Antelope User Group Meeting Trieste

University of Trieste

Trieste, Italy

29-30 November 2004

Frank Vernon

BRTT

ROADNet

Overview

- **Frank Vernon**
  - Instruments and Response information
  - Data exchange
  - ROADNet
  - System Monitoring

- **Dan Quinlan**
  - Antelope 4.5, 4.6, 4.7
  - Dbbuild
  - Example PERL script

- **Jennifer Eakins**
  - RT system and dbmaster configuration
  - Rtexec.pf
  - Waveform backups

- **Kent Lindquist**
  - New Antelope interfaces
  - Web displays
  - Map preparation
  - XML

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ANZA Seismic Network
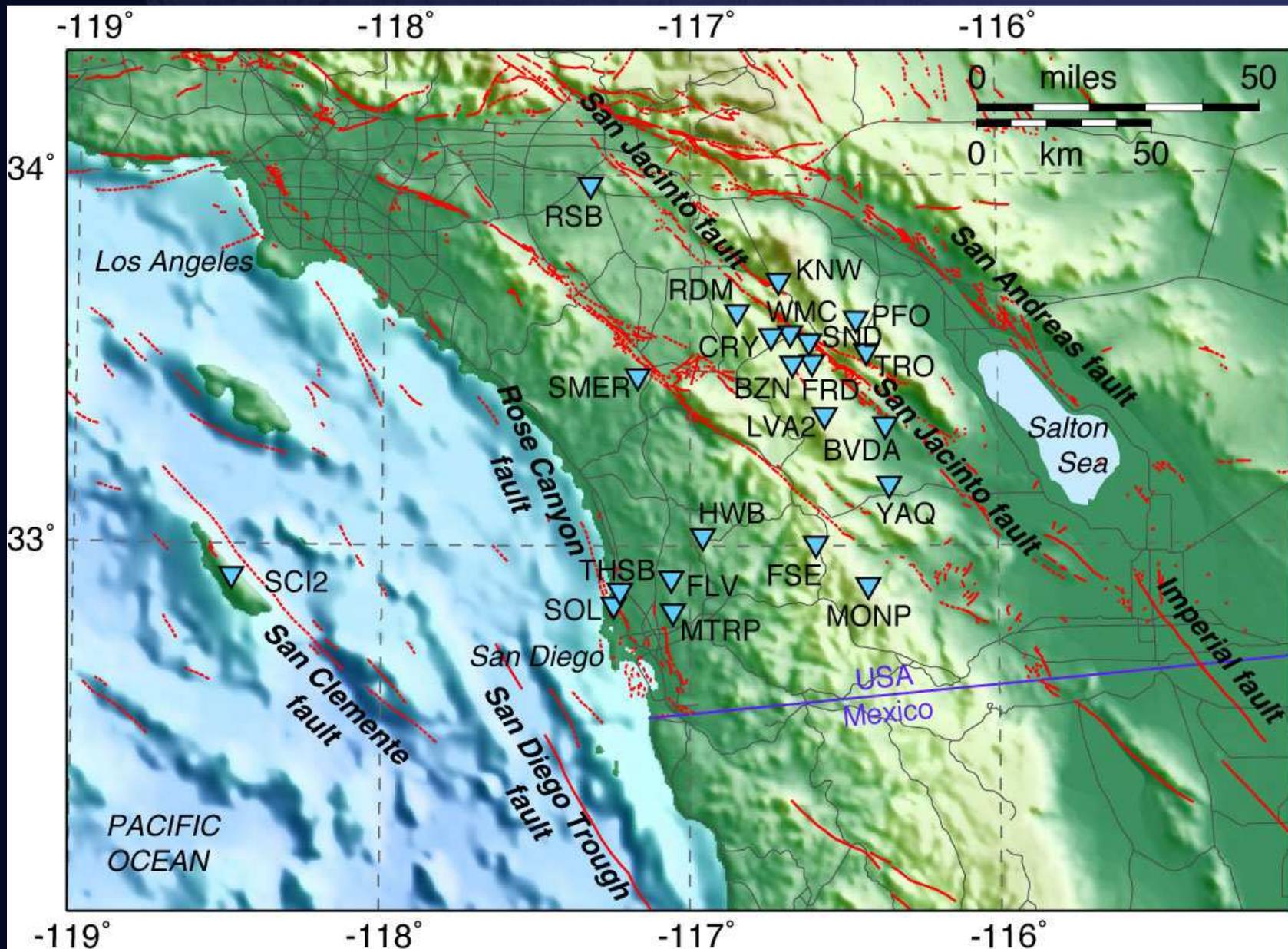
# Earthquakes recorded by ANZA Network
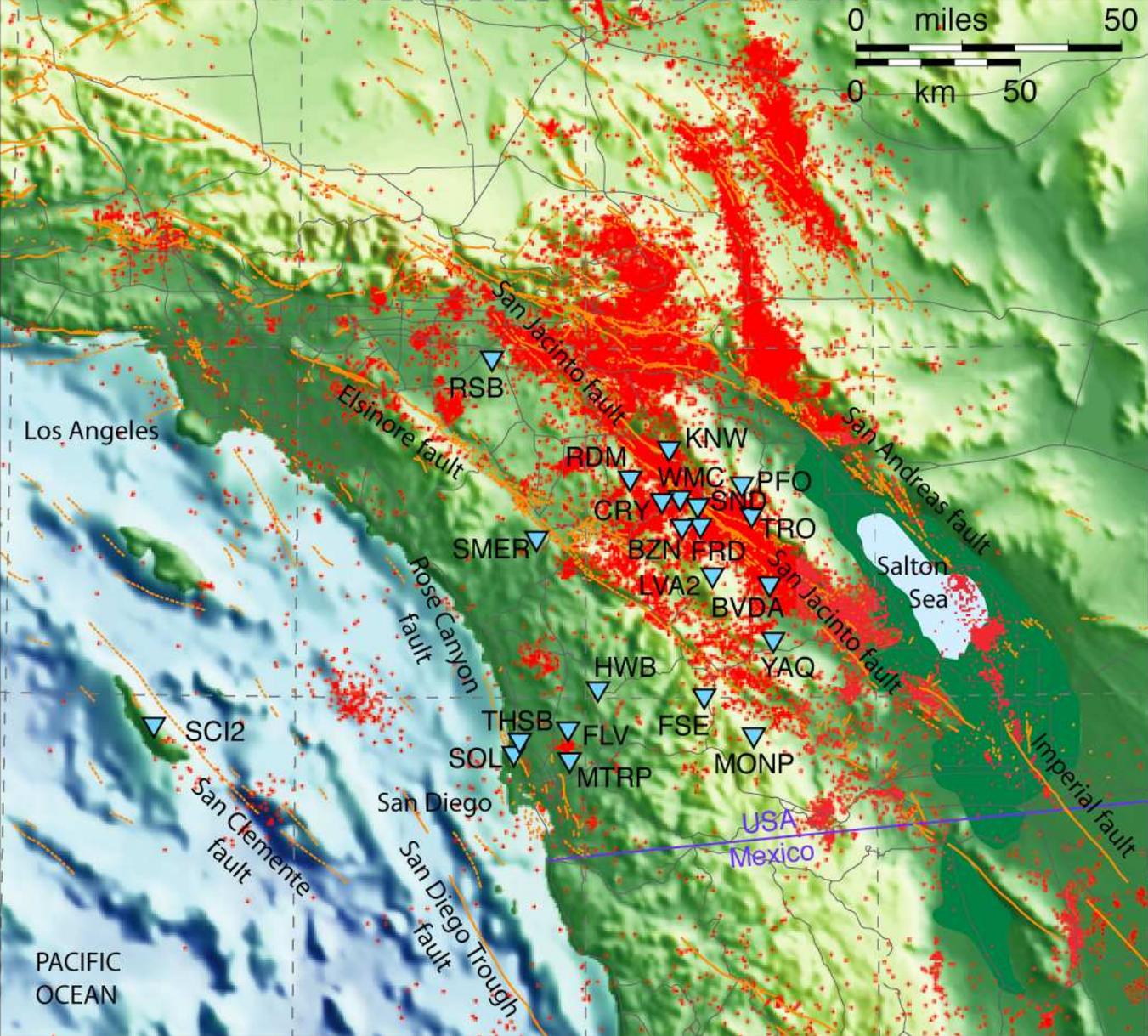
Connecting seismic data to the world

