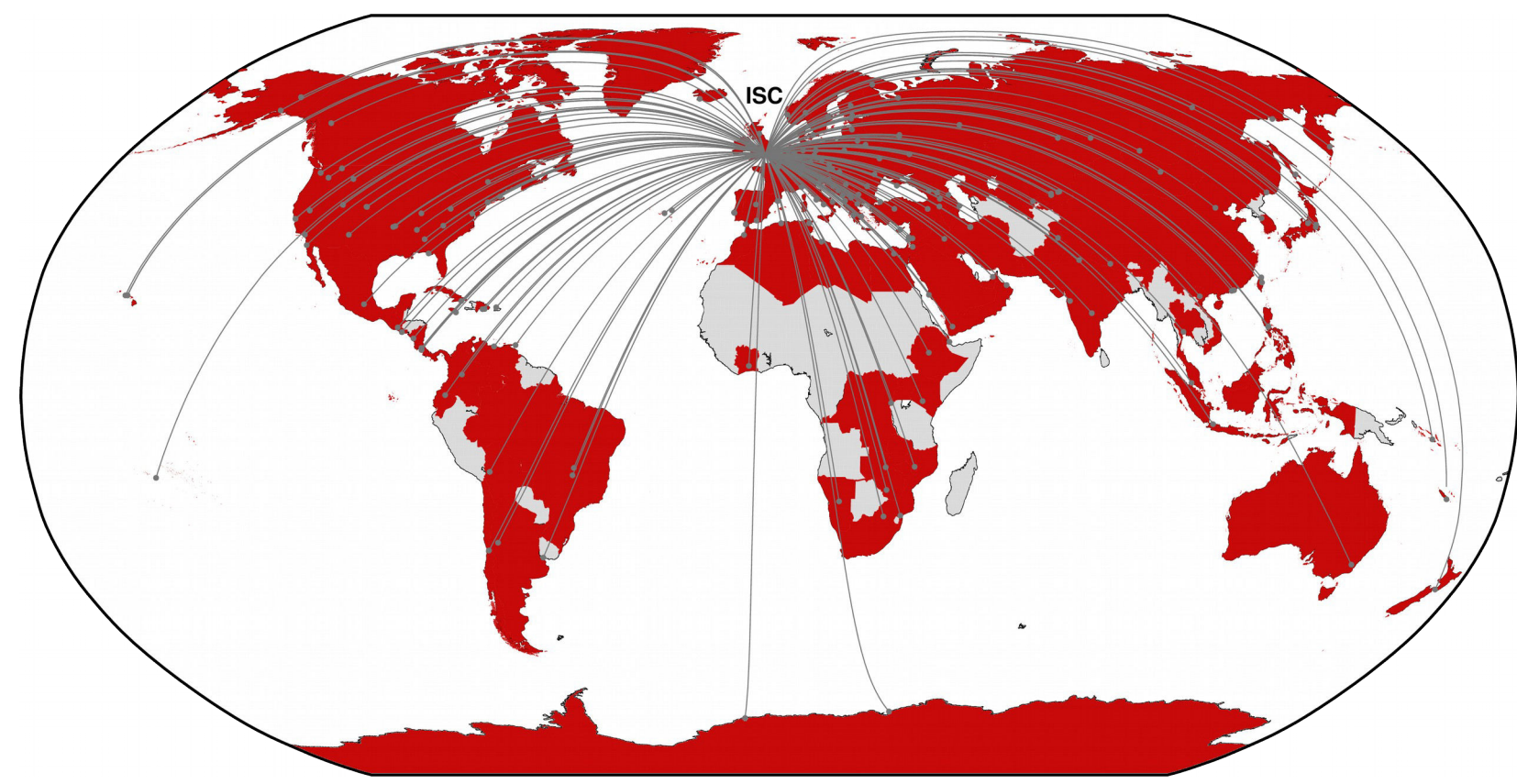


# The Status of the CTBTO Link to the ISC database

