Activities at the LAC and D-LAC UPAD

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- Network organization
- Network data management and processing for EPN Densification
- Time series, velocities
- Strain rate on seismogenic faults
- multiGNSS
- Conclusions

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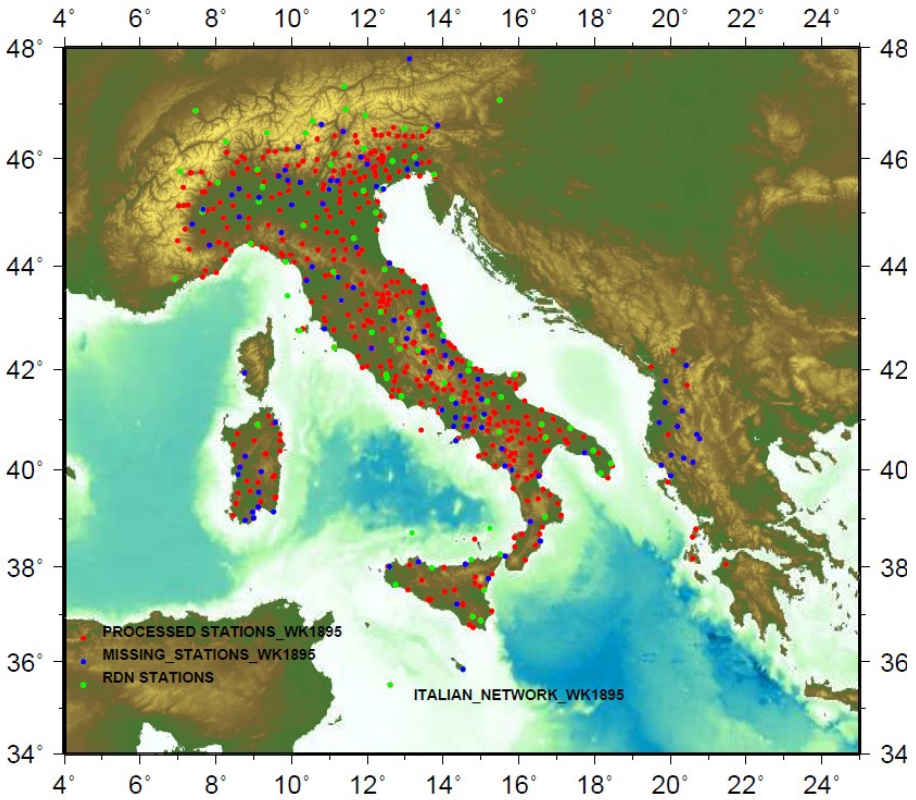
RINEX data are polled daily from a variety of FTP repositories in Italy and neighboring areas

- BKG
- BEV
- ASI
- IGMI-RDN (Rete Dinamica Nazionale)
- TPOS (Provincia Autonoma di Trento)
- STPOS (Provincia Autonoma di Bolzano)
- SMARTNET (Rete GNSS nazionale Leica Geosystems)
- NETGEO (Rete GNSS nazionale Topcon)
- SPIN (Rete interregionale GNSS Piemonte-Lombardia)
- Rete GNSS Regione Abruzzo
- Rete GNSS Regione Puglia
- Rete GNSS Regione Umbria Rete GNSS Regione Friuli Venezia Giulia
- Rete GNSS INOGS
- INGV (Istituto Nazionale di Geofisica e Vulcanologia)
- Rete GNSS NOA (Grecia)
- Rete IGEWE (Albania)
- Rete ALBPOS (Albania)



Close collaboration with the national Mapping Agencies IGM and Cadastre for a dense backbone of the Italian network validated by EUREF in 2009.

