

GNSS archive facility and standard geodetic products

Edited by the GNSS analysis and RING infrastructure team



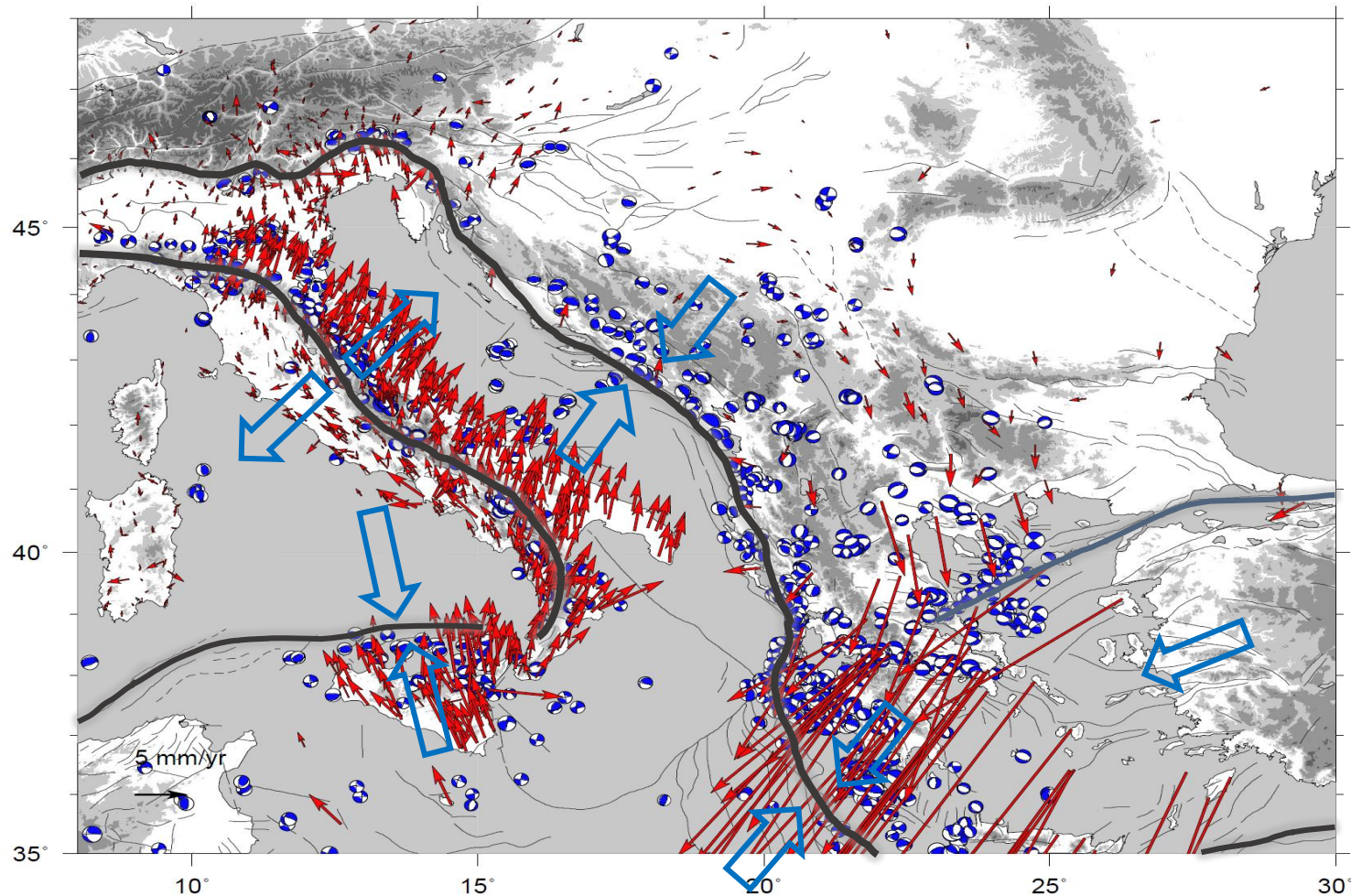
ISTITUTO NAZIONALE DI GEOFISICA E VULCANOLOGIA



• SCIENTIFIC RATIONALE

Ground deformation monitoring.

GNSS Networks continuously archived: (RING, Agencies, Public, Private, etc.) 4253 stations archived, in Italy 1420 stations, mean interdistance 15 km



• Mediterranean GNSS archive (MGA)

All daily GNSS data from permanent stations in Europe - Africa region are archived on MGA. The Monitor allows to get a picture of the data download process, data are logically subdivided into Networks, containing the list of contributing stations.

MONITOR NETWORKS STATIONS REPORT							
Station code or name							
Detail	New	Notify	Network ↕	Type ↕	Status ↕	Description	Download status, last 15 days
			Select Network	Select type ▼	Select status ▼		
			ABRUZZO	CONTINUOUS	scheduled	Servizio Informazioni Territoriali e Telematica, Rete di stazioni permanenti	
			AFREF	CONTINUOUS	idle	African Geodetic Reference Frame	
			AGROS	CONTINUOUS	scheduled	Active Geodetic Reference Network, Republic of Serbia	
			ALBPOS	CONTINUOUS	idle	Central Office of Immoveable Property Registration, Rruga "Jordan Misja" Tirana, ALBANIA	
			ALGERIA	CONTINUOUS	decommissioned	Algeria	
			AMMA	CONTINUOUS	decommissioned	African Monsoon Multidisciplinary Analysis Project, Africa occidentale	
			ARAGEA	CONTINUOUS	scheduled	Red de Geodésia Activa de Aragón, Spagna.	