Central Telemetry Site - Toro Peak

Remote Seismic Station

Toro Peak 8700'
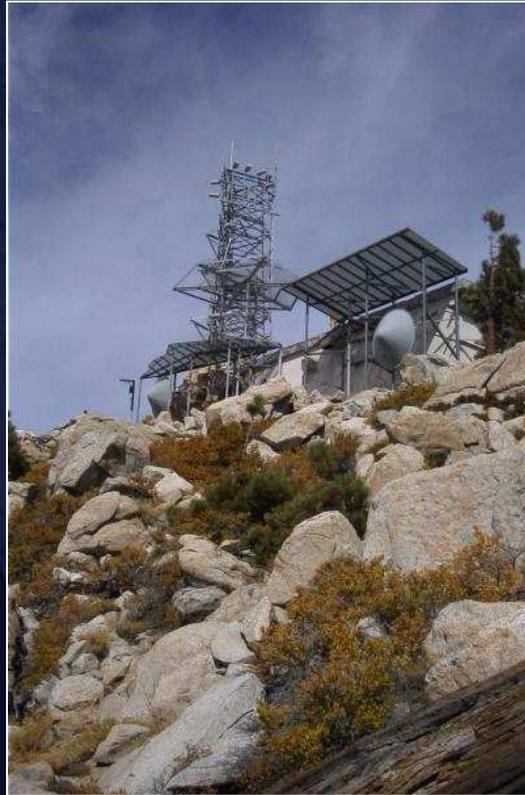
Salton Sea
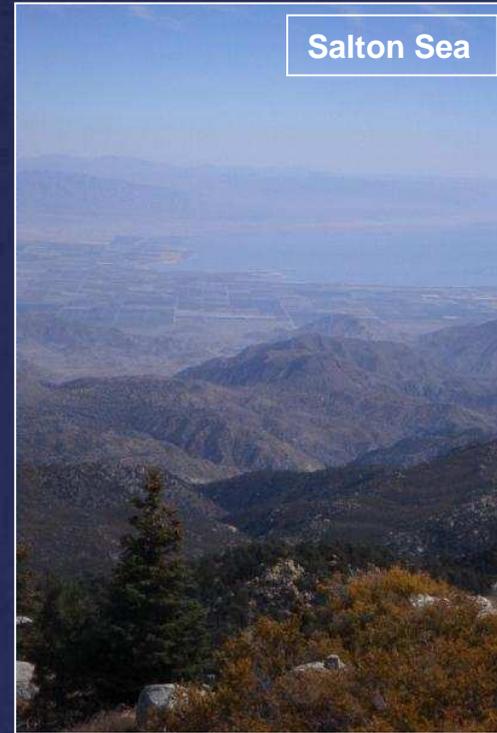
Pinyon Flats

