ON THE COUPLING OF HYPERSPECTRAL OPTICS TO ECOLOGICAL MODELS: IOP'S, AOP'S, AND CHROMATIC ADAPTATION

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ABSTRACT

Predicting inherent and apparent optical properties requires coupling an optical model of light propagation through the water column, to a marine ecological model of the optically-active water column constituents. Such a simulation must replicate the dynamic response functions of the phytoplankton community, as well as the response functions of other optically-active constituents, e.g., detritus, colored dissolved organic matter, etc., to environmental forcing in order to resolve and predict the *in situ* light field and water leaving radiance. Here we describe the formulation and results of Ecological Simulation (EcoSim) 1.0. EcoSim 1.0 couples a hyperspectral optical model of IOP's and AOP's to an ecosystem model that includes the optically-active constituents of multiple phytoplankton functional groups and colored degradational matter in the Sargasso Sea. Results demonstrate the efficacy of coupling hyperspectral optics to an ecosystem simulation. In addition to replicating the response functions of the optically-active constituents, it is clear that resolving the environmental forcing, i.e., light, mixing, advection, etc., is also paramount to the goal of IOP and AOP prediction. Thus, we also describe the application of EcoSim to coastal projects in the Mid-Atlantic Bight, West Florida Shelf, and the California Current System.