

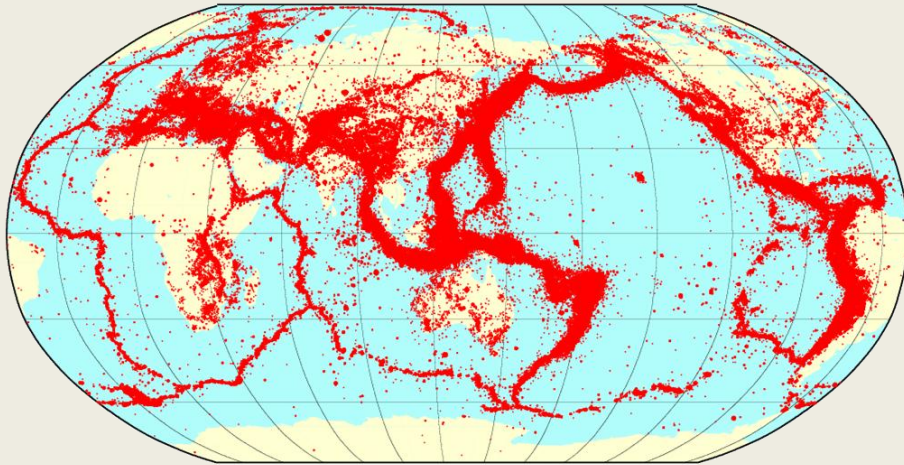
# ISC: Mission & Status

Dmitry A. Storchak, István Bondár & James Harris

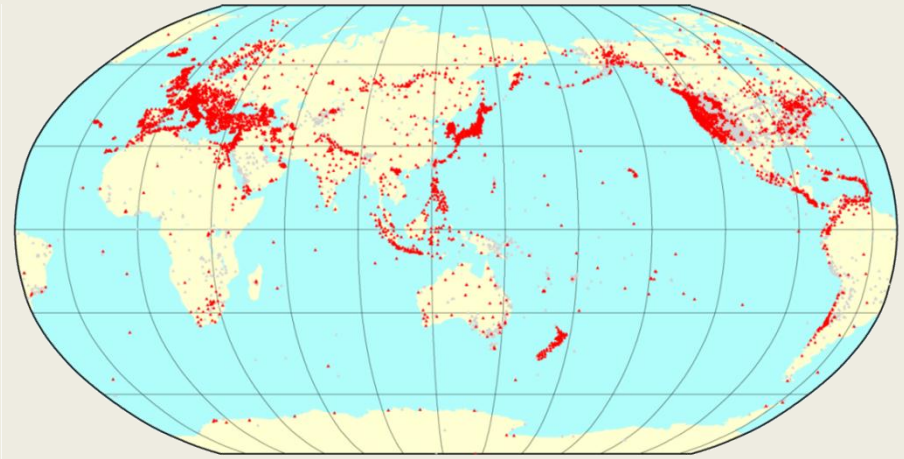
[www.isc.ac.uk](http://www.isc.ac.uk)

# ISC Missions

1: Global Seismic **Bulletin**



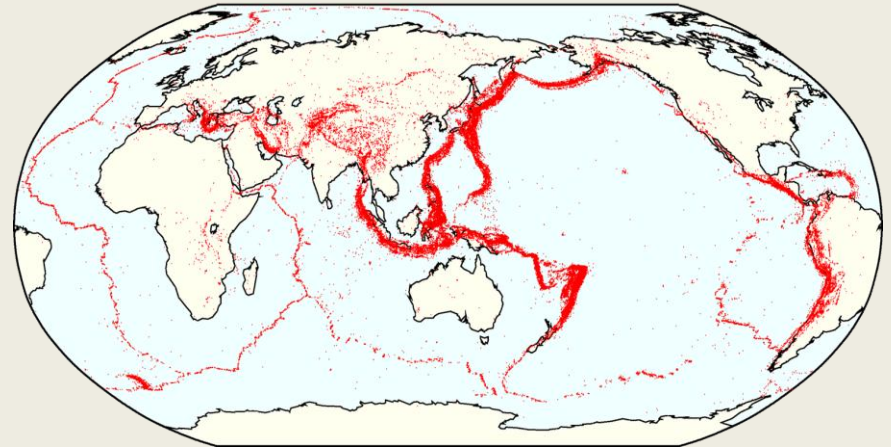
2: International Seismographic **Station Registry**



