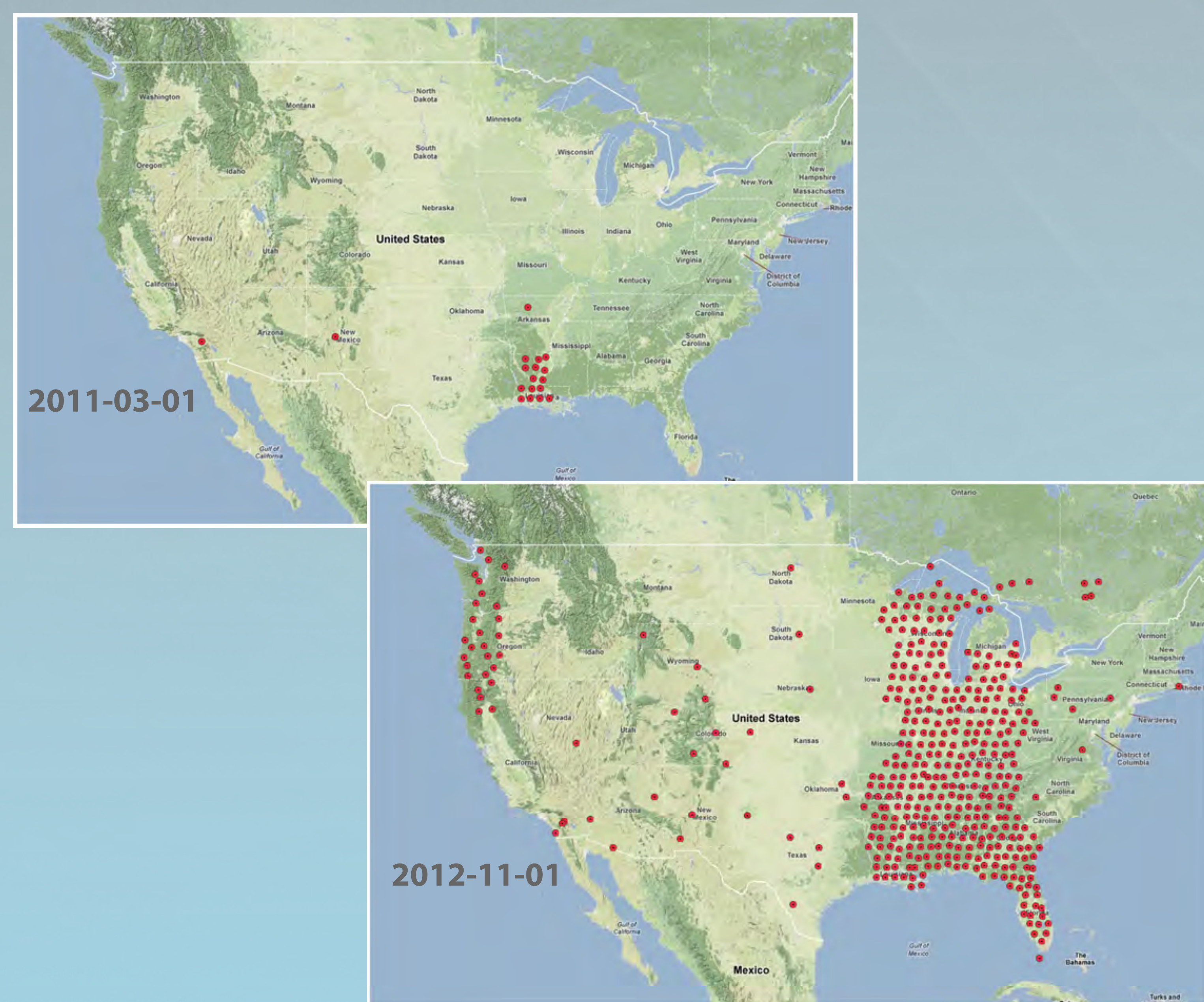


Abstract

In 2011 infrasound sensors were installed at some existing USArray Transportable Array (TA) sites and became a standard component of all new sites. Currently there are over 400 sites with infrasound sensors with an average spacing of 70 kilometers. To promote and facilitate the use of these data, the IRIS Data Management Center has developed two new data products: an infrasound reference event database and an infrasound signal detector. The TA Infrasound Reference Event Database (TAIRED) is a user-supported database that contains information on events of interest for which there are associated USArray microbarograph recordings. This database is initially populated with events from observations on the USArray infrasound data, event bulletins, news on explosions and rocket launches. As a user-supported resource, we ask users to submit events of interest to be included in the database or submit their alternate solutions to the existing events. The second data product