Reference for mountpoint coordinates of Regional RTK networks, in Italy and neighbor Countries solution numbers

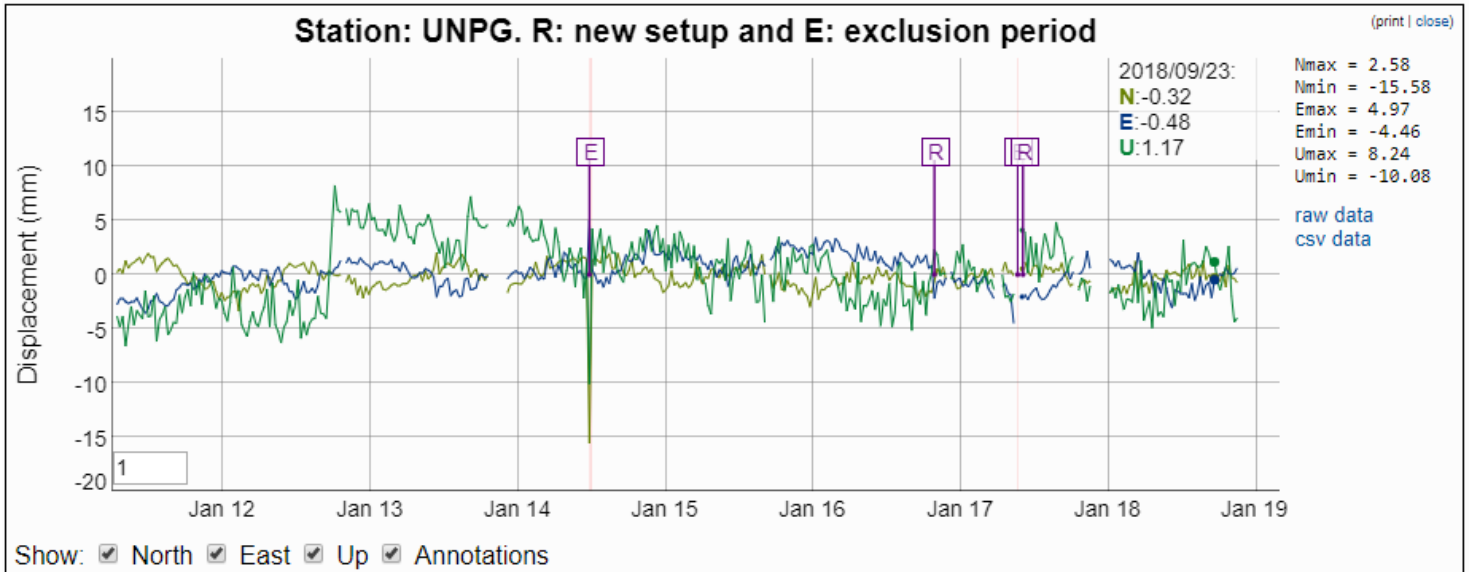
Data management for the Italian network (D-LAC)

- Repository
- Densification of Rete Dinamica Nazionale (RDN)
- Time series and update of the velocities (weekly)
- Logfile management (IGS style):
  - Daily check Rinex header/ Logsheet -> diagnostic mail to station manager
  - Validation of 4 char ID against IGN data base (thanks to Bruno Gayrat!)
  - Keep track of which site we downolad from which FTP server
- Daily processing is Rapid/Final IGS orbits
- Check that estimated coordinates agree with the predicted ones -> diagnostic mail to station manager
- Publish weekly Bullettin with updated coordinates (Geodetic and UTM, ETRF2000/WGS84)
- Send results to the WGs of EUREF
- Stack new NQ0 to the previous ones and update coordinates, velocities, solution numbers (if necessary)
- Update Web site