3: Reference Event (**GT0-5**) List



4: Hosting and distributing the **EHB**



# MISSION 1: Producing the ISC Bulletin

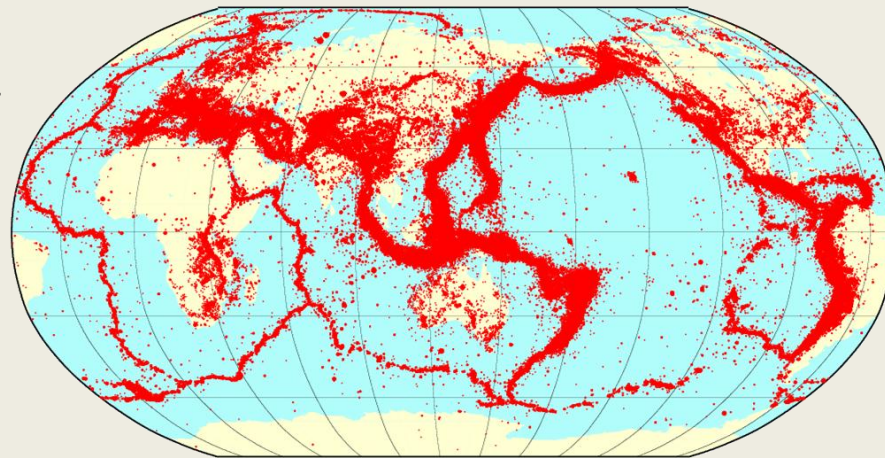
The **prime** mission of the ISC is to compile and distribute **the ISC Bulletin** that serves as the **definitive** summary of the world seismicity, the **longest continuous & uniform** set of bulletin data.

The Bulletin includes

- ✓ hypocentre solutions,
- ✓ damage reports,
- ✓ source mechanisms,
- ✓ magnitudes and
- ✓ seismic station arrivals,

received from agencies, grouped per physical event with ISC location and magnitude given where appropriate

