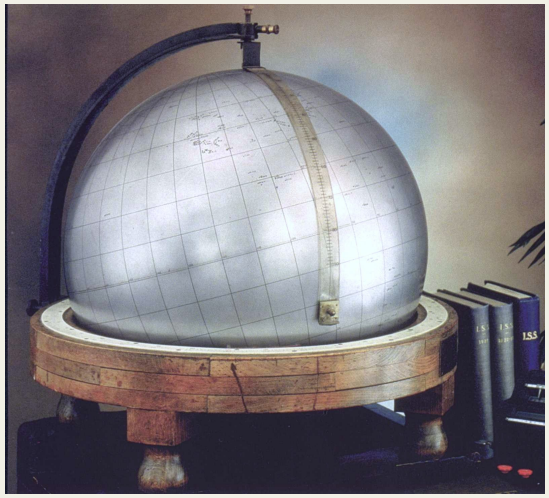


International Seismological Centre

ISC 2015: Mission and Rebuild of the Bulletin

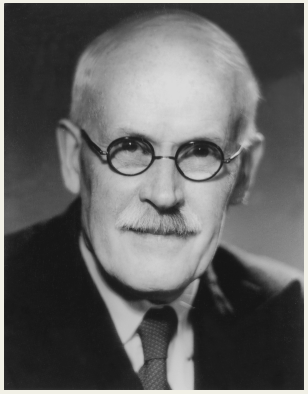
Dmitry A. Storchak, Domenico Di Giacomo, James Harris

www.isc.ac.uk

ISC Products and Services in 2015

1. **Station Registry** *(with USGS)*
2. ISC **Bulletin** (including the **EHB**)
3. Reference Event (**GT**) List *(with IASPEI)*
4. **ISC-GEM** Catalogue
5. **Event Bibliography**
6. Seismological **Contacts**

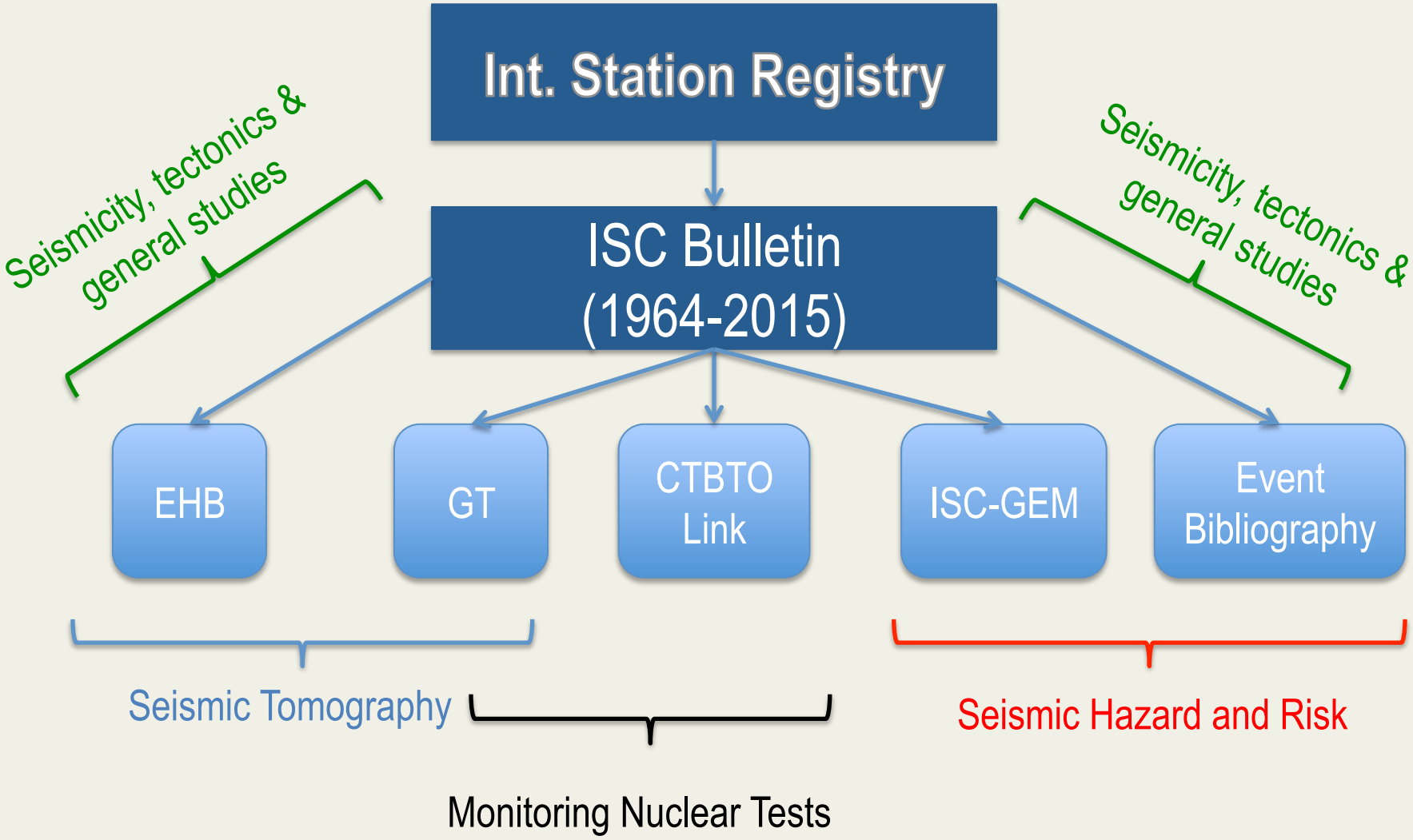
John Milne



Harold Jeffreys

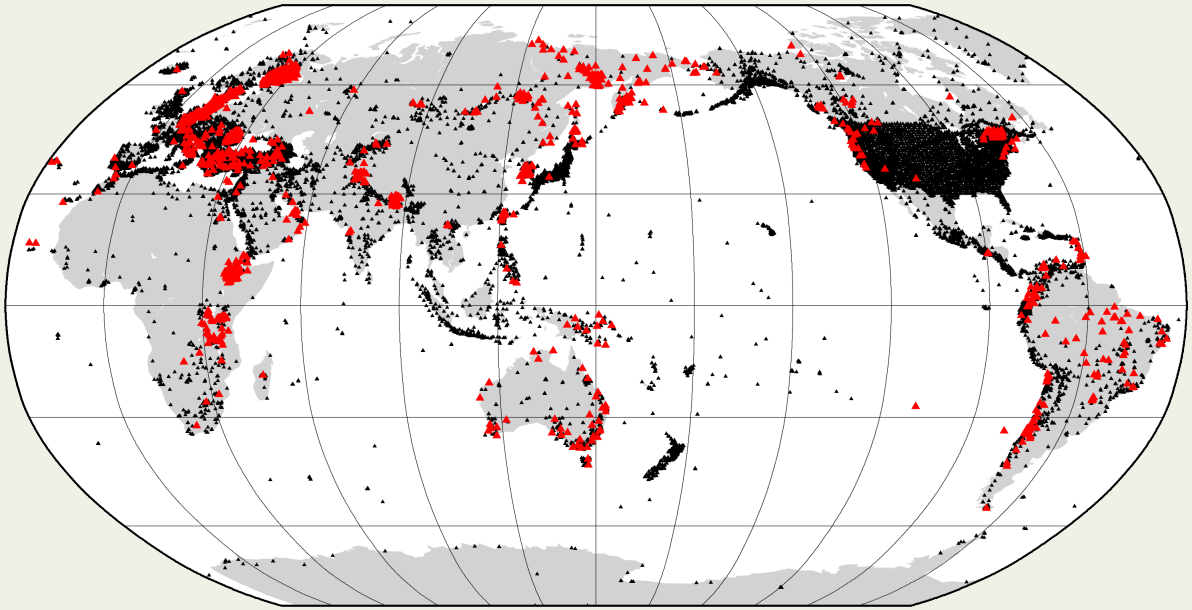
- ✓ not real time
- ✓ aimed at quality, not a speed of delivery
- ✓ long-term
- ✓ continuous
- ✓ most complete
- ✓ open to all
- ✓ designed for use by researchers

The ISC Data Products



1: International Seismograph Station Registry (IR)

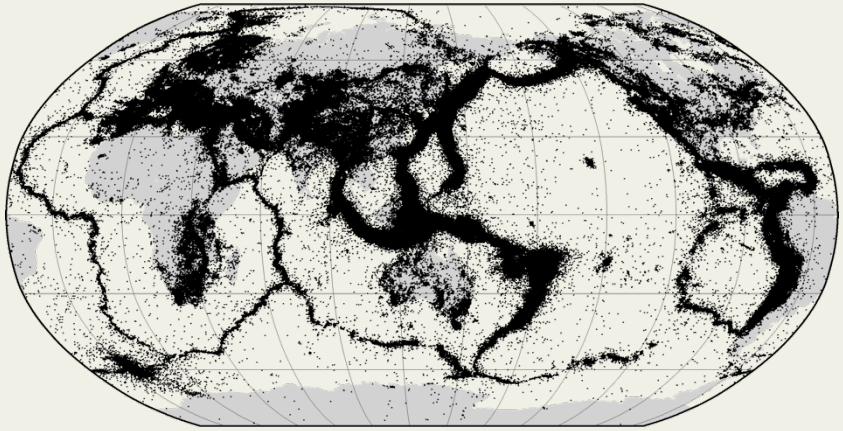
Since 1970s, the ISC maintains the Registry jointly with NEIC / USGS



