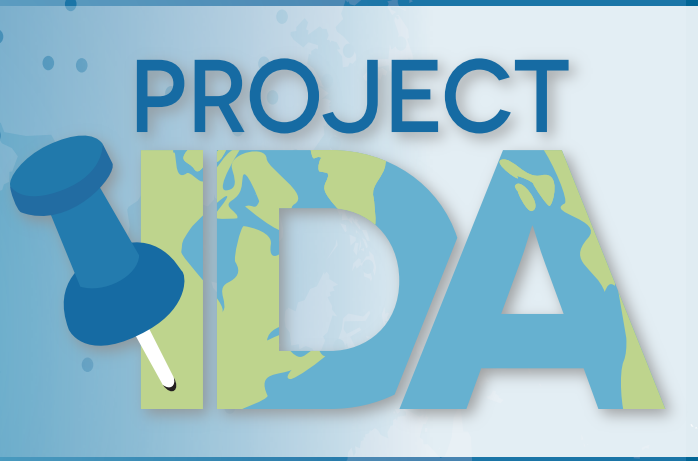
II GSN Pre-shipment Testing Procedures



Carl Ebeling, IGPP

INTERNATIONAL DEPLOYMENT OF ACCELEROMETERS (IDA)

Is equipment to be tested…

- Destined for a new station installation?
- Part of an upgrade at an existing station?
- A component in a system needing trouble-shooting?
- Intended to replace a failed piece of deployed equipment?
- Returned from a manufacturer after a repair?

These factors determine

- Extent of testing (functional, performance assessment, etc)
- Testing facility

When appropriate, testing carried out in “equipment environment” as similar as possible to that of destination II station

Replicating equipment environment: Seismic instrumentation across the II network

Weak-motion instruments

- Geotech KS54000
- Nanometrics Trillium 240, 120PH
- Streckeisen STS-1V/1H
- Streckeisen STS-2
- Streckeisen STS-2.5
- Streckeisen STS-5A

} Surface Vaults
Boreholes (~100 m)
Postholes (~7 m)

Strong-motion instruments

- Kinemetrics FBA-23
- Kinemetrics Episensor

IDA Sensor Testing Facilities

IGPP Munk Lab vault

- Near IDA lab; easy to reach (walkable)
- Hard-wired communication link to IDA
- Very high seismic noise environment