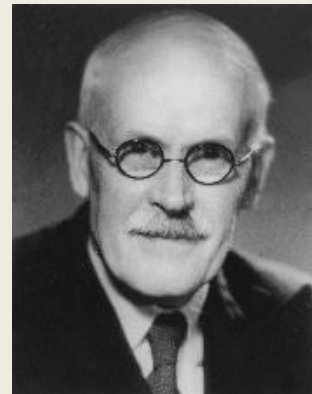
*3.5 million events*



*1960-2010*



*John Milne,  
1850-1913*

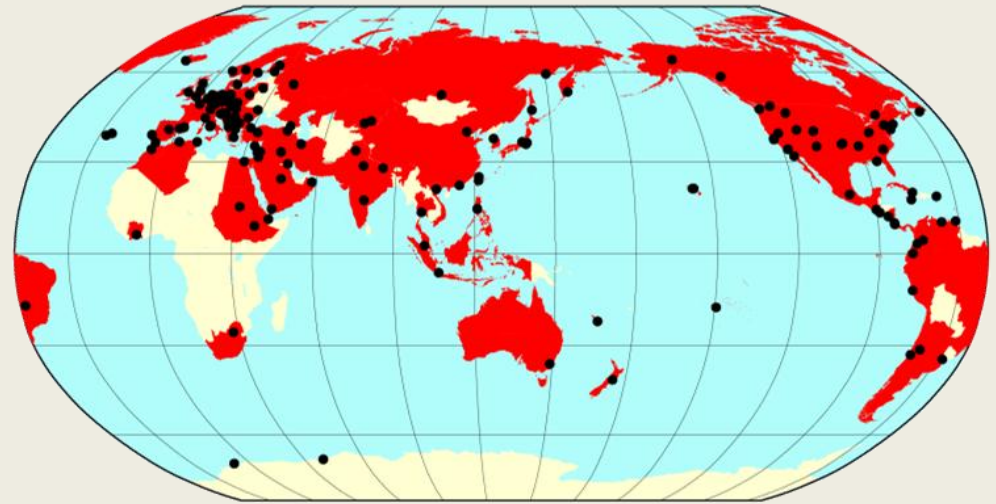


*Sir Harold Jeffreys  
1891-1989*



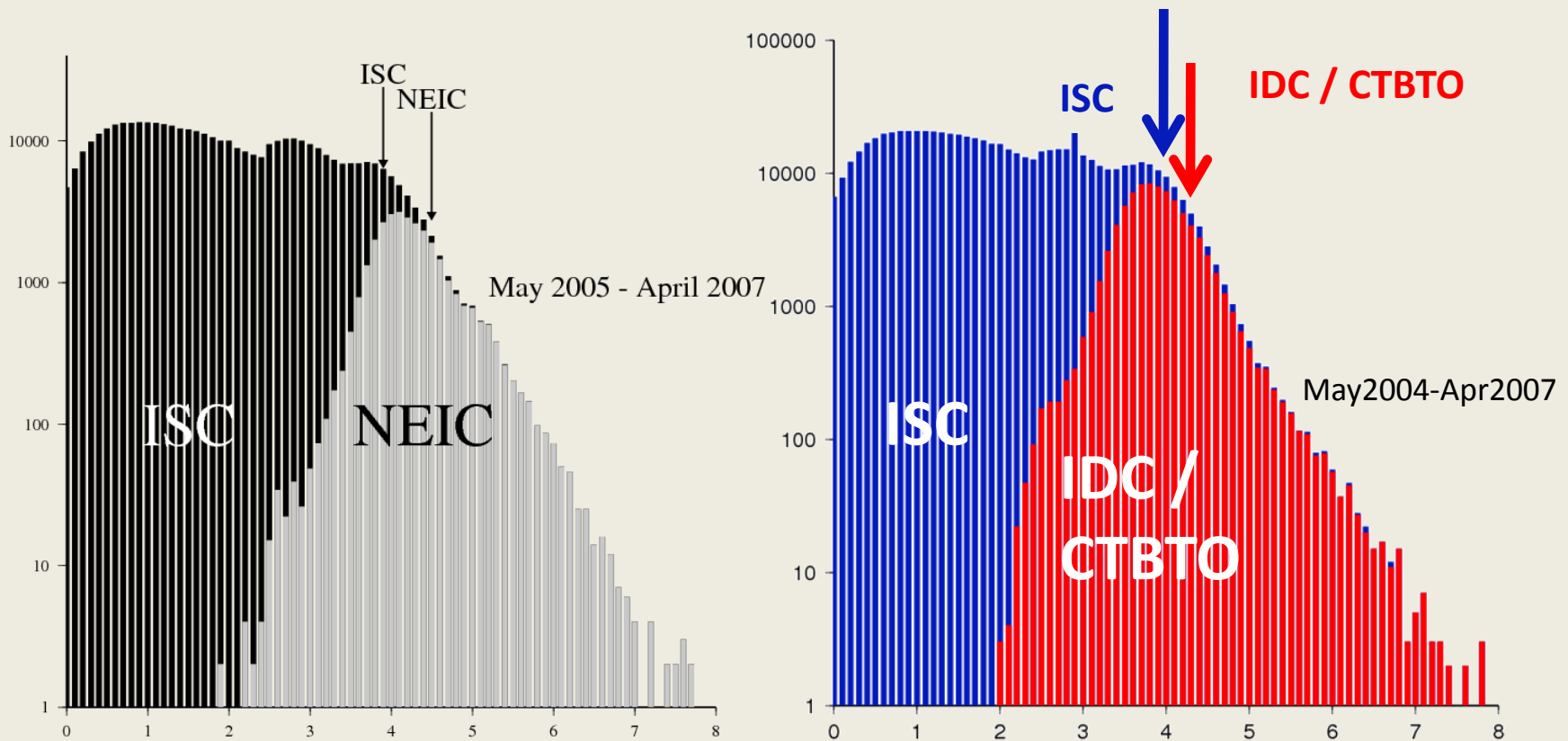
# ...MISSION 1: collecting bulletins around the world

