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Crust deformation in the Northern Adria plate from twenty years of geodetic monitoring

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In the complex geodynamic context of the central Mediterranean, squeezed between the two major tectonic plates of Africa and Eurasia, the Adria microplate plays a key role in modulating the deformation and seismicity of the region. The northern sector of Adria is of particular interest as it exhibits moderate seismicity despite low deformation rates.

The crustal deformation is monitored thanks to the various geodetic networks in the area, which can provide continuous and highly accurate daily data. The geodetic network with the most stations is the Friuli Regional Deformation Network - FReDNet (<https://frednet.crs.ogs.it>), set up by the National Institute of Oceanography and Applied Geophysics – OGS, to monitor the distribution of crustal deformation and provide complementary information for regional seismic hazard assessment (Zuliani et al., 2018). FReDNet currently counts 22 permanent GNSS stations homogeneously covering the Eastern Alps, the alluvial plain, and the coastal areas of northeastern Italy. Most of the time series are longer than 15 years. In addition to FReDNet, another geodetic network in northeastern Italy, the Marussi GNSS network, comprises ten stations and is managed by the Friuli Venezia Giulia (FVG) region. The geodetic network of the Veneto region in the west and the permanent GNSS networks of Austria and Slovenia in the North and East respectively, complete the puzzling northern border of the Adria microplate opposite the southern front of Eurasia.

We processed daily GNSS data from the different permanent geodetic networks using the GAMIT/GLOBK software package version 10.71 (Herring et al., 2018). Data processing was performed on the HPC cluster GALILEO100 of CINECA, which uses the SLURM system for job scheduling and workload management (Tunini et al., 2023).

This study shows the processing results, in the form of time-series and velocity field, as well as the different aspects taken into account to check the reliability of the processing procedure applied and the results obtained, such as the consideration or avoidance of tidal or non-tidal loads or the change of the reference stations, the influence of the type of GNSS monuments, or the location of the geodetic antenna on a roof or in an open field.

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