

Abstract Submitted  
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**Pseudo Volume-filling Sampling (PVS) via Bouyancy Control in Ocean Systems** ROBERT KROHN, THOMAS BEWLEY, University of California, San Diego — This project address sensing methods for modeling and prediction in structured ocean current flow applications. Well distributed measurements of important flow quantities such as the local fluid velocity, temperature, and pressure are scientifically valuable. Such measurements can be obtained from very simple sensor systems. The challenge is to distribute the sensors uniformly over the volumes of interest. Using a fleet of sensor-equipped free-drifting floats, such as those currently used in the Argo project, uncoordinated distribution has been well documented. The sensor systems are grossly underactuated, and are only capable of controlling their vertical motion, making coordinated distribution difficult. Given that an accurate estimate of the background velocity field is available, however, it is possible to “fly” each individual sensor system, much as a recreational balloonist can direct a balloon fairly accurately by exploiting known velocity shear within the atmosphere. The present work addresses how a network of such underactuated vehicles can be distributed uniformly over the domain of interest using variations in local flow velocities, with both global model predictive control (MPC) algorithms regulated centrally and, in certain well-defined subproblems, simple LQG algorithms implemented locally.

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