The Center for BioEnergy Sustainability (CBES)
At Oak Ridge National Laboratory (ORNL)
is pleased to announce that we are holding our next Forum on September 20th, 2012
in the Ocoee Room (Room 189) in Building 1505 at 3:30pm

The forum will be followed by a casual gathering at Virginia Dale's home where light refreshments will be enjoyed as the discussions continue.

This month's forum topic is:

"Balancing Human Needs and Ecosystem Services to Develop a Sustainable Biofuels Industry: A Modeling Systems Approach""

Guest Speaker:

Xuesong Zhang
Senior Research Scientist of Ecosystem Modeling at PNNL

Abstract:

Biofuels research and deployment can contribute significantly toward energy independence and security in the USA. The successful development of a socially, economically, and environmentally sustainable biofuels industry will require of a comprehensive understanding of short-term and long-term productivity of bioenergy crops as well as the impacts that the expansion of these crops over large areas may have on climate, water, nutrient, and biodiversity. The DOE Great Lakes Bioenergy Research Center (GLBRC) has been advancing modeling techniques to quantify the productivity and socio-environmental consequences of established and novel biofuel cropping systems. In this presentation, I will introduce a Spatially-Explicit Integrative Modeling Framework (SEIMF) for bioenergy crops modeling and its applications in a) predicting potential bioenergy production and climate mitigation capacity from marginal lands in US Midwest; b) projecting potential availability of alternative cellulosic biofuel feedstocks by providing a bioeconomic model with spatially distributed yield and environmental performance data of multiple candidate bioenergy crops. The terrestrial ecosystem model employed in SEIMF is Environmental Policy Integrated Climate (EPIC), which describes biophysical and biogeochemical processes in detail but lacks the capability to trace sediment and nutrient transport through water movement over a large scale or to explore water and energy feedbacks to regional climate via land-surface perturbations. To enhance and complement SEIMF, we are developing two new modeling systems. The first focuses on revising and parameterizing the Soil and Water Assessment Tool's (SWAT) crop growth and biogeochemical cycling modules to better simulate emerging bioenergy crops, such as switchgrass and miscanthus and associated environmental performance. The other system attempts to improve our understanding of the implications of bioenergy crops expansion for regional climate. We do this by coupling the Climate extension of Weather Research Forecast (CWRF) model with the Decision Support System for Agrotechnology Transfer (DSSAT) model in order to simulate the dynamic interactions between agroecosystems and regional climate. Brief description and preliminary results of these novel modeling systems will be presented and discussed.

Bio:

Dr. Xuesong Zhang graduated from Texas A&M University in 2008, where he earned his PhD degree in Hydrology and Water Sciences. During 2009-2010, he received his postdoctoral training on biophysical modeling at Joint Global Change Research Institute (JGCRI), a collaboration between Pacific Northwest National Laboratory (PNNL) and University of Maryland. Currently, he is a senior research scientist of ecosystem modeling at PNNL. His research interests include [1] developing large scale terrestrial ecosystem modeling systems by integrating high resolution GIS and Remote Sensing data with complex watershed models (e.g. SWAT); [2] developing Markov Chain Monte Caro (MC^2) based Bayesian uncertainty analysis methods to explicitly integrating uncertainties associated with input data, parameter, and model structure; [3] incorporating carbon cycling and greenhouse gases algorithms into watershed models to provide comprehensive understanding of environmental implications of biofuel production; [4] coupling agroecosystem models with climate models to depict complex interactions between agroecosystems and regional climate. He is serving as an associate editor for Journal of the American Water Resources Association and a member on the SWAT international conference scientific committee.

Please mark your calendar for every third Thursday for 2012 so that you can join in the collaboration and camaraderie that is being built by your participation in the CBES forums.