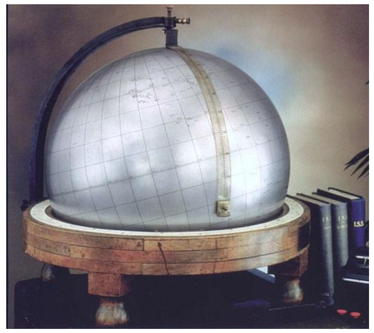


THE CTBTO LINK TO THE INTERNATIONAL SEISMOLOGICAL CENTRE (ISC)

István Bondár, Dmitry Storchak, Ben Dando and James Harris

International Seismological Centre

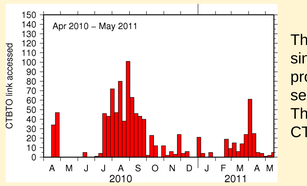
Customised, Secure Access to ISC Data Sets

The CTBTO Link provides secure web access to the data sets maintained at the International Seismological Centre through interactive tools. The unique access to the wealth of data via the CTBTO Link is provided exclusively to National Data Centres and PTS personnel.

- ISC Bulletin, the definitive bulletin of the seismicity of the Earth, 1960-2010
- EHB (Engdahl, van der Hilst, Buland ,1998) Bulletin, the groomed ISC Bulletin, 1960-2007
- IASPEI Reference Event List, ground truth database of GT0-5 events
- IDC REB
- International Registry of Seismograph Stations

The objective of the project is to provide the capacity for NDCs

- to assess the historical seismicity in a specific region
- to put an event of interest into context with the seismicity of the surrounding region
- to look at observations reported by non-IMS stations
- to compare hypocentre solutions provided by various agencies
- to investigate station histories and residual patterns of IMS or IMS surrogate stations



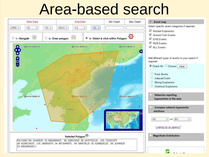
The CTBTO Link has been operational since September 2010. The link is provided to the NDCs through the IDC secure website hosting the Expert Area. The figure shows the activity on the CTBTO Link.

CTBTO Link: A Brief History

- The CTBTO Link is developed and maintained by the ISC
- Initial funding (August 2008 – March 2011) was provided by
  - UK Foreign and Commonwealth Office (90%)
  - NORSAR (2.5%)
  - the Geological Survey of Denmark and Greenland (GEUS) (2.5%)
  - the Swedish National Defence Research Establishment (FOI) (2.5%)
  - the University of Helsinki (2.5%)
- Consultation with UK NDC
- Concept demonstration presented to IDC representatives
  - December 2008: ISC, Thatcham, UK
  - December 2009: IDC, Vienna
- April 2009: Secure internet link established between the IDC and ISC
- July 2010: Test and feedback from PTS staff and select NDCs
- August 2010: Announcement of the CTBTO Link becoming operational at the WGB 35th Session
- September 2010: the CTBTO link is made available to all NDCs
- CTBTO Link functionality presented to NDC representatives
  - May 2010: NDC Evaluation Workshop, Nairobi
  - August 2010: Fringe meeting during the WGB 35th Session, Vienna
- April 2011 – March 2012 funding provided by the PTS

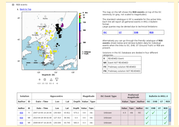
Case study: North Korea

Area-based search

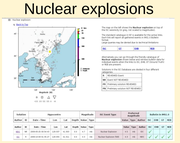


ISC events

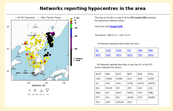
REB events



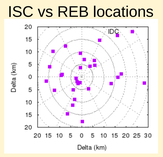
Nuclear explosions



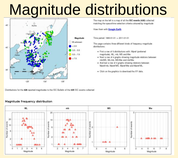
The area-based search allows the study of the historical seismicity inside a user-defined polygon



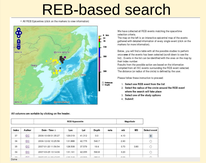
ISC vs REB locations



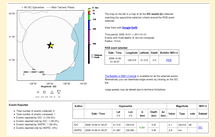
Magnitude distributions



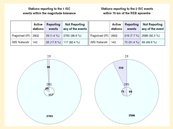
REB-based search



REB vs Ground Truth



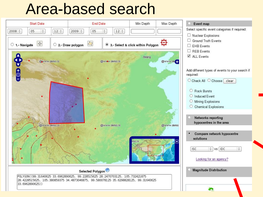
IMS network performance



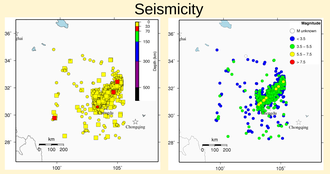
The REB-based search displays the seismicity in the vicinity of an REB event. It also provides comparisons between the REB locations and those from other agencies, as well as the assessment of the IMS network performance compared to all registered stations.