Boyd Deep Canyon
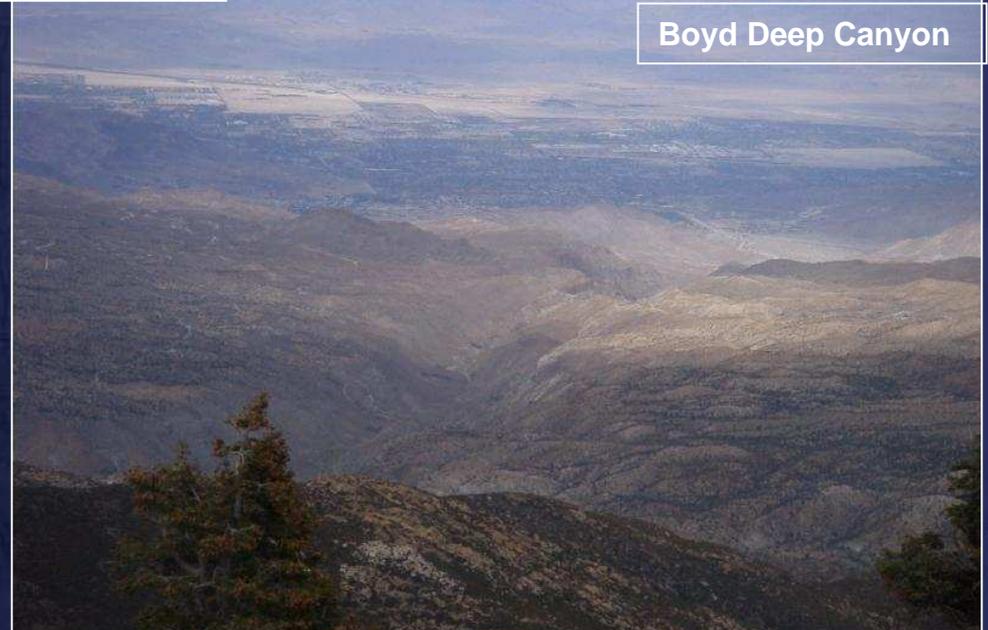
Caribbean CD Experiment
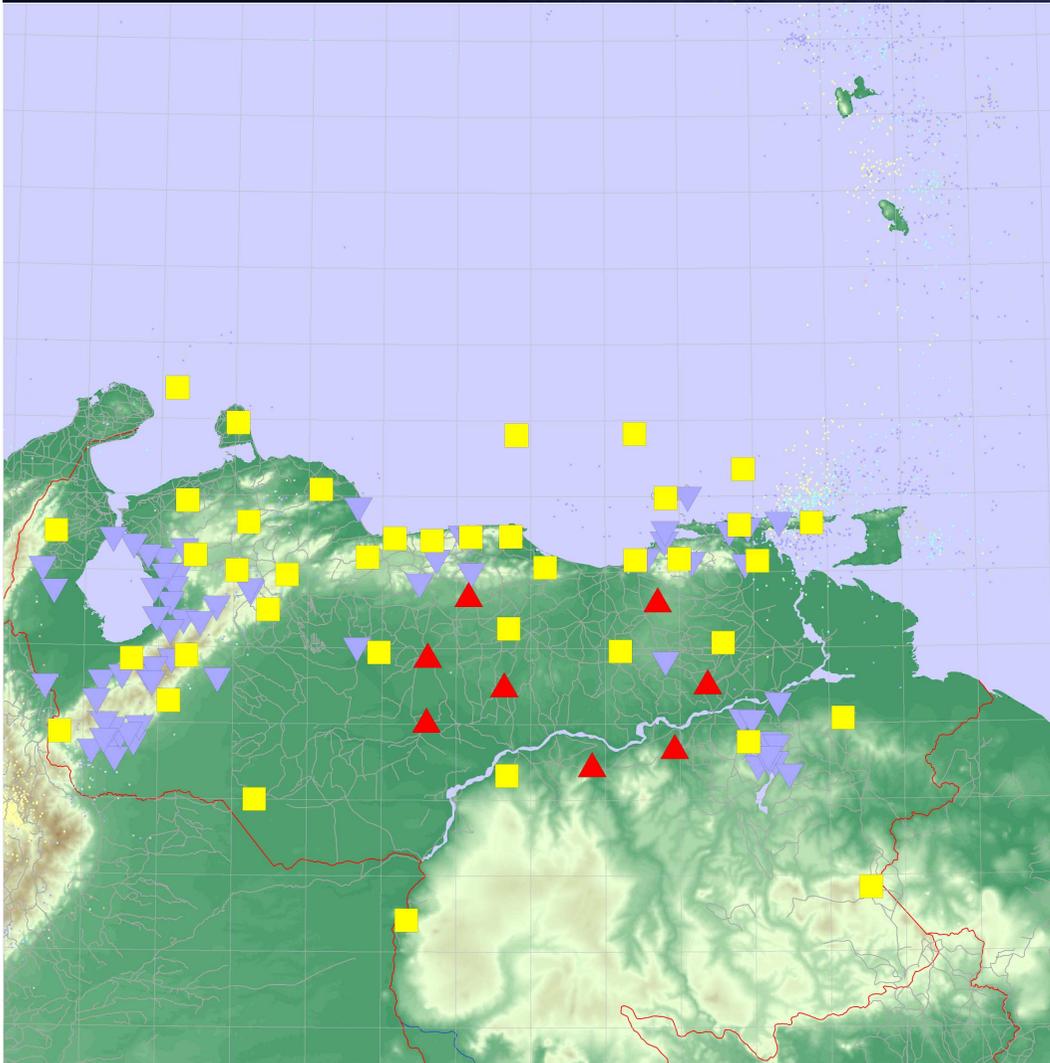
- 20+ PASSCAL Q330s w/ BB sensors
  - 18 to 24 months
- Spacenet Telemetry
- 15 OBS's
  - 15 months
- 30+ FUNVISIS BB stations
- 60+ Analog stations

