



AdriaArray workshop Dubrovnik, April 3 - 5

AdriaArray Seismology Group

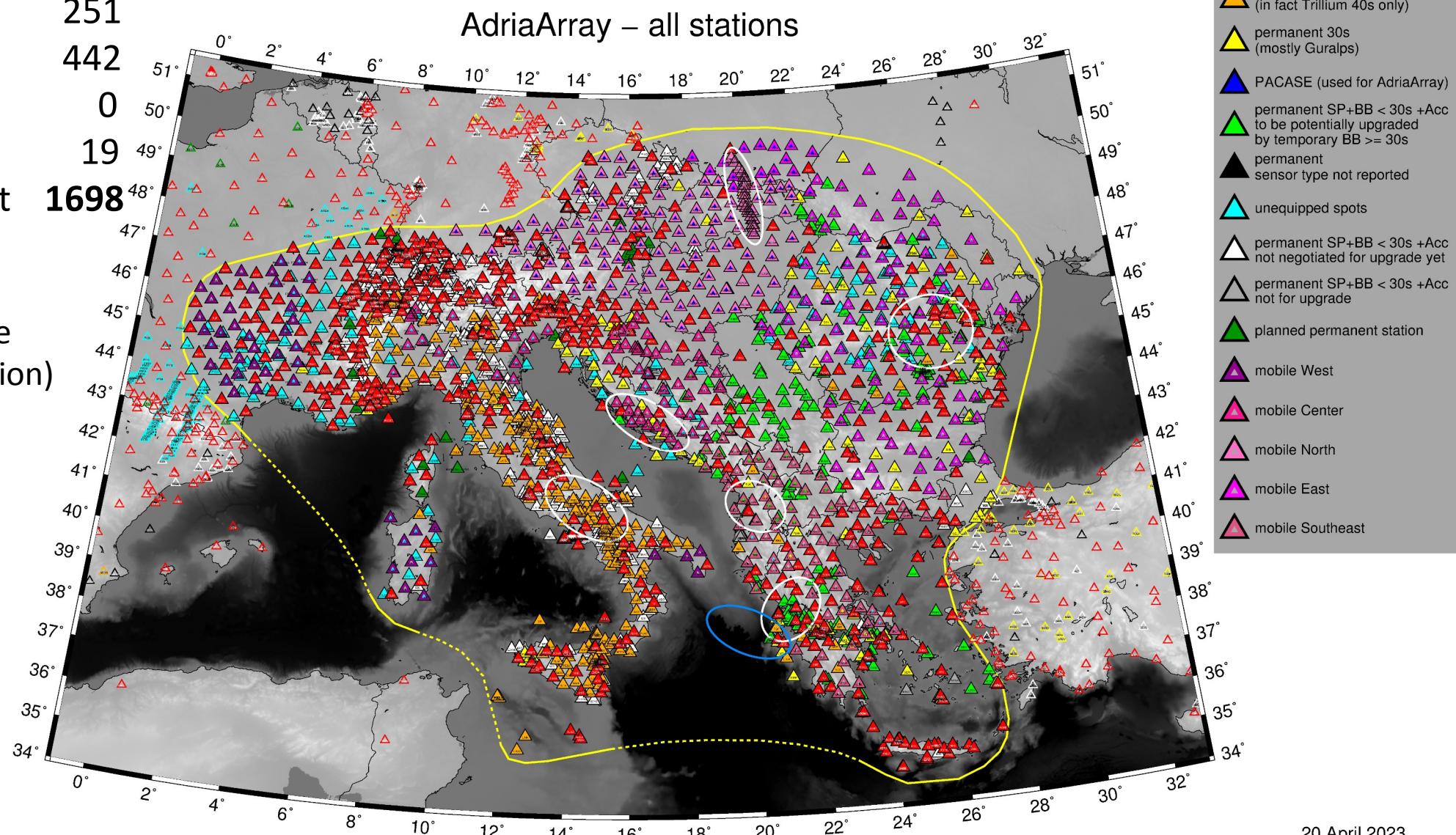
EGU splinter meeting (Vienna, April 27, 2023)

1. Status of AdriaArray (operation, data availability, data quality)
2. AdriaArray web page, logo
3. AdriaArray structure, WGs, CRGs
4. Publications
5. AdriaArray workshop 2024

inside AdriaArray region:

| | |
|--------------------------|------|
| BB (>= 30s) = backbone | 994 |
| SP+SM for upgrade | 251 |
| SP+SM others | 442 |
| unknown | 0 |
| planned permanent | 19 |
| total existing permanent | 1698 |

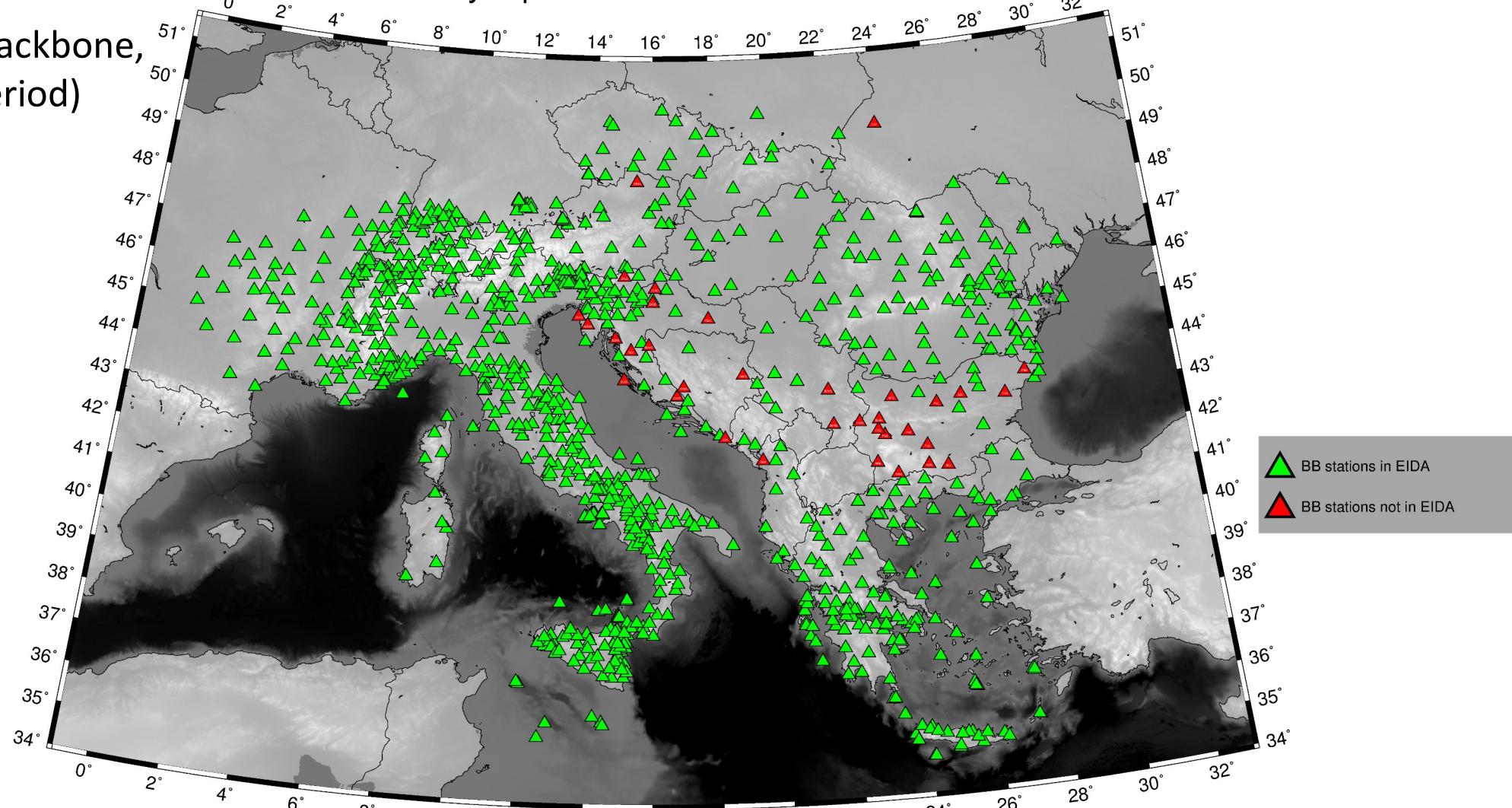
(there are 2400+ stations
on the map including those
outside the AdriaArray region)



- from that **994** permanent stations, **960** are already in EIDA (96.6%) => 34 are not in EIDA
- before AdA, more than 100+ stations were not in EIDA, meaning 70+ stations connected already