- Thanks to the **international** and **non-governmental status**, the ISC is able to collect seismic bulletin information from 120 institutions worldwide
- In particular, the ISC data collection **includes** important data sets such as
  - ✓ NEIC, GCMT, EMSC, JMA etc
  - ✓ ISS (1900-1964)
  - ✓ EHB (1960-2007)
  - ✓ IASPEI GT (GT0-5 events)
  - ✓ US Array phase data
  - ✓ IDC REB
- The ISC data are **free and open**



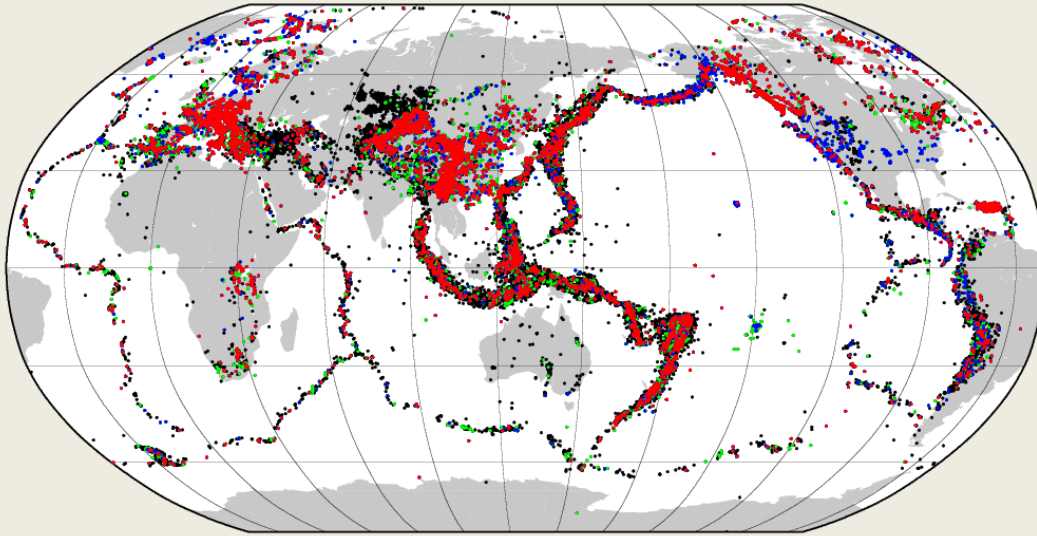
*~120 agencies contribute bulletin data to the ISC*

# ...MISSION 1, Completeness

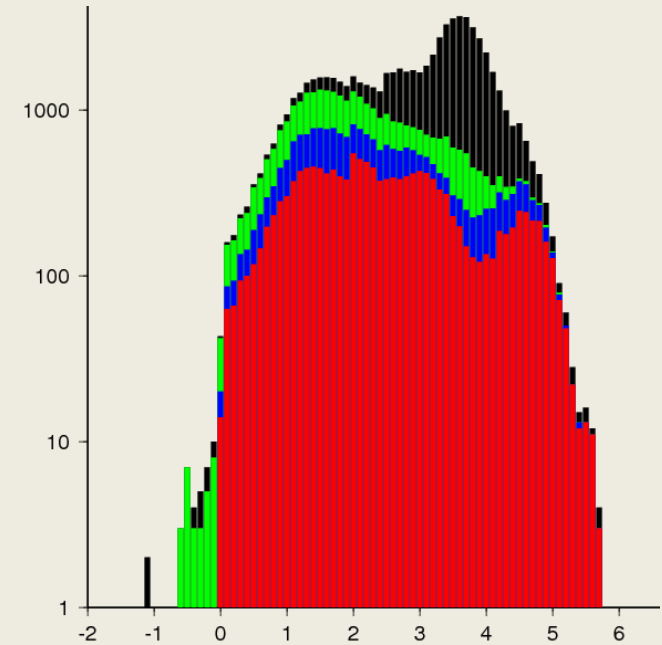


The ISC Bulletin includes bulletin data from many sources, including NEIC (USGS) and IDC (CTBTO). The ISC Bulletin is the most complete source of global bulletin data yet it is dependent on both NEIC and IDC fulfilling their mission. In turn, both IDC and NEIC use ISC data and cooperate with the ISC on a number of projects.

