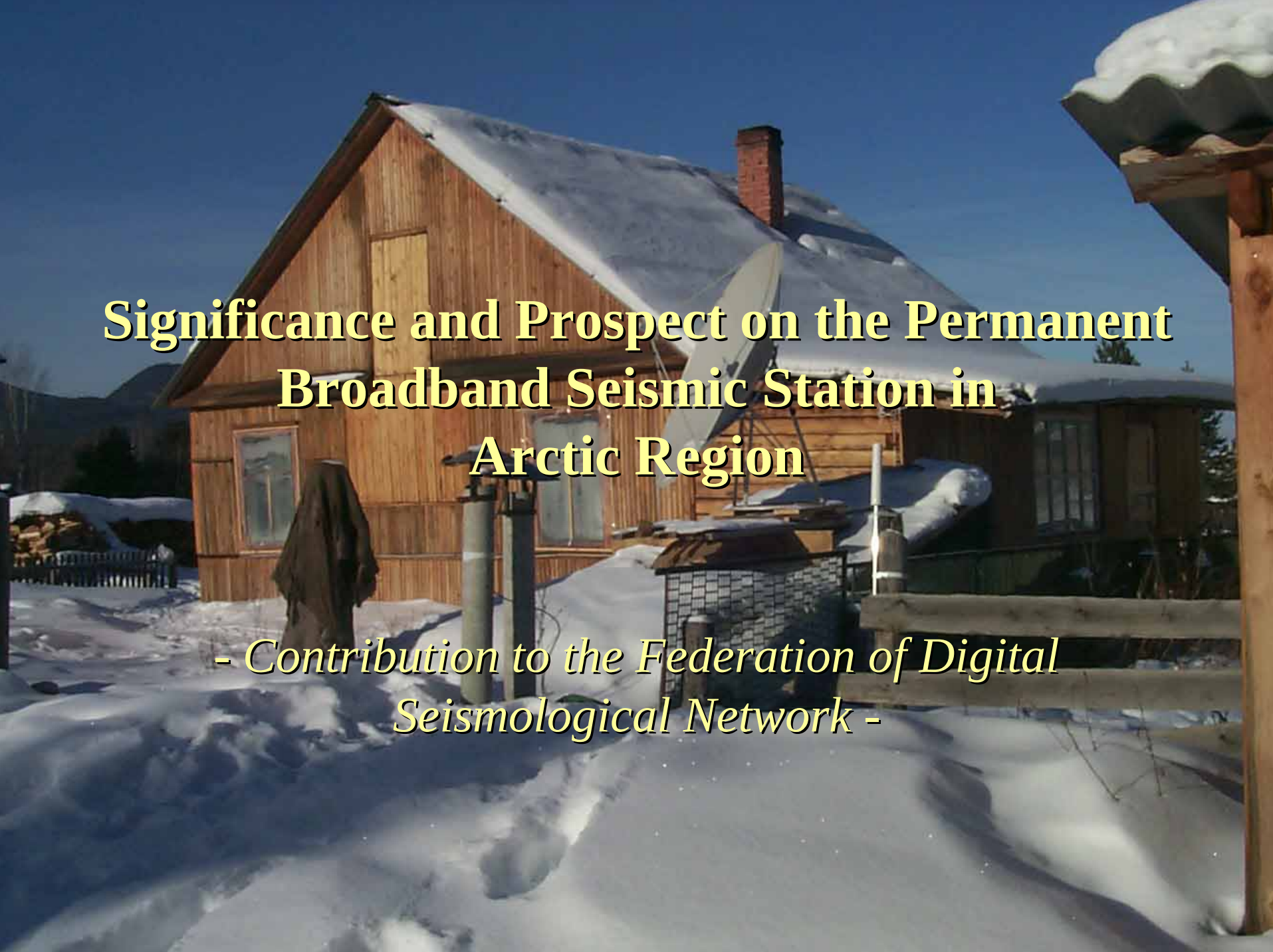


Significance and Prospect on the Permanent Broadband Seismic Station in Arctic Region

