

Better Communication, Analysis and Decisions

SAS® plus GIS

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ABSTRACT

SAS is now incorporating Geographic Information Systems (GIS) functionality in many of its current applications and will be adding GIS to even more applications in the near future. This paper will briefly discuss the benefits of utilizing GIS functionality to not only enhance current analytic capabilities of SAS but to make entirely new analyses possible. The presentation will also highlight the improved communication of discovered intelligence through the use of GIS maps.

INTRODUCTION

The purpose of this paper is to illustrate new analyses and methods of presenting and disseminating information by utilizing the new GIS capabilities of SAS applications. The paper will start with a brief description of how GIS works and end with real-world examples of how GIS is currently being used by a wide range of both public and private organizations. It is hoped that many of these examples will inspire the audience to explore the new GIS functions in many of the new SAS applications.

WHAT IS GIS?

A Geographic Information System uses the location component of most data (addresses, latitudes and longitudes, zip codes, etc.) to bring to light new data relationships and geographic influences on data. To analyze data residing in multiple tables there must be data fields in common across the tables allowing them to be linked in meaningful ways. GIS looks at table data in the context of real world coordinates implicit in any geographic data present. A simple way to picture this would be to look at billing addresses of customers and what service or product they purchased. GIS converts the address to a geographic coordinate system and places a "dot" at that coordinate. That "dot" can now be placed on digital census maps, using the same coordinate system, to determine the probable age, education, ethnicity and income of the buyer at that location. We can now look at clusters of buyers, determine a demographic profile of the cluster, and then look for areas with similar demographics. This analysis could result in a more finely tuned marketing program (constrained geographically) or a new facility in a previously underserved area.

GIS AND SAS

In 2002 SAS determined that there was a need for more GIS functions in some of their applications. Rather than creating these new functions they decided to leverage GIS technology developed by ESRI over the past 35 years. The first result of integrating the two platforms was the SAS® Bridge for ESRI which was released in 2003. The SAS Bridge for ESRI allows bi-directional communication and processing between SAS tables and stored processes, and ESRI desktop GIS applications.

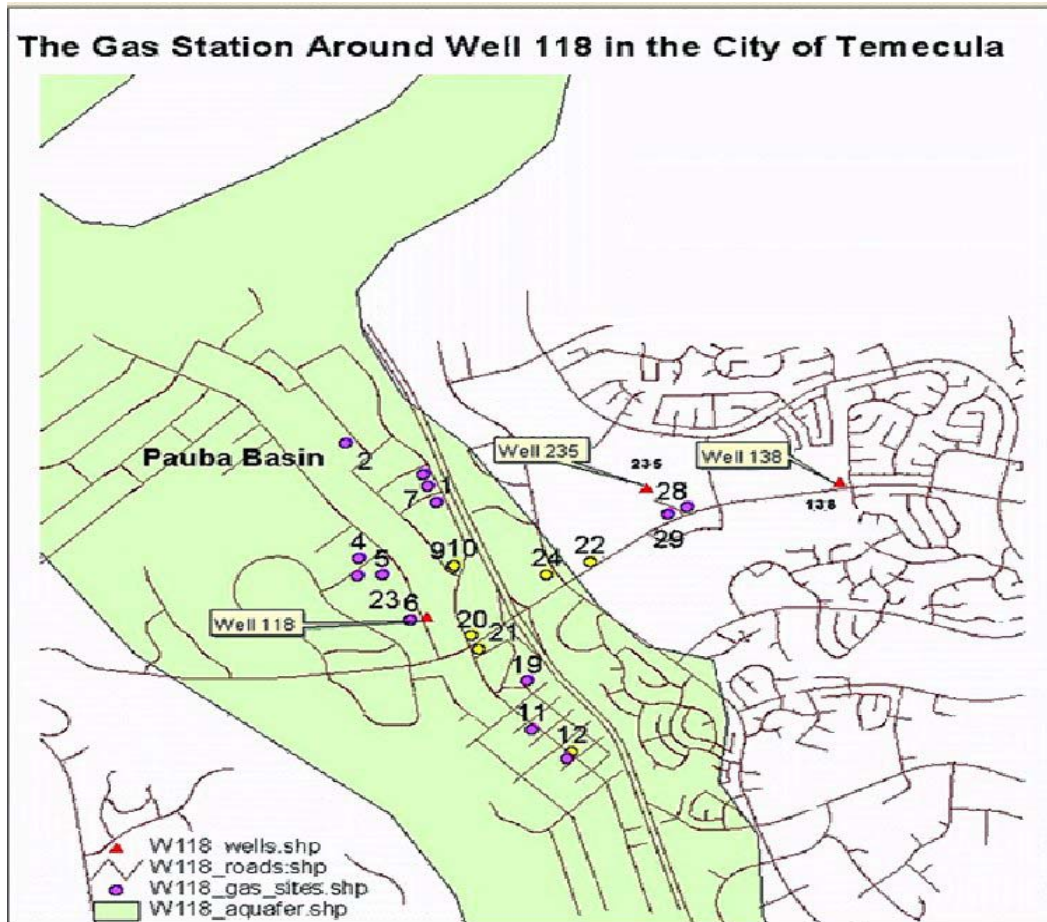
In 2005 SAS announced the optional integration of GIS functionality in both the SAS® BI Server and Enterprise BI Server product lines. GIS analysis and interactive maps are now available to multiple users in a server based environment.