Antelope Real–Time System

field digitizer

field digitizer

field digitizer

Field Interface Module

Object Ring Buffer

Executive Module

ORB Export

Archiving

ORB Import

Processing

to external sites

to ASIS

from external sites
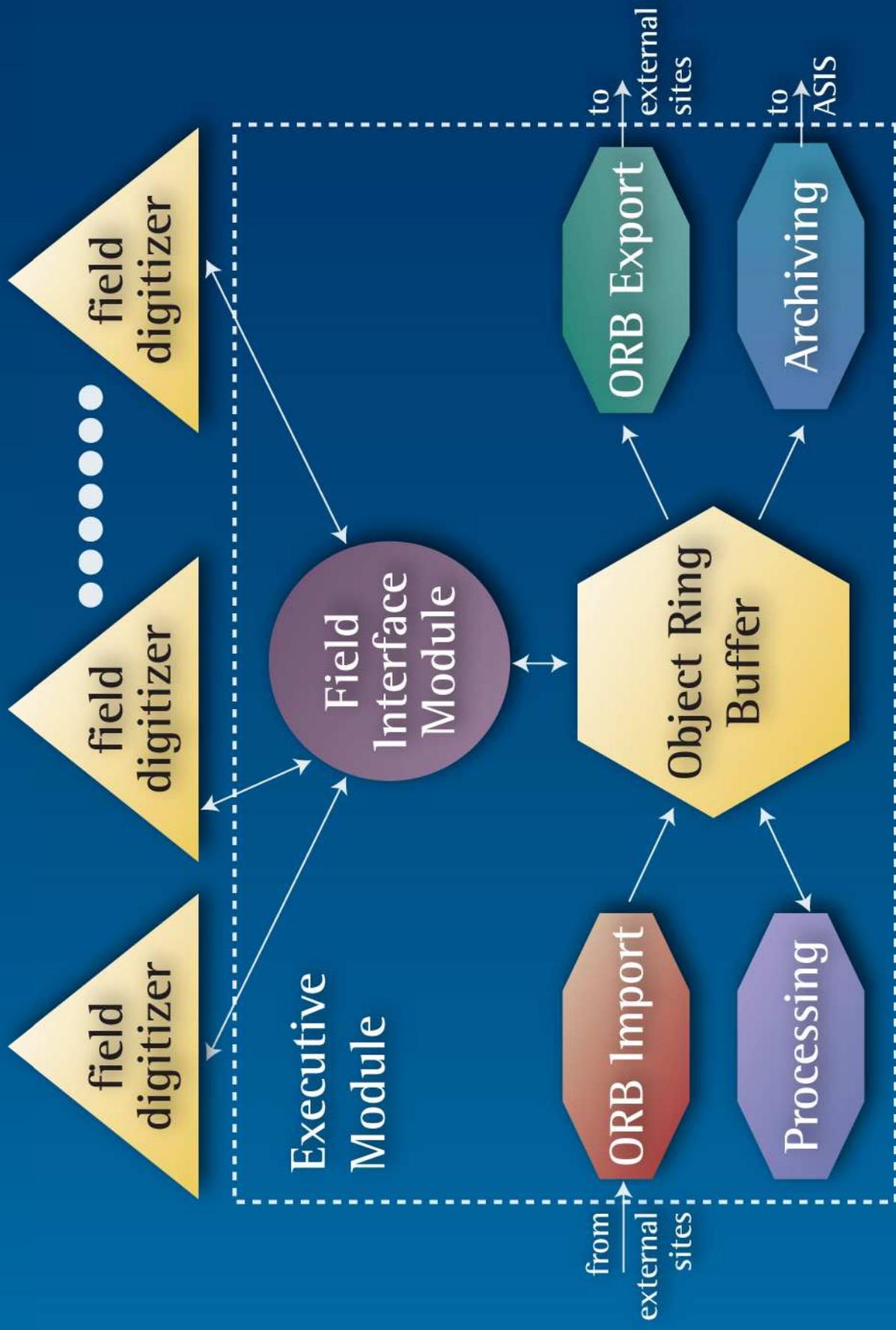
Data Flow for "Routine" Automated Seismic Network Processing: Single Associator
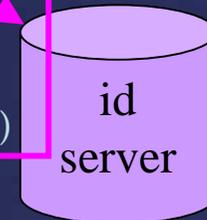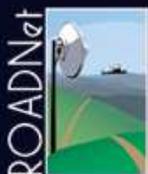
USArray Prototype Station

