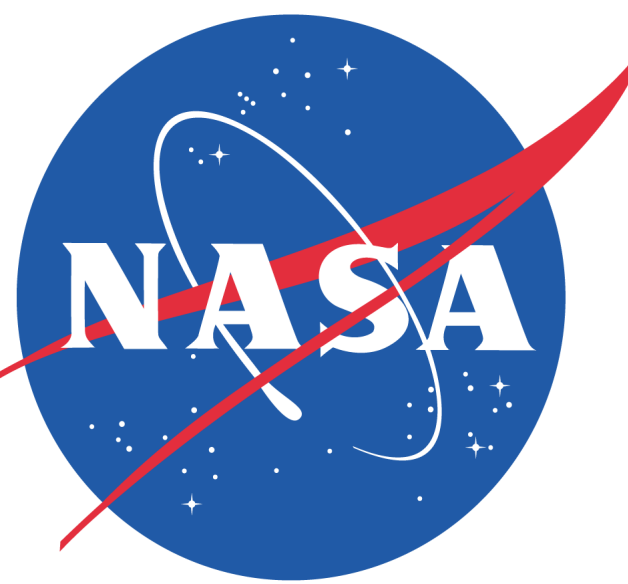




# Detecting Non-Seismic Precursor Earthquake Signals Using Tree Antennas

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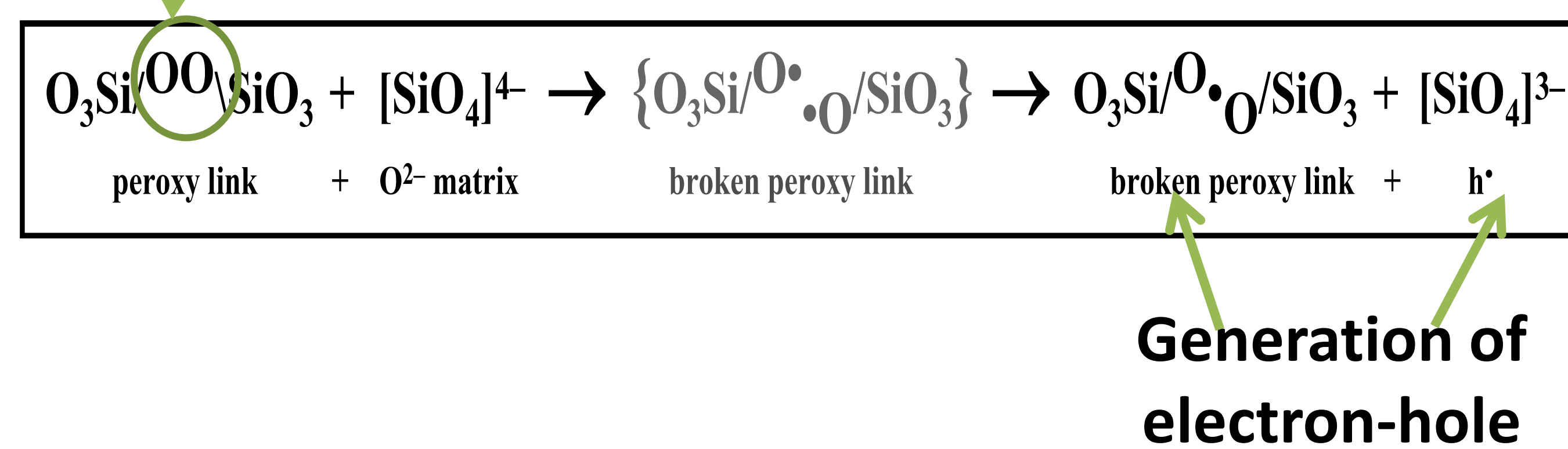
## Abstract

Forecasting earthquakes has yet to be achieved. However, there are numerous non-seismic precursor signals, which become detectable weeks to days before major events – for instance changes in Earth's electrical surface potential. These changes are due to the arrival of positive electronic charge carriers, known as positive holes, stress-activated deep in the Earth's crust, in the hypocenter of the future earthquake. Trees can be used as antennas for detecting the surface potential changes due to these mobile charges. This configuration allows for the detection of diurnal variations of the ground potential. Although we only had 105 days worth of data, our preliminary analysis helps us conclude that tree antennas may help identify anomalous surface potentials created by positive hole stress activation weeks before an earthquake.

