NASA Project: High fidelity modeling of parasitic capillary wave dynamics for remote sensing
Jiarong Wu, and Luc Deike, Stephane Popinet (Sorbonne University), Bertrand Chapron (Ifremer),
Ernesto Rodriguez (NASA-JPL), Tom Farrar (WHOI)

Scope and approach: high fidelity modeling of small scale surface waves coupled with atmospheric and oceanic turbulent boundary layers

Direct numerical simulations of wind-wave-current coupling; including breaking and parasitic capillary waves

Multi-layer modeling for wave dynamics coupled with upper ocean, including breaking waves

Example of broad banded breaking wave field (Wu, Popinet and Deike 2023)

Spatial wave spectrum

Space time wave spectrum

Breaking wave length of breaking crest distribution, compared to field data and proposed scaling based on the mean square slope

Upper ocean turbulence profile below the breaking waves compared to field observations