



Award #: 1835791,  
1835692, 1835661, 1835566

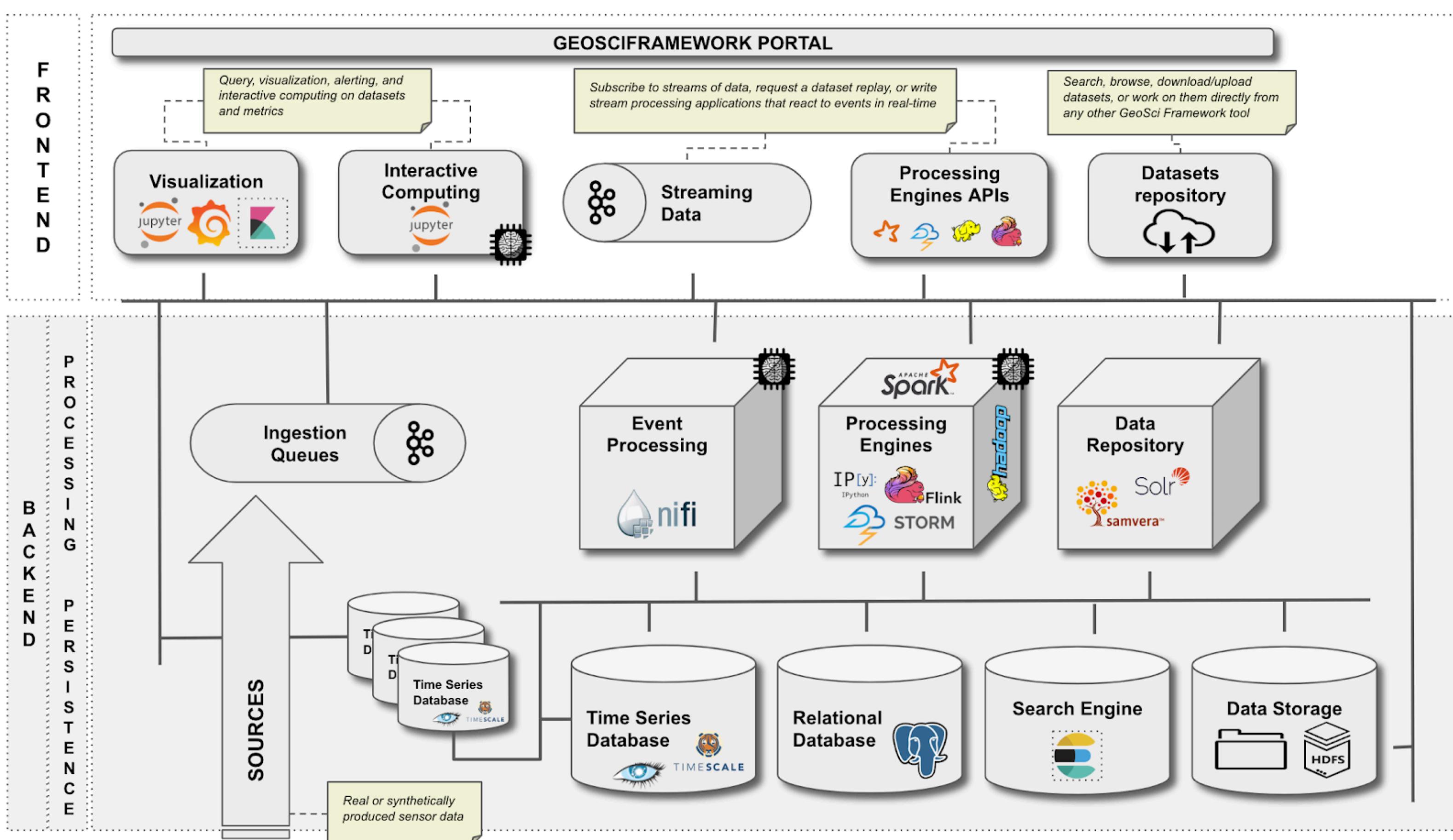
## CSSI Element: Collaborative Research: NSCI:HDR:Framework: Data: GeoSciFramework: Scalable Real-time Streaming Analytics and Machine Learning for Geoscience and Hazards Research

