WP2.4 - Ground deformation pattern of the Calabro-Peloritani area and the Messina Straits from GPS networks and terrestrial data

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Goals

- Velocity and strain rate field across the Messina Straits and the Calabrian Arc from the analysis of periodical and continuous GPS data

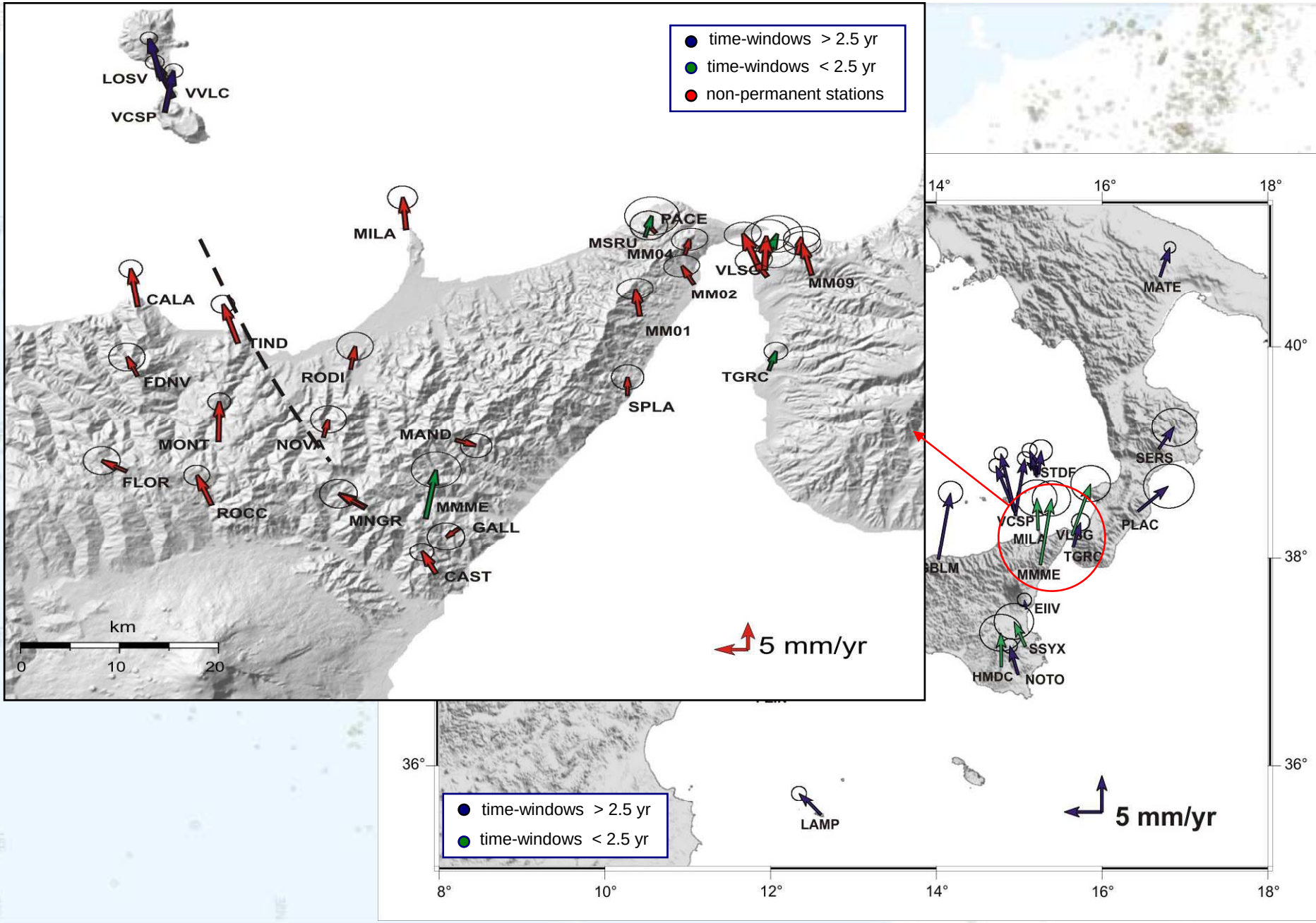
- Elastic block modelling, inter-seismic strain loading and deep geometry of the 1908 Messina fault

- Analysis of triangulation data for the estimates of the strain rates in the Messina Straits and the interseismic tectonic loading on the fault responsible for the 1908 Messina earthquake

- Modelling of the source responsible for the December 28, 1908 earthquake, by using a numerical approach (i.e. finite element)

