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# S11D-0290 Breaking Adria and Southern Italy: adjoint tomography of an intricate lithosphere.



Monday, 11 December 2023



17:30 - 21:50



*Poster Hall A-C - South (Exhibition Level, South, MC)*

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## Abstract

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High-resolution adjoint tomography has emerged as a powerful tool for unraveling the complexities of the Earth's lithosphere. We present an overview of the analysis conducted on the seismic images generated by the application of high-resolution adjoint tomography for the lithosphere beneath Southern Italy and the Adriatic region.

Recently, we have proposed IMAGINE\_IT, a reference 3D high-resolution seismic tomography model for tectonic and geological structures of the Italian lithosphere. Enhanced accuracy is enabled by state-of-the-art methods, including three-dimensional wavefield simulations based on SPECFEM3D in combination with an adjoint-state method.

Adria plate plays a peculiar role in the geodynamics of the Central Mediterranean. It is the foreland of non-coeval mountain ranges and its margins are consumed in the process by subduction systems under the Alps to the north, the Apennines to the west and the Dinarides to the east.

The complex behavior of this system and the large geographical heterogeneity in data availability lead to a fragmented understanding of the Adria plate. In particular, its lithospheric structure, in terms of  $V_p$  and  $V_s$  profiles, is poorly known due to a lack of seismic stations, poor earthquake location quality (large observational gaps), and the consequent lack of coverage by classical seismic tomography methods. The uncertainties increase the difficulty of correctly assessing the seismic hazard along the Adriatic coasts (including tsunami hazard evaluation).

Here, we present additional details of this region, such as the mid-Adriatic ridge, and a preliminary set of iterations that exploit 7 years of additional data (IMAGINE\_IT was limited to data until 2015) and the recent deployment of very dense regional arrays of broadband seismic stations– the 2016-2019 AlpArray and the AdriaArray Seismic Network currently under installation – which provide a new opportunity to improve our comprehension of the area.

Furthermore, we focus on southern Italy, starting from L'Aquila region up to Calabrian Arc. The analysis of the images produced by high-resolution adjoint tomography IMAGINE\_IT reveals intricate details of the lithospheric architecture, including crustal thickness variations, seismic velocity anomalies, and (lack of) subduction-related features.

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