Italian GNSS network: status of the processing and position/velocity results

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Introduction

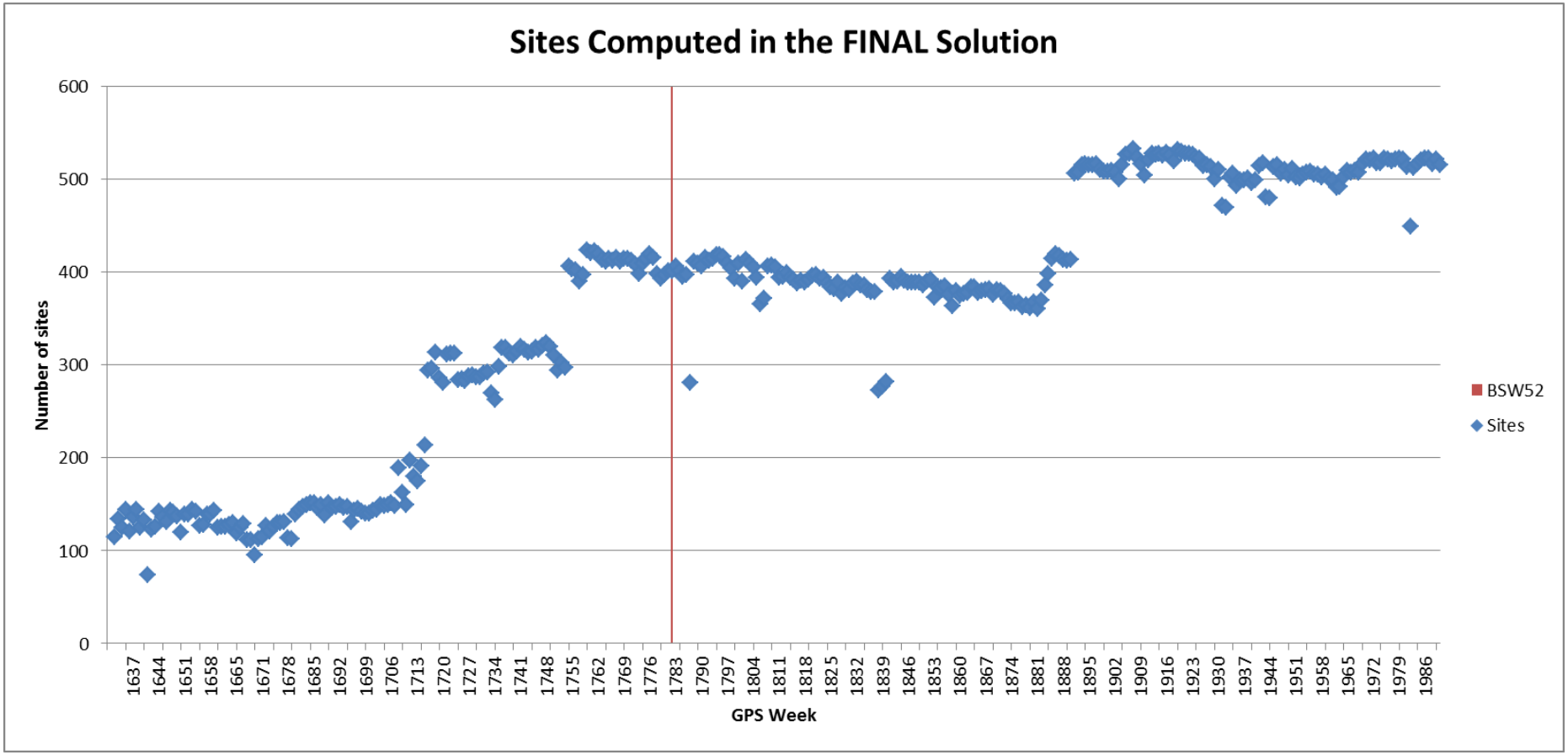
The Italian GNSS Network is a multi-purpose network whose major goals are:

- Densify the European Reference Frame in Italy (contributing to EPN D).
- Must be compatible with the requirements of the National Cadastre, Geodetic and Mapping Agencies.
- Must serve to the geophysical community to monitor crustal deformations.
- Fully include the “Rete GPS della Regione Veneto” to give RTK users accurate solutions in official frames.

The processing of the Italian GNSS Network is done following the EUREF standards and the software used in Bernese 5.2 from GPS week 1784 included (BSW5.0 was used before).
The GNSS sites are subdivided in 13 regional clusters.
Two solutions are daily computed: RAPID and FINAL (CODE products).