is the TA Infrasound Detections (TAID) that systematically scans the USArray broadband infrasound data (BDF channel sampled at 40 Hz) and generates station-based weekly detection lists that highlight time intervals containing potential signals of interest. The detection product includes two components, standard signal-to-noise ratio based detections and spectral power based detections. No attempt is made to categorize detections or associate them to events. These data products join the growing collection of products produced and managed at the IRIS DMC, for the complete list please visit <http://www.iris.edu/dms/products>.

USArray TA: a large seismic AND pressure array

Infrasound sensors were installed at some existing USArray Transportable Array (TA) sites starting in 2011 and currently there are over 400 sites with infrasound sensors.



<http://www.iris.edu/dms/products/infrasound>
Contact us: product@iris.washington.edu

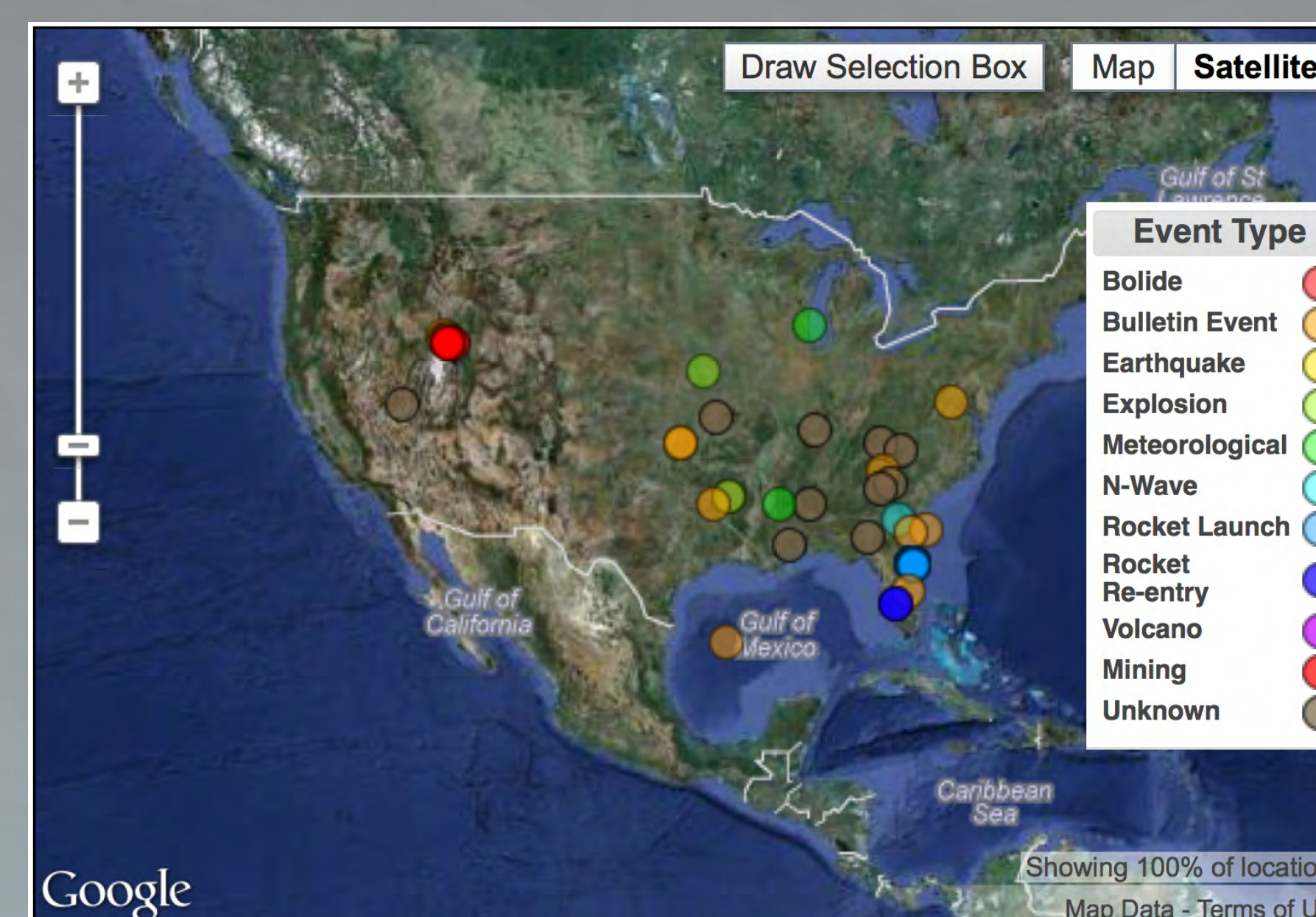
TAIRED, TA Infrasound Reference Event Database

