IASPEI Co-operate internationally to better understand our Earth

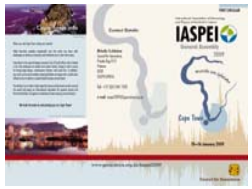
presented at the XXV IUGG General Assembly, Melbourne, 2011 **http://www.iaspei.org**

As stated by our Statues, IASPEI is dedicated to the advancement, promotion, and communication of knowledge in the fields of earthquake and engineering seismology, and physics of the Earth's interior.

Bob Engdahl, IASPEI president 2003~2007:
The organizational structure and the scientific programs of IASPEI have been created around an essential and guiding concept. International cooperation is the guiding principle for the advancement of seismology and physics of the Earth's interior.

B. L. N. Kennett, IASPEI president 1999~2003:
In the last few years IASPEI has moved towards a thematic structure for the generation of the programs for General Assemblies and IUGG Meetings. The theme approach has generally worked well.

During the last 4-years, IASPEI kept this theme approach.



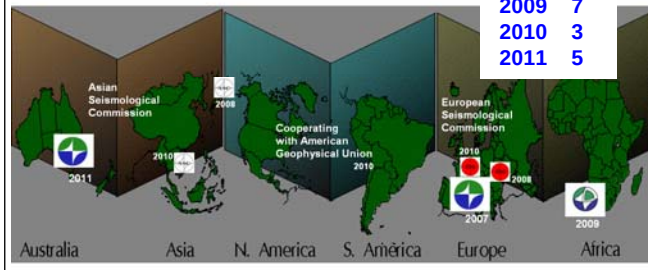
January 2009: the IASPEI Assembly was successfully held in Cape Town – the first IASPEI Assembly in the African continent

Organization of the XXV IUGG General Assembly here… is another big event for IASPEI

IUGG
MELBOURNE Australia 2011

IASPEI sponsored (on its own or via an IUGG grant) workshops and/or seminars

2007	4
2008	3
2009	7
2010	3
2011	5



The IASPEI-IAHS-IAPSO Joint Assembly will be held in Gothenburg, Sweden, July 22-26, 2013

IASPEI Commissions

Education and Outreach
Seismological Observation and Interpretation
Tectonophysics and Crustal Structure
Seismic Sources – Monitoring and Modeling for Prediction
Earth Structure and Geodynamics
Earthquake Hazard, Risk and Strong Ground Motion
Digital broadband Seismograph Networks
European Seismological Commission (ESC)
Asian Seismological Commission (ASC)

New pages opened 2007-2011

ISS 09: New start of the cooperation between IUGG and CTBTO PrepComm PTS

SHR WG-CSEP: New generation of the IASPEI evaluation of earthquake forecast

GEM: with IASPEI and IASPEI-people playing an active role

During the 14th World Conference on Earthquake Engineering (WCEE), Beijing, the **IAEE-IASPEI Dialogue** mechanism was formulated

Joint Commissions with IASPEI participation

The Physics and Chemistry of Earth Materials
Volcano Geophysics
Heat Flow
Electromagnetic Studies of Earthquakes and Volcanoes
Tsunami Warning
International Ocean Network
Earth Sciences in Africa
Subduction Zones Located in Developing Countries
Re-use of Submarine Telephone Cables

Mathematical Geophysics
Lithosphere Study
Geophysical Risk and Sustainability

IASPEI sponsored several good projects, such as the Rotational Seismology project, the SeismoArchives project, and the ISC-IASPEI Networking project

IASPEI's Scientific Products

International technical standards and recommendations that facilitate operational works in seismology, such as magnitude and intensity scales, seismic phase nomenclature, format of seismic data, and recommendations on site selection and construction of seismic stations.

Earth models, travel time tables, and relocated and calibrated earthquake catalogues not only reflect the state-of-the-art of seismology and facilitate seismological observation practice, but also act as an interface between seismology and other research fields, including interdisciplinary studies on the physics and chemistry of the Earth's interior.

Many places worldwide have benefited from IASPEI's development of seismological software, training courses for young scientists, and manuals for seismological observatory practice.

