Specialist Meeting on

Globalization in the World-System: Mapping Change over Time

University of California, Riverside
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Co-sponsored by:
Center for the Spatially Integrated Social Sciences at the University of California, Santa Barbara
And at University of California, Riverside:
Office of the Vice Chancellor for Research,
Office of the Chancellor,
Institute for Research on World-Systems, and
Program on Global Studies

This workshop will bring together about thirty scholars with a substantive or methodological interest in the study of global-scale socioeconomic processes across time and space. The group will be composed of empirically oriented scholars of global social processes and several experts on geographic information science and network analysis. The purpose of the workshop is to encourage participants to develop ideas for research projects on the structure and dynamics of globalization using new research technologies such as Geographic Information Systems (GIS), spatial analysis methods (including network analysis), and sources of geographic information not usually employed by globalization researchers. Geologists, climatologists and other earth scientists have long used GIS and related methods along with geocoded data at the global scale, but social-science work on globalization phenomena that explicitly utilizes such methods is still quite rare. This workshop will bring researchers together to help generate ideas for new globalization research projects that make use of GIS methods, spatial analysis including formal network analysis, and scientific visualization techniques such as "time-mapping." [1]

Particularly relevant to the objectives of the workshop are worldwide studies of evolving social processes, and projects that explicitly compare recent global processes with those that have operated in the past. We are also interested in mapping and more generally, graphically representing the spatial scale and intensity of human interaction networks in order to study the emergence of global integration and its cross-temporal characteristics. We hope that new research projects that use novel methods developed in geographic information science will eventually emerge from the workshop.

The program will open with a keynote address by Michael Goodchild of the Center for Spatially Integrated Social Sciences at UC Santa Barbara, and will consist of five topical

[1] The *Time*Map® Project (http://www.timemap.net/) allows GIS maps to be used to show changes over time by defining a conceptual mapping between an explicit spatio-temporal data model (the Snapshot-Transition model) and the data actually recorded by any particular project (Johnson 2000).

sessions built around 15-minute paper presentations. Each topical session will have two discussants, one familiar with geographic information science concepts and methods and the other an expert on the substantive theme of each session. There will also be a final session for brainstorming about possible research projects that capitalize on new ways to study globalization using GIS and related spatial analysis techniques.

The workshop's five topical sessions will be on:

- Commodity Chains and Labor in the World Economy,
- Global Business Networks,
- Global City Systems
- Hegemony and Power Configurations in Interstate Systems, and
- Global Transportation and Communications Networks

One example of an approach to globalization studies that could greatly benefit from spatial analysis techniques and GIS is the comparative world-systems approach. This focuses on four specific kinds of social interaction networks (information, prestige goods, bulk goods, and political/military networks), each operating at a different spatial scale (Chase-Dunn and Hall, 1997). The comparative world systems approach defines its units of analysis as systemic combinations of very different kinds of societies. Multicultural systems and core/periphery relations are studied as nested systems of networks that evolve the institutions necessary for populations, polities and networks to expand. The first question thus for any region of interest is about the nature and spatial characteristics of its links with the above four kinds of interaction networks. This is prior to any consideration of core/periphery position because one region must be linked to another by systemic interaction in order for considerations of core/periphery relations to be relevant.

A good part of what has been called globalization is simply the intensification of larger interaction networks relative to the intensity of smaller ones. Structural economic globalization can be conceptualized as the extent to which international capital investments and international trade increases (or decreases) relative to the overall size of the world economy. This kind of integration is often understood to be an upward trend that has attained its greatest peak in recent decades of global capitalism. But research on trade and investment shows that there have been two recent waves of integration, one in the last half of the nineteenth century and the most recent since World War II (Chase-Dunn et al. 2000, 2002). The expansion and contraction of interaction networks in earlier world-systems needs to be studied in order to make comparisons with the waves of structural globalization that have occurred in the modern world-system. This will allow us to identify the structural and dynamic similarities and differences between different world-systems and across historical periods.

