



# Status of the AdriaArray Seismic Network

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&

the AdriaArray Seismology Group

# AdriaArray

AdriaArray Workshop, March 12-15, 2024, Sofia  
The workshop is partly supported by ORFEUS



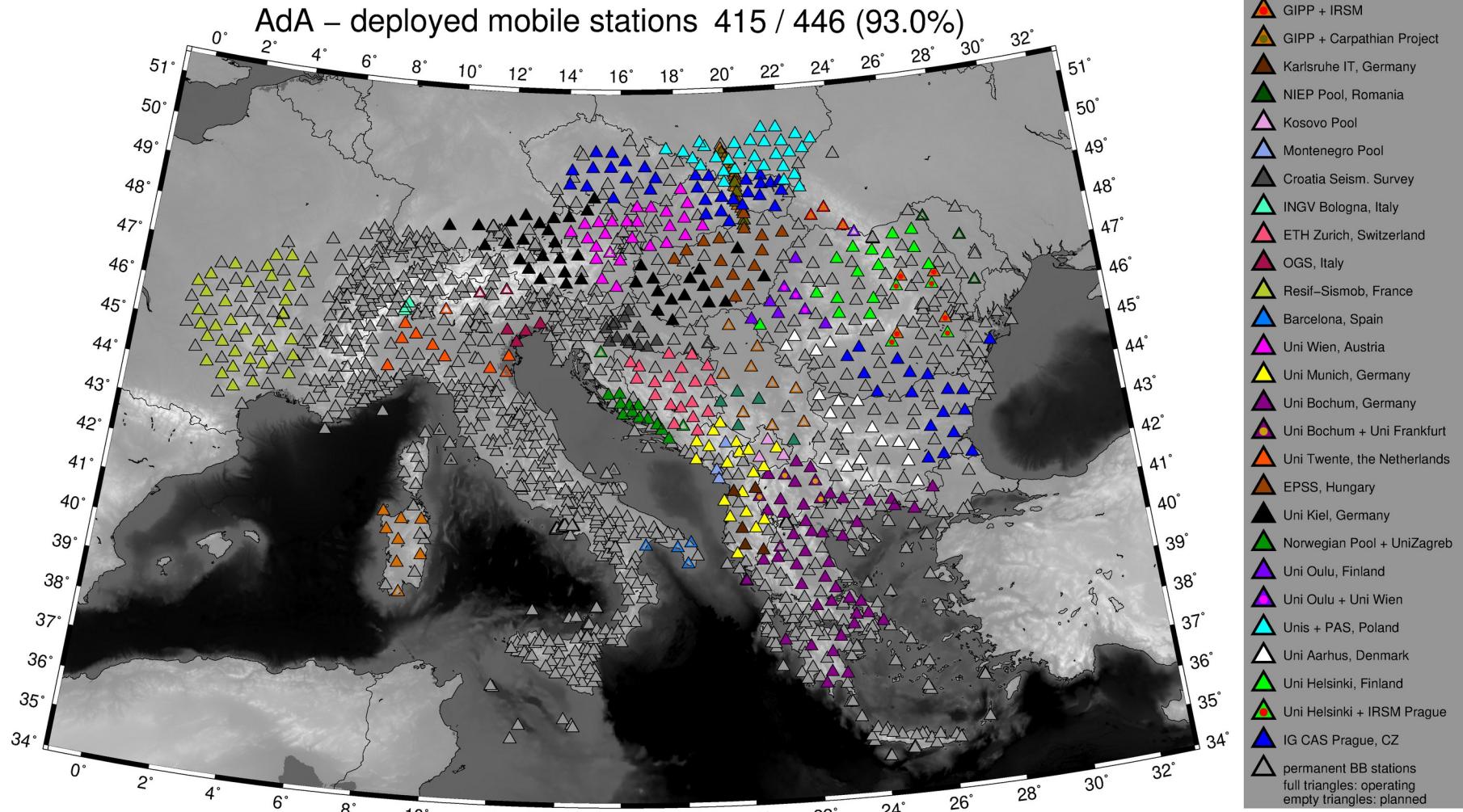
Kiel University  
Christian-Albrechts-Universität zu Kiel



