

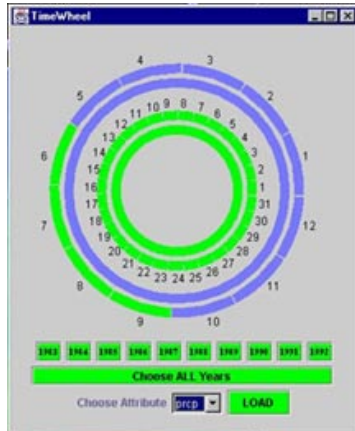
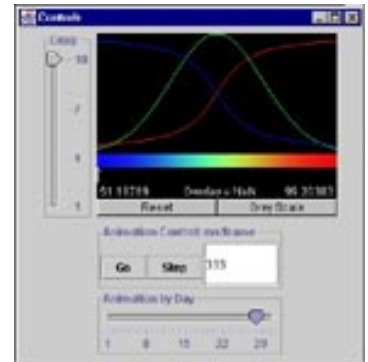
# Collaborative Geographic Visualization

an example of

## Geographic Information Science at Penn State

### What is Geographic Visualization?

Human beings have a remarkable capability to process and understand visual information. Visualization takes advantage of this capability by graphically representing data, and allowing scientists and decision makers to visually pick out patterns in those data. Geographic visualization (GVis) facilitates exploration, analysis, synthesis, and presentation of geospatial information. GVis is part of a broader rapidly developing field of research known as Geographic Information Science (GISci). GISci integrates research traditions including cartography, remote sensing, and geographic information systems.

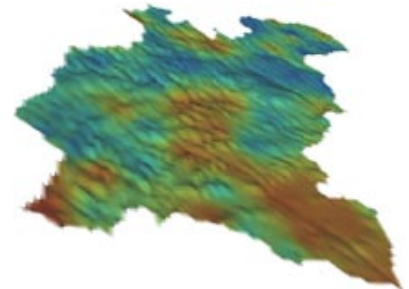


### Collaborative GeoVirtual Environments

Exploratory analysis of complex, multi-dimensional space-time data sets demands new and innovative tools. As an extension from the Apoala Project (see note below), individuals in the GeoVISTA Center and the Center for Academic Computing are working together to explore the potential of same-time-different place collaboration among scientists at remote locations as they explore complex spatiotemporal data.

Many potential scientific, educational, and decision-making applications for Geographic Visualization (GVis) involve small groups working together on a problem solution, but existing tools are designed for use by individuals. We developed a prototype GVis environment focused on same time-different place collaboration. Such environments have potential application to regional and local planning/decision-making, scientific

research by distributed interdisciplinary teams, and web-based education. Our prototype, consisting of a series of linked desktops, is designed to facilitate collaboration among users who are exploring time series of climatic data for a large drainage basin. The exploration involves interaction with shared dynamic (animated and interactive) displays. The prototype is constructed from a set of Java/Java3D tools. These include VisAD, a DEM viewing module that works with VisAD, and our own extensions for data queries and networking. In relation to query, we focused on temporal query tools designed to help users explore both linear and cyclic components of the data. The prototype collaborative GVis environment allows multiple users to view and manipulate the changing climatic data simultaneously and thus to share knowledge as they identify drainage basin scale patterns and processes. Though the Java language operates across platforms and operating systems, dealing with different levels of hardware performance and Internet access speeds represent future challenges for implementing ideas explored here. The data used in the demonstration are extracted from a much larger climate data set for the Susquehanna River Basin of Pennsylvania, New York, and Maryland -- specifically daily maximum temperature, minimum temperature and precipitation extending from 1983-1993.



### THE APOALA PROJECT

Work presented today is part of the Apoala Project, a three-year effort to develop and test an integrated spatio-temporal geographic information, visualization, and analysis system with the goal of supporting complex exploratory analysis of environmental data as well as policy decision-making based upon those data. Apoala is Co-lead by Donna Peuquet and Alan MacEachren in the Department of Geography, and supported by the U.S. Environmental Protection Agency under grant # R825195-01-0.  
<http://www.geovista.psu.edu/apoala/index.htm>

### GeoVISTA Center

Building on a strong GISci base that involves several faculty with related research and teaching interests, the Department of Geography recently established the GeoVISTA (Geographic Visualization Science, Technology, and Applications) Center – devoted to fundamental and applied scientific research on the visualization of georeferenced information, development of geographic visualization (GVis) technologies, and the application of both in science, industry, decision-making, and education.  
<http://www.geovista.psu.edu/>

### Credits

Dr. Alan MacEachren, Director, GeoVISTA Center, Professor and Faculty Fellow CAC  
Dr. Brent Yarnal, Professor Dept of Geography, PSU  
Isaac Brewer, research assistant Dept of Geography, PSU  
Amy Griffin, research assistant Dept of Geography, PSU  
Jeremy Mennis, research assistant Dept of Geography, PSU  
[Collaborative GeoVirtual Environments to Facilitate Environmental Management: Prototype Internet 2 Applications](#)

George Otto, Manager – Visualization Group, CAC, PSU  
Jack Gundrum, – Visualization Group, CAC, PSU  
Hadi Abdo– Visualization Group, CAC, PSU  
Daniel Haug, GeoVISTA staff scientist Dept of Geography, PSU  
Masahiro Takatsuka, GeoVISTA staff scientist Dept of Geography, PSU

1999 WebGIS Conference, October 28-29  
The Penn Stater Conference Center Hotel, State College, PA