

# ArcUser

The Magazine for ESRI Software Users

## Worldwide Natural Hazard Atlas

*By Cornelia Schmidt, Swiss Reinsurance Company*

**Editor's note:** Raymond Chandler's tough guy detective John Dalmas was fond of saying, "Trouble is my business." That could also be the motto of the Swiss Reinsurance Company (Swiss Re), one of the world's leading international reinsurance companies. Founded in Zurich in 1863 and still headquartered there, Swiss Re operates in more than 30 countries providing risk transfer, risk financing, and asset management.

Reinsurance companies share the risks that direct insurance companies cannot carry alone. This requires Swiss Re to constantly improve its methods for assessing and managing risks from natural disasters. In addition to using GIS for research and analysis, Swiss Re has developed a service, Catastrophe Network (CatNet), that disseminates information to direct insurers and other organizations via an ArcIMS application. It provides information on 500,000 locations, including risk rates and CRESTA Zones (i.e., insurance industry zones that separately evaluate total exposure in different areas), so users can more intelligently evaluate risks.

In 1999, insured losses caused by natural catastrophes amounted to \$24.4 billion of which \$7 billion resulted from storms and earthquakes. This claims burden was second only to losses incurred from Hurricane Andrew in 1992. These ominous developments coupled with the globalization of the insurance industry have created an increasing demand for global information on natural hazards and ways of insuring against them.

Swiss Re's Reinsurance and Risk division is helping meet this demand with CatNet, an Internet-based electronic atlas. Clients have comprehensive information on natural hazards worldwide, country-specific insurance information, and loss event data available 24 hours a day. Since 2000, users of this service have been able to access in-depth information. It provides easy access to up-to-date maps, showing the most relevant perils worldwide. This tool helps users estimate more accurately the risks for any location on earth within minutes.

It is available, along with other products, through the Swiss Re portal ([www.swissre.com](http://www.swissre.com)). Clients register to use CatNet or any other products available. After verification, a user name and password are sent to the client that provide access to CatNet for an eight-week trial period free of charge.

### Using CatNet

The atlas, powered by ArcIMS 3, includes typical identification, zooming, panning, and view extent tools and buttons for displaying legends and printing maps. An eraser tool removes labels resulting from a specified search when they are no longer needed. Specific display and query functionality for natural hazard information is built into CatNet. Clicking the Hazard button displays the following list of natural hazards for which data is available:

- Natural perils
- Seismic hazard
- Volcanoes
- Wind hazard
- Flood hazard (selected countries only)

Historic event collection on earthquake epicenters, tropical cyclone tracks, and tornadoes in the United States as well as CRESTA Zone information is also accessed from this window.

Users can search for data on approximately 500,000 locations, countries, named tropical cyclones (approximately 2,500 recorded between 1900 and 2000), earthquakes (important events named by location), and approximately 1,500 volcanoes. Selected features are labeled. The Source button displays the data sources and processing methods used.

### Data Sources

CatNet uses a variety of data sources—primarily data from Infotech Enterprises Europe as well as ESRI datasets and a world map from Chalk Butte

Inc. Swiss Re's Cat Perils group, composed of hazard and GIS specialists, processes and maintains most of the hazard data.

CatNet currently offers detailed information about country-specific insurance conditions for Australia, Canada, Belgium, France, Germany, Israel, Japan, Mexico, the Netherlands, the United Kingdom, and the United States. The country pages offer in-depth information about the insurance situation, natural catastrophes, and economic figures—information that is otherwise difficult to acquire. New countries are added on a regular basis and developed jointly with the market divisions.

CatNet also supplies information on natural catastrophic events, such as fatalities and losses, and the impact of these events on insurance. It includes a comprehensive manual and a glossary.

### Architecture and Specifications

Swiss Re chose its first Internet platform, ELRIX, as the CatNet platform. The ELRIX architecture is on IBM WebSphere running on Solaris using a standard servlet connector with ArcIMS 3. An additional servlet proxy bean—miniservlet engine—was built to host the “insecure” ArcIMS servlet and fulfill Swiss Re's security requirements for transactions.