400 Broadband Stations in Transportable Array

200 Broadband Stations in Flexible Array

Optional GPS

Photos courtesy of Marcos Alvarez
IRIS PASSCAL Instrument Center

q3302orb

- Many changes included in patches to the 4.5 version:
  - Many bug fixes on original version
  - Changes to support systematized generation of status waveform packets
  - Arbitrary time-channel packaging of output waveform data
- Integrate with new `dlmon` and `dlcmd`:
  - Support `dlcmd getconfig` command that will return a (nearly) complete configuration state in parameter file form
- Streamlined open/close and register/deregister
- Streamlined packet acknowledgements
- Automatically detect datalogger reconfiguration and cycle (close/deregister/reregister/open) any running data connections
- Convert to new `pktchannelcalib` tool
- Cellular phone connectivity

k22orb

- Integrate with new **dlmon** and **dlcmd**
- New command for erasing the Altus disk and running monitor commands
- Can specify "any" for **serial** and **model** parameters for point-to-point wired connections
- Convert to new **pktchannelcalib** tool
- Convert to new **orbreapthr** tool
- Support for continuous streaming data rates other than 100 sps (continuous sample rate is now specified in the parameter file)
- Streamlined initial startup for continuous connections
- User can specify the Altus streaming timeout parameter for continuous connections (this allows the user to put the datalogger into "mode 1" so that the data stream will never timeout)

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Q330

- Sample rates
  - 200, 100, 50, 40, 20, 10, 1 sps
  - 0.1 sps with baler

- Multiple data streams
  - Any combination allowed

- Filter and Decimation
  - Knowledge not allowed, considered proprietary
  - Composite filter responses provided

