**REMOTE SENSING OF SEAGRASS ENVIRONMENTS USING A CANOPY MODEL AND UNCERTAINTY PROPAGATION**

John Hedley1, Heidi Dierssen2, Brandon Russell3

Seagrass meadows are important components of the coastal zone, playing key roles in preservation of biodiversity, coastal stabilisation and blue carbon budgets. Remote sensing of the meadows themselves, and associated water column processes such as terrigenous inputs or the consequences of eutrophication, requires an understanding of the optical properties of these systems and associated uncertainties. The reflectance of a seagrass meadow measured by a satellite or airborne sensor is the result of a complex interaction of the overlying water column and the canopy bi-directional reflectance distribution function (BRDF) - itself a result of canopy structure and position, and leaf and sediment optical properties.

We have used a 3-dimensonal radiative transfer model to produce a simplified physics-based parameterised model for canopy reflectance, dependent on canopy density (leaf area index) and other factors. In particular we have quantified the uncertainties in reflectance due to canopy structure, leaf position and sediment on leaf surfaces. Using a model inversion methodology an algorithm for mapping seagrass leaf area index and water column properties, with per-pixel error bars on all quantities, has been developed. The algorithm was applied to hyperspectral airborne data of Florida Bay collected by the Portable Remote Imaging Spectrometer (PRISM). Estimated leaf area indexes agreed well, uncertainties were high due to substantial coverage of leaves by sediment at this site. Sensitivity analysis shows BRDF effects due to canopy position and solar-view angle geometry can lead significant variation in the water leaving reflectance, giving further scope to refine the model.

1- Environmental Computer Science Ltd., Tiverton, Devon, EX16 6LR, United Kingdom. j.d.hedley@envirocs.com

2- Department of Marine Sciences, University of Connecticut, Groton, CT 06340, USA. heidi.dierssen@uconn.edu

3- Department of Marine Sciences, University of Connecticut, Groton, CT 06340, USA. brandon.russell@uconn.edu