



The **COSMOS Virtual Data Center (VDC)** is an unrestricted web-based search engine for access to worldwide earthquake strong-motion data. It provides an interactive resource for research and practicing earthquake engineers, earth scientists, and government and emergency response professionals. The VDC is the only on-line strong-motion resource continuing to expand and significantly improve the accessibility and the use of strong-motion records worldwide.

Users have a wider range of access options than any other on-line source; using the VDC, they may search for specific characteristics of the data, view data in a geographical perspective, preview records, compare recorded data with design spectra and retrieve the data and metadata of most interest to them.

**Data available via the VDC**

In the last few years substantial data sets representing earthquakes with magnitude > 5.0 have been added: ChiChi, Taiwan; all New Zealand records from 1966-2006; the NSF-funded Guerrero array on the Pacific Coast of Mexico, as well as smaller but seismically important data sets from Central Asia, Turkey and India. As a measure of the international reputation of the COSMOS VDC, the Institute of Geological and Nuclear Sciences Ltd, New Zealand, and the Department of Earthquake Engineering, Indian Institute of Technology, Roorkee, India requested that their accelerograms and metadata be stored and distributed directly from the VDC.

*In 2000, FEMA estimated that the annual losses due to earthquakes for the U.S. alone was \$4.4 billion. Strong-motion time histories acquired by seismic networks are critical to earth scientists for understanding the physics of the earthquake process and to improve our ability to predict ground shaking from future earthquakes. The data of observed ground motions are important to engineers for designing safer structures, ultimately reducing the cost of earthquakes and loss of life.*



The heavily damaged Acorn/Mastagni Bldg, Paso Robles, CA, after the 12/22/2003 San Simeon earthquake. (Photo by Janise Rodgers, USGS).

All of the records from the large legacy dataset distributed by the National Geophysical Data Center (NGDC) are currently being added to the VDC. The VDC continues to incorporate all data available from the USGS and CISN with magnitude > 5.0 in highly seismic areas and > 4.5 in other areas. The VDC incorporates all data from the Japanese K-Net and Kik-net networks with a pga of at least 0.1g. Recent data sets from these sources include the 2004 Parkfield and Niigata-Chuetsu earthquakes and aftershocks. The VDC has also recently added data for the Kobe 1995 earthquake. The VDC is currently in negotiations with the Geological Survey of Canada and the European Strong-Motion Database to link to their datasets through the VDC. Thus the VDC can be expected to continue its exceptional expansion and its service to the earthquake research community.

**Search for Data on the VDC**

The Map Interface displays earthquakes and stations on a world map, which users may reconfigure by entering latitude and longitude ranges, zooming in, clicking on a station or earthquake symbol to transfer to station or earthquake pages, or highlighting the stations reporting a selected earthquake.

The Earthquakes Page lists earthquake name, magnitude, number of stations and data provider for all earthquakes available through the VDC by region, with a drop-down list of regions at the top of the page for quicker navigation.

The Stations Page lists owner and station name for all stations available through the VDC by region, and also has a drop-down list of regions at the top of the page.

The Basic Search Page allows the user to enter the most common parameters. The user may also tailor the output to reflect station information only, earthquake information only, or all data, for the result set.

The Advanced Search Page allows the user to query and recover almost every field in the database. The user may select an html table or a station page as the output of the advanced search, or download the metadata as an rtf file.

**Increase In Data Available Via The COSMOS VDC**

	Sept 2001	Jan 2007	Increase
Earthquakes	199	623	213%
Stations	1,744	3,555	104%
Accelerograms	11,537	36,248	214%

## Preview Data via the VDC

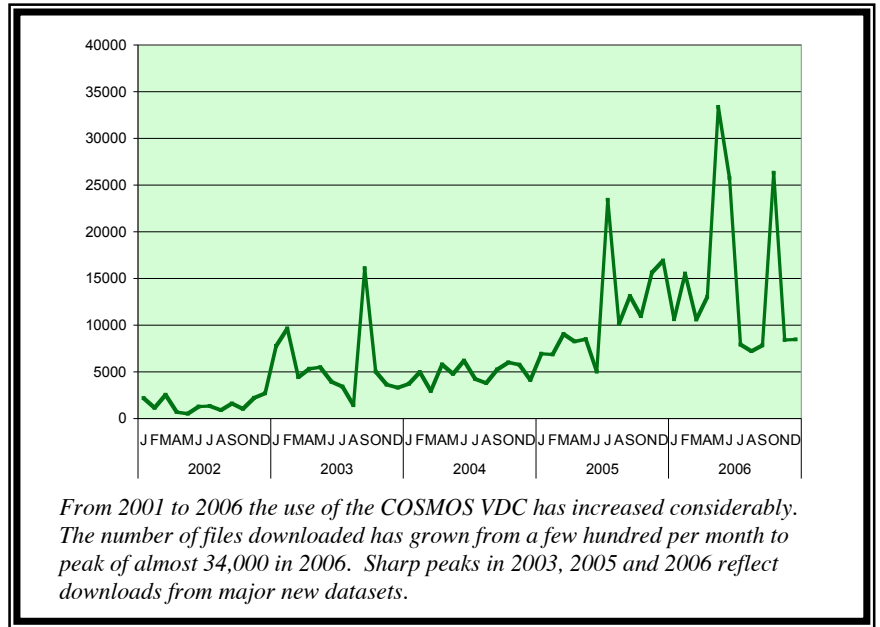
Each html search result page has a link to a new map of the results of the search, a link to each station and earthquake represented, to acceleration plots for each station, and to both logarithmic and linear plots of response spectral acceleration. The user may configure the units in which the spectra are displayed, scale the spectra and enter parameters to define the shape of overlaid design spectra that correspond to several building code standards.

## Download Data via the VDC

There are 3 ways to download data:

- on many Earthquake Pages, there is a link to a zipped archive of files for that event, allowing the user to download all data for the selected earthquake.
- on the Download Page, users may select individual files for downloading.
- on the Download Page, users select files and receive them as a set of zipped files containing up to 30 data files each, together with a log of files included.

The VDC is virtual in that the



accelerograms reside with the source agencies. At the time of the user's request data files are pulled in real time from these agencies that collected and archived the data. Thus, users will always receive the most recent and authenticated copy of data available.

When you use this data in your publications, please acknowledge both COSMOS and the data owners.

## In Development

COSMOS is currently developing a simplified, comprehensive, and extensible strong-motion format that is both easily computer-parseable and human-readable. This format will facilitate metadata extraction for the VDC database, website plotting of all data products and conversion of files to various formats including xml, Excel and MatLab compatible files.

During the spring of 2007 the VDC will become part of the new National Center for Engineering Strong Motion Data, a joint venture between the USGS (ANSS and NSMP) and CGS (SMIP) with centers of operation in Sacramento and Menlo Park, CA. The VDC provides search resources and highly valued access to international data that complement the US data in the Center. COSMOS will continue to provide guidance and advocacy for the VDC.

*The VDC provides a one-stop shopping approach for finding strong-motion data collected anywhere in the world.*