"Permanent" Equipment

- KS54000
- STS-2/2.5/5A
- STS-1H/V

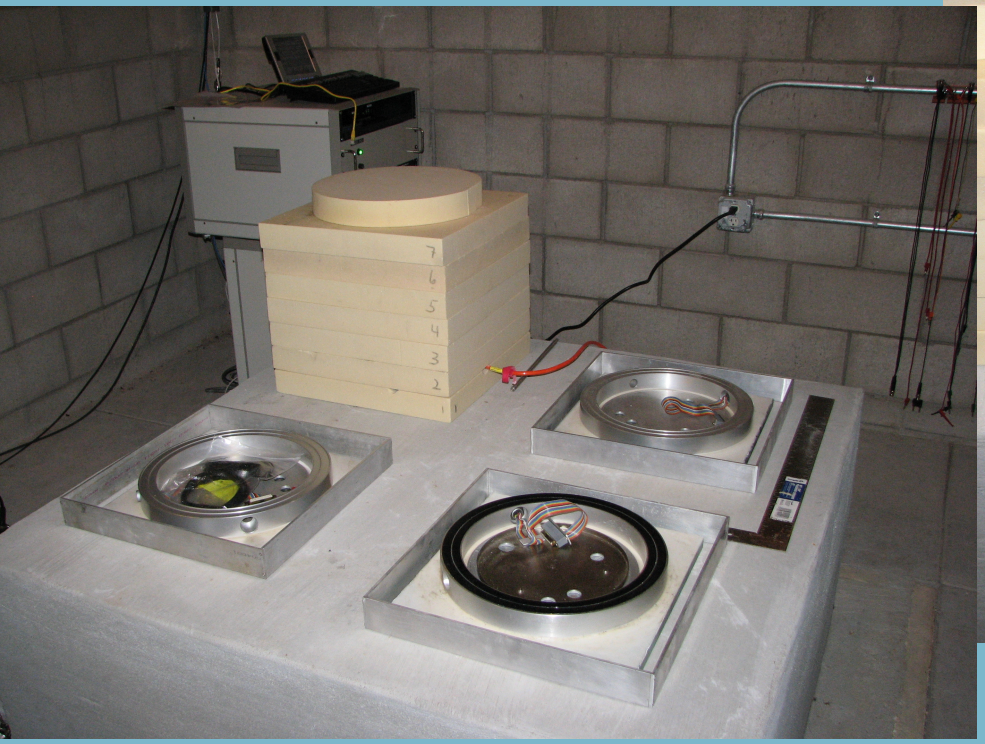
"Temporary" Installations

- Compact Trillium
- Trillium 120 PH
- Trillium 240
- FBA-23
- Episensor

IDA Sensor Testing Facilities

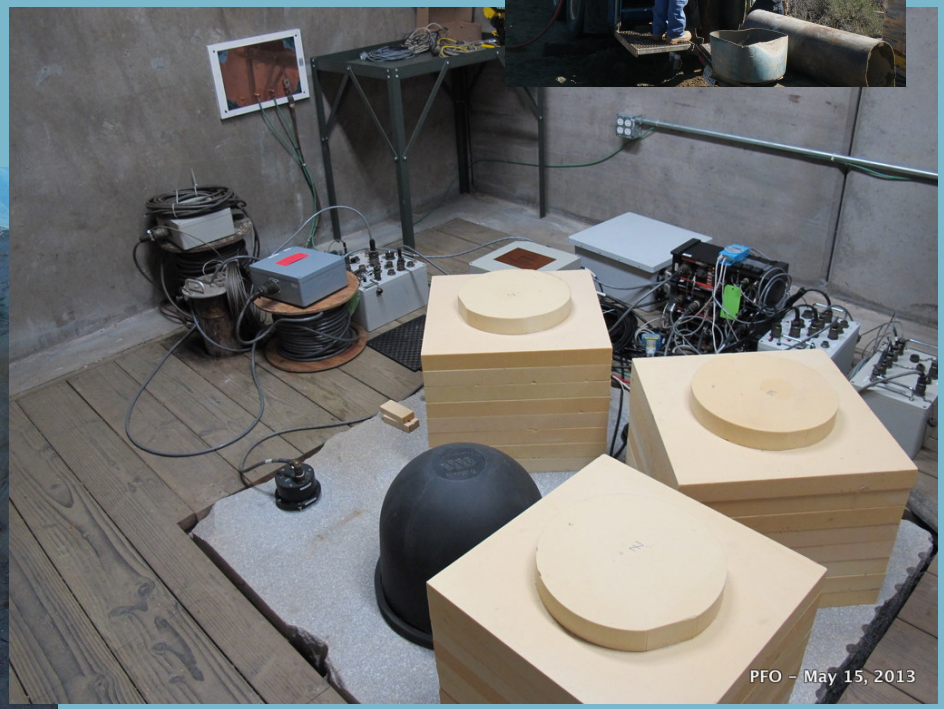
UCSD Elliot Seismic Vault

- Moderate seismic noise (I-15 only 2 km distant)
- Easy to reach by vehicle from SIO



Piñon Flat Testing Facility

- Moderate-low seismic noise
- Diorite pier
- Two ~7-m side-by-side postholes
- One ~20-m borehole (in PFO vault)
- Proximity to PFO for data analysis
- Travel from SIO requires ~90 min