A **user-supported** evolving database that serves as a reference event depository where researchers can contribute new events, provide a new solution for an existing event and find sample infrasound events for their use. Currently this database contains:

- 40 unique events
- 8 pairs of associated solutions
- 8 source types

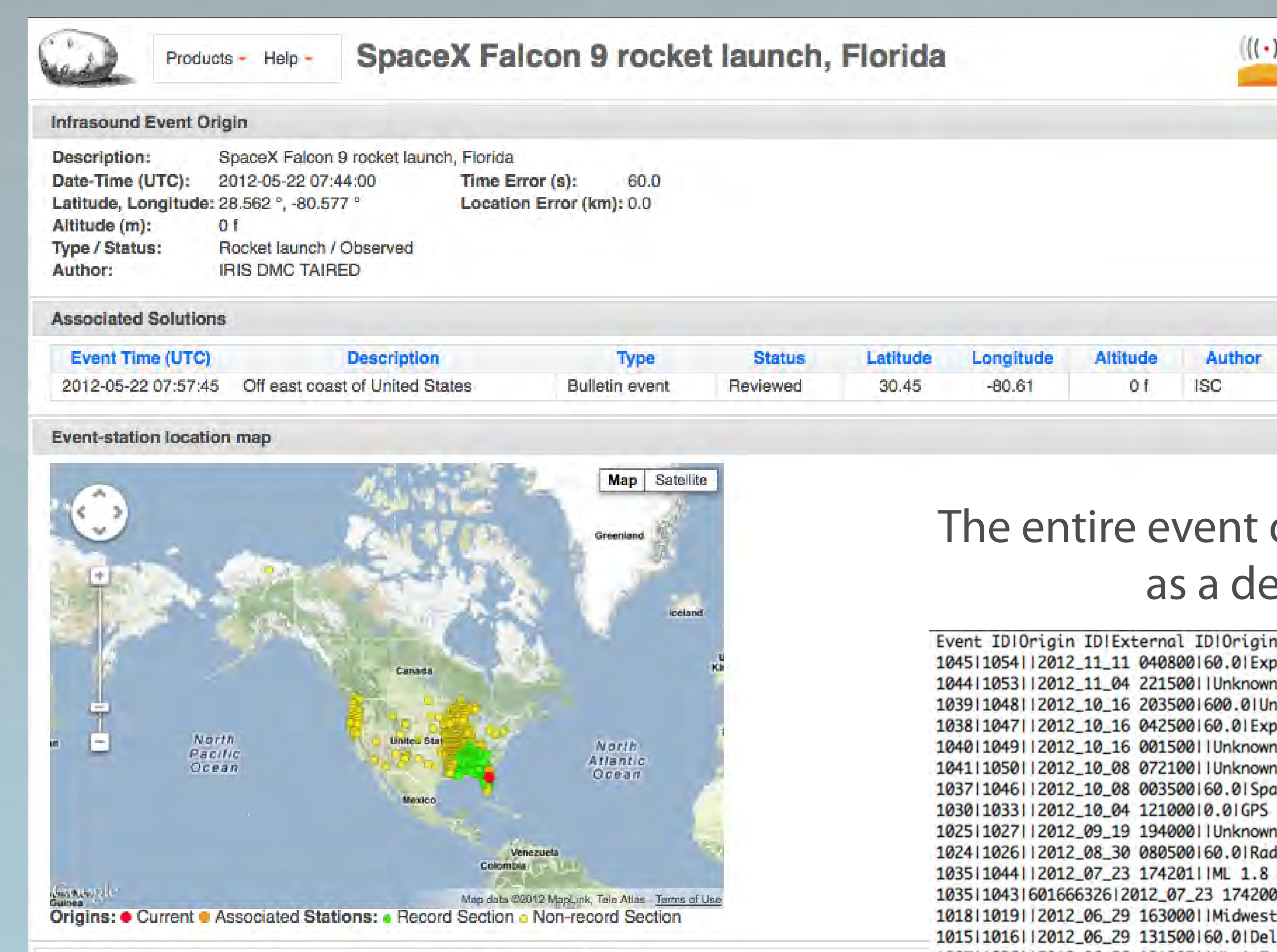
TAIRED is hosted by the IRIS Searchable Product Depository (SPUD)