## Background

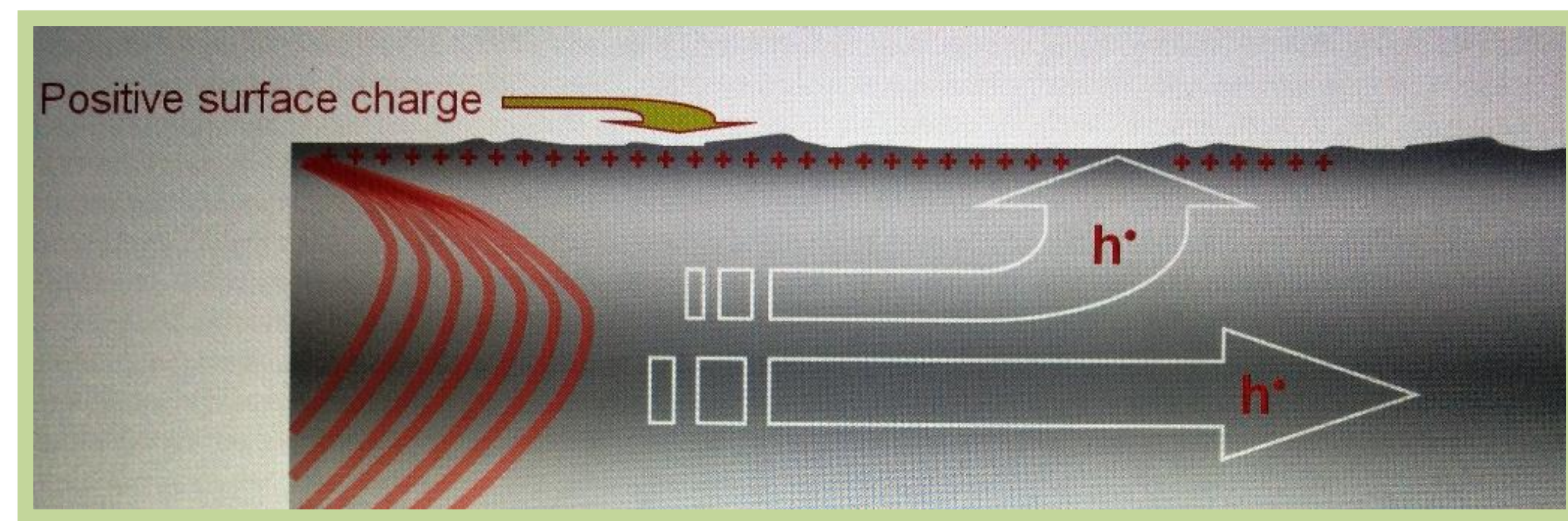
- Minerals in Earth's crust contain dormant electronic charge carriers called peroxy defects.
- When stressed, these peroxy links brake and create positive holes.
- Positive holes are defect electrons in the oxygen sublattice of minerals in crustal rocks.

### Peroxy defect



### Process Summary

- Stress causes peroxy links to break and release positive hole charge carriers.
- Electrical potentials build up at the surface of Earth due to stress activation of highly mobile positive holes in rocks.



