

Karst Hydrogeology and Geodesy

Karst-Carso-Kras, a dynamic borderland
Presentation of the Karst continuous gravity monitoring network
Symposium in memoriam of Prof. Maria Zadro

University of Trieste, DMG, Via Weiss 6, Trieste Building O Room A , 16th -17th of November 2018



GNSS NETWORK IN FVG

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AGENDA

FReDNet

Data & Products

Extended network

Applications

Developments

Conclusions





FRIuli Regional **D**eformation **N**etwork



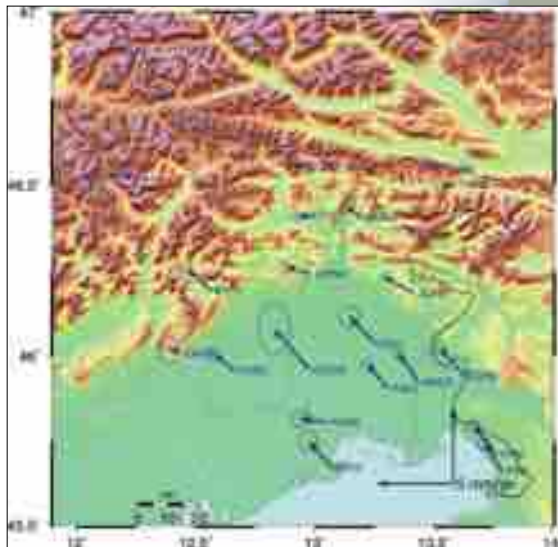
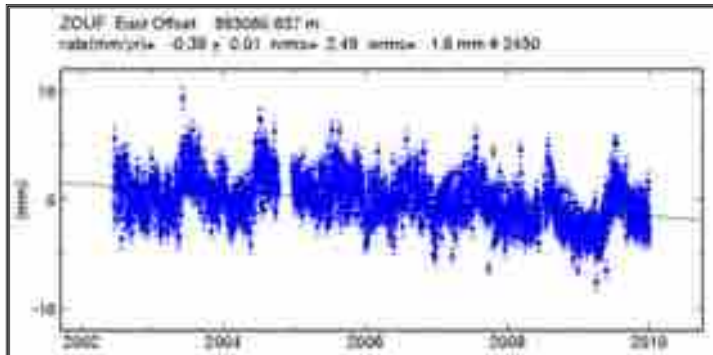
Zuliani et al. 2018

18 GNSS SITES FOR RESEARCH & SERVICE



GNSS Data, Data products, Software & Services

Time series (GAMIT/GLOBK)



Velocities (GAMIT/GLOBK)

Data (ftp, GSAC)



