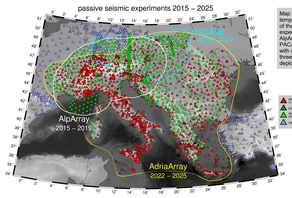
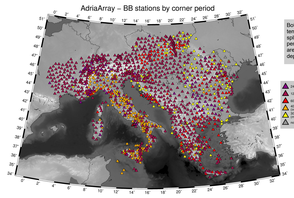
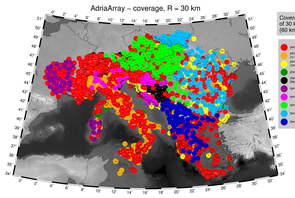


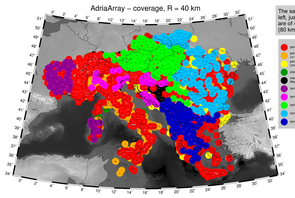
Map shows the temporary stations of the previous experiments in the AdriaArray PACASE, together with outlines of all three large-scale deployments.



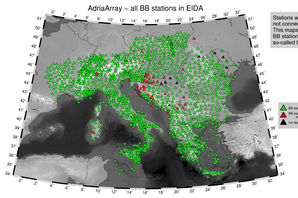
Both permanent and temporary stations split by five corner period ranges. Grey are stations not deployed yet.



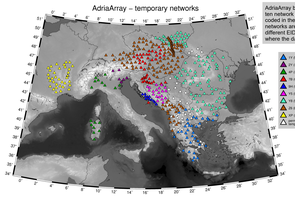
Coverage with circles of 30 km in radius (60 km in diameter).



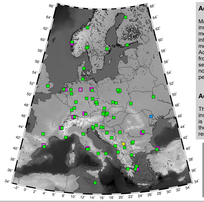
The same as on the left, just the circles are of 40 km in radius (80 km in diameter).



Stations which are / are not connected to EIDA. This maps shows only BB stations (>= 30 s), so-called backbone.



AdriaArray backbone uses ten network codes, color-coded in the map. The networks are assigned to different EIDA nodes, where the data is archived.



AdriaArray institutions

Map shows the member institutions, the institutions that has applied and their membership is pending, and institutions interested as possible candidates for the membership. Some institutions joined the AdriaArray Seismology Group as member, from some institutions, more groups joined separately as different members. EIDA nodes storing the data from temporary and permanent stations are also shown.