- Causal and Acausal filters

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Q330 default response
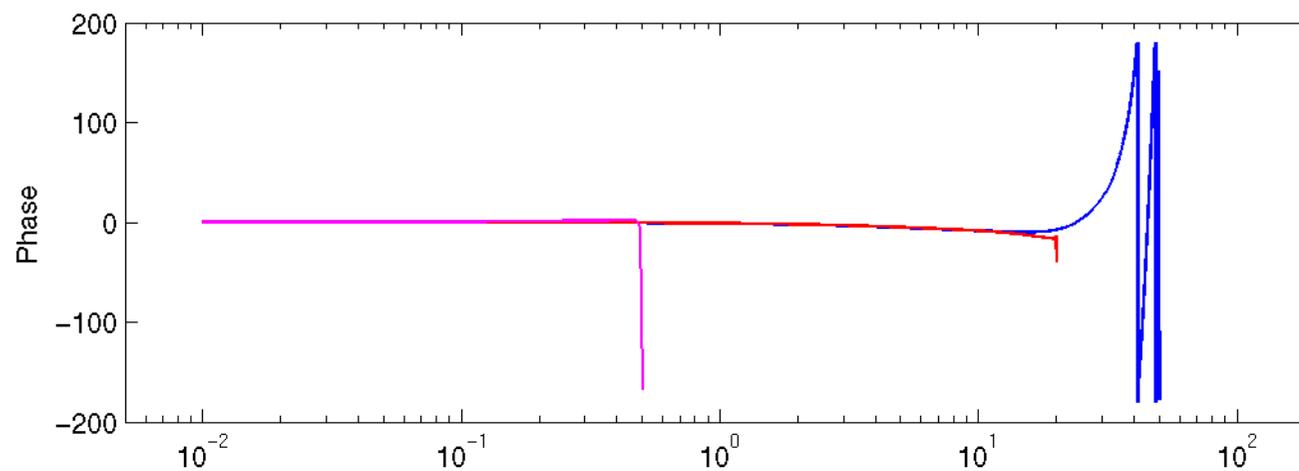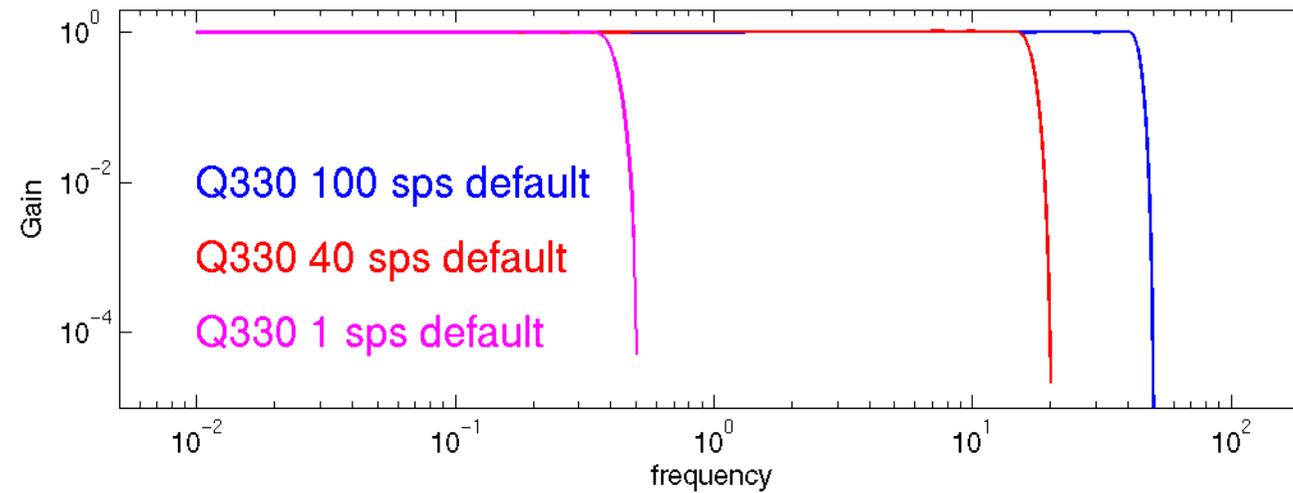