FReDNet repository
Free Radio Environment Data Network



Powered by



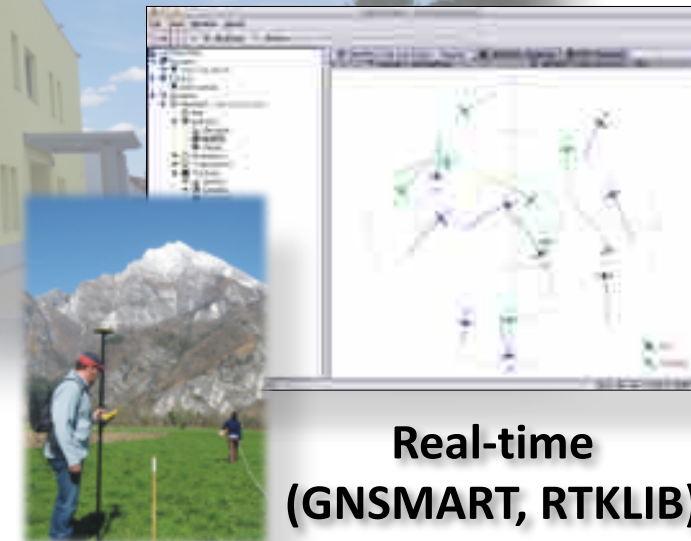
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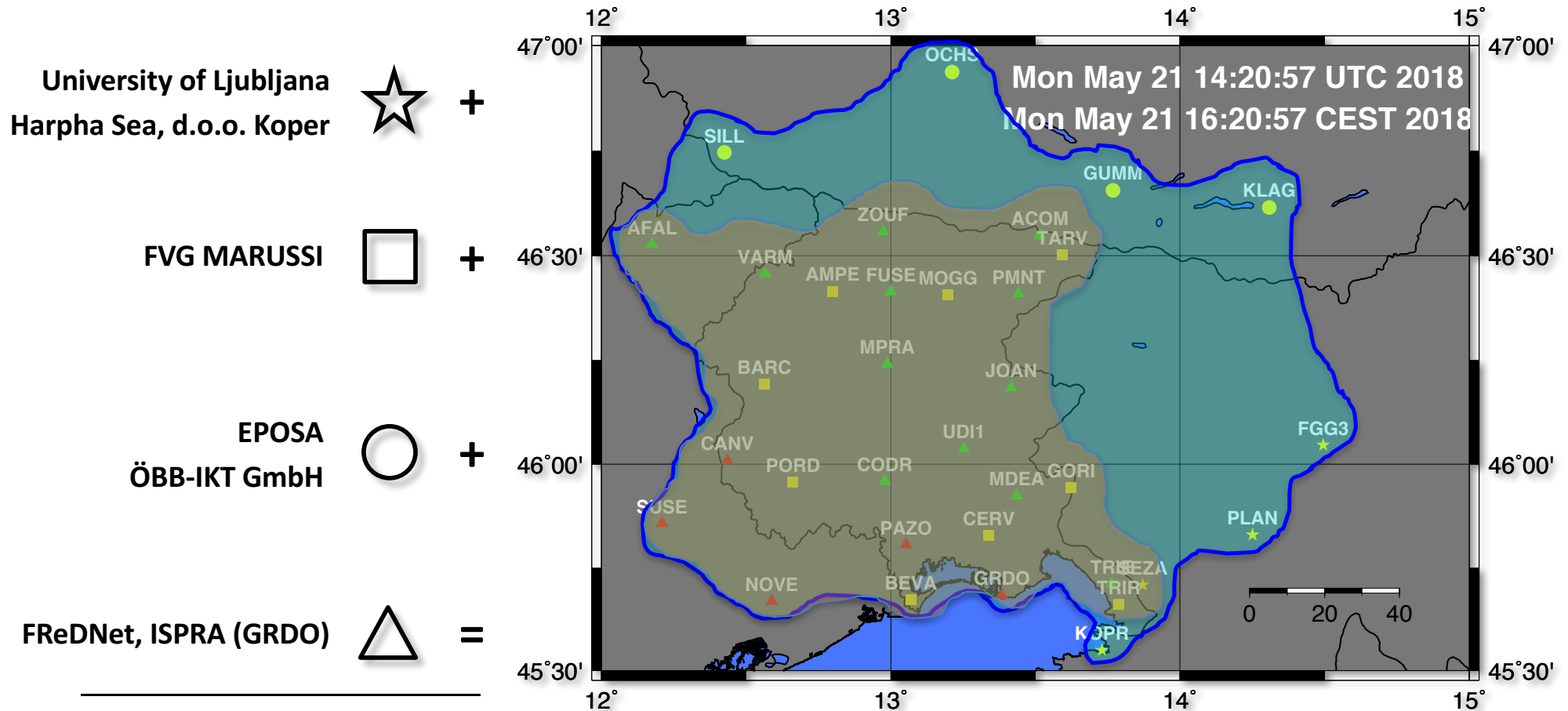
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index0240.00e.z	RINEX GPS navigation file	2003-01-24 00:00:00 - 2003-01-24 23:59:30	30 0	index0240.00e.z 28.90 KB
index0240.00e.z	GNSS observation QC file (step: 10 file)	2003-01-24 00:00:00 - 2003-01-24 23:59:30	30 0	index0240.00e.z 4.90 KB
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index0270.00e.z	GNSS observation QC file (step: 10 file)	2003-01-27 00:00:00 - 2003-01-27 23:59:30	30 0	index0270.00e.z 4.90 KB



Real-time (GNSMART, RTKLIB)