INSTITUTE OF GEOPHYSICS  
OF THE CZECH ACADEMY OF SCIENCES

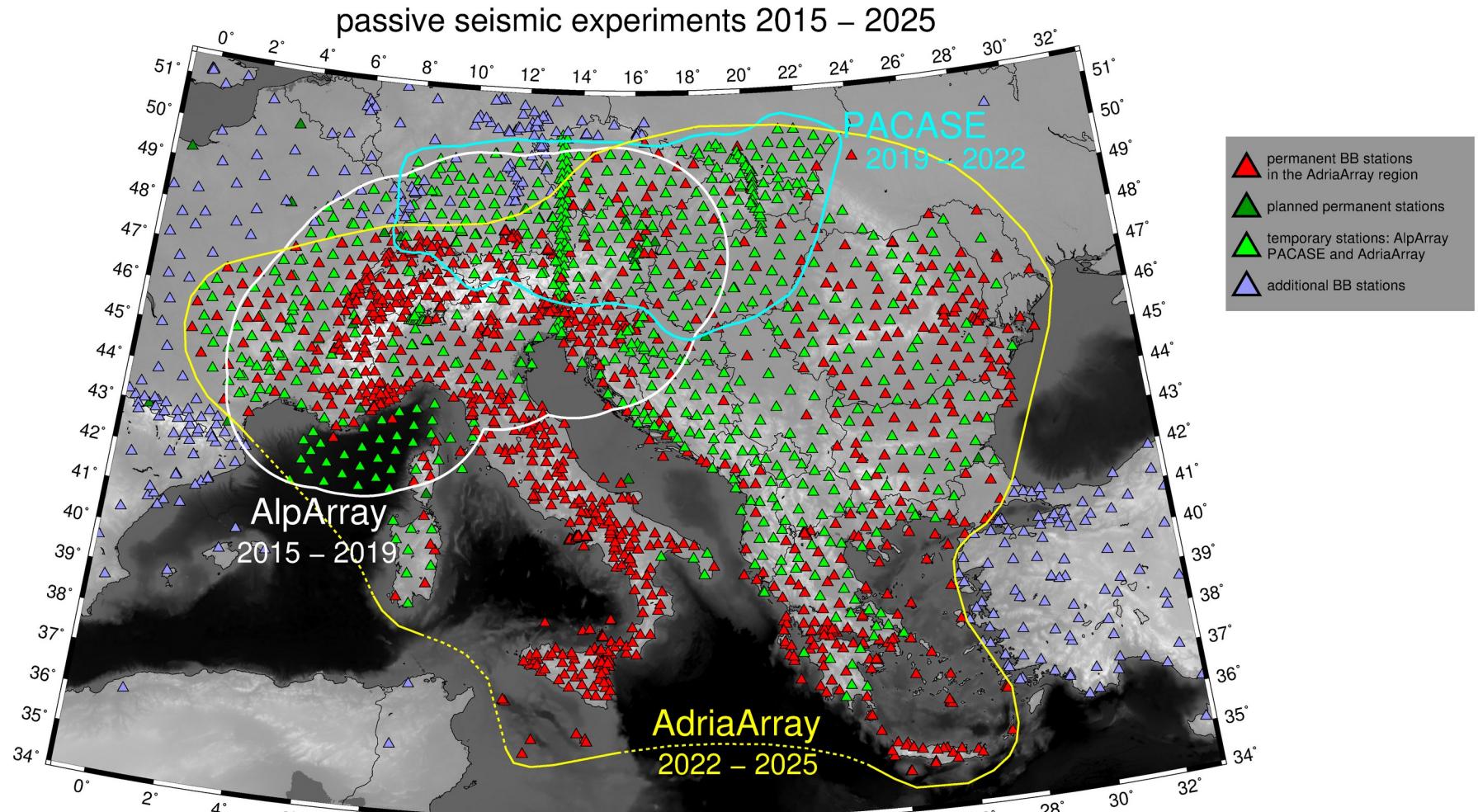
Orfeus

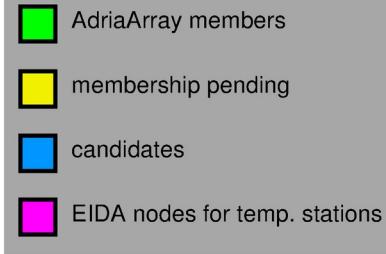
# AdriaArray - status



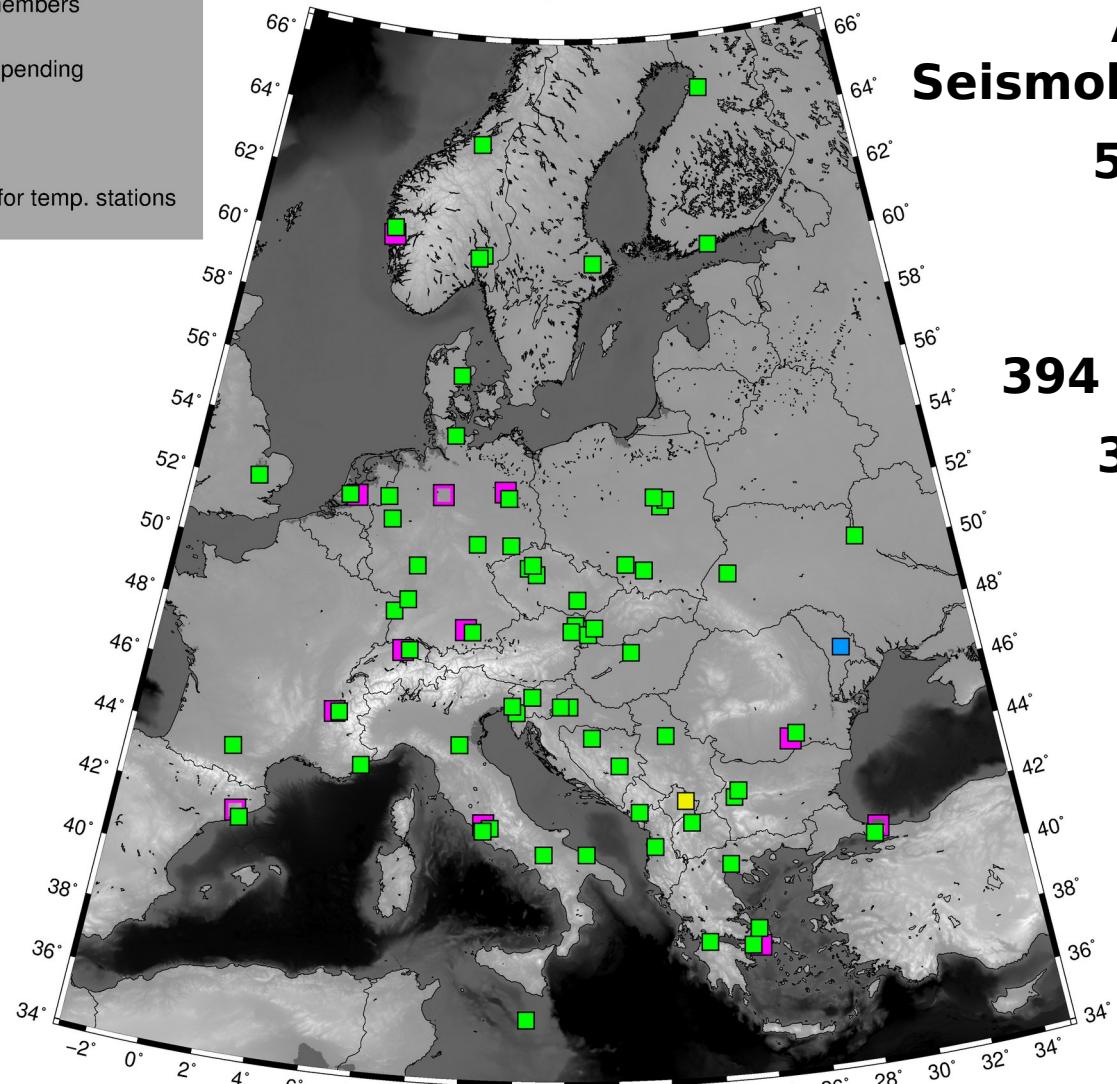
# AdriaArray

2022 - 2025





## AdriaArray institutions



# AdriaArray Seismology Group

**53 members**

**63 member institutions**

**394 participants**

**30 countries**

### MEMBER INSTITUTIONS:

IGWE-PUT, Tirana, Albania  
 Uni Vienna, Austria  
 ZAMG, Austria  
 SC FHMZ, Sarajevo, Bosnia and Herzegovina  
 GS Republic of Srpska, Bosnia and Herzegovina  
 NIGG, BAS, Bulgaria  
 Uni Sofia, Bulgaria  
 CSS, Zagreb, Croatia  
 Uni Zagreb, Croatia  
 Charles Uni, Prague, Czech Republic  
 IG, CAS, Prague, Czech Republic  
 IPE, Masaryk Uni, Brno, Czech Republic  
 IPEM, CAS, Prague, Czech Republic  
 Uni Aarhus, Denmark  
 Uni Helsinki, Finland  
 Uni Oulu, Finland  
 Uni Grenoble, France  
 Uni Strasbourg, France  
 Geazur, France  
 Uni Toulouse, France  
 Uni Frankfurt, Germany  
 TU Freiberg, Germany  
 Uni Kiel, Germany  
 Uni Jena, Germany  
 Karlsruhe I.T., Germany  
 LMU München, Germany  
 GFZ Potsdam, Germany  
 Uni Bochum, Germany  
 NOA, Greece  
 Uni Athens, Greece  
 Uni Thessaloniki, Greece  
 Uni Patras, Greece  
 EPSS, Hungary  
 INGV, Italy  
 OGS, Trieste, Italy  
 Uni Bari, Italy  
 Uni Roma Tre, Italy  
 Uni Trieste, Italy  
 Uni Sts. Cyril and Methodius, Skopje, N. Macedonia  
 Uni Malta  
 MSS, Podgorica, Montenegro  
 Uni Twente, the Netherlands  
 Uni Bergen, Norway  
 NORSAR, Norway  
 Uni Oslo, Norway  
 Geological Survey of Norway  
 IG PAS, Warsaw, Poland  
 Institute of Geological Sciences, PAS, Warsaw, Poland  
 Uni. of Science and Technology, Krakow, Poland  
 Uni Silesia, Katowice, Poland  
 Uni Warszawa, Poland  
 NIEP, Romania  
 Serbian Seismological Survey, Serbia  
 ESI SAV, Bratislava, Slovakia  
 Dept. of Geology and Paleontology, Comenius Uni, Bratislava  
 SSS, Ljubljana, Slovenia  
 LabSis, Geo3Bcn-CSIC, Barcelona , Spain  
 Uni Uppsala, Sweden,  
 ETH, Zürich, Switzerland  
 KOERI, Türkiye  
 Uni Cambridge, United Kingdom  
 Iog, NAS, Ukraine  
 ORFEUS