- Contribution to the Federation of Digital Seismological Network -

FDSN；Federation of Digital Seismological Network

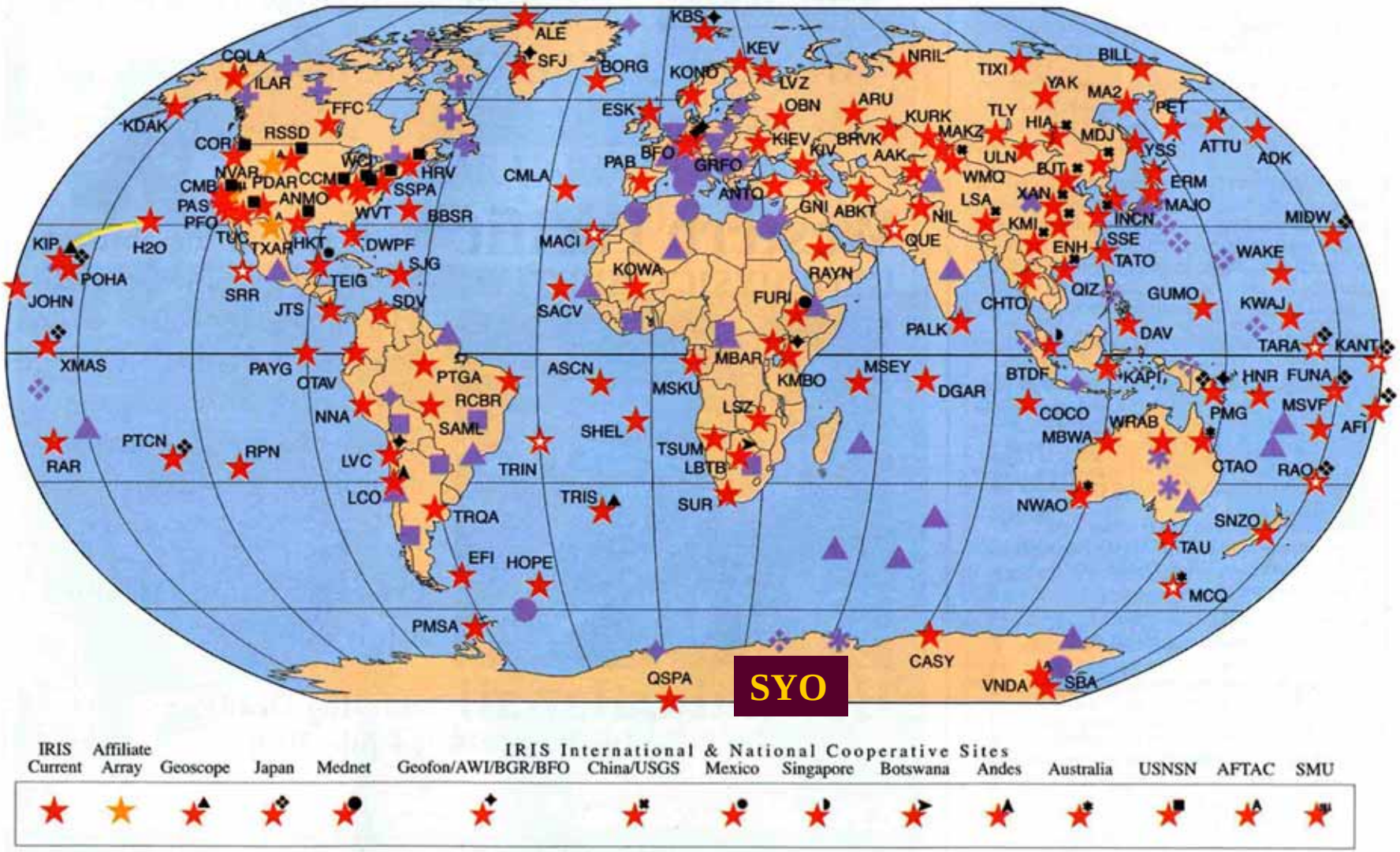
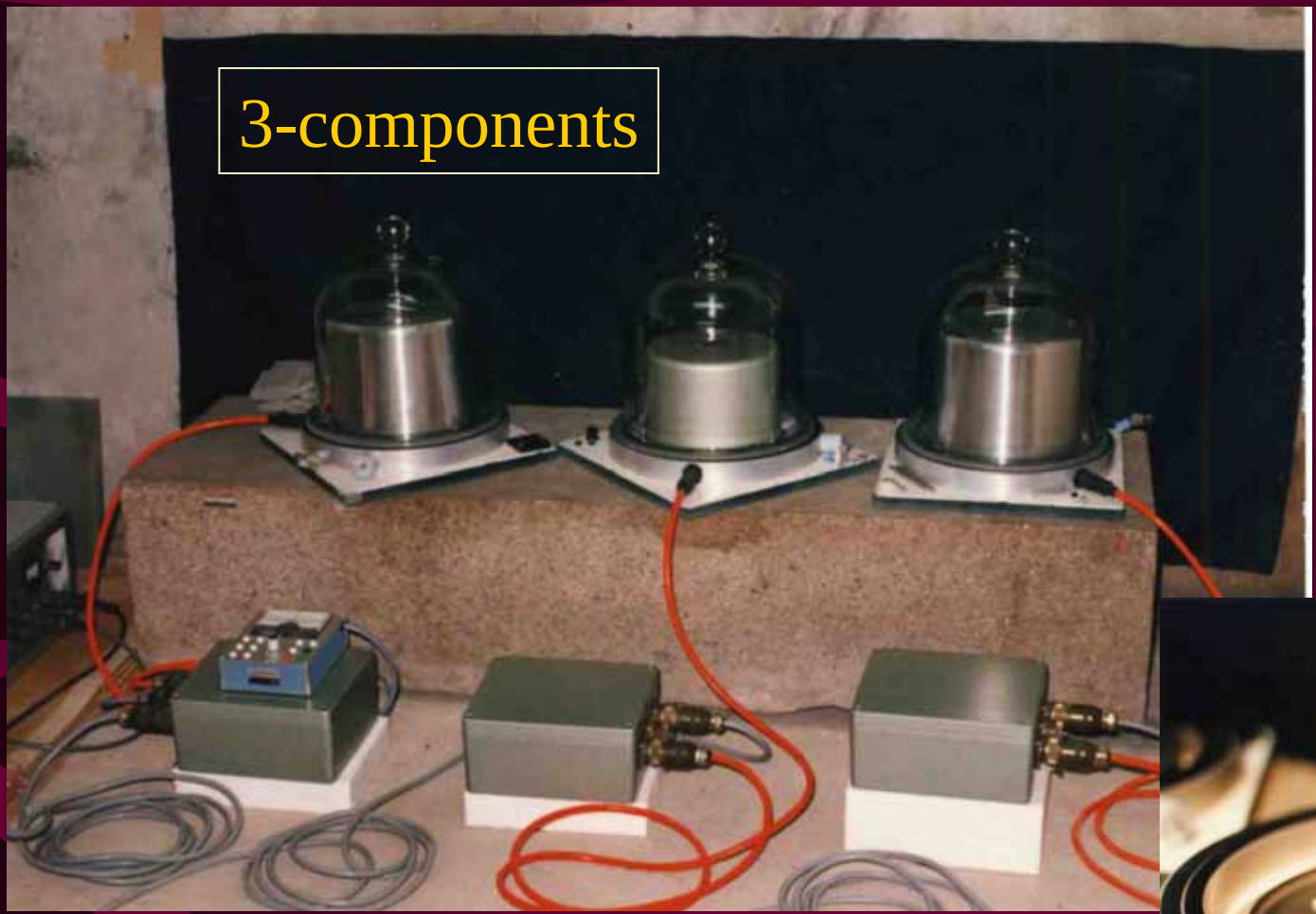