An «increasing» Network

Since GPS week 1891, the number of sites computed in the FINAL weekly solution (around 520) is quite stable (status at 2018-03-21).
Data before than GPSW 1632 (2011-04-17) are also available, but not used in our analysis as non IGb08 compliant.



Relationship with other GNSS Networks

The Italian GNSS Network is a densification of the RDN (Italian level: National official realization of the ETRS89 in Italy) and EPN (EUREF level) since Permanent stations of both Organizations are used in the analysis.

Also it contributes to the CEGRN Network.

To verify the alignment to the EPN, the Helmert parameters of the A Class stations included in the analysis are regularly monitored.

The reference files (releases Cxxxx of the cumulative solutions) that the EPNCB maintains are updated regularly to have always the latest available version and use it in both: daily/weekly analysis and cumulative solution.

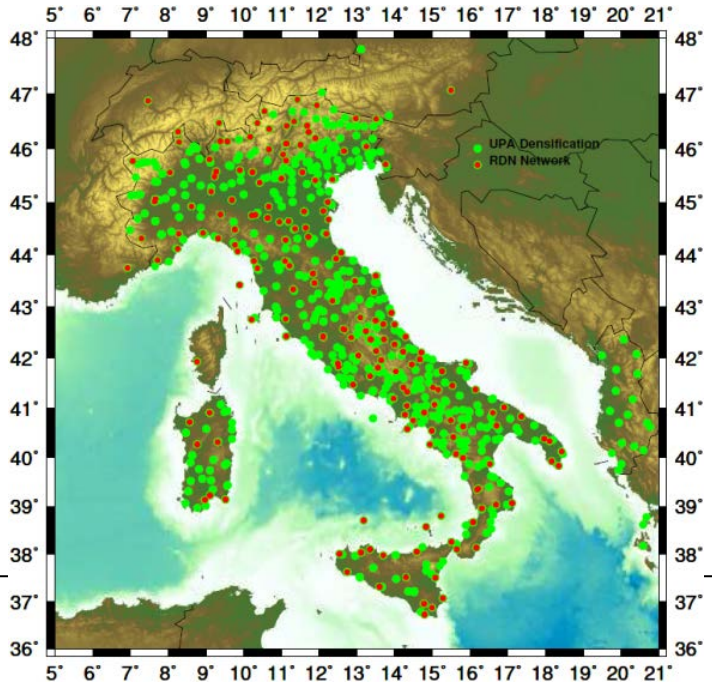
Relationship with other GNSS Networks: RDN

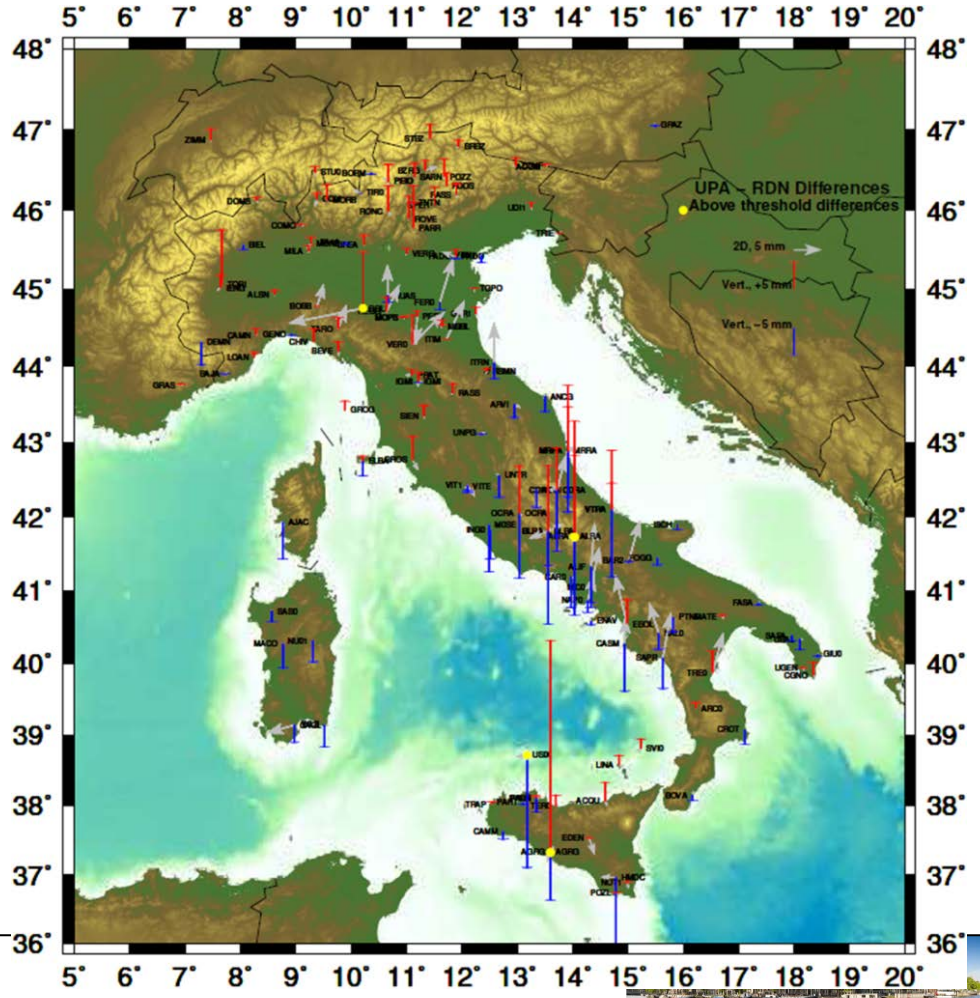
149 Permanent GNSS sites in the period of 2012-12-30 to 2016-10-22, both days included (GPS weeks 1721 to 1919, both included). To check the quality/alignment between both sets of coordinates, we set a threshold of 10, 10 and 20 mm for North, East, and Up respectively (4 stations exceeded the threshold), at epoch 2015.0, we get the following statistics (in mm):

