Global Assessment of Carbon Export Using Satellite Observations: New Approaches and Plans for the Future

Professor David Siegel

Abstract:
The biological carbon pump is thought to export anywhere from 4 to >12 Peta (10^15) gC each year from the surface ocean depth in the form of settling organic particles, and its functioning is crucial for the global carbon cycle. Assessments of the global export flux have either been through the empirical extrapolation of point measurements to global scales or the results of ocean system model experimentation. Satellites resolve relevant space and time scales, providing guidance to the empirical extrapolation problem, but they do not quantify directly carbon export. Here, I introduce a mechanistic approach for assessing global carbon export by synthesizing modeling approaches with satellite observations. The resulting export flux model does an excellent job of reproducing regional export flux observations, and it reproduces the basic patterns of export both spatially and seasonally. The talk concludes by introducing an on-going planning project for a major NASA field campaign on the quantification of the biological pump from satellite observations.

Bio:
Professor David Siegel received a B.A. in Chemistry and a B.S. in Engineering Sciences from the University of California, San Diego and M.S. and Ph.D. degrees in Geological Sciences from the University of Southern California. In 1989, he was a postdoctoral fellow at the Woods Hole Oceanographic Institution. Since 1990, he has been on the faculty at University of California, Santa Barbara and is a Professor in the Department of Geography and Director of the Earth Research Institute. Professor Siegel is a fellow of the American Geophysical Union and the American Association for the Advancement of Science.
Professor Siegel’s research focuses on marine ecosystems and their functioning, using the tools of an applied physicist: radiative transfer and fluid mechanics. His work specifically addresses the coupling of marine ecosystems and physical oceanographic processes by using circulation models, marine bio-optics, and satellite ocean color remote sensing. Using these tools, he has worked on a wide suite of problems, ranging from microbial and population diversity, open ocean biogeochemical cycling, and ocean bio-optics to kelp forest metapopulation dynamics, marine larval transport, and fisheries management.