Fiber-optic seismic and geodetic monitoring network of Friuli Venezia Giulia: implementation and first results from the ITINERIS project

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The ITINERIS project has supported the deployment of the first operational Distributed Acoustic Sensing (DAS) network as part of the existing Seismic Monitoring in North-Eastern Italy (SMINO) network, which operates within the Near-Fault Observatory (NFO) of the Friuli Venezia Giulia region.

Five permanent DAS interrogators, each monitoring up to 50 km of publicly owned dark fiber optics managed by INSIEL and the regional government, collectively provide continuous seismic coverage over approximately 250 km of optical backbone. This configuration creates an unprecedented spatial density of virtual seismic channels, complementing and enhancing the capabilities of the conventional SMINO network.

The permanent deployment enables real-time detection and continuous surveillance of seismic activity across the NFO area, improving earthquake localization and characterization. By incorporating DAS data into SMINO, the system delivers higher-resolution spatial insights into ground-motion patterns and extends monitoring capabilities toward multi-hazard applications such as geodetic deformation, landslides, infrastructure stability, and environmental vibrations.

This initiative represents Italy's first large-scale DAS-based seismic monitoring network and one of the earliest in Europe, offering a replicable and scalable model for regional integration of DAS technology into existing research infrastructures.

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