A Reference Ocean Surface Emission and Backscatter Model from Microwaves to Infrared

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Abstract— Satellite observations are vital for the initialization of Numerical Weather Prediction models, and very important for climate monitoring and prediction, as well as other applications such as hydrology and flood awareness prediction. Knowledge of radiative contributions from the Earth's surface is needed to sound the lower troposphere from space. The lack of a reference quality ocean emission and backscatter model is a major gap in our ability to provide absolute calibration of the satellite based observing system. Uncertainty in emissivity models is not well characterized and different models are used for different spectral bands, for active and passive instruments. An International Space Science Institute (ISSI) team was put together [4] to address these issues. The objectives of the team are to provide a reference model as a community software (i.e., documented and freely available code), that is maintained and supported, has traceable uncertainty estimations, and that enables new science from microwaves to infrared with bidirectional reflectance distribution function (BRDF) capability.

We will present the model and its various components, discussing the choices between various parameterizations, building on the LOCEAN model of [2]. The model predictions will be evaluated at various frequencies, including comparisons to radiometric observations by SMAP, AMSR2 and GMI (e.g., [5]). We will discuss early model evaluation in the infrared and for active microwave sensors. Areas of ongoing research include improving the foam parametrization (coverage and emissivity) to provide consistent performances across frequencies, building on [1], and the azimuthal dependence of the active and passive signals. The model will be used to generate training data for fast models e.g., Fastem, [3], that are used in operational data assimilation and climate re-analysis.

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