Supplemental material

An example of fitting $E(k_r, \theta)$ at a given $k_r$ with the Gaussian distribution is shown in Figure 2(a), where $\theta$ is measured counterclockwise from the positive range-axis in the range-azimuth domain. The directional ambiguity inherent in the SAR retrievals is removed with the aid of the in-situ observed wave direction (Thomson et al., 2018).

Figure S1. Demonstration of fitting the main wave direction $\theta_{k_r}$ for $k_r = 0.025m^{-1}$ by a Gaussian distribution.

Figure S2. Scatter plots of calibrated $G, \nu$ of the WS model after filtered outliers discussed in section 4.3.
Figure S3. Scatter plots of calibrated $G$, $\nu$ of the FS model.

Figure S4. Similar as Figure 6 for the FS model.

Figure S5. Similar as Figure 7 for the FS model.