- Mediterranean GNSS archive (MGA)

Each Network may be inspected and visualized (list of stations, data availability, coordinates, kml, etc.)

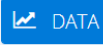
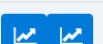
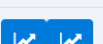
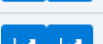
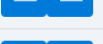
MONITOR

NETWORKS

STATIONS

REPORT

ABRUZZO - Servizio Informazioni Territoriali e Telematica, Rete di stazioni permanenti - 22 Stations

		Marker	Name	Position
☐	 DATA  KML  XYZ			
☐		ALRA00ITA	Alfedena, AQ	41.7339, 14.0344
☐		AQRA00ITA	L'Aquila	42.3659, 13.3743
☐		ATRA00ITA	Atri, TE	42.5515, 14.0073
☐		AZRA00ITA	Avezzano, AQ	42.0431, 13.4238
☐		BLRA00ITA	Balsorano Nuovo, AQ	41.8103, 13.5603
☐		CDRA00ITA	Castel del Monte, AQ	42.3675, 13.7201
☐		CMRA00ITA	Castiglione Messer Marino, CH	41.8692, 14.4559
☐		FRRA00ITA	Franravilla al Mare, CH	42.4177, 14.2922

- Mediterranean GNSS archive (MGA)

EPOS like user interface, to browse among stations and networks.

EPOS History Help Products portal

Metadata Search Files Search Clear Show advanced search

Spatial selection

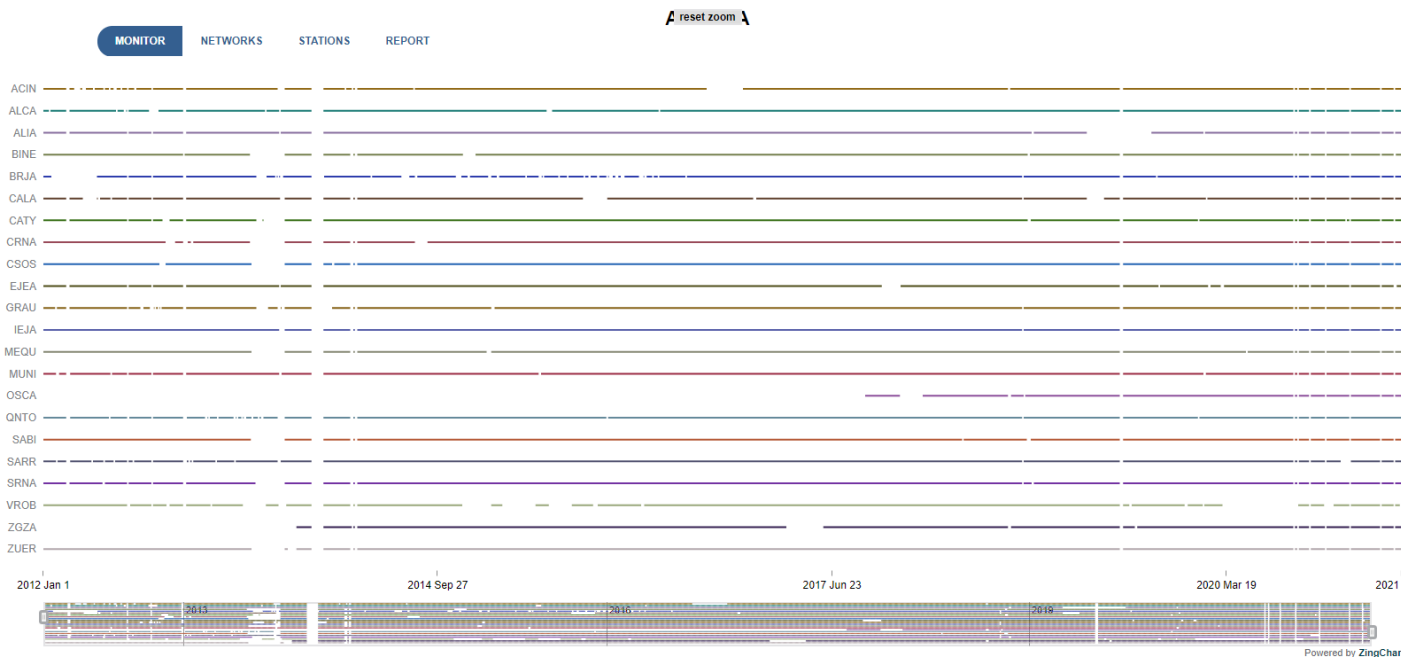
Rectangle
Lat-Lon Bounding Box

Circle
Latitude Longitude
19.8014 -155.4563
Radius (Km)

