



# SOUTH DAKOTA MINES

An engineering, science and technology university

## Department of Geology and Geological Engineering GGE Research Highlights...

<https://sites.google.com/sdsmt.edu/masterlark/home>

**Please visit Dr. Masterlark's research page to learn more about his research!**



SDSM&T Geology & Geological Engineering

4 mins · 🌐

GGE Research Highlights...

Dr. Tim Masterlark's research team combines big data with machine learning to investigate mega-earthquakes, tsunamis, and volcanoes that profoundly impact our world.

The past few decades produced quantum leaps in our ability to observe how earthquakes and restless magma within active volcanoes change the shape of the Earth's surface. We can measure millimeter-scale movements for numerous points on the Earth's surface using GPS data and satellite radar (InSAR) measurements produce entire maps of deformation over large regions. Models are the critical linkage between this observed deformation and the inaccessible tectonic processes of earthquakes and volcanoes at depth that cause this deformation. Forward models allow us to predict deformation based on the specific characteristics of a given earthquake or magma intrusion event. Unfortunately, as residents of the Earth's surface we cannot directly observe these internal loading events at depth that drive surface deformation. Instead, we are tasked with the far more challenging problem of constructing inverse models that seek to characterize the internal loading processes, based on geodetic data and models that relate how internal loading (e.g., fault-slip from a mega-earthquakes or magma intrusion) translates to surface deformation.

My research team continues to pioneer methods that integrate numerical models and machine learning methods that allow us to ingest satellite and field data streams --big data-- to not only characterize fault-slip of earthquakes or magma intrusion at depth, but also to understand the uncertainties of our predictions. The National Science Foundation is currently supporting our investigations of how predictions and uncertainties of seafloor deformation from mega-earthquakes translate to subsequent tsunami behavior. This research is important for developing engineering strategies and emergency evacuation plans for vulnerable coastal communities.

To learn more about Dr. Masterlark's research team, please click on the following link:

<https://sites.google.com/sdsmt.edu/masterlark/home>

...  
#southdakotamines #SDMines #sdsmt

