Near Fault Observatories: multidisciplinary research infrastructures, high resolution data and scientific products available through dedicated services implemented within the EPOS-IP project

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Near Fault Observatories (NFOs) are innovative research infrastructures based on dense, state of the art networks of multi-parametric sensors that continuously monitor the underlying Earth instability processes over a broad time interval. They aim at understanding the physical/chemical processes responsible for earthquakes and faulting and tracking their evolution over time by enabling advancements in ground shaking prediction.

EPOS-IP is aimed at contributing in creating and harmonizing data and products distributors from seven NFOs, operating on different tectonic regimes and different areas of Europe. They include plate boundary systems at South Iceland Seismic Zone, the Marmara Sea and the Corinth rift. In mountain settings, NFOs monitor the Alto Tiberina and Irpinia faults in the Apennine mountain range, the Valais region in the Alps, and the Vrancea fault in the Carpathian Mountains. They monitor diverse faulting mechanisms (strike-slip, normal and thrust), high to low angle faults, shallow and deep faults, as well as regions with fast and slow strain rate accumulation. The focus of the observatories varies, ranging from small- to large-scale seismicity and includes the role of different parameters such as fluid playing in fault initiation, the internal structure of fault systems, site effects and derived processes such as earthquake generated landslides and tsunamis. In response to their specific objectives, the NFOs operate a diverse set of monitoring instrumentation using seismic, deformation, strain, geochemical and electromagnetic equipment.

Since NFO methodological approach is based on extremely dense networks and less common instruments deserving multi-parameter data description, a main goal of this group is to build inclusive and harmonised services supporting the installation over the next decade of tens of near-fault observatories monitoring active faults in different tectonic environments in Europe. The NFO Thematic Core Service (TCS) relies on external platforms and services for accessing to standard data (e.g. seismic and geodetic) and on the direct access to the e-infrastructures of individual NFOs for distribution of non standard data (e.g. strain- and tilt-meters, geochemical data, electro- magneto-telluric data) and high-level data products. To define standards for formats and metadata, the TCS actively participates into the several harmonization groups across EPOS.

Two main specific services are under implementation at the TCS level. FRIDGE (EU – NFO Specific Data and Products Gateway and Virtual Laboratory) is a NFO common gateway that enables the specific data and high-level data products availability also furnishing simple visualization tools. CREW (EU – Testing Centre for Early Warning and Source characterization) is a testing facility built on real-time and offline high-resolution data, whose focus is on operating and benchmarking various existing Earthquake Early Warning (EEW) methodologies. The backbone of the testing centre is the Irpinia NFO.