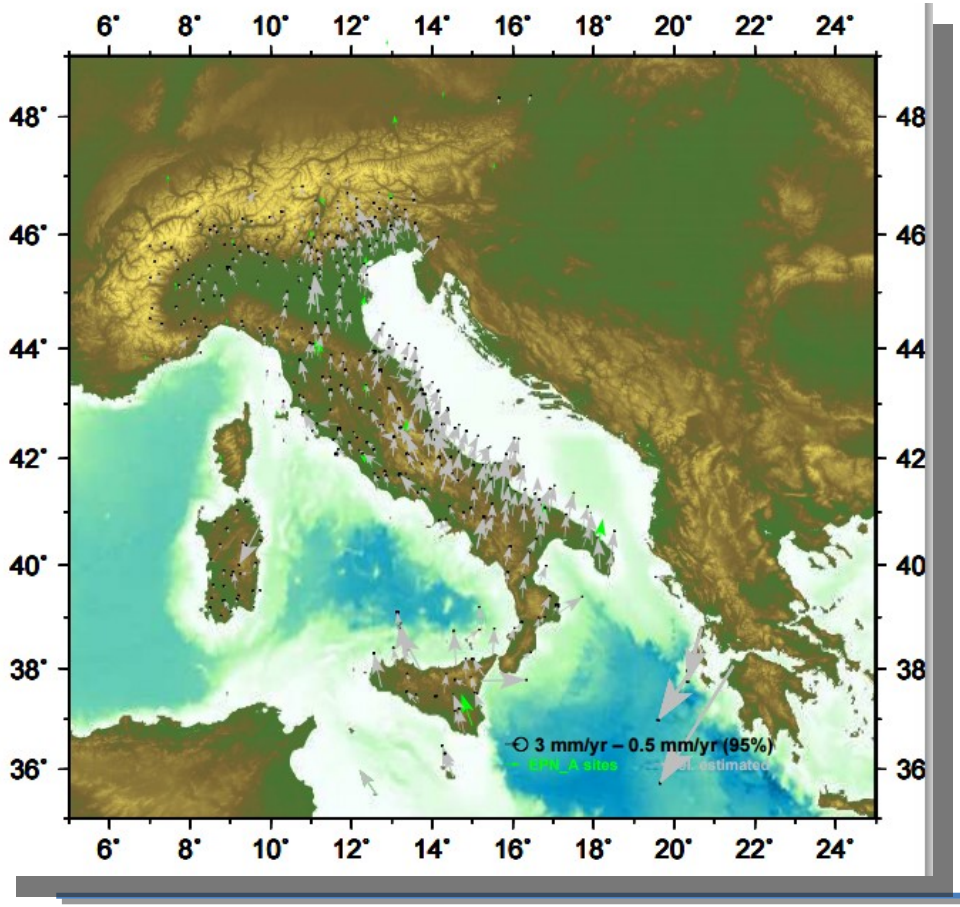
- Management of RTK network of Regione Veneto (30 sites G+G, free)