An extended GNSS network at the tip of the Adria plate



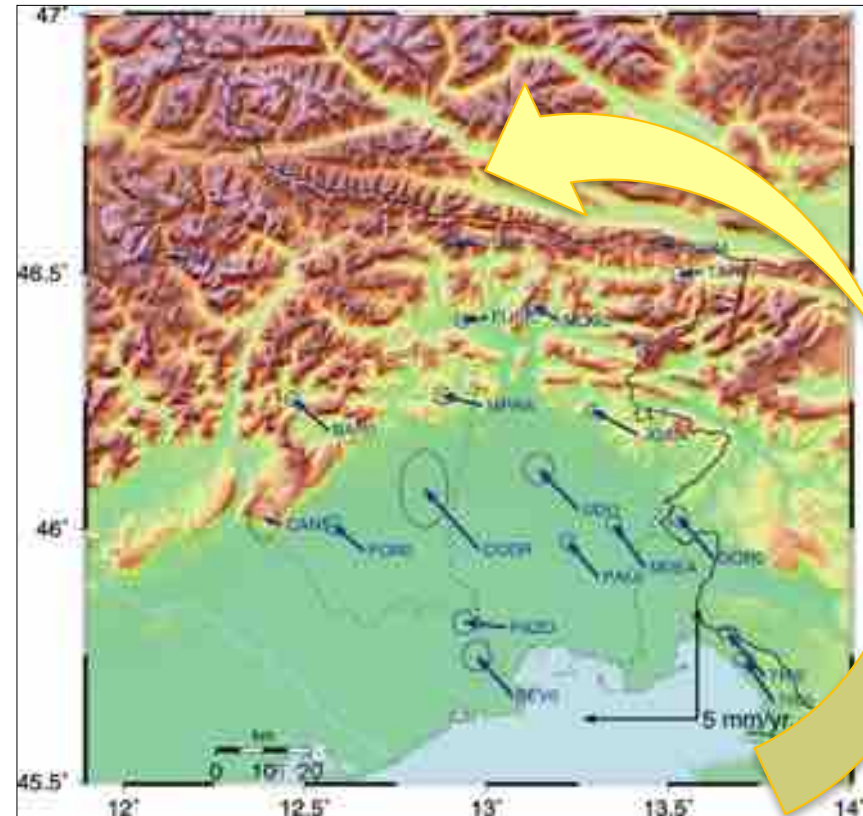
Real-time exchange...
and
extended services



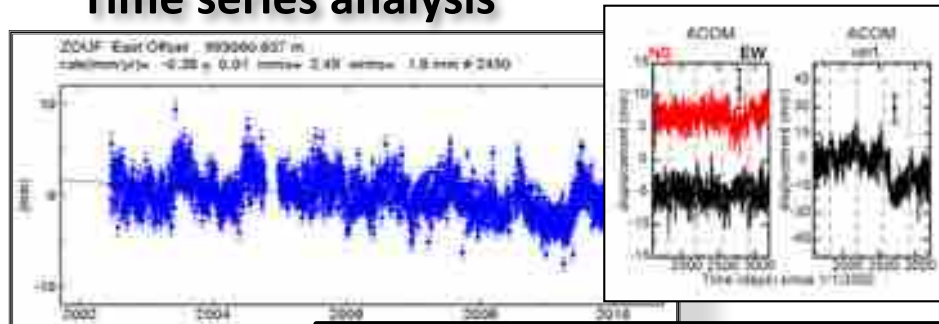
Application 1: regional deformation monitoring



GNSS velocities can detect secular motion of the Adria microplate compared to the Eurasia plate.