<http://www.iris.edu/spud/infrasoundevent>



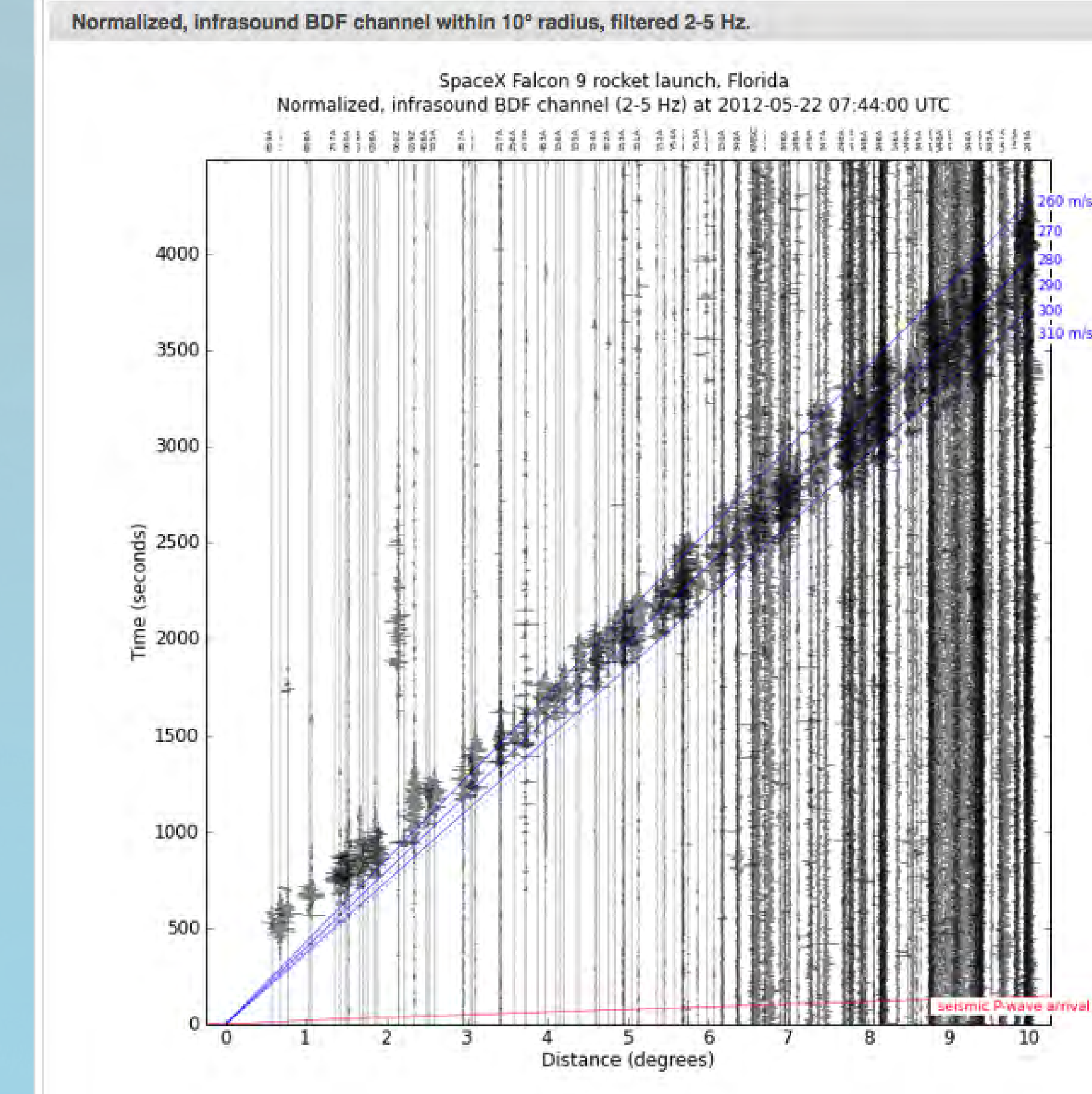
Max Lat: 56.44
Min Lon: -145.88 -54.12 Max Lon:
Min Lat: 6.1
Start Date: [] [] [] [] [] []
End Date: [] [] [] [] [] []
Type: All
Status: All
Author: []

