Real-time Permanent Networks, Transportable Arrays, Virtual Seismic Networks

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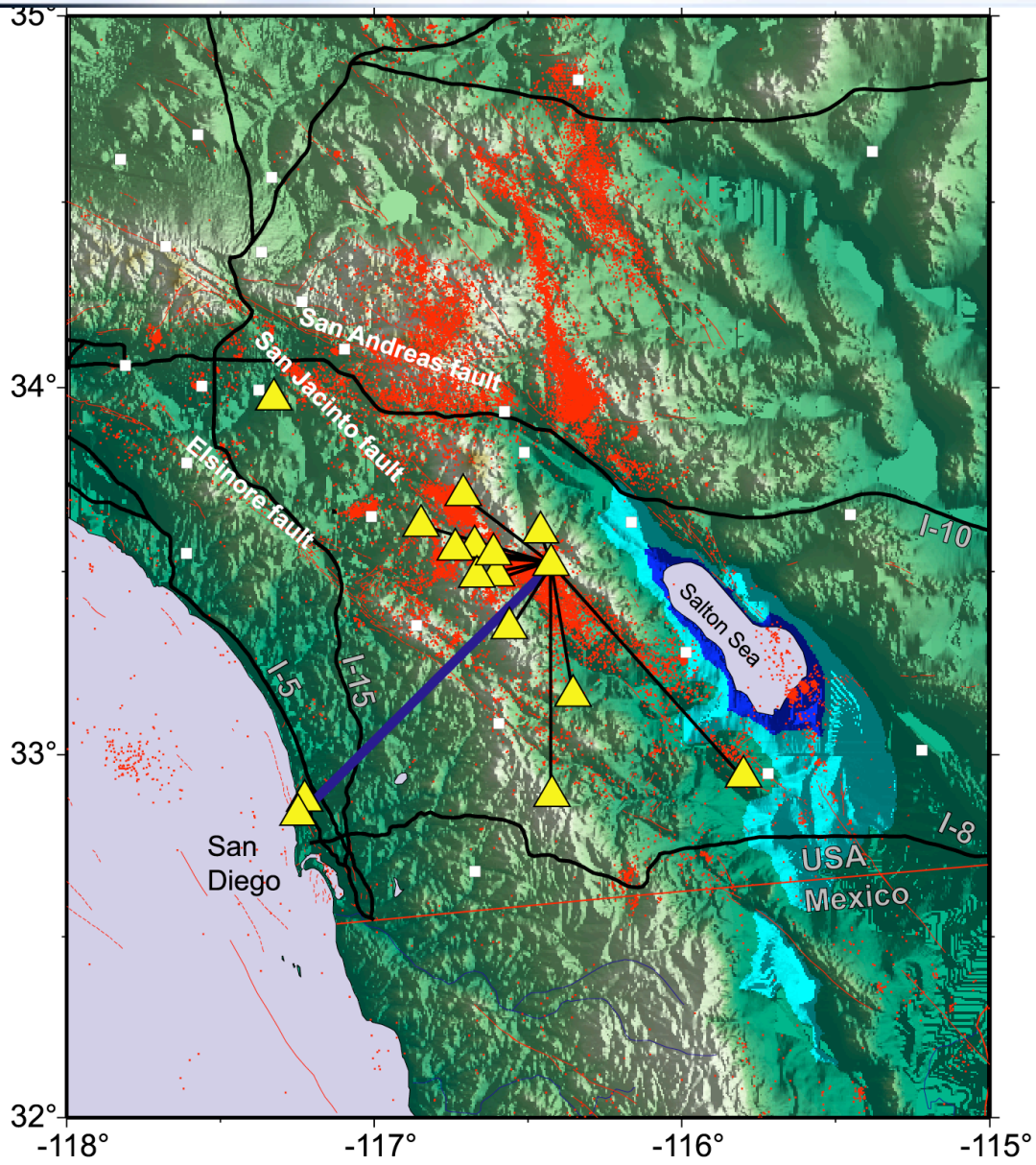
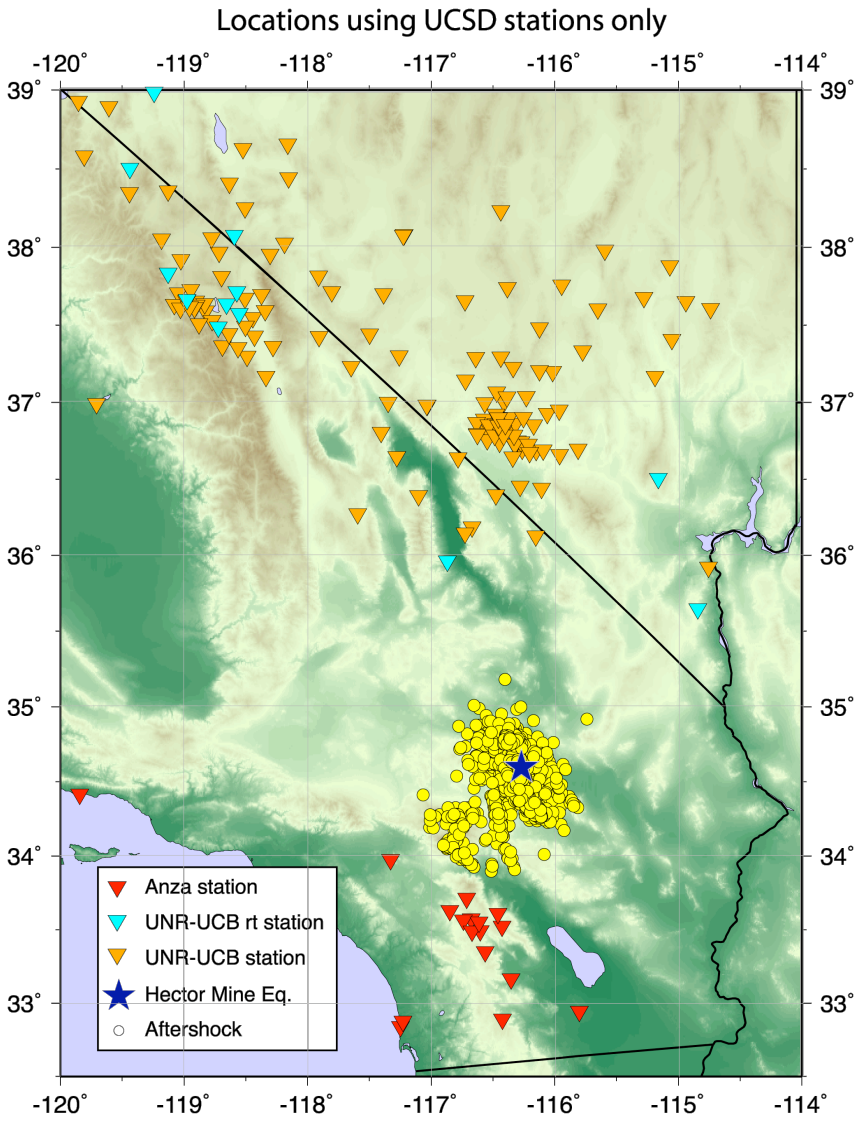
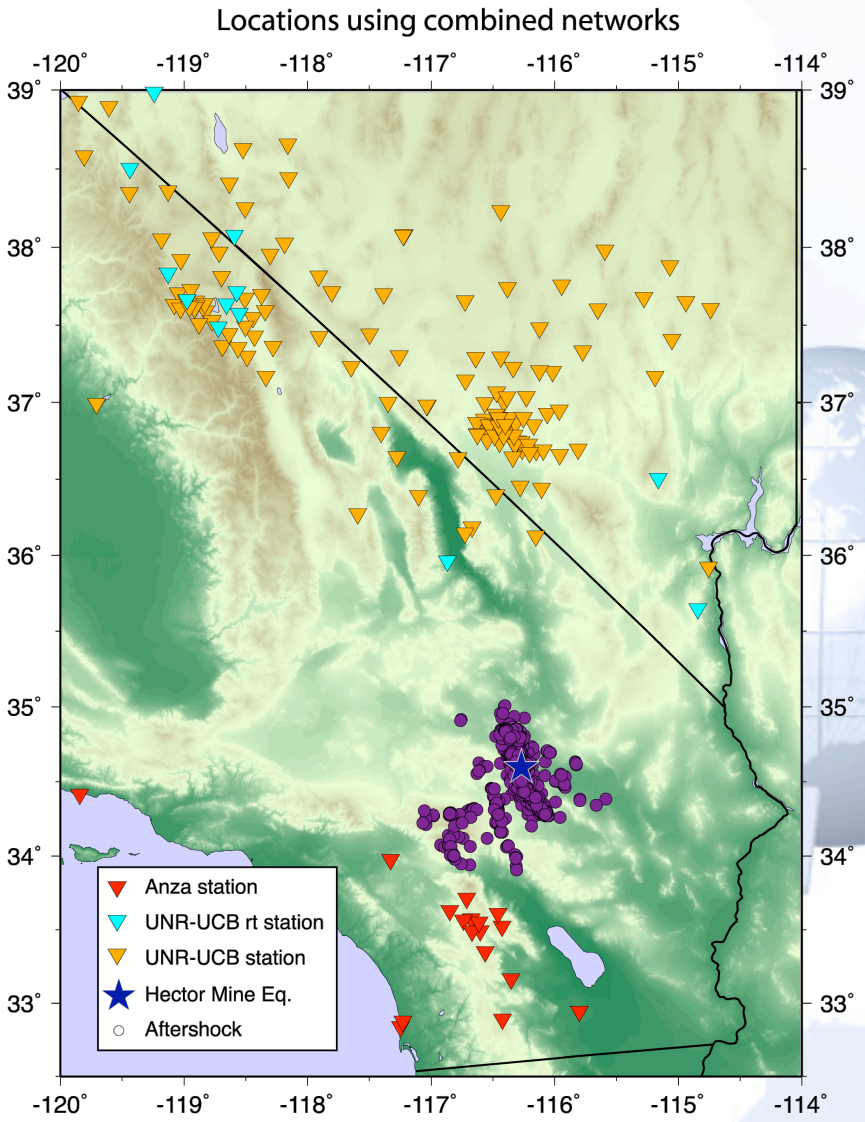
AUG Muscat,Oman 10-12 Nov. 2001

