

IASPEI SeismoArchives Project: A brief summary by Willie Lee (June 23, 2011)

The SeismoArchives Project is under the auspices of IASPEI and is being carried out by volunteers. In 2004, the IRIS Data Management Center kindly agreed to host an online website so that scanned seismogram images and related data files can be openly accessed at: <http://www.iris.edu/seismo/>. It contains scanned seismograms, station information, and some useful books and papers. However, collecting, scanning, and preparing the necessary website files have to be done, and unfortunately, no funding agencies are willing to support such activities directly. We depend on volunteers, scanned seismogram files contributed by research/data rescue projects, and private donations.

Thanks to (1) Bob Hutt -- about 150,000 WWSSN seismograms were scanned (mostly by USGS funding for data rescue or research projects); (2) Jim Dewey -- about 70,000 seismograms from historical seismogram microfilms (through his USGS research project); (3) Emily Brodsky -- about 20,000 Caltech paper seismograms (through Google); (4) Willie Lee -- about 50,000 seismograms (through his various research projects and his private donation); and (5) other donors -- about 10,000 seismograms. Although a total of about 300,000 seismograms had been scanned, only about 80,000 seismograms are now available online. A big bottle neck is the time required to organize the scanned seismogram files and related materials in a form suitable for IRIS DMC to post online.

Some highlights in the past year are: (1) About 20,000 Caltech paper seismograms scanned by Google are now online at: http://www.iris.edu/seismo/projects/caltech_archive/; (2) The Caltech paper seismogram collection (~500,000 seismograms from 1920s to 1980s) is now stored at the California Department of Water Resources in Sacramento (in stead of being discarded); (3) About 30,000 pre-1963 seismograms from microfilms contributed by USSR and Japan to the IASPEI/Unesco Historical Seismogram Filming Project were commercially scanned (thanks to a private donation); (4) We started collaboration in scanning historical seismograms of Coimbra (Portugal), De Bilt (the Netherlands), Eskdalemuir (Scotland), Hamburg (Germany), Irkutsk (Siberia), and Toledo (Spain); (5) UC Berkeley donated their collection of seismic bulletins for merging with the USGS collection in Menlo Park, forming one of the largest collections of the world; and (6) The USGS Earthquake Science Center in Menlo Park set up a fast scanning facility and has hired a summer student to start systematic scanning of seismic bulletins, which provide arrival times and amplitude data for re-locating pre-1963 earthquakes and computing their magnitudes.

Why Paper Seismograms and Station Bulletins Are Necessary?

Any probabilistic seismic hazard analysis (PSHA) requires a reliable database of earthquake source parameters that are derived by modern methods of data processing and analysis using instrumental data (seismic, geodetic, etc.), historical records, and field observations of earthquake effects (intensities from damage, fault ruptures, etc.). Modern data analyses (such as seismic moment tensor inversion) were not developed until the 1970s. Collecting and analyzing paper seismograms are so time consuming that only a few hundred earthquakes occurring before 1980 (i.e. before the digital era) have been studied using modern methods. Analog seismograms dated back to the 1880s, and global coverage of analog seismographs began by ~1900. Digital seismograms dated back to the 1970s, and global coverage of digital seismographs began by ~1985. Therefore, over 100 years of analog seismograms and station bulletins can supplement the ~25 years of digital seismograms. The March 11, 2011 catastrophic Japan earthquake/tsunami suggests that we must analyze seismograms and station bulletin data as far back as possible.

OpenSeismo Website for File Sharing and Preparation

Beginning in May, 2011, the IASPEI SeismoArchives Project operates a website with FTP file transfer (<http://www.openseismo.org/>) so that contributors can share files, and for the project volunteers to prepare final files for the SeismoArchives at the IRIS DMC. It has a 12-terabyte hard disk, enough to hold over 100,000 high-quality scanned seismograms. Some preliminary and prepared files can be accessed openly for "public" comments.

Bottleneck and Some Proposed Solutions

Our bottleneck is due to the lack of any direct funding for the IASPEI SeismoArchives Project. We have a backlog of ~220,000 analog seismograms, but we do not have enough volunteers to perform quality assurance and prepare the meta data that are necessary to make use of the scanned seismogram files. There are still about 10 million analog seismograms worldwide, but they are disappearing fast. We propose IASPEI to pass a resolution urging seismological observatories to preserve their analog seismograms and to join the SeismoArchives Project by scanning their seismograms and preparing the necessary meta data. We urge individual seismologists to join the SeismoArchives Project by volunteering as "archivists" of earthquakes that they are interested. We urge funding agencies to support the IASPEI SeismoArchives Project.

Reference

Jim Dewey will present an invited talk on July 2 at the IUGG General Assembly in Australia. The title is: SeismoArchives: Making Analog Seismograms Available for Online Access (by R. Benson, W.H.K. Lee, C.R. Hutt, T. Knight, T. Ahern, M.F. Diggles, S.R. Walter, and J.W. Dewey).