A glider flight model for ocean microstructure gliders

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Abstract (Oral Presentation)

The turbulent dissipation rate **ε** is a key parameter to many oceanographic processes. Recently gliders have been increasingly used as a carrier for microstructure sensors. Compared to conventional ship-based methods, gliderbased microstructure observations allow for long duration measurements under adverse weather conditions, and at lower costs.

To calculate the dissipation rate the incident water velocity U is one of the required input parameters. Since U can not be measured using the standard glider sensor setup, the parameter is normally computed from a steady-state glider flight model. As **ε** scales with U^2 or U^4 , depending whether it is computed from temperature or shear microstructure, flight model errors can introduce a significant bias. This study uses measurements of in-situ glider flight, obtained with a profiling Doppler velocity log and an electromagnetic current meter, to test and calibrate a flight model, which was extended to include inertial terms. Compared to a previously suggested flight model, the calibrated model removes a bias of approximately 1 cm s^{-1} in the incident water velocity, which translates to roughly a factor of 1.2 in estimates of the dissipation rate. The results further indicate that 90% of the estimates of the dissipation rate from the calibrated model are within a factor of 1.1 and 1.2 for measurements derived from microstructure temperature sensors and shear probes, respectively. We further outline how the glider flight model can improve reconstructed velocity profiles from measurements of a glider-borne profiling Doppler velocity log.