AMP Graduate Student Seminar – Friday, May 6, 2011

Detection of Lagrangian Coherent Structures and Their Use in the Study of Water Quality in the Coastal Ocean

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In order to understand water quality in the coastal ocean and its effects on human health, the necessity arises to locate the sources of contaminants and track their transport throughout the ocean. Dynamical systems methods are applied to the study of transport of enterococci as an indicator of microbial concentration in the vicinity of Hobie Beach. Previous studies on water quality have shown that Hobie Beach, an urban, subtropical beach in Miami, FL, that is used for recreation and bathing on a daily basis, has high microbial levels despite having no known point source. To investigate the cause of these high microbial levels, a combination of measured surface drifter trajectories and numerically simulated flows in the vicinity of Hobie Beach is used. The numerically simulated flows are used to identify Lagrangian Coherent Structures (LCSs), which provide a template for transport in the study area. Surface drifter trajectories are shown to be consistent with the simulated flows and the LCS structures. LCSs are then used to identify potential sources of water contaminants and help explain the unusually high concentrations of microbes in the water off of this beach as compared with its neighboring beaches.