		N	E	Up
RMS / COMPONENT		2.51	1.16	4.93
MEAN		0.93	0.37	-0.39
MIN		-4.79	-4.78	-19.32
MAX		9.19	6.00	14.76

Only 4 solutions exceed the thresholds:

STATION	RESIDUALS (mm)		
	N	E	U
AGRG119584M001	-1.22	-0.89	38.33
ALRA219565M001	-0.51	-0.38	20.89
COL1 18530M001	-2.23	-13.26	10.11
USIX 18798M001	-0.06	-1.57	-20.44



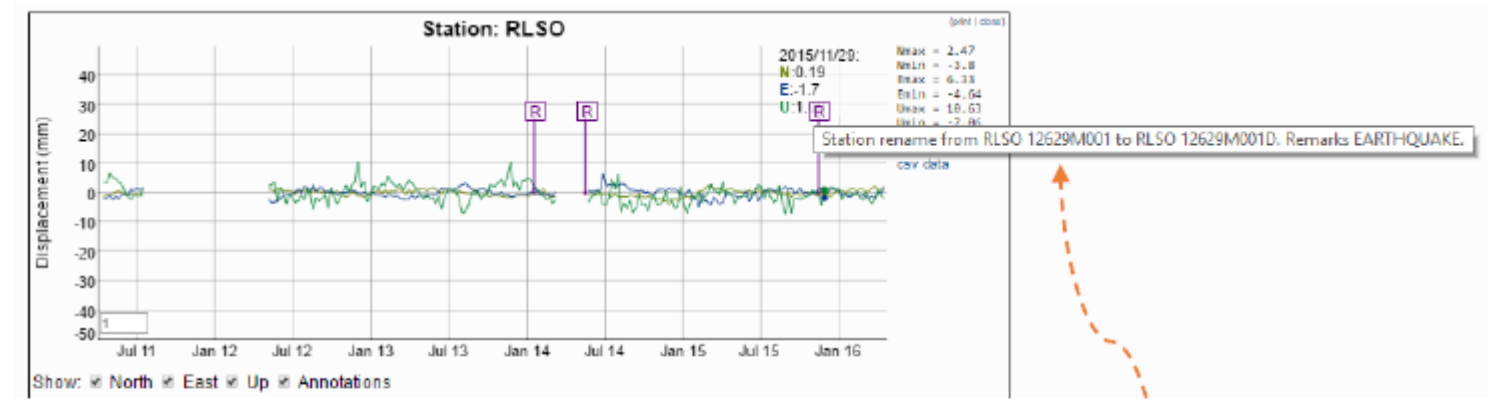


Long Term Solutions

Long term analysis and products are some of the major goals of the Italian GNSS Network.