Fig. 1. Locations of the current GSN stations (red stars) and GSN affiliate arrays (orange stars) are shown, as well as sites planned for completion in the coming years (red-white stars). The site code name is indicated. The H2O sea floor site is connected to Hawaii by a re-used undersea telephone cable. GSN is a founding member of the Federation of Digital Seismic Networks (purple symbols) and coordinates with FDSN in station siting and open data exchange. Many GSN stations are cooperative with other networks, indicated by the symbol on the "shoulder" of the star.

Broadband seismometer（STS-1）

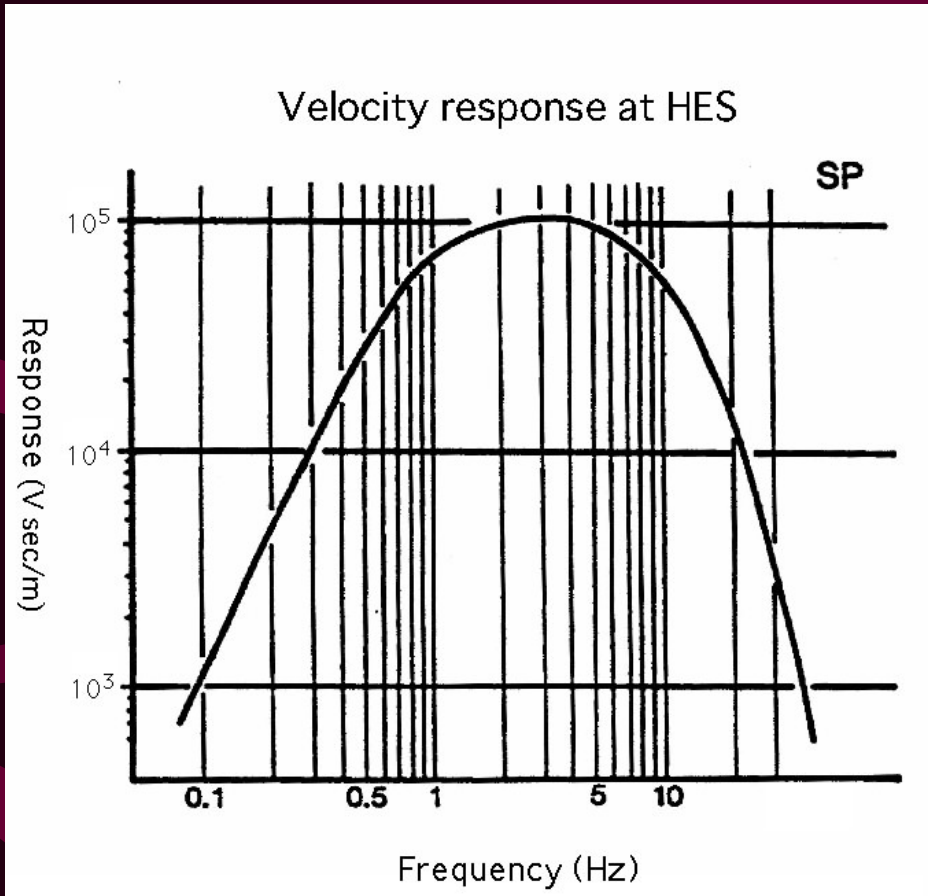


horizontal

vertical

with magnetic, electric shield, & covered by glass bell（10% atmosphere pressure）

Overall frequency response, installed at SYO



Short-period (1 Hz)