Dedicated event pages with links to other associated solution pages. The page contains record sections of the broadband pressure channel, BDF and broadband seismic channels (BHZ, BHN, and BHE)



The entire event database is downloadable as a delimited text file

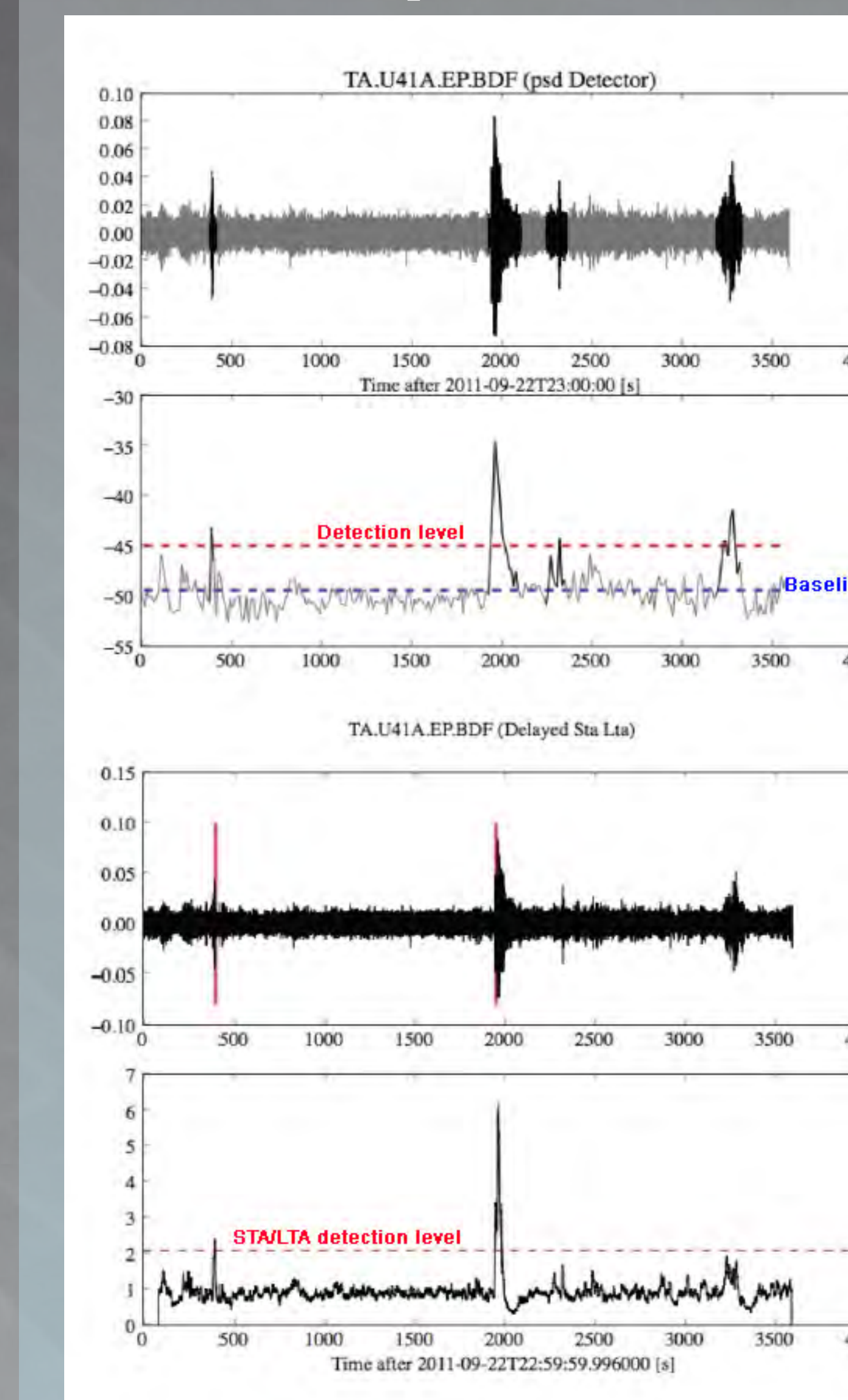
```
Event ID|Origin ID|External ID|Origin Time|Origin Time Error|Title|Event Type|Event
1045|1054|2012_11_11_040800|60.0|Explosion in Indianapolis|Explosion|Not Verified|37
1044|1053|2012_11_04_221500|Unknown source|Unknown|Not Verified|28_441_102_51|11|IRI
1059|1040|2012_10_16_203500|60.0|Unknown Source Possibly at Camp Minden, Louisiana
1038|1047|2012_10_16_042500|60.0|Explosion at Camp Minden, Louisiana|Explosion|Not
1040|1049|2012_10_16_001500|Unknown source|Unknown|Not Verified|37_751_116_0|11|IRI
1041|1050|2012_10_08_072100|Unknown source|Unknown|Not Verified|36_331_87_35|11|IRI
1037|1046|2012_10_08_003500|60.0|SpaceX CRS-1: Falcon 9 rocket launch, Florida|Rocket
1030|1033|2012_10_04_121000|0.0|GPS IIF-3: Delta 4 rocket launch, Florida|Rocket Launch
1025|1027|2012_09_19_194000|Unknown source|Unknown|Not Verified|30_081_83_68|11|IRI
1024|1026|2012_08_30_000000|60.0|Radiation Belt Storm Probes: Atlas 5 rocket launch, FL
1035|1044|2012_07_23_174200|1.0|Utah, 66 km NW of Tooele|Mining|Reviewed|41_0031_
1035|1043|2012_06_29_163000|1.0|Utah, 66 km NW of Tooele|Mining|Reviewed|41_2425_
1018|1019|2012_06_29_163000|1.0|Utah, 66 km NW of Tooele|Mining|Reviewed|41_2425_
1015|1016|2012_06_29_131500|60.0|Delta 4-Heavy rocket launch, Florida|Rocket Launch
1027|1036|2012_06_26_191900|1.0|Utah, 75 km W of Ogden|Mining|Reviewed|41_111_11
1027|1029|2012_06_26_191900|1.0|Utah, 75 km W of Ogden|Mining|Reviewed|41_111_11
1031|1032|2012_06_25_193600|1.0|Utah, 69 km W of Ogden|Mining|Reviewed|41_131_1
1031|1034|2012_06_25_193600|1.0|Utah, 69 km W of Ogden|Mining|Reviewed|41_131_1