AdriaArray – permanent BB stations in EIDA

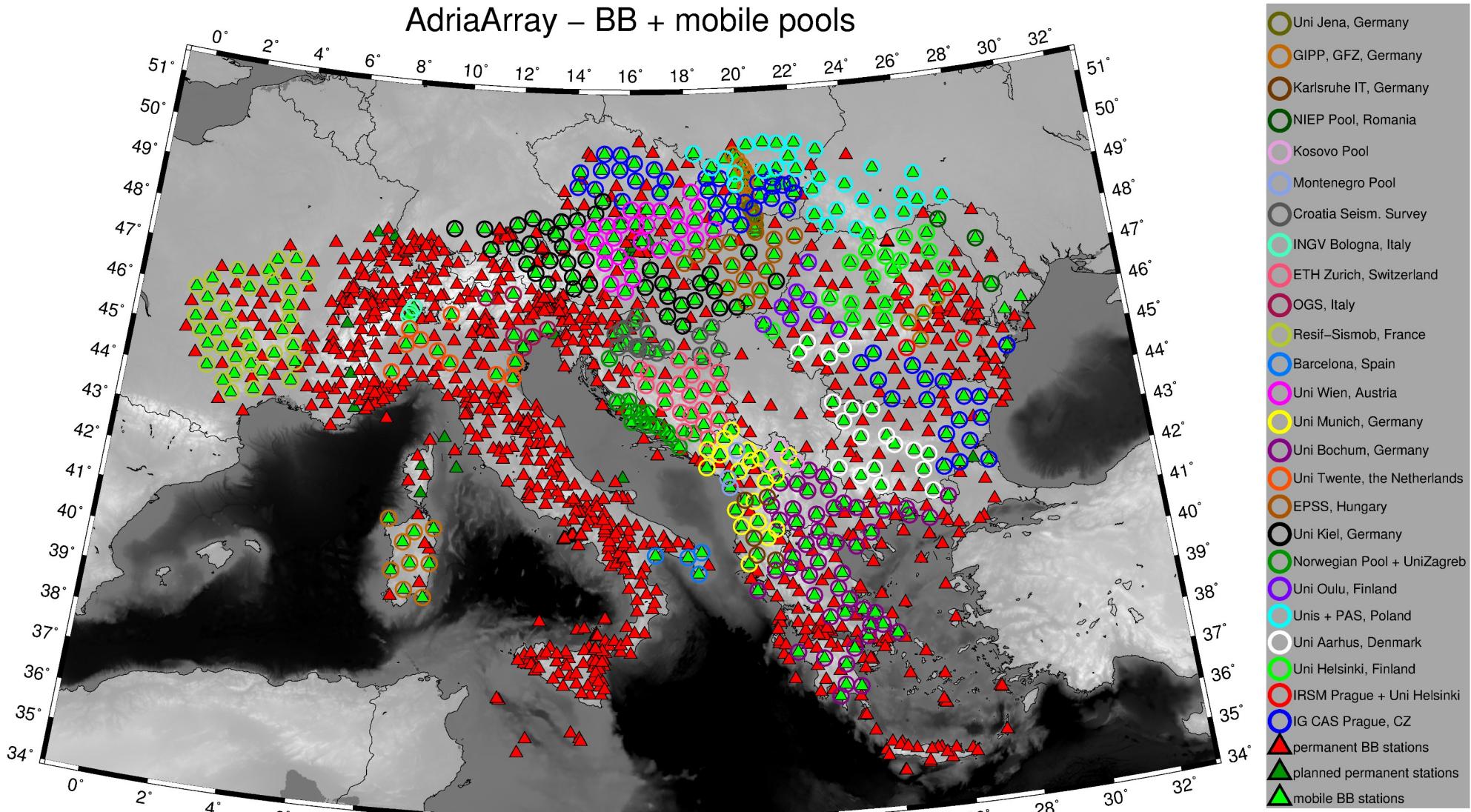
(still talking about the backbone,
meaning 30s+ corner period)