# ...MISSION 1: Preliminary & Final ISC Bulletins



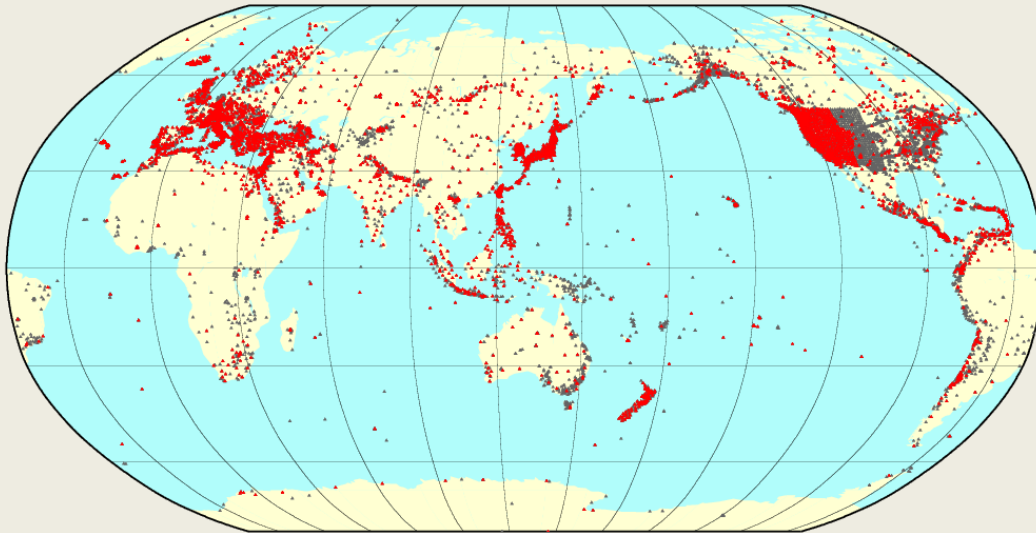
- The traditional **Reviewed ISC Bulletin**, based on the **final** data from networks is available 24 months after real time
- Until then, the **Preliminary ISC Bulletin**, based on **preliminary** hypocentre solutions and station arrival data from networks, is available from the ISC website in the order of days/weeks of event occurrence
- ISC own re-locations are always based on the final network reports. Therefore they first become available only as part of the traditional Reviewed ISC Bulletin.



- **Events reported within 3 days of occurrence**
- **7 days**
- **1 month**
- **4 months**

# MISSION 2: International Seismographic Station Registry

The ISC, jointly with the World Data Center for Seismology, Denver (NEIC), is responsible for running the International Seismographic Station Registry (IR).



**17,524** stations, open or closed, are currently registered in the IR; 4981 of those (red) reported seismic arrival data to the ISC in 2007. ~1650 **US Array** stations are integral part of the Registry.