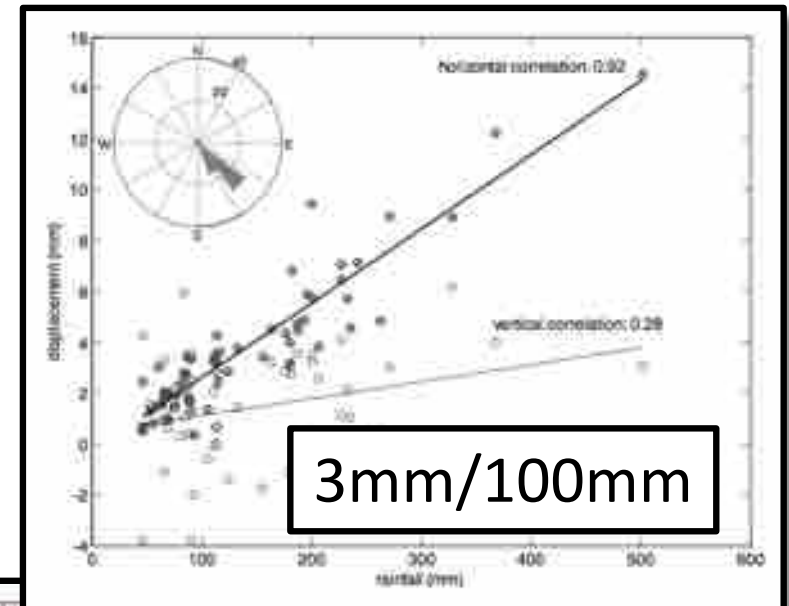
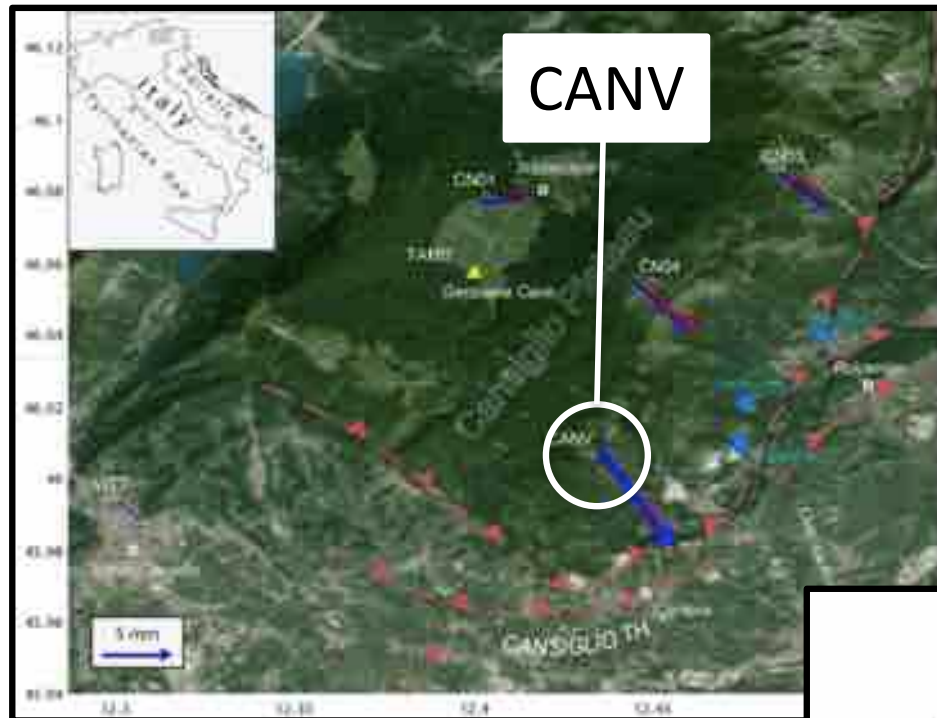
Time series analysis



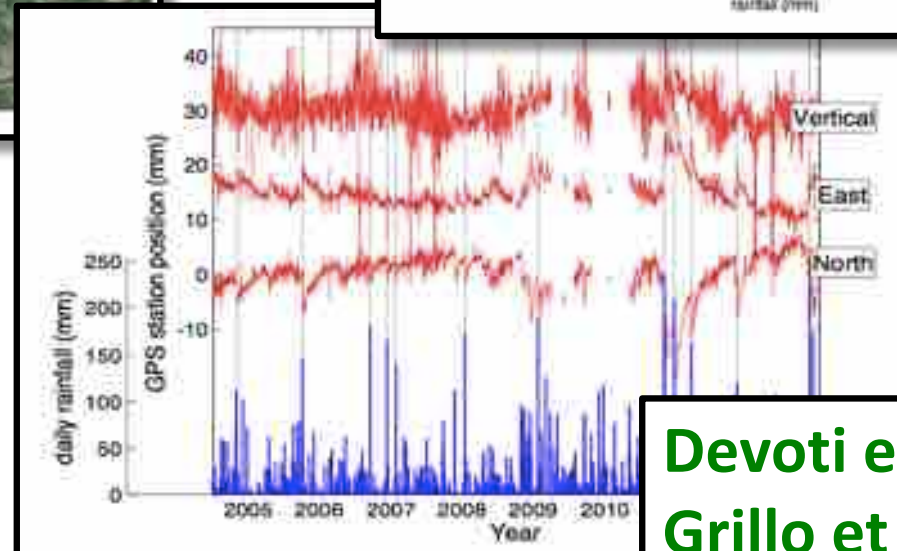
Rossi et al. 2016,2018

- GNSS data improve seismological observation;
- time series analysis reveal different physical phenomena.