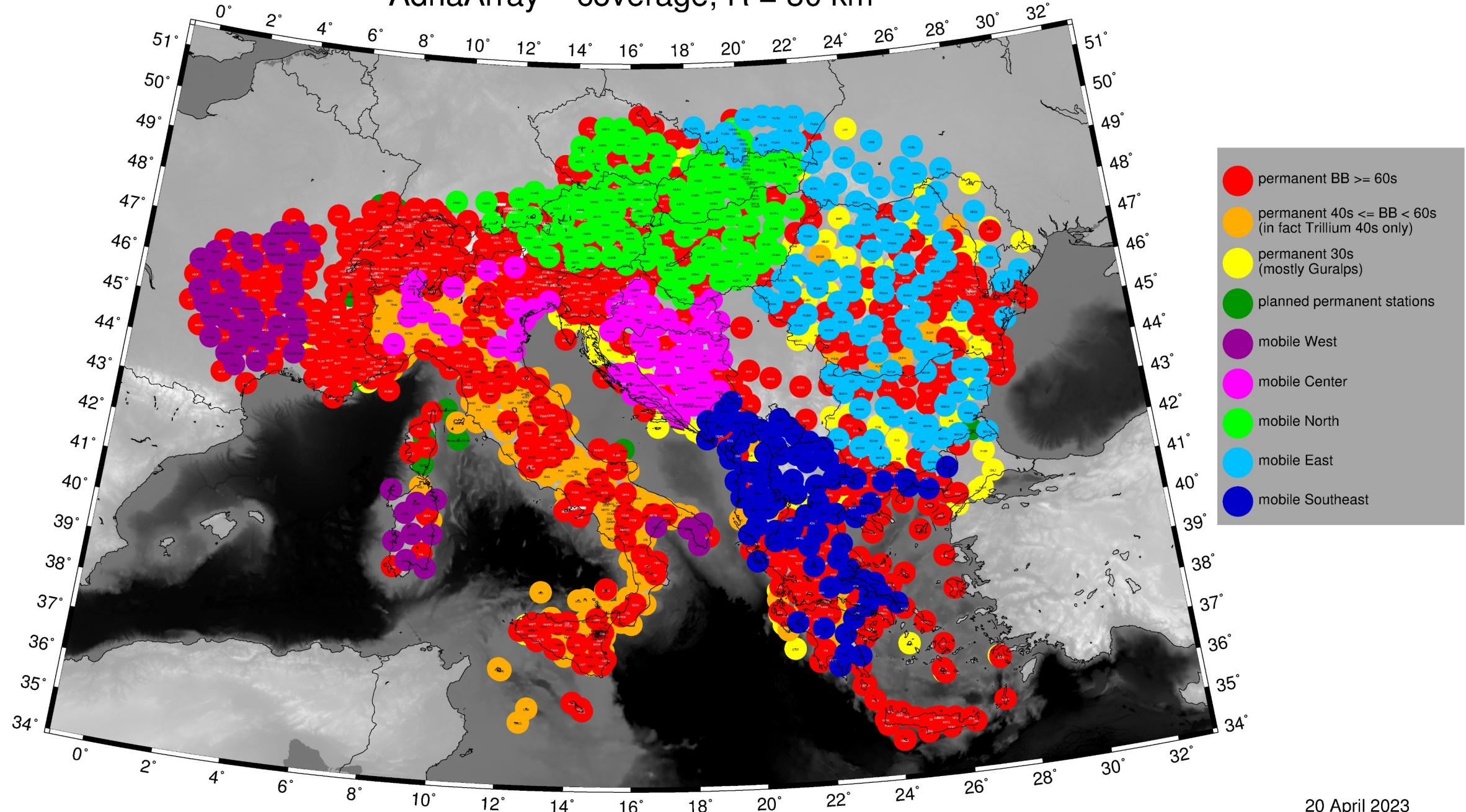
mobile pools assigned to the stations

435 BB mobile stations

994 BB permanent stations --> **1429 BB stations in total** + additional local experiments (three already included)

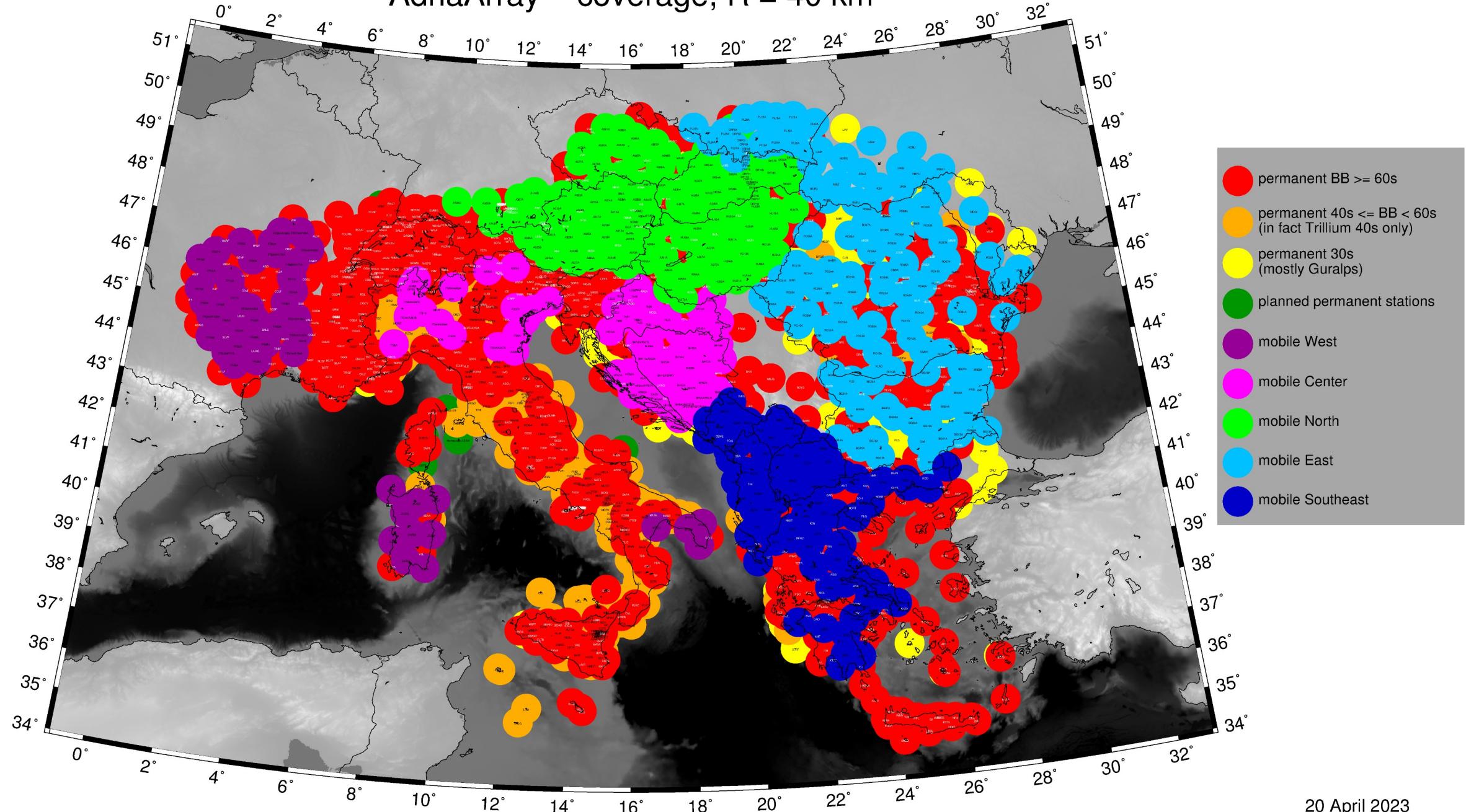


AdriaArray – coverage, R = 30 km



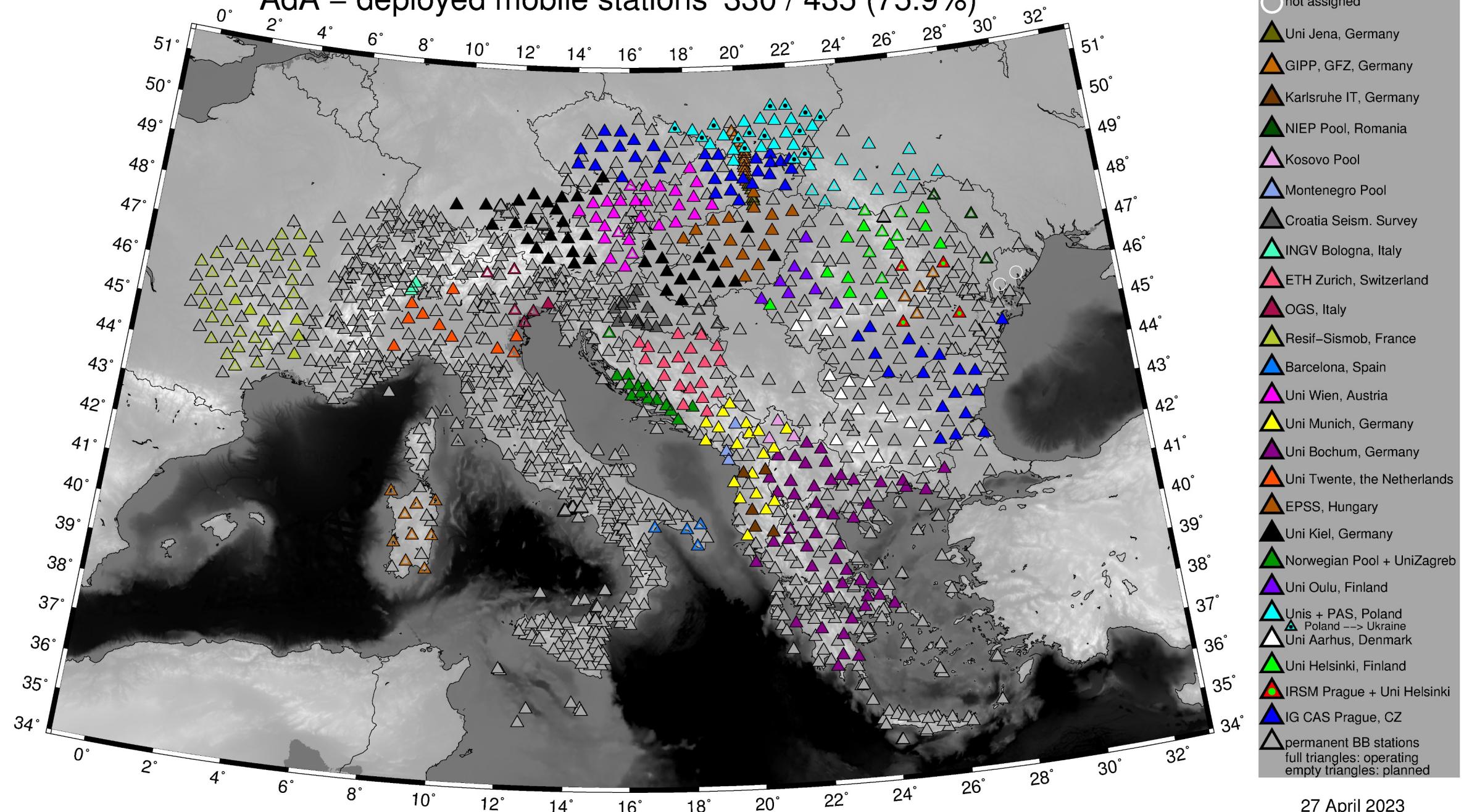
20 April 2023

AdriaArray – coverage, R = 40 km



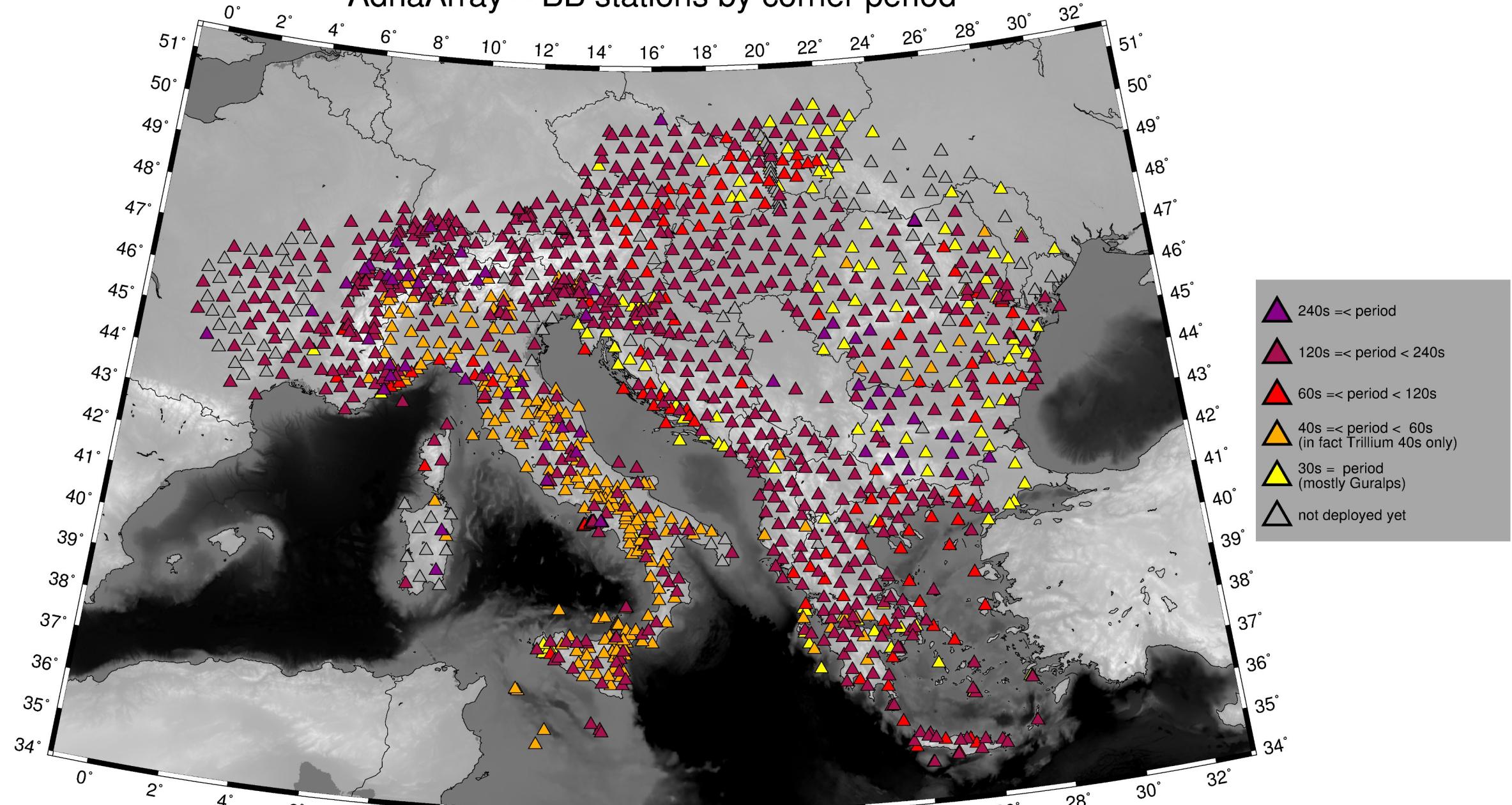
20 April 2023

AdA – deployed mobile stations 330 / 435 (75.9%)