### How It Works

Let's say an insurance company located in Baldwin, Louisiana. This company needs information on potential natural hazards. By going directly to the Hazard Atlas and using the location finder for Baldwin, Louisiana, and choosing the desired city, this information can be quickly accessed. The view automatically zooms to Louisiana and the city is labeled.

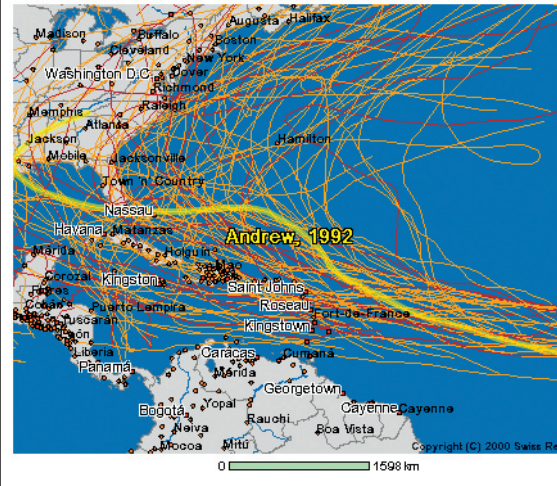
Clicking the Hazard button displays all available perils that can be displayed several ways, depending on the topic. Choosing Seismic Hazard With Earthquakes will show that Baldwin has little exposure to seismic hazard. However, choosing Tropical Cyclone Tracks reveals that Baldwin is highly exposed to cyclones. The user can use the Identify tool to query each individual cyclone track as well as Baldwin itself to get a preliminary risk rate in permille (i.e., tenths of a percent). In addition, the CRESTA Subzone information will be added where applicable.

Activating the Source button not only shows information on the data supplier but also explains data processing and links specific terms to a comprehensive glossary that is part of the manual.

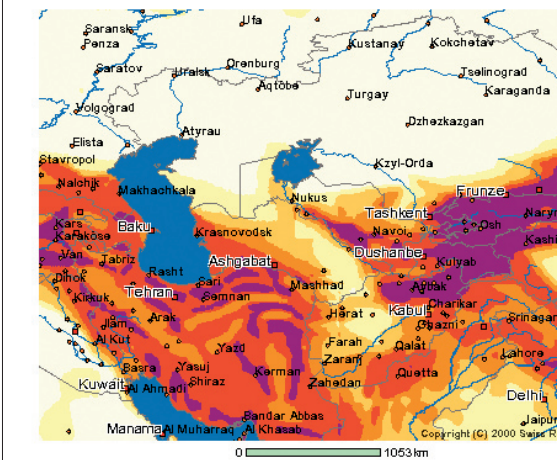
### Outlook

The next generation of CatNet will include additional data for search and orientation as well as more natural hazard data—such as European winter storms, hail, and earthquakes—stored

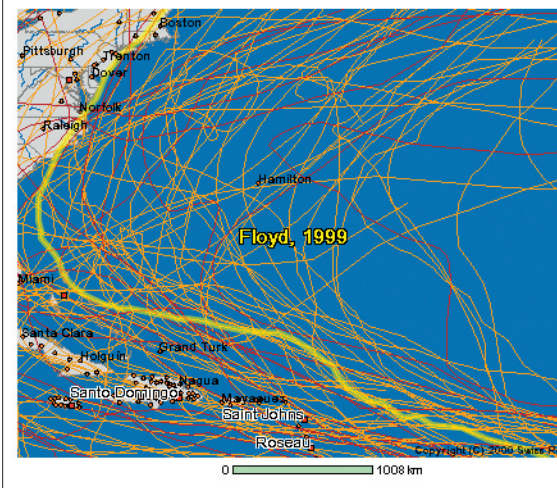
## Natural hazard atlas



## Natural hazard atlas



## Natural hazard atlas



ArcIMS powered CatNet lets users search for data on hazards for approximately 500,000 locations.

