

ANZA SEISMIC NETWORK

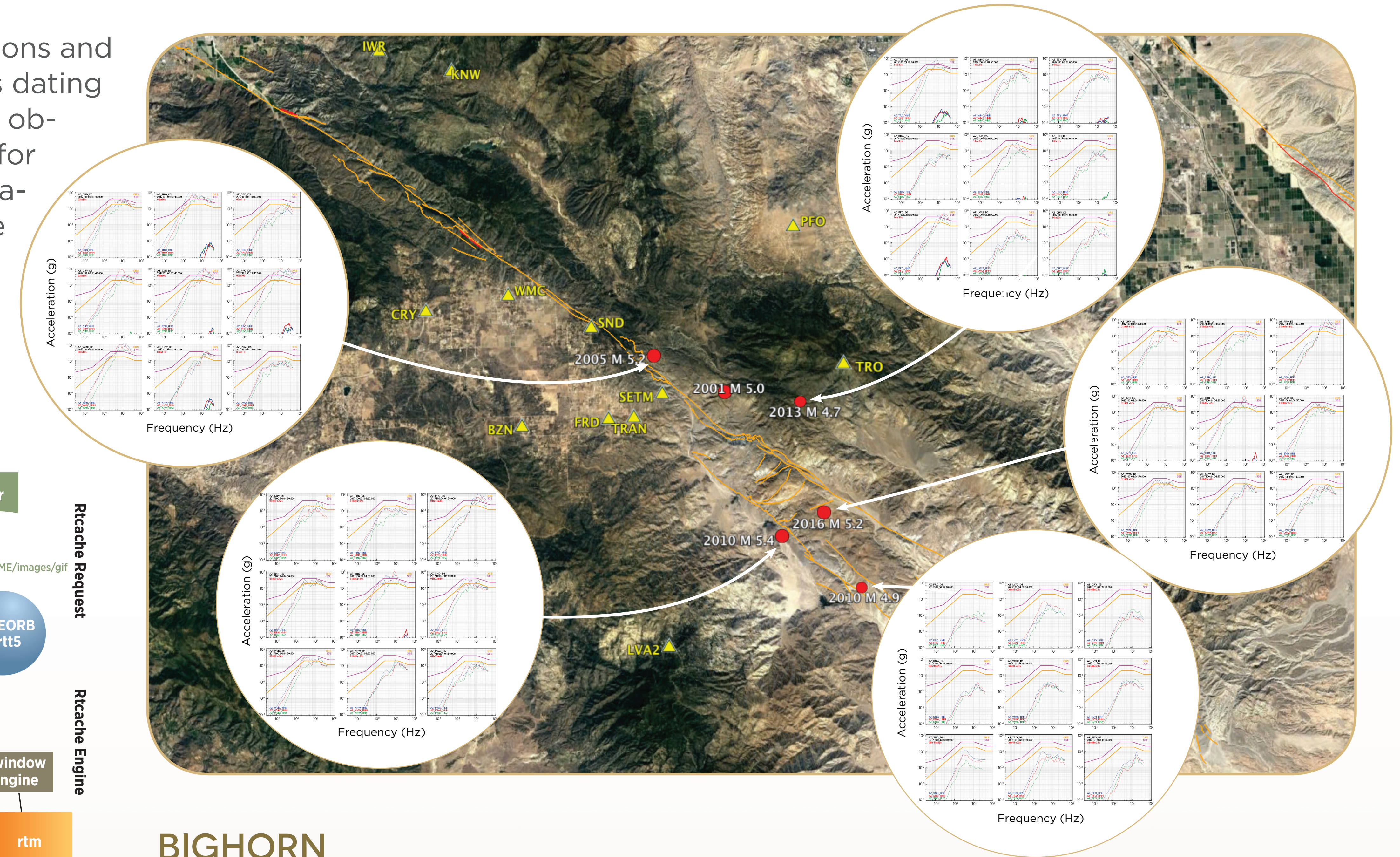