PI: Meertens, C., Rodero, I., Tiampo, K., Melgar, D. Co-PIs: Mencin, D., Baker, S., Villalobos, J.  
Institutions: UNAVCO, Rutgers University, University of Colorado, University of Oregon

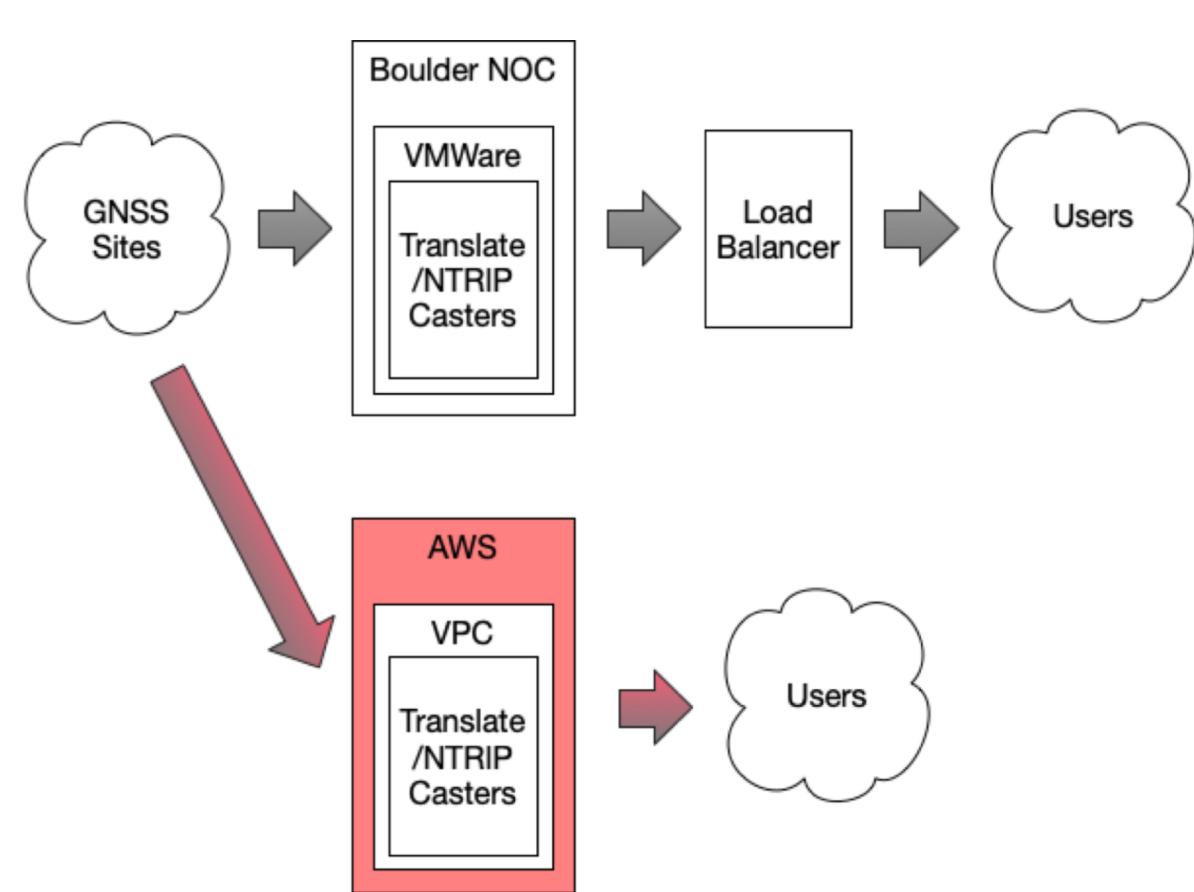
### Project Overview:

GeoSciFramework will provide an experimental computational framework that enables natural hazards research and enhanced earthquake, tsunami and volcano early warning systems.

Real-time streaming analytics and machine learning on continuous integrated data streams from thousands continental and oceanic high-rate sensors, when combined with satellite radar time series, will give a coherent high-resolution global-scale view of the motions of the earth over time periods of seconds to years.

