Earthquakes remain an ever-present threat to humans, a nearly-unpredictable surge of geologic power that can lay waste to unprepared cities and their inhabitants. Beyond simply shaking buildings, however, an earthquake can cause the soil below buildings to stop acting like a solid and start acting like a liquid, which in turn can cause more damage. To understand this natural phenomena, researchers have placed sensors hundreds of meters below the surface of the earth to measure the effects of seismic waves on the soil.

This is the point at which I become involved. The first role in which I contribute to the research is in the assembly of a "Best of" database for seismic events. This database provides interested parties, such as building engineers, with a convenient source of high quality data of seismic events, carefully selected to ensure the data is error free. The events chosen cover large and small magnitude events to show all types of soil liquefaction. Several events from each test site are also presented so that persons using the data have access to the results from different types of soil and sediment, allowing them to tailor their own research as necessary.

The second research role I have been working in has been the maintenance of field sites. Ranging from small 2'x2' fiberglass enclosures to large metal sheds, these stations hold a variety of equipment used to record seismic data and transmit it back to the servers where it is shared internationally. Since an earthquake could happen at any time, it is important to have the stations' equipment up and running at all times. A typical trip to one of these sites involves checking for any pests that may have moved in, replacing faulty equipment, weather proofing the interior, and testing the new equipment. Different sites require different amounts of maintenance, with factors such as hot climates and persistent pests causing equipment to wear out faster.

The third component of my research work pertains to the lightning protection circuits used at the seismic stations. When lightning hits the ground near a given station it can create an induction loop in the large lengths of cable connecting the devices inside the stations and underground, which can easily destroy any of the sensitive electronics used in the sensors and data-recorders. Thus, lightning protection circuits are added to shield the delicate and expensive electronics from lightning. As an unfortunate side effect, it appears that the added circuits cause some slight anomalies to the data being received by the sensors. The exact specifics and causes of this "noise" is uncertain, leading me to create another circuit that connects to a computer to run tests on the lightning protection circuits to see if the lightning protection circuits are causing the problems, and if so, what specific input or glitch triggers the noise. Once the problem has been identified using this experimental setup, the results can be used to modify the lightning protection circuits such that the data produced by the seismic stations will possess a higher quality and suffer from fewer cases of noise.s