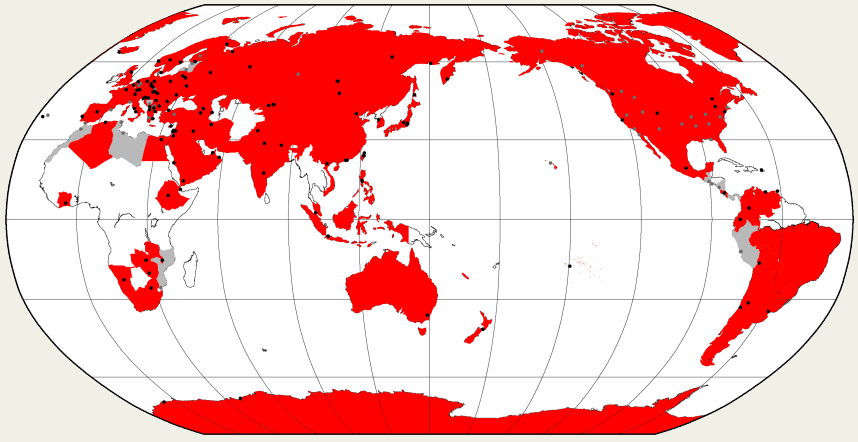
***~21,000** stations, open or closed, are registered in the IR; parameters of **~1,700** of those (in red) were either registered or modified during 2014.*

The IR station codes are used in various types of seismological research as well as for waveform storage and distribution by IRIS DMC, EIDA and other data centres

2: ISC Bulletin (1964-2015)



5.7 M events, 1.8 M of them reviewed, 141M seismic arrivals, 94M in reviewed

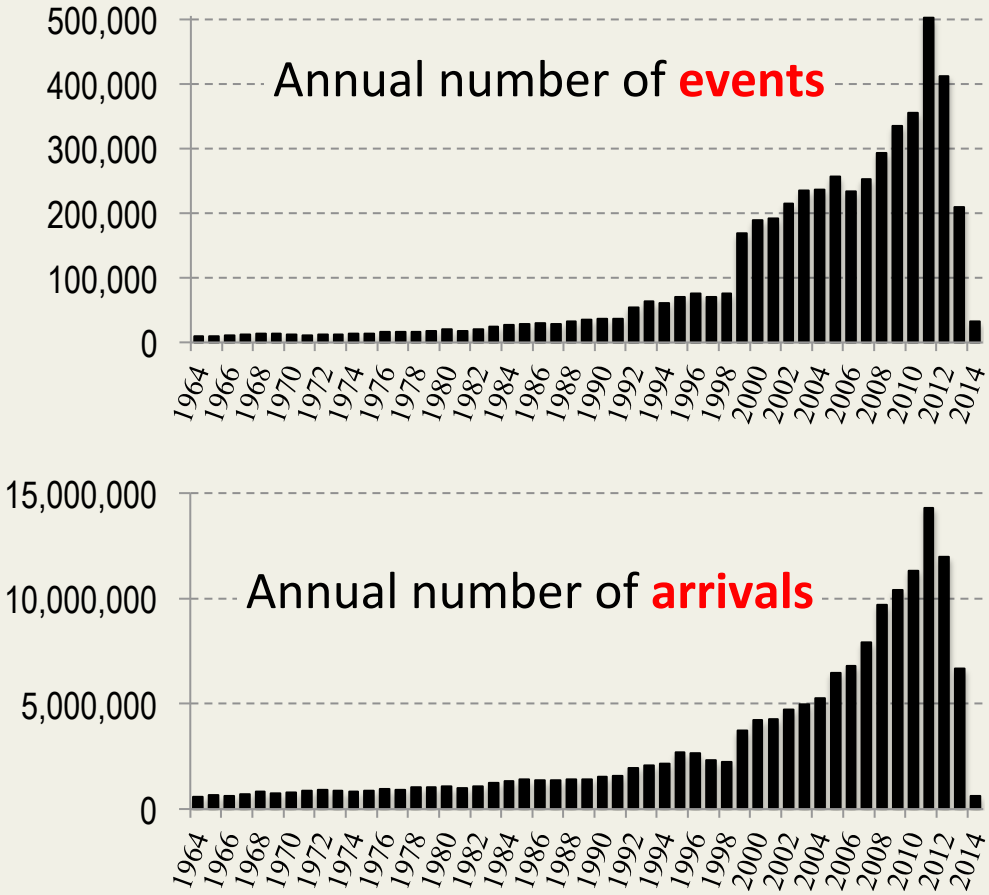


137 agency-contributors

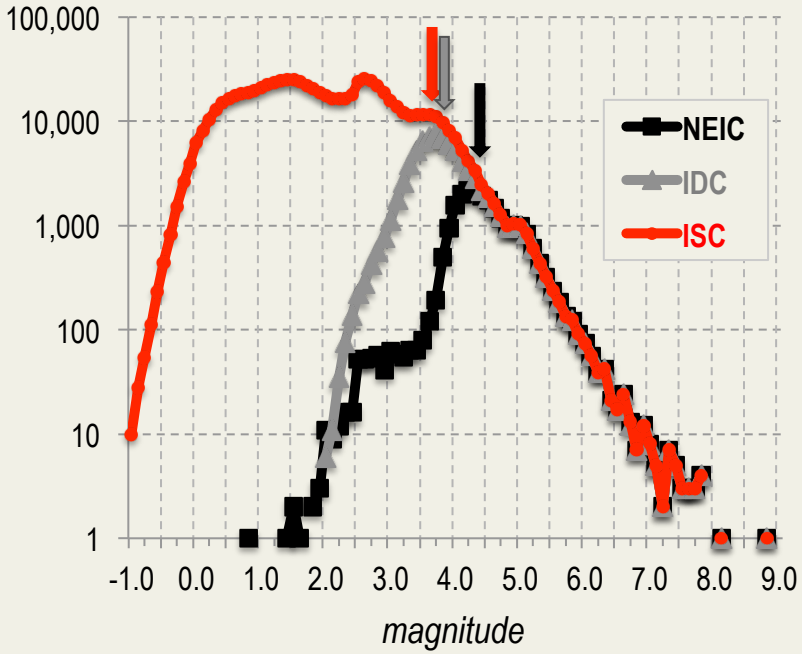
- The definitive and most complete long-term record of global earthquake information
- Contains major source parameters of ~5.7 million seismic events: natural and anthropogenic
- ~137 agencies report bulletin data to be included into the ISC Bulletin.
- Individual agency bulletins in different formats are parsed, checked, merged per natural event, event parameters re-calculated, reviewed and made available in standard formats.

2: ISC Bulletin

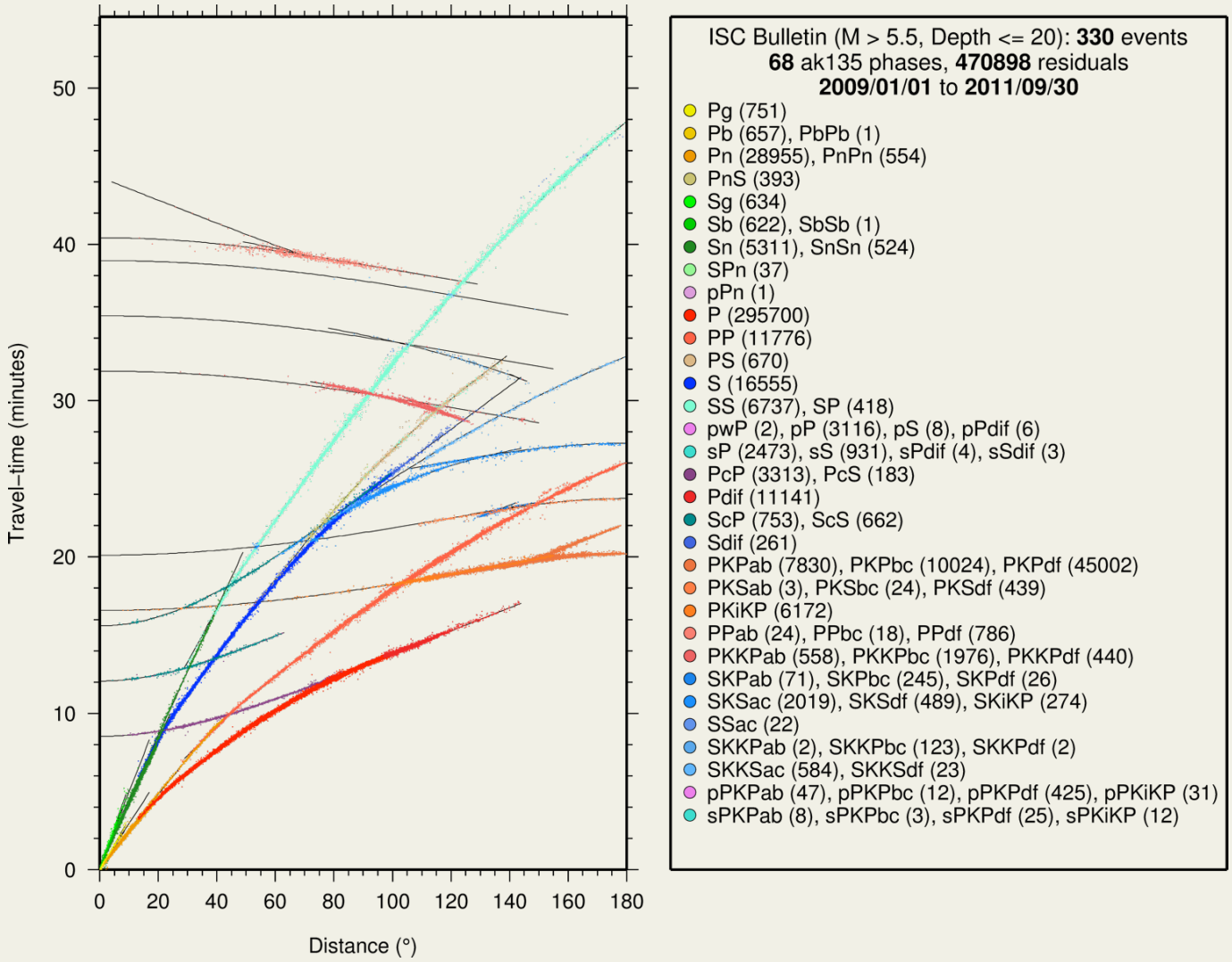
Growth of event & phase data volume continues



