



## **Solitary Rossby waves in the ocean**

R. A. de Szoeke, **R. M. Samelson**, and D. B. Chelton  
COAS, Oregon State University, USA (rsamelson@coas.oregonstate.edu)

Altimeter observations that show a tendency for nondispersive propagation of sea-surface disturbances in energetic midlatitude and tropical regions, motivate an examination of weakly nonlinear theory for long Rossby waves. Scaling analysis suggests a balance between nonlinearity and dispersion, which leads to KdV-type equations through extensions to standard quasi-geostrophic theory. These equations have solitary wave solutions. Fourier transforms of random wave-trains of solitary waves are computed. Ensemble-averaged power spectra of these transformed solutions are analyzed for their frequency-wavenumber characteristics. The spectra are qualitatively and quantitatively similar to observed altimeter spectra in the high-wavenumber regions, and show the same nondispersive structure as the observations. Extensions of the weakly nonlinear theory to include background shear and to two-dimensional disturbances are discussed.