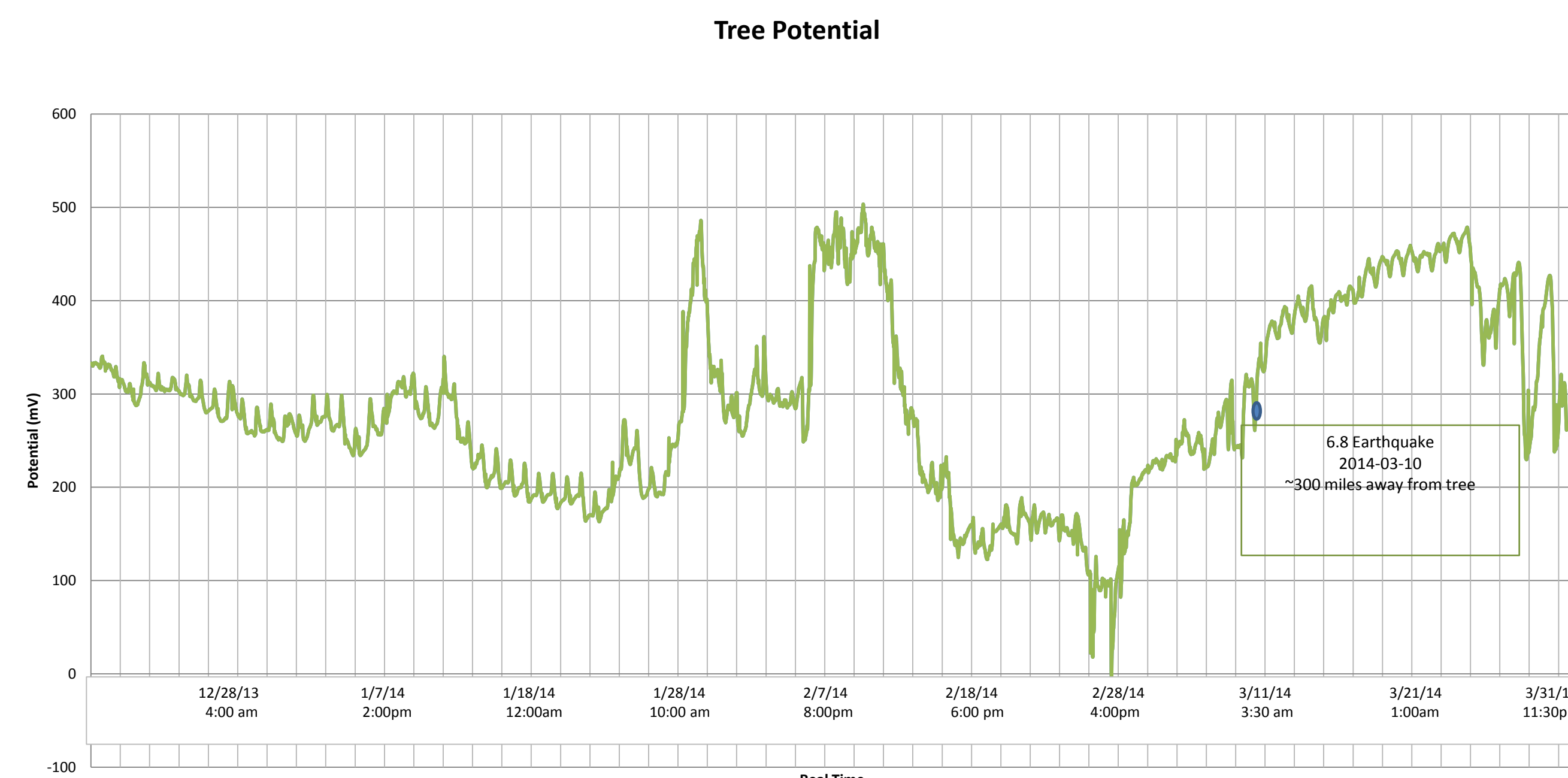
## Experimental Set Up

- A pair of stainless steel screws were spaced vertically 1 meter apart in the trunk of a redwood tree, connected to a milliVolt meter and a data acquisition system.