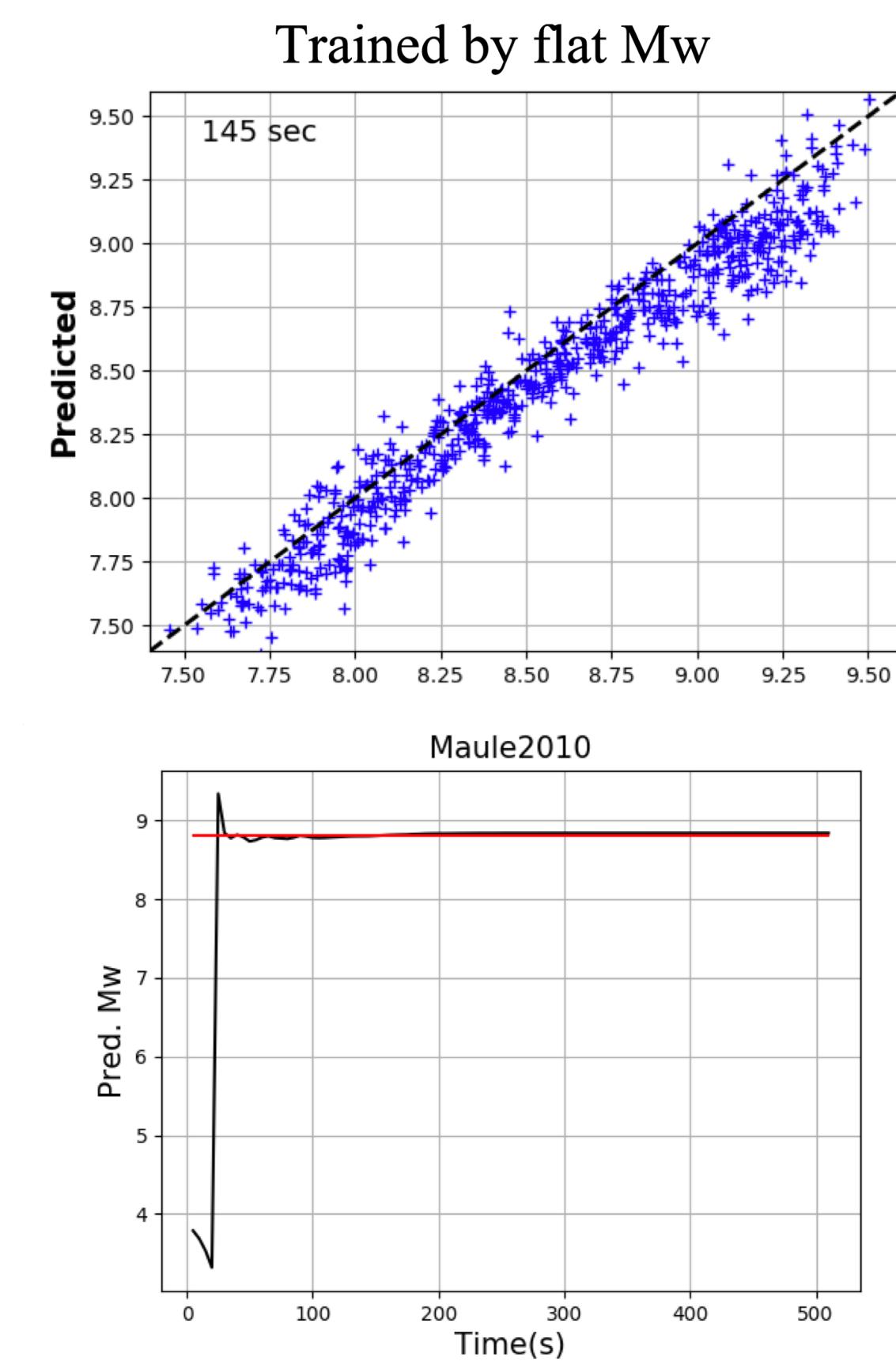
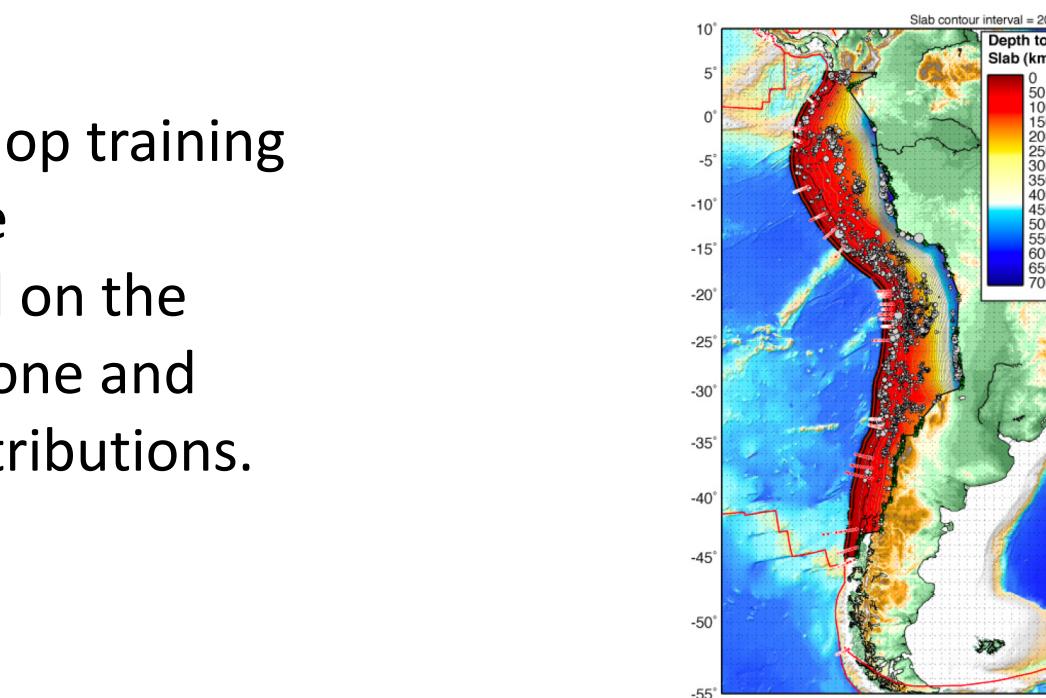


