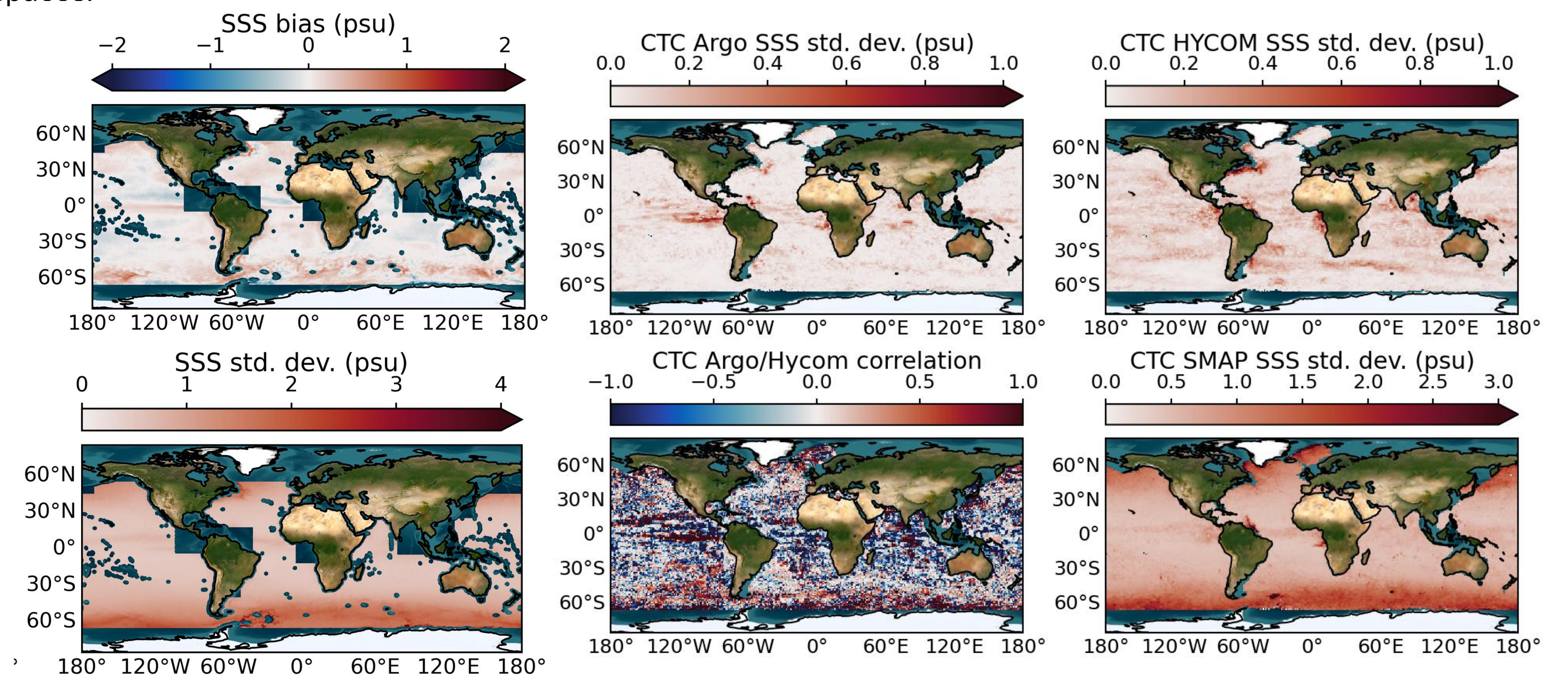
## PRELIMINARY STABILITY ANALYSIS



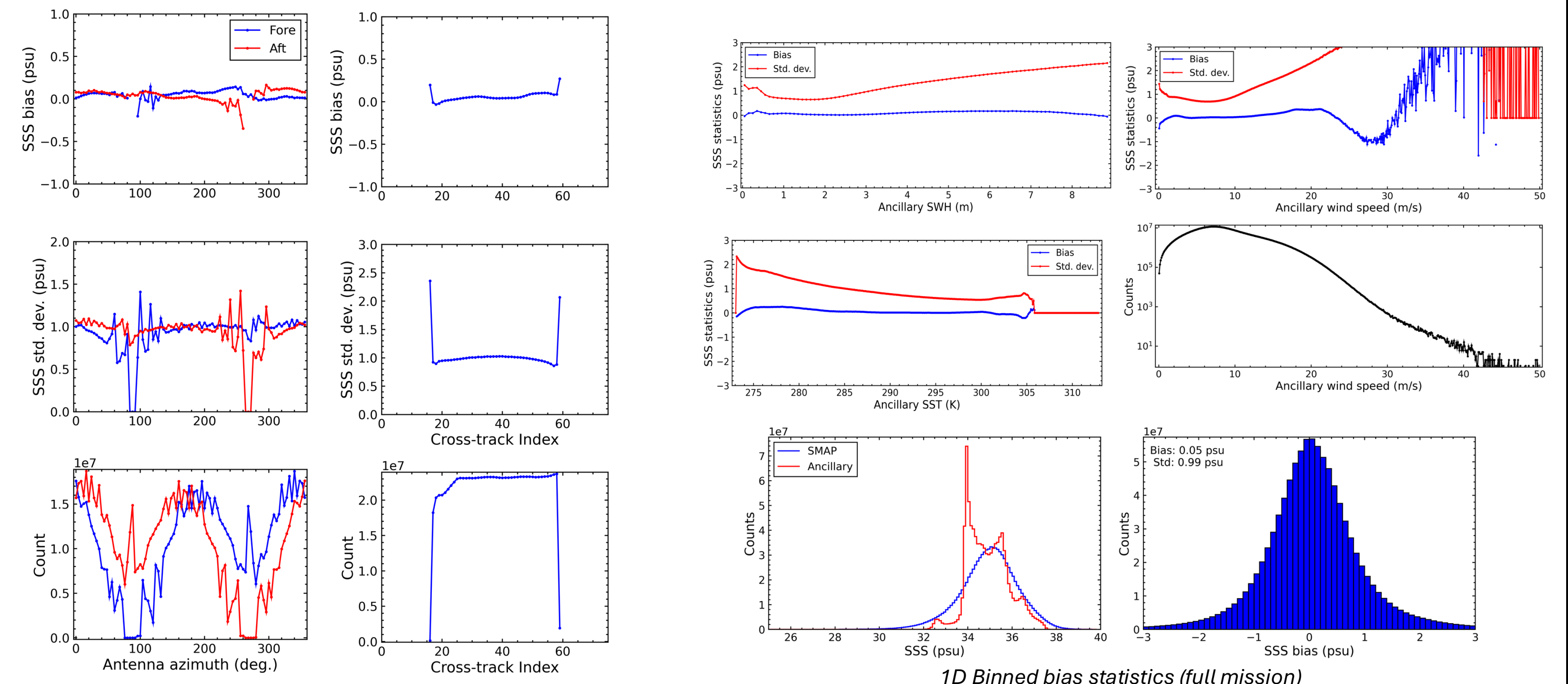
Excess emissivity vs. wind at different BRN values  
Excess emissivity vs. BRN at different wind speed

