



A Brief Introduction to TerraSeer's  
Space-Time Intelligence System  
(STIS™) Technology  
Applications in Exposure Science and  
Environmental Epidemiology

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# Goal

- Extend traditional GIS with space-time visualization and statistical functionality
- Many applications, but today will focus on epidemiologic and environmental health applications
  - Integrating space-time datasets
    - Human mobility
    - Environmental contaminants
  - Cancer cluster analyses over the life-course

# TerraSeer STIS

Space-time data analysis and visualization software

First release: April, 2004

## Visualization

Maps  
Histograms  
Scatterplots  
Box plot  
Time series  
Variogram cloud  
Parallel coordinate plot  
Dataset view  
Log of operations

## Basic Functionality

Import and export space-time dbf, txt, shape files  
Select subsets of data  
Link and brush across windows, queries  
Dataset calculator  
Spatial weights calculator  
Synchronized view, animations  
Redefine temporal orientation(e.g., year, age)  
Space-time join and proximity analyses (coming soon)  
Spatial aggregation (coming soon)  
Raster (coming soon)

## Statistical Operations

Spatial autocorrelation (Global and Local: e.g., Moran's I)  
Disparity analyses (Goovaerts' disparity statistic)  
Cluster analyses for residential histories (coming soon)  
Geostatistics (coming soon)                      Alternative spatial null hypotheses (coming soon)  
Regression (GWR—coming soon)                      Multi-level analyses (coming soon)



# Proof of Concept

- Federally-funded R&D
- Successful deployment – National Atlas of Cancer Mortality, Michigan Cancer Registry
- University site licenses
- Peer-reviewed science
- Featured at UCGIS Congressional Breakfast 2005

# Federally-funded R&D

<b>Agency</b>	<b>Award No.</b>	<b>Amount</b>	<b>Period</b>
<b>NIEHS</b>	<b>R43ES010220</b>	<b>\$100,000</b>	<b>09/01/1999-02/29/2000</b>
<b>NIEHS</b>	<b>R44ES010220</b>	<b>\$750,000</b>	<b>09/30/2001-09/29/2003</b>
<b>NCI</b>	<b>R01CA096002</b>	<b>\$676,269</b>	<b>09/01/2002-08/31/2007</b>
<b>NCI</b>	<b>R43CA092807</b>	<b>\$170,490</b>	<b>08/01/2001-07/31/2002</b>
<b>NCI</b>	<b>R44CA092807</b>	<b>\$998,550</b>	<b>02/08/2005-12/31/2006</b>
<b>NCI</b>	<b>R43CA105819</b>	<b>\$99,871</b>	<b>03/08/2004-02/28/2005</b>
<b>NCI</b>	<b>R44CA105819</b>	<b>\$744,992</b>	<b>07/26/2005-06/30/2007</b>
<b>NCI</b>	<b>R01CA092669</b>	<b>\$1,062,300</b>	<b>09/12/2001-08/31/2005</b>
<b>NCI</b>	<b>R43CA110281</b>	<b>\$99,911</b>	<b>09/03/2004-08/31/2005</b>
<b>NCI</b>	<b>R43CA117171</b>	<b>\$100,000</b>	<b>07/01/2005-12/31/2005</b>
	<b>TOTAL</b>	<b>\$4,817,383</b>	

# In-use at >300 Institutions Worldwide

American Museum of Natural History

Chicago Department of Public Health

CIFOR Center for Int'l Forestry Research

Colorado State University

Dalhousie University

Johns Hopkins Emergency Medicine

Johns Hopkins SPH

Kansas State University

Korea Inst. Of Geoscience & Mineral Resources (KIGAM)

Kusumi Team, SORST, JST

Loma Linda University

Louisiana State University

Mapping & Analysis for Public Safety Program

Michigan State University

Middle East Technical University

Montreal Chest Institute

National Cancer Institute

National Cheng Kung University

National Health Research Institute

National Minority Health Month

NJ Public Health Protection & Prevention

OK Dept of Environmental Quality

OK State Dept of Health

Penn State University

State of Montana FCHB

SUNY Binghamton

Syngenta Crop Protection

Univ. of Colorado Health Sciences Center

Universidad de Alcala

Universidad Valencia

Universite Laval

University of Aberdeen

University of Denver

University of Iowa

University of Marketing & Distribution Sciences

University of Michigan

University of Minnesota, Vet & Biomed Science

University of Montreal/Faculty of Medecine

University of Nebraska - Lincoln

University of New Mexico

University of Northern Iowa

University of Vermont

USDA APHIS VS CEAH

USDA-NRCS

Utah State University

Virginia Tech

Wayne State University

Western Carolina University

# Recent Publications

1. AvRuskin, GA, GM Jacquez, JR Meliker, MJ Slotnick, A Kaufmann and JO Nriagu. 2004. Visualization and exploratory analysis of epidemiologic data using using a novel space time information system. *International Journal of Health Geographics* 3:26.
2. Jacquez, G. M., D. Greiling and A. Kaufmann. 2005. Design and Implementation of Space-Time Information Systems. *Journal of Geographical Systems*. 7:7-31.
3. Meliker, J. R., MJ Slotnick, GA AvRuskin, A. Kaufmann, GM Jacquez and JO Nriagu. 2005. Improving exposure assessment for environmental epidemiology: Applications of a Space-Time Information System. *Journal of Geographical Systems* 7:49-66.
4. Greiling, D.A., G.M. Jacquez, A.M. Kaufmann, and R.G. Rommel. 2005. Space time visualization and analysis in the Cancer Atlas Viewer. *Journal of Geographical Systems*. 7:67-84.
5. Meliker, JR MJ Slotnick, GA AvRuskin, A Kaufmann, SA Fedewa, P Goovaerts, GM Jacquez, JO Nriagu. 2006 (online). Individual Lifetime Exposure to Inorganic Arsenic Using a Space-Time Information System. *International Archives of Occupational and Environmental Health* (In Press).
6. Jacquez, GM, JR Meliker, GA AvRuskin, P Goovaerts, A Kaufmann, M Wilson, JO Nriagu. 2006. Case-control clustering for residential histories accounting for risk factors and covariates. *International Journal of Health Geographics* 5: 32.
7. Jacquez, GM and J. Meliker. 2007. "Geographic Clustering for Mobile Populations". In "A Handbook of Spatial Analysis", S. Fotheringham and P. Rogerson (Eds.). Sage Publications (In Press).



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**PRODUCTS**

- ▼ TerraSeer STIS
  - Features
  - Help
  - Support
  - Method descriptions
  - Demo
  - Update
- ▶ BoundarySeer
- ▶ ClusterSeer
- ▶ SpaceStat
- GIS compatibility

**Order Now**

**TerraSeer Space-Time Intelligence System™**  
TerraSeer STIS is the only dynamic tool for space-time analysis

Difference 1990-1970  
Map Toolbars Animation  
Legend  
Border width  
Border color  
Fill color  
WMR 90-70  
12 16/05

LISA scatterplo...  
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RWM

Histogram: RWM  
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0  
1.4125 25.873  
RWM

Learn more about TerraSeer STIS through reading up on its [features](#), [on-line help](#), [support](#), and [method descriptions](#).  
Or, [download the demo](#) and try it out!  
Users, [Check for updates...](#)

The TerraSeer Space-Time Intelligence System (STIS) is the first true space-time information system.  
A STIS is more than just a GIS. In STIS, time is an integral part of the data and the

Internet