Worldwide, the ISC Bulletin is more complete than either of NEIC or IDC

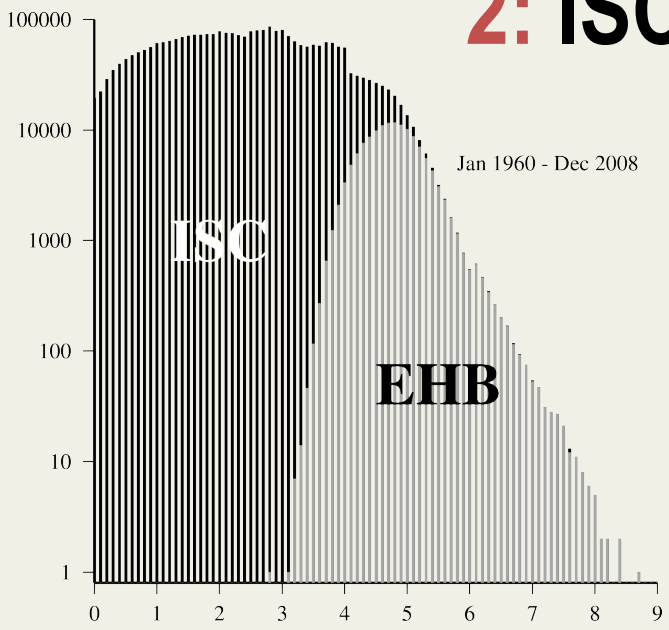


2: ISC Bulletin

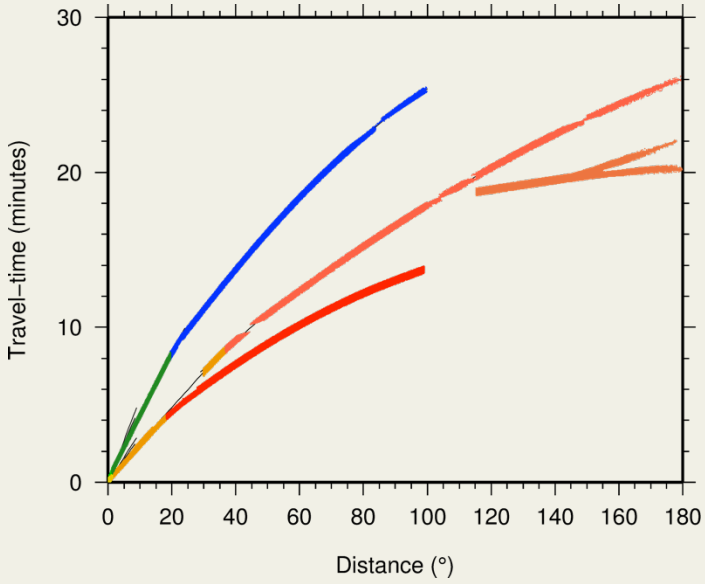


The ISC Bulletin contains arrival times of many different types of seismic waves, including those predicted by the ak135 velocity model

2: ISC Bulletin: EHB (1960-2008)



The EHB dataset is a groomed subset of the ISC Bulletin with well recorded seismic events relocated using *(Engdahl et al, 1998)* technique

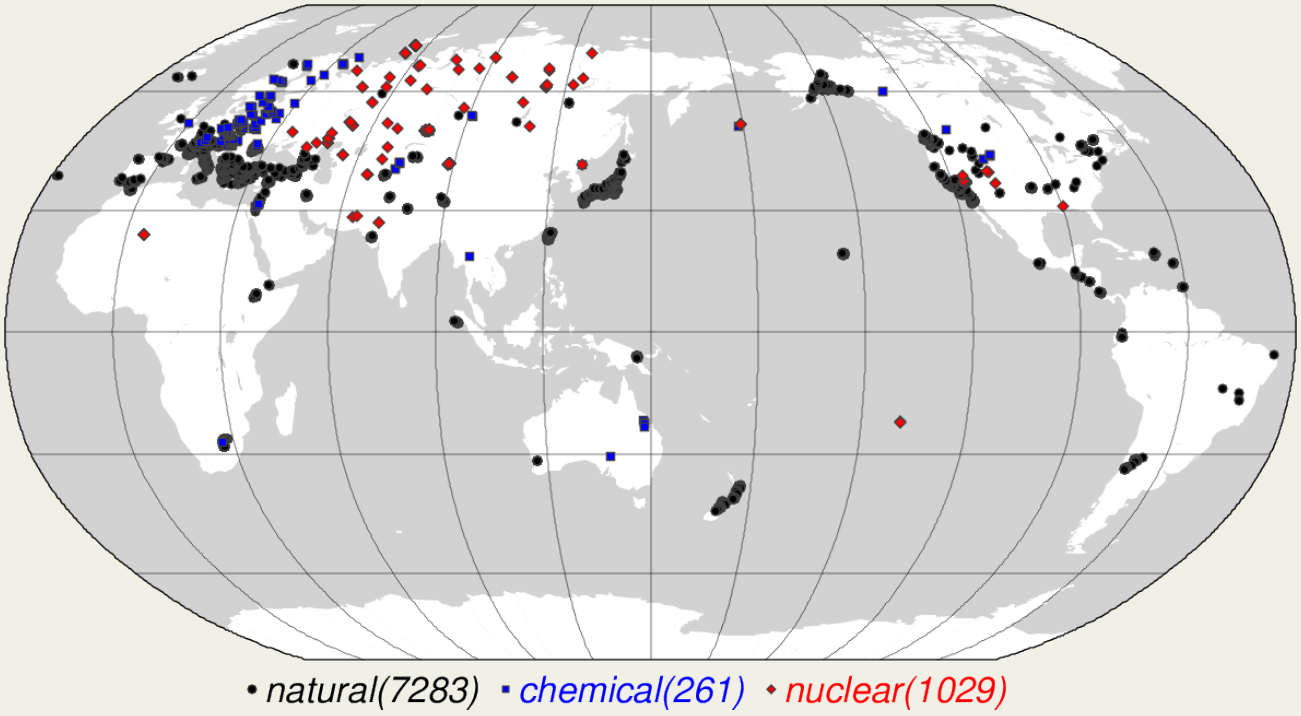


EHB Bulletin (Depth <= 20): **37262** events
16 ak135 phases, **6780078** residuals
1960/01/01 to **2008/12/31**

- Pg (31922)
- Pb (9959)
- Pn (851574), PnPn (12998)
- Sg (17265)
- Sb (9118)
- Sn (203515)
- P (4236435)
- PP (109526)
- S (273235)
- pwP (100553), pP (133404)
- sP (79647)
- PKPab (77791), PKPbc (165270), PKPdf (467866)

The EHB contains arrival times of the most prominent and well reported types of seismic waves

3: IASPEI Reference Event List, GT (1959-2012)



8,573 GT(0-10) events with locations known with 95% confidence level:

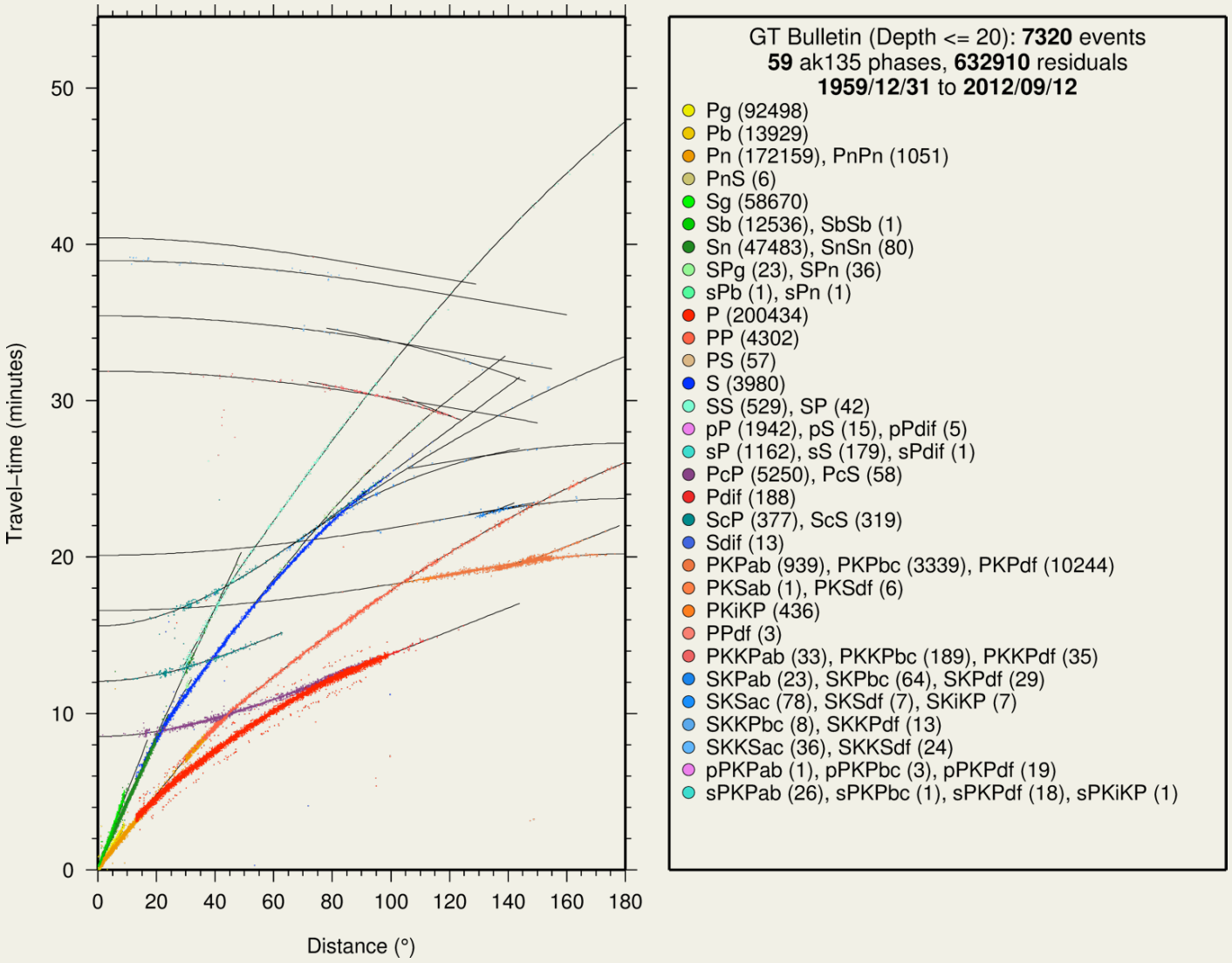
✓ natural

✓ anthropogenic

accompanied by **~870,000** associated seismic arrivals

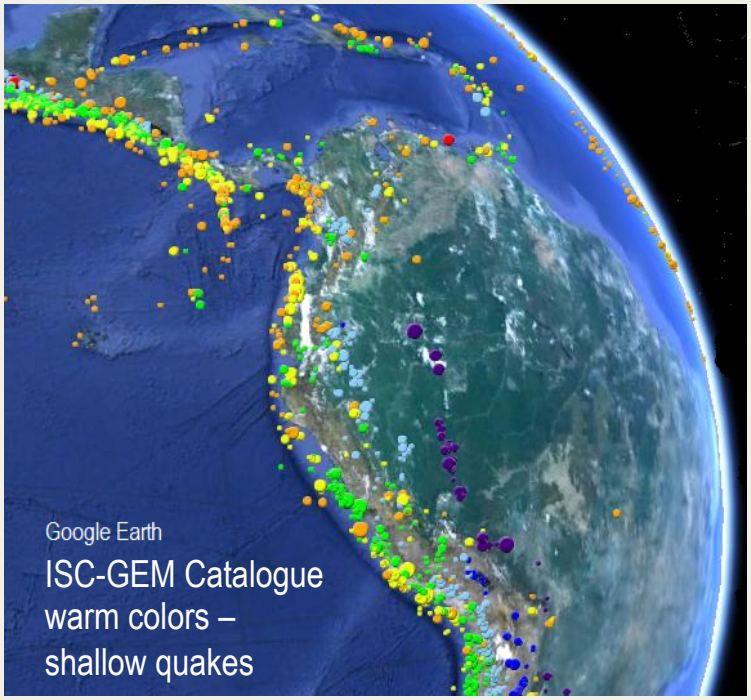
The list is maintained by the ISC under the supervision of IASPEI

3: IASPEI Reference Event List, GT



~870,000
seismic arrivals

4: ISC-GEM Catalogue (1900-2011)



1900-1917: $M_W \geq 7.5$ worldwide + smaller shallow events in stable continental areas

1918-1949: $M_W \geq 6¼$

1950-2009: $M_W \geq 5.5$

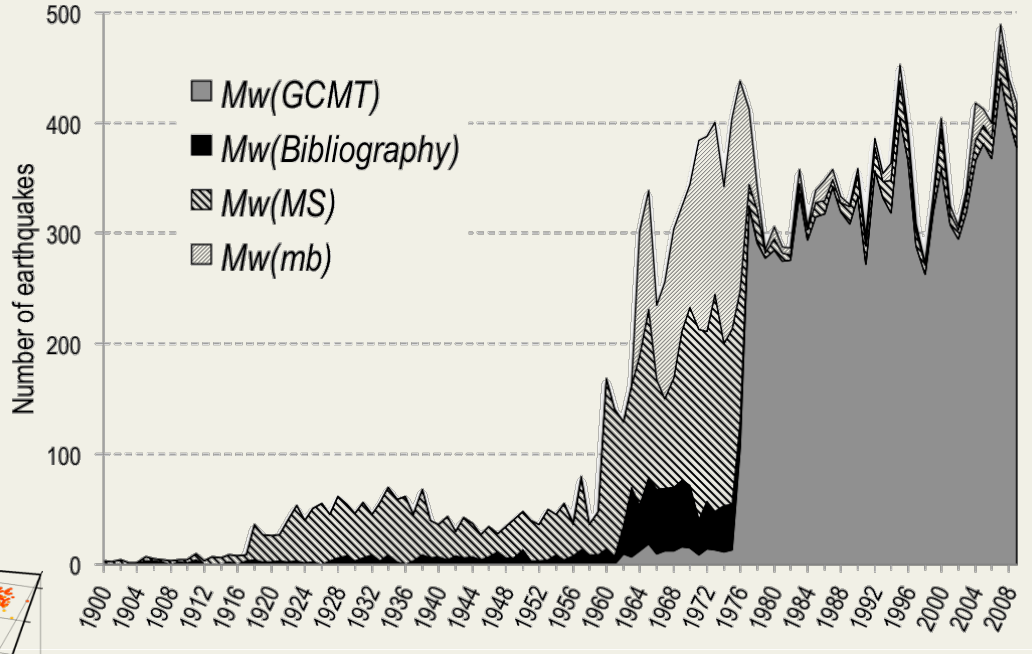
The ISC-GEM Global Instrumental Earthquake Catalogue is built for the purpose of seismic hazard and risk assessment:

- ~24,000 homogeneous hypocentre locations and M_W estimates
- with the estimates of uncertainty
- covering 110 years period
- prepared using uniform location and magnitude determination techniques,
- using original seisogram measurements

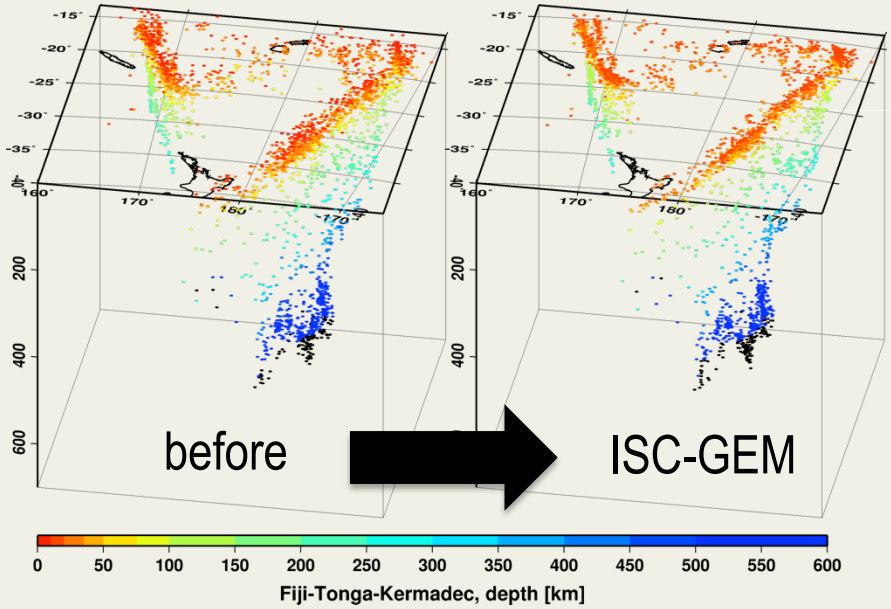
4: ISC-GEM Catalogue, Homogeneity

All magnitudes are expressed in M_W scale with uncertainties

(Di Giacomo et al., 2015)



(Storchak et al., 2015)

