The Global Seismic Network (GSN)

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Twenty-sixth Session Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System
April 22-24, 2015
Honolulu, Hawaii
Stations provide the backbone for the Global Tsunami Warning Systems.
THE GLOBAL SEISMOGRAPHIC NETWORK

- High dynamic range
- Broadband (hrs to ~ 10 Hz)
- Quiet instruments / sites / installations
- Real-time telemetry
- Global distribution at ~ 2000 km spacing
- Have primary and secondary sensors, and strong motion stations

Multi-use
- Basic Earth science research
- Monitoring applications such as earthquakes, tsunamis, and nuclear testing
Facilitate – Collaborate – Educate

GSN OPERATIONS & LOCAL DATA COLLECTION CENTERS

USGS/ASL
Operates ~100 stations
DCC at USGS/NEIC
ships data to the IRIS

IRIS/IDA
Operates ~ 39 stations
DCC at UCSD
ships data to the IRIS DMC
GSN PARTNERSHIPS

• Host country partnerships
  ✧ MOUs between foreign governments, private entities & universities
  ✧ Long-standing relationships between foreign network operators and local personnel

• International agencies
  ✧ FDSN partners for improved coverage (GEOSCOPE, GEOFON, etc.)
  ✧ CTBTO shares the Global Communication Interface (GCI) with GSN at 50+ colocated IMS stations

• National agencies
  ✧ NOAA, NEIC, PTWC, NTWC – data flow & delivery
DATA FLOW FROM GSN STATIONS

Some of the data flow through the PTWC, CTBTO and other international data hubs on the way to IRIS DMC.

These telemetry paths reflect the multiple uses of the GSN, i.e. the needs of the research community and mission requirements for tsunami warning, earthquake hazard monitoring and nuclear test-ban monitoring.
IRIS DATA MANAGEMENT CENTER

- IRIS DMC freely distributes data from the world’s largest open archive of continuous seismological waveforms including:
  - 150+ GSN stations
  - Seismic Networks funded by the USGS
  - Continuous data from 66 networks of the Federation of Digital Seismic Networks (FDSN)
  - Receive and distribute data from 39 non-FDSN international networks

2012 – DMC Waveform Data and Metadata Workshop
Bangkok, Thailand
GSN IMPACTS on GLOBAL MONITORING

• National Earthquake Information Center (NEIC) usage
  ✷ Rapid determination of size and location of major earthquakes
  ✷ Provides comprehensive catalog of EQ source info

• Tsunami warning
  ✷ ~100 GSN stations are used for real-time analyses by the NTWC; coverage on islands and international areas is key – sparse coverage by other networks

• Verification seismology (CTBTO)
  ✷ ~50 auxiliary seismic stations are contributed by GSN
GSN STATIONS USED IN TSUNAMI WARNING

GSN stations used in real-time for the Sumatra-Andaman Earthquake.

Due to GSN station proximity, the first alarm at the PTWC was sounded before the earthquake rupture was completed.

Modified from the PTWC
Quality and distribution of stations is helpful for rapidly characterizing potential tsunamigenic events; Yellow and red areas would be ideal targets for future stations.
Map showing existing GSN & FDSN station distribution. Contoured values show the number of GSN stations within 10 degrees of each point.
Thank you for your support of the GSN!