ANZA Seismic Network



1999 Hector Mine Data Exchange

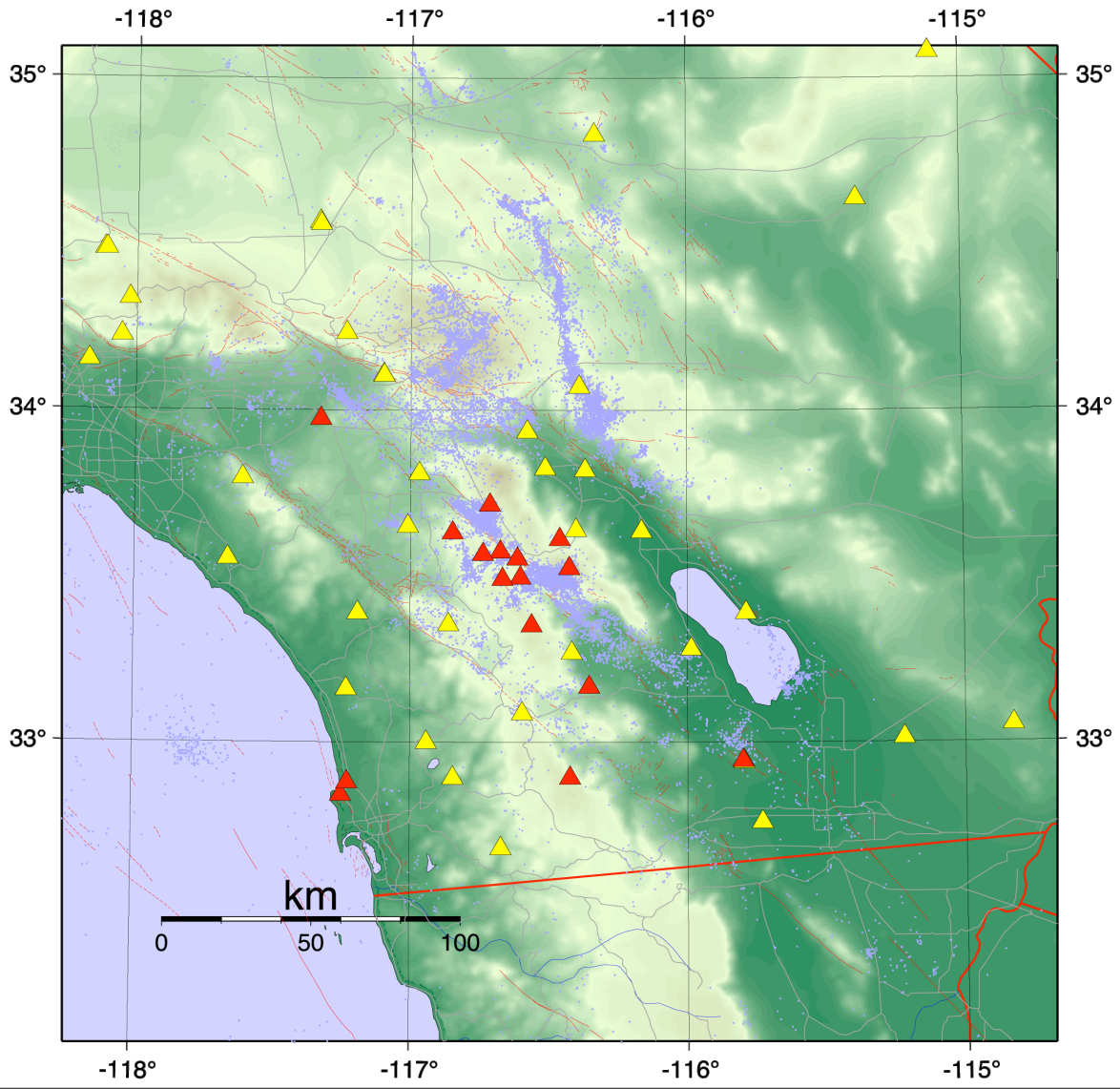




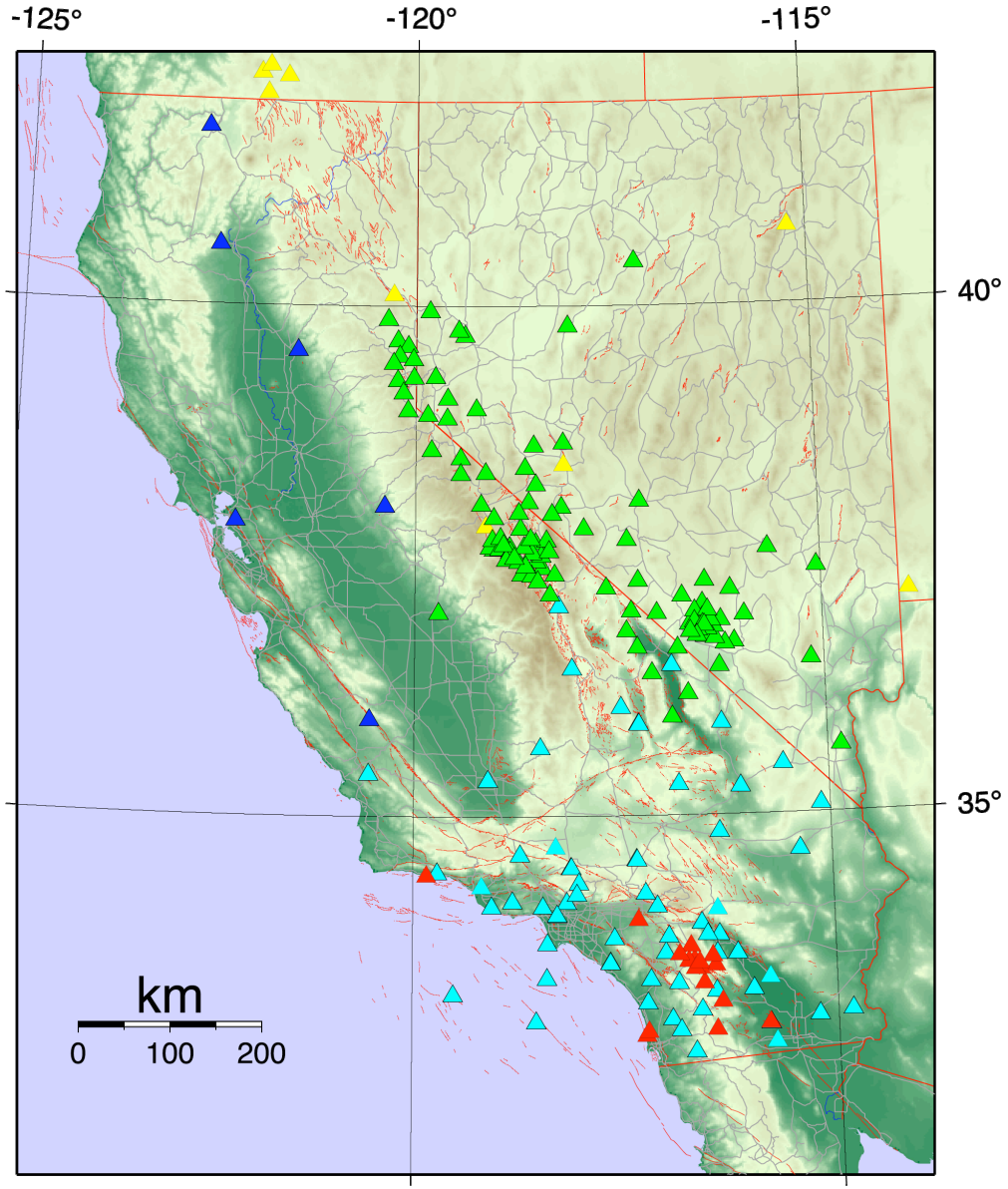
Virtual Seismic Network

- Access open datasets over internet
- Process data in near-real time
- Maximizes use of existing infrastructure
- Minimizes cost
- Scales to size of research or monitoring region
- Customize for research projects
- Enhances collaboration and cooperation
- Redundant and backup systems