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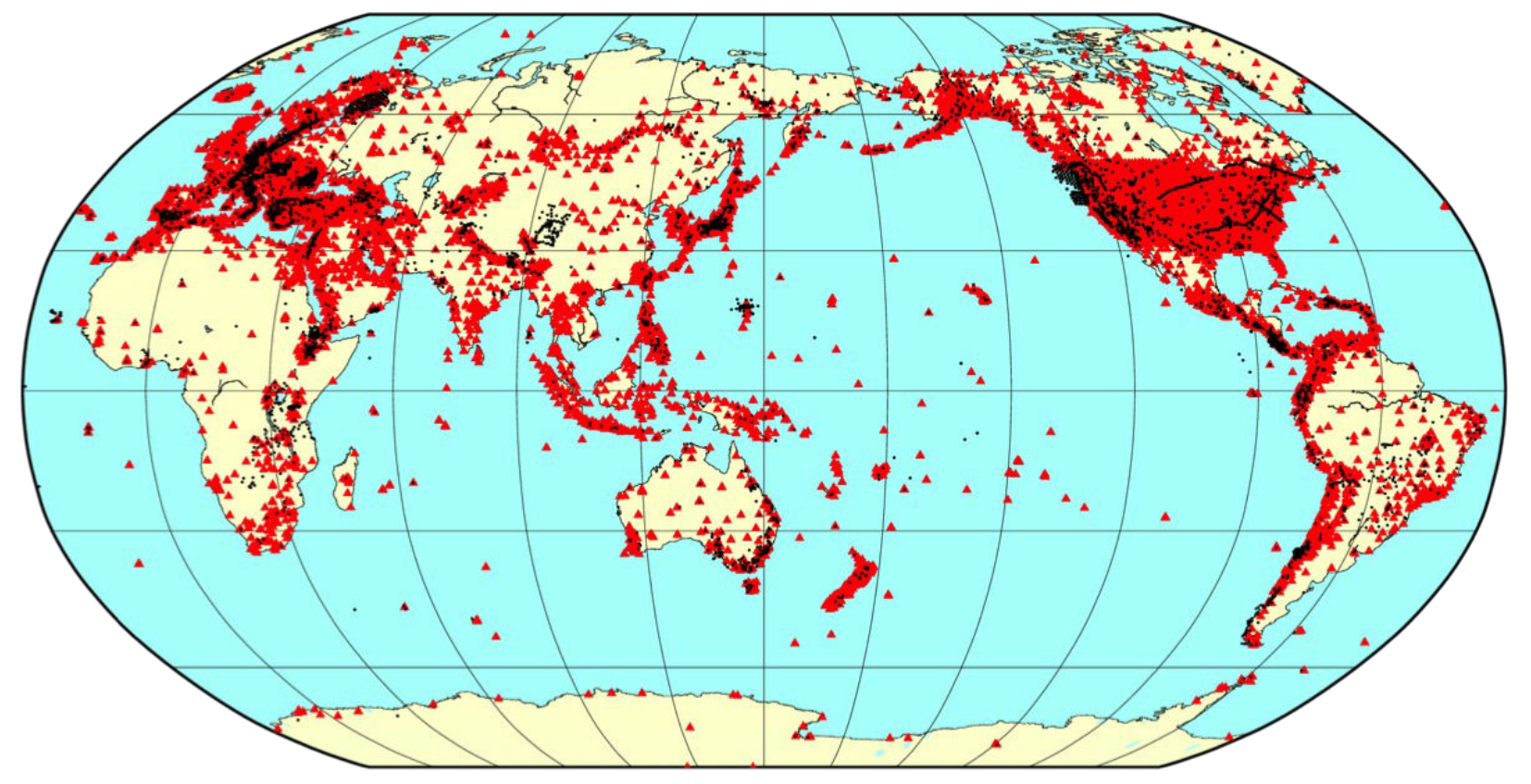
## 1. Introduction