# Q330 default vs linear filters
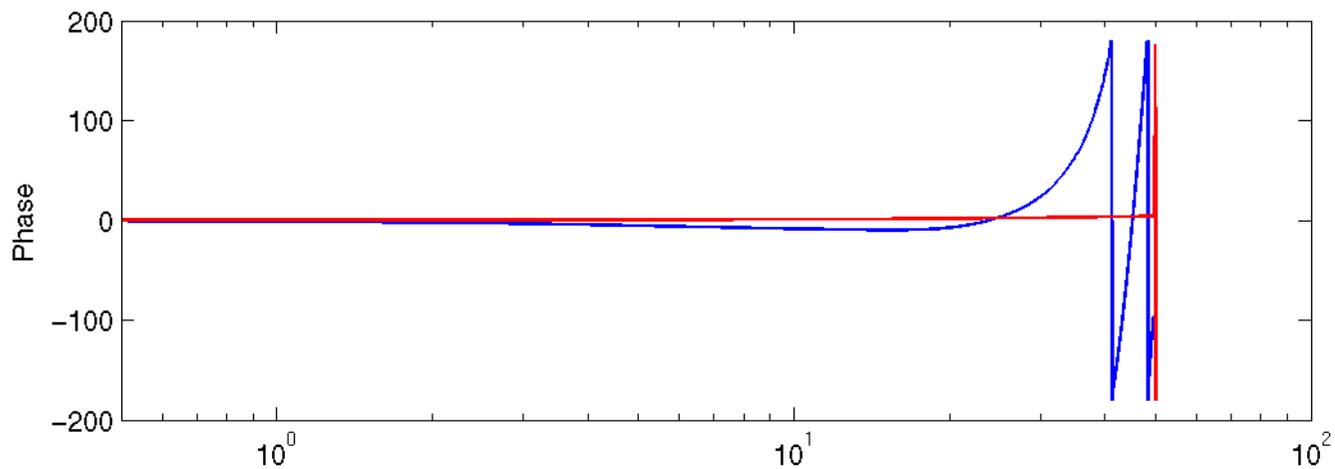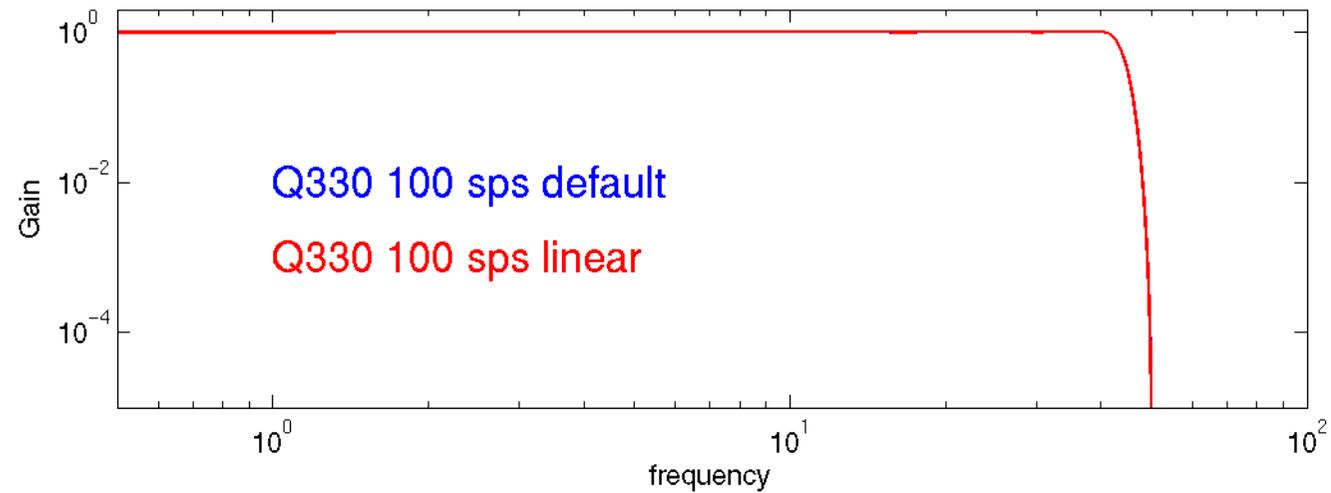
Q330 composite filters
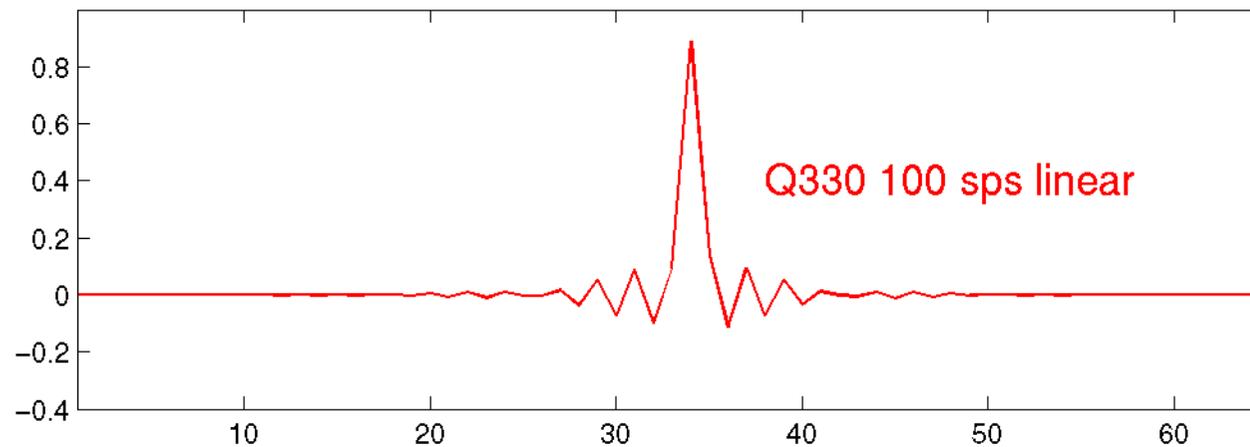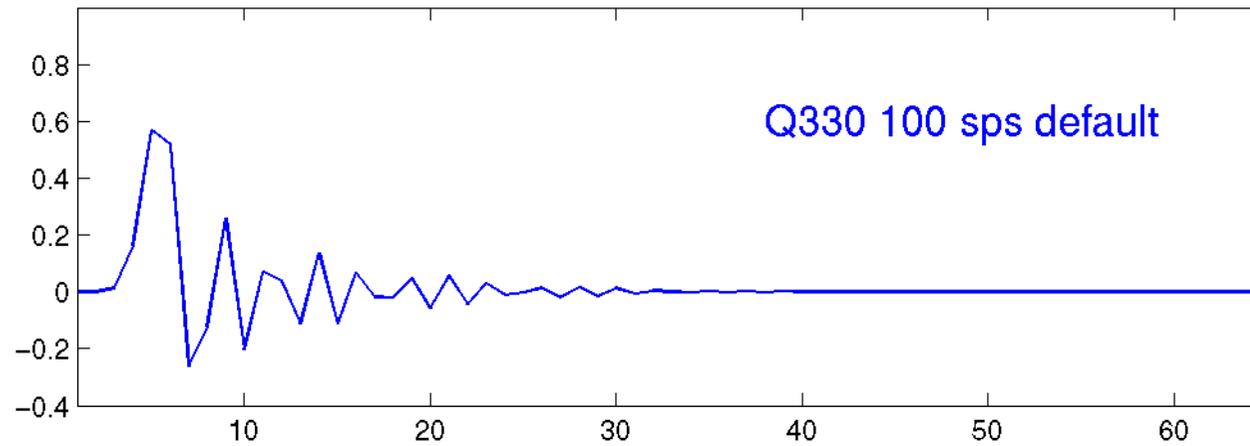
Perils of virtual networks