### PENDING:

GS Kosovo, Pristina, Kosovo

### CANDIDATES:

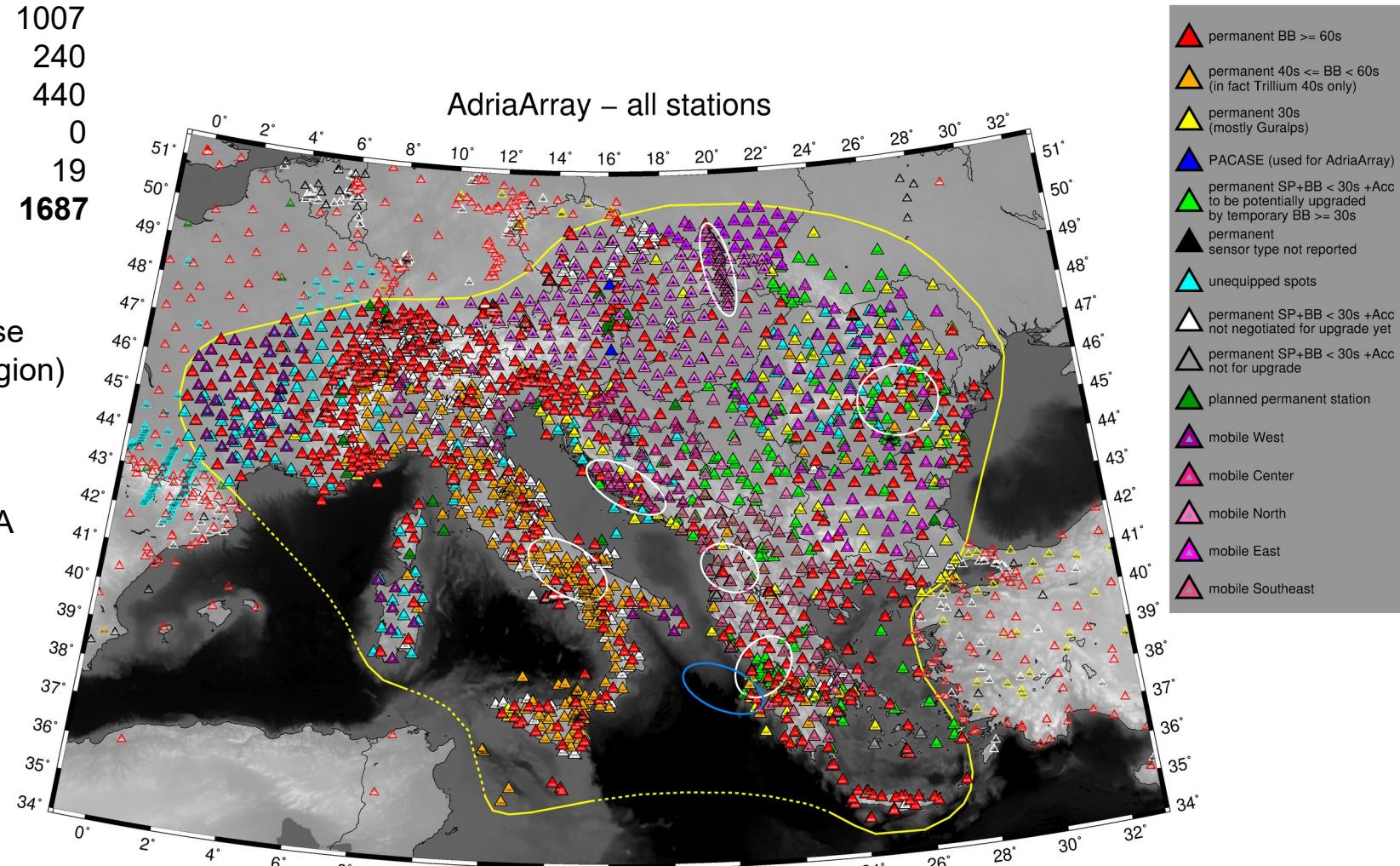
IGS-CES, Chisinau, Moldova

## PERMANENT stations inside the AdriaArray region:

BB (>= 30s) = backbone	1007
SP+SM for upgrade	240
SP+SM others	440
unknown	0
planned permanent	19
<b>total existing permanent</b>	<b>1687</b>

(there are 2400+ stations  
on the map including those  
outside the AdriaArray region)

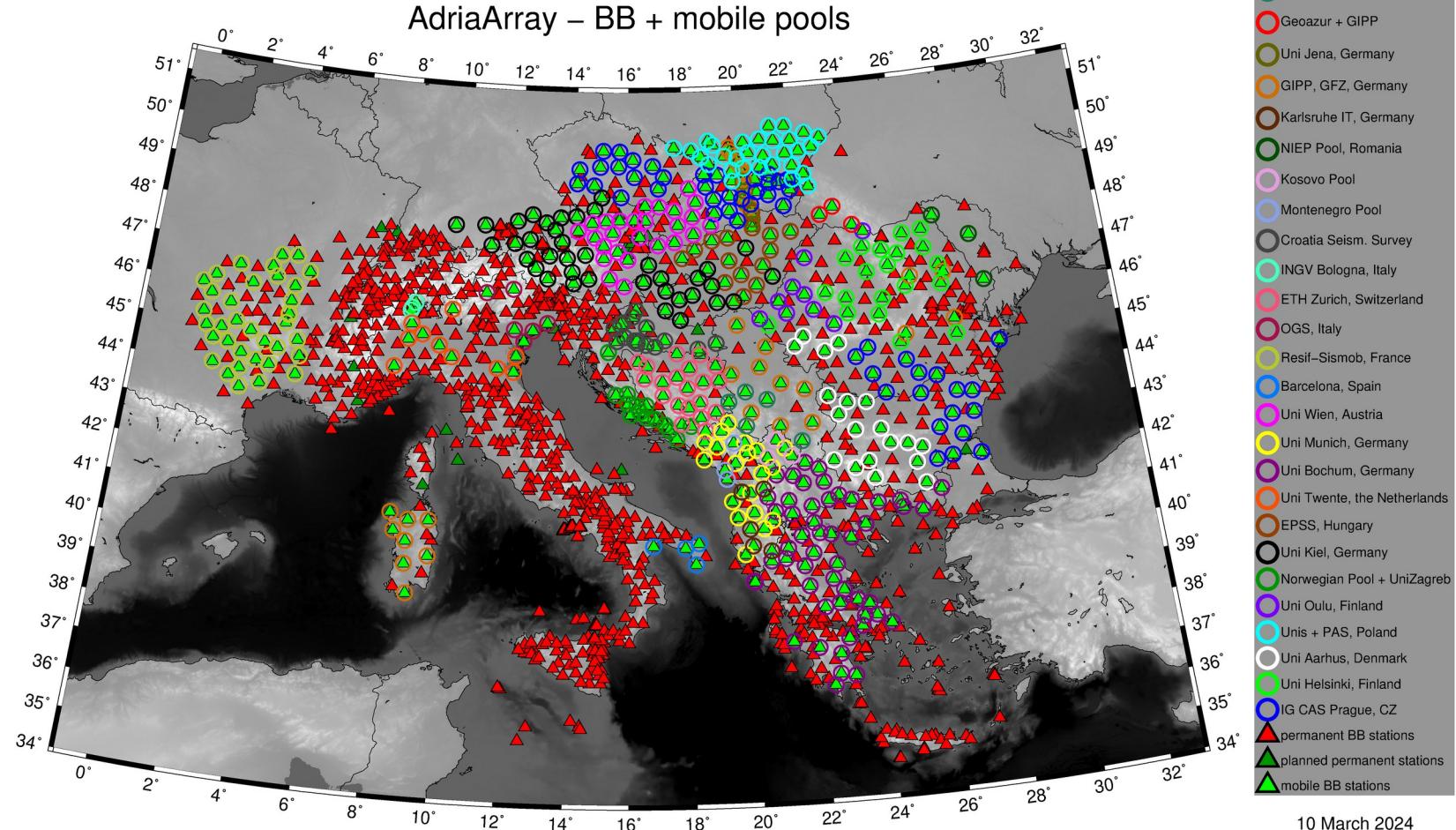
synchronization with EIDA  
provided regularly by  
Luděk Vecsey