### Agencies reporting to the ISC



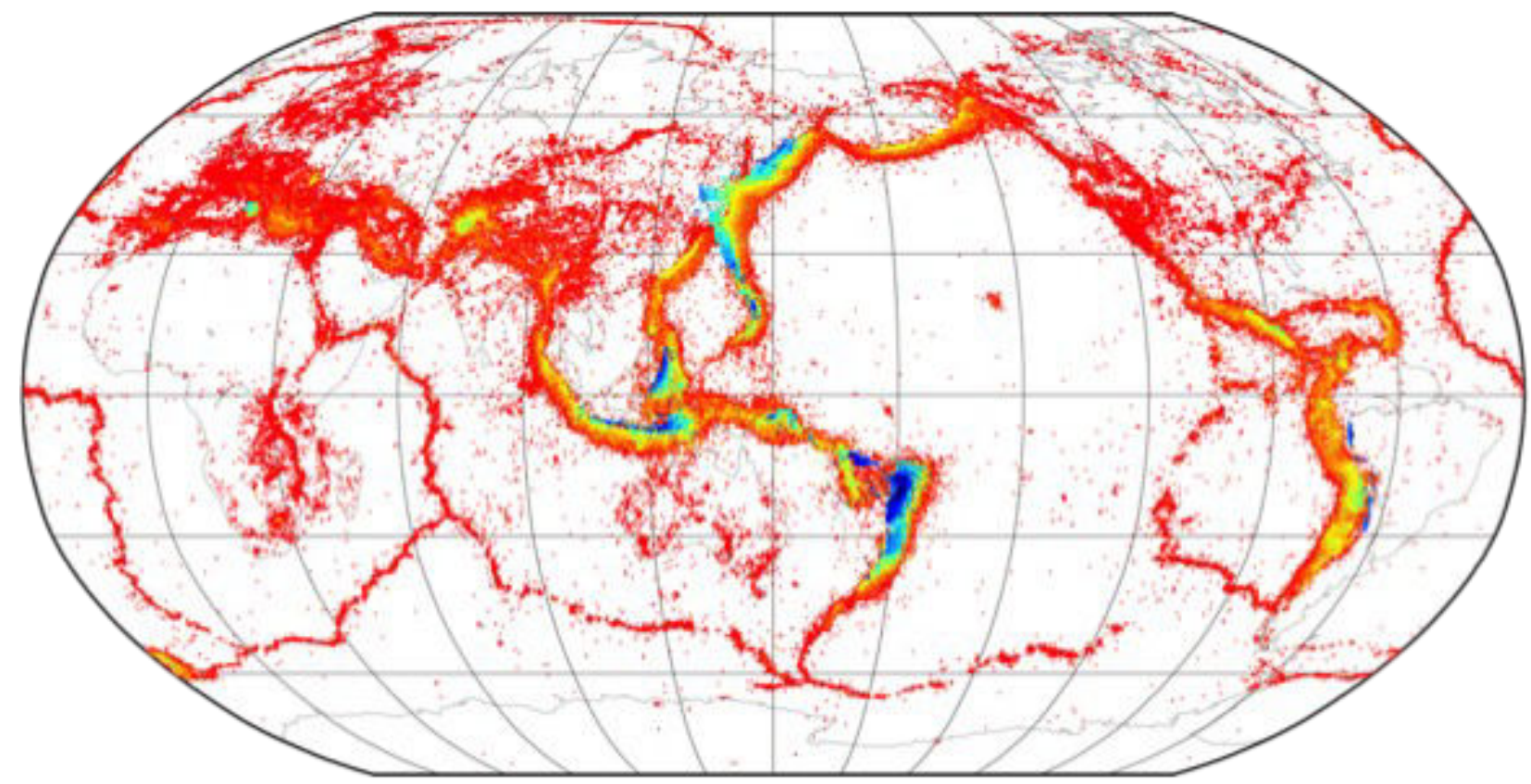
- Thanks to its non-governmental and non-profit making status, the International Seismological Centre (ISC) is able to regularly collect seismic bulletin reports from ~130 agencies from ~100 countries.
- At present, these reports contain parametric information from ~7,000 stations each year.
- 28 agencies also report preliminary data soon after event occurrence.

### Stations with data in the ISC Bulletin



- Over ~100 years, we registered ~24,000 seismic stations.
- Parametric information (arrival times, slowness, azimuth, amplitudes and periods of variety of seismic waves) from ~17,000 of them is contained in the ISC Bulletin.
- Many of these stations are operated near or at existing IMS sites for many tens of years.

### Events in the ISC Bulletin



- The ISC Bulletin is the most long-term, comprehensive and complete account of natural seismicity and other seismic events.
- Today, the ISC Bulletin contains ~6,000,000 events accompanied with ~150,000,000 seismic arrivals recorded at ~17,000 stations
- Thus, the ISC Bulletin and associated datasets remain one of the best reference and calibration datasets for monitoring research.