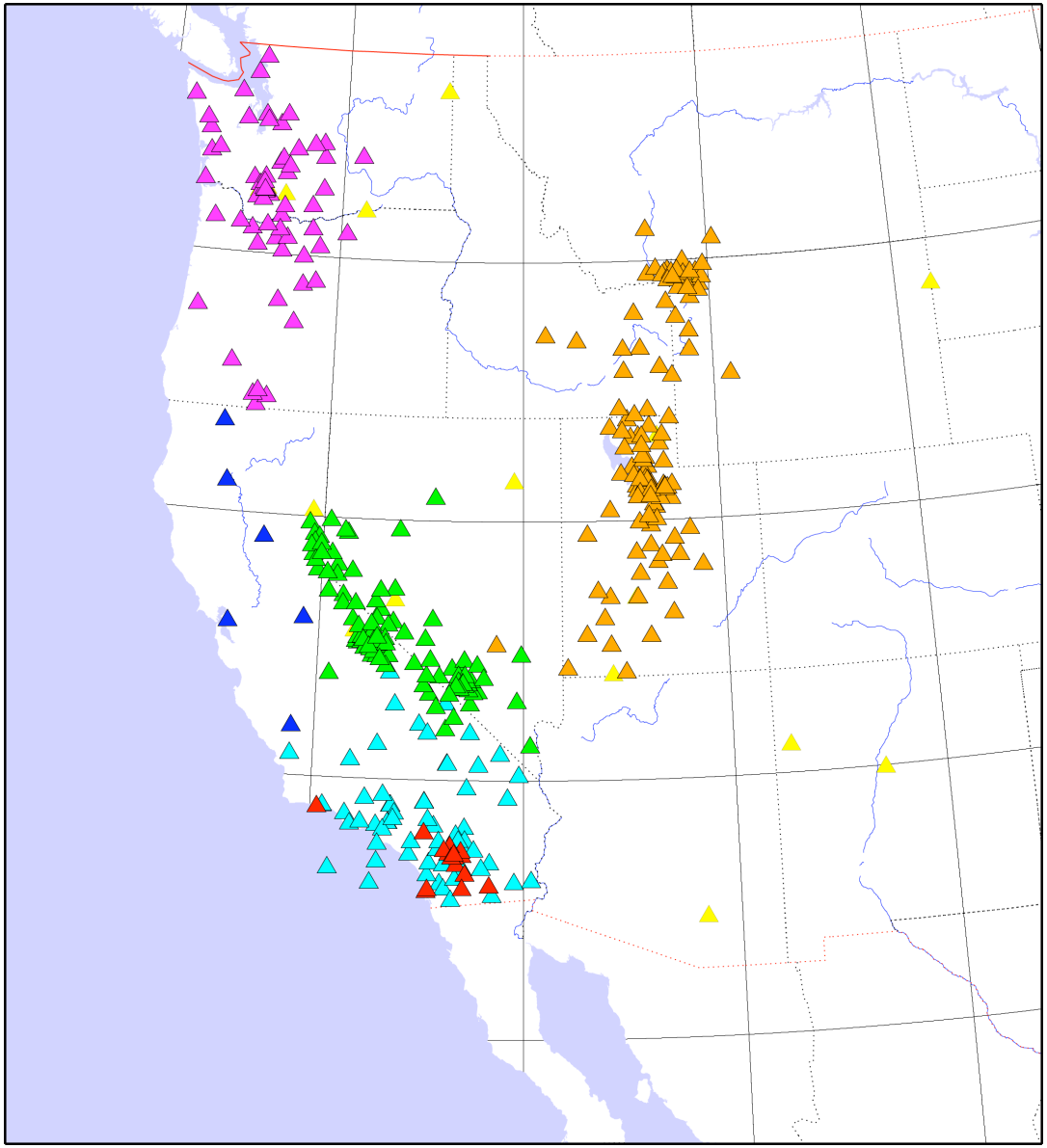
Southern California VSN



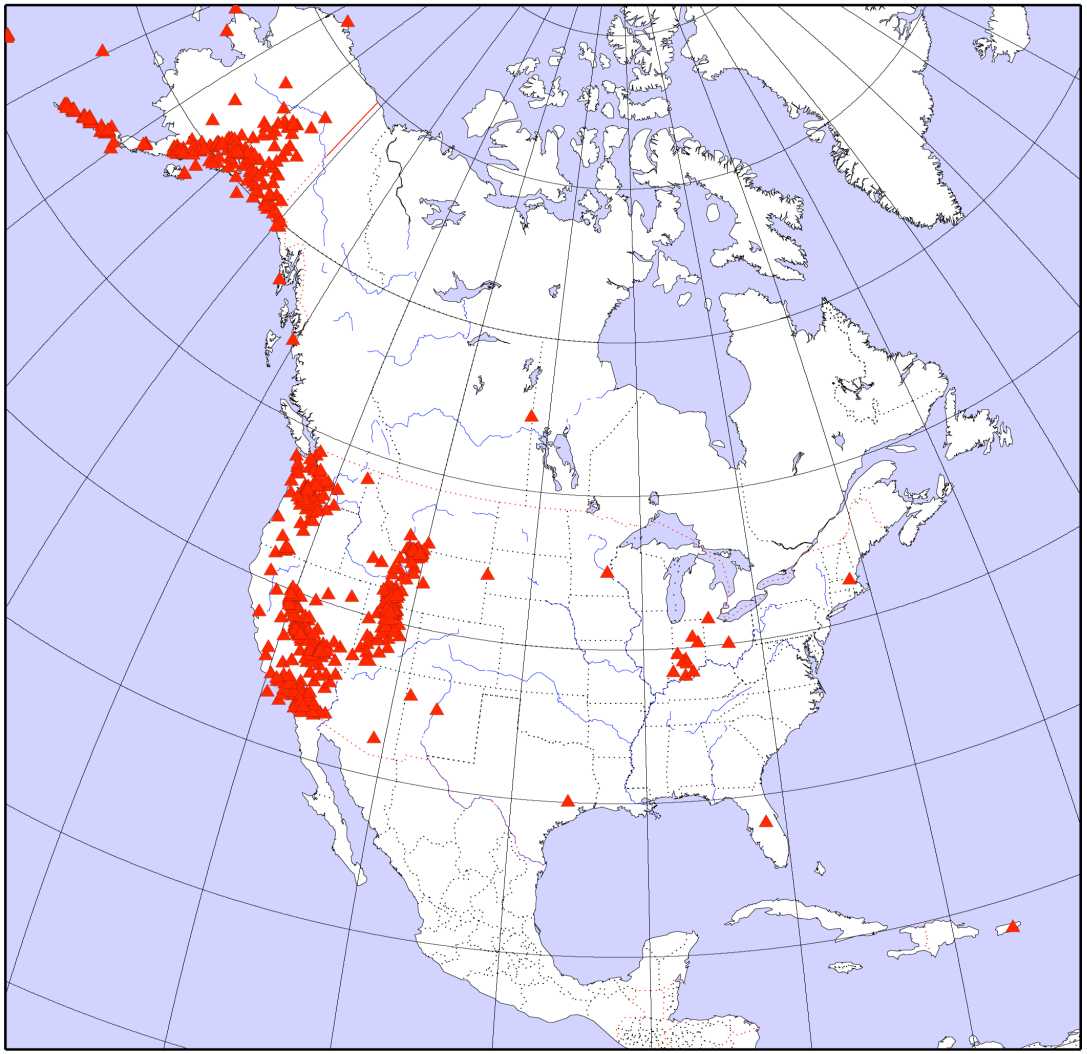
California VSN



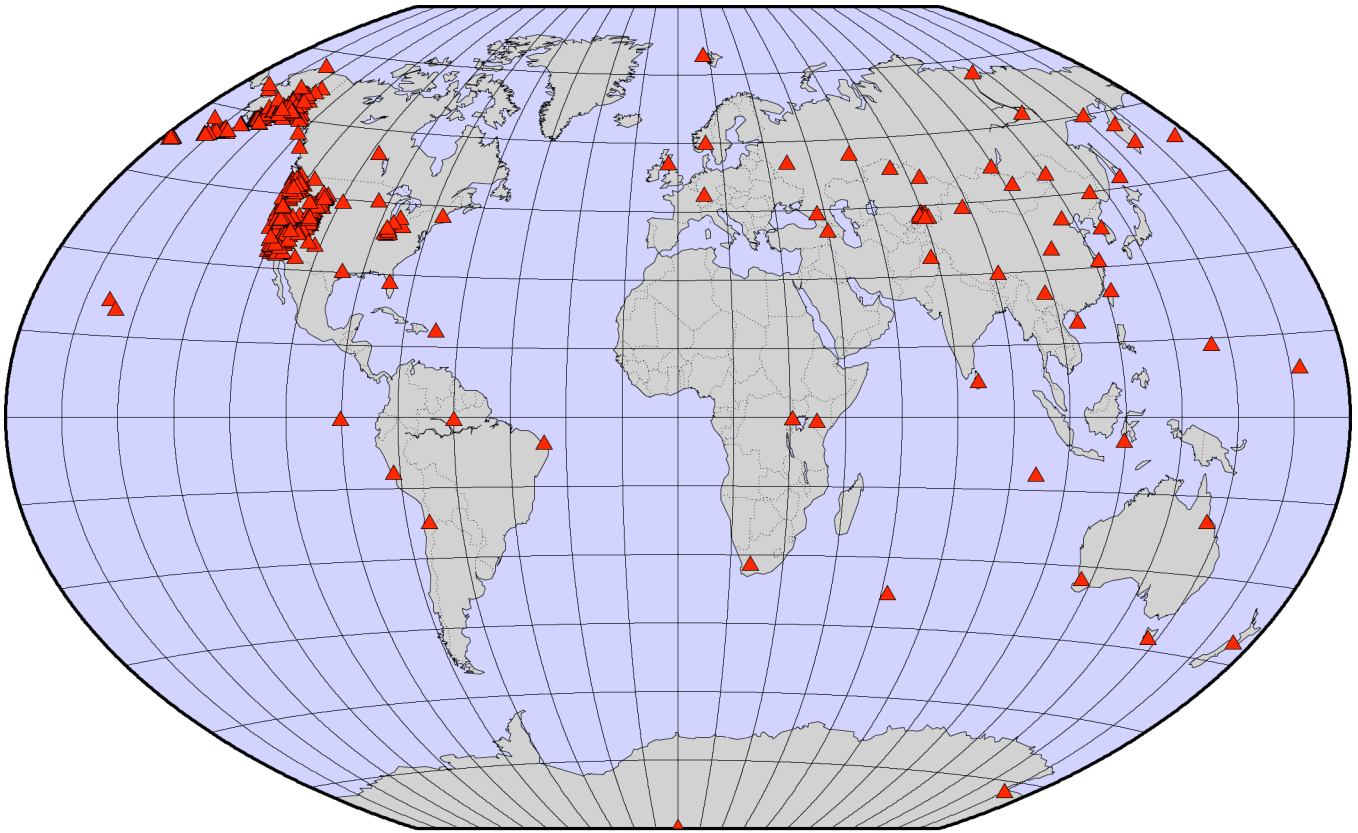
Western US VSN



North America VSN



Global VSN



A Virtual Seismic Network

- Internet access to 740+ globally distributed stations
- GSN
  - USGS
  - UCSD IDA
- KNET
- Austria
- PASSCAL Arrays
  - Parkfield Experiment
- US regional network sources
  - Alaska
  - ANZA
  - Berkeley
  - Nevada-Reno
  - PEPP
  - TriNet
  - Utah
  - Washington