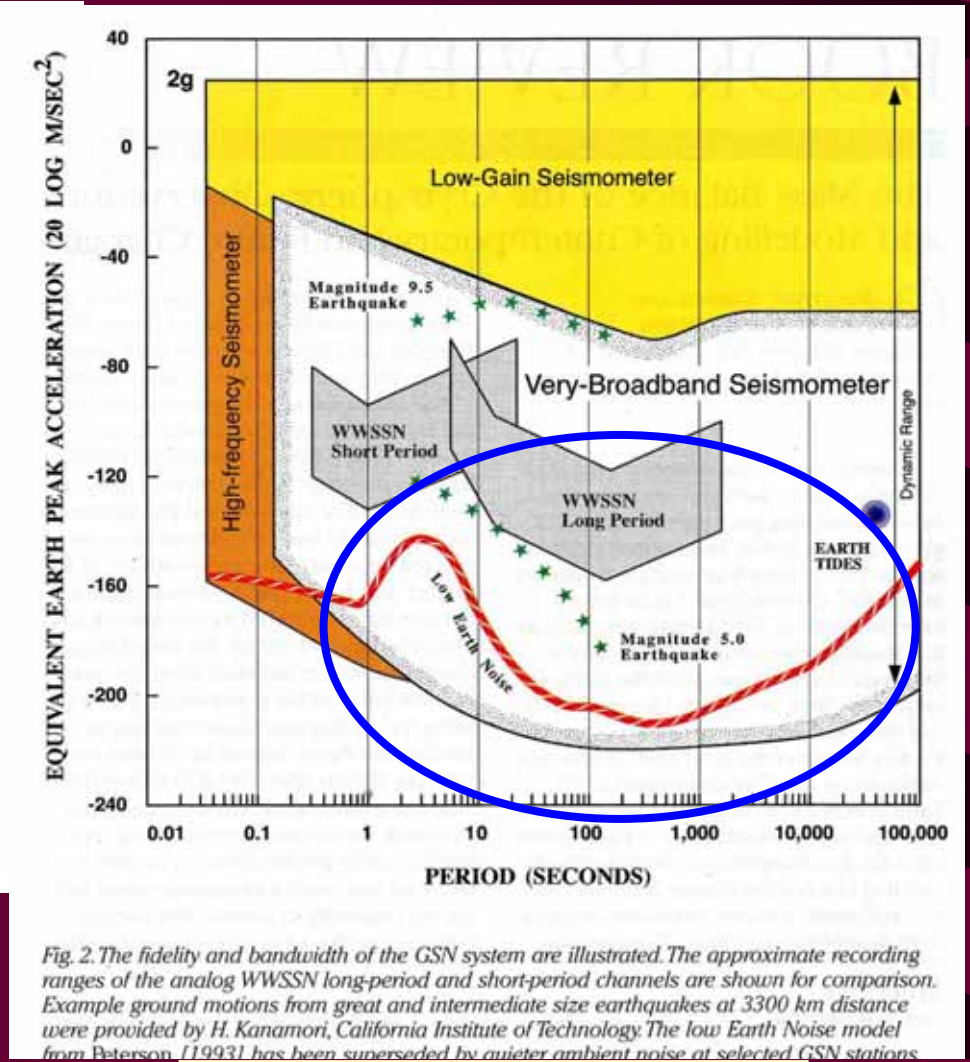


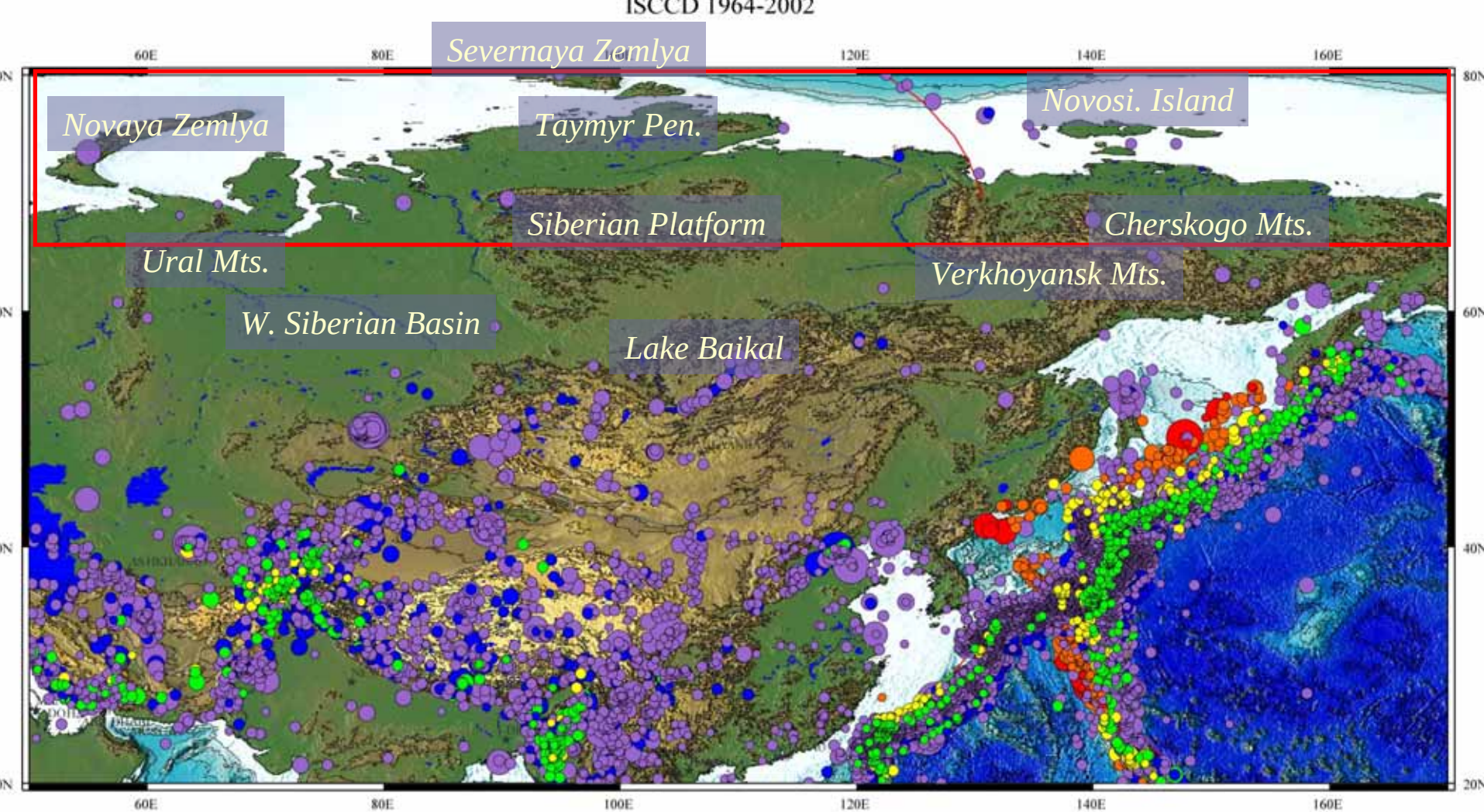
Fig. 2. The fidelity and bandwidth of the GSN system are illustrated. The approximate recording ranges of the analog WWSSN long-period and short-period channels are shown for comparison. Example ground motions from great and intermediate size earthquakes at 3300 km distance were provided by H. Kanamori, California Institute of Technology. The low Earth Noise model from Peterson [1993] has been superseded by quieter ambient noise at selected GSN stations

Broadband (STS-1)

Contribution to global data centers

- **International:**
  - United States Geological Survey, National Earthquake Information Center (USGS/NEIC)
  - International Seismological Center (ISC)
  - Federation of Digital Seismographic Networks (FDSN)
  - The Incorporated Research Institutions for Seismology, Data Management System (IRIS/DMS)
  - Antarctic Seismic Web Resource (AnSWeR)

- **Domestic:**
  - PACIFIC21 (developed from POSEIDON)
  - Ocean Hemisphere Project Data Management Center, Earthquake Research Institute, University of Toyo (OHP/ERI)
  - Institute for Frontier Research on Earth Evolution, Japan Marine Science and Technology Center (IFREE/JAMSTEC)
  - National Institute of Earthquake Prediction and Disaster Prevention (NIED)



Seismicity ISCCD

Legend:

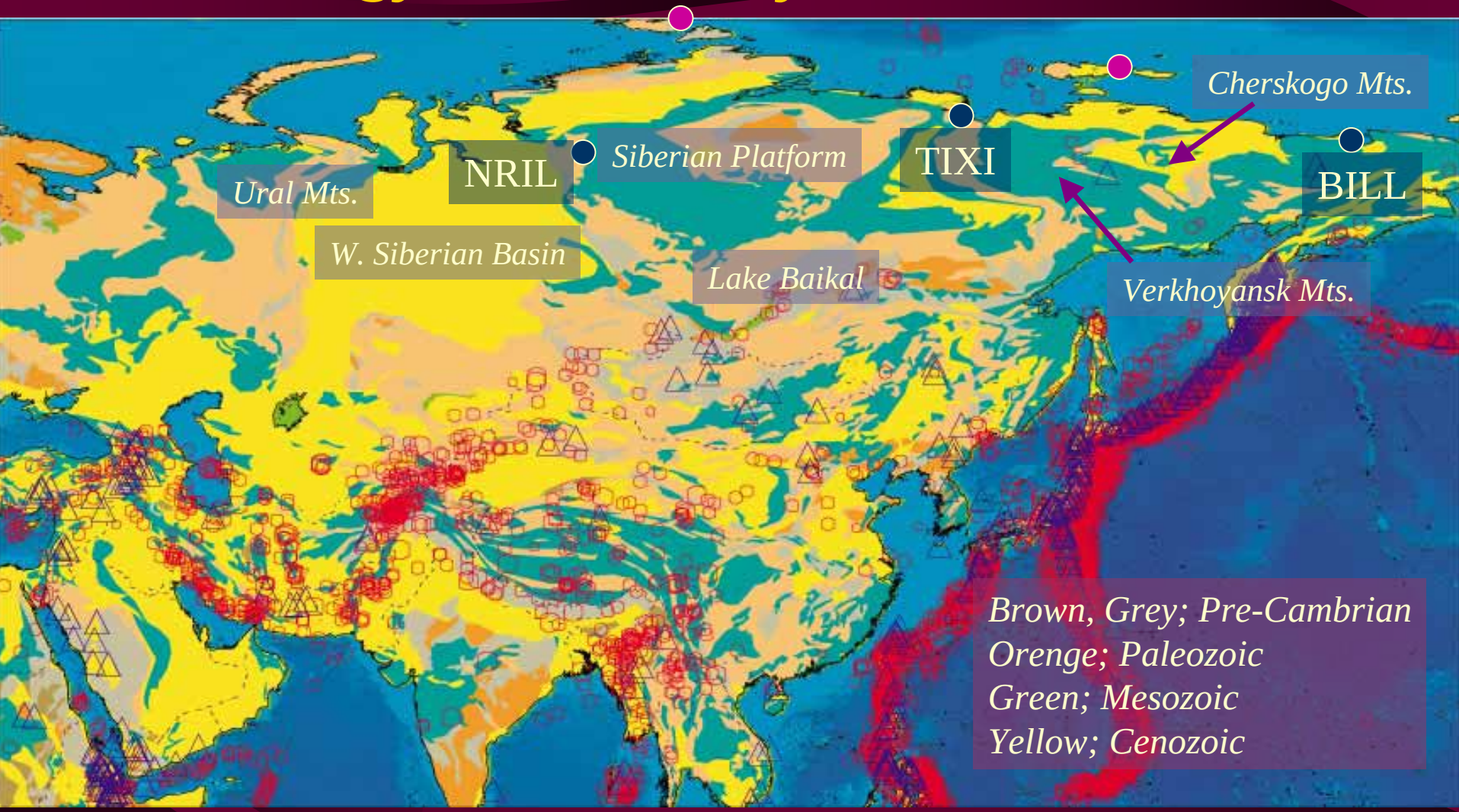
0 33 70 150 300 500 800

Depth

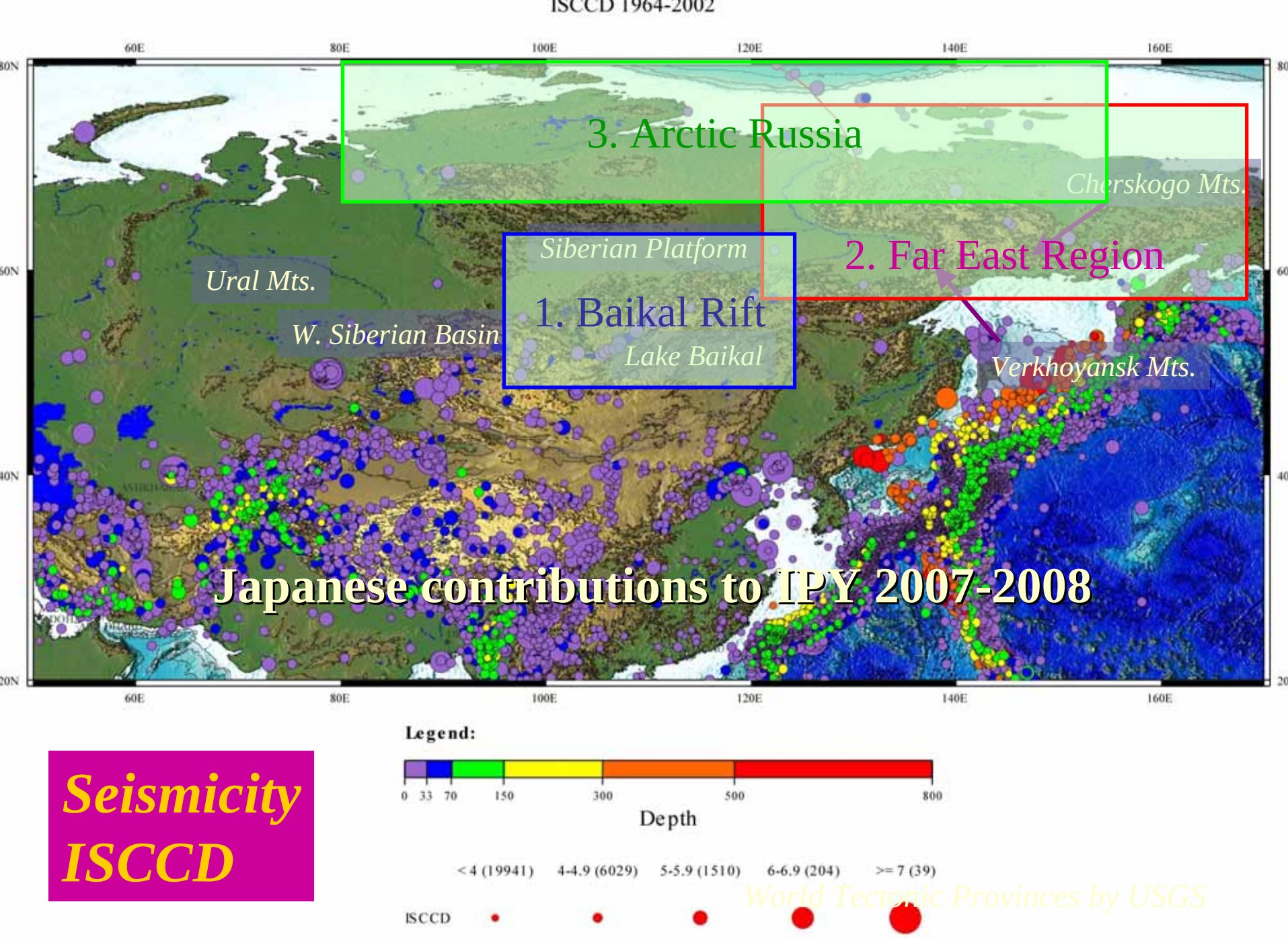
< 4 (19941)	4-4.9 (6029)	5-5.9 (1510)	6-6.9 (204)	>= 7 (39)

ISCCD

Geology + Seismicity, Volcanoes



After Cornell Database; World geology, ISC Seismicity + Volcanoes


ISCCD 1964-2002
60E
80E
100E
120E
140E
160E
80N
60N
40N
20N
3. Arctic Russia
Cherskogo Mts.
Siberian Platform
2. Far East Region
Ural Mts.
1. Baikal Rift
W. Siberian Basin
Lake Baikal
Verkhoyansk Mts.
Japanese contributions to IPY 2007-2008
Seismicity
ISCCD
Legend:
0 33 70 150 300 500 800
Depth
< 4 (19941)
4-4.9 (6029)
5-5.9 (1510)
6-6.9 (204)
>= 7 (39)
ISCCD
World Tectonic Provinces by USGS

Targets for permanent broadband seismic station in Polar regions

Seismic waveforms/ & travel-times, hypocenters of the earthquakes are used to clarify the heterogeneous structure and dynamics of the various scales of the Earth's interior.

Local crust - lithospheric structure & dynamics

Regional upper mantle structure, plume tectonics

Deep Earth's interior and dynamics

- (D" zone, CMB, Outer- & Inner-Core)