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Accurate and drift-free ancillary range corrections continue to be critical in ocean altimetry both for climate data record production and many scientific applications. One objective for this study is to help solidify the choice of optimal sea state bias (SSB) models for application to satellite altimeter data from the Topex/Poseidon mission forward. To support the objective, we first present a new and more rigorous examination of the common 2D SSB estimators created using direct averaging and collinear differencing techniques. Robust uncertainty estimates for the direct-averaging model approach and derived models will be addressed to illustrate the accuracy of this method. It is shown that one can observe statistically significant agreement between wind and SWH dependencies in Ku-band SSB models for the T/P and Jason missions, indicating a self-consistent electromagnetic bias component across platforms within the overall SSB correction. We also investigate some apparent smoothing within the operational collinear SSB solutions that are likely due to data sampling limitations in data sparse portions of the two-dimensional domain used to develop these models. First assessments from SARAL/AltiKa data analyses will also be presented to compare and contrast Ku- vs. Ka-band SSB models as derived using summer 2013 AltiKa and Jason-2 datasets.
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