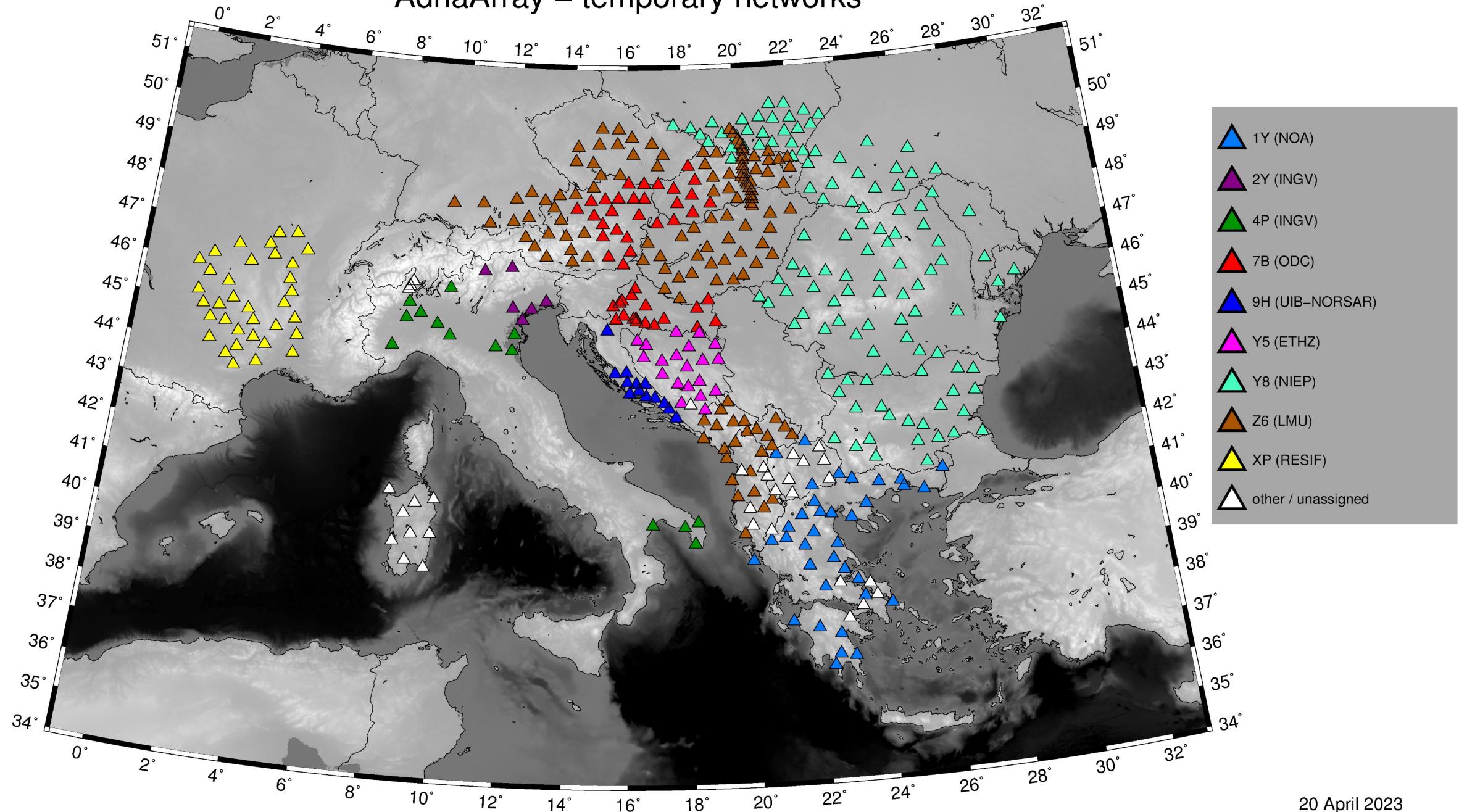


27 April 2023

AdriaArray – BB stations by corner period



AdriaArray – temporary networks



20 April 2023

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

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



TOKEN to get the data

EIDA Authentication System = EAS <https://b2access.eudat.eu/saml-idp/saml2idp-web-entry>

request token

<https://geofon.gfz-potsdam.de/eas/>

create an account at B2ACCESS, if not existing: "No account? Sign up" <https://b2access.eudat.eu/saml-idp/saml2idp-web-entry>

select group: [request to be part of EPOS !!!](#)

send an email to Cédric Legendre and request to be added to the AdriaArray group. Let him know which email you registered.

Upon confirmation, you should be able to request a token that gives access to the AdriaArray data.

GO TO EUDAT WEBSITE

B2ACCESS EUDAT

WHAT IS B2ACCESS USER GUIDE FAQS CONTACT

No account? Sign up.

User name
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Institute of Engineering Seismology and Earthquake Engin.
UNIVERSIDAD TECNOLÓGICA DE PEREIRA
University of Jinan
29 Mayis University
A*STAR - Agency for Science, Technology and Research
A. T. Still University
AAF Virtual Home
aai.lab.maeen.sa
AAI@EduHr Single Sign-On Service
Aalborg University

Cancel authentication

Epos

 European Integrated Data Archives

User documentation with all the details can be found in the following [link](#).

EIDA users requesting Alarray data must complete all the requirements mentioned below for the registration process and later get in contact with the Network PI to be authorized to access the data.

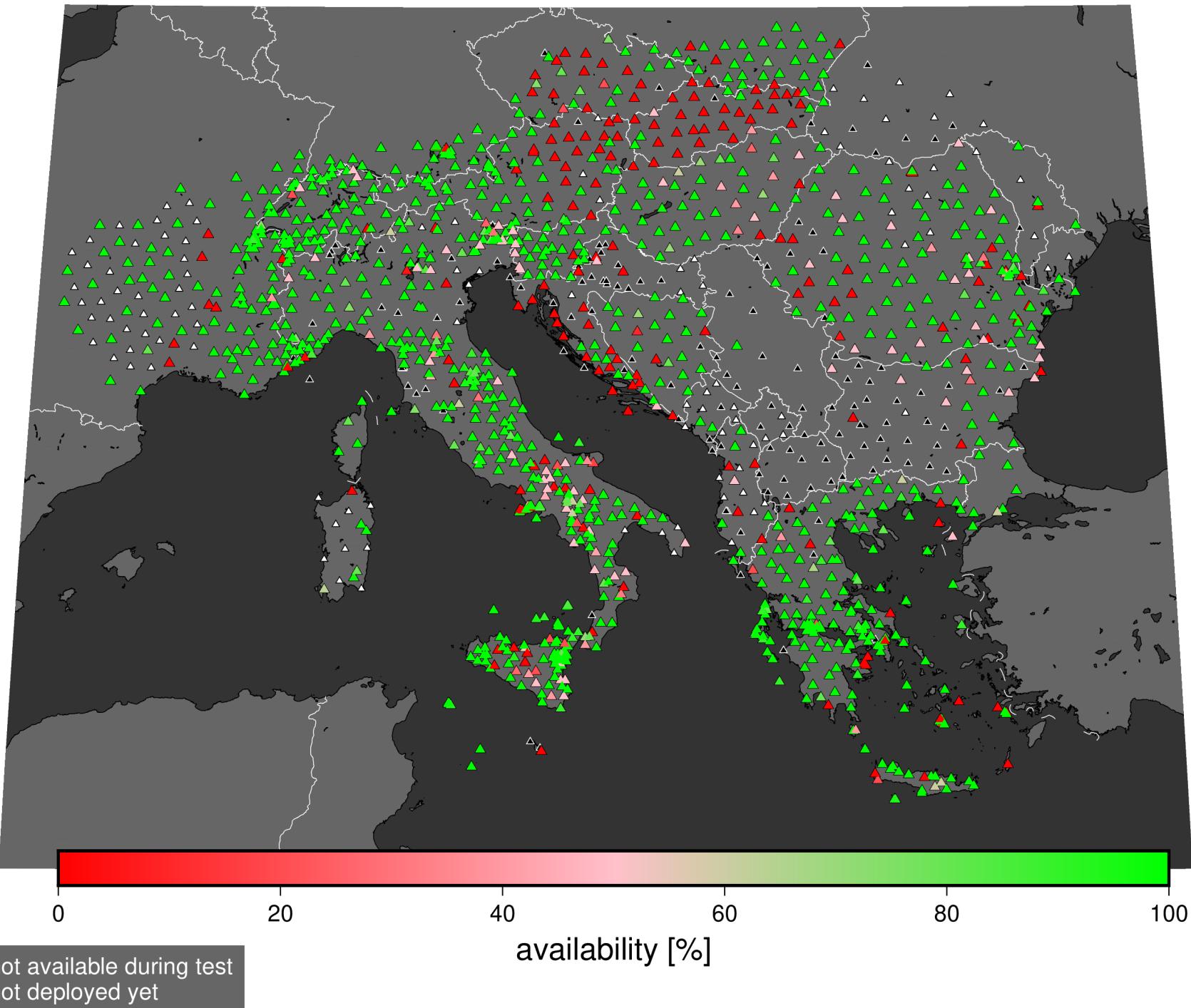
From this page you can request a digitally signed token to be used with all existing EIDA web services (not Arclink) in order to not only retrieve open or restricted data, but also personalize your interaction with the EIDA services.

Please, select a duration for your token. After this amount of time, the token will not be accepted anymore. After clicking on the "Request token" button you will be redirected to B2ACCESS (optionally your home institution) to complete the authentication.