## PRODUCT AND VALIDATION REPORTING UPDATES

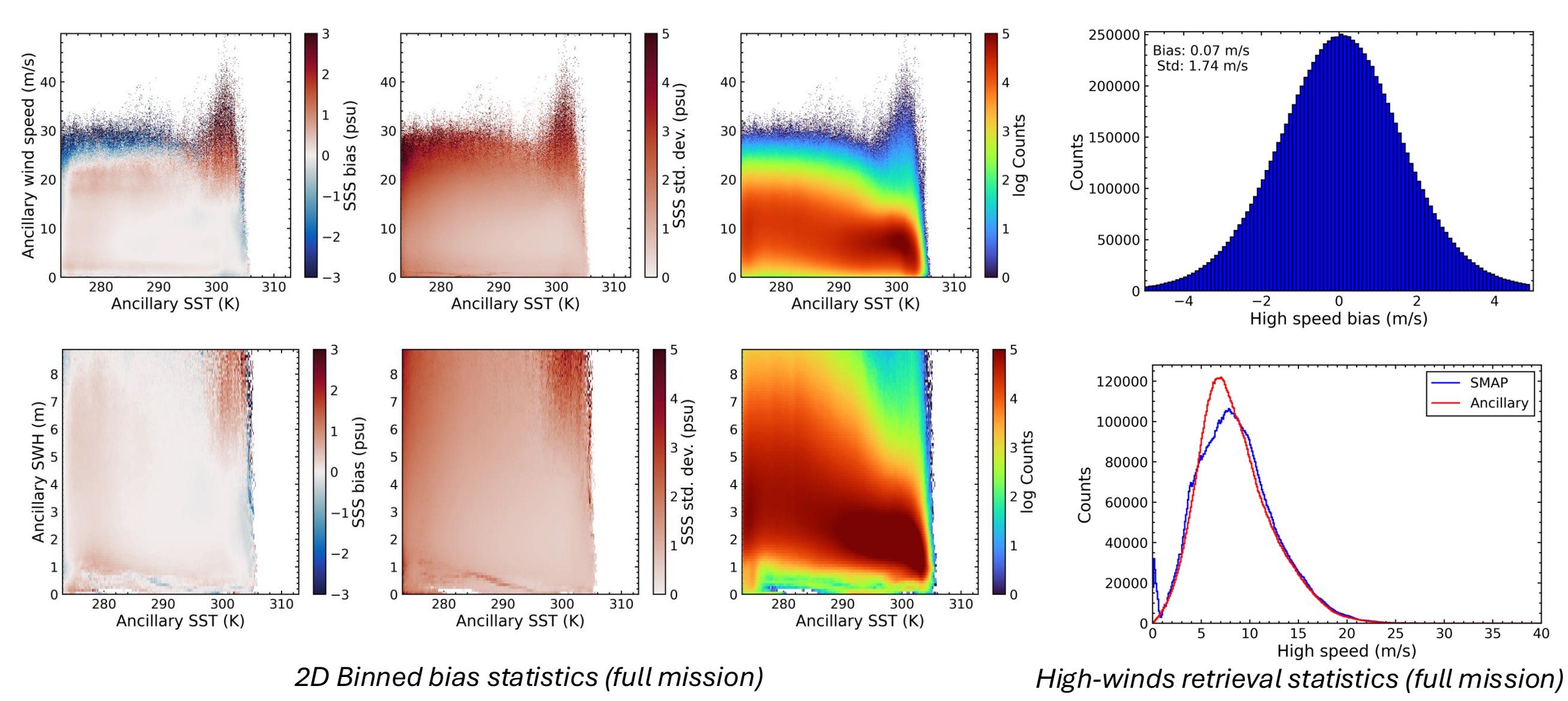
The main changes planned for the Version 6 release of the JPL SMAP L2/L3 SSS/winds product will include the use of new model functions derived from our binned excess emissivity analysis, further bias correction for the high winds product, addition of the rain impact ancillary parameter, and updates to flagging structure. Product validation information will be expanded to include monthly and annual bias/deviation assessments across different parameter spaces.



Bias and standard deviation of SMAP SSS relative to HYCOM salinity (2021)  
Correlated triple collocation analysis between HYCOM salinity, gridded Argo salinity, and SMAP



Azimuthal and cross-track bias statistics (full mission)  
1D Binned bias statistics (full mission)



2D Binned bias statistics (full mission)  
High-winds retrieval statistics (full mission)

## REFERENCES AND ACKNOWLEDGEMENTS

Jacob, M. M., et al. (2019). Salinity Rain Impact Model (RIM) for SMAP. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 12(6), 1679-1687  
 // Meissner, T., et al. (2014). The emission and scattering of L-band microwave radiation from rough ocean surfaces and wind speed measurements from the Aquarius sensor. *Journal of Geophysical Research: Oceans*, 119(9), 6499-6522.  
 // Said, F., et al. (2024). Exploring the Impact of Sea Surface Temperature and Salinity on SMAP Excess Surface Emissivity. *IEEE Transactions on Geoscience and Remote Sensing*, 62, 1-11.  
 // Yueh, S. H., et al. (2013). L-Band Passive and Active Microwave Geophysical Model Functions of Ocean Surface Winds and Applications to Aquarius Retrieval. *IEEE Transactions on Geoscience and Remote Sensing*, 51(9), 4619-4632.  
 // Yueh, S. H., et al. (2015). Impact of Ocean Wave Height on L-band Passive and Active Microwave Observation of Sea Surfaces. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 8(12), 5491-5499.  
 This project is supported by NASA and conducted at the Jet Propulsion Laboratory, California Institute of Technology