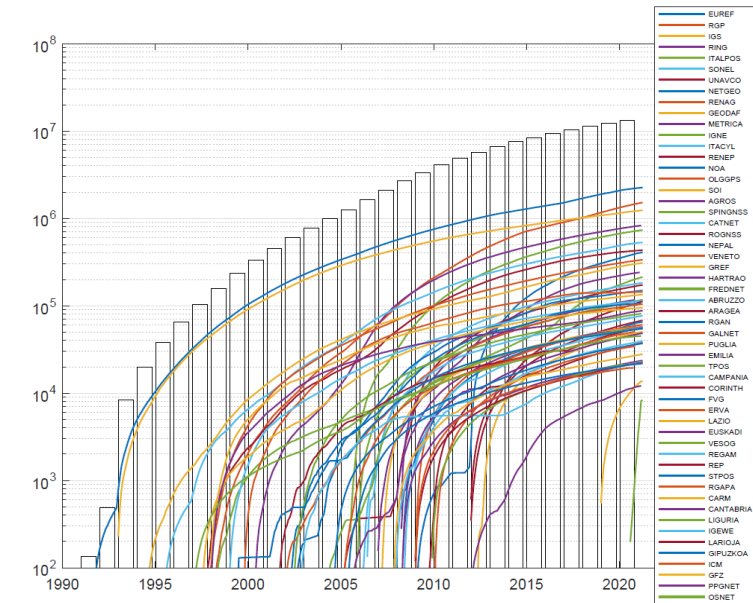
Marker	Site Name	Lat	Lon	Alt	Install Date	End Date	Country	State	City	Agency	Network
☐		greater than less than	greater than less than	greater than less than	greater than less than	greater than less than					inverse filter
☐	MKEA	Mauna Kea, H...	19.801	-155.456	3,754.750		None	None	None	Istituto Naziona...	CANARY
☐	MKMN	Nea Kameni, S...	36.409	25.401	92.350		None	None	None	Istituto Naziona...	UNAVCO
☐	MKRS	Mukacheve, Uc...	48.379	22.709	188.180		None	None	None	Istituto Naziona...	EUREF

• Mediterranean GNSS archive (MGA)

GNSS data timeline.



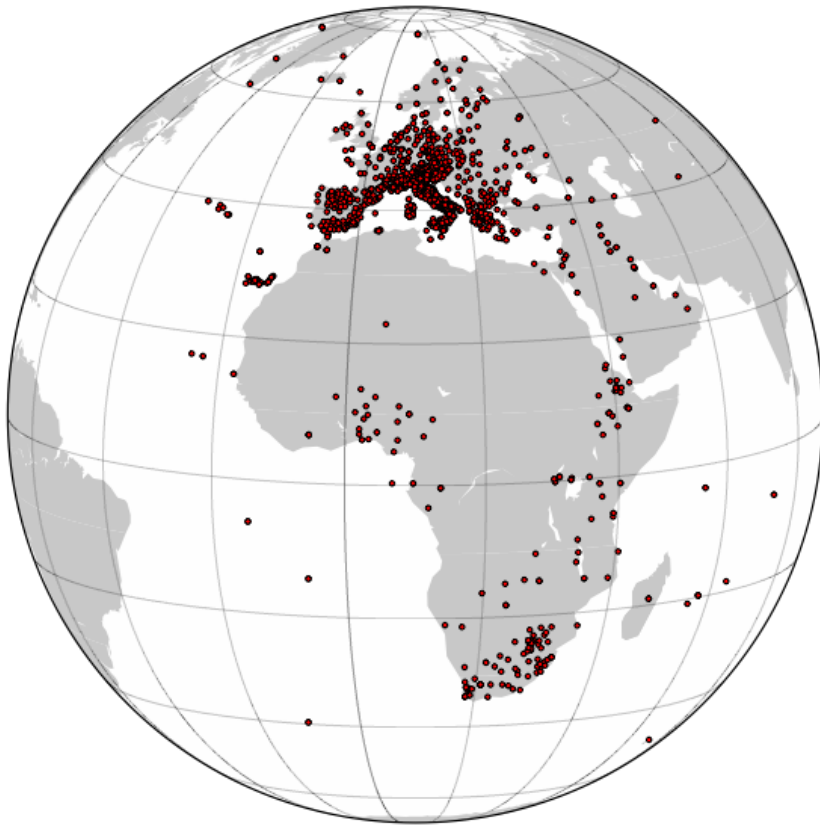
Day-by-day data availability.



Cumulated data availability.