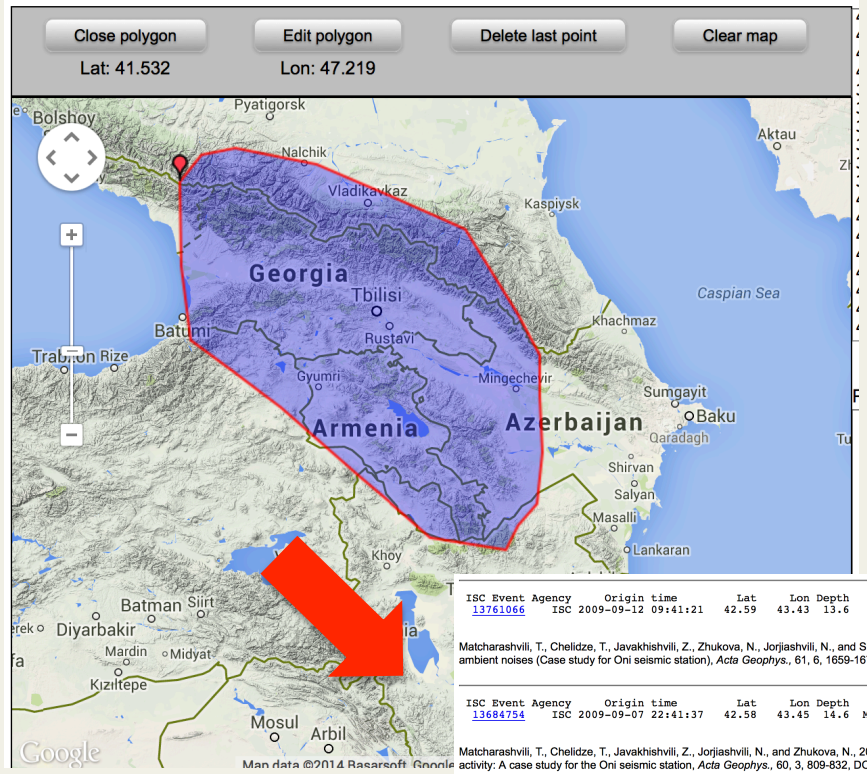


(Bondár et al., 2015)

All hypocentres recomputed using a combination of **EHB** and **ISC** location techniques

5: ISC Event Bibliography (1904-2014)

- An interactive web-search for references to scientific articles related to seismic events in a particular region and period of occurrence/ publication;
- includes articles in many fields of Geosciences;



ISC Event	Agency	Origin time	Lat	Lon	Depth	Magnitude	Articles_total
13761066	ISC	2009-09-12 09:41:21	42.59	43.43	13.6	Ms(ISC) = 3.8	1

Matcharashvili, T., Chelidze, T., Javakhishvili, Z., Zhukova, N., Jorjiashvili, N., and Shengelia, I., 2013. Discrimination between stochastic dynamics patterns of ambient noises (Case study for Oni seismic station), *Acta Geophys.*, 61, 6, 1659-1676, DOI: 10.2478/s11600-013-0141-1

ISC Event	Agency	Origin time	Lat	Lon	Depth	Magnitude	Articles_total
13684754	ISC	2009-09-07 22:41:37	42.58	43.45	14.6	Mw(GCMT) = 6.0	2

Matcharashvili, T., Chelidze, T., Javakhishvili, Z., Jorjiashvili, N., and Zhukova, N., 2012. Scaling features of ambient noise at different levels of local seismic activity: A case study for the Oni seismic station, *Acta Geophys.*, 60, 3, 809-832, DOI: 10.2478/s11600-012-0006-z

Matcharashvili, T., Chelidze, T., Javakhishvili, Z., Zhukova, N., Jorjiashvili, N., and Shengelia, I., 2013. Discrimination between stochastic dynamics patterns of ambient noises (Case study for Oni seismic station), *Acta Geophys.*, 61, 6, 1659-1676, DOI: 10.2478/s11600-013-0141-1

ISC Event	Agency	Origin time	Lat	Lon	Depth	Magnitude	Articles_total
3004606	ISC	2002-04-25 17:41:22	41.76	44.82	10.0	mb(ISC) = 4.7	1

Javakhishvili, Z., Godoladze, T., Elashvili, M., Mukhadze, T., and Timchenko, I., 2004. The Tbilisi earthquake of April 25, 2002 in the context of the seismic hazard of the Tbilisi urban area, *Boll. Geof. Teor. Appl.* 45, 3, 169-185.

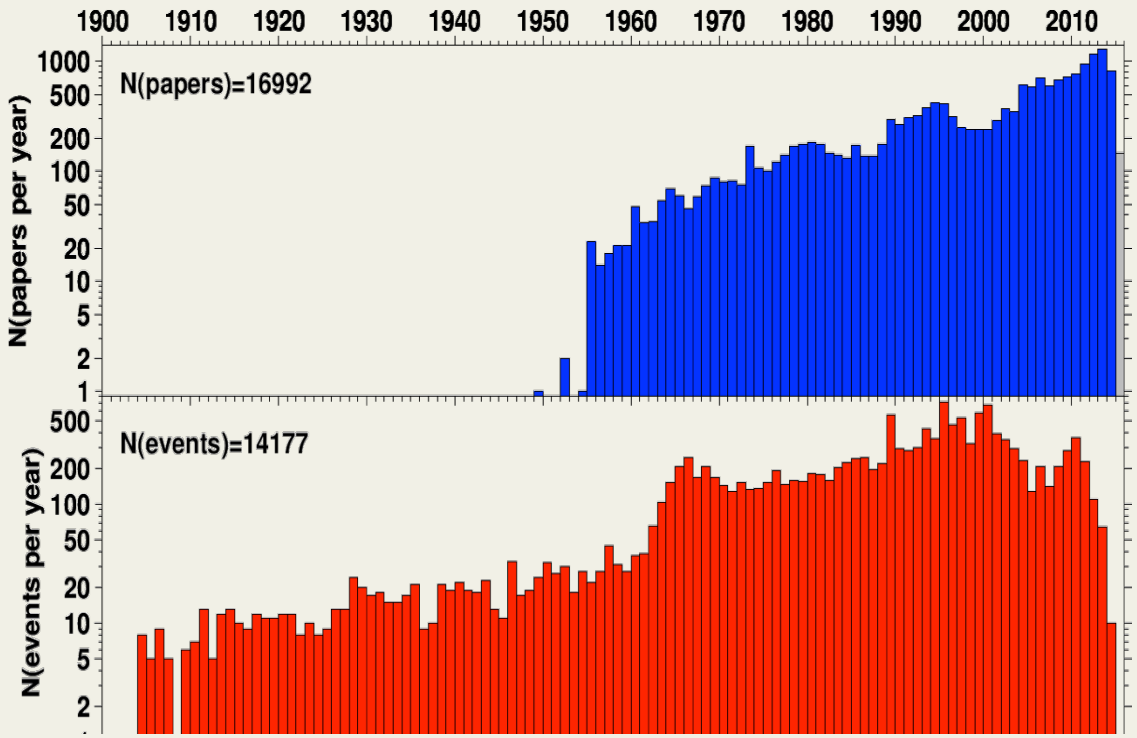
ISC Event	Agency	Origin time	Lat	Lon	Depth	Magnitude	Articles_total
1439567	ISC	1999-01-14 22:45:16	41.29	44.04	17.4	mb(ISC) = 4.7	1

Bondár, I., Bergman, E., Engdahl, E.R., Kohl, B., Kung, Y.-L., and McLaughlin, K., 2008. A hybrid multiple event location technique to obtain ground truth event locations, *Geophys. J. Int.*, 175, 1, 185-201, DOI: 10.1111/j.1365-246X.2008.03867.x

ISC Event	Agency	Origin time	Lat	Lon	Depth	Magnitude	Articles_total
1205885	ISC	1998-09-20 19:47:21	42.45	46.31	46.4	mb(ISC) = 3.4	2

Bondár, I., Engdahl, E.R., Yang, X., Ghalib, H.A.A., Hofstetter, A., Kirichenko, V., Wagner, R., Gupta, I., Ekström, G., Bergman, E., Israelsson, H., and McLaughlin, K., 2004. Collection of a Reference Event Set for Regional and Teleseismic Location Calibration, *Bull. seism. Soc. Am.*, 94, 4, 1528-1545, DOI: 10.1785/012003128

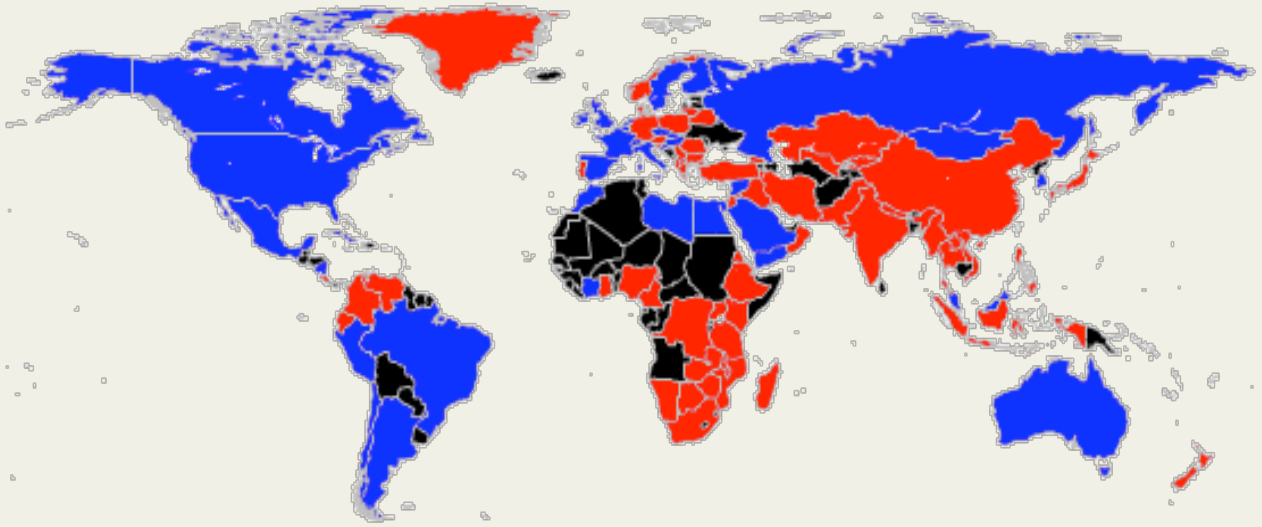
5: ISC Event Bibliography (1904-2015)



(Di Giacomo et al., 2014)

- ~17,000 scientific articles related to ~14,000 events in ~500 journal titles;
- articles published in the last ~60 years and
- related to seismic events occurred in the last ~110 years;
- a few events in the first half of the 20th century;
- includes earthquakes and anthropogenic events.