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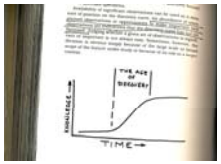
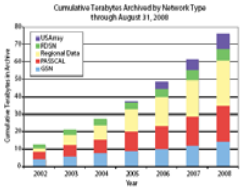
Thinking about the future of earthquake science

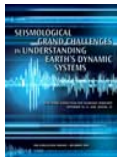
If one plots cumulative knowledge as a function of time using almost any measure of knowledge, the curve will rise slowly at early times, then rise rapidly during a relatively short interval, then flatten out to become asymptotic to the total quantity of knowledge available in that subject.



The curve of discovery
(Jack E. Oliver, 1991. *The Incomplete Guide to the Art of Discovery*, NY: Columbia Univ. Pr.)



Accumulation of seismic data
Figure from:

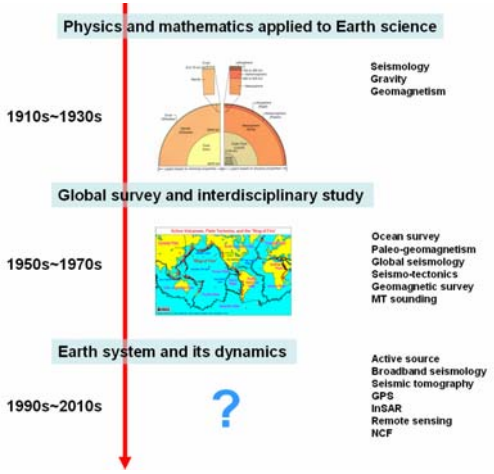


Note: this report also provides the 'Hilbert problems' in modern seismology

Among the driving engines of the new progresses in seismology and physics of the Earth's interior we can certainly list:

meeting the increasing needs of society for the reduction of earthquake disasters and the exploration of resources; the interdisciplinary discussion on the physics of the Earth's interior and the physics of earthquakes; the continuous accumulation of high-quality observational data; application of new technologies in seismological observation and data analysis; debates on several unsolved fundamental problems related to earthquakes and the Earth's interior, and most important, the study of significant earthquakes that provide opportunities for new discoveries in seismology.

At present seismology is in a period of fast development. A new series of discoveries is underway, following the first series in the 1910s to 1930s which led to a clear picture of the Earth's interior, and the second one in the 1950s to 1970s which led to the establishment of global plate tectonics.



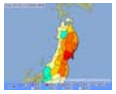
New types of 'earthquakes' investigated since the 21st century – new developments of modern seismology

- ☐ artificial earthquakes generated by 'green-sources' for time-lapse geophysics
- ☐ 'repeating' earthquakes by waveform cross-correlation for high-precision seismology
- ☐ 'silent' earthquakes or epidemic tremors and slips (ETS) by geodetic and seismic observation
- ☐ tremors triggered by seismic waves
- ☐ 'virtual' earthquakes by cross-correlating seismic wave fields

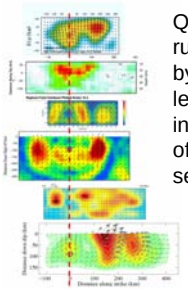
The 2007-2011 IASPEI Bureau thanks the support and cooperation it has received from all of you, and hopes you are having a nice stay in Melbourne!

Lessons from recent earthquakes, 2007-2011, an incomplete list

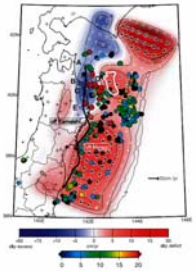
Tohoku, 2011



JMA quick report of intensity: capability of modern seismology



Quick report of rupture process by different leading institutions: limit of modern seismology

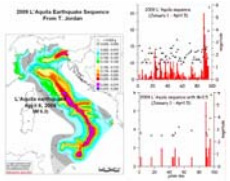


Repeating earthquakes and interplate aseismic slip in the NE Japan subduction zone (by Igarashi et al., 2003): potential of modern seismology

Haiti, 2010

Triggering of the IASPEI-ISC networking project

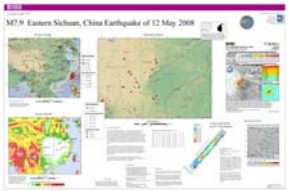
L'Aquila, 2009



from the International Commission on Earthquake Forecasting (ICEF)

The first time seismology faced legal problems…

Wenchuan, 2008



Earthquake poster from USGS

Nuclear crisis following the 2007 Niigata earthquake

Niigata, 2007

Challenging the classical understandings of the geodynamics of inland mega-thrust...

Any relation with the nuclear crisis following the 2011 Tohoku earthquake?