
Probing lithosphere and volcanoes of the French Massif Central using multiscale seismic experiments: the MACIV project

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R sum 

The French Massif Central (FMC) hosts a complex intraplate volcanic system that is probably influenced by deep mantle processes, Variscan inheritance, and Cenozoic rifting. To better understand the crustal and mantle structures of the FMC, a consortium of 4 French laboratories – ISTerre Grenoble, LMV Clermont-Ferrand, GET & IRAP Toulouse – has set up the MACIV project (2023–2027) based on multiscale seismic experiments combining regional-scale and dense local deployments. The regional scale is covered by 2 temporary networks of 100 broadband stations spanning the whole FMC for a duration of 3–4 years. The large-scale XP array of 35 stations complements the permanent networks to achieve homogeneous coverage with ~ 35 km spacing. It is France’s contribution to the European AdriaArray project. The XF network of 65 stations includes 3 quasi-linear profiles (N–S, E–W, NW–SE) that cross major volcanic areas and Variscan structures with inter-station spacing of 5–20 km.

In September 2025, the broadband arrays were supplemented by a month-long deployment of 2 dense arrays of 624 three-component short-period nodes (5 Hz) across an 80 km x 100 km area. The instruments were deployed in two nested networks : an ultra-dense network (inter-station distance 0.5–1.5 km) on an aperiodic grid covering the recent volcanoes of Cha ne des Puys and Mont-Dore/Sancy massif, and a larger-scale regular grid network (inter-station

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distance 3.5–7 km).

All MACIV data are or will be distributed by SI-S EPOS-France. Waveforms of the XP array are openly available in real-time since the acquisition started in 2023. XF and nodal data will be publicly available after July 1, 2026.

We will present an overview of the project objectives, the experimental setup designed to optimize performance and cost efficiency, as well as the innovative tools developed for dense network deployment, the data acquisition strategy, and preliminary results.