6: Seismological Contacts

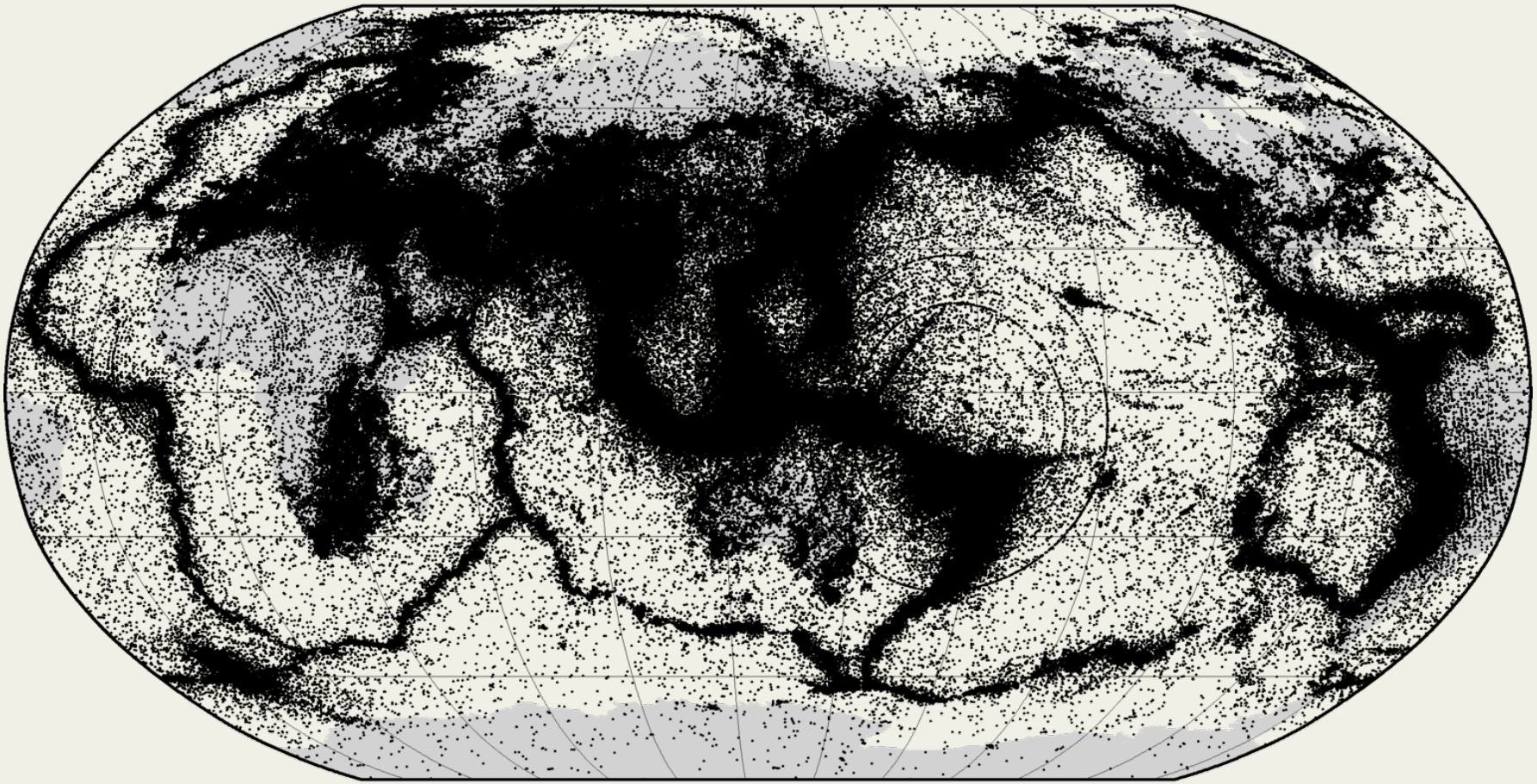


RED *– institutes and individual members of staff are willing to share information and serve as a local point of contact.*

