

The Strong Ground-Motion Virtual Data Center (VDC) Fact Sheet 2014

Hosted and supported by CESMD (strongmotioncenter.org/vdc)

Facilitated by COSMOS (www.cosmos-eq.org)



ABOUT THE VDC

The Strong-Motion **Virtual Data Center** (VDC) is an unrestricted web-based search engine for accessing worldwide earthquake ground response data. It provides an interactive resource for researchers, 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 use of worldwide strong-motion records.

The VDC was developed at U.C. Santa Barbara with support from the Southern California Earthquake Center (SCEC) and COSMOS, and was operational in 2000. In 2006, COSMOS, California Geological Survey (CGS), and U.S. Geological Survey (USGS) agreed to transfer the operation of the VDC to the Center for Engineering Strong-Motion Data (CESMD), which is jointly supported by USGS and CGS.

The VDC is virtual in the sense that most of the accelerograms reside with the source agencies. Thus, at the time a user issues a download request, the most recent and authoritative versions of the selected data are pulled in real time from the servers at the agencies that have collected and archived the data.

VDC users have a wide range of data selection tools: (a) they may search for records with specific characteristics; (b) view data in a geographical perspective (c) preview records; (d) compare recorded data to design spectra; and (e) retrieve the data and metadata of interest to them. Access is provided through the VDC website at:

www.strongmotioncenter.org/vdc

“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 the 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)

VDC DATA INCLUSION CRITERIA

Through the VDC, the CESMD works to provide access to significant ground strong-motion records from data providers worldwide. However, the event selection criteria used are not uniform. In areas that are highly active, such as Japan, the magnitude threshold of $M=5.5$ and a maximum hypocentral depth of 100 km are used to limit the data volume to a manageable level. 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

Since September 2013, access to more than 9300 strong-motion records from 770 seismic stations and 90 earthquakes has been added to the CESMD VDC. The regional magnitude thresholds for these events are 5.0 in the U.S. and 5.5 in Japan and New

Zealand. These additions represent a 13% increase in the number of earthquakes, and a 19% increase in the number of accelerograms available via the VDC.

Some issues with virtual data access have been resolved. These problems resulted from recent changes in data formats, content, and file structures on the servers of some networks providing data. These experiences point out some of the ongoing challenges in providing continuity in virtual data access.

SEARCH FOR DATA AT THE VDC

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 the 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,

Increase in Data Available Via the VDC

	September 2001	June 2014	Increase
Earthquakes	199	787	295%
Stations	1,744	5,322	205%
Accelerograms	11,537	61,387	432%

earthquake information only, or all data, for the search result.

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

THE ROLE OF COSMOS

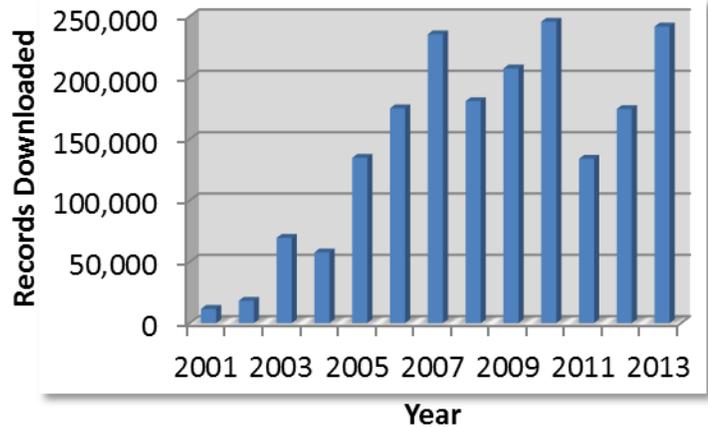
COSMOS serves as a liaison in facilitating data access from international strong-motion networks by advocating and promoting the use of strong-motion data, and by providing input and advice on developing tools and software applications.

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

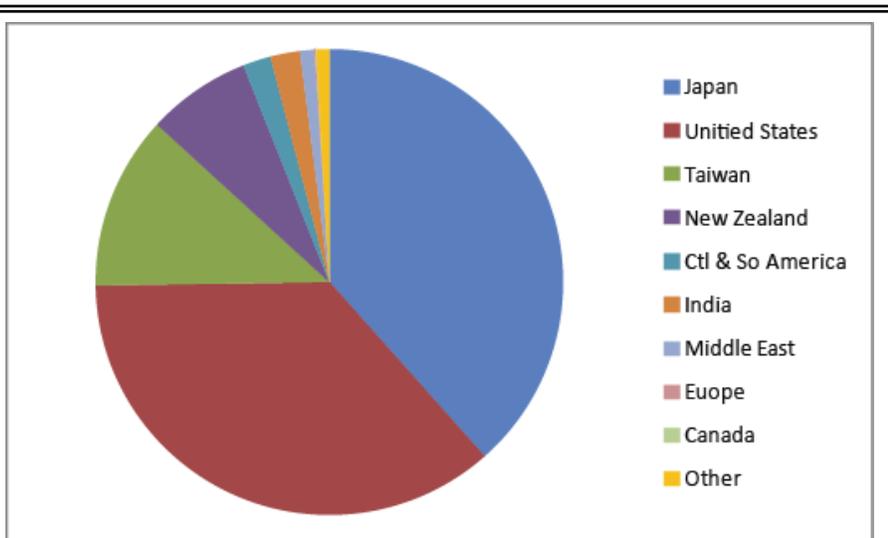
*Please send comments to:
cesmd@strongmotioncenter.org*



VDC Data Download



The annual number of files downloaded has grown from a few thousand in 2001 to peak of almost ¼ million in 2010 (for 2012 the count does not include January-February). Note that the decrease in the number of downloads in 2011-2012 coincides with the transition of the VDC from UCSB to CESMD; since then the rate of downloads once again has increased in 2013.



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 December 2013. This chart clearly reflects high interest in records from the United States and Japan.