# Boulder Fluid Dynamics Seminar Series

Tuesday, May 19, 2015
3:30pm-4:30pm (refreshments at 3:15pm)
Bechtel Collaboratory in the Discovery Learning Center (DLC)
University of Colorado at Boulder

## Deuterated Water and Suface Vector Winds in a Madden-Julian Oscillation Event: Using Data from TES on Aura and SeaWinds on QuikSCAT

Ralph Milliff, *Cooperative Institute for Research in Environmental Sciences*

The moisture convergence process, especially prior to the onset of deep convection, is a difficult-to-observe process early in the active phase of a Madden-Julian Oscillation (MJO) event. Nonetheless, moisture convergence in the atmospheric planetary boundary layer is thought to play a key role in energy transfers that drive MJO evolution with implications for MJO propagation mechanisms and processes of convective organization. Conversely, downdrafts associated with subsidence characterize the transition to stratiform processes occurring at the end of the active phase of the MJO life-cycle. We examine the feasibility of detecting moisture convergence and subsidence signals associated with a single MJO event, Dec 2007 - Jan 2008, in the tropical Indian and western Pacific oceans. Correlations and covariances of water isotope concentrations and surface vector winds (SVWs) are analyzed given SVW retrievals from the NASA QuikSCAT mission and water-isotope:water vapor ratio (i.e., delta-D) retrievals from the Tropospheric Emission Spectrometer (TES) aboard the NASA Aura mission. Implications for spaceborne observing systems focused on tropical processes are discussed.

## Changes in valveless pumping mechanics of the developing embryonic vertebrate heart

David Bark, *Colorado State University*

Blood flow regulates the remodeling of our cardiovascular system from initial heart beats until our death. As the first developing organ, the heart provides critical feedback to cardiovascular cells through the flow-derived stress environment corresponding to its pumping mechanism. Although this feedback is critical to proper development, the mechanism that drives flow remains ill-defined as the heart transforms from a semi-straight primitive tube to the multi-chambered adult heart. Here, we describe changes in pumping by analyzing high speed planar videos. Spatiotemporal plots and particle imaging velocimetry are used to quantify flow and to derive relative pressure fields. We show that through coordinated motion between cardiac layers, the valveless heart is able to maximize forward flow despite a series of changes in heart morphology.