- Every datalogger different
- A/D's
  - Crystal
    - Reftek, KMI, Guralp, Ida, etc.....
  - Proprietary
    - Quanterra, Nanometrics
- FIR Filters
  - Zero Phase Filters
    - Reftek, Quanterra, KMI, Gurlap, Ida, Nanometrics
  - Causal
    - Quanterra, KMI

Idiosycracies

- Quanterra
  - Variable A/D constants by channel
    - Q680, Q4120, Q730
  - Home brewed filters allowed
    - Q680, Q4120, Q730
  - Q330 default
    - Causal to 100 sps
    - Acausal below
  - FIR coeffs distributed in reverse time order
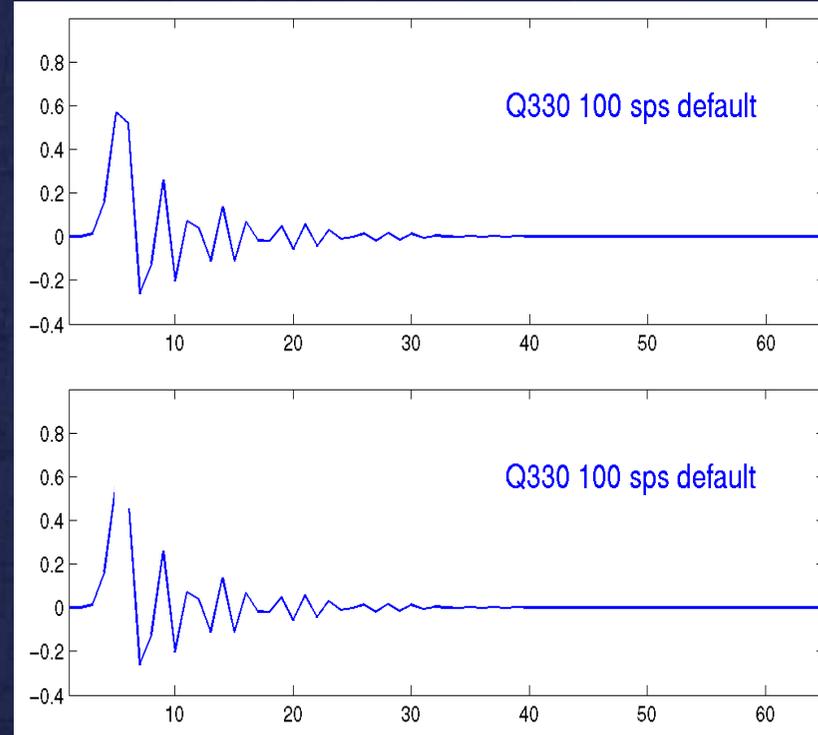
    - Asymmetric fir coeff now distributed in *forward time* order

Idiosycracies

- Guralp
  - Differential or Single ended inputs

- Nanometrics
  - Variable A/D gains
  - FIR Filters
    - 6 decimation rates
    - 9 decimate by 5 filters in specification
    - 6 unique decimate by 5 filters

Datalogger descriptions

- Reftek
  - RT24, RT72A-0[2678], RT97, RT130
- Gurlap
  - DM24, PEPP
- UCSD
  - Ida Mark 8
  - Lcheapo 2000

- Quanterra
  - Q4120, Q730, Q330
  - Q680 needed for USARRAY
- KMI
  - Altus, K2, Makalu
- Nanometrics
  - Trident
- Canadian
  - GD-1

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Sensor Descriptions

- **Streckeisen**
  - STS1, STS2
- **Mark Products**
  - L4, L22, L28
- **KMI**
  - Episensor, FBA-23, Ranger
- **Geospace**
  - HS10

- **Guralp**
  - CMG3T, CMG3ESP, CMG3ESP_NSN, CMG40T
- **Geotech**
  - KS54000, S6000
- **Terratech**
  - FBA

Realtime Dataserver Imports to Antelope

BRTT supported

- Orbserver
- CD1.0
- Comserv
- AutoDRM

Contributed

- LISS
- NRTS
- Earthworm
- Scream
- Seedlink
- RTPD (Reftek)

ROADNet

Realtime Dataserver Exports from Antelope

BRTT supported

- Orbserver
- CD1.0
- AutoDRM

Contributed

- Mshear
- Earthworm
- Seedlink
- Multicast
- Socket

Antelope Packet types

- waveform packet
  - many types
    - non multiplexed data
    - multiplexed data
- status packet
- database row
- parameter file
- control messages
- arbitrary binary data, wrapped in orb packet
  - images
  - codar
  - Ashtech MBEN
  - Lycra
- arbitrary character string
  - log files
- test packet

Antelope Datalogger Modules

BRTT supported

- Quanterra
  - Q380, Q680, Q980
  - Q4120
  - Q730, Q730B
  - Q330
- Kinemetrics
  - K2
  - Etna
  - Makalu
  - Mt. Whitney
  - Everest
- Reftek
  - RT130

Contributed

- Reftek
  - RT72A-08, RT72A-07
  - RT130
- Earthworm Digitizer
- Guralp
- Campbell
- Davis
- Oregon Scientific
- ICE-9
- NEMA Encoding
- Ricoh cameras
- MBEN GPS
- Webcameras
- SeaBird
- CODAR

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Antelope Sensor Types

- Seismometers
- Accelerometers
- Displacement
- Barometric pressure
- Temperature
- Wind Speed
- Wind Direction
- Infrasound
- Hydroacoustic

- Differential Pressure Gauges
- Strain
- Solar Insolation
- pH
- Electric Current
- Electric Potential
- Dilution of oxygen
- Still Camera Images
- Codar

ROADNet

DImon - Station SOH monitor

Nagios - System SOH

Orbmonrtd - Data SOH

Orbmonrtd - Data SOH