1034|1042|2012_06_25_174434|1.0|Utah, 68 km W of Ogden|Mining|Reviewed|41_1181_
1034|1041|2012_06_25_174434|1.0|Utah, 68 km W of Ogden|Mining|Reviewed|41_1181_
1017|1018|2012_06_21_220000|Unknown source|Unknown|Not Verified|33_221_82_14|11|IRI
1014|1015|2012_06_21_022000|Unknown source|Unknown|Not Verified|32_581_82_81|11|IRI
1011|1012|2012_06_20_122500|60.0|Atlas 5 rocket launch, Florida|Rocket Launch|Obs
1013|1014|2012_06_20_021000|Unknown source|Unknown|Not Verified|35_671_82_81|11|IRI
1012|1013|2012_06_11_030000|Unknown source|Unknown|Not Verified|35_141_81_33|11|IRI
1032|1031|2012_06_11_180500|1.0|Utah, 70 km NW of Tooele|Mining|Reviewed|41_01
1032|1031|2012_06_11_180500|1.0|Utah, 70 km NW of Tooele|Mining|Reviewed|41_01
1001|1002|2012_05_22_075451|840.0|Off east coast of United States|Bulle
1001|1001|2012_05_22_075451|840.0|Off east coast of United States|Bulle
1007|1006|2012_05_17_082101|0.2|W 4.9 Louisiana-Texas border region|Bulle
1028|1031|2012_05_04_184200|60.0|Secure war-time communications: Atlas 5 rocket laun
1028|1030|2012_05_04_184200|60.0|Secure war-time communications: Atlas 5 rocket laun
1028|1028|2012_05_04_184200|60.0|Secure war-time communications: Atlas 5 rocket laun
1008|1009|2012_02_09_063000|Unknown source|Unknown|Not Verified|37_041_94_29|11|IRI
1010|1011|2012_01_20_235900|900.0|Explosion at a grain elevator in northeastern Kans
1005|1006|2012_01_11_06_035100|1.0|W 5.7 Oklahoma Bulletin event|Reviewed|35_3371_9
1029|1032|2012_01_05_071245|1.0|W 5.0 Oklahoma Bulletin event|Reviewed|35_351_9
1004|1005|2011_10_29_235900|900.0|Explosion at a grain elevator in northeastern Kans
1006|1007|2011_08_23_175104|0.1|W 5.7 Virginia Bulletin event|Reviewed|37_321
1002|1003|2011_08_05_162500|60.0|Atlas 5 rocket launch, Florida|Rocket Launch|Obs
1022|1024|2011_07_21_143000|Unknown source|Unknown|Not Verified|32_091_87_74|11|IRI
1021|1021|2011_07_21_094100|100.0|ATCS-1-3: Space Shuttle Atlantis flight re-entry, FL
```