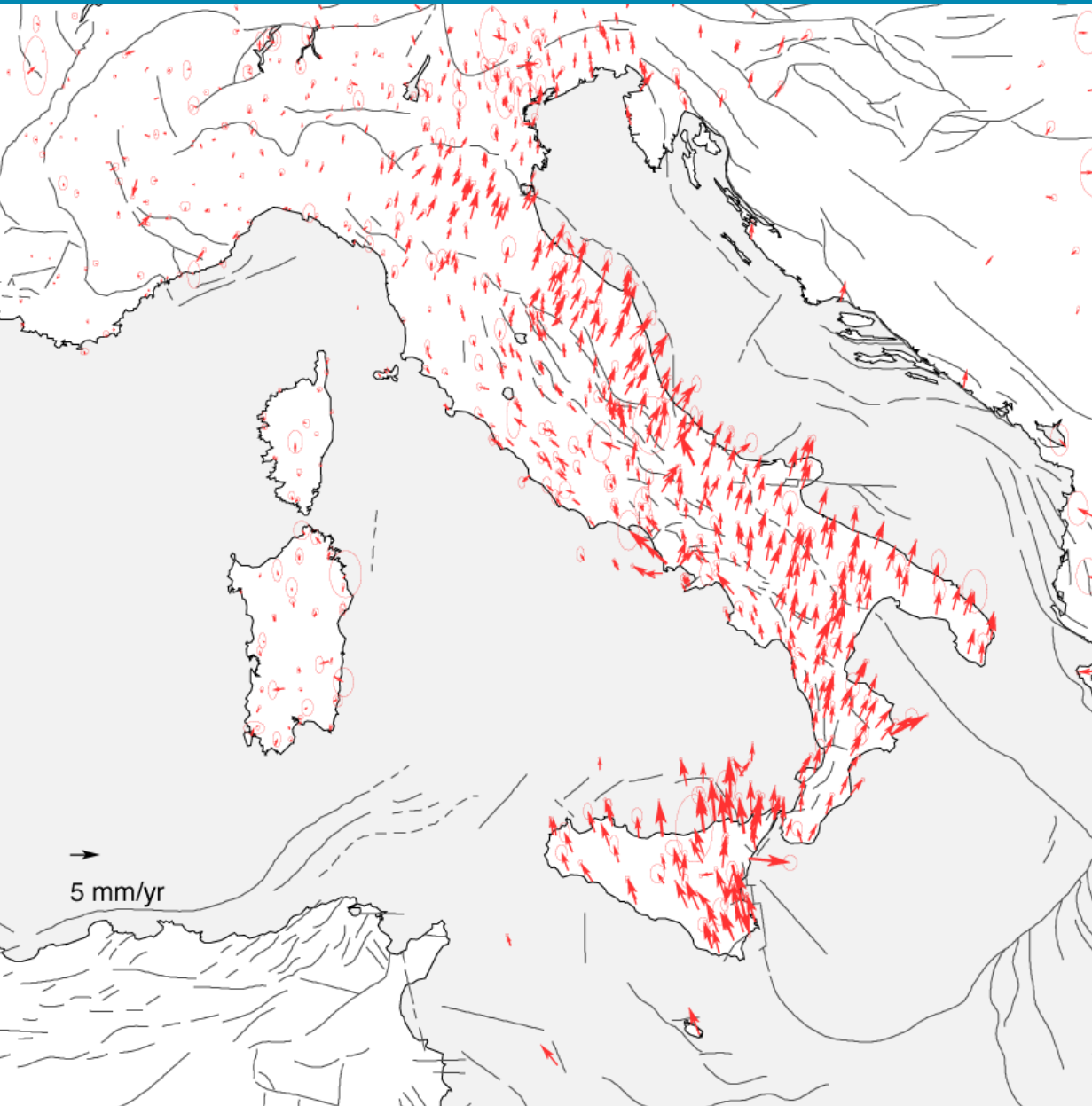
- Mediterranean GNSS archive (MGA)

MGA in brief:



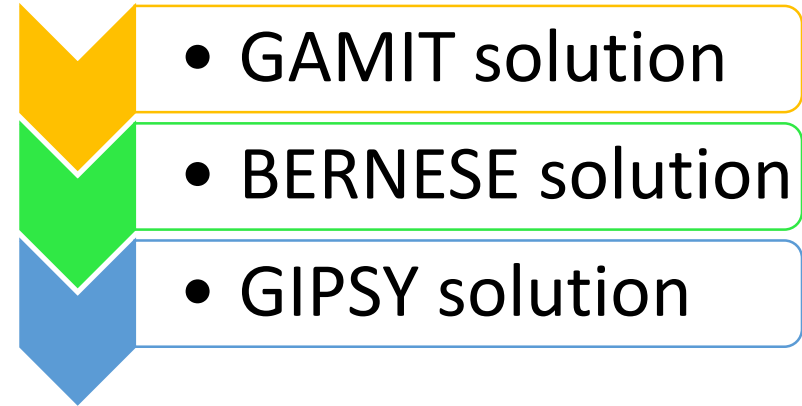
- Daily RINEX files available for 4253 GNSS stations
- Over 13.6 millions of RINEX files archived in PSQl database
- Quality check, and metadata reconstruction for each RINEX file
- Automatic detection of new stations in the region of interest
- Download from about 60 public and private external archives
- Data distribution through anonymous ftp or webservice