Applications 2: hydrologically induced deformations

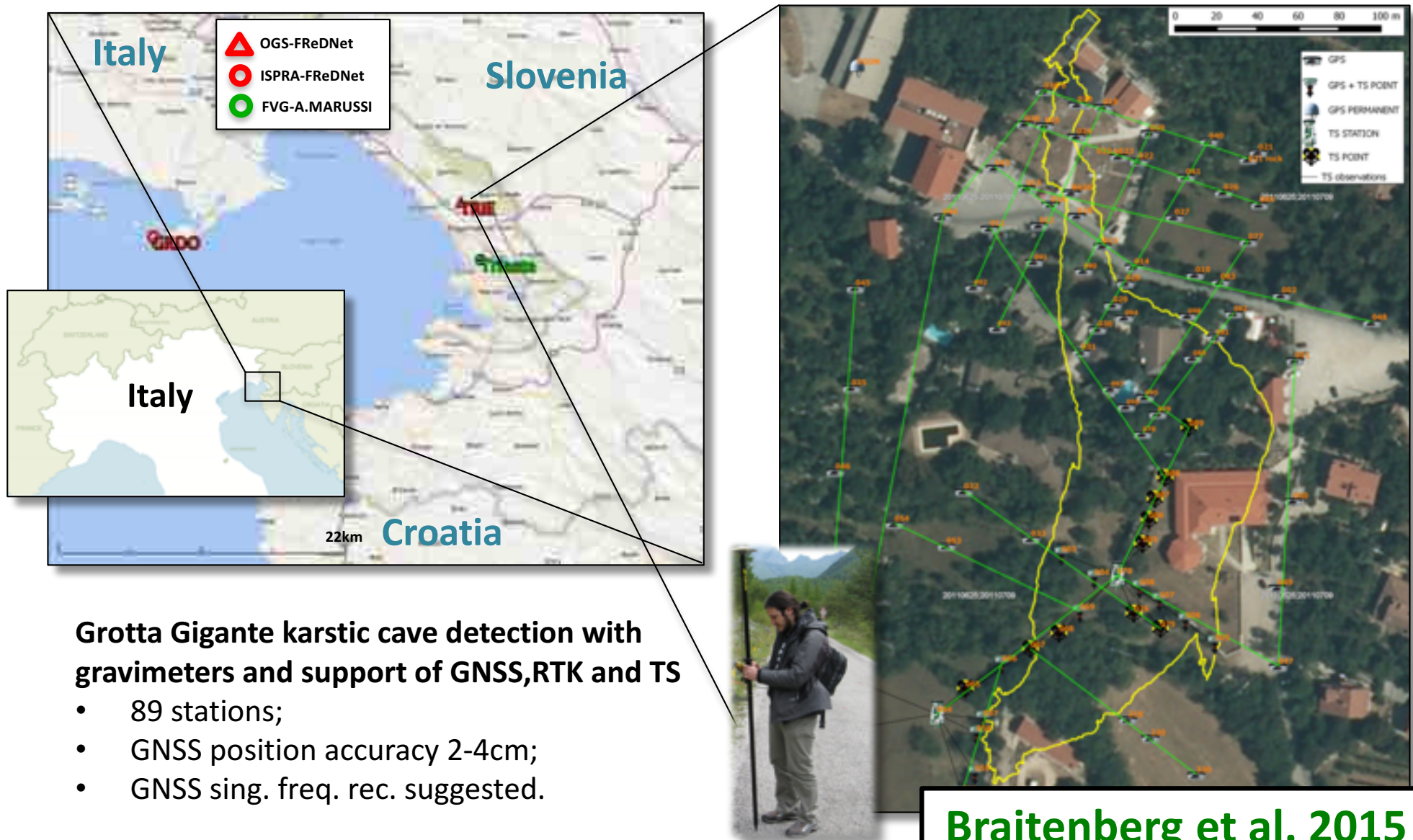


Hydrologically induced slope deformations detected by GPS and clinometric surveys in the Cansiglio Plateau, southern Alps. In collaboration with INGV and University of Trieste.