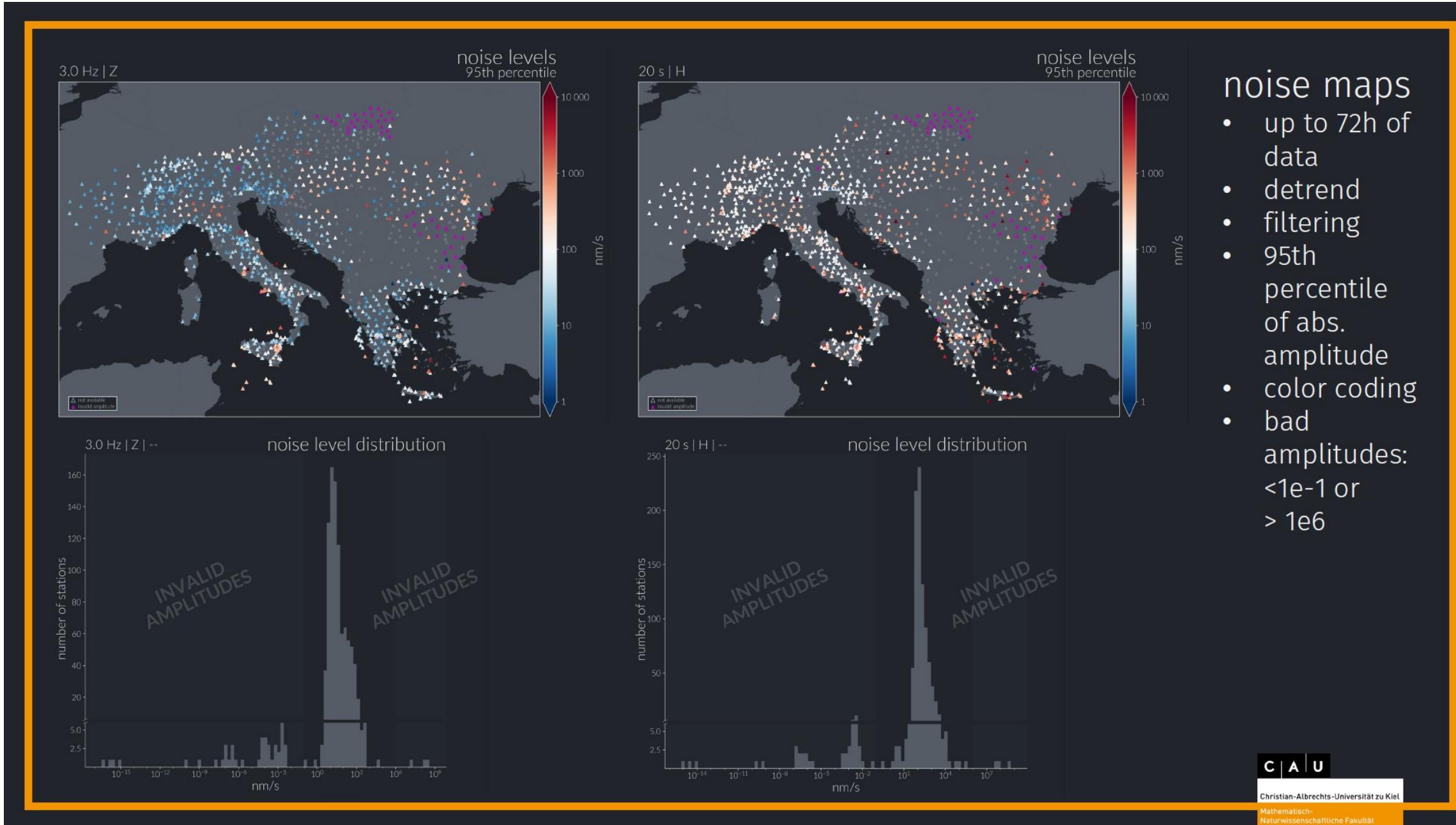
1 day
2 days
1 week
2 weeks
1 month

[Request token](#)

availability tests
by Johannes Stampa

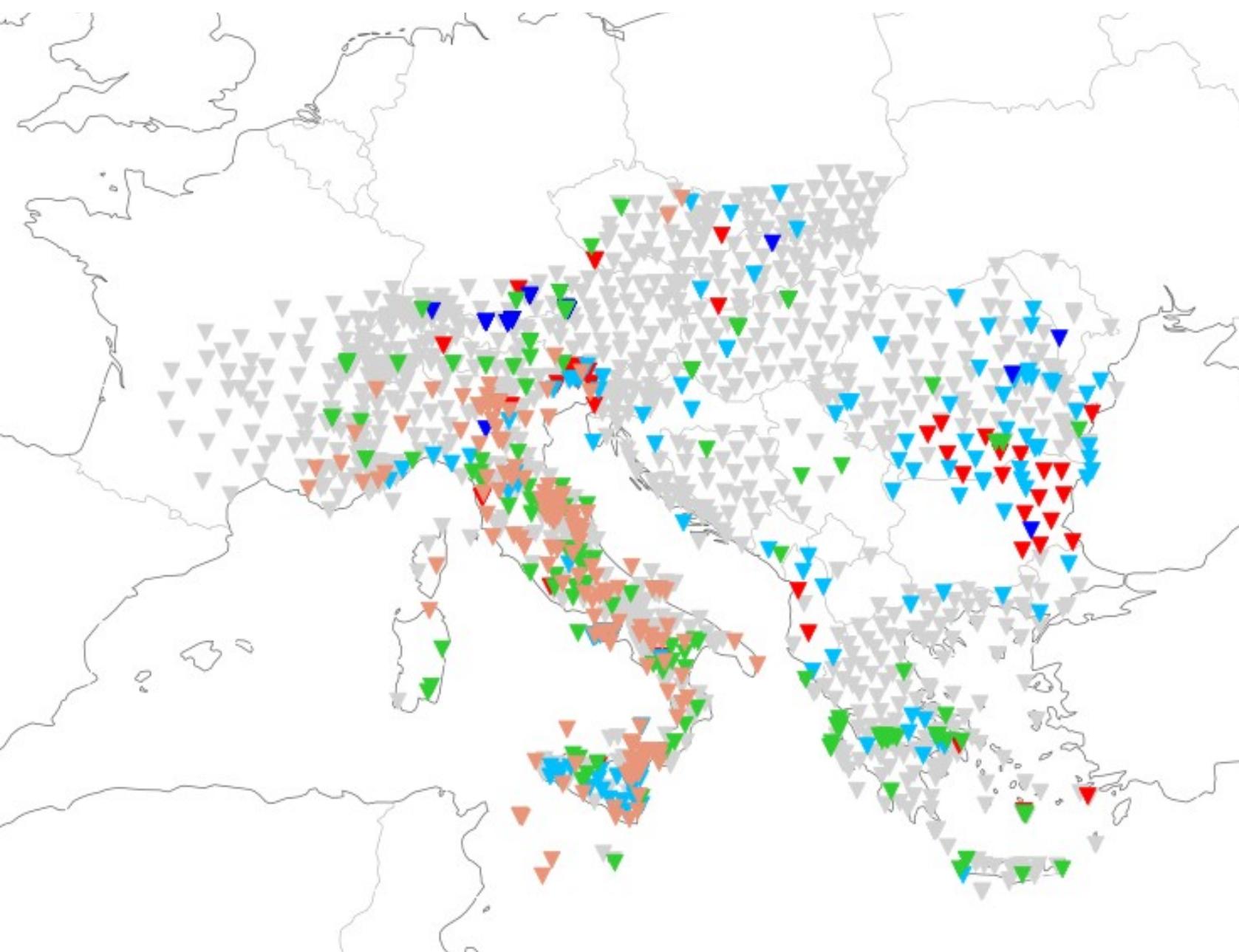


noise maps by Felix Eckel



metadata State-of-Health by Luděk Vecsey

Testing: StationXML scheme, response, corner periods, band codes, P&Z consistency



▼ metadata warnings
(15.3 %)

▼ errors in metadata
(3.6 %)

▼ wrong band code
(8.4 %)

▼ different corner
periods in metadata
and the list
(8.8 %)

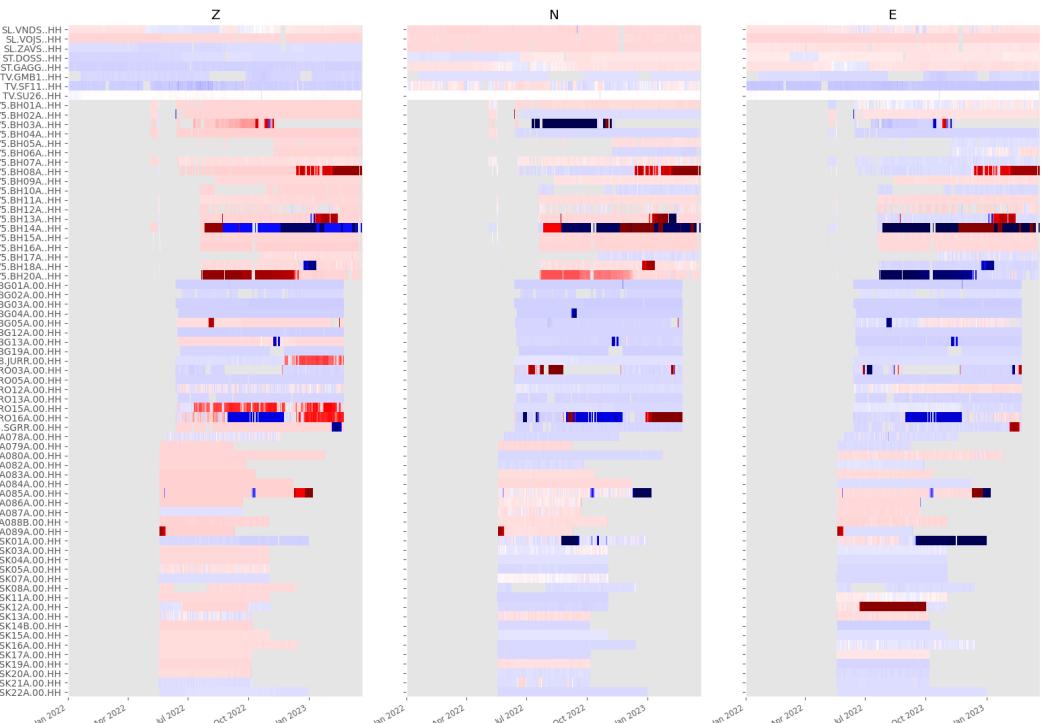
▼ switched broad-band
and short-period
(1.0 %)