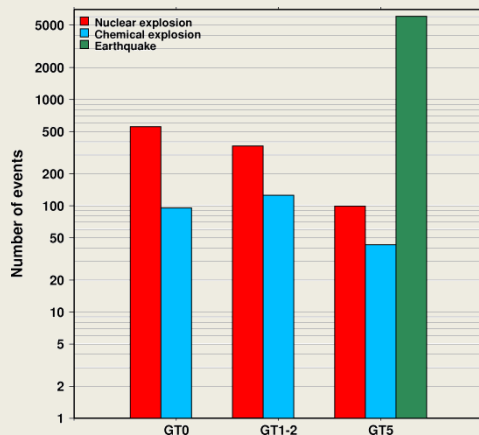
A screenshot of the International Seismological Centre (ISC) website. The page title is "International Registry of Seismograph Stations" and it is maintained jointly by the International Seismological Centre & World Data Center for Seismology, Denver. The main heading is "Provisional Station Registration". Below this, there is a link to "Station Registration Rules". The form is divided into two sections: "Station Details (fields with \* must be filled)" and "Contact Details (required to confirm registration)". The "Station Details" section includes fields for: Station code (with a note: "Uppercase letters and digits"), Station name (with a note: "Name of a nearby town or city"), latitude (with a note: "real number in [-90.0,+90.0]"), longitude (with a note: "real number in [-180.0,+180.0]"), Elevation (metres) (with a note: "surface height above geoid"), Depth (metres) (with a note: "instrument depth below surface"), Open date (with a note: "YYYY/MM/DD"), and Close date (with a note: "YYYY/MM/DD"). The "Contact Details" section includes fields for Name and E-mail. At the bottom of the form are "Register" and "Reset" buttons.

At the ISC web-site one can submit information to register a new station as well as search and obtain information about already registered stations.

# MISSION 3: Maintaining IASPEI Reference Event List (GT0-5)



7,334 GT0-5 seismic events  
with station arrivals



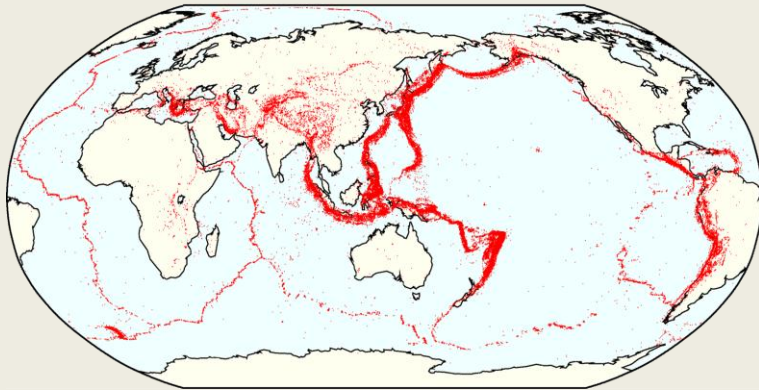
- GT (ground truth): locations known at 95% confidence level

GT0-5 locations are necessary to

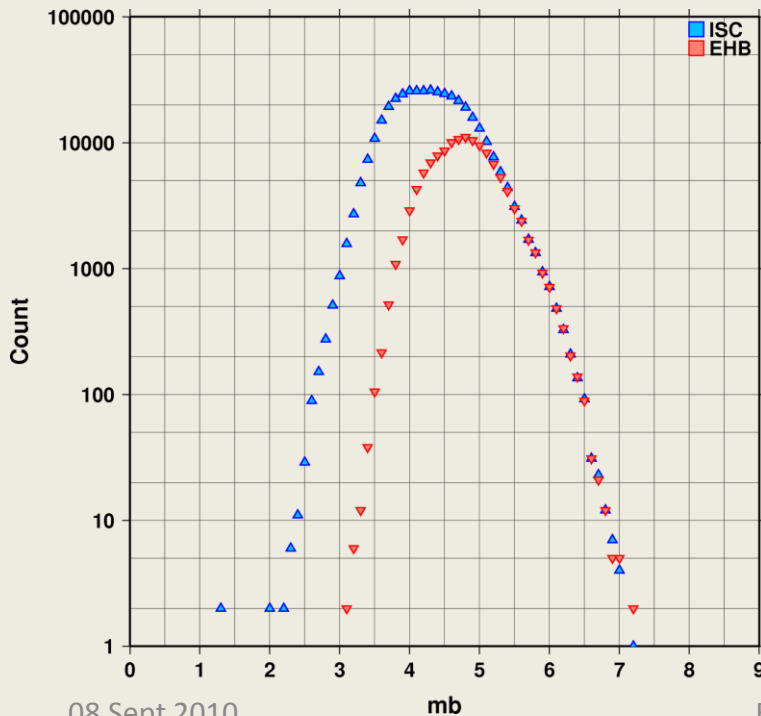
- Validate 3D Earth models against observed travel-times
  - Test new location algorithms
  - Develop empirical path corrections
  - Assess the accuracy of published bulletins
- 
- The effort was coordinated by the CoSOI/IASPEI Working Group on Reference Events for Improved Locations co-chaired by Bob Engdahl and Paul Richards
  - The data set is hosted on the ISC website and currently contains 7,334 GT0-5 events accompanied with ~500,000 arrival data