USES OF GIS

The ability of GIS to analyze and present data from disparate data sets is being utilized by a wide variety of public and private organizations. Following are examples of how GIS is being used today.

PUBLIC

All departments of the Federal Government use GIS, including all branches of the military. The EPA uses GIS extensively to monitor and map the effects of people on the environment. For instance, water well samples are collected and combined with terrain and geologic data to model the subsurface extent and spread of pollutants in ground water. The CDC uses GIS to map occurrences and spread of disease in relation to demographics, terrain and transportation corridors. The census bureau uses GIS to predict population trends in various areas which end up determining congressional district boundaries.



Location of gas stations (HTPB sources) in relation to water wells and local aquafer

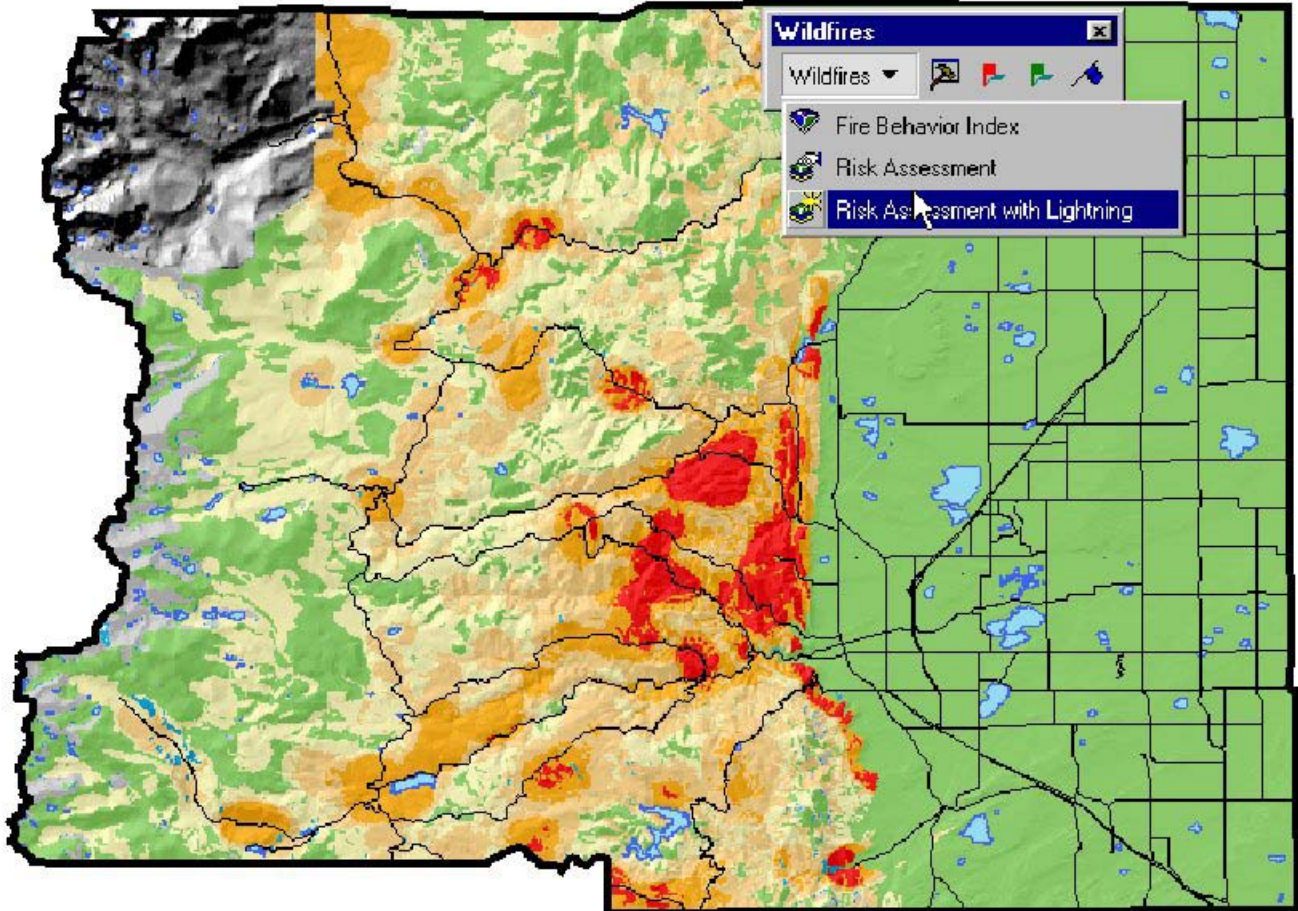
All states use GIS in various departments such as education, transportation and health and human services. Education uses GIS to determine how funds are distributed and examine demographic data and its relation to scholastic performance. DOT's use GIS to determine cost of construction based on terrain and geology as well as predicting where new roads will be needed in the future based on population trends. Uses of GIS in health and human services ranges from mapping outbreaks of disease, predicting future needs of services, and detecting fraud in food stamp programs.

Cities and counties use GIS to plan future growth, predict potential damage from natural disasters, and determine taxable value of real property. Local public safety agencies use GIS to monitor and solve crimes and deploy resources to fight wild fires. Virtually every department of local government has discovered valuable uses of GIS in their day-to-day operations. Public utilities monitor and maintain their assets utilizing GIS; they also predict future demand based on census growth patterns and building permits granted for new construction.

PRIVATE

Service and goods providers have long used GIS to determine optimal sites for new facilities, from warehouses and retail outlets to ATM locations. Optimizing sales territories based on potential number of clients that can be reached in a given time span is a common use of GIS in the commercial sector as is optimizing delivery and service routes.

Insurers use GIS to help determine insurance rates based on risk from floods, earthquakes and wildfires. It's a simple operation in GIS to overlay addresses of policy holders and applicants on FEMA provided digital Flood Insurance Rate Maps (created with GIS).