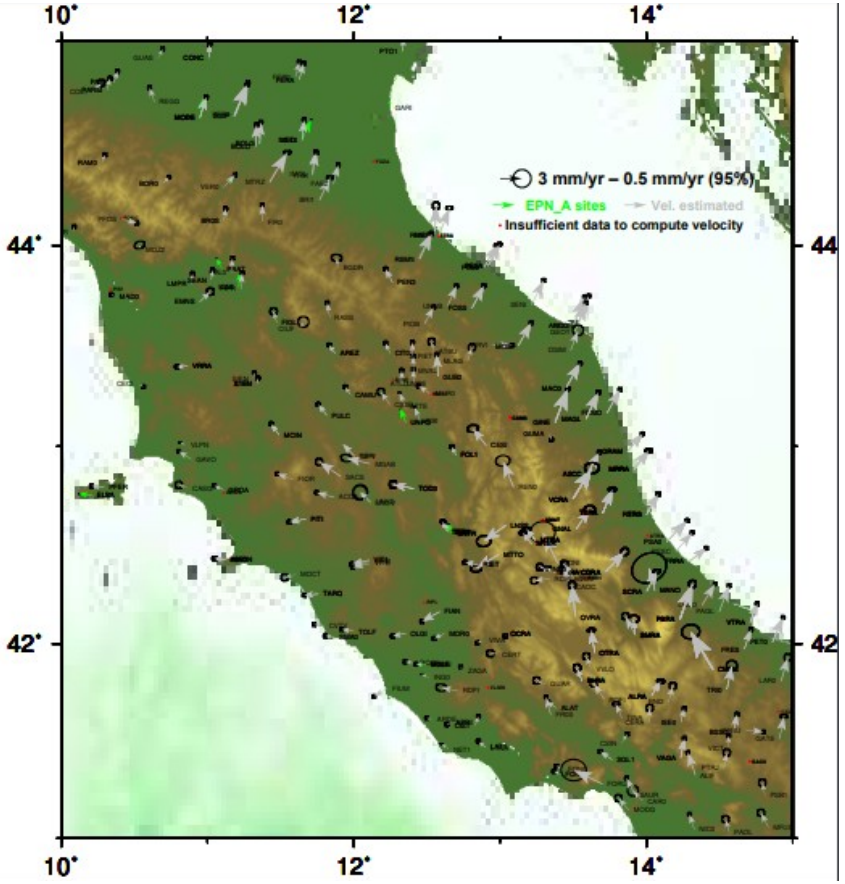
Time series

- Analysis of the time series (semi-automated) since gpswk 1632 (IGb08 compliant)
  - Detect offsets of more than 3 sigma
  - Decide on RESET new solution number
  - Decide on REMOVE
  - Graphics linked to STA file (important!)