Case study: Sichuan, China earthquake

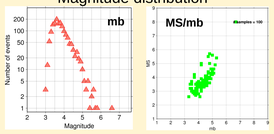
Area-based search



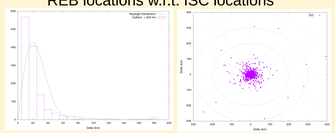
Seismicity



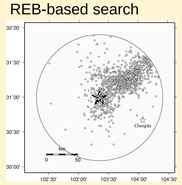
Magnitude distribution



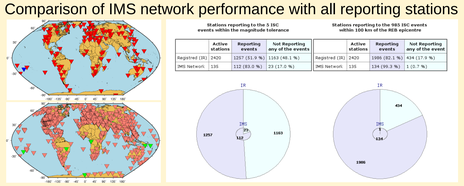
REB locations w.r.t. ISC locations



REB-based search



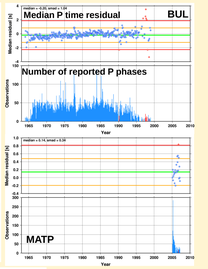
Comparison of IMS network performance with all reporting stations



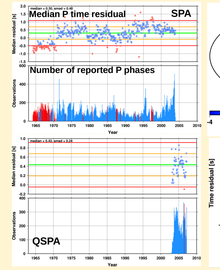
Station Histories

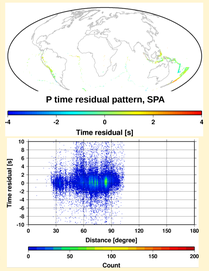
Many of the IMS stations have a relatively short operational history. Surrogate stations (colocated or nearby stations) registered in the International Registry of Seismograph Stations may provide insight for the expected time residual patterns from various seismically active regions.

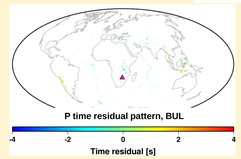
Bulawayo: a surrogate for Matopo, Zimbabwe



South Pole (SPA): a surrogate for QSPA, Antarctica

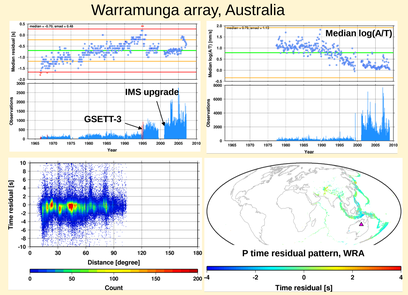




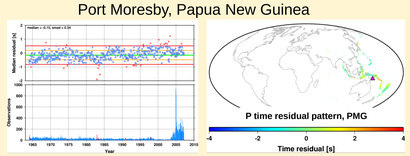


Some stations have a long operational history before becoming part of the IMS network. The upgrade to IMS standards typically results in an increase of reported phases and lowered detection threshold making the IMS network an essential contributor to global seismology.

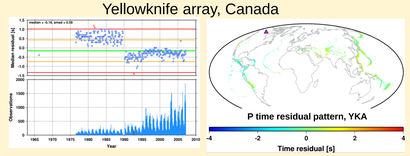
Warramunga array, Australia



Port Moresby, Papua New Guinea



Yellowknife array, Canada



Future developments

- Provide facility to request waveforms for REB events from non-IMS stations
- Provide images of non-IMS waveforms for REB events with reported picks from preliminary ISC bulletin
- Upgrade link between the IDC and ISC to 10 Mbps (~20 x faster upstream speed) using the existing slow internet line as a fall-back facility
- Improve the performance and reliability of the CTBTO Link
  - Provide 95% uptime
  - Decrease response times by 50%
- Improve interactive user interface using Google maps
  - Circular, rectangular and polygonal search regions
  - Editable polygons