# MISSION 4: Hosting and Distribution of the EHB – a groomed ISC Bulletin



1960-2007



- The **EHB** (E.R. Engdahl, R.D. van der Hilst, R. Buland, 1998) catalogue is **predominantly based on 20% of (larger) events in the ISC Bulletin**. It contains a set of most accurate seismic event locations regularly used in seismic tomography. The EHB algorithm has been used to significantly improve routine hypocenter determinations made by the ISS, ISC and PDE.
- The EHB bulletin is regularly updated by Bob Engdahl as soon as the ISC publishes every next new annual Bulletin
- The EHB is hosted on the ISC website and currently contains ~ 140K events between 1960 and 2007 accompanied with ~20M arrivals

# Major Projects 1: GEM Global Instrumental Catalogue (1900-2009) *(Separate talk)*

## Purpose:

To compile a Reference Global Instrumental Seismic Catalogue (1900-2009) to be used by GEM for characterization of the spatial distribution of seismicity, the magnitude frequency relation and the maximum magnitude.



The Team: [Bob Engdahl](#), [Antonio Villaseñor](#), [Willie Lee](#), [Peter Bormann](#), [Graziano Ferrari](#), [Peter Suhadolc](#) (IASPEI) and **the entire ISC staff**.

## Deliverables:

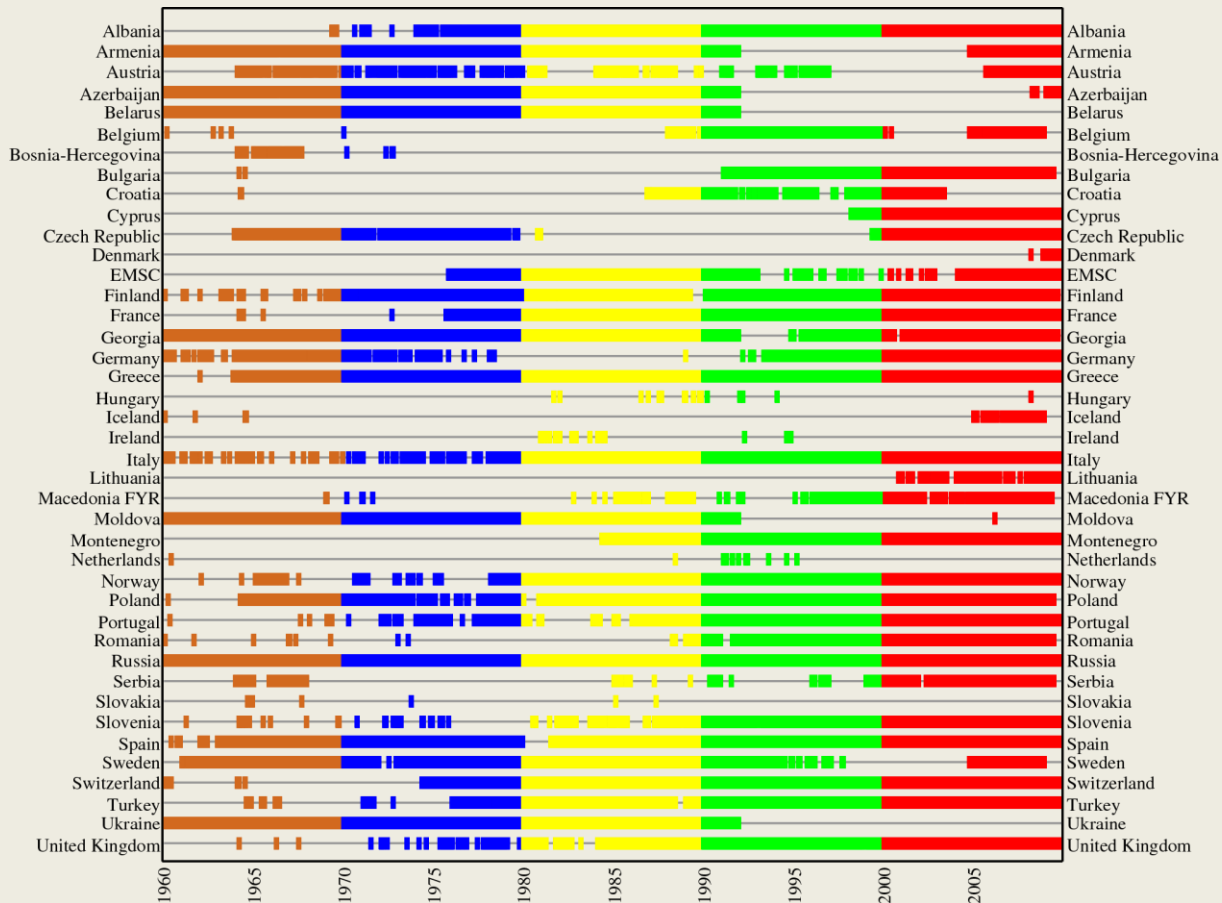
- ✓ 110 years of relocated earthquake hypocenters;
- ✓ Recomputed  $M_S$  values for relocated events;
- ✓  $M_W$  values based on seismic moment where possible (mainly 1980-2009) and proxy values in other cases using appropriate empirical relationships;
- ✓ Database with all above information and reference to original sources including scanned historical bulletin pages.