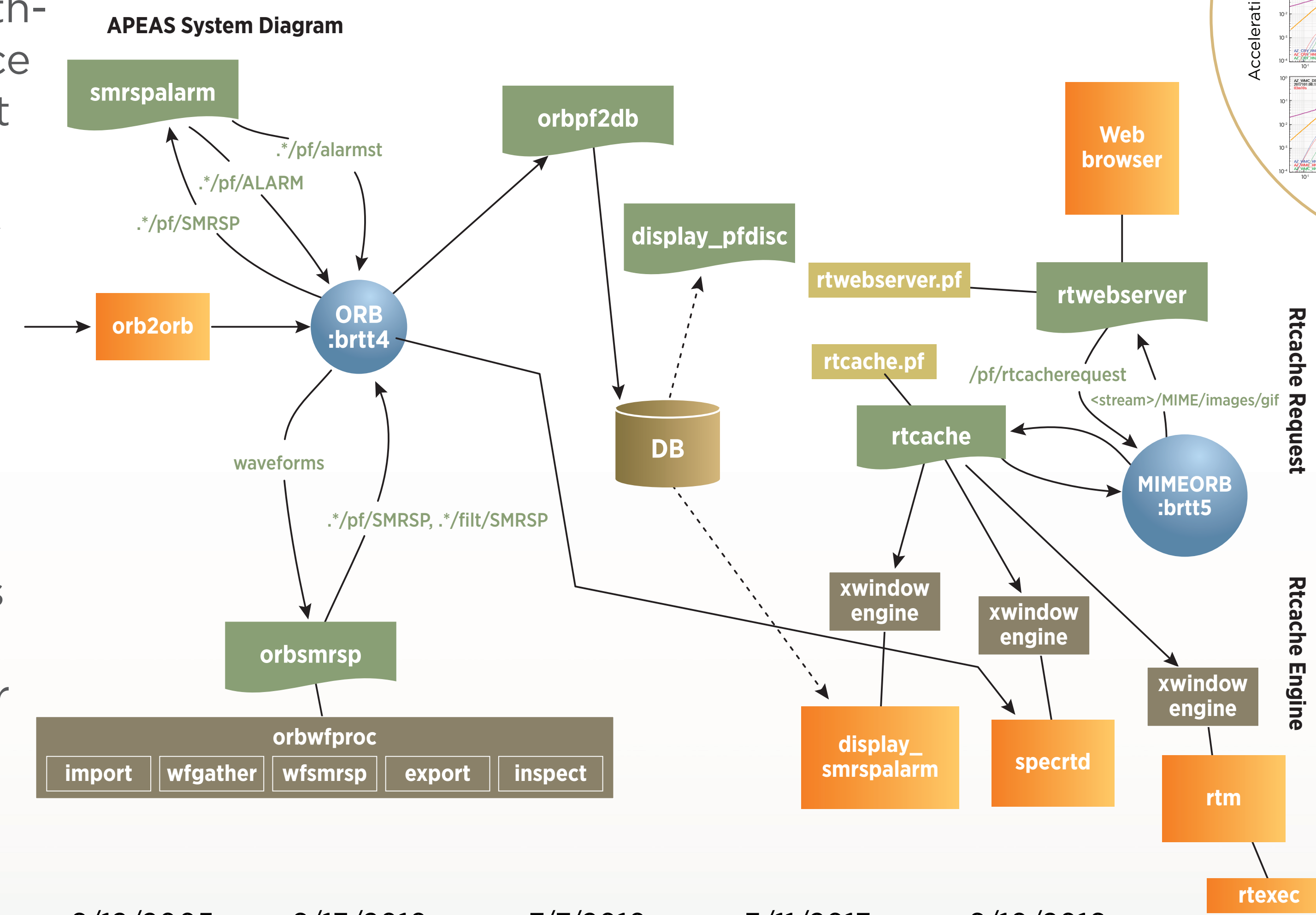
REAL-TIME CONTINUOUS RESPONSE SPECTRA EXCEEDANCE CALCULATION