A Virtual Seismic Network

- Internet access to 990+ globally distributed stations
- GSN
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- KNET
- Austria
- Slovenia
- Germany
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  - Parkfield Experiment

- US regional network sources
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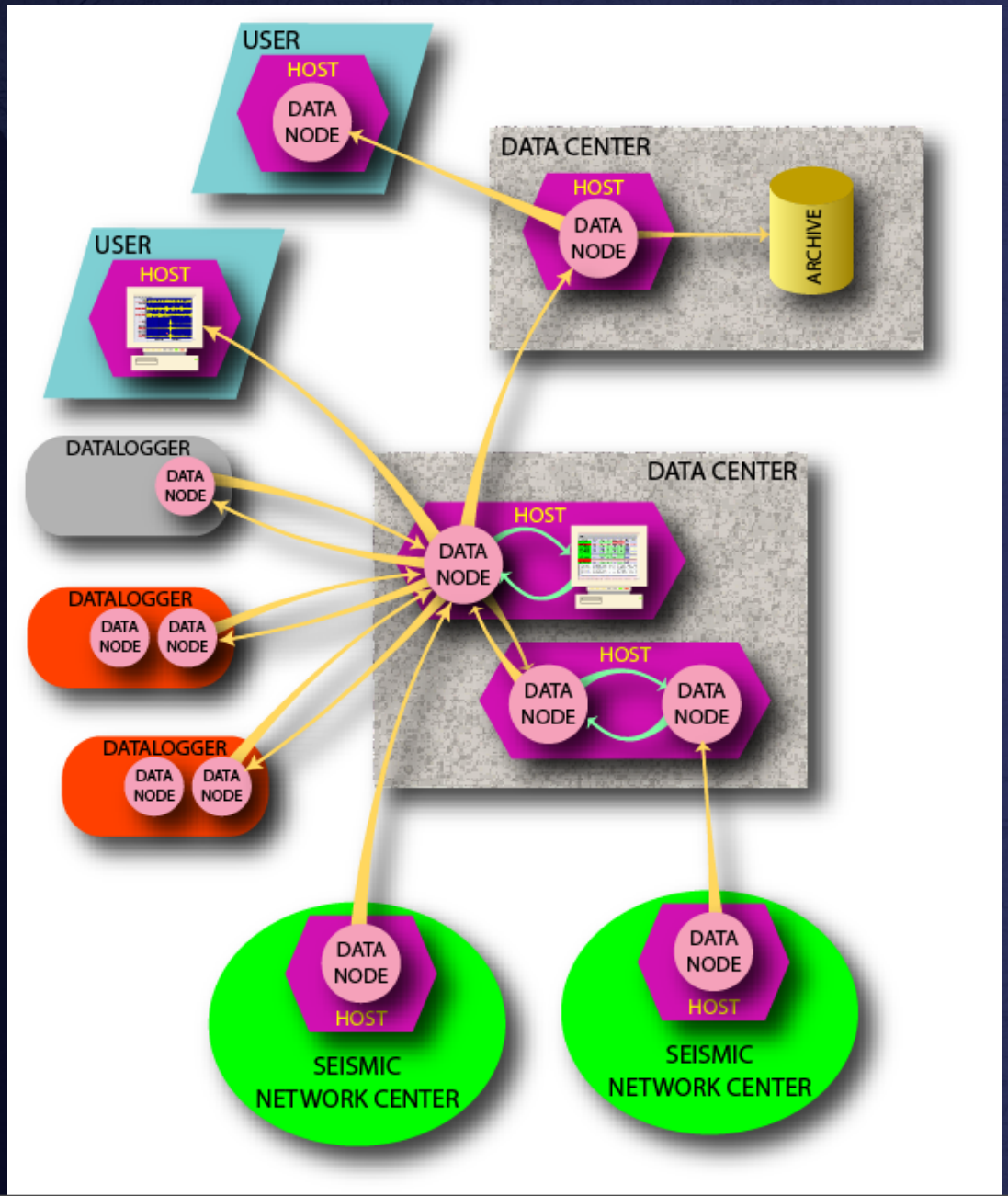
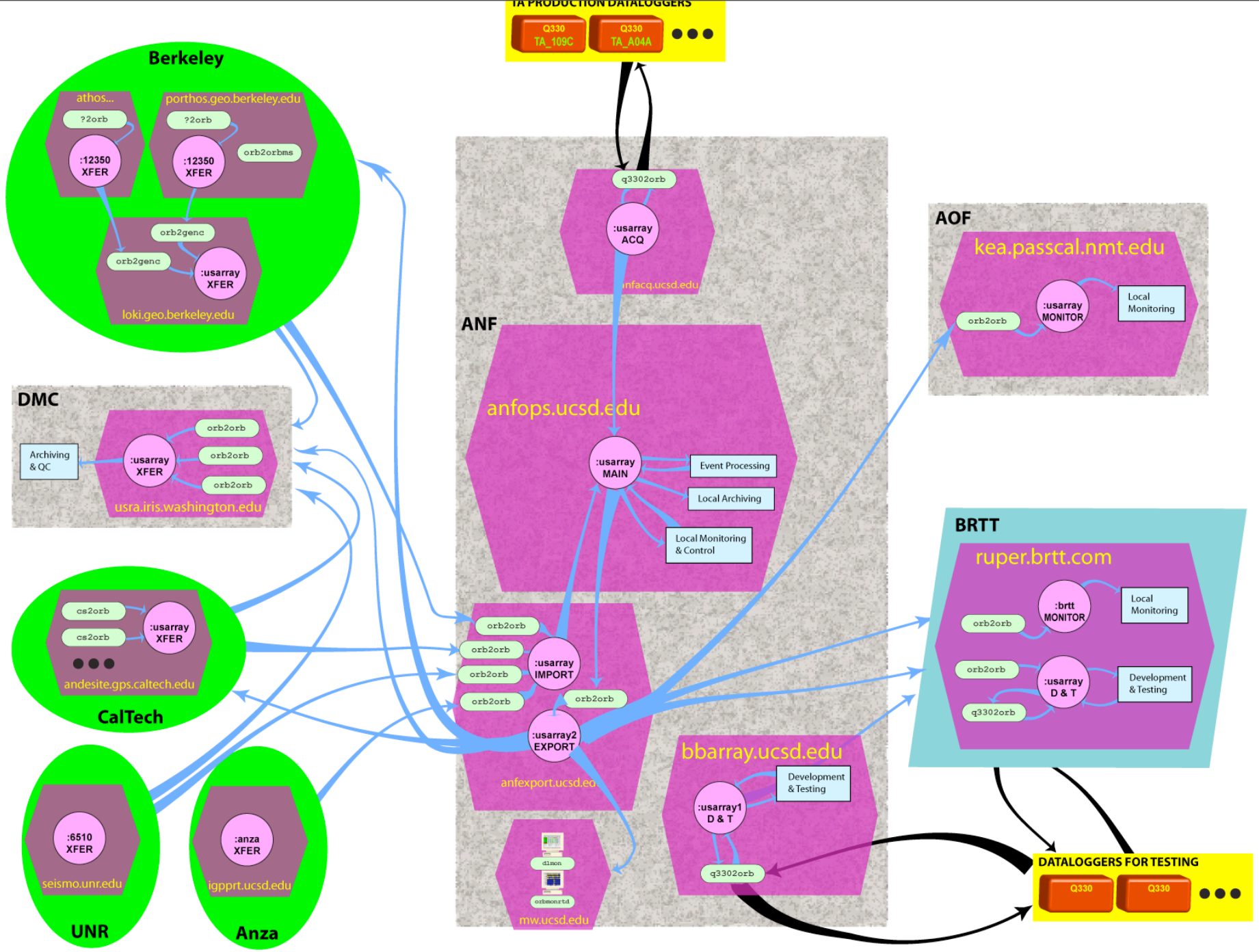
  - ANZA
  - Berkeley
  - Lamont
  - Nevada-Reno
  - PEPP
  - TriNet
  - Utah
  - Washington