AdriaArray Seismology Group

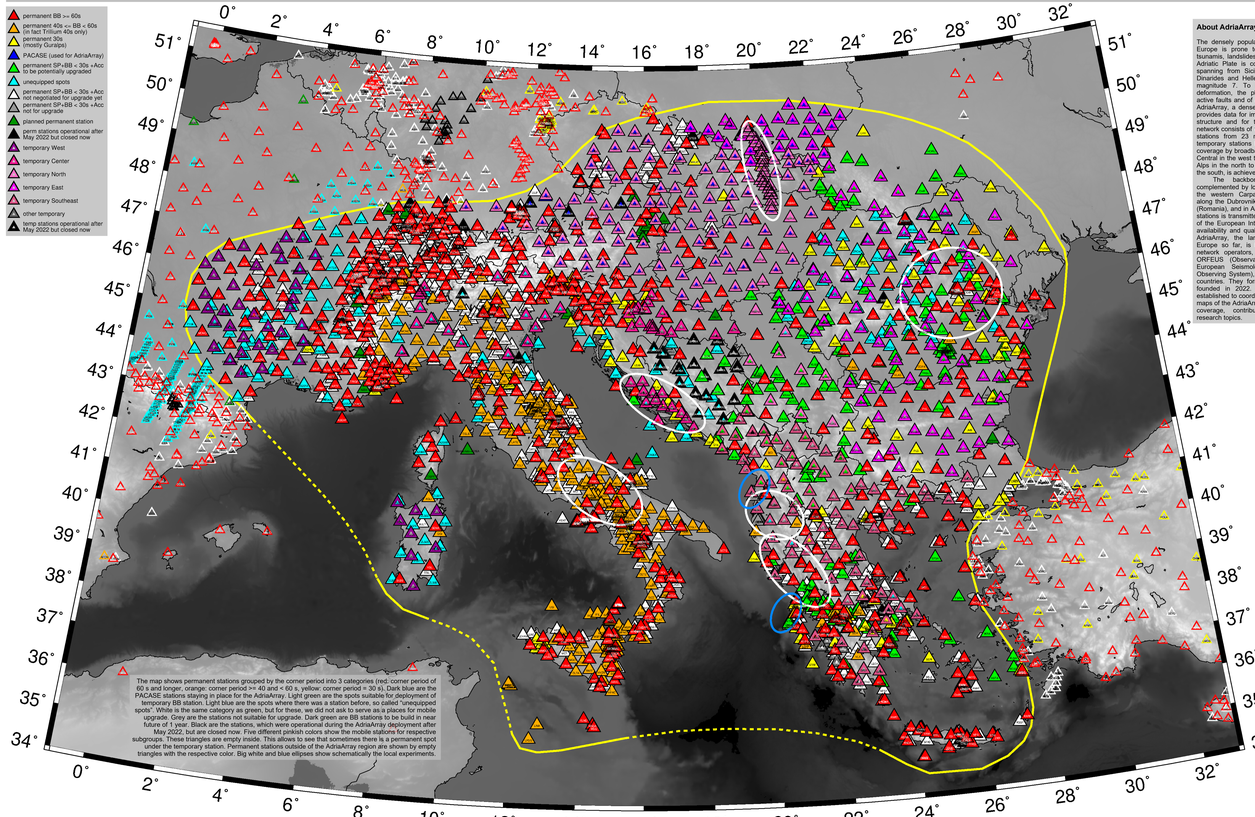
The group has 53 members comprising 63 institutions from 30 countries. 1 membership is pending and there is 1 candidate. Overall, the initiative puts together over 440 researchers, technicians and students.

AdriaArray – a Passive Seismic Experiment to Study Structure, Geodynamics and Geohazards of the Adriatic Plate

Petr Kolínský, Thomas Meier and the AdriaArray Seismology Group
Institute of Geophysics of the Czech Academy of Sciences, Prague, Czech Republic; Christian-Albrechts-Universität zu Kiel, Institut für Geowissenschaften, Kiel, Germany
petr.kolinsky@ig.cas.cz