BLUE *–geophysical organisation(s) known, no specific individuals.*

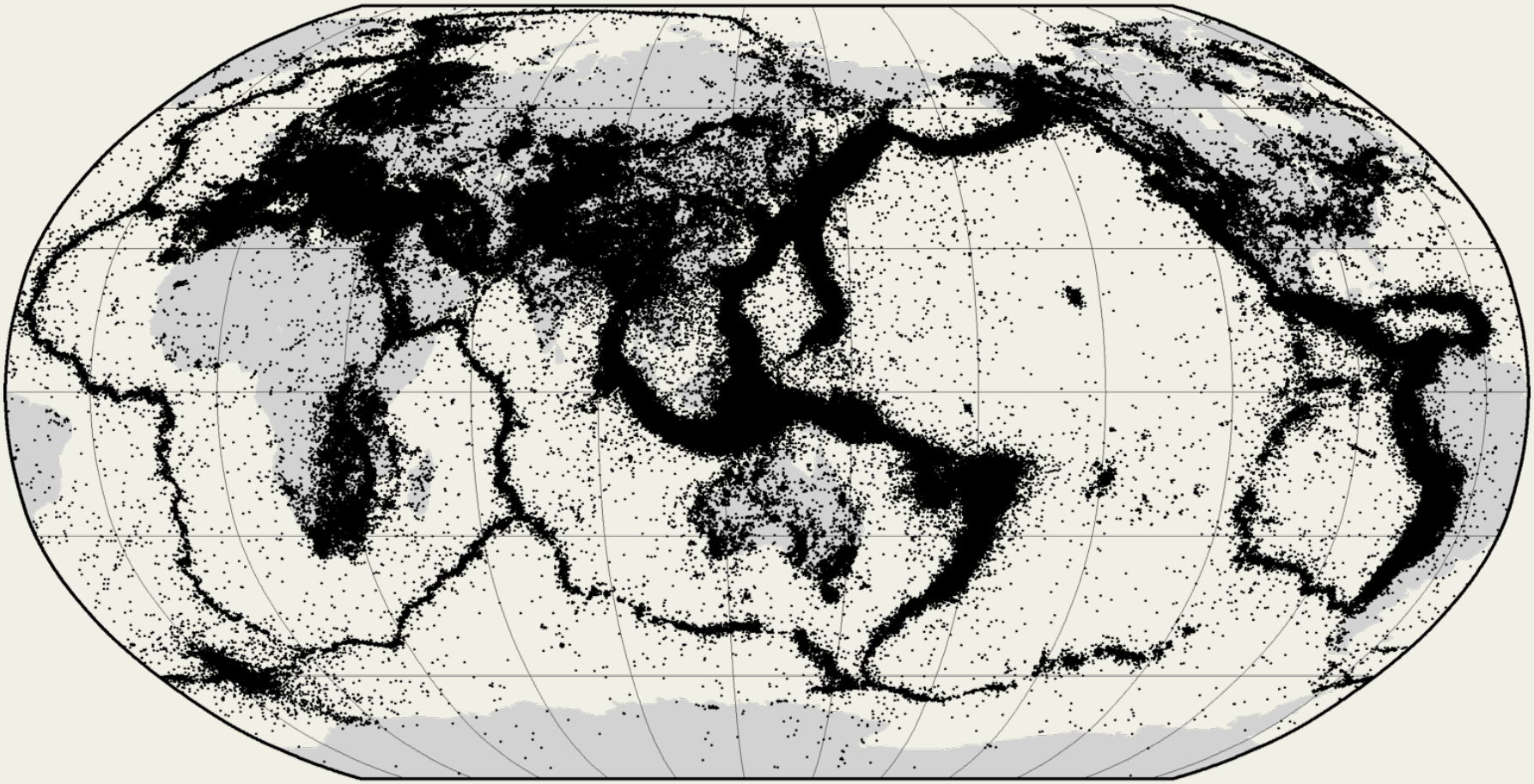
BLACK *– no information.*

All hypocentres reported to the ISC



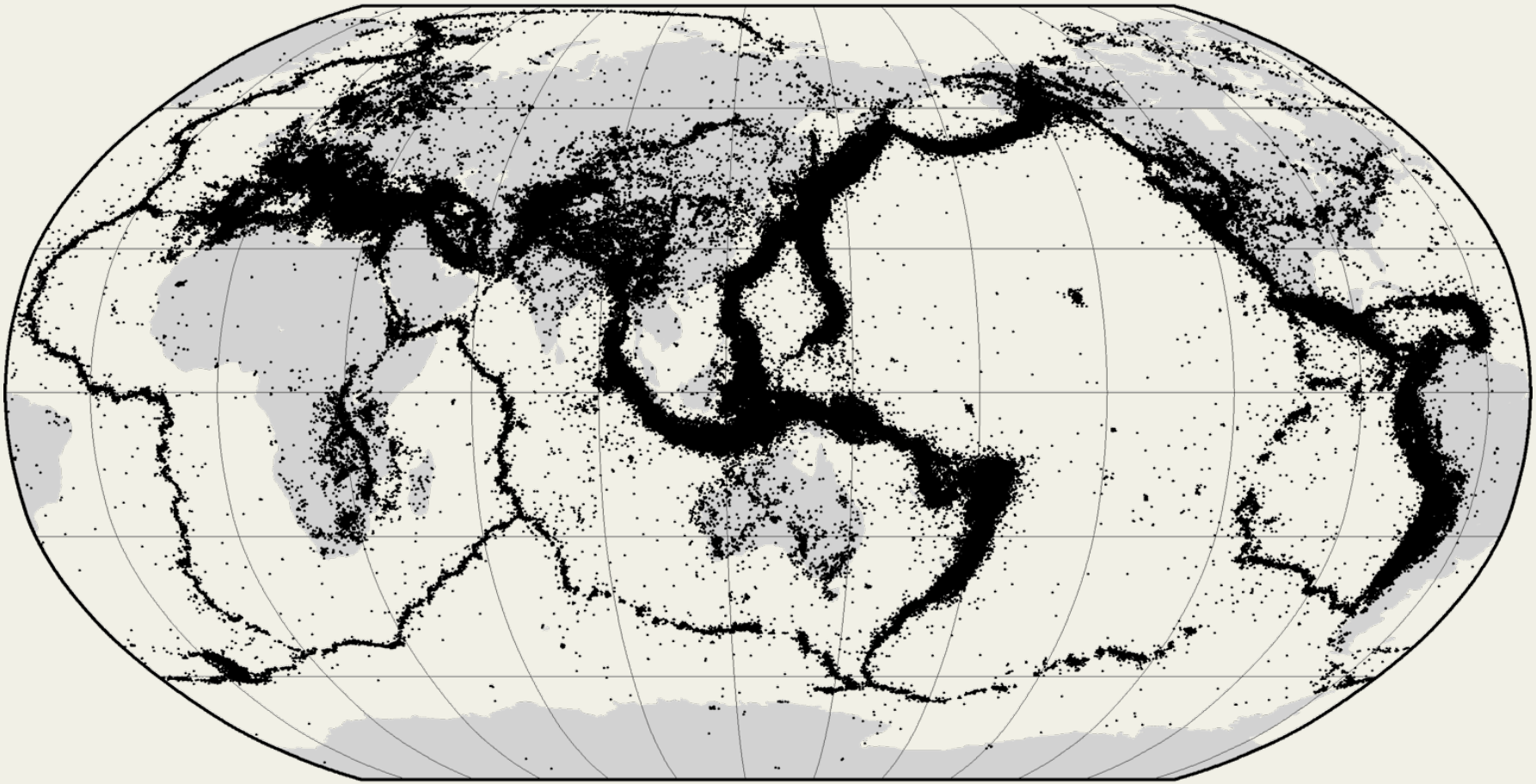
11 M hypocentre solutions

Events in ISC Bulletin, grouped (1904-2015)



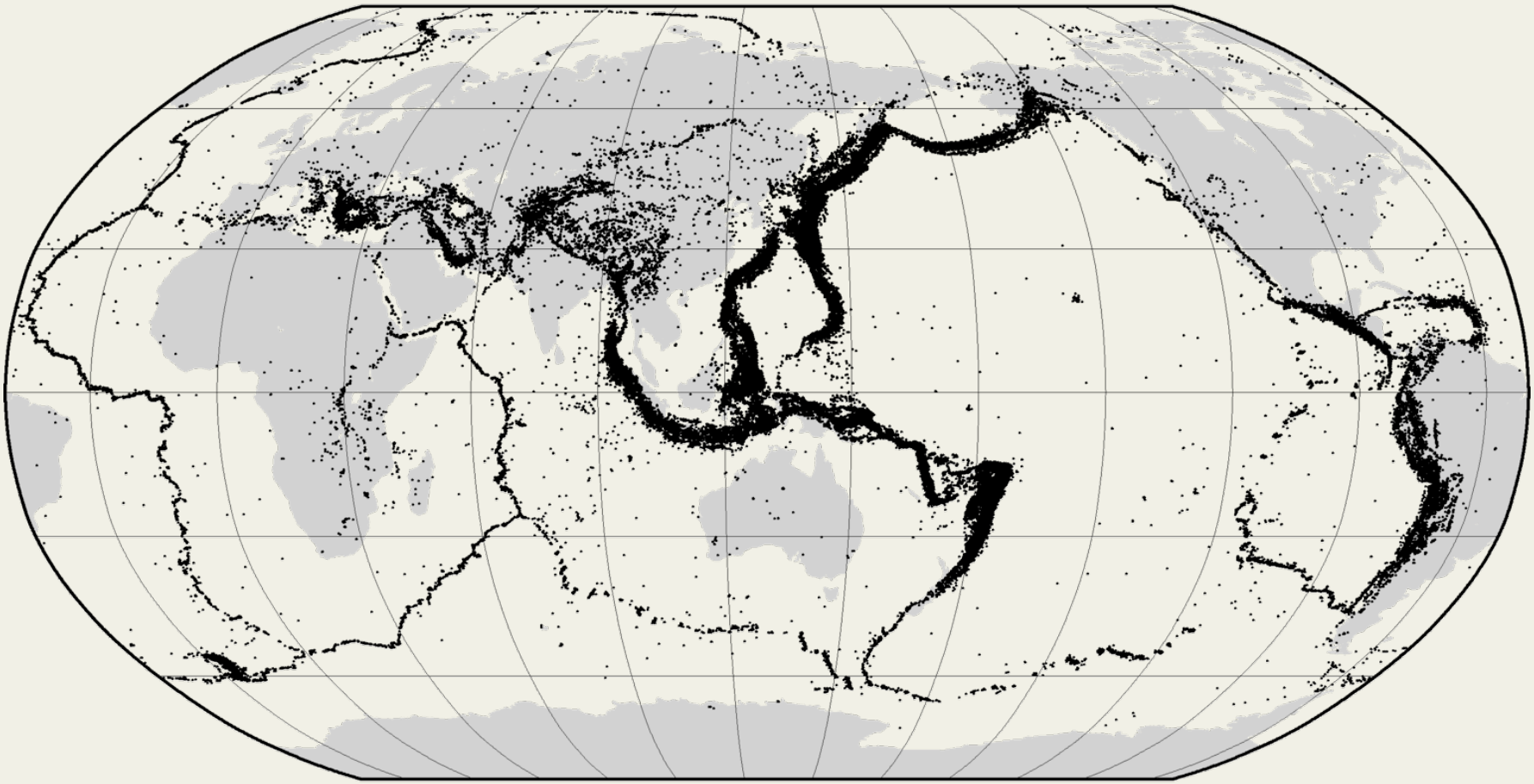
5.7 M events

Events relocated by ISC (1904-2012)



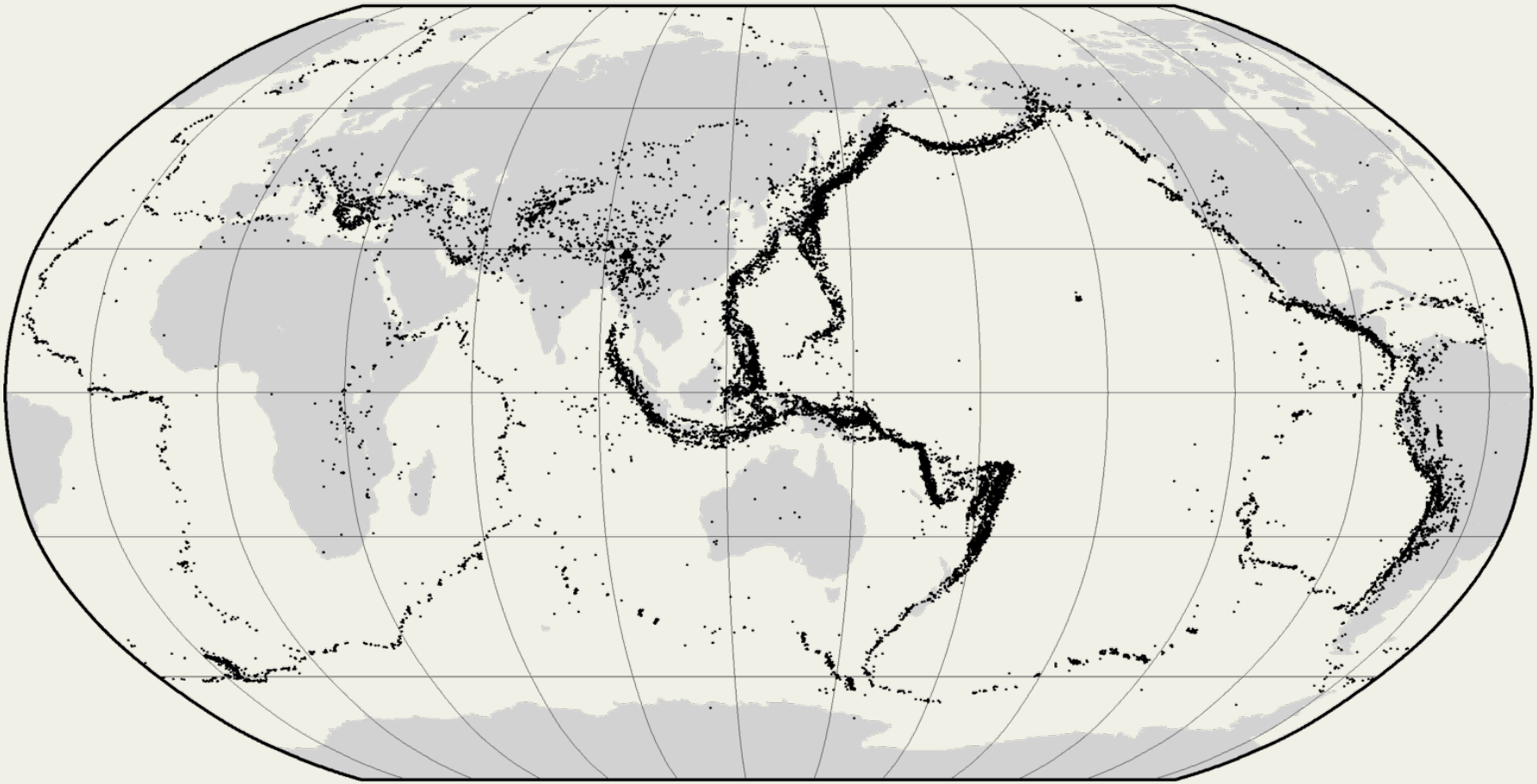
1.2 M events

EHB (1960-2008) (Engdahl *et al*., 1998)