# Major Projects 2: Re-build of the entire ISC Bulletin: 1960-2009 *(separate poster)*

- ✓ Re-computing all ISC hypocentres with the **new ISC event locator** *(separate talk by I.Bondár)* and the **ak135** velocity model, using **uniform set of seismic phases**
- ✓ Re-computing event magnitudes, this time with uncertainties:
- ✓ Introduction and integration of additional essential bulletins that have not been available at the time of original ISC Bulletin production: permanent networks, temporary deployments, OBS installations.
- ✓ Essential corrections



# ...Major Projects 2: Re-build of the entire ISC Bulletin: 1960-2009 *(separate poster)*



*An example from the corresponding ISC poster demonstrating gaps in the event hypocentre reporting from countries in Europe*



# Major Projects 3: CTBTO Link to the ISC database

*(separate poster by O. Gaspà Rebull)*



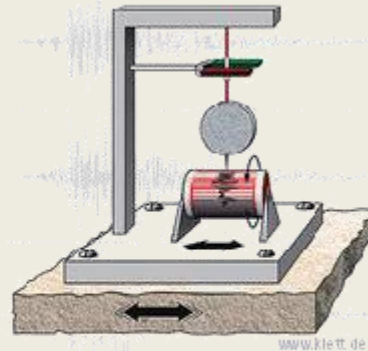
The **United Kingdom Foreign and Commonwealth Office** along with partners from **four Nordic countries** are currently funding the project to make the ISC database of seismic events securely linked with computer facilities of PTS and NDCs.



Area based Search



REB event based Search



Station Based Search

The ISC Bulletin data are already available to PTS and will soon be made available to NDCs through dedicated software designed to offer the ISC data in a way convenient to monitoring and verification community.

# Summary

- ✓ The ISC continues with its **unique international mission**;
- ✓ The ISC products (the Bulletin, the International Seismographic Station Registry, the Reference (GT) list & the EHB) are **free and open**;
- ✓ In its **Preliminary** form the ISC Bulletin is available soon after events occur; the **Final ISC Bulletin** is available 24 months after event occurrence;
- ✓ The ISC is engaged in three major development projects (**Bulletin Re-build**, **GEM** and **CTBTO Link**) that will substantially improve the quality and ways of using the ISC flagship products.