total: 37 %

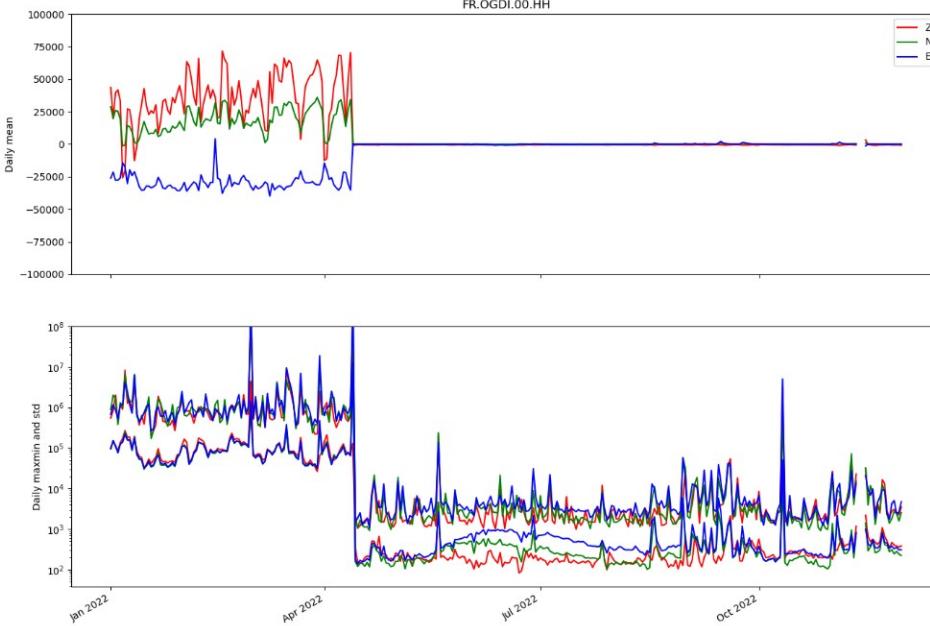
daily means (medians) by Luděk Vecsey

- fast and powerful tool for QC
- metrics from EIDA WFCatalog:
daily median, daily std, daily max, min
- detection of saturated offsets, signal clipings

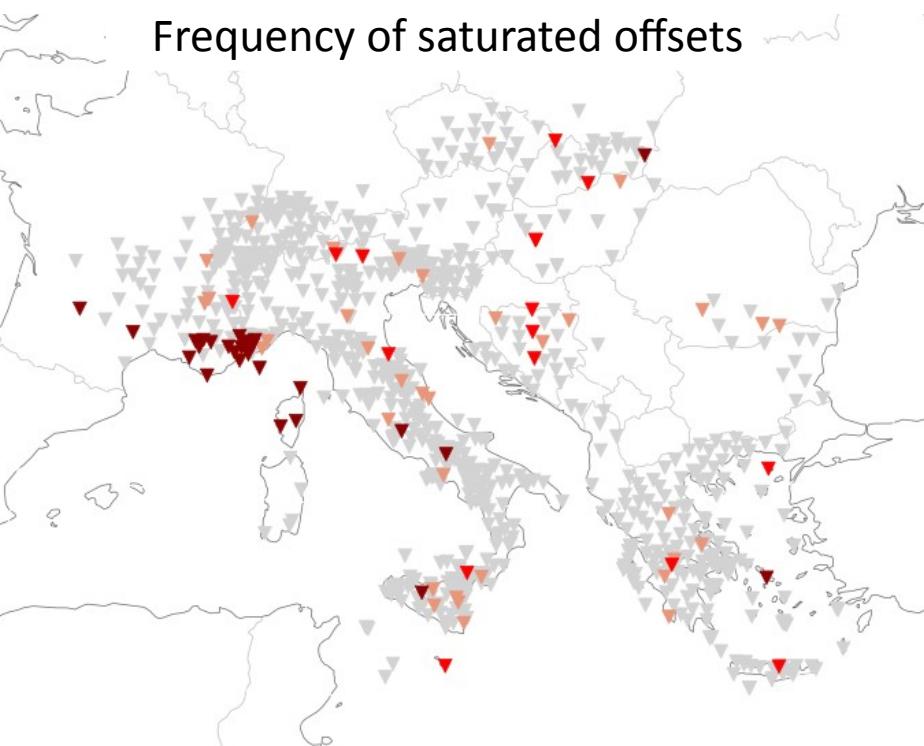
Detection of saturated offsets



Station State-of-Health

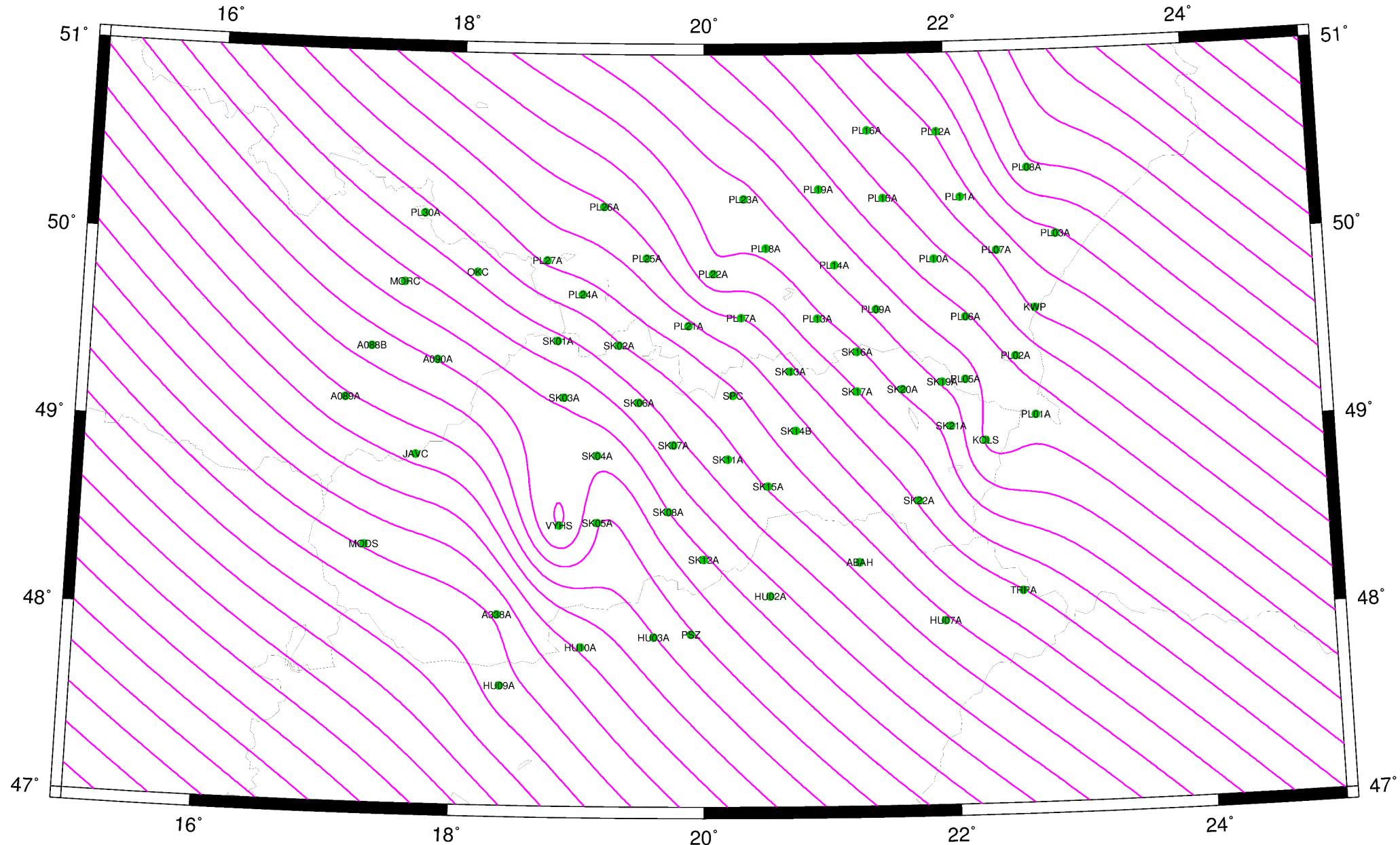


Frequency of saturated offsets



wavefront checks by Petr Kolínský

56 s Rayleigh wave propagation times



call for volunteers:

- retrievability tests
- data quality tests
- data vizualization (sections, movies)
- preparation of data products in case of large earthquakes



**EIDA:**[Introduction](#)[User information](#)[Authentication System](#)[Routing Service](#)[StationBook](#)**STRONG MOTION:**[Strong Motion](#)**EIDA DOCUMENTATION:**[Developments](#)**COMMUNITY SERVICES:**[ORFEUS Software Development Grants](#)[Focus Section on European Seismic Networks and Associated Services and Products](#)**ADRIAARRAY INITIATIVE:**

AdriaArray

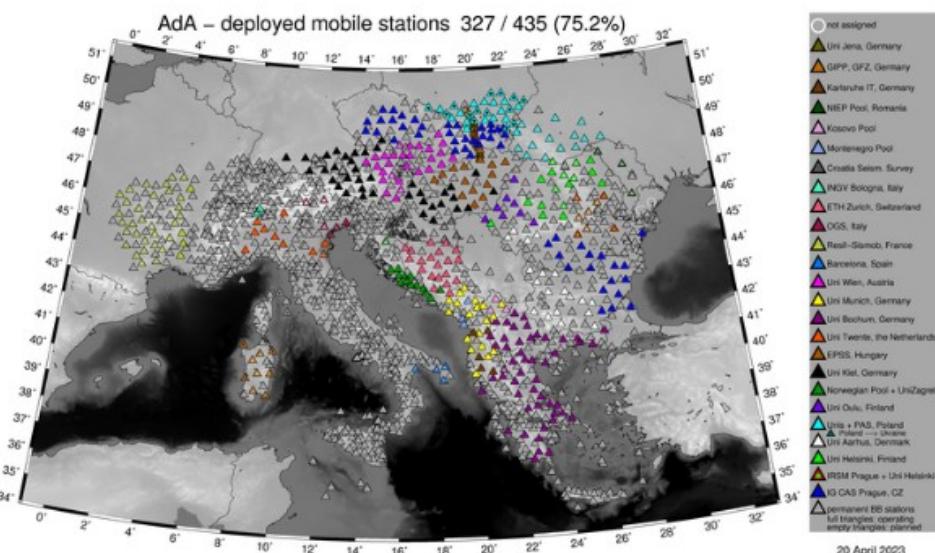
[AdriaArray - Logo](#)[AdriaArray - Mission](#)[AdriaArray - Current deployment](#)[AdriaArray - Station map](#)[AdriaArray - Station properties](#)[AdriaArray - Relation to EPOS](#)

AdriaArray - Organization

a physical understanding and modelling of plate deformation and associated geohazards.

AdriaArray - Current deployment

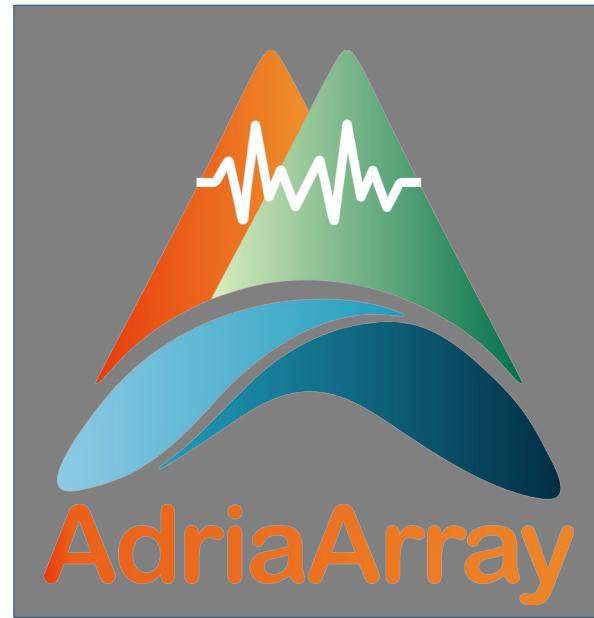
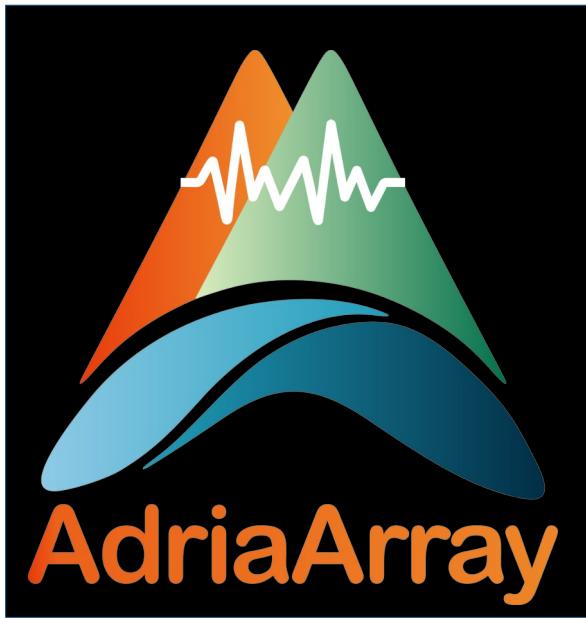
Current status of the AdA seismic network. Filled triangles represent stations already in the field, while empty triangles indicate stations that are not yet deployed.



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.



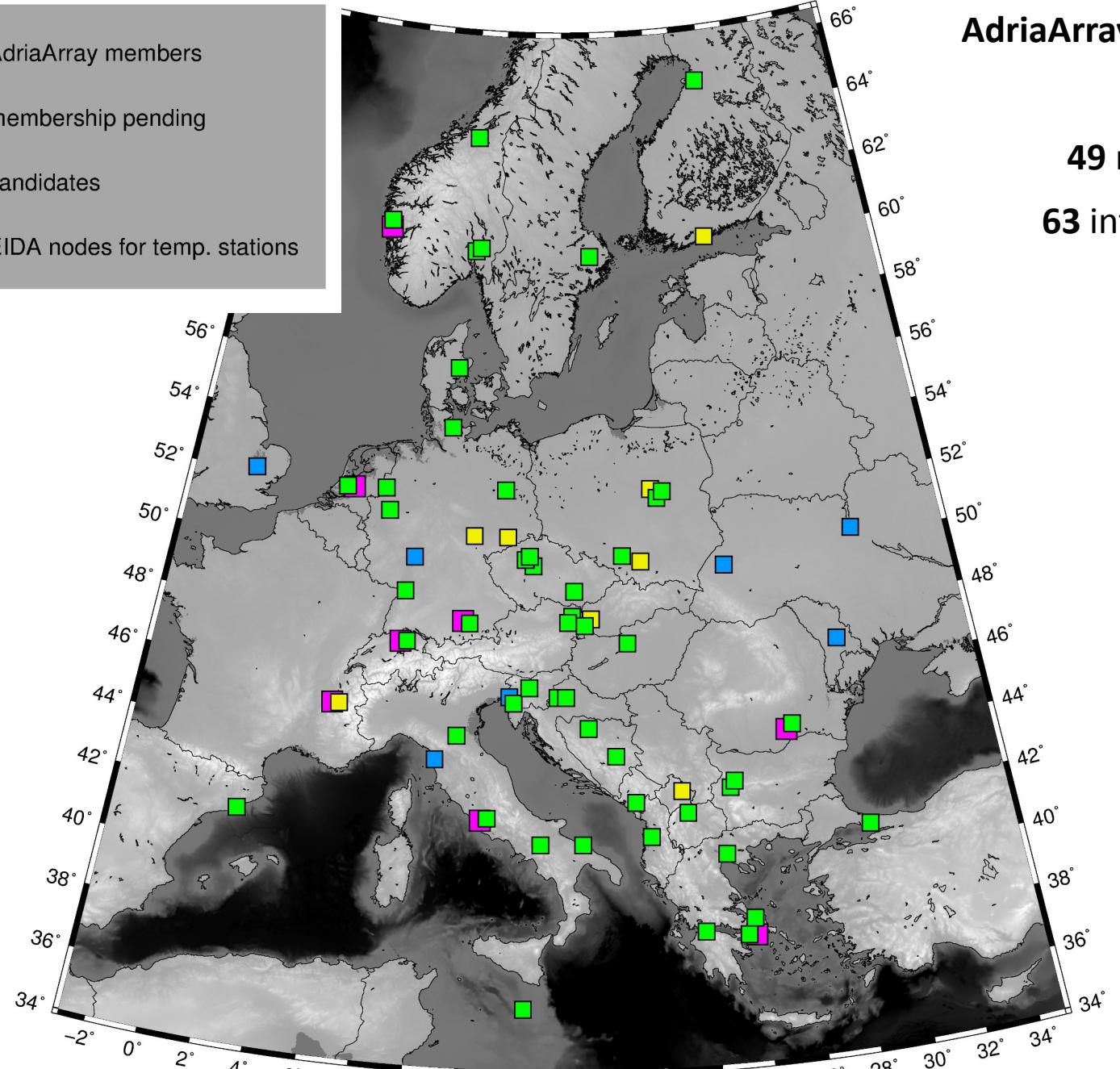
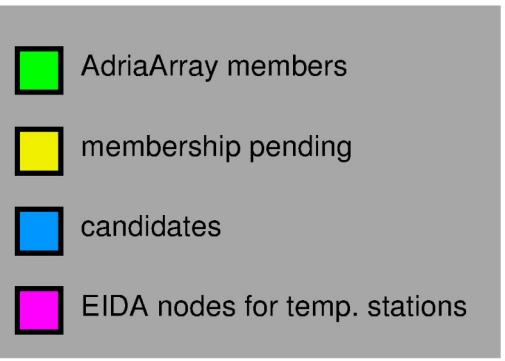