6 Months later!

Antelope Real-Time System: store-and-forward model



ROADNet


TA PRODUCTION DATALOGGERS
Q330 TA_109C
Q330 TA_A04A
Berkeley
athos...
?2orb
:12350 XFER
porthos.geo.berkeley.edu
?2orb
:12350 XFER
orb2orbms
orb2genc
orb2genc
:usarray XFER
loki.geo.berkeley.edu
DMC
Archiving & QC
:usarray XFER
orb2orb
orb2orb
orb2orb
usra.iris.washington.edu
CalTech
cs2orb
cs2orb
:usarray XFER
andesite.gps.caltech.edu
UNR
:6510 XFER
seismo.unr.edu
Anza
:anza XFER
igpprt.ucsd.edu
ANF
q3302orb
:usarray ACQ
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anfops.ucsd.edu
:usarray MAIN
Event Processing
Local Archiving
Local Monitoring & Control
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orb2orb
orb2orb
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:usarray2 EXPORT
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dlmon
orbmonrtd
mw.ucsd.edu
bbarray.ucsd.edu
:usarray1 D & T
Development & Testing
q3302orb
AOF
kea.passcal.nmt.edu
orb2orb
:usarray MONITOR
Local Monitoring
BRTT
ruper.brtt.com
orb2orb
:brtt MONITOR
Local Monitoring
orb2orb
:usarray D & T
Development & Testing
q3302orb
DATALOGGERS FOR TESTING
Q330
Q330

Real-time Data Exchange Issues

- Transparent waveform data exchange
  - Multiple data logger types
  - Multiple data server types
- Metadata and Data products
  - Origins and magnitudes
  - Transfer Functions and Site Info
- Attribution and Acknowledgement

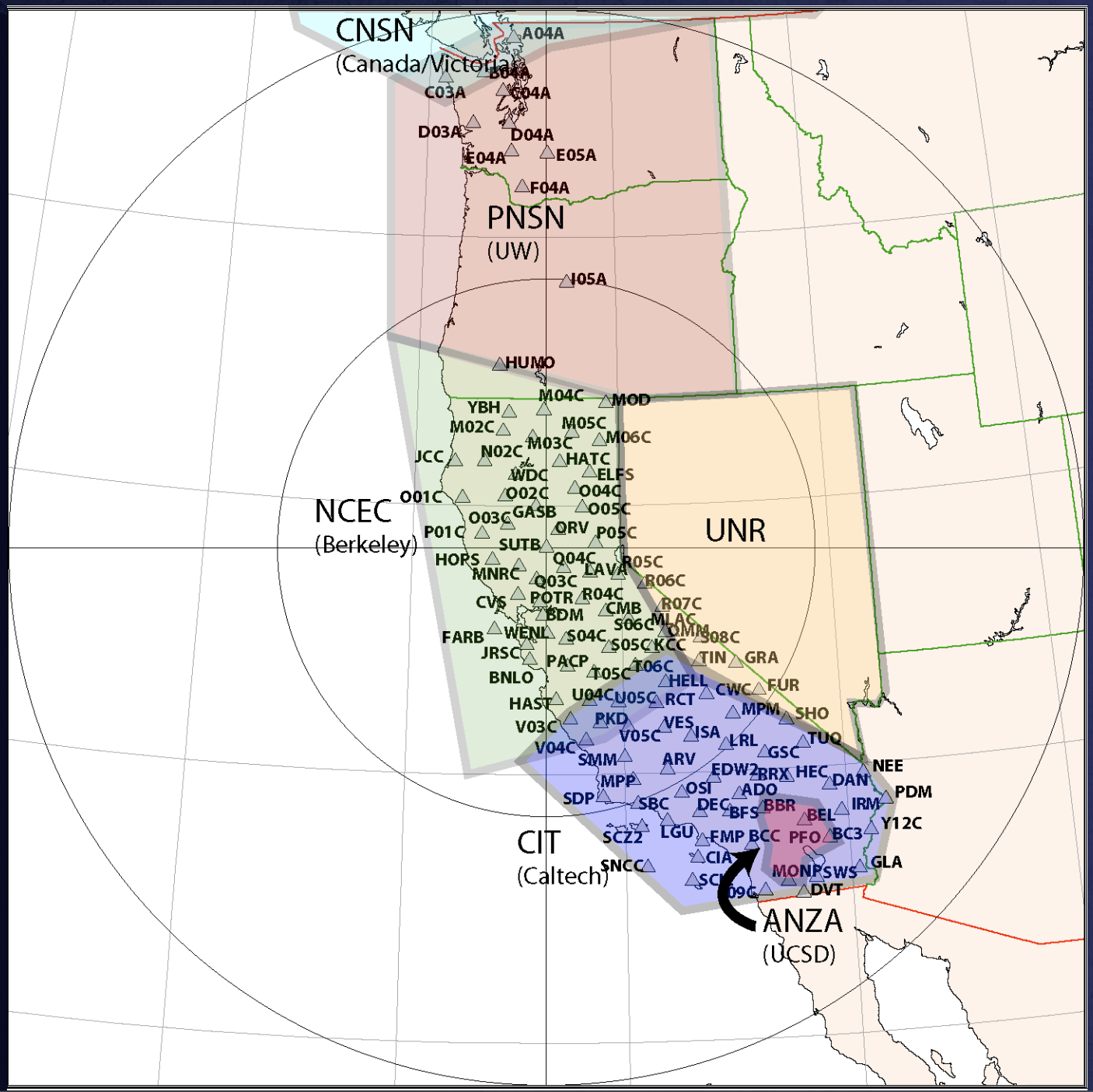
Realtime Dataserver Imports to Antelope

BRTT supported

- Orbserver
- CD1.0
- Comserv
- AutoDRM

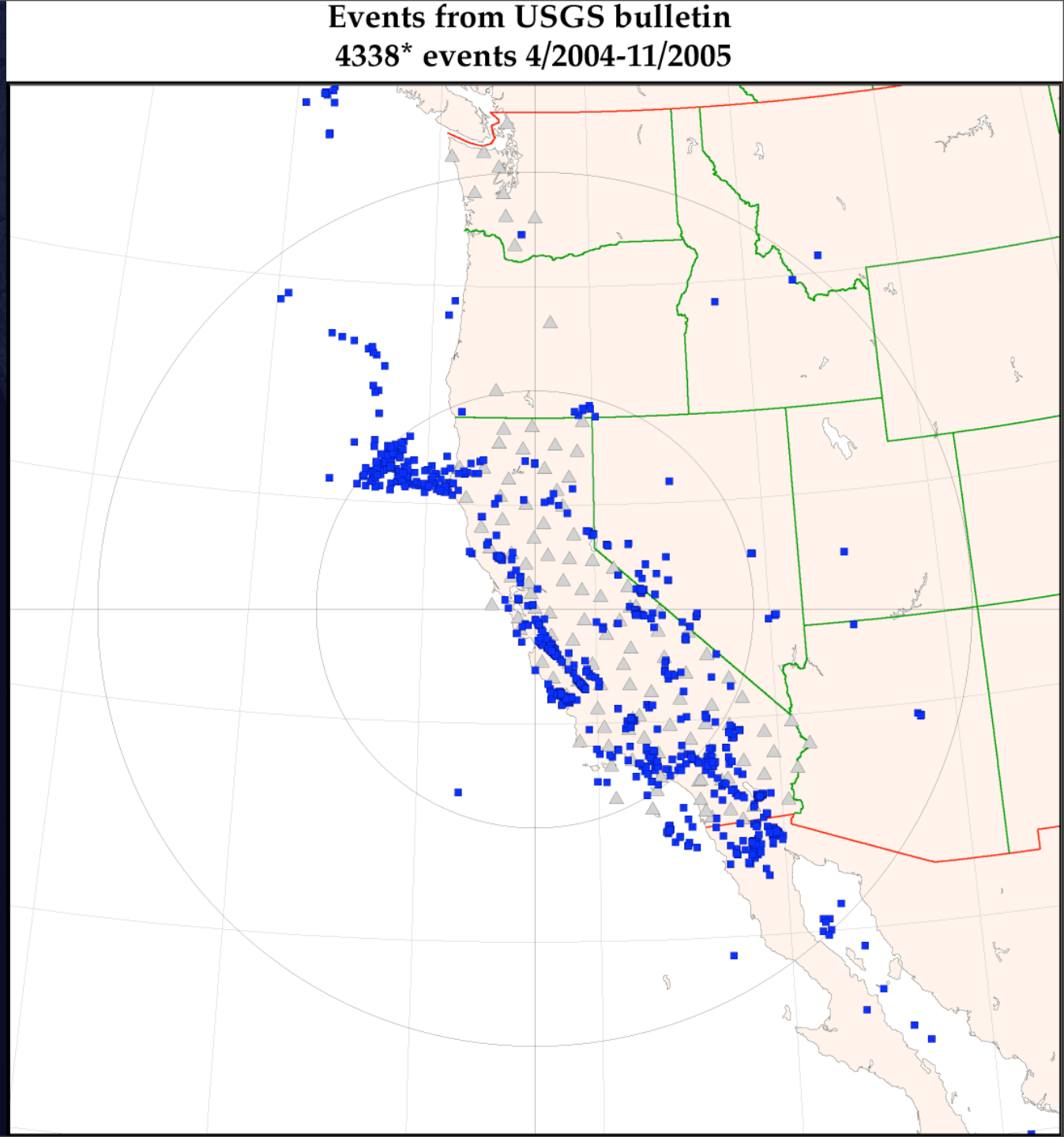
Contributed

- LISS
- NRTS
- Earthworm
- Scream
- Seedlink
- isi2orb
- CD1.1 ?