• INGV Analysis Centers

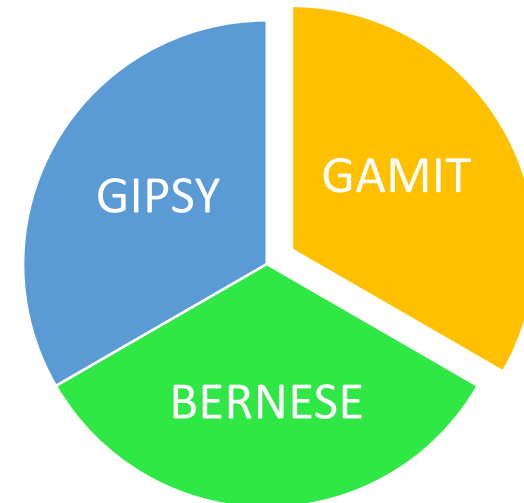


GNSS data analysis

INGV Analysis Centers



Unified velocity field



- GNSS Time Series

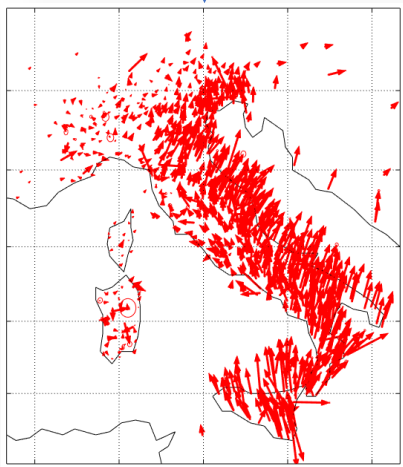
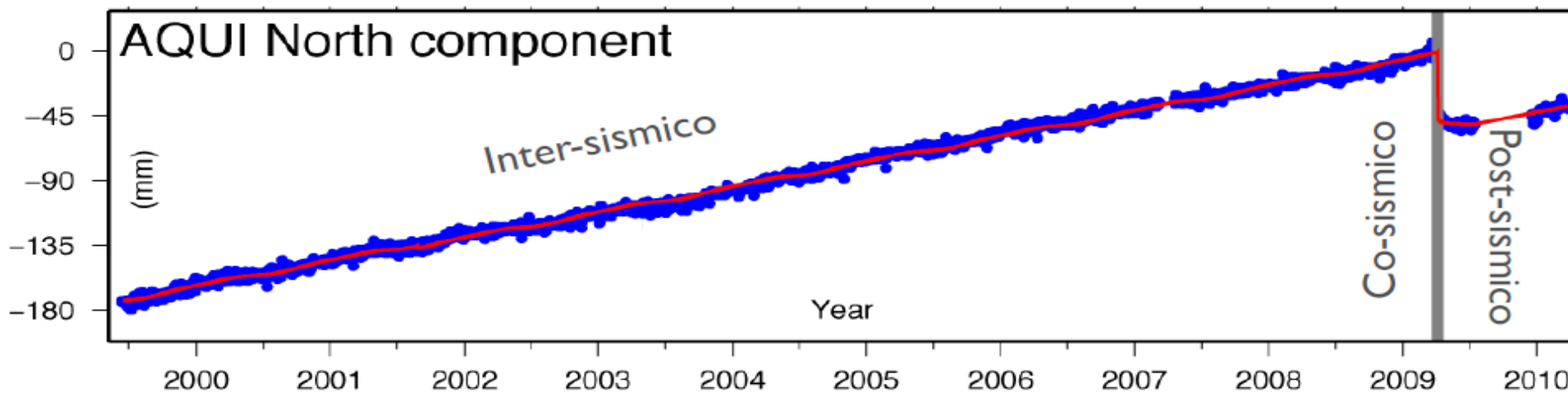
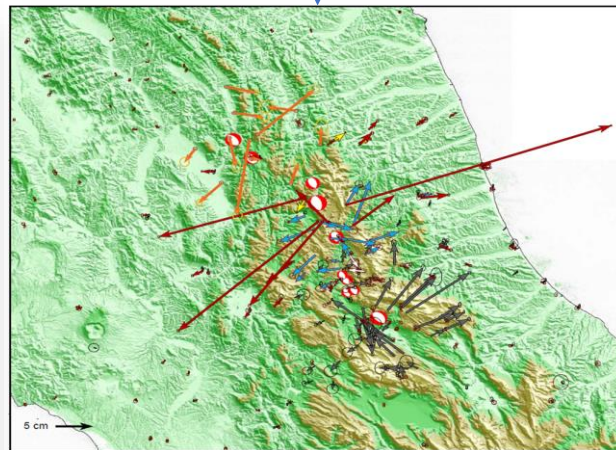
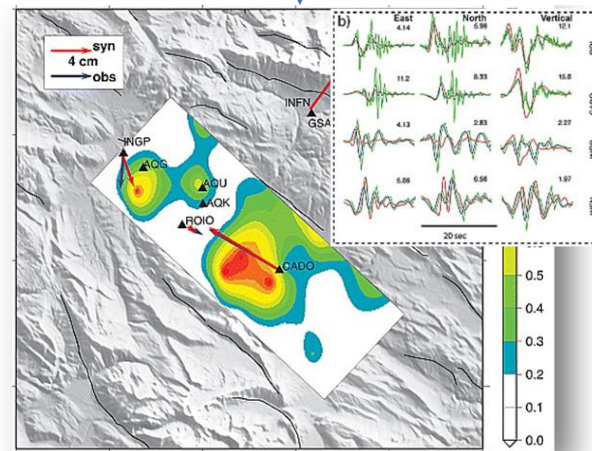


