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Building a precise seismic catalog in the intraplate northwestern European region from the AlpArray experiment

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Seismic hazard assessment for intraplate regions such as northwestern Europe remains complex, mainly because of the lack of knowledge on the nature of the processes responsible for earthquakes (tectonics, fluid circulations, response to transient loading, ...) and on long-term seismic behavior of the active tectonic structures.
This is particularly the case for the Rhine area bordering the northwestern corner of the Alps Arc. Our region of interest encompasses the Upper Rhine Graben and its margin, the Vosges and the Jura mountains. The area is characterized by a moderate seismicity, with magnitude and intensity reaching ∼6.5-7 and IX-X, respectively. We take advantage of the high density of the seismic network never reached before, due to both the recent development of the permanent French national network (RLBP-RESIF) and the temporary network in the framework of the European AlpArray project, reinforcing the permanent national networks of Germany, Switzerland and Belgium (total of ∼120 stations). We build a new seismic catalog since January 2016, including a discrimination step to local anthropogenic and natural seismic events.
This catalog will constitute a strong dataset to study the space-time distribution of the seismicity over the period 2016-2020, which will shed light on the locations and mechanism of the active structures, together with the impact of industrial activities on the generation of triggered earthquakes. Eventually, this will also allow us to refine the crustal and mantle structures using local seismic tomography.