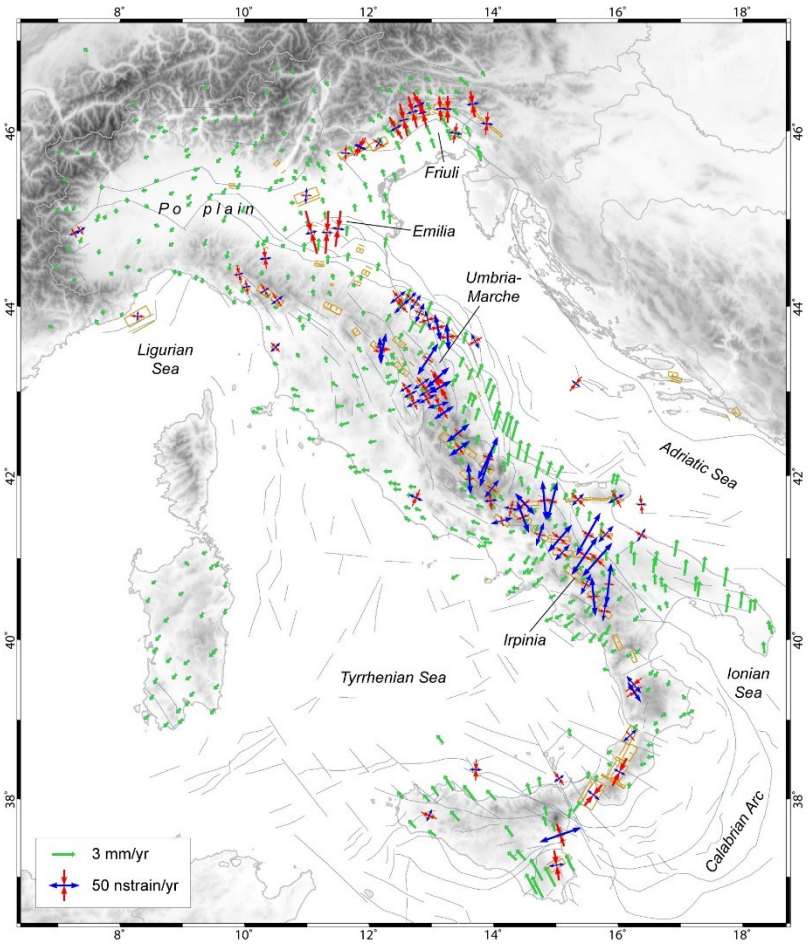


Update velocities in 3D



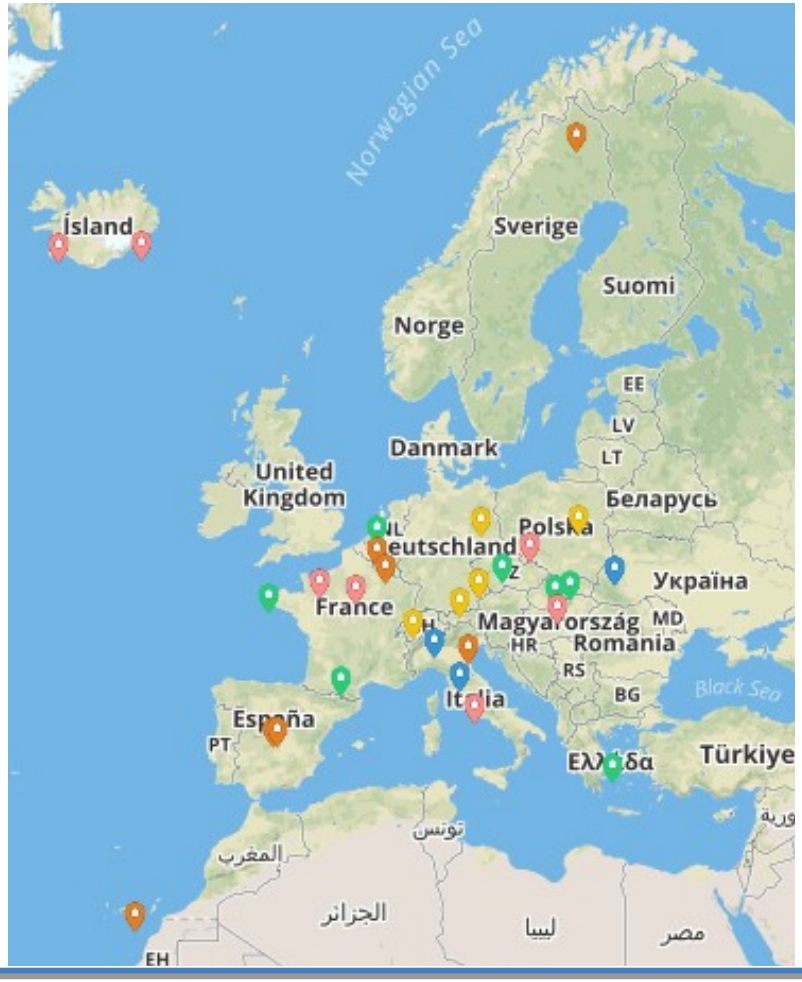


How does stress build up on seismogenic faults?



32 multiGNSS permanent sites with different commercial receivers/antennas/firmware

- Daily processing of RINEX obs/nav
- Estimate epochwise
  - time offset to GPS time for each GNSS (Glonass, Galileo, BeiDou, QZSS, NAVIC, SBAS)
  - TZD
  - Coordinates
  - Postfit range residuals
- Receivers: Trimble, Leica, Septentrio, Topcon, Javad (+Stonex)



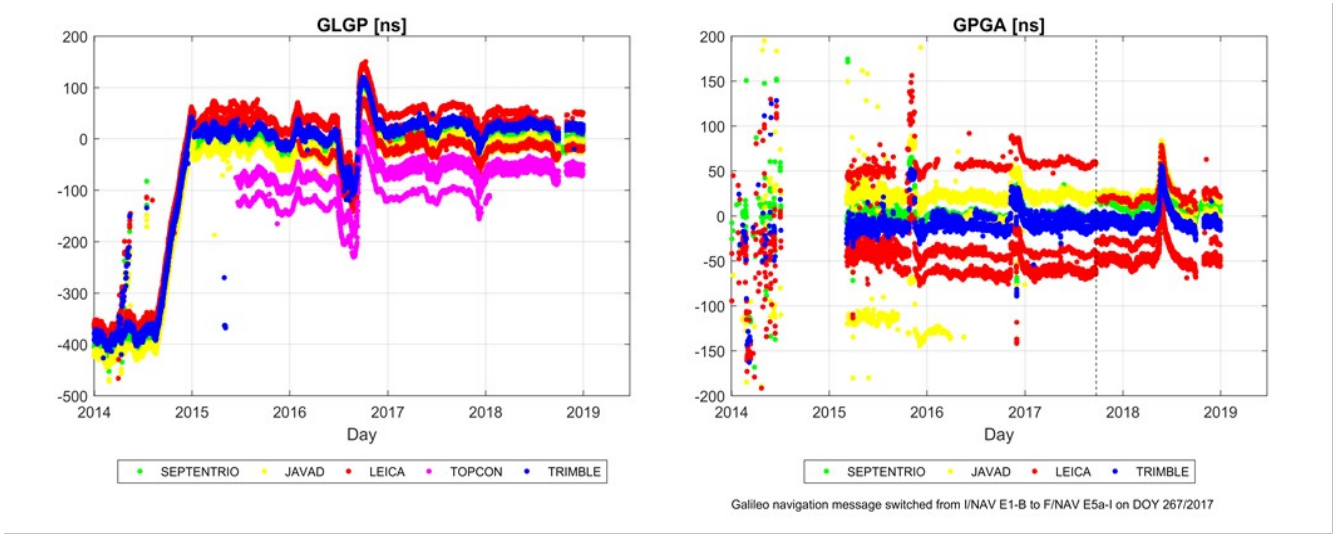
Input Data

Static receivers -> sample at 15 min, synchronous with SP3 epochs; at each epoch solve for coords, clock, TZD
Pseudoranges/carrier phases combined in iono free mode