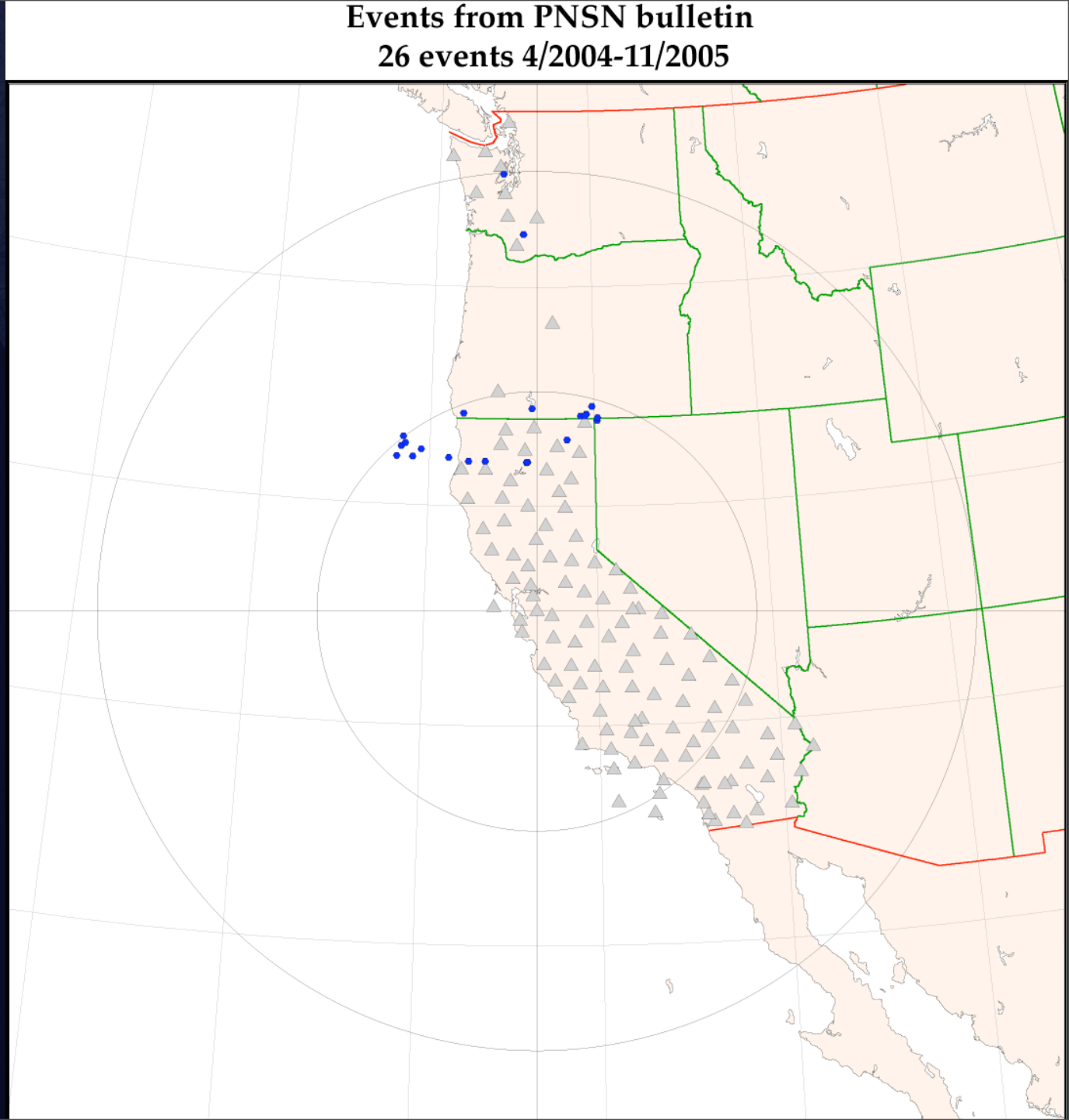

CNSN
(Canada/Victoria)
A04A
B04A
C03A
C04A
D03A
D04A
E04A
E05A
F04A
PNSN
(UW)
I05A
HUMO
M04C
MOD
YBH
M02C
M05C
M03C
M06C
JCC
N02C
HATC
WDC
ELFS
O01C
O02C
O04C
O03C
GASB
O05C
P01C
ORV
P05C
SUTB
NCEC
(Berkeley)
UNR
HOPS
Q04C
R05C
MNRC
LAVA
Q03C
R06C
CVS
POTR
R04C
BDM
CMB
R07C
MLAC
S06C
OMM
FARB
WENL
S04C
S08C
S05C
KCC
JRSC
PACP
TIN
GRA
T06C
BNLO
T05C
HELL
CWC
FUR
HAST
U04C
U05C
RCT
MPM
SHO
PKD
VES
V03C
ISA
V05C
LRL
TUQ
V04C
GSC
SMM
ARV
NEE
EDW2
BRX
HEC
DAN
MPP
OSI
ADO
PDM
SDP
SBC
DEC
BBR
IRM
BFS
BEL
Y12C
SCZ2
LGU
FMP
BCC
PFO
BC3
CIT
(Caltech)
CIA
GLA
SNCC
MONP
SWS
SCI
DVT
ANZA
(UCSD)