TAID, TA Infrasound Detections

TA Infrasound Detections is an **automated** IRIS DMC data product produced by systematically scanning USArray Transportable Array broadband infrasound data (40 Hz BDF channel) and generating station-based weekly detection lists. These lists contain raw detections without event association or categorization, which highlight time intervals that may contain potential signals of interest.

Spectra and Time-Domain Detectors



Power spectra detector — calculates power spectra of the signal as a function of time in pre-defined frequency bands. A characteristic function based on the signal's mean power in the band of interest is used for detection. Some infrasound signals are emergent with long durations. For these signals, their characteristics are often sharper and more easily detected in the frequency domain than in the time domain STA/LTA approach below.

Time-domain detector - STA/LTA-based detector — a detector similar to classic STA/LTA detectors with an additional fixed time gap between STA and LTA windows to compensate for the emergent nature of the infrasound signals. This gap reduces the level of LTA contamination by the signal.



Detection Lists

Two detection lists, full and customized, are compiled for each detector. The longer full lists provide all detections while the shorter, more conservative, customized lists use additional metrics. These lists can serve as an input into user's event association algorithm.

week	date range / station list link	power spectra detections		sta/lta detections	
		full	customized	full	customized
44*	2012-10-29 to 2012-11-04	view / download	view / download	view / download	view / download
43	2012-10-22 to 2012-10-28	view / download	view / download	view / download	view / download
42	2012-10-15 to 2012-10-21	view / download	view / download	view / download	view / download
41	2012-10-08 to 2012-10-14	view / download	view / download	view / download	view / download
40	2012-10-01 to 2012-10-07	view / download	view / download	view / download	view / download
37*	2012-09-10 to 2012-09-16	view / download	view / download	view / download	view / download

Visualizing Detection Trends

Currently there are over 400 sites with infrasound sensors creating a large infrasound array that continuously samples the wavefield of atmospheric acoustic sources. Time display of detections (detection visualization) for such a dense network can reveal their associations.



The Google Earth detection visualization of detections on 2012-10-16 showing signature of an explosion at Camp Minden, Louisiana at 4:25 UTC

Graph of full PSD detection count for the week 36 of 2012 (2012-09-03 to 2012-09-09) for station 959A, Okeechobee, Florida (UTC -4 hours). The chart shows daily increase in detection counts between hours of 13 UTC (9 am local) and 24 UTC (8 pm local), except the September 3rd hours that correspond to the local Sunday.