Seismological Society of America
Baltimore, Maryland, 14 - 18 April 2025

https://orfeus.readthedocs.io/en/latest/adria_array_main.html

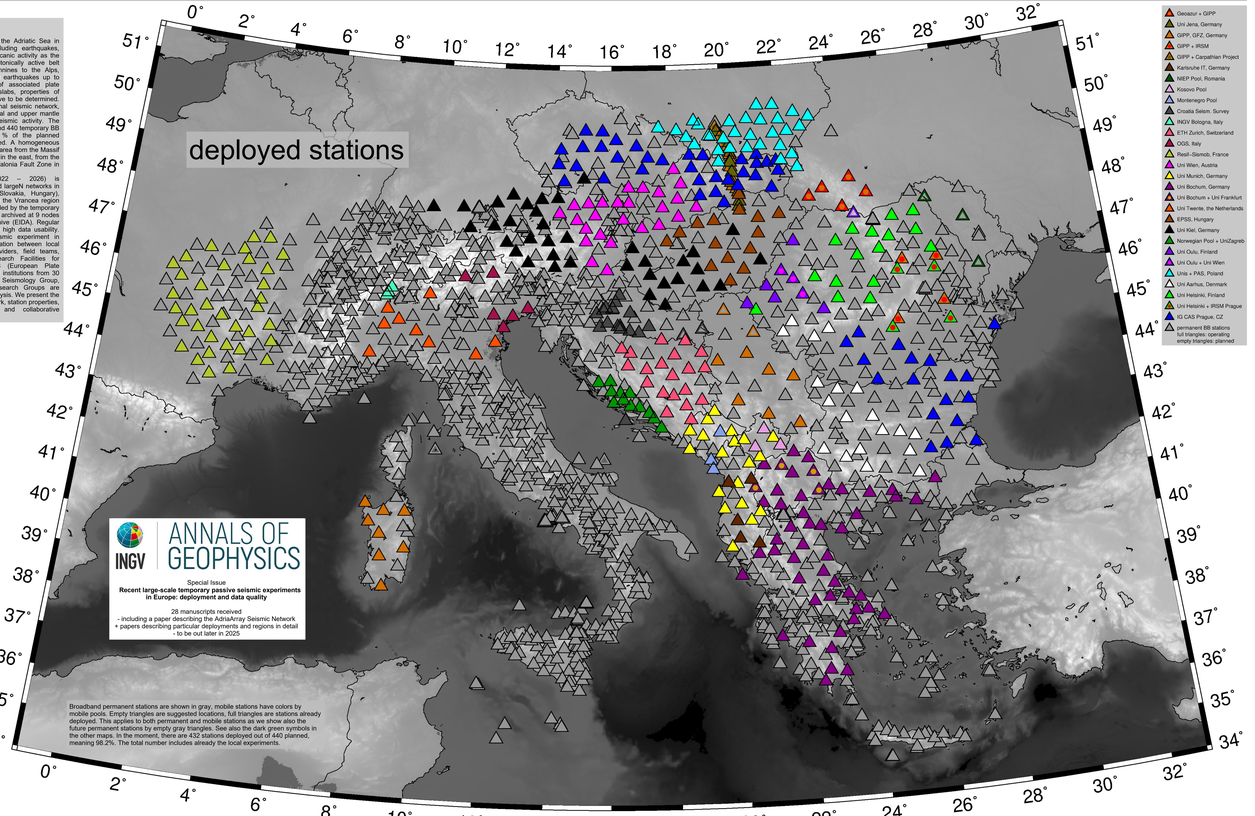


The map shows permanent stations grouped by the corner period into 3 categories (red: corner period of 60 s and longer, orange: corner period >= 40 and < 60 s, yellow: corner period = 30 s). Dark blue are the PACASE stations staying in place for the AdriaArray. Light green are the spots suitable for deployment of temporary BB station. Light blue are the spots where there was a station before, so called "unequipped spots". White is the same category as green, but for these, we did not ask to serve as a places for mobile upgrade. Grey are the stations not suitable for upgrade. Dark green are BB stations to be build in near future of 1 year. Black are the stations, which were operational during the AdriaArray deployment after May 2022, but are closed now. Five different pinkish colors show the mobile stations for respective subgroups. These triangles are empty inside. This allows to see that sometimes there is a permanent spot under the temporary station. Permanent stations outside of the AdriaArray region are shown by empty triangles with the respective color. Big white and blue ellipses show schematically the local experiments.

About AdriaArray

The densely populated area around the Adriatic Sea in Europe is prone to geohazards including earthquakes, tsunamis, landslides, flooding and volcanic activity as the Adriatic Plate is consumed in a tectonically active belt spanning from Sicily, over the Apennines to the Alps, Dinarides and Hellenides, generating earthquakes up to magnitude 7. To identify drivers of associated plate deformation, the plate boundaries, slabs, properties of active faults and of the stress field have to be determined. AdriaArray, a dense plate-scale regional seismic network, provides data for imaging of the crustal and upper mantle structure and for the analysis of seismic activity. The network consists of 1075 permanent and 440 temporary BB stations from 23 mobile pools. 98 % of the planned temporary stations have been installed. A homogeneous coverage by broadband stations in an area from the Massif Central in the west to the Carpathians in the east, from the Alps in the north to Sicily and the Kefalonia Fault Zone in the south, is achieved.