VERNON, F. L., UC San Diego, La Jolla, CA, USA, flvernon@ucsd.edu; HARVEY, D., BRTT, Boulder, CO, USA, danny@brtt.com; LINDQUIST, K., BRTT, Boulder, CO, USA, kent@brtt.com; FRANKE, M., KMI, Pasadena, CA, USA, mathias.franke@kmi.com

An approach is presented that can be used for near real-time earthquake alarms for structures at distributed locations and large facilities using real-time estimation of response spectra obtained from near free-field motions. Influential studies dating back to the 1980s identified spectral response acceleration as a key ground motion characteristic that correlates well with observed damage in structures. Thus, monitoring and reporting on exceedance of spectra-based thresholds are useful tools for assessing the potential for damage to facilities based on input ground motions only. With as little as one strong-motion station per site, this scalable approach can provide rapid alarms on the damage status of remote towns, critical infrastructure (e.g., hospitals, schools) and points of interest (e.g., bridges) for a very large number of locations enabling better rapid decision making during critical and difficult immediate post-earthquake response actions. Real-time calculation of PSA exceedance and alarm dissemination are enabled with Bighorn, a component of the Antelope software package. Examples are shown using several recent M-5 event recorded in the near field by the ANZA seismic network.

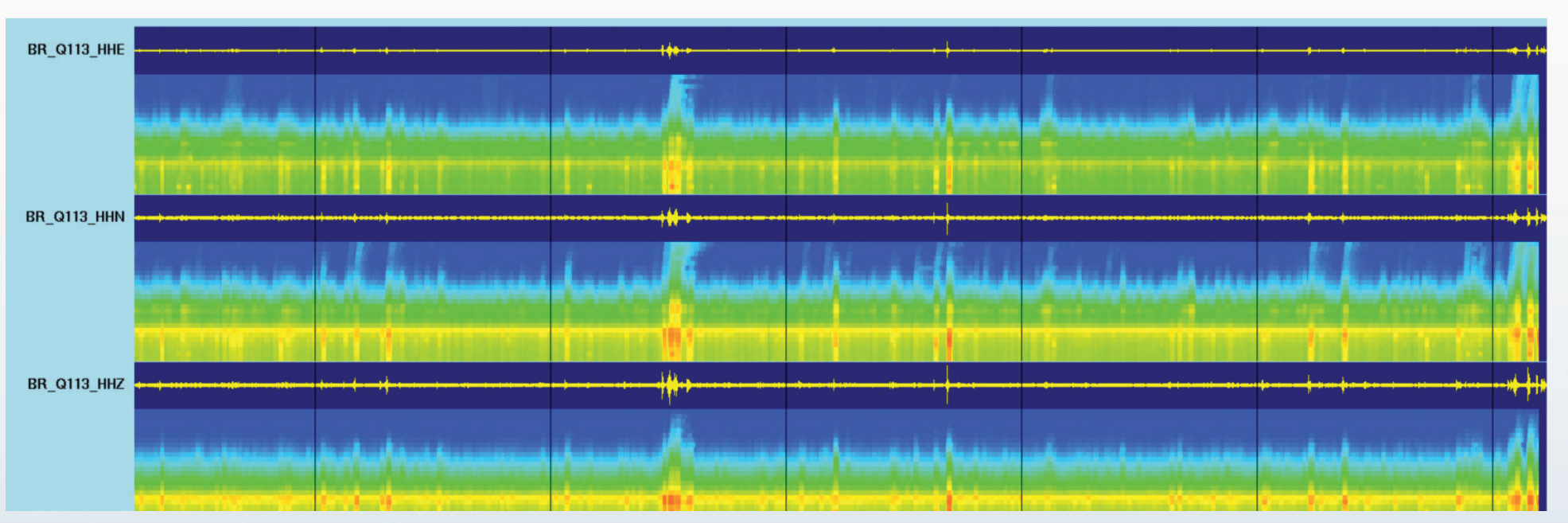
BIGHORN – ORBSMRSP

Developed to produce continuous time-dependent strong motion response spectra. Offers expanded floating point data representations within ORB packets and Datascope waveform files. Parameter-file ORB Packets will represent time continuous strong motion response spectra. Provides a very fast method for computing continuous time-dependent response spectra for large numbers of channels.



BIGHORN

The Bighorn post-earthquake alarm system implements a novel and robust approach for providing spectral limit exceedance alarms using real-time estimation of response spectra obtained from near free-field motions was presented. The Bighorn solution represents a paradigm shift in how strong-motion data is continuously processed in real-time. This method enables remote alerting on possible damages for a large number of critical structures without knowledge of earthquake parameters and applying ground motion prediction equations.



sta	meatype	6/12/2005 M 5.2	6/13/2010 M 4.9	7/7/2010 M 5.4	3/11/2013 M 4.7	6/10/2016 M 5.2	6/12/2005 M 5.2	6/13/2010 M 4.9	7/7/2010 M 5.4	3/11/2013 M 5.2	6/10/2016 M 5.2
BZN	peaka	-63.585	-22.755	-94.717	21.355	-67.302	-240.385	10.739	-123.583	-44.558	-116.028
CRY	peaka	-42.052	-6.365	-18.027	-13.365	68.187	194.755	-8.016	-49.354	-17.282	-151.796
FRD	peaka	-51.644	5.054	-32.422	-57.416	46.072	39.707	2.614	-44.908	18.576	56.985
KNW	peaka	39.582	1.177	13.318	-5.031	-22.738	90.67	-6.751	-41.004	-17.808	-37.777
LVA2	peaka	15.688	6.433	13.442	-4.426	-11.11	25.459	10.405	-38.254	15.706	46.301
PFO	peaka	61.5	10.182	-30.156	60.814	62.414	219.603	-15.256	85.765	131.064	239.609
SND	peaka	-26.046	-3.374	20.472	-19.586	57.647	118.897	-47.207	-63.987	-56.169	-126.976
TRO	peaka	122.732	20.396	-21.667	-24.302	59.14	-218.403	-21.485	-136.082	-271.887	-307.292
WMC	peaka	-40.595	5.299	-25.898	-19.554	-61.679	-252.423	18.659	64.996	36.235	-225.835