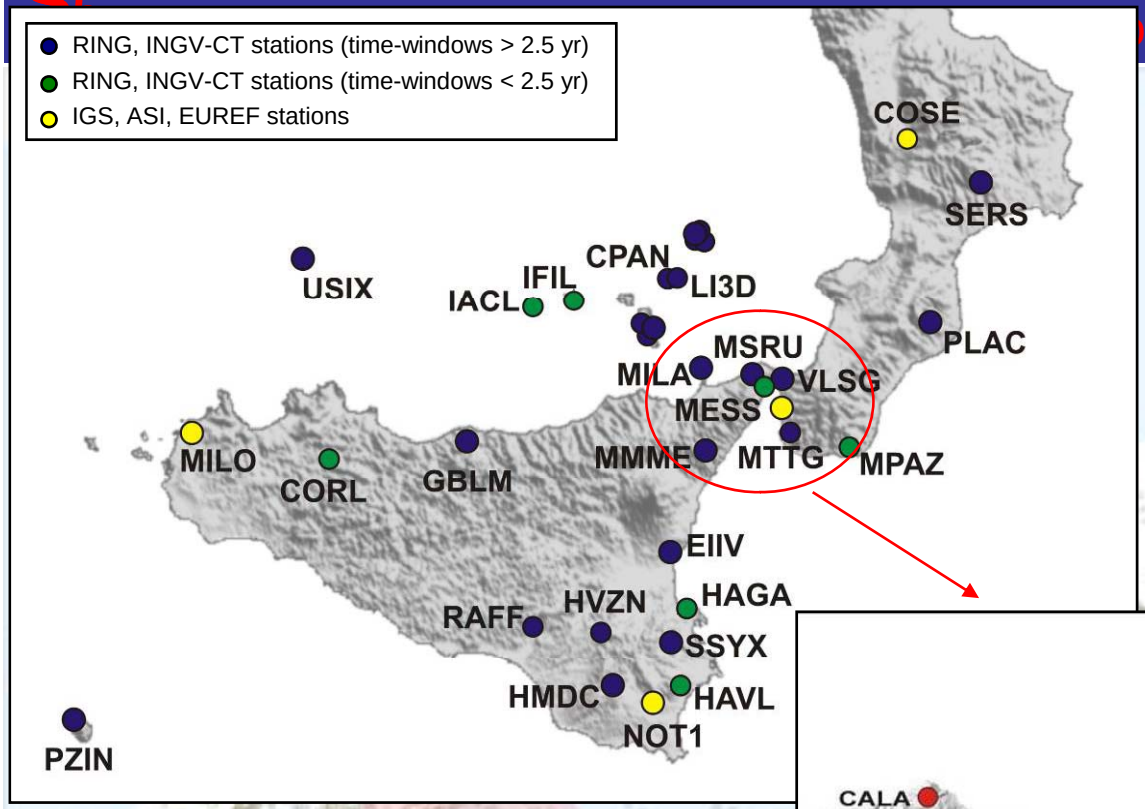
S5

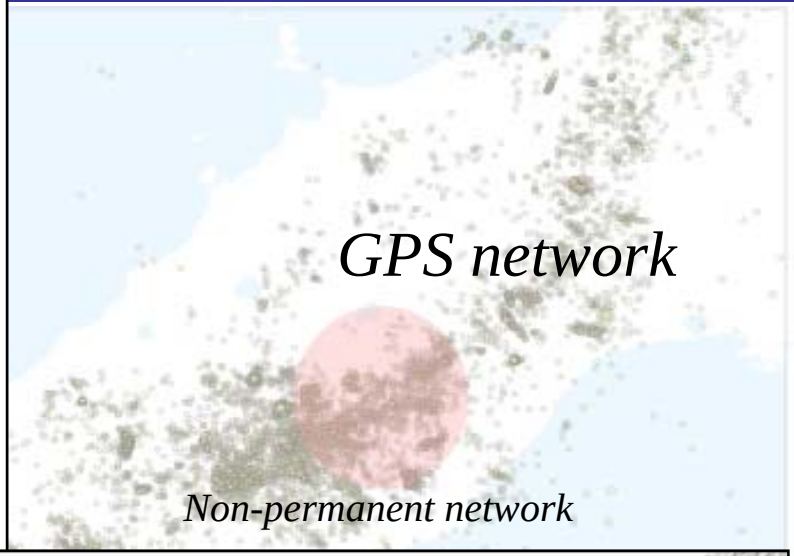
DPC 2007-2009
High-resolution multi-disciplinary monitoring of active fault test-site areas in Italy