The backbone network (2022 – 2026) is complemented by locally densified and largeN networks in the western Carpathians (Poland, Slovakia, Hungary), along the Dubrovnik fault (Croatia), in the Vrancea region (Romania), and in Albania. Data recorded by the temporary stations is transmitted in real-time and archived at 9 nodes of the European Integrated Data Archive (EIDA). Regular availability and quality checks ensure high data usability. AdriaArray, the largest passive seismic experiment in Europe so far, is based on cooperation between local network operators, mobile pool providers, field teams, ORFEUS (Observatories and Research Facilities for European Seismology) and EPOS (European Plate Observing System), encompassing 64 institutions from 30 countries. They form the AdriaArray Seismology Group, founded in 2022. Collaborative Research Groups are established to coordinate the data analysis. We present the maps of the AdriaArray Seismic Network, station properties, coverage, contributing institutions and collaborative research topics.

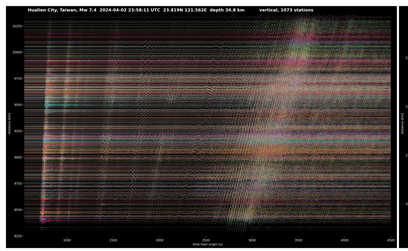


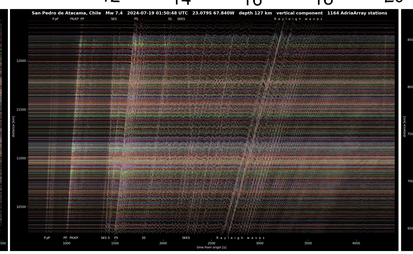
INGV ANNALS OF GEOPHYSICS

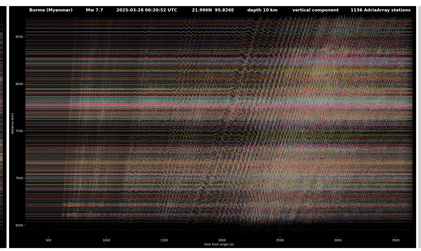
Special Issue
Recent large-scale temporary passive seismic experiments in Europe: deployment and data quality

28 manuscripts received
- including a paper describing the AdriaArray Seismic Network
+ papers describing particular deployments and regions in detail
- to be out later in 2025

Broadband permanent stations are shown in gray, mobile stations have colors by mobile pools. Empty triangles are suggested locations, full triangles are stations already deployed. This applies to both permanent and mobile stations as we show also the future permanent stations by empty gray triangles. See also the dark green symbols in the other maps. In the moment, there are 432 stations deployed out of 440 planned, meaning 98.2%. The total number includes already the local experiments.



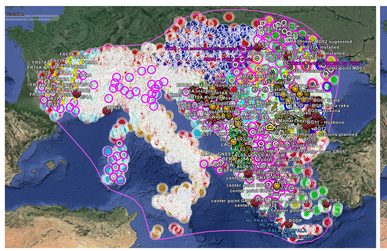


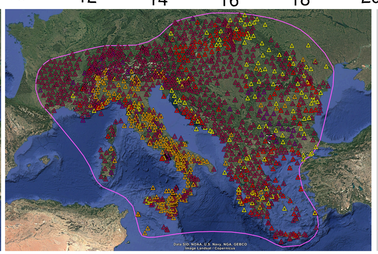


Collaborative Research Groups

CRGs are groups of AdriaArray participants focusing on a specific topic of data processing & research. CRGs work independently and report on activities at the AdriaArray Workshops. CRGs consist of participants of at least two countries. Coordination of individual CRGs by an experienced researcher and an early career scientist is encouraged. Members of CRGs may change. CRGs may be established at the beginning of the experiment or later. Currently, there are the following CRGs:

- Seismicity and seismic sources
- Body wave tomography
- Receiver functions
- Ambient noise & surface wave tomography
- Shear-wave splitting and anisotropy
- Modelling of seismic wave propagation and full waveform inversion
- Linking geophysical observables and geodynamics
- Engineering Seismology





Station deployment

The mobile station distribution was done in GoogleEarth. Permanent stations were imported to the maps and circles of 30 and 40 km in radius corresponding to the mobile stations were manually moved over the region to cover it – see the second figure on the left. We placed as many of the temporary BB stations as possible to existing SP/SP+A stations or unequipped spots, which were upgraded later in the field. As the backbone, we used a kind of what was the corner period of the backbone we were successively replacing the "worst" (most SP) stations with the "best" (long-period BB). As a result, we ended up consuming all the temporary stations at hand having replaced as many SP stations as possible. This gave us the best "quality" of the given coverage in the given subgroup. The lowest corner period of each subgroup thus differs. In the subgroup EAST and partly in the subgroup CENTER, there are several stations with 30 s corner period used for the backbone. The rest is covered with stations of 40 s and longer corner period. This obviously trades-off with the station spacing considered. If, for example, the "40 km" station coverage is considered for subgroup CENTER, it is also almost all covered with >= 40 s sensors. As, however, for this subgroup the stations spacing used was "30 km", some 30 s sensors are popping up in the respective coverage maps.

Besides using GMT for plotting the various properties of the stations, the same can be shown also in GoogleEarth. The *.kml files are generated by a Python script from the station inventories. The figure on the left shows all AdriaArray stations split by color according to their corner periods in GoogleEarth, similarly as the second map from the left at the top of the poster.

In addition to the backbone, there are several local experiments. These are local densification of the backbone, either with BB or SP/SM (or a combination) stations in the regions of particular interest.

The table on the right shows which mobile pool goes to which region including the number of stations deployed. The table is split by the five regional subgroups.

All information about the AdriaArray Seismic Network can be found in the GitHub repository at:
https://github.com/PetrColinsky/AdriaArray

Scan the QR code

EAST	10 CAS Prague		10			
	11 Karlsruhe		11			
	MPI-K LPF		6			
	Kaiserslautern		6			
	LMU Munich		6			
	GFZ Potsdam		6			
	LPF-Jena		6			
	LPF-Global		6			
	Kiss Global		6			
		20	20	0	0	0
		20 %	20 %	0 %	0 %	0 %
						100 extra
						120 total
NORTH	12 CGS	Czech Rep.	Austria	Hungary	Serbia	Germany Prague
	13 ZAMG		13			
	LPF-Linz		6			
	LPF-Graz		6			
	Graz & PACASE		6			
	LPF-Vienna		6			
	GPI		6			
		12	19	0	0	0
		12 %	19 %	0 %	0 %	0 %
						120 extra
						132 total
CENTER	GeoPhysx Zagreb		10	10		
	GeoNet Rijeka		10			
	ETH Zurich		20			
	OGS Bologna		6			
	LMU Munich		6			
		20	26	10	0	0
		20 %	26 %	10 %	0 %	0 %
						56 extra
						76 total
SOUTHEAST	Albania	N. Macedonia	Montenegro	Kosovo	Greece	
	14 Bochum		14			
	Bochum Frankfurt		6			
	LMU Munich		6			
	ETH		6			
	Vienna Prev.		6			
	Montenegro Prev.		6			
		0	44	0	0	0
		0 %	44 %	0 %	0 %	0 %
						44 extra
						44 total
WEST	Germany	France				
	15 Karlsruhe		15			
	Nancy	5	5			
		5	20	0	0	0
		5 %	20 %	0 %	0 %	0 %
						25 extra
						45 total
						432 total
						440

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Christian-Albrechts-Universität zu Kiel
Mathematisch-Naturwissenschaftliche Fakultät