

UCGIS 2003 Summer Assembly – Plenary Talks and Workshops

Tuesday, 17 June

Morning Program

8:30 a.m. "Aerial and Satellite Remote Sensing: What's Out There for Use in GIScience Research?" (**Plenary 1**)

Carolyn Merry, Department of Civil and Environmental Engineering and Geodetic Science, Ohio State University

9:15 a.m. "Integrating Online and Geospatial Information Sources" (**Plenary 2**)

Craig Knoblock, Information Sciences Institute, University of Southern California

Afternoon Program

1:30 p.m. "Using Remote Sensing Data in Engineering Applications" (**Workshop 1**)

Carolyn Merry, Department of Civil and Environmental Engineering and Geodetic Science, Ohio State University

1:30 p.m. "Integrating Online and Geospatial Information Sources" (**Workshop 2**)

Craig Knoblock, Information Sciences Institute, University of Southern California

1:30 p.m. "Computational Geography: The Grid, the Un-grid, and Their Wedding in the Chapel of Collaborative Tools" (**Workshop 3**)

Marc Armstrong, Department of Geography, University of Iowa

Wednesday, 18 June

Morning Program

8:30 a.m. "First We Shape Our Tools and Then Our Tools Shape Us: Computational Imperatives in GIScience and Their Consequences" (**Plenary 3**)

Marc Armstrong, Department of Geography, University of Iowa

9:15 a.m. "Modeling and Projecting Urban and Exurban Growth and Its Impacts"
(Plenary 4)

John Landis, Department of City and Regional Planning, University of California at Berkeley

Afternoon Program

1:30 p.m. "Modeling and Projecting Urban and Exurban Growth and Its Impacts"
(Workshop 4)

John Landis, Department of City and Regional Planning, University of California at Berkeley

1:30 p.m. "Machine Learning and Knowledge Extraction Techniques for Natural Resources Inventory" **(Workshop 5)**

A-Xing Zhu, Department of Geography, University of Wisconsin at Madison

1:30 p.m. "Location-Based Services and Augmented Reality" **(Workshop 6)**

Michael Goodchild, Department of Geography, University of California at Santa Barbara

Thursday, 20 June

Morning Program

8:30 a.m. "GIS, Artificial Intelligence Techniques and Fuzzy Logic Concepts for Natural Resources Inventory and Hazards Mapping" **(Plenary 5)**

A-Xing Zhu, Department of Geography, University of Wisconsin at Madison

9:15 a.m. "The Fundamental Laws of GIScience" **(Plenary 6)**

Michael Goodchild, Department of Geography, University of California at Santa Barbara

UCGIS Summer Assembly – Workshop Abstracts

1. "Using Remote Sensing Data in Engineering Applications"

Carolyn Merry, Department of Civil and Environmental Engineering and Geodetic Science, Ohio State University

This workshop will focus on current remote sensing data sets available for use in GIScience research activities in the engineering area. Image processing techniques available for transforming remote sensing data into useful geophysical products will be covered. Examples highlighted during the workshop will include remote sensing of water quality, measuring ice flow in Antarctica, using high-resolution imagery in transportation flow applications, and monitoring and mapping land cover change. Geometric and radiometric considerations of the various forms of remote sensing imagery will be discussed. Sources and costs of remote sensing data available for GIScience research will be described. Future remote sensing systems that offer potential for addressing science and engineering issues will be discussed.

2. "Integrating Online and Geospatial Information Sources"

Craig Knoblock, Information Sciences Institute, University of Southern California

With the explosive growth of the Web there are now a huge number of sources of data available online, including geospatial sources with maps and imagery and an even larger number of sources with data that can be placed into a geospatial context. The challenge is how to make effective use of all this data by integrating the data across diverse source types. In this workshop, I will describe the techniques that we have developed for exploiting online sources, including turning online sources into structured data, linking records across different sources, planning to dynamically compose sources, and efficiently integrating sources in a networked environment. I will also describe techniques for integrating online sources with various geospatial data sources, including using online sources to automatically conflate vector data with imagery, identify buildings in imagery, and predict the location of moving objects (e.g. trains) along fixed trajectories.

3. "Computational Geography: The Grid, the Un-grid, and Their Wedding in the Chapel of Collaborative Tools"

Marc Armstrong, Department of Geography, University of Iowa

The focus of this workshop will be placed on developing ideas about three areas of emergent work in geographic information science, and how linkages among these three areas can be established to promote research and instruction. The first area is widely referred to as "grid computing" because of its reliance on the use of a computational network that is metaphorically akin to the electric grid: users need not be concerned about the computational resources that they are using any more than they need to care about the source of the electricity that powers their refrigerator. We will focus on how

the grid came to be, how it can be accessed and what potential it holds for GIScience. The second area, which I will refer to here as the “un-grid”, concerns rapidly changing developments in wireless computing with a particular emphasis placed on their implications for GIScience (and geographic) education. Next, we will delve into the use of grid (and un-grid) computing by groups of individuals who may be required to collaborate in order to achieve one or more objectives. GIS tools at present are not well-designed for group use and we will work towards the specification of a typology of group tool needs. Finally, we will consider how grid and wireless computing can support group use of GIS tools. Participants will be asked to read several articles as background to the material that will be covered in this workshop.

4. "Modeling and Projecting Urban and Exurban Growth and Its Impacts"

John Landis, Department of City and Regional Planning, University of California at Berkeley

This workshop will demonstrate statewide procedures for modeling urban and exurban growth, for developing spatially-explicit urban growth scenarios, and for analyzing past and potential impacts of urban growth on the natural landscape. The workshop will demonstrate how commonly available polygon and raster datasets can be used to identify past patterns of urban and exurban development; how the same datasets can be used to develop and test spatially-explicit statistical models of urban growth; and how the results of these models can be used to develop future growth scenarios. The workshop will draw on recent work undertaken for the California Resources Agency as part of its Legacy Program. Participants will gain practical experience building and using urban growth models and procedures. Scenario-building datasets and software will be provided to workshop participants via CD for onsite use in laptop computers. Some knowledge of raster GIS and elementary statistics is assumed.

5. "Machine Learning and Knowledge Extraction Techniques for Natural Resources Inventory"

A-Xing Zhu, Department of Geography, University of Wisconsin at Madison

This workshop introduces the techniques for extracting knowledge on relationships between natural resources and their environmental conditions. The extracted knowledge is needed for conducting predictive mapping of natural resources (such as soils) and for mapping the susceptibility of natural hazards (such as landslides). The techniques to be discussed include: neural networks, case-based reasoning, personal construct-based interview techniques, decision-trees, and noise-reduction techniques for spatial data mining. Each of the techniques will be introduced and discussed using a real application (soil mapping). Attendants will also gain a hand-on experience of using some of the techniques. Software and real world data set will be provided.

6. "Location-Based Services and Augmented Reality"

Michael Goodchild, Department of Geography, University of California at Santa Barbara

An LBS is defined as an information service that knows where it is, and modifies the information it provides accordingly. AR is defined as the supply of information to augment the user's senses. LBS and AR are rapidly developing areas of technology, both heavily dependent on geographic information and knowledge of location. The workshop begins with a review of the technologies available for LBS and AR, and likely developments in the next decade. Applications are discussed in detail, ranging from the replacement of impaired senses, to commercial LBS. A research agenda for AR and LBS is proposed, and selected research questions are examined in detail.

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