

# The Strong-Motion Virtual Data Center (VDC) Fact Sheet 2013

Hosted and supported by CESMD ([strongmotioncenter.org/vdc](http://strongmotioncenter.org/vdc))

Facilitated by COSMOS ([www.cosmos-eq.org](http://www.cosmos-eq.org))



## About the VDC

The Strong-Motion **Virtual Data Center** (VDC) is an unrestricted web-based search engine for access to worldwide earthquake ground response 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 worldwide strong-motion records.

The VDC is virtual in that, in most cases, the accelerograms reside with the source agencies. At the time a user issues a download request, the selected data files are pulled in real time from the servers at the agencies that have collected and archived the data. Thus, users will always receive the most recent and authenticated version of the data.

Users have a wide range of access options; using the VDC, they may search for records with specific characteristics, view data in a geographical perspective, preview records, compare recorded data to design spectra, and retrieve the data and metadata of interest to them. Access is provided through the VDC website at: [www.strongmotioncenter.org/vdc](http://www.strongmotioncenter.org/vdc)

## VDC Data Inclusion Criteria

The CESMD works, through the VDC, to provide access to significant ground motion strong-motion records from data providers worldwide. However, the event selection criteria used are not

*“The February 2011 Christchurch earthquake was a powerful natural event that severely damaged New Zealand's second-largest city, killing 185 people in one of the nation's deadliest peacetime disasters.”*

*Strong-motion time histories acquired by seismic networks are critical to Earth scientists for understanding the physics of the earthquake process and for improving our ability to predict ground shaking and related effects from future earthquakes.*

*The role of VDC is to provide access to the significant strong-motion data recorded anywhere in the world*



*(Above) RNZAF aerial survey of damage, showing flooding due to soil liquefaction in Christchurch. (Quote and photo with caption from Wikipedia, last accessed 11/12/2013)*

uniform. In its early years the VDC under UCSB attempted to include earthquakes of magnitude  $M \geq 5$ . In some areas that are highly active seismically, such as Japan, the magnitude threshold was raised to  $M=5.5$  and a maximum hypocentral depth of 100 km was used to limit the data volume to a manageable level; later, following the 2011 Tohoku earthquake, the CESMD raised the magnitude threshold to  $M=6$ . In other areas where the level of seismic activity is low, such as in the Eastern U.S., a magnitude threshold of  $M 4.5$  is used. Exceptions to these criteria are made to include events judged to be of significant interest.

## VDC Database Updates

One of the challenges in providing virtual access to data records is maintaining awareness of and responding to changes in data formats, content, and file structures at the servers for various networks providing data. The CESMD recently responded to three such situations, ranging in complexity from simply changing the

server URL for the UNR website ([www.seismo.unr.edu](http://www.seismo.unr.edu)), to addressing re-structuring of the data file system for Japan NIED that accompanied the merging of K-NET & KiK-net sites (<http://www.kyoshin.bosai.go.jp/>), to updating links to reflect extensive revisions to data content and file naming conventions at the New Zealand GNS Science website (<http://info.geonet.org.nz/display/appdata/Strong-Motion+Data>). The CESMD gratefully acknowledges the help from these networks in identifying and resolving these issues.

## Search for Data at the VDC

The updated VDC at CESMD preserves much of the look and feel of the COSMOS VDC with newly added important features that include:

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

### Increase in Data Available Via the VDC

	Sept 2001	Sept 2013	Increase
Earthquakes	199	697	250%
Stations	1,744	4,552	161%
Accelerograms	11,537	51,796	349%

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 search result.

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.

## Previewing Data

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

## Downloading Data

There are three ways to download data:

- On many Earthquake Pages there is a link to a zipped archive of files for the event, thus 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 may select files and receive them as a set of zipped files containing up to

30 data files each, together with a log of the files included.

Users of strong-motion data via the VDC are kindly requested to acknowledge both the data owners and the VDC in their publications and presentations.

