Sinica Workshop (May 16) 9:30AM – 10:50AM
Speaker: Professor Ming-Hsiang Tsou, San Diego State University, U.S.A.
Topic: **"Research Challenges and Opportunities for Geospatial Cyberinfrastructure and Mapping Cyberspace"**

Abstract:

Geospatial cyberinfrastructure is "*a combination of distributed high performance geospatial computing resources, geo-referenced information, geo-processing web services, and geographic knowledge to facilitate the advancement of Geographic Information Science (GIScience), geospatial technology, and geographic education*" (Zhang and Tsou 2009, p.605). Geospatial cyberinfrastructure provides valuable geospatial data, location-based information, and geographic knowledge for citizens, scientists and researchers. It also integrates or interconnects different types of web portals, mashups, and web mapping services.

This presentation will highlight the research challenges and opportunities for geospatial cyberinfrastructure in four domains: grid computing, cloud computing, web portals, and mashups. A few case studies (Spatial Demographic Simulation with Schelling's segregation model, Metropolitan Area Pluralism Study (MAPS) website http://geoinfo.sdsu.edu/maps/) and ongoing research projects (NSF funded CyberGIS project http://cybergis.cigi.uiuc.edu/ and Mapping Cyberspace http://mappingideas.sdsu.edu/) will be introduced in the presentation. The recent Big Data Initiative by the White House Office of Science and Technology Policy (http://www.whitehouse.gov/blog/2012/03/29/big-data-big-deal) and the research activities in the AAG Cyberinfrastructure Specialty Group (http://www.cigi.illinois.edu/cisg/index.php) will also be included in the presentation. One major challenge in geospatial cyberinfrastructure is to develop effective parallel computing algorithms for high performance GIS models. Most traditional GIS tools and programming libraries are created for stand-alone computers rather than parallel computing platforms. Current parallel processing GIS projects are mainly created for solving specific domain problems and these parallel algorithms are not reusable. By adopting grid computing and cloud computing frameworks, we may be able to develop more sustainable parallel algorithms for GIS models. Another key challenge is the semantic interoperability of GIS related web services and web mapping functions. We need to create comprehensive and sharable ontology databases, keywords, and knowledge bases for the GIScience communities and transform geospatial web to intelligent "semantic" web. The possible resolution will require not only the standardization of domain keywords and concepts, but also the standardized translation methods between different domain knowledge bases.

The development of geospatial cyberinfrastructure is critical for the progress of GIScience and the innovation of geospatial technology. We hope that the development of geospatial cyberinfrastructure will facilitate a quantum leap of GIScience and enable more people to discover the value of geographic knowledge and geospatial technology.

Reference: Zhang, T. and Tsou, M.-H. (2009). Developing a grid-enabled spatial Web portal for Internet GIServices and geospatial cyberinfrastructure, *International Journal of Geographical Information Science. 23(5), pp.605-630.*