

Impacts of wave spreading and multidirectional waves on estimating Stokes drift

*Adrean Webb¹, Baylor Fox-Kemper²

1.The University of Tokyo, Dept. of Ocean Technology, Policy, and Environment, Kashiwa, Chiba, Japan, 2.Brown University, Dept. of Earth, Environmental, and Planetary Sciences, Providence, RI, USA

The Stokes drift velocity is an important quantity in categorizing the effects of ocean surface gravity waves and is increasingly used in models to parametrize wave-driven mixing or calculate sea surface transport. However, it is often overlooked that Stokes drift for a random sea is not easily generated from wind and wave data and large differences exist even between 1D and 2D spectral approximations. It is important to rectify these differences in order to compare model results and improve understanding.

Here, it will be shown that differences in Stokes drift magnitude and direction depend mainly on the interaction of different wave groups and the process of wave spreading. To illustrate, we will review various Stokes drift approximations and introduce a new 1D spectral approximation to include the systematic effects of wave spreading. This new approximation will be used with observational and global model data (buoy located at Ocean Weather Station P and WAVEWATCH III output respectively) to separate and quantify wave spreading and multidirectional wave effects on Stokes drift.

Keywords: Stokes drift, unidirectional waves, wave spreading