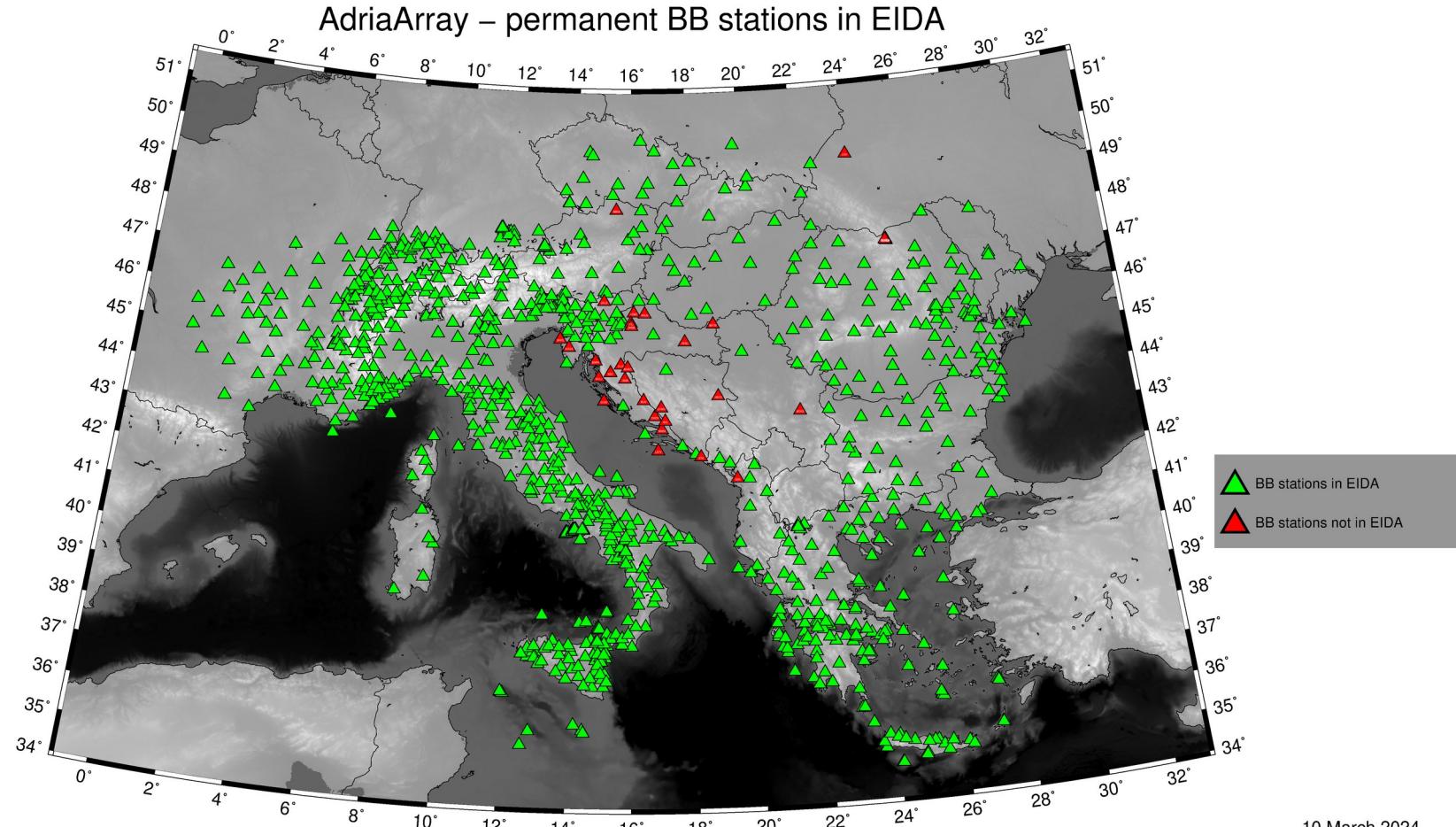
# AdriaArray backbone

446 BB mobile stations

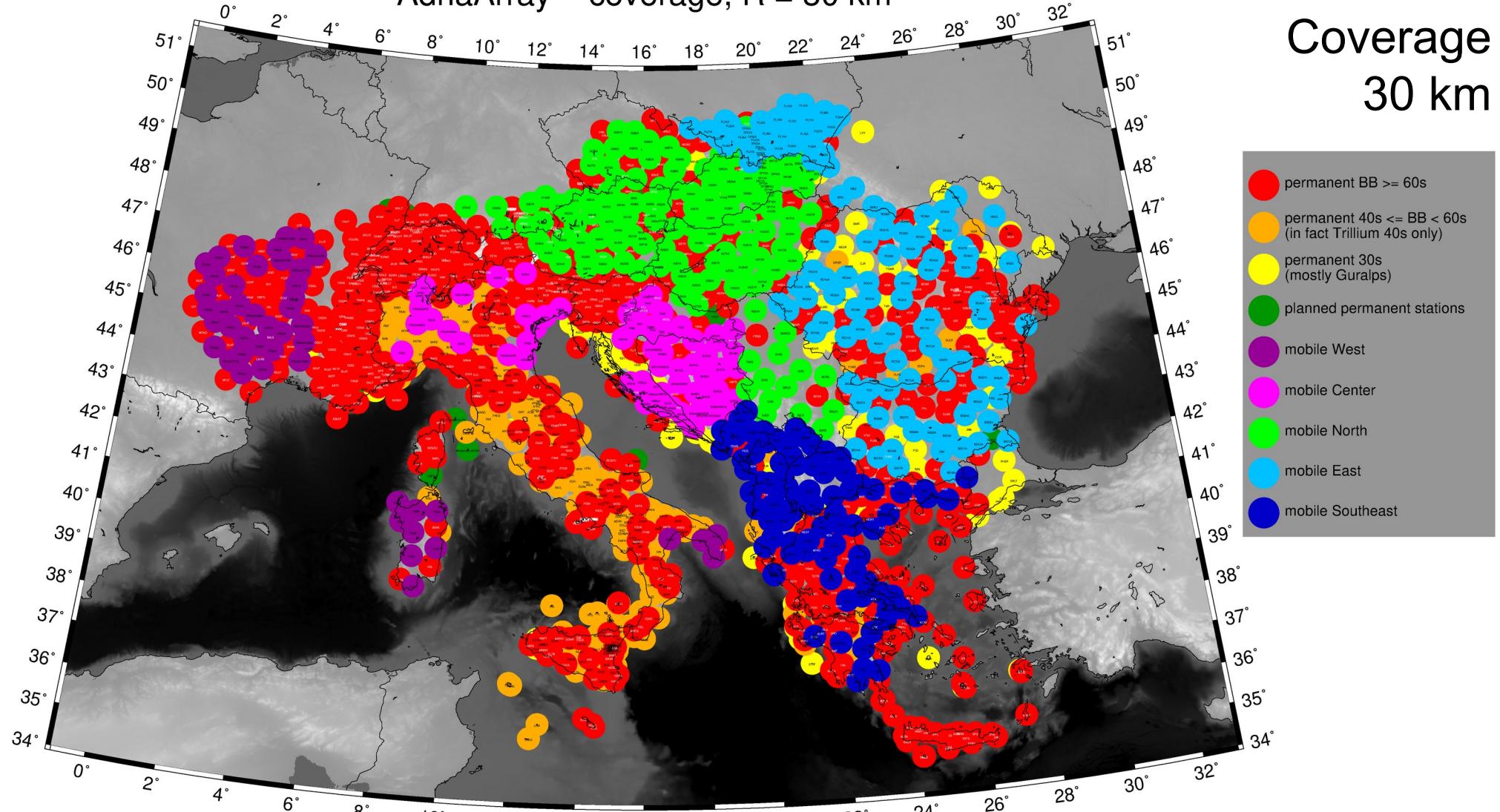
1007 BB permanent stations --> 1453 BB stations in total (local BB experiments included)



from that **1007** permanent stations, **976** are already in EIDA (96.9%) => 31 are not in EIDA  
(still talking about the **backbone**, meaning 30+ s corner period)