### Use Case #1



Concurrently develop training sets to detect large earthquakes based on the Chile subduction zone and current station distributions.

Phase one, lift the dataflow infrastructure into the cloud, this involved a complete overhaul of VPN topologies, careful cost analysis, and appealing to diverse active user segments.

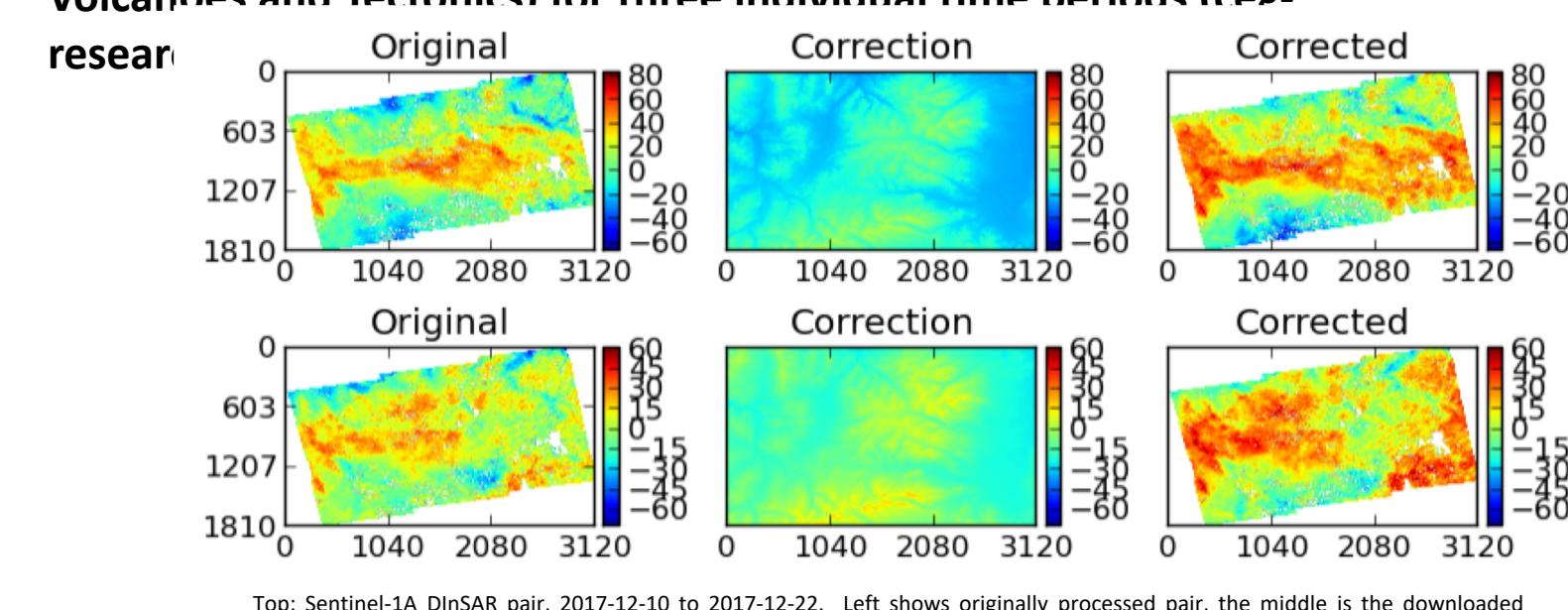


### Use Case #2

**Intermediate-term Events.** Natural catastrophes occur at a variety of spatial and temporal scales. In particular, solid earth hazards, such as large earthquakes and volcanic eruptions, often have very long interevent times and this makes it