Geographical Information Systems (GIS) can play a major role in such research and in globalization studies in general, by helping analyze, forecast, and visualize the great variety of spatial interactions and networks involved in global-scale socioeconomic phenomena. These include global commodity chains, information flows, labor migration flows, financial flows, and other aspects of the global economy, as well as the relationships between such networks of human interaction on the one hand and natural environments on the other. Elegant and powerful

spatial analysis techniques can help unpack and make visible the very substantial spatial and temporal components of the phenomena of interest, be they networks or flows across the globe (see, for example, Tobler's (1995) maps of 'migration winds'). In addition to the scientific value of such techniques, GIS enables us to generate sophisticated visualizations and computer animations that are extremely useful for education and for conveying the results of globalization research to a wider public. For example, we can construct animated visualizations of how traditional social structures and interaction nets have recently changed their spatial scale to merge within the single global political economy of today.

The potential of GIS and spatial analysis for suggesting and testing causal social science models of historical development is only beginning to be tapped. Such models will involve further elaboration of the ability to represent and analyze movement and interaction networks, and the development of techniques that use change over time to test complex causal models. GIS may be combined with other techniques to better meet the objectives of globalization research. For example, Hierarchical Linear Modeling (HLM) is used to study causal interactions among different levels of nested interaction networks (e.g. communities, metropolitan areas, regions). HLM makes it possible to separate the variance into components explaining the effects of different levels of analysis (Vogt 1999). This allows us to address the questions of what relationships at which levels of analysis really are more causally powerful. The debates about whether national societies or variable characteristics of the world-system as a whole are more powerful for explaining social change are among the issues amenable to systematic analysis using HLM. There are obvious methodological issues that need to be addressed in utilizing multilevel GIS databases with historical data. Such spatial databases are naturally hierarchical with multiple levels of analysis: states, counties, cities, census tracts, or nations, regional systems of nations, and world-systems. The general comparative method of non-experimental research design assumes that "cases" (units of analysis) are independent instances of the process under study. Because spatial modeling can deal explicitly with the relations of phenomena across geographic scales, HLM in combination with GIS may allow us to determine degrees of interdependence of processes as well as the causal power of variable characteristics of different levels of analysis.

GIS can also profitably be combined with Network Analysis as developed by quantitative sociologists and mathematicians. Network Analysis is a quantitative approach to interaction networks that produces different measures of network structure and function. It includes sophisticated analytic techniques that are little known outside of mathematical sociology. Networks have also been studied extensively by geographers in the context of transportation and communication as part of the major emphasis in human geography on human interactions across space and time. Tools for studying spatial networks are by now well integrated into GIS. Linking traditional Network Analysis, which does not explicitly consider space, with geocoded data could substantially enhance the analytic tools available to those studying spatial relations and interactions at global scales.

In summary: according to many researchers, interaction networks, the empirically determinable links among people, are more important than categorical attributes for understanding the bounding of social systems at different scales. Networks allow us to examine the important ways in which the members and organizations in different societies are connected

with one another as well as the structure of subgroups within societies. Networks are inherently *spatial*. There are new techniques and tools for organizing spatial data and for analyzing nested systems that can help us to better understand historical development and social evolution. It is time that our research community begins taking advantage of these new and very promising opportunities.

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The Center for Spatially Integrated Social Sciences (CSISS) http://www.csiss.org/ recognizes the growing significance of space, spatiality, location, and place in social science research. It seeks to develop unrestricted access to tools and perspectives that will advance the spatial analytic capabilities of researchers throughout the social sciences. Located at the University of California at Santa Barbara, CSISS focuses on the methods, tools, techniques, software, data access, and other services needed to promote and facilitate a novel and integrating approach to social science that is *spatially integrated*. The National Science Foundation funds CSISS.

The Institute for Research on World-Systems (IROWS) http://www.irows.ucr.edu/ organizes collaborative research among social, biological and physical scientists on long-term, large scale social change and its ecological, geographical and epidemiological causes and effects. Located at the University of California at Riverside, IROWS pursues comparative research on the rise and fall of civilizations, long-term processes of globalization and climate change.

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Center for International Earth Science Information Network http://www.ciesin.org/

Center for Spatially Integrated Social Sciences (CSISS) http://www.csiss.org/

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