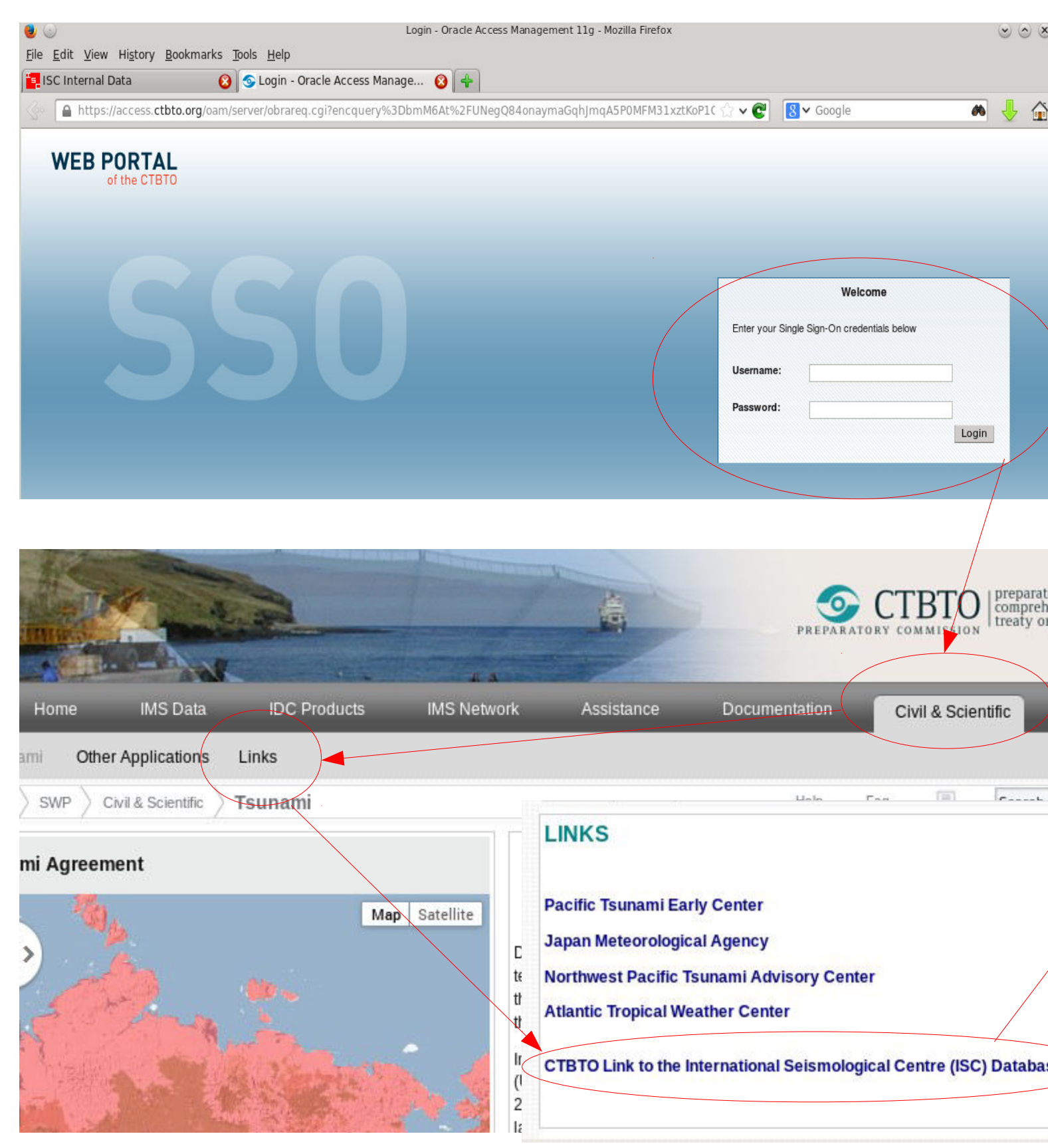
## 2. Objective of the Link

Design, maintain and extend a web-based interactive tool to:

- Provide access to the seismological datasets maintained by the ISC.
- Give historical perspective into current IMS observations based on the wealth of seismological recordings of non-IMS stations over the last 50-100 years.
- Help with waveform visualisation of non-IMS stations for the events in the REB bulletin.
- Collect and provide waveforms for the Ground Truth (GT) events maintained by the ISC on behalf of IASPEI.

