Geo-INQUIRE Transnational Access Project Report

Geo-INQUIRE installation: Corinth Rift Laboratory - Optic instruments (TA3-88-1)

Project title: Near-real time detection and location of local seismicity integrating Distributed Dynamic Strain Sensing (DDSS) and seismic stations.

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Project acronym: NEREIDS

Project report ID: C3_TA3-88-1_2

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Date of visit: 6-10 October 2025 (installation), 10-13 November 2025 (deinstallation). Data was recorded from 7 October to 10 November 2025.

Geo-INQUIRE Virtual Access: in preparation

Data/Products: in preparation

Project report:

The motivation for this project lies in the lack of existing workflows that efficiently integrate Distributed Acoustic Sensing (DAS) and traditional seismic station data in near-real-time detection and location algorithms. The main objective is to develop and test a workflow that combines DAS's dense, high-resolution measurements of the wavefield, with seismic stations records which provide reliable ground motion estimates and often better azimuthal coverage, to improve earthquake detection and event location using hybrid DAS–station networks. The project will also produce a seismicity catalog and an open-access dataset, enabling the seismological community to evaluate and develop new methodologies for integrated DAS–seismic stations monitoring.

We recorded DAS data along the ~12.5 km optical fiber connecting the Asteri and Valmatoura dam sites for nearly one month, generating 14 TB of data. We used a ping rate of 5000 Hz during the acquisition and saved the data after a decimation of a factor 10. We used a channel spacing of 2.04 m and a gauge length of 10 m. During the experiment, we also installed three temporary seismic stations: one at the end of the fiber to calibrate DAS amplitudes, and two additional stations to fill gaps in regional coverage and ensure better azimuthal constraints for earthquakes occurring near the fiber. A preliminary inspection of the data shows that our system clearly

captured earthquakes reported in the catalog of the National Observatory of Athens (https://bbnet.gein.noa.gr/HL/databases/database).

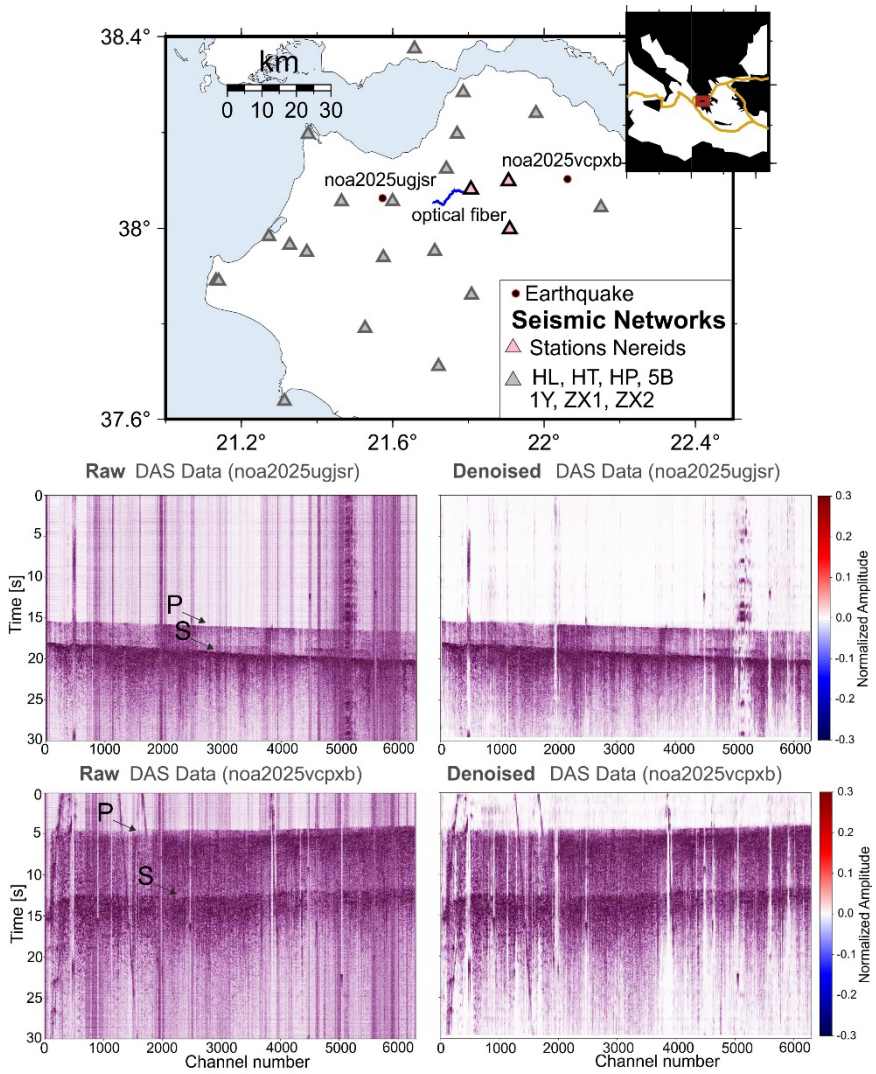

Figure 1. (Top) Experimental setup showing the optical fiber location (blue line), the available temporary and permanent seismic stations (gray triangles), and the three temporary seismic stations (pink triangles) deployed near the optical fiber as part of the NEREIDS experiment. The map shows the location of two earthquakes recorded during the experiment that are identified by their National Observatory of Athens (NOA) IDs. (Bottom) Example recordings of the two earthquakes along the optical fiber. The DAS recordings are shown both before (left) and after (right) applying to a denoiser.