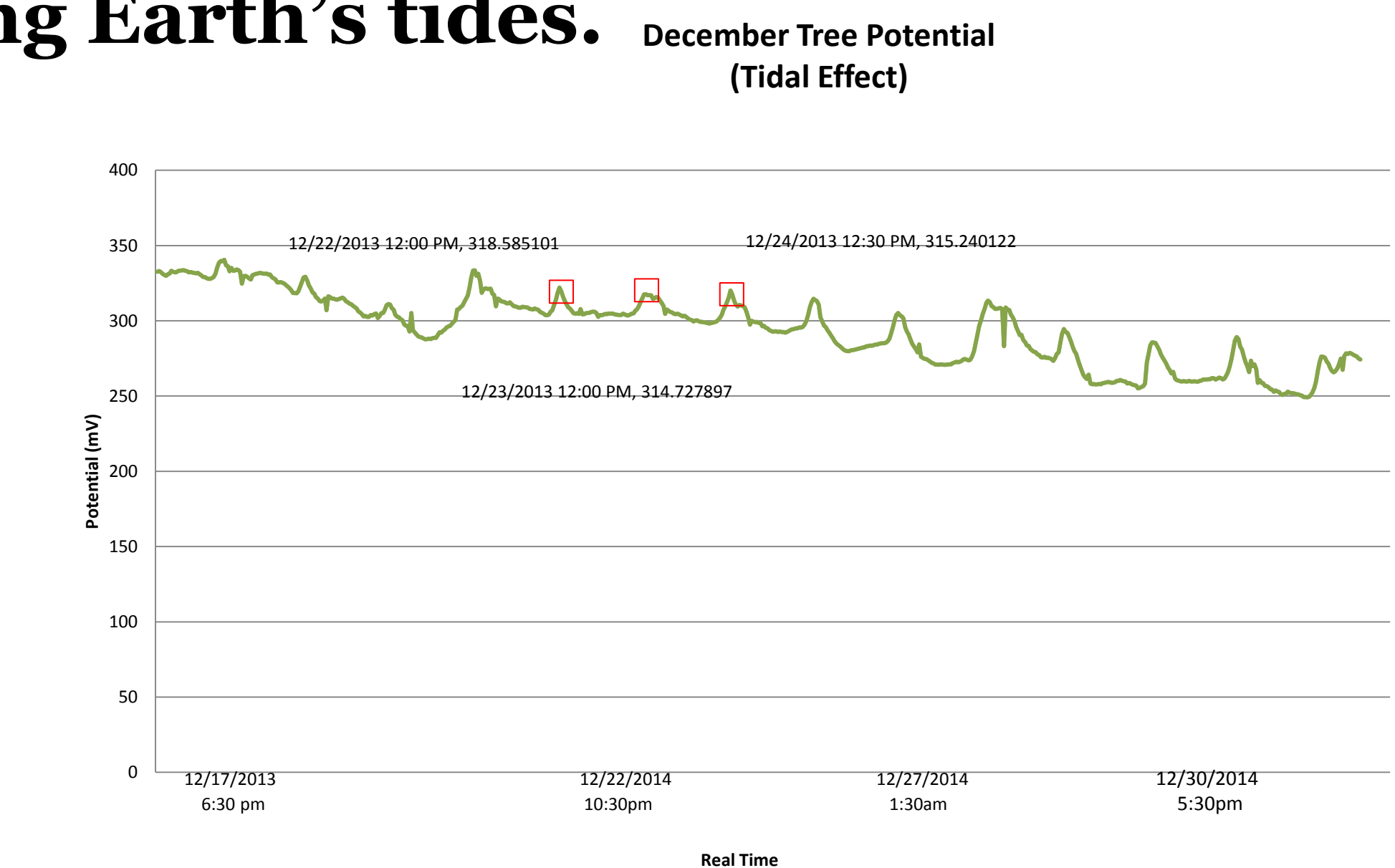
## Results

- Seasonal changes are observed in February
- Unipolar dips occur before Earthquakes.
- Pearson correlation disregarded most weather variations as a direct effect to tree potentials.
- However, strong correlations with humidity and tree potential data were found through statistical analysis.



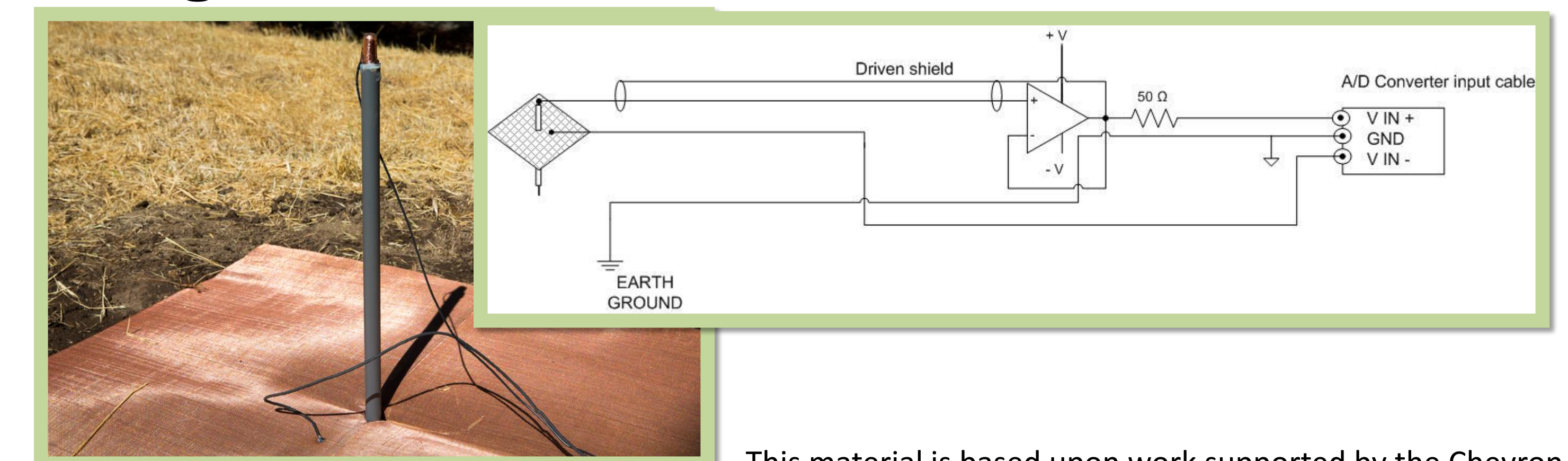
## Conclusions

- Our data analysis confirm earlier published observations of a diurnal pattern, most likely associated with the activation of positive holes during Earth's tides.



## Next Steps

- Install all metal ground potential sensors at a 900' elevation.
- Compare an contrast data from tree potentials and ground sensors.



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