Title:

A wavelet cross-spectral analysis of solar-ENSO-rainfall connections in the Indian monsoons

Speaker:	**Subarna Bhattacharyya**, Lawrence Livermore National Laboratory
Date:	Thursday, March 22, 2012
Time:	Presentation from 12:30 PM – 1:30 PM
Cost:	No charge
Place:	Livermore Valley Open Campus (LVOC) – Bldg. 6475
	Lawrence Livermore National Laboratory
	Greenville Road, Livermore, CA

> Building 6475 is located south of the Eastgate Avenue entrance off of Greenville Road. Follow signs to the HPC Innovation Center. The building is located behind the UNCLE Credit Union.

RSVP:	**Please make a reservation** by e-mailing Brock Beauchamp (brockb@ieee.org)

Meeting Description:

Solar activity and its variability is an important natural forcing that influences Earth's climate. Traditionally the sun-earth climate connection suffered from poor statistical significance and the lack of a plausible physical mechanism explaining such connection threw further doubts on it. However with improved observational data, analysis techniques and understanding of the global climate system from modeling and simulation perspectives, there has been a renewed interest to understand the impact of solar variability on the climate. Increasingly sophisticated empirical analyses show connections between solar variability and climatic indices like rainfall for instance on both long time scales of centuries to millennia as well as on shorter multi-decadal scales. Literature reports possible connections between the El Nino-Southern Oscillation (ENSO) phenomenon and Indian monsoon rainfall. Here we analyze the connections among the solar–ENSO–monsoon 'triad' devising a novel method using wavelet cross power spectrum together with statistical time series analysis and further devising a statistical significance testing procedure using synthetically generated noise statistics. Since all the processes and time series associated with monsoon rainfall, ENSO and solar activity are generally both nonstationary and nonlinear, the Morlet wavelet transform turns out to be a most appropriate tool for a study of the present kind. We show strong statistical evidence here for connections of ENSO with solar activity. Wavelet statistical analysis reveals that the link between solar activity and ENSO is generally stronger than that between ENSO and rainfall but only slightly weaker than that between solar activity and rainfall.

About the Speaker:

Dr. Bhattacharyya is interested in understanding the process of global change in climate, its dynamics, modeling and hence prediction of the near term as well as long term climate at the regional as well as global scale. She is currently working on Abrupt Climate Change under the IMPACTS Project using the state-of-the-art Community Earth System Model (CESM). In particular, her project goal is to investigate and understand the role of methane clathrate destabilization in bringing about a possible climate change on a short time scale of less than 100 years. She is also interested in signal processing applications to analyzing climate signals and in understanding and quantifying the effect of solar forcing of the earth's climate.

Dr. Bhattacharyya is currently a Post Doctoral Fellow in the Atmosphere, Earth, Energy Division, Chemistry/Carbon Climate Group at the Lawrence Livermore National Laboratory. She received her Ph.D. from the Engineering Mechanics Unit, Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bangalore, 2006 and is a member of the American Geophysical Union. She is also the recipient of numerous honors and awards from her academic work in India.