Geophysical Research Abstracts
Vol. 14, EGU2012-13333-1, 2012
EGU General Assembly 2012

A Biochemical Upper Ocean State Estimate in the Southern Ocean GasEX Region

S. Dwivedi (1), T. W. N. Haine (2), and C. E. Del Castillo (3)

(1) Department of Atmospheric and Ocean Sciences, University of Allahabad, Allahabad, India, (2) Johns Hopkins University, Earth and Planetary Sciences, Baltimore, MD, United States (Thomas.Haine@jhu.edu), (3) Ocean Remote Sensing Group, Johns Hopkins University Applied Physics Laboratory, Laurel, MD, United States

The processes controlling colored dissolved organic matter (CDOM) in the upper ocean are uncertain, specifically, the importance of advection, photodegradation, thermocline entrainment and in-situ biological sources. This issue is addressed using a biochemical/physical state estimate in the Southern Ocean Gas Exchange Experiment (SO GasEx) region. A high-resolution ocean general circulation model with realistic physics simulates the SO GasEx cruise near South Georgia in March 2008. The state estimate uses in-situ CDOM, temperature, salinity, and deliberately-released sulfur hexafluoride measurements, and remote-sensed CDOM, sea level anomaly, and sea surface temperature measurements. The method of Lagrange multipliers is used to find the initial conditions that generate the time-evolving biochemical and physical fields that fit the observations best. Photo-degradation of CDOM is included explicitly, but biological sources of CDOM are not. The state estimate accurately fits the data, implying that the biological CDOM sources and sinks are indistinguishable from zero. Lateral advection is very important for the mixed-layer CDOM, however. Both photo-degradation and thermocline entrainment are moderately important and decrease mixed-layer CDOM with timescales of 2-4 weeks, averaged over the region.