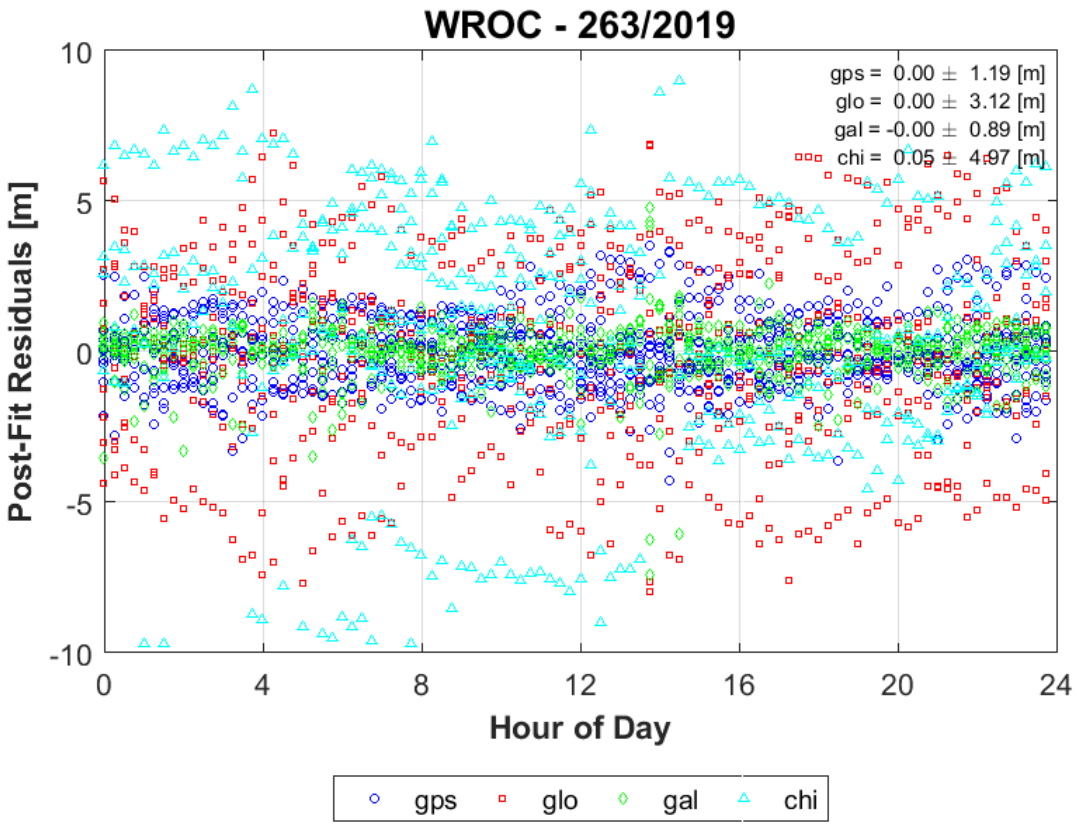
	Carrier/Frequency [MHz]		Coding in RINEX 3.03		
GPS	L1 (1575.42)	L2 (1227.60)	C1C	C2W	
GLONASS	G1 (1602+k*9/16)	G2 (1246+k*7/16)	C1C	C2P	
Galileo	E1 (1575.42)	E5b (1207.14)	C1	C7I/C7Q/C7X	I/NAV
	E1 (1575.42)	E5a (1176.45)	C1	C5I/C5Q/C5X	F/NAV
BeiDou	B1 (1561.098)	B2 (1207.14)	C1I	C7I	
QZSS	L1 (1575.42)	L2 (1227.60)	C1C	C2S/C2L/C2X	
NAVIC	L5 (1176.45)	S (2492.028)	C5A	C9A/C9B/C9C	
SBAS (GAGAN)	L1 (1575.42)	L5 (1176.45)	C1C	C5I	

According to Rinex version 3.03, tables 4-10.