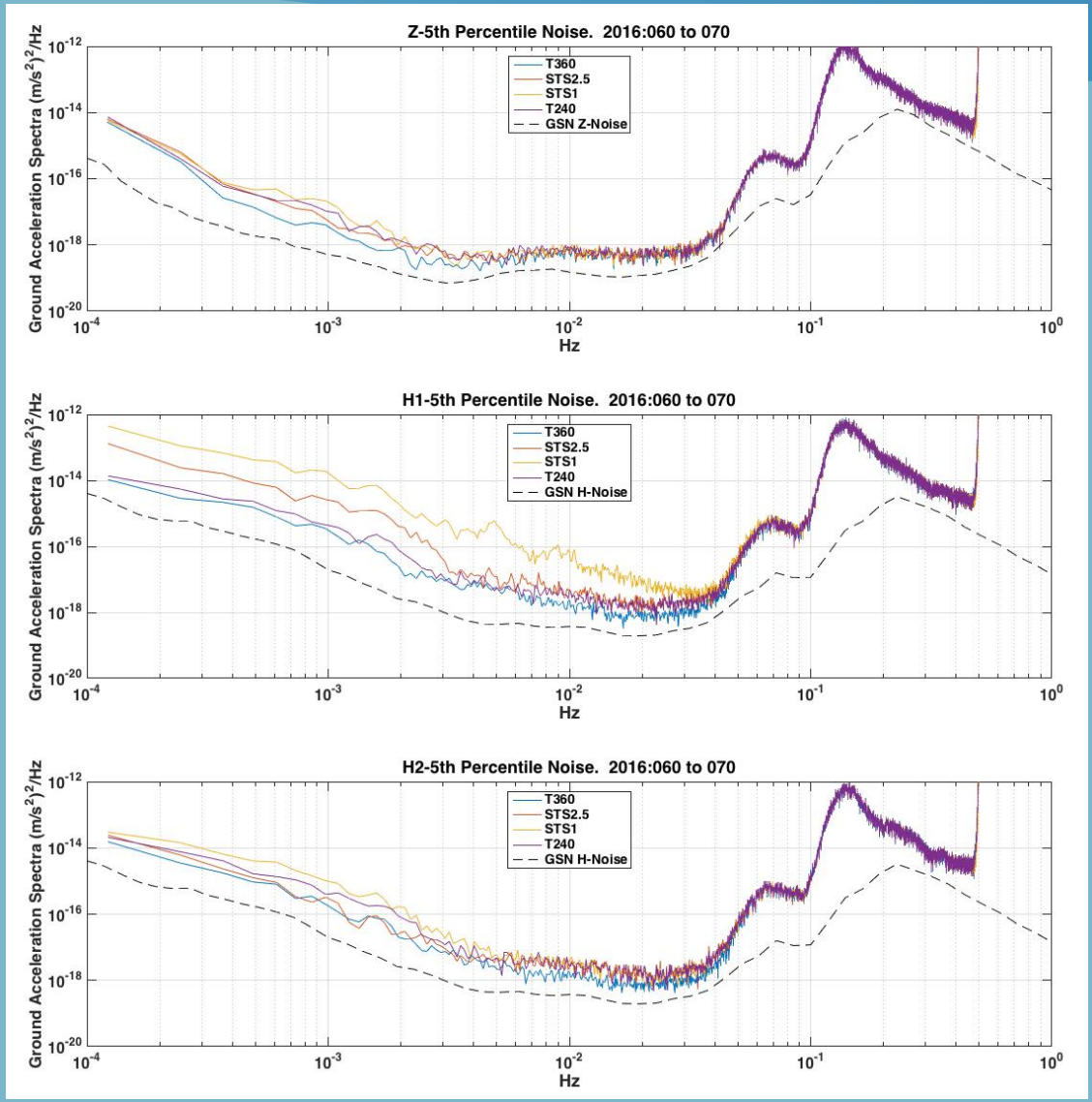


PROJECT IDA

Noise testing

Carried out for new sensors at Piñon Flat Seismic Test Facility (STF)

Other testing (functional, calibration, assessment) done at Elliot or Munk locations as appropriate



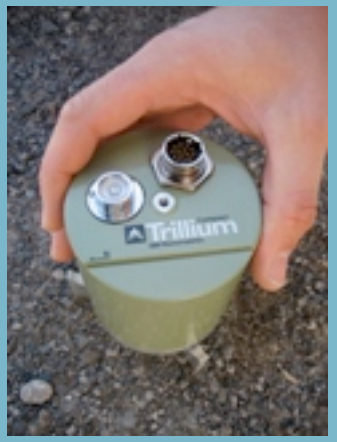
Acceleration spectra for

- Trillium 360 (borehole)
- STS-2.5
- STS-1
- Trillium 240

Strong Motion 3-axis "Tilt Test"

"Tilt test" of Kinemetrics Episensor (with help of fixture):

Nanometrics Compact Trillium and Taurus/Centaur digitizer



- Provides orientation of seismometers *in-situ* (when used with differential GPS)
- Absolute calibration

Compact Trilliums calibrated using shake table (and in some cases tested on Munk or Elliot piers) ***before and after*** every field deployment

Q330HR Digitizer Acceptance Testing

Conducted on

- All new digitizers
- Digitizers with suspected problems
- Digitizers returned from repair

Tests (Automated):

- Base Noise
- DC Calibration
- Linearity
- Time Tag Accuracy
- Common Mode Rejection

Station Test Configuration/Replication

IDA Outer Lab

- Local AC mains voltage replicated
- IDA 48 V supply generated at equipment rack
- Uplink cable (power/data) run to Munk ~200 m

Munk Lab

- Weak and strong-motion instrumentation installed
- Analog signal digitized by Q330HR with same parameters
- Timing provided by re-radiated GPS signal

IDA Outer Lab

- Acquisition computers: two redundant Stealths stn1 and stn2
- Protected behind firewalls
- To greater world

Test equipment rack in IDA outer lab

UCSD Export Control Office

Export Control identifies and manages export risks and provides export licenses in support of the research activities of university faculty, staff, and students

- Determine whether activity subject to U.S. jurisdiction
- Classify technology or goods involved (e.g., subject to ITAR, EAR, or other controls)
- Work with researchers to develop Technology Control Plans
- Determine whether embargoes apply or whether prohibited parties/destinations involved
- Determine if license needed for particular technology and particular end-use and end-user
- Determine if license exemptions or exceptions available
- Determine if license is required; if so, apply promptly and keep records


NIL (Nilore, Pakistan)

Thanks!