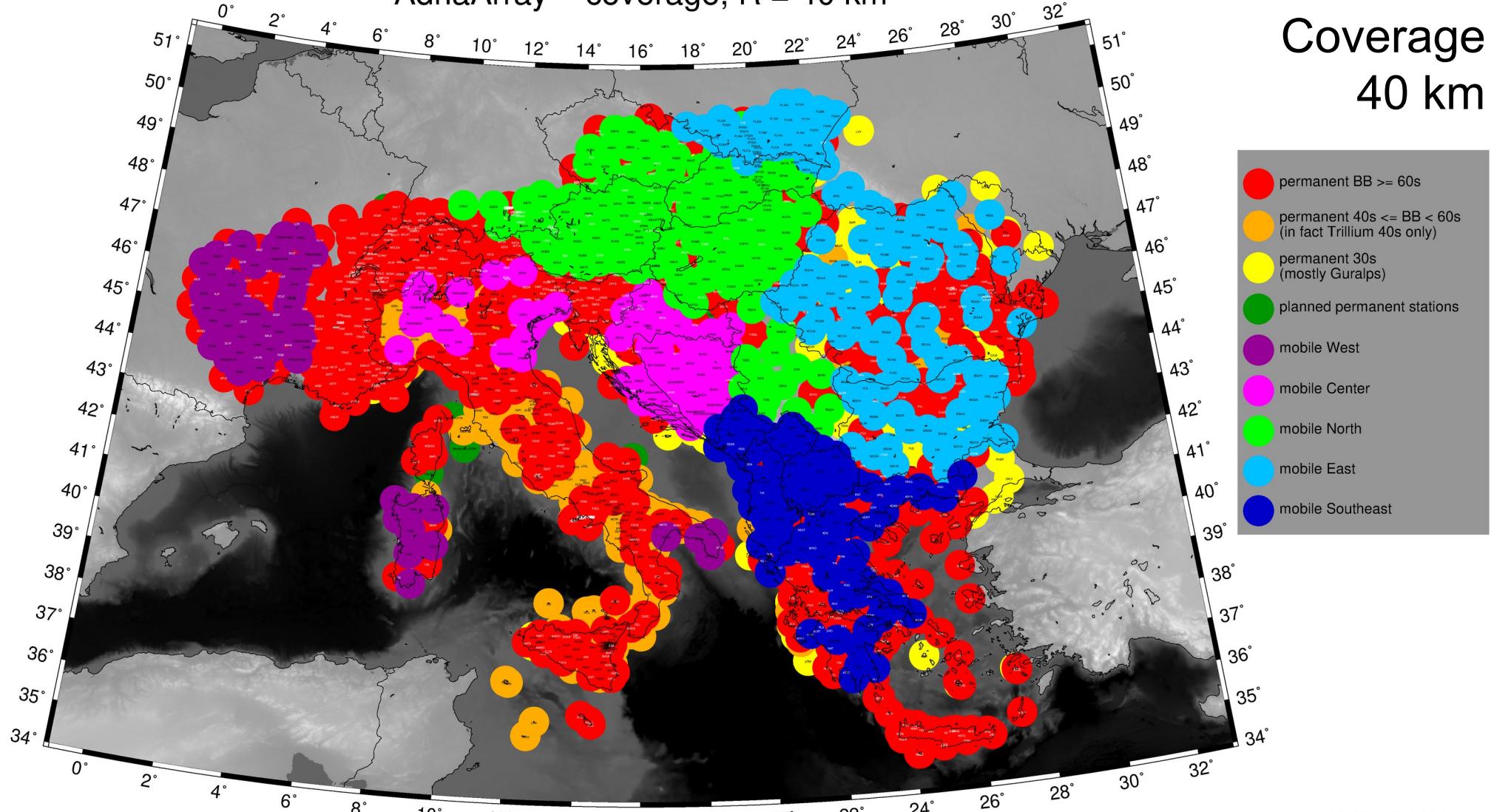


# AdriaArray – coverage, R = 30 km

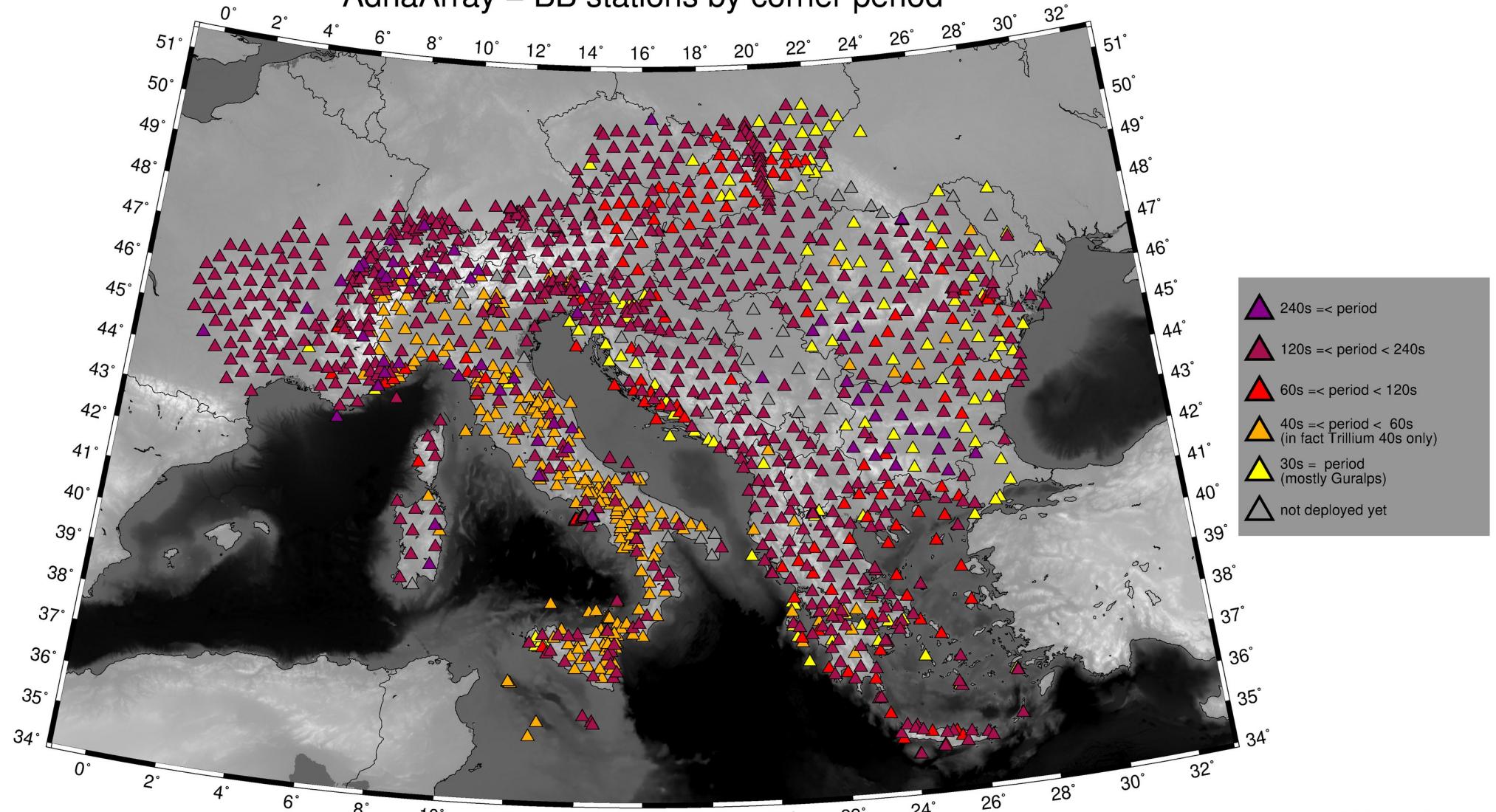


Coverage  
30 km

# AdriaArray – coverage, R = 40 km

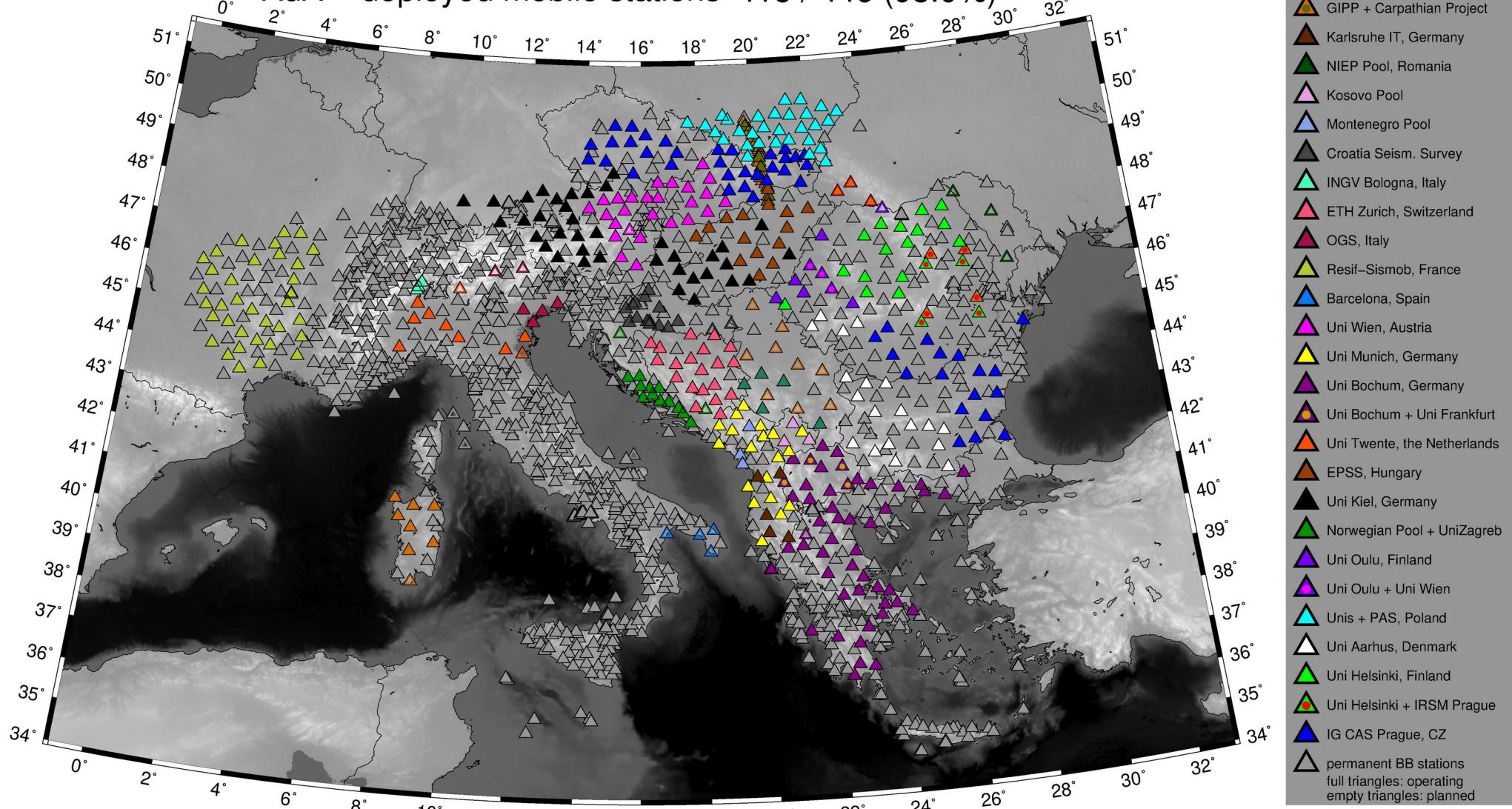


# AdriaArray – BB stations by corner period



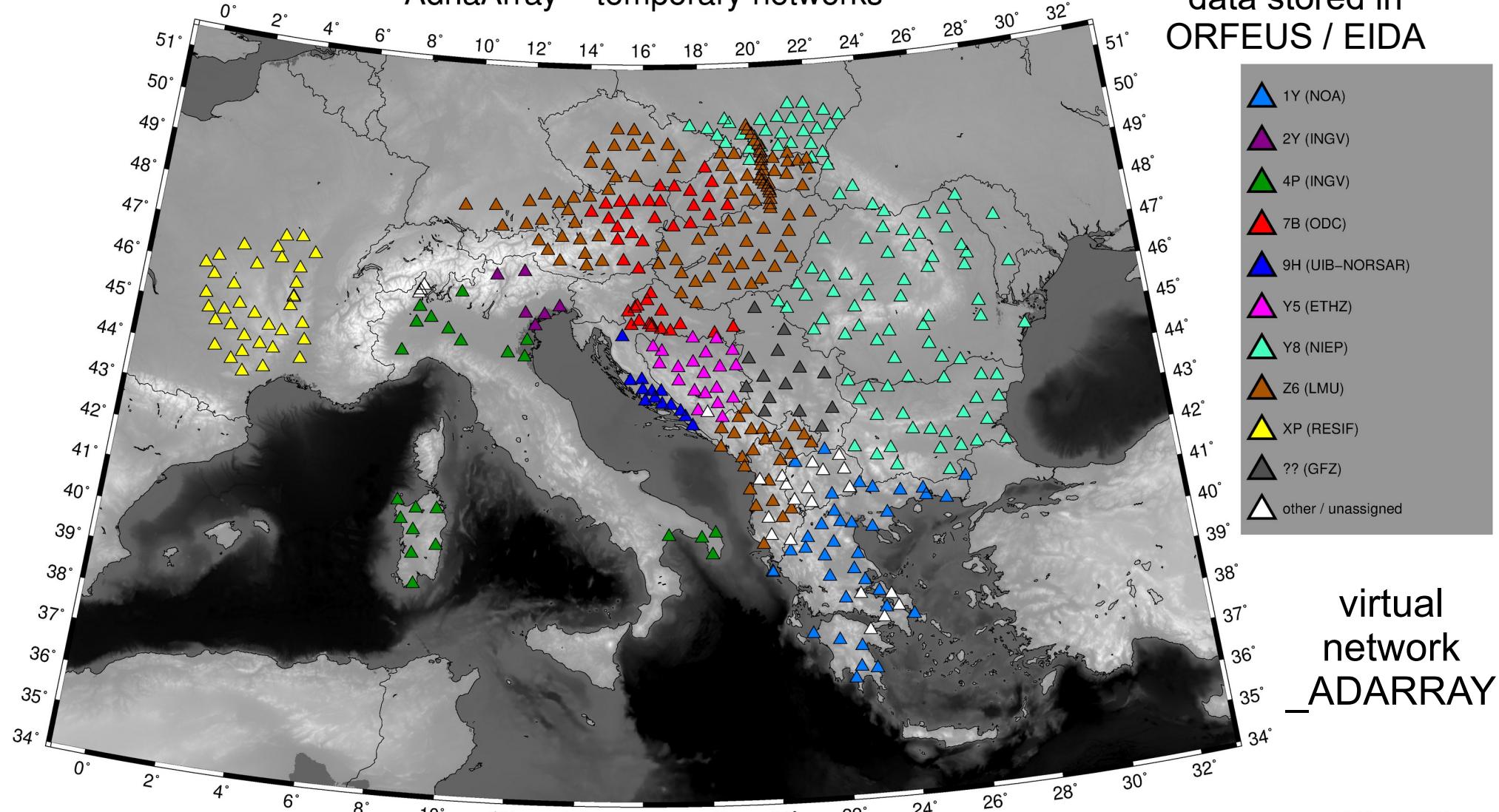
10 March 2024

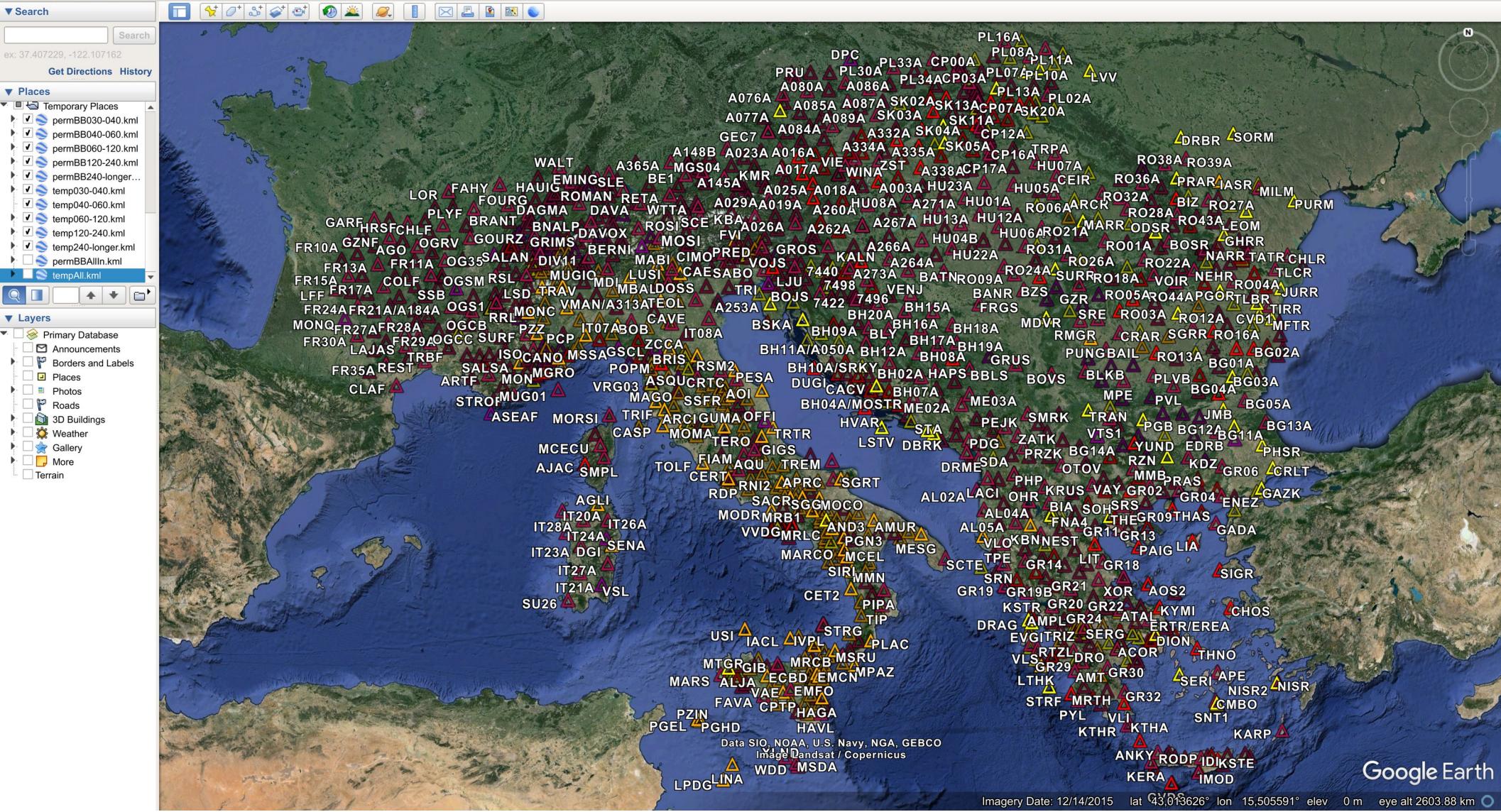
# AdA – deployed mobile stations 415 / 446 (93.0%)



10 March 2024

# AdriaArray – temporary networks





AdriaArray — ORFEUS docu X +

https://orfeus.readthedocs.io/en/latest/adria\_array\_main.html

StationBook

Developments

**STRONG MOTION:**

Introduction

**COMMUNITY SERVICES:**

ORFEUS Software Development Grants

ORFEUS Data Integration Grants

Focus Section on European Seismic Networks and Associated Services and Products

Conference Sessions

EPOS Seismology Workshop 2023

**ADRIAARRAY INITIATIVE:**

AdriaArray

- AdriaArray - Mission
- AdriaArray - Logo
- AdriaArray - Current deployment
- AdriaArray - Station map
- AdriaArray - Station properties
- AdriaArray - Relation to EPOS