difficult to forecast their behavior. This part of the project pulls in multiple data sets to address the long- intermediate- and short-term forecasting of these types of events. Test sites include the Yellowstone magmatic center and the Hawaiian island volcanoes.

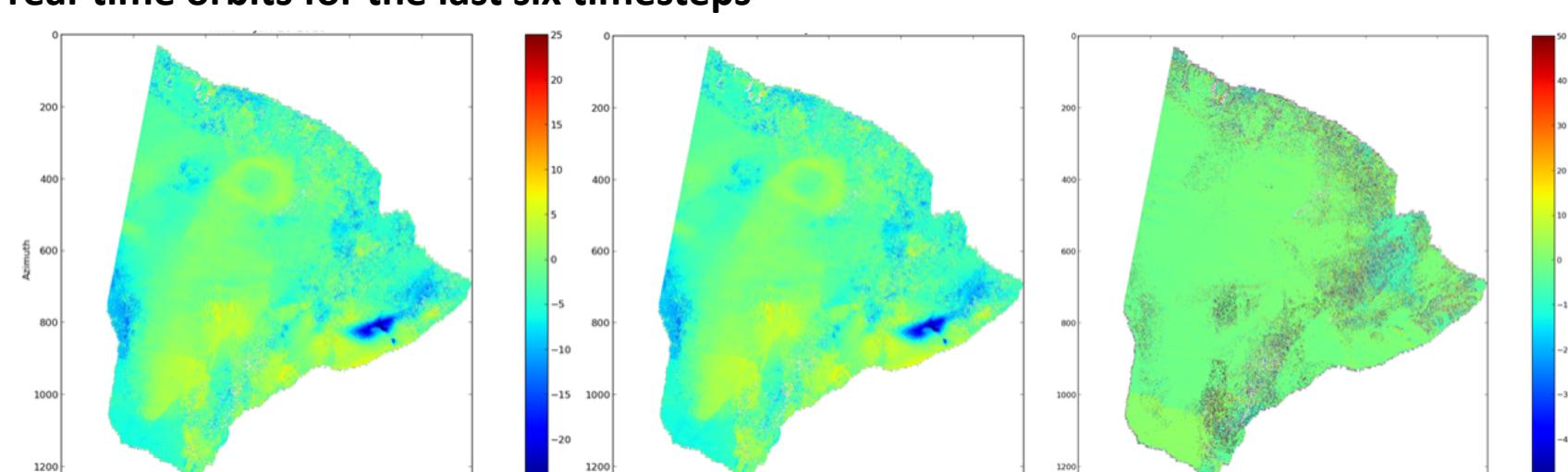
#### Assess the impact of atmospheric corrections on individual DinSAR image correction at Yellowstone

- Here we use the Generic Atmospheric Correction Online Service for InSAR (GACOS) developed by COMET (Centre for the Observation and Modelling of Earthquakes, Volcanoes and Tectonics) for three individual time periods (top-researcher).

