

2007 June 22

Report from the

**Working Group on Reference Events for Improved Locations (REIL)
under the IASPEI Commission on Seismological Observation and
Interpretation (CoSOI)**

The immediate goal of this Working Group (WG) is to develop a set of earthquakes or other seismic sources for which hypocenter information (origin time, latitude, longitude, depth) is accurately known, and whose seismic signals are large enough to be detected at distances out to 1000 km and perhaps teleseismically. We are calling such earthquakes (or other seismic sources) "**reference events**." Our larger goal is to enable the seismological community to do a better job of locating earthquakes.

The WG now consists of

Bob Engdahl and Paul Richards, co-chairs and the following members (together with their affiliations and main area of expertise):

Avi Shapira, International Seismological Centre, seismicity from local and regional networks worldwide

Kiyoshi Suyehiro, Japan Marine Science and Technology Center (JAMSTEC), expertise with ocean-bottom networks

Rowena Lohman, Woods Hole Oceanographic Institution, InSAR

Liu Ruifeng, China Earthquake Administration, seismicity of China

Joachim Saul, GeoForschungsZentrum (GFZ) Potsdam, seismicity from temporary networks

Francis Wu, State University of New York, Binghamton, seismicity of Kanto region, Japan, Taiwan and Himalayan regions

Godey Stephanie, European Mediterranean Seismological Centre (EMSC), European and Mediterranean regions

Andy Nyblade, Penn State University, African networks

Diana Comte, University of Chile, South American networks

Since the last meeting of CoSOI in Chile (2005), the first and most important activity of the group has been in association with the International Seismological Centre (ISC), to provide a practical working arrangement for receiving and disseminating information on reference events. This effort has been recently announced as a new service by the ISC. It is available via <http://www.isc.ac.uk/reference/reference.html> (subject to further revision). Via this URL, contributors are asked to submit basic information on events as follows:

Information about the nominated event: (*) required

Source parameters of the event :	
* Date and Origin Time (down to 0.001s or better) ex: yyyy/mm/dd hh:mm:ss.mms	<input type="text"/>
* Latitude (down to 0.0001 degrees or better)	<input type="text"/>
* Longitude (down to 0.0001 degrees or better)	<input type="text"/>
* Focal Depth (in km)	<input type="text"/>
* Estimated error in Origin time (± 1 ms)	<input type="text"/>
* Estimated epicentral error (± 0.0005 degrees)	<input type="text"/>
* Estimated error in Focal Depth (± 25 meters)	<input type="text"/>
* Region of Occurrence	<input type="text"/>

Contributors can also submit

Additional Data:	
Please submit text files when relevant	
Local velocity model used to locate the event	<input type="button" value="Choose File"/> no file selected
Information (lat, lon, elevation) of the location algorithm/method, stations used to locate the event and key statistics (eg: RMS, formal location error ...)	<input type="button" value="Choose File"/> no file selected
Arrival times of seismic phases to recording stations	<input type="button" value="Choose File"/> no file selected
Magnitude(s) process - Please specify type of magnitude and how it is determined.	<input type="button" value="Choose File"/> no file selected
Waveform data with full instrument response (attach or link to)	<input type="button" value="Choose File"/> no file selected
Focal mechanism and/or moment tensor solution	<input type="button" value="Choose File"/> no file selected
Master event data if relocated	<input type="button" value="Choose File"/> no file selected
Secondary data (eg: InSAR, surface geology, remote sensing measurements ...)	<input type="button" value="Choose File"/> no file selected
References to literature on seismicity in the region containing the nominated events.	<input type="button" value="Choose File"/> no file selected

The WG has previously developed guidelines for obtaining reference events.

The second activity of the group has been to organize a session for the 2007 IASPEI meeting in Perugia, Italy, on July 12, to be convened by Bob Engdahl, Paul Richards, and Avi Shapira. The session has invited contributions on:

- (1) Effective seismological and non-seismological methods for obtaining reference events in different regions;
- (2) Methods for implementing the use of travel-times that differ for each station (as determined in part from reference events), in the work of event location;
- (3) Evaluation of the accuracy of bulletin locations, as currently published using traditional methods, and as they might be published using improved methods: and
- (4) Use of reference events in testing 3-D Earth models and in other applications.

The session has attracted 13 oral presentations and 3 posters.

The final activity has been continued research on the acquisition of reference events, by members of the working group and others. Reports on this research are anticipated at the group's IASPEI session in July 2007.

After several years of preparation, in which several different approaches to obtaining reference events have been developed, the group now has a practical channel for its future efforts, namely the URL offered by the ISC, as noted above.