## In Development

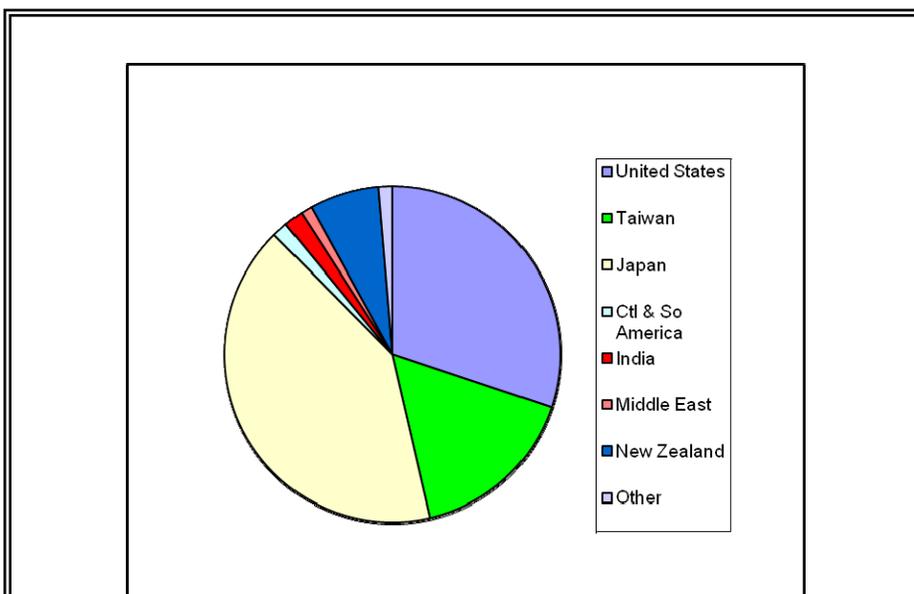
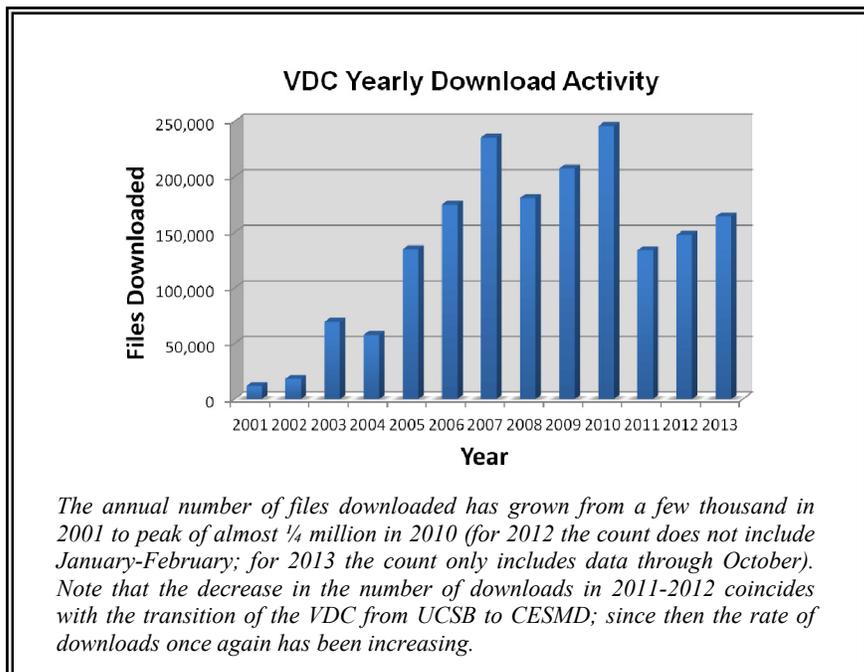
Collaboration with other international strong-motion networks is facilitating the development of converters from local network formats to the VDC XML in order to access additional significant strong-motion data.

## COSMOS Is a Facilitator

The COSMOS serves as a liaison in facilitating data access from international strong-motion networks. As an advocate promoting the use of strong-motion data, COSMOS also provides input and advice on developing tools and software applications.

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

*Please send comments to:  
cesmd@strongmotioncenter.org*



*Users download data from a variety of data providers through the Strong-Motion VDC. This chart displays the source regions of data that were accessed between September 2012 and September 2013. This chart clearly reflects high interest in records from the 2011 Tohoku earthquake and its aftershocks in Japan. Although records from the United States (USGS, CGS, universities, etc.) account for next the largest share, a substantial number of files from Taiwan and New Zealand were also downloaded.*