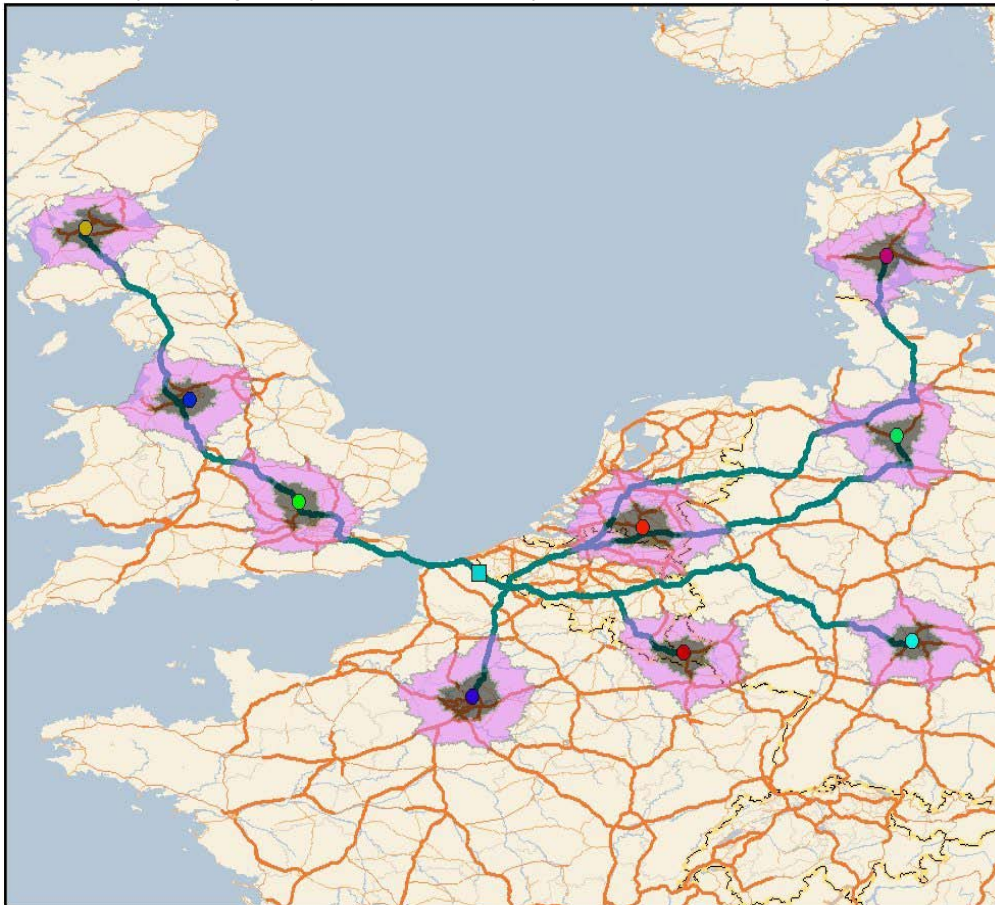


Areas at risk from lightning sparked wildfires in Boulder County, CO.

The most pervasive use of GIS in the banking industry is to monitor compliance with the Community Reinvestment Act (CRA) and the Home Mortgage Disclosure Act (HMDA). Banks also match the services used by clients to where the clients live in order to establish demographic profiles. Areas with similar demographics are then targeted with specific marketing campaigns offering services most likely to be purchased.

Retailers use GIS for marketing in the same way bankers use GIS. They also determine levels and mix of stock based on the demographics of their trade areas. Some have gone as far as mapping long range weather forecasts to predict demand for various products and making sure the supply chain can react to these predictions.

Manufacturers monitor their supply chains to mitigate the effects of natural disasters and to optimize the delivery of goods based on transportation network capacity at different times of the day. Manufacturers have recently begun mapping warranty claims to investigate product failures in the context of location. An automobile manufacturer recently avoided costly fuel system warranty claims when they noticed that claims had an obvious geographic correlation. A faulty gasoline blend provided by one refinery was adversely affecting fuel systems so the refinery was responsible for damage and not the manufacturer.



Supply chain analysis England to Europe

CONCLUSION

The new GIS functions available from SAS open up new avenues of data analysis and new ways of presenting data to SAS users. Analysis of the effects of location on human and natural processes very often expose cause and effect relationships that are beyond the reach of non-geographic statistical methods. It is my hope that this paper will provide an impetus for current SAS users to begin looking at their projects in the context of location and its influence.

CONTACT INFORMATION

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