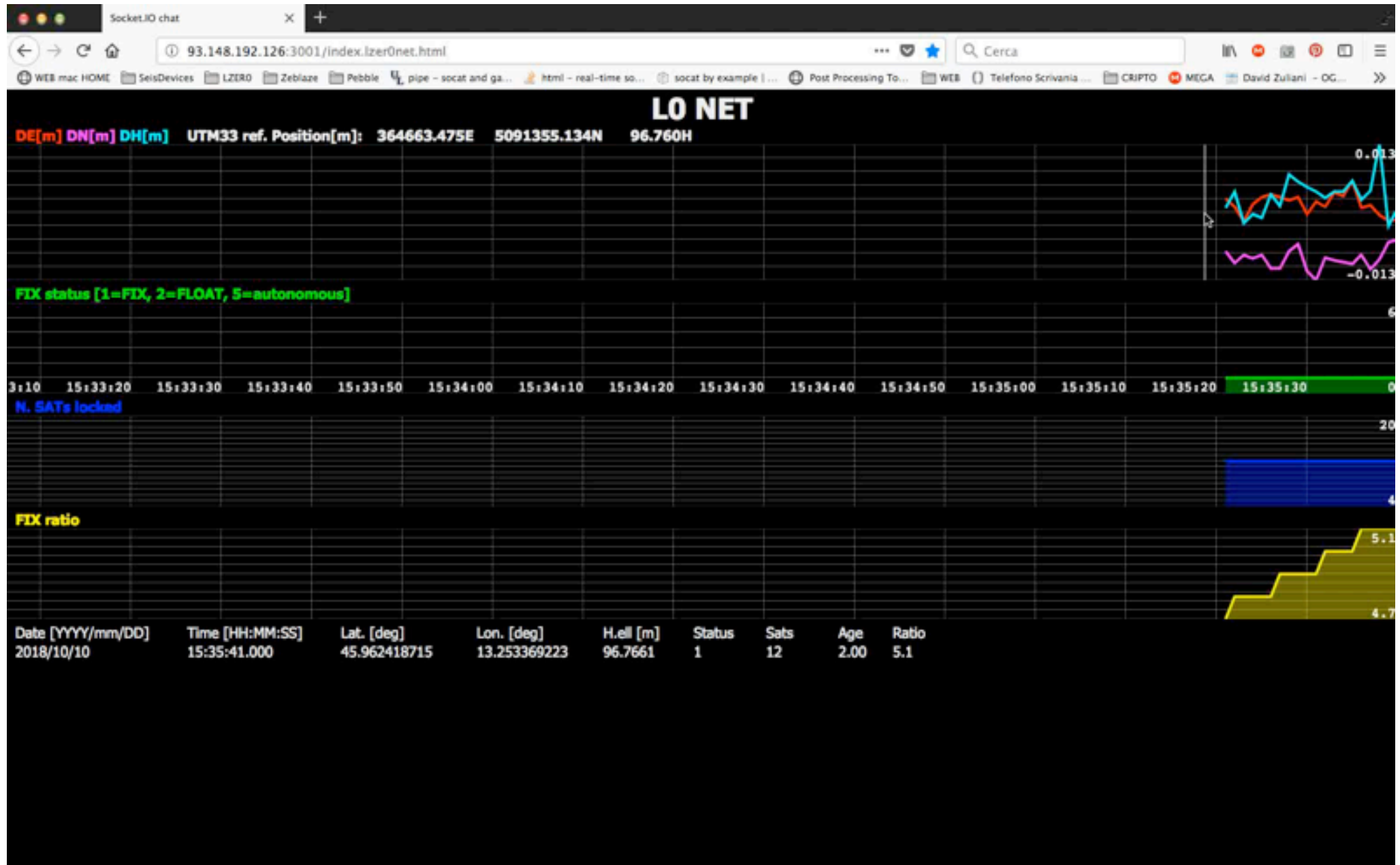


Devoti et al. 2015
Grillo et al. 2018

Applications 3: support for campaign measures (gravimetry)



Developments



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- **Tolmezzo Municipality** (UD), Italy



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Conclusions

- Detailed GNSS analysis, needed for crustal deformation, can reveal karstic phenomena;
- real time GNSS services are fast and accurate enough to support gravimetry for karstic cave detection;
- development of cost effective GNSS devices and methods is wished.

<http://frednet.crs.inogs.it>

Thank you