Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Langmuir circulation in shallow water waves W.R.C. PHILLIPS, Swinburne Univ of Tech, ALBERT DAI, National Taiwan University — The instability of shallow water waves on a moderate shear to Langmuir circulation (LC) is considered. In such instances the shear can significantly affect the drift giving rise to profiles markedly different from the simple Stokes drift. Since drift and shear are instrumental in the instability to LC, of key interest is how that variation in turn affects onset to LC. The initial value problem describing the wave-mean flow interaction is crafted from scratch and includes a consistent set of free-surface boundary conditions. The problem necessitates that Navier Stokes be employed side by side with a set of mean-field equations; these are seen to reduce to the well known CL-equations, albeit with different time and velocity scales. Typical shear driven and pressure driven flows are considered. Shear driven flow is found to be destabilizing while pressure driven are stabilizing to LC. It is further found that multiple layers, as opposed to a single layer, of LC can form, with the most intense circulations at the ocean floor. LC can also extend into a region of flow beyond which instability applies thus deepening the mixed layer. Two preferred spacings occur, one closely in accord with observation for small aspect ratio LC.

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Date submitted: 27 Jul 2014 Electronic form version 1.4