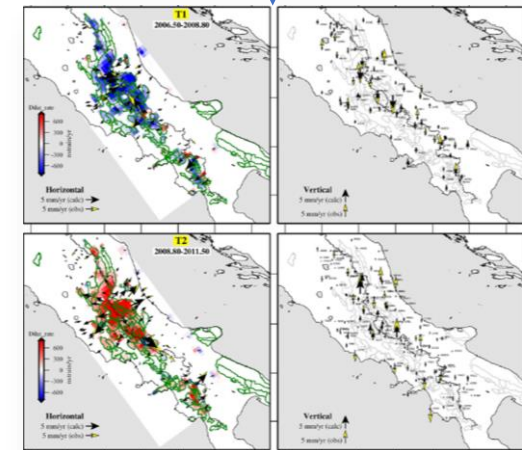
Plate tectonics



Co-seismic displacements



Earthquake rupture

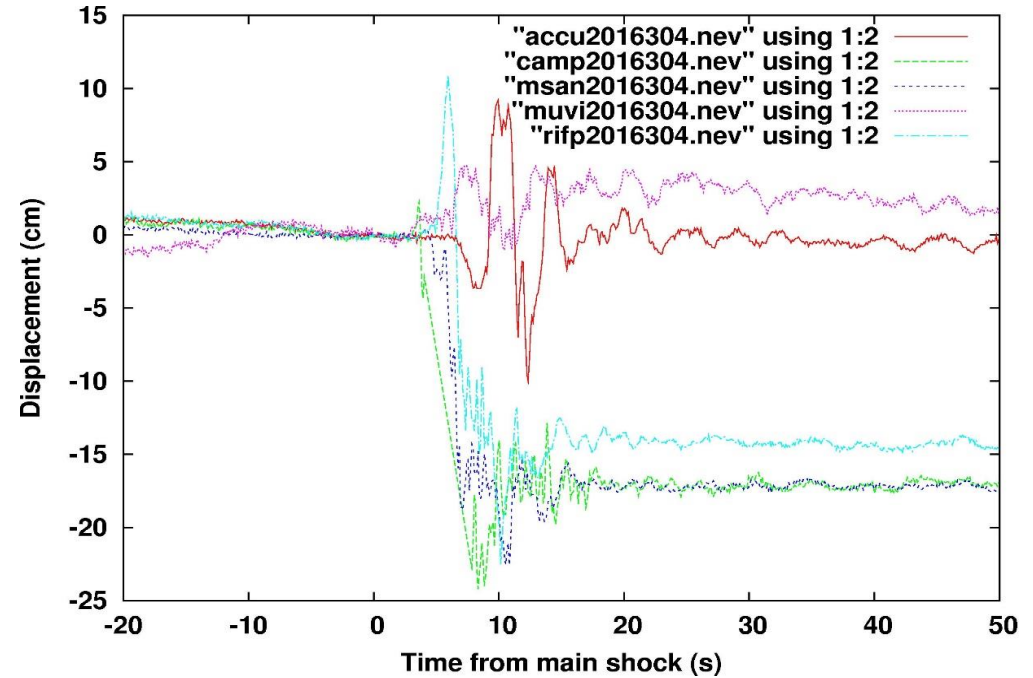
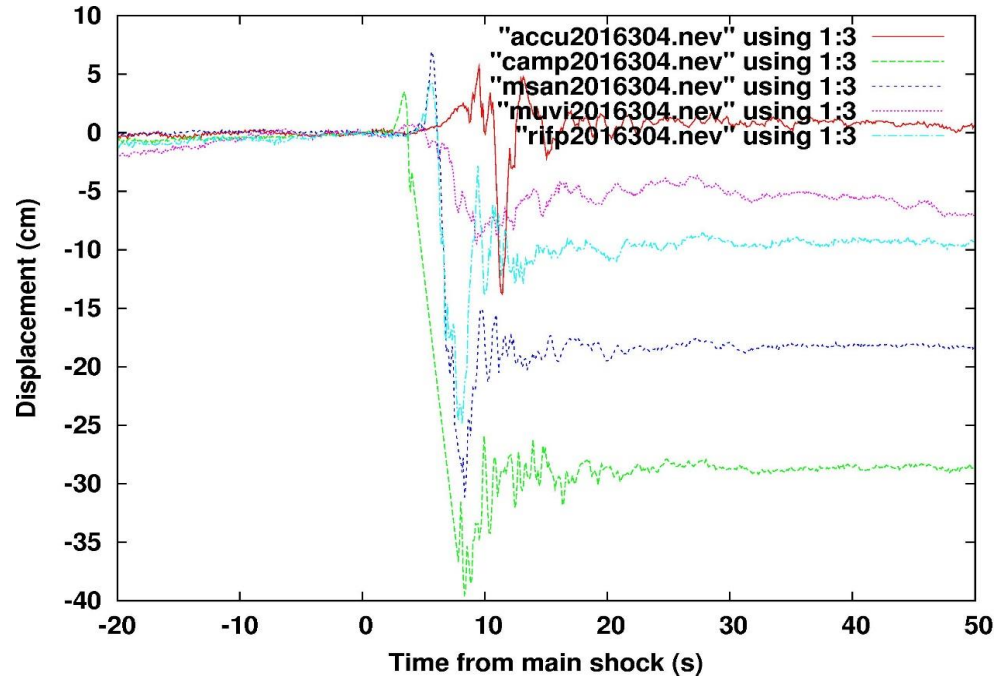