GNSS Time offsets to GPS measured by different (32 receivers of 5 manufacturers) receivers



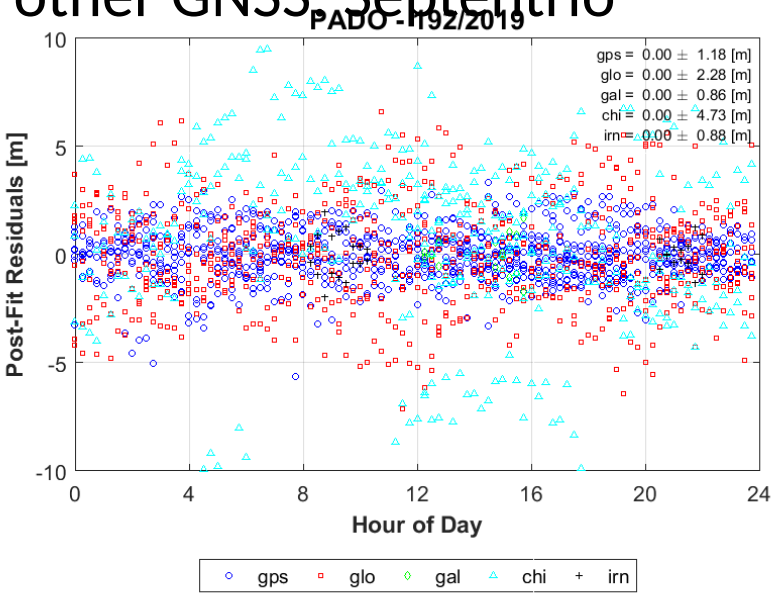
Leica Receiver

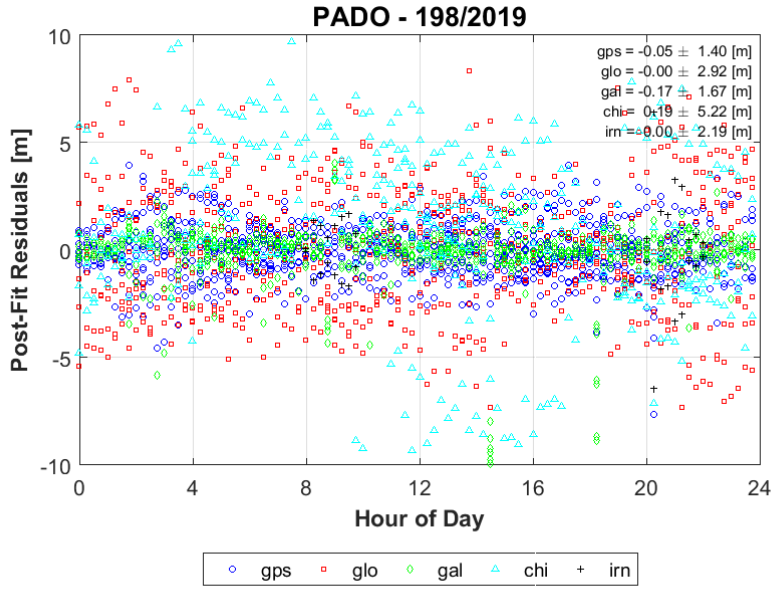


Range residuals of Galileo relative to other GNSS: Septentrio

Range residuals on July 11 (top) and July 17 (bottom): nominal accuracy of Galileo

No calculation was possible on doys 193 to 197 due to unavailability of the Galileo broadcast ephemeris





Conclusion:

- Dense (660+) GNSS network within the EPN: compliance with EPN standards
- Maintenance of coordinates, logsheets. Mountpoints of regional RTK networks can be updated.
- Updates of velocities, eigenvectors of strain rate matrix is computed at the epicenters of known seismic events.
- Monitor how well faults absorb energy from the regional stress field

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