Preservation of WWSSN and Historical Seismograms

A committee has just been established by the International Association of Seismology and Physics of the Earth's Interior (IASPEI) to raise awareness and hopefully some funds from institutions and individuals so that WWSSN and Historical seismograms can be scanned into image files for long-term preservation. By establishing "International Digital Earthquake Archives" (IDEAs) online, seismograms and related materials can be made freely accessible for selected earthquakes from 1882 to early 1980s. This committee is now being organized by W.H.K. Lee [current members includes: Tim Ahern (USA), Josep Batllo (Spain), Harold Bolton (USA), Graziano Ferrari (Italy), Bob Hutt (USA), Hiroo Kanamori (USA), Ota Kulhanek (Sweden), Alberto Michelini (Italy), Guust Nolet (USA), Roger Musson (UK), and Johannes Schweitzer (Norway)]. If you have any comments or suggestions, or better yet, if you are willing to serve, please contact him at lee@usgs.gov (office) or whklee@ix.netcom.com (home).

Background

Since the late nineteenth century seismologists have been recording earthquakes worldwide, using smoked papers or photographic papers (until the digital era beginning in the mid-1970s). Unfortunately, most of these paper seismograms from a few thousand seismic observatories or stations (from 1880s to 1970s) have not been preserved properly, leading to huge amounts of loss. In the late 1970s, an IASPEI working group chaired by W.H.K. Lee (with financial support from U.S. Geological Survey (USGS) and in collaboration with National Oceanic and Atmospheric Administration (NOAA)) began an effort of microfilming selected "historical" seismograms up to 1962. Unfortunately, the project was terminated prematurely after about 5 years, with only about 500,000 "historical" seismograms microfilmed out of over 20 millions that existed in the 1970s (Lee et al., 1988).

In the late 1990s, a three-year project aimed toward the preservation of historical paper seismograms and bulletins (period 1895-1980) of the Italian seismic observatories was started by the Istituto Nazionale di Geofisica e Vulcanologia (INGV) in Italy. The project ("Progetto Sismos") was financed by the Italian Ministry for the Environment. Very high-resolution scansion equipments (up to 2500 dpi) were acquired and some "ad hoc" personnel were hired. So far, a total of nearly 60,000 records have been scanned. In September 2002, at the European Seismological Commission meeting in Genoa (Italy), a project entitled "Saving and Studying the Seismograms of the Strongest Euro-Mediterranean Earthquakes" (commonly known as EuroSeismos) was put forward (more information is given on http://storing.ingv.it/Es_web/). Twenty eight countries have adhered to this initiative. In this project, INGV has scanned so far a total of 4,500 records

provided by twelve European observatories. The current earthquake set consists of about 800 events that occurred in the Euro-Mediterranean area.

WWSSN Film Chips

In the late 1950s, a group of university seismologists persuaded the US government to install standard seismographic equipment (3-component long- and short-period seismographs, and an accurate clock) at over 100 sites worldwide. These stations formed the Worldwide Standardized Seismographic Network (WWSSN), with the seismograms sent to NOAA for microfilming and distribution (Oliver and Murphy, 1971). Seismograms from these WWSSN stations played an important role in defining plate boundaries and confirming the existence of transform faults. From 1962 to the early 1980s, about 5 million WWSSN film chips were produced. When digital stations became common in the mid-1980s with easy online access from the Data Management Center (DMC) of the Incorporated Research Institution for Seismology (IRIS), WWSSN film chips fell out of favor. Nevertheless, they are the only source of worldwide seismograms for earthquakes in the 1960s and most of the 1970s.

As far as we know, there are only two complete sets of WWSSN film chips now in existence (one at Lamont Earth Observatory and the other at USGS). Recently, Bob Hutt and Harold Bolton of the USGS's Albuquerque Seismological Laboratory (ASL) obtained a grant of about $40K to scan about 11,000 film chips from the International Council of Scientific Unions (ICSU). After this scanning, the USGS collection will be boxed up and sent to the U.S. National Archive, and access will be very limited after that. However, IRIS is now urging the USGS to keep the collection at ASL for a few more years so that the seismology community has some time to consider the preservation issue.