Water cycle

• High Frequency GNSS Time Series

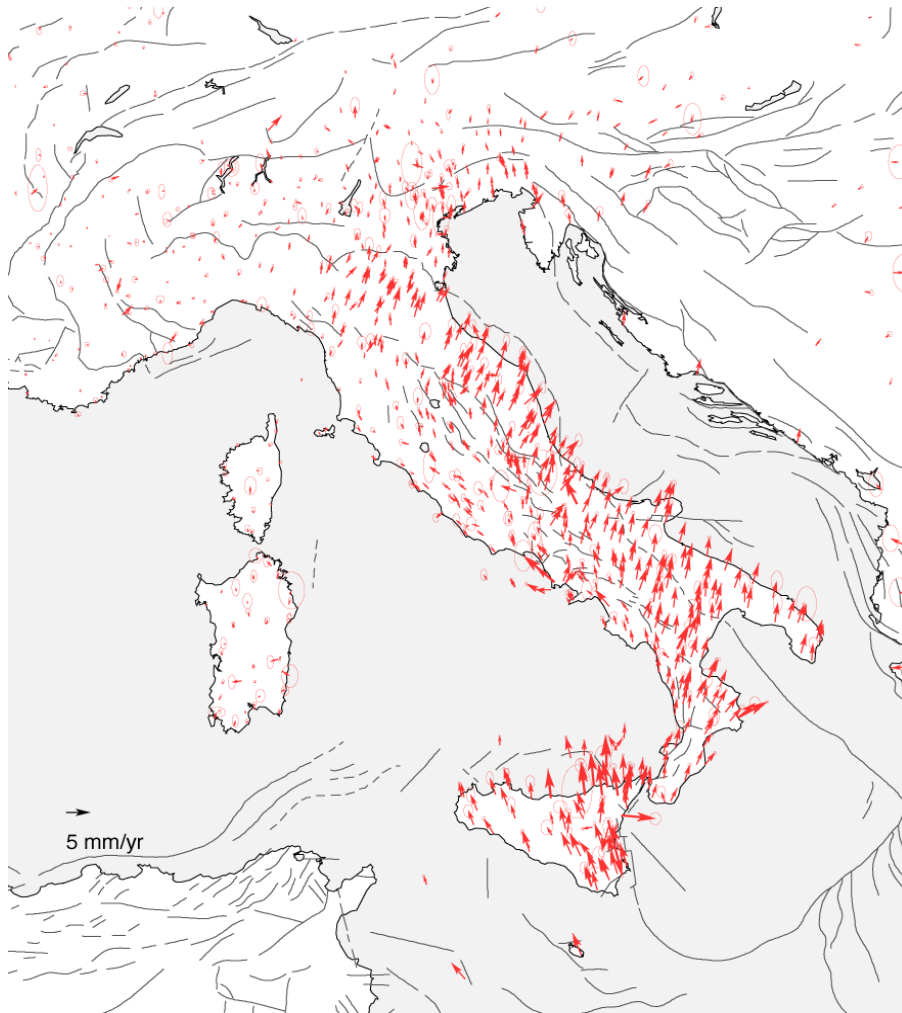
High frequency position estimations (1-20 Hz), available to the scientific community