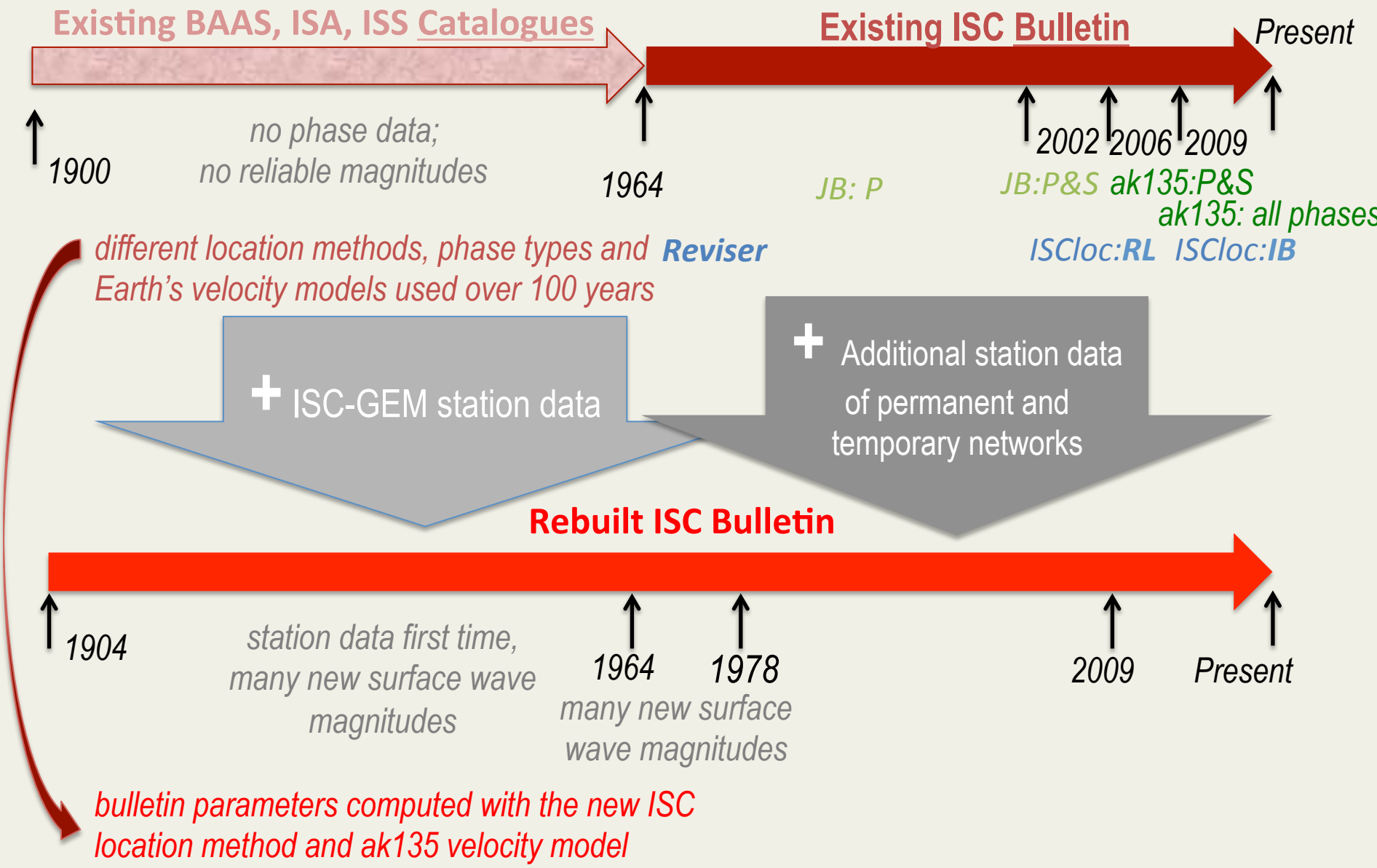
141 K events

ISC-GEM events, M>=5.5 (1904-2011)

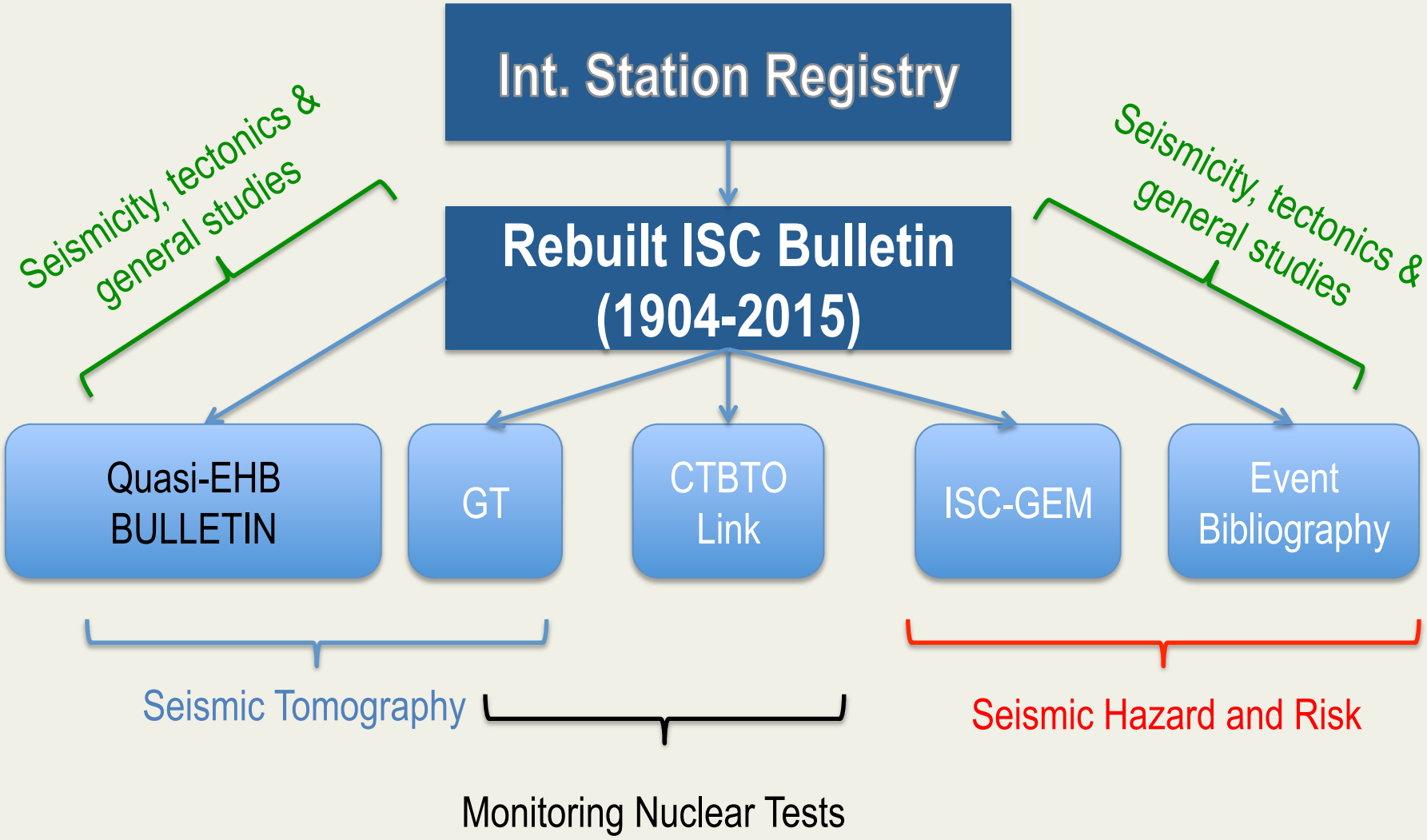


24 K events

ISC Bulletin Rebuild, ingredients



The Data Products expected at the end of Rebuild



Members and Supporters

63 Member-Institutions from **46** countries

Innovate UK

REF TEK
A DIVISION OF TRIMBLE

Summary

- The ISC continues with its unique long-term international mission collecting seismic parametric data from 137 agencies worldwide
- The ISC Products are openly available:
  - Int. Station Registry (1964-2015)
  - ISC Bulletin (1964-2015), including the EHB (1964-2008)
  - GT (1959-2012)
  - ISC-GEM Catalogue (1900-2011)
  - ISC Event Bibliography (1950-2015)
  - Seismological Contacts
- The ISC appreciates the financial support of its Members and Sponsors