Map tools



- [Hazard](#)
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Map tools

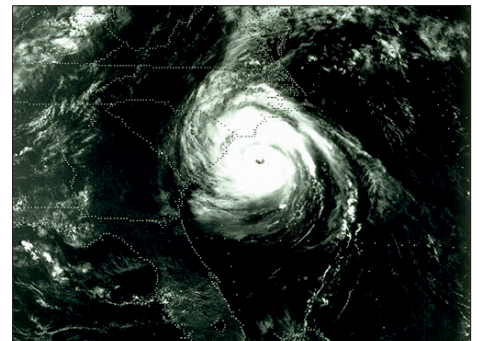


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Map tools



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using ArcSDE. The additional functionality will be supplied by features such as geographic analysis tools, geocoding, and latitude and longitude input capability. Clients will also be able to send portfolios based on ZIP Code, CRESTA Zone and Subzone, or administrative units and see the distribution of values in these portfolios. CatNet will be expanded as part of a server system called CAT Online System (CATOS), which will offer a comprehensive geographic database with GIS technology using ArcSDE and ArcIMS, risk information maps,

and advanced CAT rating engines to support all Swiss Re internal applications with GIS-related information.

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Cornelia Schmidt received her undergraduate degree in physical geography from the University of Trier in Germany and a graduate degree in cartography from International Institute for Aerospace Survey and Earth Sciences (ITC), the Netherlands. She was a GIS trainer and consultant at ESRI Geoinformatik GmbH, Germany, and ESRI Geoinformatik AG, Switzerland, from 1989 to 1996. She has been responsible for GIS at Swiss Re since 1999.



For more than 30 years ESRI has been helping people manage and analyze geographic information. ESRI offers a framework for implementing GIS technology in any organization with a seamless link from personal GIS on the desktop to enterprisewide GIS client/server and data management systems. ESRI GIS solutions are flexible and can be customized to meet the needs of our users. ESRI is a full-service GIS company, ready to help you begin, grow, and build success with GIS.

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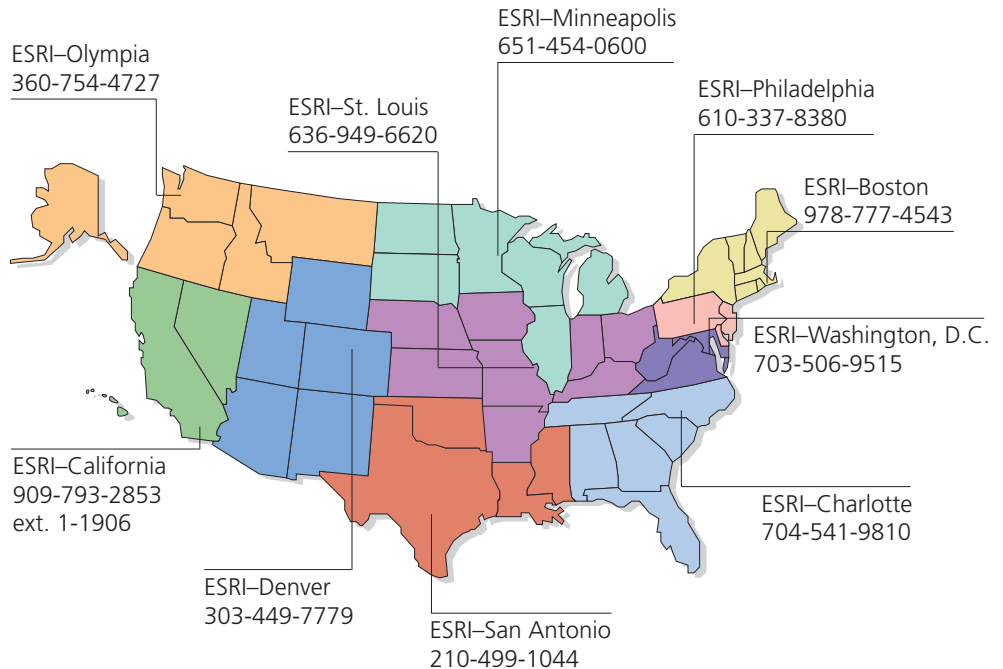
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