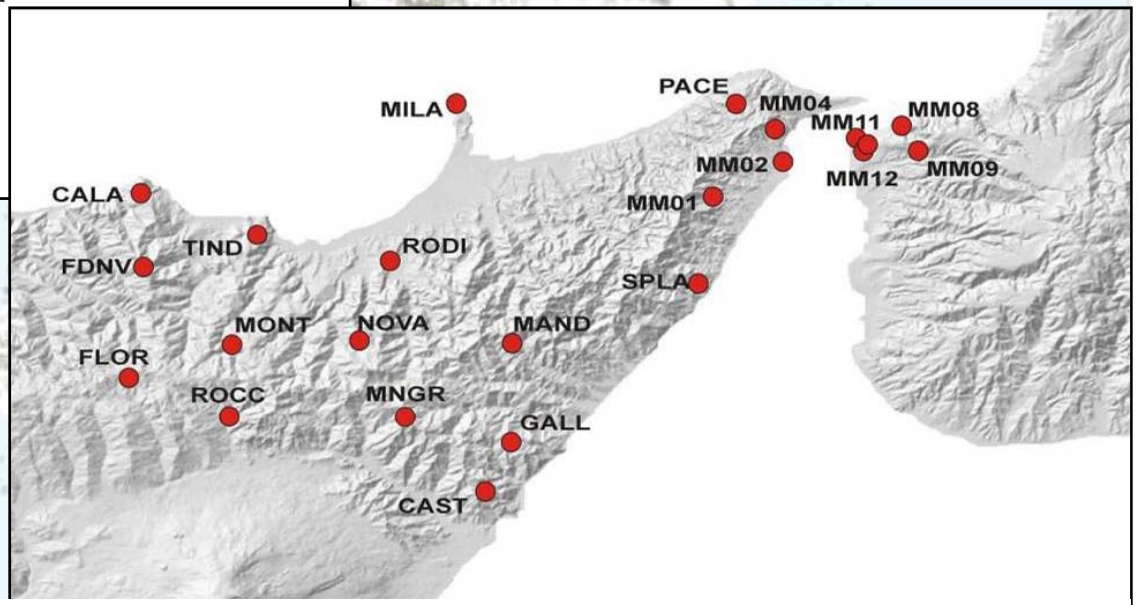


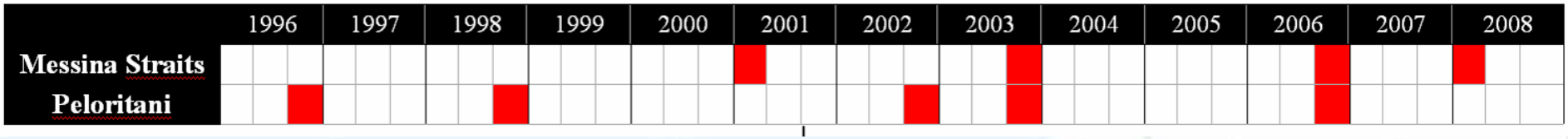
Permanent network DPC 2007-2009

f active fault test-site areas in Italy

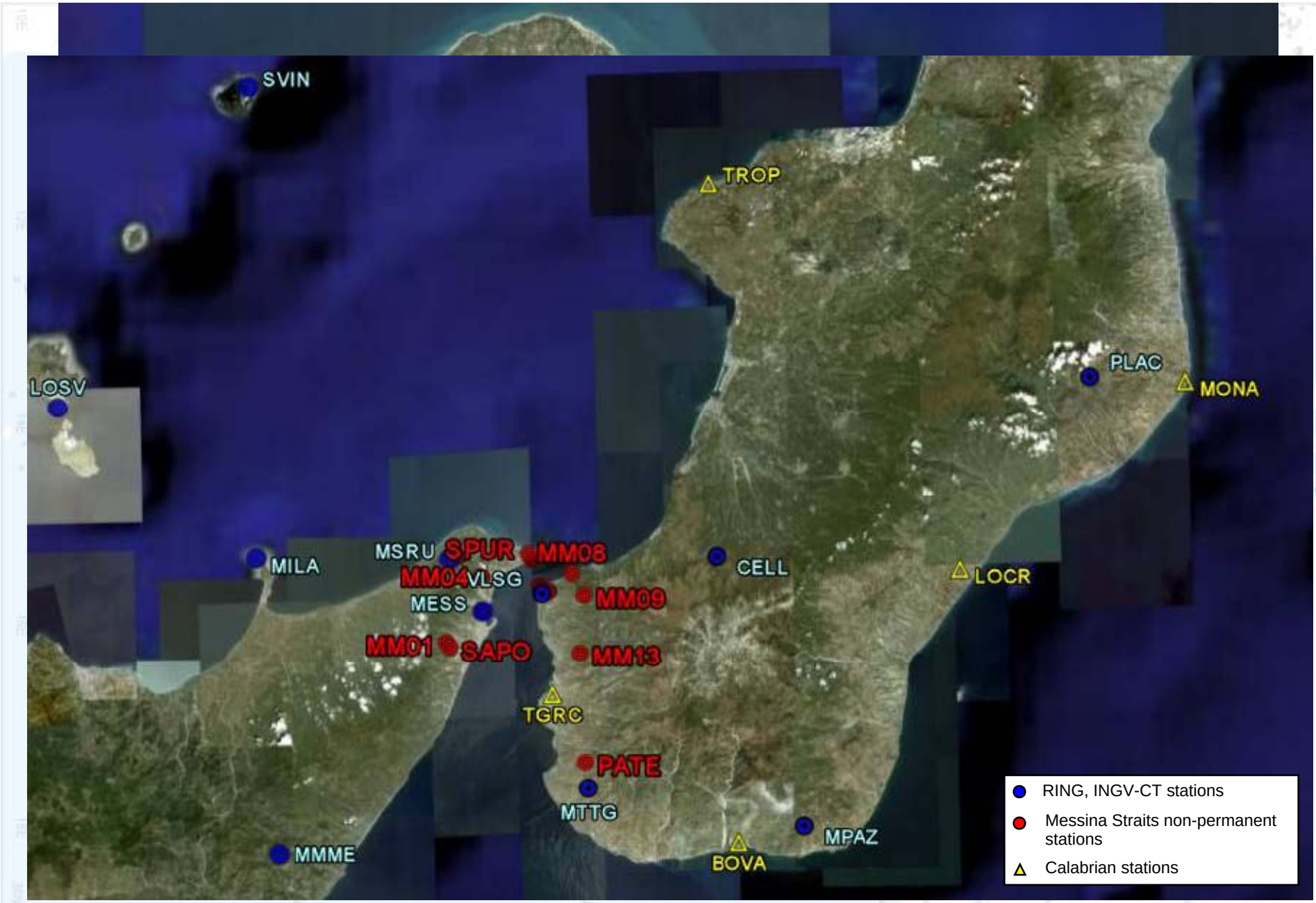








S_5 DPC 2007-2009
High-resolution multi-disciplinary monitoring of active fault test-site areas in Italy



2008 "Messina Straits" GPS network

- ✓ The network has been measured in March 2008 by a team of INGV researchers and technicians
- ✓ The data collected in the field have been already pre-processed
- ✓ The data (in RINEX format) are available in a FTP site

Data processing

- Analysis of GPS data - GAMIT software *(Herring et al., 2006)*
- Combination of individual solution with global solutions - GLOBK software *(Herring et al., 2006)*
- Reference frame definition: ITRF2005, Eurasia fixed and Nubia fixed - GLORG module *(Herring et al., 2006)*

Strain rate analysis

- Sparse software *(Haines and Holt, 1993)*
- eXtrain software tool *(INGV-CT)*

Final products:

- *Velocity field*
- *GPS time series*
- *Strain rate field*

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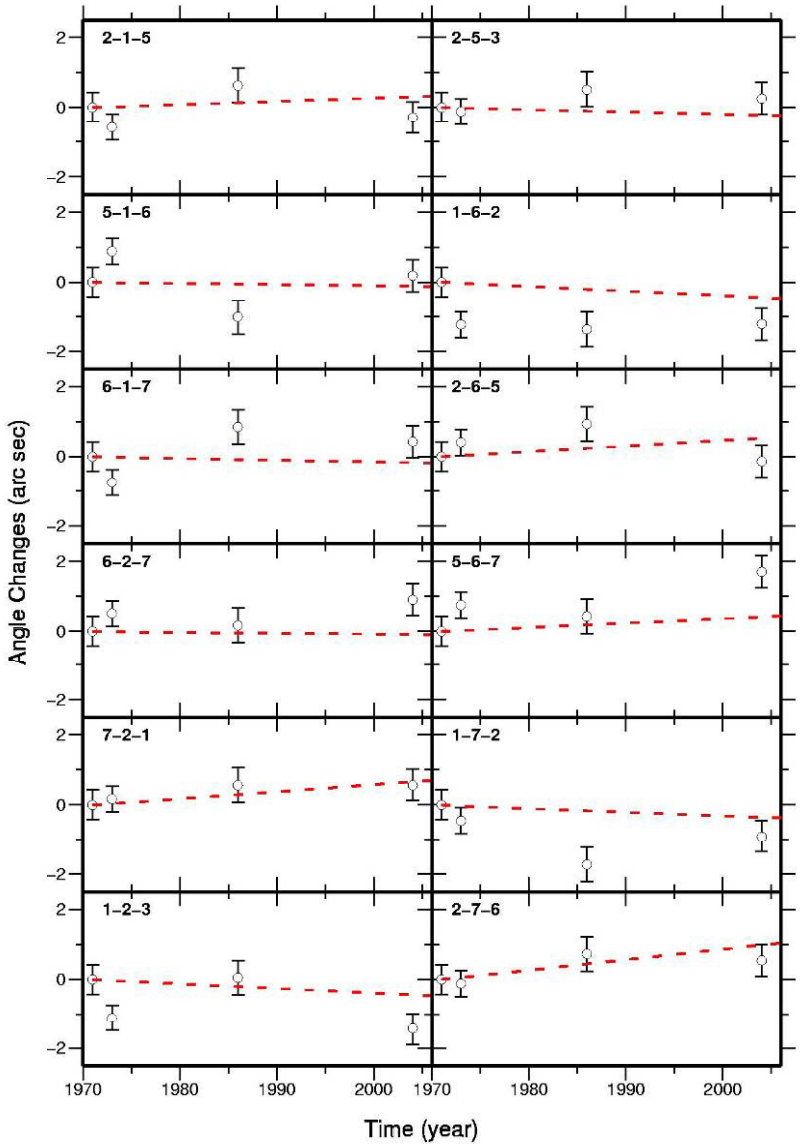
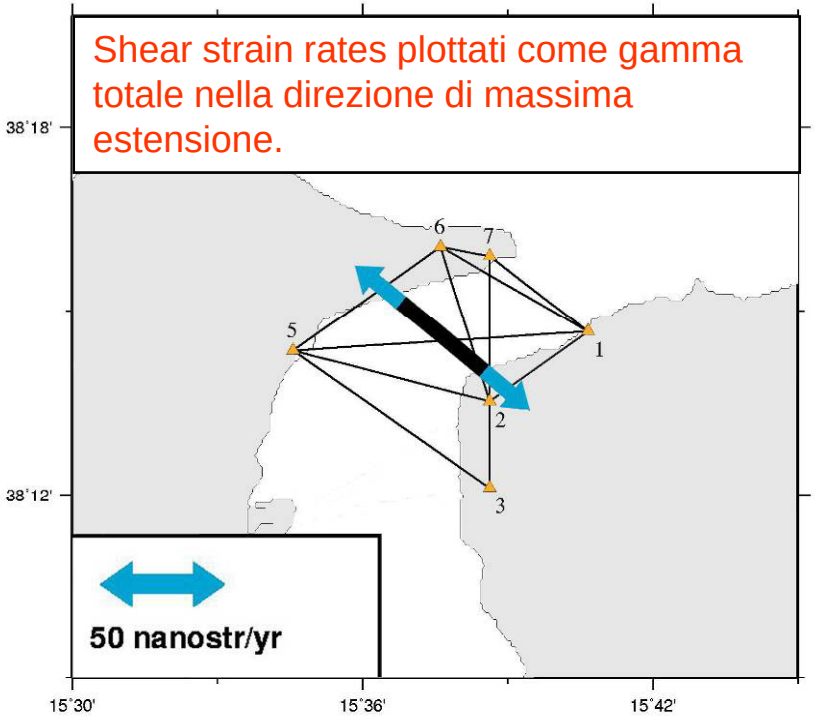
Messina Straits – Triangulation network



Shear strain rates (nanostrain/yr) and Orientation of the most extensional strain (degrees)					
γ_1	γ_2	$\sigma_{\gamma 1}$	$\sigma_{\gamma 2}$	θ	σ_θ
-23.37	-113.88	48.71	54.96	140.79	44.89

Shear strain rates plottati come gamma totale nella direzione di massima estensione.



Daniele Cheloni, Tesi Dottorato Univ. Bologna

First year deliverables

- Processing of all available GPS data for the investigated area (1996-2008)
- Combination of individual solution with global solutions (e.g. IGS1, IGS2, IGS3, IGS4, EURA)
- Analysis of the GPS time series and of the velocity field
- Elastic block modelling, inter-seismic strain loading and deep geometry of the 1908 Messina fault
- Analysis of triangulation data for the estimates of the strain rate in the Messina Straits and comparison with strain rate from GPS data