Several aerospace companies are designing quiet supersonic business jets for service over the United States. These aircraft have the potential to increase the occurrence of mild sonic booms across the country. This leads to a variety of concerns among earthquake warning (EQW) developers and the general seismological community in terms of characterizing the effects of sonic booms on seismic sensors in the field, their potential impact on EQW systems, and means of discriminating their signatures from those of earthquakes. The SonicBREWS project (Sonic Boom Resistant Earthquake Warning Systems) is a collaborative effort between Seismic Warning Systems, Inc. and NASA’s Dryden Flight Research Center. The project aims to evaluate the effects of sonic booms on seismic sensors.

### Sonic Booms on Big Structures (SonicBOBS)

Because flight testing in NASA’s 550’ x 1000’ research aircraft is limited in duration and altitude, we conducted two field experiments to study the effect of sonic booms from space shuttle re-entry and jet aircraft at Edwards AFB.

#### Early Results from SonicBOBS

The figure shows a record of a sonic boom from an F-18 at Edwards AFB. The blue trace is a microphone in the free field, and the green trace is the vertical displacement from nearby CISN station EDW2. The figure shows a record of a sonic boom from an F-18 at Edwards AFB. The blue trace is a microphone in the free field, and the green trace is the vertical displacement from nearby CISN station EDW2.

- **Time Delay between the booms:**
  - The time delay between the booms on the two sensors is consistent with a sound wave traveling at 1030 ft/s rather than an acoustic noise. This discrimination means two sensors could detect both booms normally incident to the array.

### Strategies for Rejecting Sonic Booms

Several possible methods exist for determining sonic booms for EQW. The first broad class is to detect the sonic booms. The second is to use seismograms to distinguish between sonic booms and earthquakes. The third is to use a combination of the two methods. Finally, it may be possible to discriminate the booms from earthquakes by collocating acoustic sensors with the seismograms. The enhanced high-frequency component of the boom can help in this discrimination.

### Next Steps

In 2015, we will deploy a seismometer array in a ground track 50 miles during the Superpower Caustic Assembly and Measurement Program to test the response of high-amplitude (500 Pa) sonic booms. We will also fly three dedicated full-scale flights, during which we will test specific booms over key seismic stations on a building.

### References