## 3. Access to the Link

Access to the Link to registered parties (NDCs & PTS) is through the secure IDC portal:



### The Link provides:

- Four groups of searches based on: Area, REB events, IMS stations, GT events;
- Preview and ordering waveforms for specific events from major waveform data centres;
- On-line relocation of events using all available to the ISC arrival time data using the standard ISC locator and optional RSTT corrections;
- Magnitude regressions;
- Scientific Bibliography;
- Other useful tools and services.

## 4. Area based search

### Area based search

This is a graphical interface for an area based search within the ISC database. It includes a map, search parameters (circle/polygon), and a list of events with columns for Author ID, Date-Time, Hypocentre (Lon, Lat, Depth, Value), Magnitude, ISC Event Type, Preferred magnitude, and Bulletin in IMS 1.0 (EHB, GT, REB).

Author ID	Date - Time	Lon	Lat	Depth	Value	Type	Value	Type	Author	ISC	EHB	GT	REB
JTH	2012-04-01 00:34:41	23.554	38.855	24.6	3.4	ML			Earthquake				
YUE	2012-04-01 00:13:19	15.375	10.170	3.0					Induced Event				
YUE	2012-04-01 00:18:18	15.373	12.133	3.3	1.9	ML			Earthquake	1.9	ML		
SGP	2012-04-03 05:56:19	13.440	41.490	3.2									
BOH	2012-04-03 05:57:54	14.723	38.057	2.9	ML				Mining Explosions (suspected)				
DDA	2012-04-01 01:17:40	29.071	36.326	7.0	1.8	ML			Mining Explosions (suspected)				
BOH	2012-04-01 01:38:14	14.748	38.033	2.1	ML				Earthquake	2.4	ML		
JTH	2012-04-01 02:33:39	24.429	36.067	86.7	2.5	ML			Earthquake				
ISC	2012-04-01 02:36:16	14.644	37.026	0.0					Unknown				

List of events.

Magnitude type scatter plots and magnitude distributions.

## 5. IDC REB- based search

This interface shows the IDC REB-based search tool. It includes a map, search parameters, and a list of events with columns for Station, Network, Latitude, Longitude, Distance (deg), Azimuth (deg), Available channels, and Waveform.

Station	Network	Latitude	Longitude	Distance (deg)	Azimuth (deg)	Available channels	Waveform
MDJ	IC	44.617	129.591	3.348	6.440	BH*	
JNU	JP	33.125	130.877	8.295	169.392	BH*	
MAJO	IU	36.546	138.203				
BUT	IC	40.018	116.162				
HIA	IC	49.270	119.714	10.327	323.714	BH*	

A preview of the available waveforms of non-IMS stations.

## 6. IMS station based search

This interface shows the IMS station based search tool. It includes a map, search parameters, and arrival-time picks as a function of azimuth and P travel-time residual map.

P travel-time residuals as a function of azimuth. P travel-time residual map (the purple triangle shows the station's location).

## Internationally Registered (IR) stations proximate to WRA

This interface shows the IR stations proximate to WRA. It includes a map, a list of registered surrogate stations, and station WRA phase P observations.

Station Information	Reporting Period to the ISC				
CODE	Station Name	Latitude	Longitude	Started	Last
WB2	Warramunga Army Site B2	-19.943	134.351	1975-08-01	2011-09-01
WB3	Warramunga Army Site B3	-19.923	134.355	1976-12-01	1989-12-01
WB4	Warramunga Army Site B4	-19.904	134.359	1977-01-01	1977-03-01
WB5	Warramunga Army Site B5	-19.875	134.366	1989-01-01	1993-12-01

Median residual graph (top) and number of residuals (bottom) for WRA station. The red dots indicate a possible clock error. The green line is the overall median. The orange lines show the standard deviation based on the median absolute deviation, whilst the red horizontal lines show twice the standard deviation. The red columns show the number of residuals whose median (for that month) is outside two standard deviations from the overall median.

## 7. GT-based search

This interface shows the GT-based search tool. It includes a map, search parameters, and seismic phase arrival data for a selected event.

## 8. Further plans

- Monitor and maintain the link's operation in collaboration with the IDC and technical personnel of National Data Centres.
- Further improve and extend the GT database and the associated waveform archive, especially in Southern hemisphere.
- Continue improvement of the Link's capabilities, for instance, in station histories, waveform preview availability, magnitude statistics, moment tensor and event type availability, etc.
- Raise the awareness of the National Data Centres on this service and its capabilities.

## 9. Acknowledgements