As pointed out by Guust Nolet of Princeton University, it is important to preserve the WWSSN [and other historical] seismograms by scanning into image files, otherwise, the deterioration of microfilms will soon render these valuable seismograms unusable. Since the cost of scanning a film chip is about $4, we need at least a few million dollars to preserve a significant portion of WWSSN and historical seismograms. Unfortunately, it is nearly impossible to raise this kind of money from US National Science Foundation (NSF) or USGS, the two major agencies funding earthquake studies in the United States. Therefore, W. H. K. Lee proposed an alternative to raise funds from institutions and individuals to establish the "International Digital Earthquake Archives" (IDEAs), in which seismograms for selected earthquakes will be "scanned/digitized" with other relevant information.

Endowed Earthquake Archives

The Committee is now creating endowed earthquake archives for selected earthquakes. For example, to honor a recent deceased colleague at USGS, W. H. K. Lee has started an endowment of the "Jerry P. Eaton Memorial Archive of the 1966 Parkfield Earthquake".

This archive will contain scanned image files of the 1966 Parkfield earthquake recorded on the WWSSN film chips, information about Jerry Eaton and the data he collected for the Parkfield aftershocks, and PDF files of selected papers on the Parkfield earthquakes (please visit http://whklee.org/). Such an earthquake archive will greatly facilitate further research of the Parkfield earthquake and is freely accessible on the Internet. Additional donations of money or digital files are welcome and will be added to the initial endowment and archive. An endowment donor may name the endowed earthquake archive in honor of a person of his/her choice. However, the name of the endowed earthquake will remain the same as given by the local authority, usually after the geographical name of a nearby town.

The minimum cost to scan the WWSSN film chips of an earthquake is $500 (for about 120 chips), and the cost can go up considerably if more WWSSN chips and other materials are scanned and digitized. Therefore, we set a minimum "endowment" donation at US$500. Since IASPEI has tax exempt status in the United States, donations are tax deductible in the US. All donors will be acknowledged in the "Introduction" of an endowed earthquake archive.

We realize that $500 is not a small amount of money for endowing an earthquake archive, but we think that institutions and private individuals may be willing to make donations to honor their dear ones, or a group of people may join together to donate this amount of endowment money to honor their former professor, or a dear colleague.

IASPEI will handle the donated money to pay for scanning WWSSN and Historical seismograms. The scanned image files will be hosted by the IRIS Data Management Center.

IASPEI Website and Committee Website

Eric Bergman, the Webmaster of the IASPEI Website (http://www.iaspei.org/), agreed to include summary pages from the Committee for Preservation of WWSSN and Historical Seismograms. This summary pages will be brief, but with links to the Committee Website (http://whklee.org/) for details of the earthquake archives.

The Committee Website has been setup by W. H. K. Lee at his home. Available earthquake archives will be listed; each earthquake archive will have its own directory with (1) "introduction" (showing the honoree and the donor(s)), (2) a biography of the honoree, (3) selected papers on this earthquake, (4) photos, maps, etc. about this earthquake, and (5) links to the scanned image archives hosted by the IRIS Data Center. In additional, information to send endowments and donations will be given. The IASPEI Committee will also set guidelines and standards for materials to be included in the earthquake archives in collaboration with the Archive Committee of the Seismology Society of America (SSA).

Discussion

The Committee urges seismologists to get involved in persuading their institutions and/or individual colleagues to create a win-win situation, rather than waiting for funding agencies to act on the long-term preservation of seismograms. Unlike experiments in chemistry or physics, observations of earthquakes cannot be repeated at will. One has to wait for decades or hundreds of years for recording a similar large earthquake near the same location. We have only about 25 years of digital seismograms, but if we scan and digitize the WWSSN and Historical seismograms on microfilm, then we will have an additional 100 years of data to study past earthquakes with modern analysis tools. Technology now exists to scan and digitize analog seismograms for easy access and permanent preservation. If we don't preserve these old seismograms now, they may soon be lost forever.

We would like to urge all seismologists around the world to join in this effort to construct digital earthquake archives. If you support having seismograms preserved for future research, please take some actions now. Please help by raising funds from institutions and individuals to scan WWSSN film chips and historical seismograms on microfilm, or by donating digital files of your favorite earthquakes.

We realize that preservation of seismograms must be carried out in conjunction with the broader developments of online earthquake information projects. Therefore, we urge regional and national seismological groups to develop "Euro-Seismos"-type projects, and our Committee can assist in constructing and disseminating digital earthquake archives for regional and national seismological centers.

Contact Information

The IASPEI Committee website address is: http://whklee.org/, and W. H. K. Lee can be contacted by e-mail at: lee@usgs.gov (office) or whklee@ix.netcom.com (home), or by mail at P.O. Box 60099, Palo Alto, CA 94306, USA.

References

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