- AdriaArray - Organization
- AdriaArray - Working Groups
- AdriaArray - Data analysis and research
- AdriaArray - Seismic networks
- AdriaArray Communication & Outreach

v: latest ▾

## AdriaArray - Current deployment

Current status of the AdA seismic network. Filled triangles represent stations already in the field, while empty triangles indicate stations that are not yet deployed.

The map displays the geographical distribution of AdriaArray seismic stations. A legend on the right side identifies various station types and their operators. The stations are represented by triangles of different colors and fills. Most stations are filled triangles, indicating they are already deployed. Some stations are unfilled triangles, indicating they have not yet been deployed. The map covers a region from approximately 34°E to 32°E and 34°N to 51°N, centered on the Alps.

AdA – deployed mobile stations 415 / 446 (93.0%)

09 March 2024

Legend:

- Serbian Pool
- Geozur + GIPP
- Uni Jena, Germany
- GIPP, IfZ, Germany
- GIPP + IRSM
- GIPP + Cenaphtim Project
- Karlsruhe IT, Germany
- NIEP Pool, Romania
- Kosovo Pool
- Montenegro Pool
- Croatia Seism. Survey
- INGV Bologna, Italy
- ETH Zurich, Switzerland
- OGS, Italy
- Resif-Sismob, France
- Barcelona, Spain
- Uni Wien, Austria
- Uni Munich, Germany
- Uni Bochum, Germany
- Uni Bochum + Uni Frankfurt
- Uni Twente, the Netherlands
- EPSS, Hungary
- Uni Kiel, Germany
- Norwegian Pool + Uni Zagreb
- Uni Oulu, Finland
- Uni Oulu + Uni Wien
- Uni + PAS, Poland
- Uni Aarhus, Denmark
- Uni Helsinki, Finland
- Uni Helsinki + IRSM Prague
- IG CAS Prague, CZ
- permanent BB stations
- full triangles: operating stations
- empty triangles: planned stations

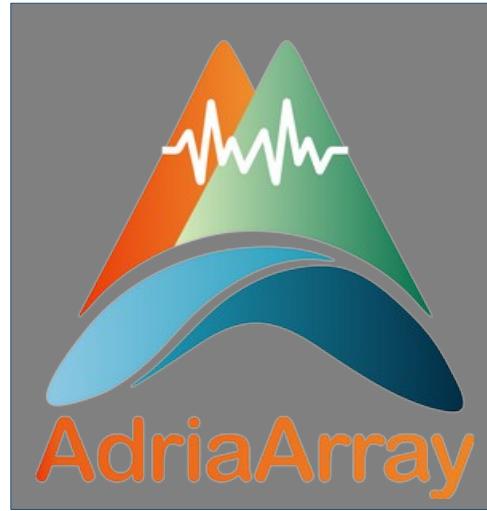
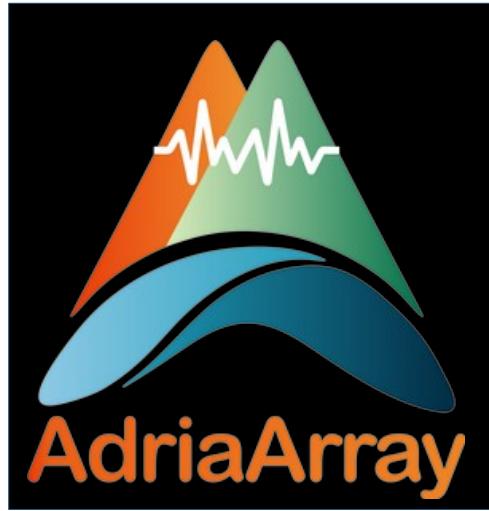
# AdriaArray webpage



## AdriaArray - Station map

Relation of AdA to PACASE and AlpArray. Red triangles: permanent broadband stations in the AdriaArray region. Green triangles are planned stations. Light green triangles indicate AlpArray PACASE and AdriaArray stations. Blue triangles: additional broadband stations.