ROADNet

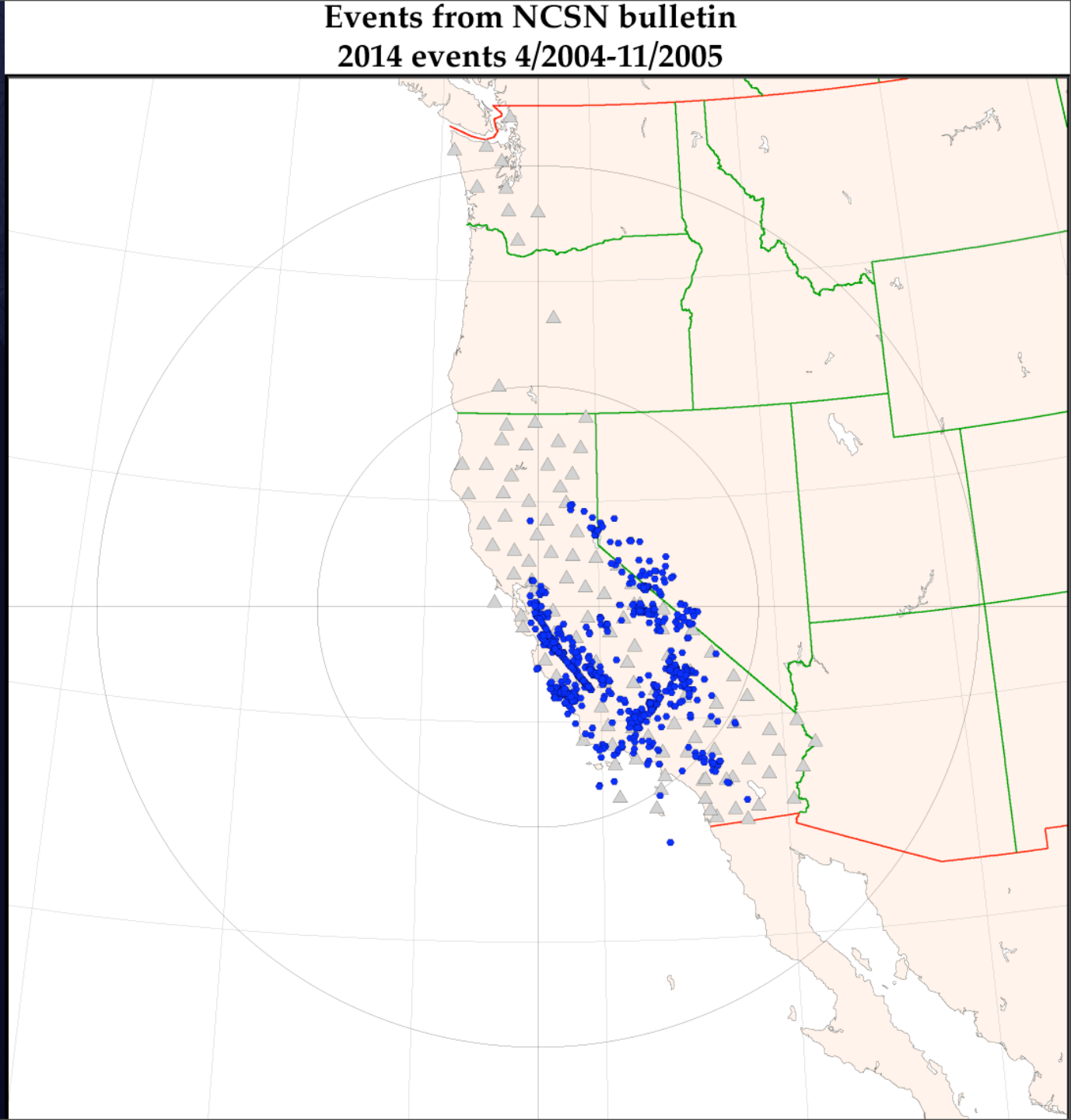
NEIC Regional Events Recorded on TA



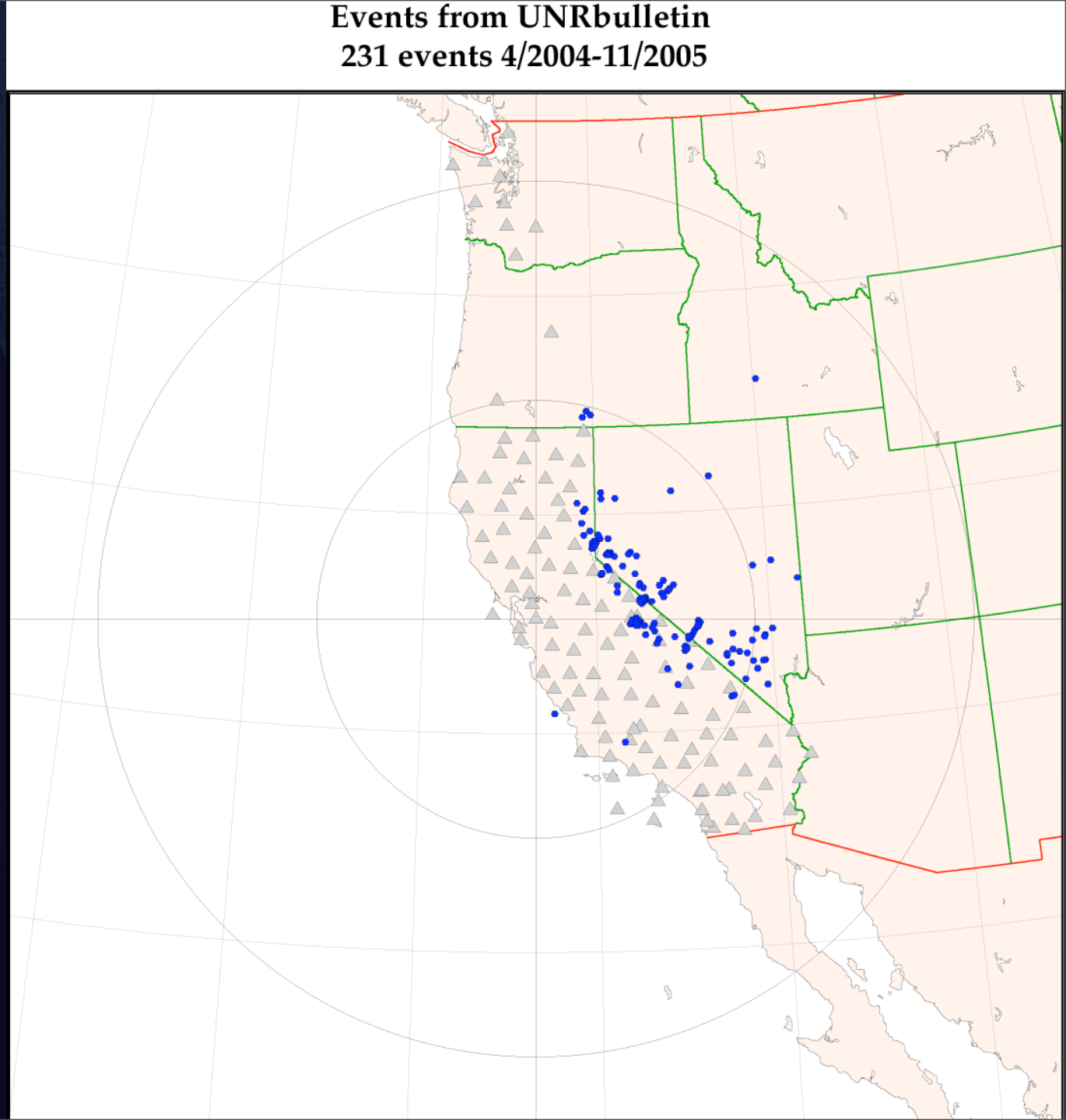
PNSN Regional Events Recorded on TA



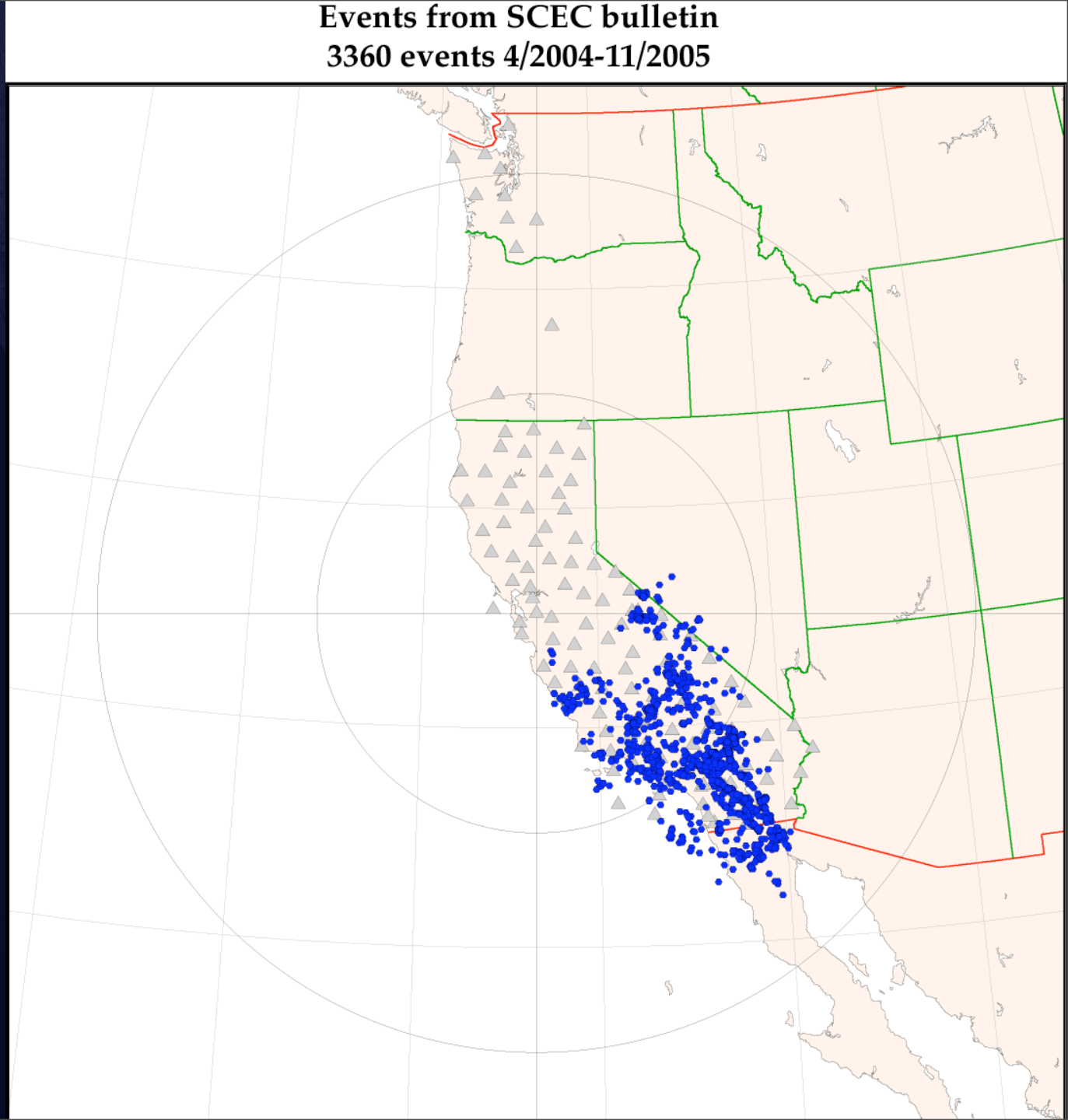
NCSN Regional Events Recorded on TA



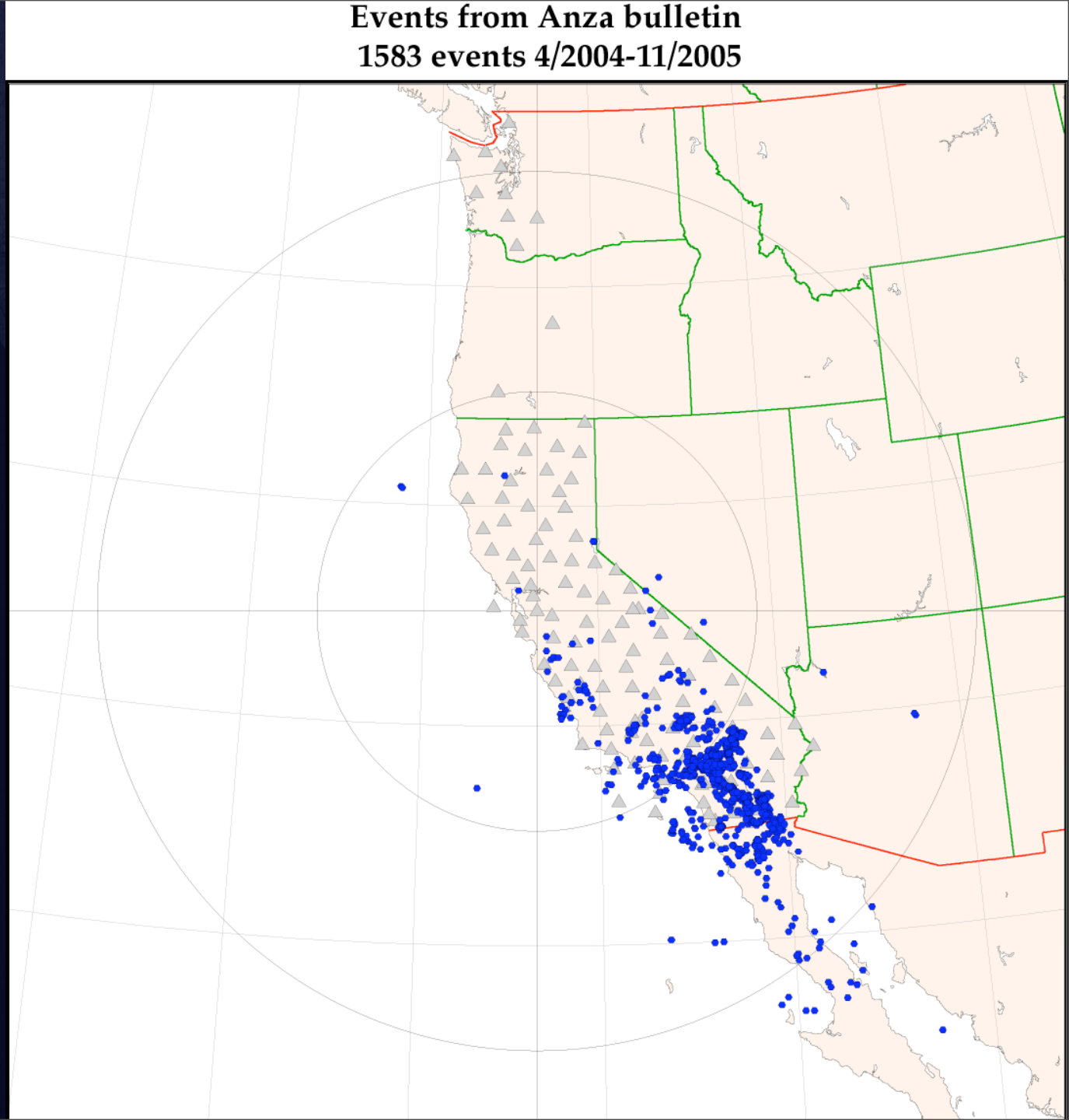
UNR Regional Events Recorded on TA



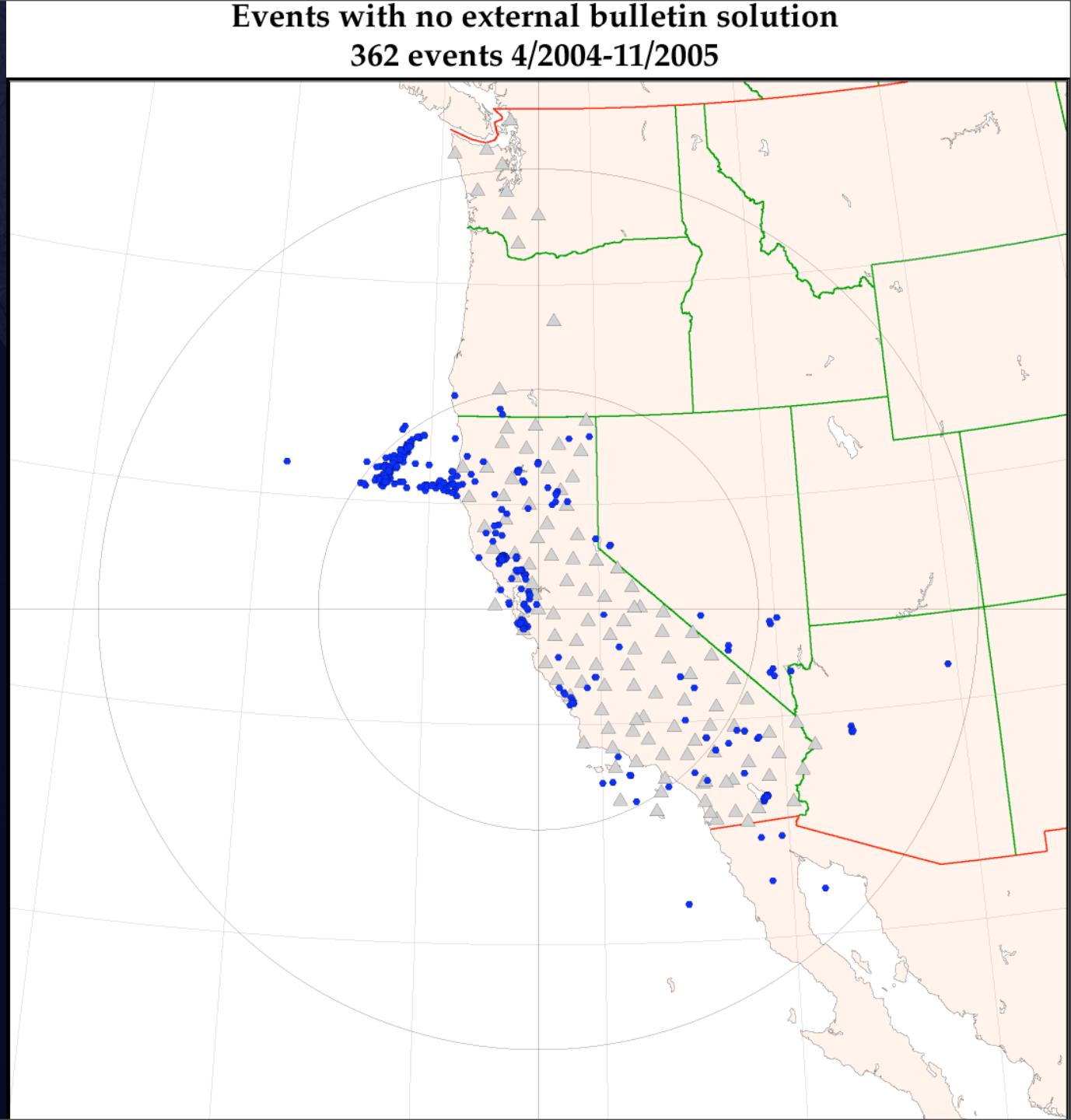
SCSN Regional Events Recorded on TA



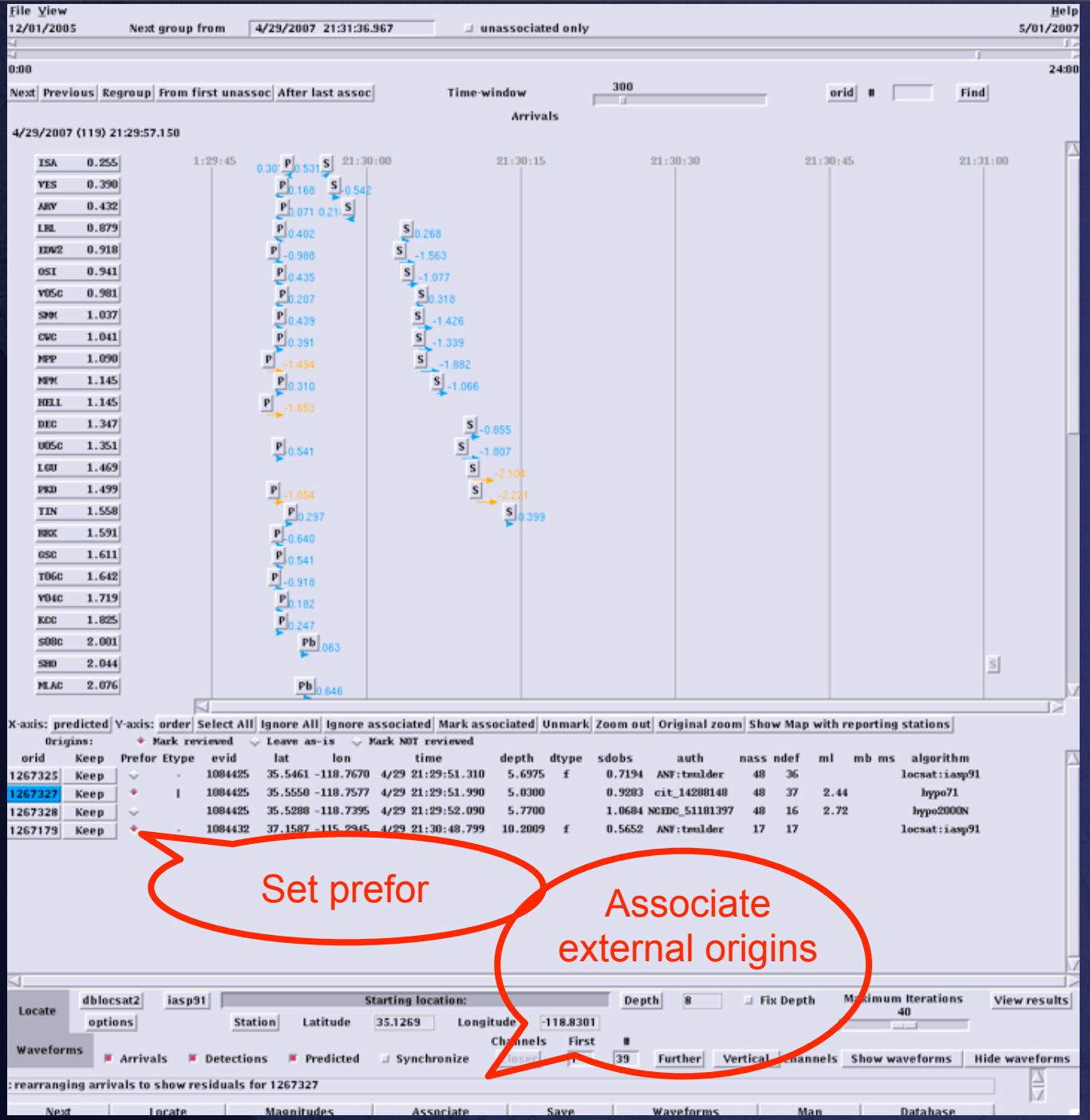
ANZA Regional Events Recorded on TA



TA only Regional Events



Easy Attribution for Authoratative Location



Benefits of Real-time Data Exchange

- Enhanced geographical coverage
  - Better locations and magnitudes
- Minimize cost of operations
- Provide backup data center
- Promotes scientific and technical interactions
- Improves quality control!

Process to establish Real-time Data Exchange

- Institute agreement to exchange data
  - attribution policy
- Establish orb2orb communications
  - orbserver.pf
    - valid_ip_addresses - readonly option
  - adjust firewalls
- Metadata exchange
  - css3.0 database with dbmerge
  - dataless seed
  - dbbuild files
- Exchange
  - waveforms
  - origins and magnitudes
- Identify points of contact
- Periodic review of exchange program