

## Title: Data Integration and Visual Analytics in Geospatial Data Processing: Multidisciplinary Research Practices and Prospects

### Abstract:

Existing environmental modeling techniques heavily rely on monolithic geospatial data processing systems (e.g., GIS) and suffers from high hardware/software/training costs and lacks effective supports for distributed and heterogeneous computing environments. Cyberinfrastructure (or e-sciences) technologies, such as metadata/ontology standards, high-performance computing facilities, scientific workflow systems and domain-specific Web-based protocols, are playing increasingly important roles in geospatial data processing and environmental modeling. Combining the cyberinfrastructure technologies and the Service Oriented Architecture (SOA), it is possible to decompose legacy environmental models into small service components. These distributed geospatial service components can be chained into complex models in a much more flexible manner. Furthermore, the service components with visual presentations can be visualized in generic viewers (e.g. Google Earth) or embedded in Web 2.0 applications. The technologies not only free environmental scientists from being forced to become information technology experts, but also are appealing to K-12 students and the general public and attract their interests in protecting our environments.

In this talk, I will first briefly introduce my past and ongoing work on integrating geospatial technology in building environmental cyberinfrastructure for ecological and environmental change research and demonstrate how these systems can be realized using open source software packages. The second part of the talk will present the developments of geospatial analytical techniques for different types of geospatial data in practical applications. The talk concludes with discussions on the prospects of incorporating geospatial analytics in environmental cyberinfrastructure to effectively support environmental research.

### Short Bio

A graduate with a bachelor in Water Resources and Environment (1993) and a master in Physical Geography (1996) from Nanjing University, China, Jianting Zhang joined computer science and earned his master (2001) and Ph.D. (2004) degrees in Computer Science from the University of Oklahoma under the supervision of Dr. Le Gruenwald.

Dr. Zhang finished his post-doc training (2004-2007) with the U.S. Long Term Ecological Research (LTER, <http://www.lternet.edu>) Office affiliated with the Department of Biology at the University of New Mexico, working on the NSF large Information Technology Research (ITR) Science Environment for Ecological Knowledge (SEEK) project (<http://seek.ecoinformatics.org>) under the supervision of Dr. William K. Michener. Dr. Zhang currently is a researcher and the leading developer for the COMET Project (for COast-to-Mountain Environmental Transect, <http://comet.cs.ucdavis.edu/wiki>) at the Department of Computer Science at the University of California, Davis, funded by the NSF Cyberinfrastructure for Environmental Observatories: Prototype Systems to Address Cross-Cutting Needs (CEO:P) initiative.

Dr. Zhang's research and publications are multidisciplinary due to his multidisciplinary training in hydrology, geography, ecology and computer science. He has published more than forty peer-viewed research papers in the broad area of Environmental Informatics, including spatial databases, Geographical Information System (GIS), geospatial Web Services and workflow, visualization and data mining of geospatial data and their applications to environmental data.