Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

Numerical simulations of aquaculture dissolved waste transport in a coastal embayment[1] SUBHAS VENAYAGAMOORTHY, Colorado State University, OLIVER FRINGER, JEFFREY KOSEFF, ROSAMOND NAYLOR, Stanford University — The present study focuses on understanding the transport and fate of dissolved wastes from aquaculture pens in near-coastal environments using the hydrodynamics code SUNTANS (Stanford Unstructured Nonhydrostatic Terrain-following Adaptive Navier- Stokes Simulator), which employs unstructured grids to compute flows in the coastal ocean at very high resolution. Simulations of a pollutant concentration field (in time and space) as a function of the local environment (bathymetry, rotation), flow conditions (tides, wind-induced currents and wind stress), and the location of the pens were performed to study their effects on the evolution of the waste plume. The presence of the fish farm pens causes partial blockage of the flow, leading to the deceleration of the approaching flow and formation of downstream wakes. Results of both the near-field area (area within 10 to 20 pen diameters of the fish-pen site) as well as far-field behavior of the pollutant field are presented. These results highlight for the first time the importance of the wake vortex dynamics on the evolution of the near-field plume as well as the rotation of the earth on the far-field plume. The results provide an understanding of the impact of aquaculture fish-pens on coastal water quality.

[1]This work was supported by Lenfest Ocean Program

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Date submitted: 02 Aug 2008 Electronic form version 1.4