

Integrative Seismology and Geodesy: Spatial Sensitivity of Velocity Changes from Ambient Noise

Proposer: Dr. Piero Poli

This research project will focus on quantifying the spatial sensitivity of velocity changes estimated from the correlation of seismic noise. Building on our previous work which showed that integrating seismological and geodetic observations over time provides key insights into earthquake cycles and volcanic system dynamics, we propose to advance this approach by developing a novel framework to spatially locate velocity changes. This will enable the creation of quantitative images of strain and velocity, providing a new 4D monitoring approach that enhances our understanding of fault and volcanic system dynamics and their progression toward catastrophic events. PhD candidates will gain expertise in geodetic and seismological data analysis, employing advanced modeling and processing techniques to derive strain and velocity variations from ambient seismic noise. They will use numerical methods to solve wave equations in 3D complex media, integrating these with observational data to build inversions quantifying strain and velocity changes. Specialized courses in wave propagation, statistics, and numerical methods will provide additional training, while candidates will also develop skills in scientific synthesis, peer-reviewed publication writing, and participation in funded workshops and conferences. This project will equip candidates with technical expertise, critical scientific thinking, and communication skills essential for their academic and professional futures.

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