[https://orfeus.readthedocs.io/en/latest/adria\\_array\\_main.html](https://orfeus.readthedocs.io/en/latest/adria_array_main.html)



AdriaArray logo by Claudia Piromallo and Hana Kampfová-Exnerová

permanent station inventory:  
sheet of 2533 stations and spots (rows) x 25 columns  
temporary station inventory:  
449 rows, the same 25 columns

Python script (1040 lines) to distill the required information from the sheet produces files for plotting by GMT (script 2100 lines)

inventories, scripts  
manuals, GMT files  
.kml files, maps  
... all is on GitHub



<https://github.com/PetrColinSky/AdriaArray>



AdriaArray/AdA at master · +

<https://github.com/PetrColinSky/AdriaArray/tree/master/AdA>

120%



## PetrColinSky / AdriaArray

Public

Notifications



Fork

1

Star

4



Code

Issues

Pull requests

Actions

Projects

Security

Insights

## Files

master



Go to file

AdA

AUXI

GOOG

MAPS

PERM

TEMP

.gmtcommands4

.gmtdefaults4

InventoryPermanent.ods

InventoryTemporary.ods

TechDocNames.pdf

extract.py

maps-legend.pdf

maps-manual.pdf

plotAdA.sh

### AdriaArray / AdA /



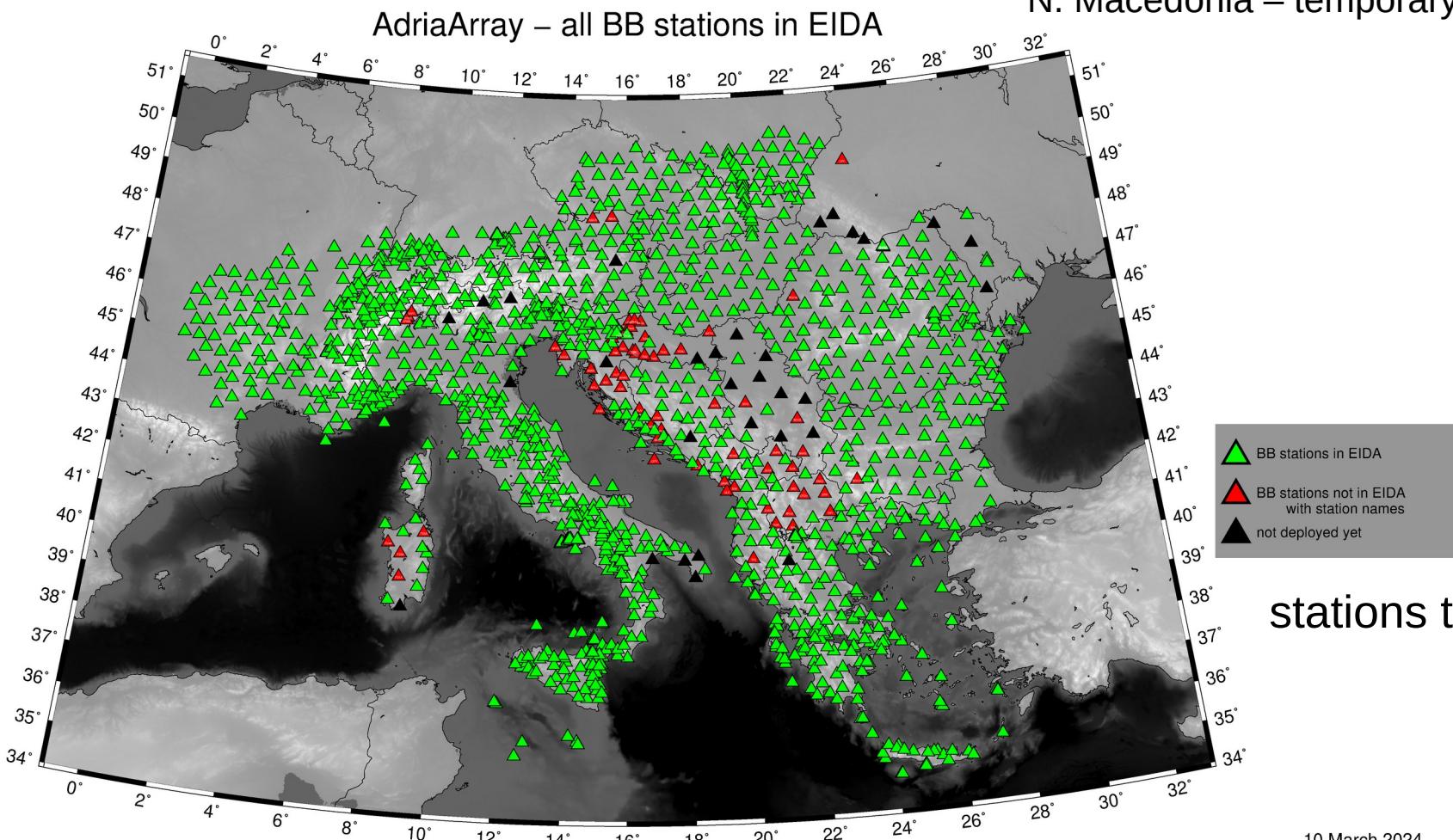
PetrColinSky AdriaArray maps

83642dd · 19 hours ago

History

Name	Last commit message	Last commit date
..		
AUXI	AdriaArray maps	last week
GOOG	AdriaArray maps	19 hours ago
MAPS	AdriaArray maps	19 hours ago
PERM	AdriaArray maps	19 hours ago
TEMP	AdriaArray maps	19 hours ago
.gmtcommands4	AdriaArray maps	3 weeks ago
.gmtdefaults4	AdriaArray maps	3 weeks ago
InventoryPermanent.ods	AdriaArray maps	19 hours ago
InventoryTemporary.ods	AdriaArray maps	19 hours ago
TechDocNames.pdf	AdriaArray maps	3 weeks ago
extract.py	AdriaArray maps	2 weeks ago

stations missing in EIDA:



systematic:  
Croatia – permanent + temporary  
N. Macedonia – temporary at permanent sites

individual:  
Montenegro  
Kosovo  
Albania  
Sardinia

stations to be deployed:  
- Apulia  
- Serbia  
- Moldova  
- Ukraine



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C | A | U

Kiel University  
Christian-Albrechts-Universität zu Kiel

Orfeus



### acknowledgements

Maps plotted using GMT by Wessel, P., Smith, W. H. F., Scharroo, R., Luis, J. F. and Wobbe, F., 2013: Generic Mapping Tools: Improved version released, EOS Trans. AGU, 94, 409-410.

AdA temporary stations by the AdriaArray Seismology Group [https://orfeus.readthedocs.io/en/latest/adria\\_array\\_main.html](https://orfeus.readthedocs.io/en/latest/adria_array_main.html).

Permanent stations by national seismological services and ORFEUS-EIDA.

Big thanks to all the network operators for supplying the station information.

AdriaArray initiative is supported by Orfeus / EPOS.

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**AdriaArray**