AdriaArray logo (Claudia Piromallo and Hana Kampfová-Exnerová)

AdriaArray Seismology Group: structure

- **Members:** participating groups or institutions
 - Permanent stations
 - Temporary stations
 - Providing data, QC, methods, software, outreach, organization
- **Steering Committee:**
 - one representative per member
- **Groups or institutions may apply for membership**
 - Next round: operation of temporary AdA stations (May/June 2023)
- **Participants:** persons affiliated with member institutions or groups
- **Data access via EIDA:**
 - permanent stations: available immediately
 - temporary stations: available immediately for AdriaArray participants, in general a rolling embargo of two years is applied to public access (depending on the decision by the deploying and hosting institutions also immediate access to the public is possible)
- **real-time data exchange of AdA data:** according to existing institutional agreements

AdriaArray institutions



AdriaArray Seismology Group

42 members

49 member institutions

63 interested institutions

from 29 countries

MEMBER INSTITUTIONS:

IGEW-PUT, Tirana, Albania
Uni Vienna, Austria
ZAMG, Austria
SC FHMZ, Sarajevo, Bosnia and Herzegovina
GS Republic of Srpska, Bosnia and Herzegovina
NIGGG, 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
IRSM, CAS, Prague, Czech Republic
Uni Aarhus, Denmark
Uni Oulu, Finland
Uni Kiel, 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 Sts. Cyril and Methodius, Skopje, N. Macedonia
Uni Malta
MSS, Podgorica, Montenegro
Uni Twente, the Netherlands
Norwegian Broadband Pool, Norway
IG PAS, Warsaw, Poland
Uni Silesia, Katowice, Poland
Uni Warszawa, Poland
NIEP, Romania
ESI SAV, Bratislava, Slovakia
SSS, Ljubljana, Slovenia
LabSis, Geo3Bcn-CSIC, Barcelona
Uni Uppsala, Sweden,
ETH, Zürich, Switzerland
KOERI, Türkiye
ORFEUS

PENDING:

Uni Helsinki, Finland
RESIF-Sismob, France
TU Freiberg, Germany
Carpathian Project Grop (Jena, Polish Acad, Krakow, Slovakia)
GS Kosovo, Pristina, Kosovo

CANDIDATES:

Uni Frankfurt, Germany
Uni Trieste, Italy
Uni Pisa, Italy
IGS-CES, Chisinau, Moldova
IoG, NAS, Ukraine
Uni Cambridge, United Kingdom

WG1: Station siting

(Planning of backbone network, updating inventory on permanent and temporary stations, providing information on station siting)

- contact: P. Kolínský

WG2: Technical advice

(Discussing field work, data transmission and archiving, data access)

- contact: C. Neagoe

WG3: Data QC

(Qcing, data availability, noise conditions, metadata)

- contacts: A. Schrömer, L. Vecsey, J. Stampa, F. Eckel

WG4: Communication and outreach

(Maintaining list participants, managing tokens, developing and updating web page, communication with participants and the public)

- contacts: C. Legendre, C. Cauzzi

WG5: Scientific co-operation

(Coordinating and supporting the establishment of Collaborative Research Groups)

- contact: T. Meier

WG6: Early Career Scientists

- contact: C. Estève

Data processing & research: Collaborative Research Groups (CRGs)

CRGs:

- Suggested by participants
- Work independently
- Approved by Steering Committee
- Report on activities at the AdASG Workshops
- Consist of participants of at least two countries
- Coordination of individual CRGs: experienced researcher + early career scientist
- Members may change
- May be established at the beginning of the experiment or later

Working Group 5 ‘Scientific Co-operation’:

- Coordinating the discussion on topics for CRGs
- Supporting the formation of CRGs

Suggestion of CRGs

- AdriaArray/ORFEUS/EPOS Workshop Potsdam, October 2022
- AdriaArray Workshop Dubrovnik, April 2023

Information of participants: EGU splinter meeting, web page, email

Response by participants directly to initial contacts: May 14, 2023

Summary of CRGs to WG5: May 31, 2023

Review by WG5: June 11, 2023

Presentation to Steering Committee: end of June?, 2023

Approval by Steering Committee: September, 2023

CRGs may be initiated **anytime later** and will be approved by the SC when needed

CRG ‘Seismicity’

Initial contact: Frederik Tilmann (tilmann@gfz-potsdam.de)

- Event detection & location
- Determination of source mechanisms
- Statistic analysis and seismotectonics

Frist subgroups and contacts:

1. *Survey of monitoring practices at national agencies:* Frederik Tilmann (tilmann@gfz-potsdam.de), Rossi, Giuliana (grossi@ogs.it), Zafeiria Roumeloti (zroumelioti@upatras.gr)
2. *Parametric data exchange with EMSC, station naming and reporting:* Costas Papazachos (kpapaza@geo.auth.gr), Christos Evangelidis (cevan@noa.gr)
3. *Machine learning for seismicity detection and location & crowd processing:* Dinko Sindija (dinko.sindija@gfz.hr), Frederik Tilmann (tilmann@gfz-potsdam.de)
4. *Moment tensors:* Gesa Petersen (gesap@gfz-potsdam.de), Efthimios Sokos (esokos@upatras.gr)

Body wave tomography

Initial contact: Claudia Piromallo (claudia.piromallo@ingv.it)

- Local & teleseismic body wave tomography
- Resolution tests

Frist CRGs and contacts:

1. *Body wave travel times (manual & automatic): Pasquale De Gori* (pasquale.degori@ingv.it)
Comparison of manual picks, benchmarking of tools for automated picking
2. *Modelling body wave propagation: Henk Keers* (Henk.Keers@uib.no)
Comparison of modelling techniques, calculation of sensitivity kernels
3. *Synthetic resolution tests of body wave tomography: Clement Esteve*
(clement.esteve@univie.ac.at)
Defining test models and perform resolution tests for various data sets

CRG ‘Receiver functions’

Initial contacts: Gergana Georgieva (ggeorgieva@phys.uni-sofia.bg), Stéphane Rondenay (rondenay@uib.no), Josip Stipčević (jstipcevic.geof@pmf.hr)

- access to harmonized receiver function analysis tools
- training & benchmarking of tools
- providing a harmonized set of receiver function products

Ambient noise and surface wave tomography

Frist CRGs and contacts:

1. *Compilation of joined database for the computation of ambient noise cross-correlation functions:* Anne Obermann (anne.obermann@sed.ethz.ch)
2. *Surface wave phase and amplitude measurements (ambient noise and earthquake data):*
testing of methods, training, set up data bases
Amandine Sergant (amandine.sergeant@get.omp.eu)
3. *Inversion of surface wave phase velocities:*
benchmarking of methods, training, methodical developments
Emanuel Kästle (emanuel.kaestle@fu-berlin.de)
4. *Body waves from ambient noise:* Yang Lu (yang.lu@univie.ac.at)
5. *Noise sources (natural and anthropogenic sources, imaging, environmental seismology):*
Richard Kramer (richard.Kramer@univie.ac.at), **Lars Wiesenber** (lars.wiesenber@ifg.uni-kiel.de)

CRG ‘Waveform tomography’

Initial contact: Sebastien Chevrot (sebastien.chevrot@get.omp.eu)

- provide tools, methods, and training to compute synthetic seismograms in 3D
- Developing algorithms for FWI
- application of FWI approaches on several focused target areas such as the Vrancea region, the Dinarides and the Hellenic subduction

CRG ‘Shear-wave splitting measurements’

Initial contacts: Silvia Pondrelli (silvia.pondrelli@ingv.it)

- Data collection of previous measurements and data sharing
- Benchmarking methods & training
- New measurements: splitting direction, intensity, various phases
- Interaction with CRGs focusing on body and surface waves as well as receiver functions

Perspective: joint inversions and interpretations of seismic anisotropy

Engineering Seismology

Initial contacts: Costas Papazachos (kpapaza@geo.auth.gr), Iva Dasovic (iva.dasovic@gfz.hr)

Frist CRGs and contacts:

1. *Station metadata inventory (Geology, geophysical structure, morphology, etc.):* Olga Ktenidou (olga.ktenidou@noa.gr), Costas Papazachos (kpapaza@geo.auth.gr)
2. *Site effects from waveform data (HVSR, Vs30/Vsz assessment, κ-κ₀, etc.):* Besian Rama (besirama@gmail.com), Olga Ktenidou (olga.ktenidou@noa.gr)
3. *GMPEs and relation with strong-motion measures: ?*

Linking geophysical observations and geodynamics

Frist CRGs and contacts:

1. *Slab hypotheses for the Adriatic and subregions (Vrancea, Alp-Pannonian-Dinarides transition etc.), creating input models for seismic resolution tests and geodynamic modelling:* Thomas Meier (thomas.meier@ifg.uni-kiel.de)
2. *Thermomechanical modelling of seismic anomalies:* Christoph Schuler (cschule@uni-mainz.de)

First publications:

- Paper introducing AdriaArray (Petr Kolínský et al., 2023)
- Special volume in Annals of Geophysics on installation of temporary AdriaArray networks
(editor: Irene Molinari, 2023/2024)

Annual AdriaArray workshop 2024: Bulgaria (Gergana Georgieva, Liliya Dimitrova)