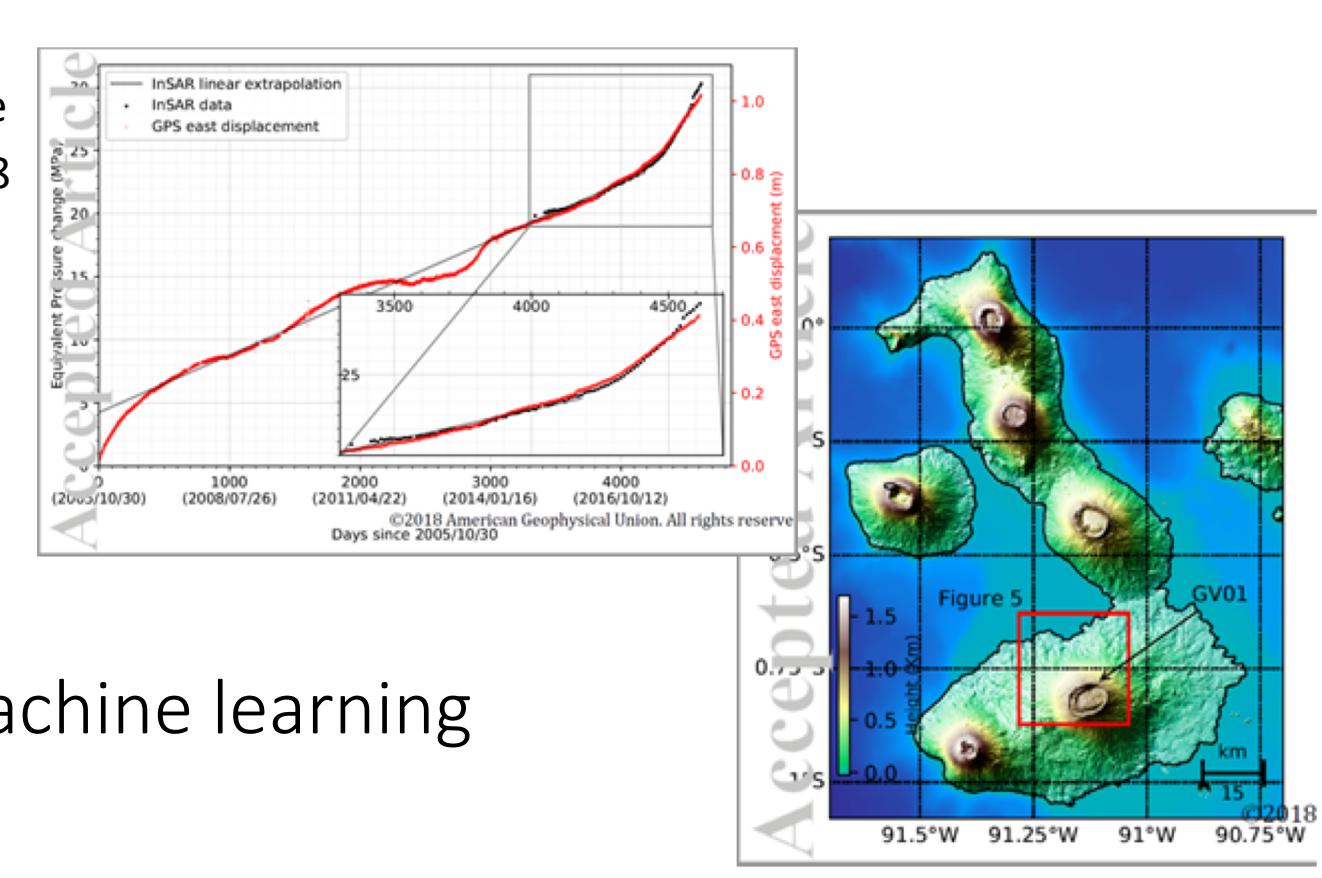


#### Impact of not using precise orbit corrections in real-time processing, automated time series generation

- Simulated processing using precise orbits for processing older images (timesteps 1-39) and real-time orbits for the last six timesteps



Model and time series produced from ICA/machine learning analysis of the 2018 eruption of Sierra Negra (Gaddes et al., 2019).



Next Step: Machine learning