## III Array Characteristics

- Each infrasonic array, with an aperture of ~150 m, consists of four sensors with one of the sensors collocated with a seismoacoustic sensor that is part of the Utah regional seismic network.
- The arrays are equipped with microphones (Chaparral 2, Chaparral 2.5, or NPL St1) and fitted with eight or ten hoses, for noise reduction. Data recorders (REFTEX 130, Quanterra Q330) are used to digitize data at 100 sps.

### Figure 1: Array Responses of the Utah infrasonic arrays (1, 2, and 5 Hz), Layout of the arrays (upper panel), normalized array response in slowness space 5y (panels 2-4), cross-section across the normalized array response at 5y=0 (panels 5-7).

### IV Examples of Recorded Events

#### UTRI Rocket Motor Detonations

- Utah Test and Training Range (UTTR) disposes rocket motors using an open burn/open detonation (OB/OD) method. To avoid public complaints due to elevated noise levels and to comply with the regulatory noise limits, two semi-empirical sound models were developed, Blast Overpressure Explosion Model (BOOM) and Sound Intensity Prediction System (SIPS) (McSelden et al., 2003).
- Both models are based on measured meteorological data and the decision to detonate at a particular day and time is based on the results from the two models. UTTR does not conduct detonations if either model indicates a peak sound level at 30 km from the site of more than 120 dB. In general, these detonations have been carried out between the months of March and October ever since, 1993.

### Example of a rocket motor detonation (the larger ones - sensor that is part of the Utah regional seismic network. Each infrasonic array, with an aperture of ~150 m, consists of four sensors with one of the sensors collocated with a seismoacoustic sensor that is part of the Utah regional seismic network.

#### Atmospheric Measurements and Raytracing Implications

- One important aspect in predicting acoustic arrivals through raytracing in the "zone of silence" is the availability of atmospheric measurements (temperature and wind). During an experiment in 2003, atmospheric profiles have been measured using rawinsondes launched close to the detonation time.

#### Map of the network of seismos acoustic arrays deployed in the Utah region (red triangles). Also shown: earthquakes (small gray circle recorded by UUSS since 2006, including seismic events induced by underground coal mining in Waterich Plateau and Black Creek coalfields in southeastern Utah, large events away from the IPSC sites [yellow circles], and some of the known blast sites [yellow circles], confirmed by Alcoa, which is the owner of the UHDD sites). The 12 events that also generated infrasound are denoted by red circles. In general, these detonations have been carried out between the months of March and October ever since, 1993.

## II Array Integration and Scientific Motivation

### Figure 2: Array analysis at array BRPU using InfraMonitor (Arrowsmith and Whitaker, 2008). The normalized waveform from one of the sensors is shown on the left), while the bottom row shows simulations for the six arrays (upper two rows show simulations for the six arrays, while the lower two show synthetic seismograms calculated using the BISL method (Modrak et al., 2000). The black arrows indicate the origin times for each event, while the blue arrows indicate the arrival time of the infrasound wavefront at the array.

### Figure 3: Example of an infrasonic signature (red triangles) in the zone of silence observed by the Utah infrasonic arrays.

### Example of an infrasonic signature (red triangles) in the zone of silence observed by the Utah infrasonic arrays.

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**References:**

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