

2025-2026 Twinning Program Research Projects

PROJECT 5: Exploring linkages between larger-scale aseismic slow fault slip and accompanying smaller-scale fast seismic slip

Project Director:

Joan Gomberg
US Geological Survey, Earthquake Hazards Program (Seattle, WA)

Twin Mentor:

Kathryn Materna
University of Colorado Boulder

Project Summary:

This project focuses on understanding the various ways in which faults slip, particularly when at large-scale they slide so slowly that they are not considered 'regular' earthquakes and don't radiate destructive seismic waves. These 'slow slip events' do seem to be accompanied by a tiny amount of 'fast' slip that radiates seismic waves that are observed as tiny overlapping 'tremor' signals or as swarms of distinct but small earthquakes. This project explores the connection between tremor and swarms and the larger-scale slow slip that is hypothesized to initiate or 'trigger' clusters of smaller seismic events. We will analyze data from both seismic and geodetic (e.g. GPS) monitoring networks for this exploration.

Role and probable activities for a student researcher in this project:

The student researcher would be conducting a variety of analyses that combine both seismic and aseismic observations to test hypotheses about how the slow fault slip that manifests as geodetic signals might impact the characteristics of the seismic signals that radiate from concurrent relatively tiny, but readily observable fast earthquake-like events.

Preferred Skills of Student:

This project requires a basic understanding of Earth science, and some background in wave propagation and deformation (stress, strain) theory is desirable. Basic computer skills, particularly in running Python codes and ideally even writing some simple scripts, are needed. This project does not involve any field work, but a student spending several weeks or more in Seattle would be encouraged to assist with field projects in the area for short intervals.