- Norcia earthquake 30/10/2016

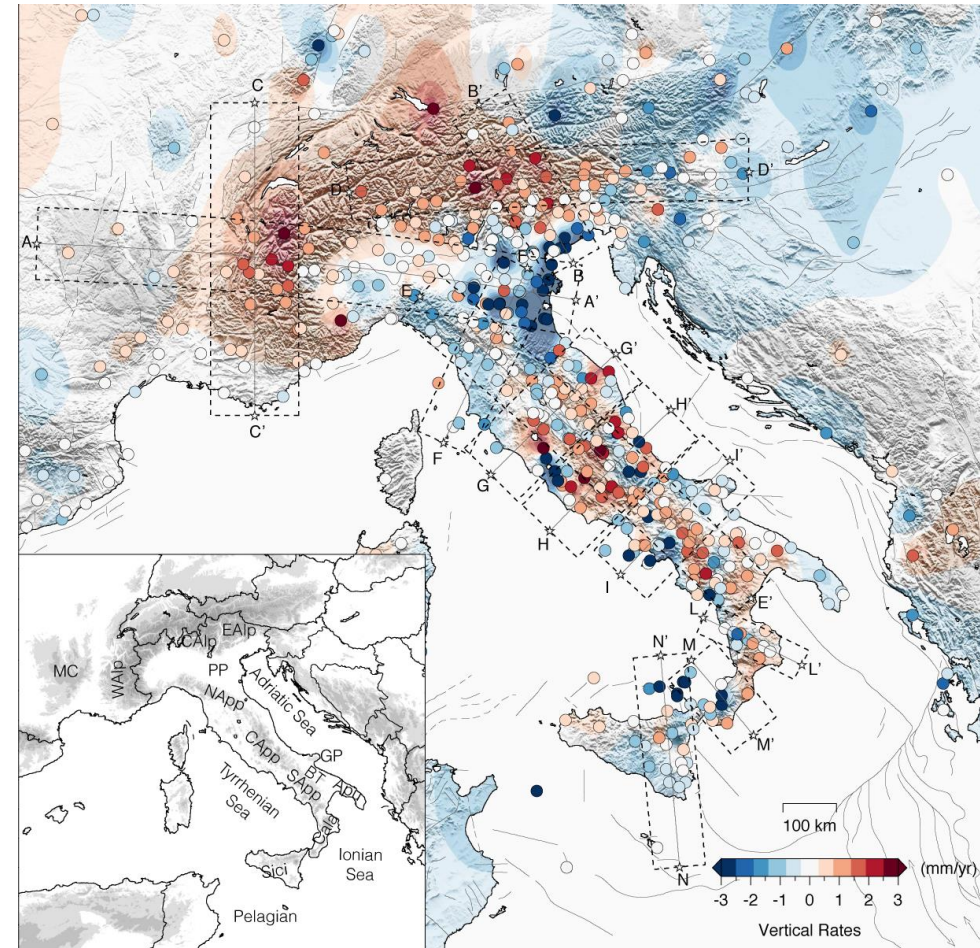


• 3-D Velocity Field

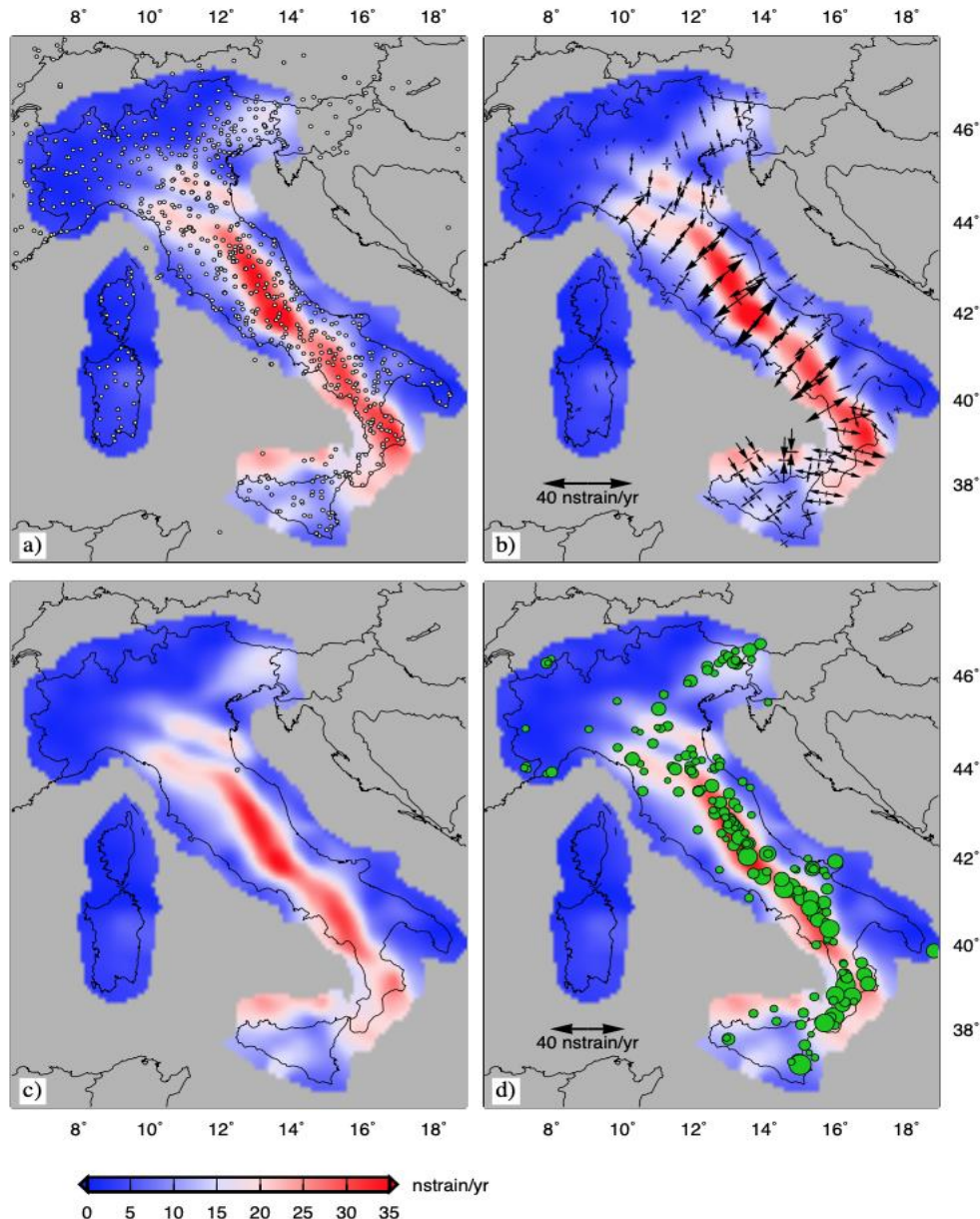
Horizontal motion estimated at the GNSS stations (arrows).



Vertical motion estimated at the GNSS stations (circles) and interpolated velocity field in background in mm/year.



• Tectonic Strain-Rate



Maps of strain-rate derived from the combined velocity field.

All maps show in background the second invariant of horizontal strain-rate tensor in false colors (see legend for units)

- a) Circles represent the GNSS stations used
- b) Principal directions of strain-rate tensor
- c) Second invariant of horizontal strain-rate
- d) Seismic events $M > 5.5$ from CPTI15 catalog

• PROGRAMS/PROJECTS OF REFERENCE

- DPC all. A, WP 3.4, WP 3.5, WP 3.6
- DPC all. B2, WP1 Task 6
- JRU EPOS-Italia
- PON-GRINT (MUR)
- Progetto Rete Multiparametrica (D.P. n.74/2020)
- Progetto Ricostruzione (D.P. n.76/2020)
- Progetti Dipartimentali (FURTHER, MUSE)

• TEAM AND AFFILIATIONS

Personnel dedicated to the RING infrastructure from following INGV branches:

- ONT
- BOLOGNA
- CATANIA
- OV-NAPOLI