Weekly, the full cumulative solution is computed. Time series of all the stations, including the decommissioned ones, are shown in: http://147.162.229.63/scidata/

The information on the plots is linked to the STA file used in the cumulative solution:

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PULC119037M001      001                          2014 02 15 23 59 59  PULC 19037M001
PULC219037M001      001  2014 02 16 00 00 00                          PULC 19037M001
RLSO 12629M001A     001                          2014 01 18 23 59 59  RLSO 12629M001
RLSO 12629M001B     001  2014 01 19 00 00 00     2014 05 17 23 59 59  RLSO 12629M001
RLSO 12629M001C     001  2014 05 18 00 00 00     2015 11 14 23 59 59  RLSO 12629M001
RLSO 12629M001D     001  2015 11 15 00 00 00                          RLSO 12629M001   EARTHQUAKE
ROVI112769M001      001                          2011 11 27 00 00 00  ROVI 12769M001
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Long Term Solutions

All the time series can easily be enabled/disabled by a selection box and different zooming options for both axes (date vs residuals) are allowed:

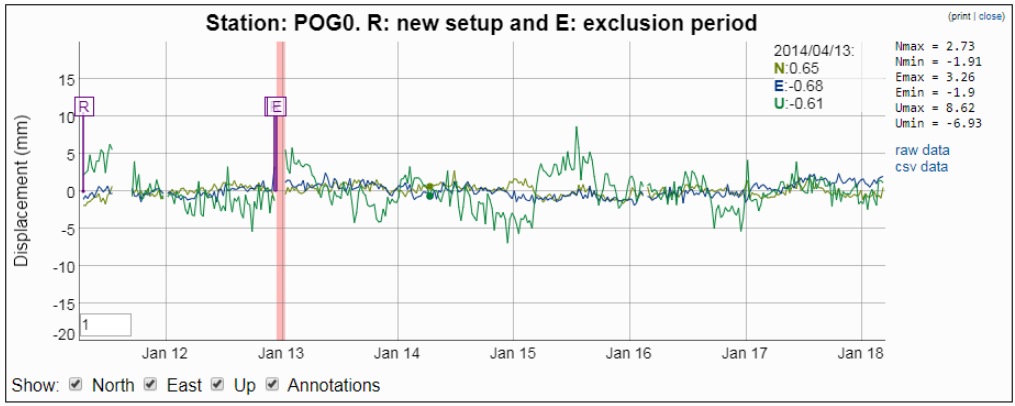
SERIE STORICHE STAZIONI GPS ITALIANE

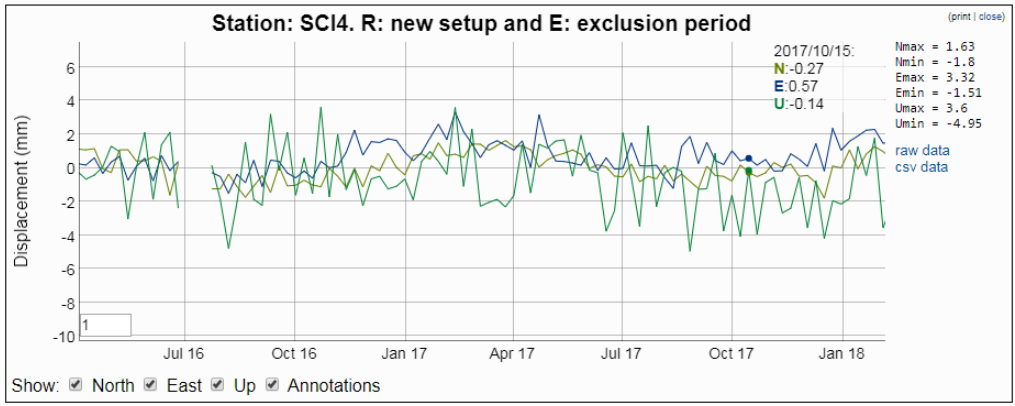
La visualizzazione delle serie storiche sfrutta alcune funzionalità avanzate dello standard HTML5.
Per la corretta visualizzazione della pagina è dunque necessario utilizzare un browser aggiornato.

Selezionando un'area del grafico col mouse è possibile zoomarla.
Tenendo premuto il tasto ALT è possibile muovere l'area del grafico visualizzata.
Un doppio click riporta il grafico allo stato originale.

Serie da visualizzare (totale: 660):

ABAS	ACCA	ACCE	ACER	ACOM	ACQA	ACQU	ADRA	AFAL	AGNE	AGRG	AJAC	ALAT							
ALB0	ALE0	ALIF	ALIN	ALRA	ALSN	ALT0	AMAP	AMAT	AMU0	ANCG	ANCN	ANT1							
AO01	AOST	APRI	AQRA	AQUI	AQUM	ARBU	ARC0	ARDE	AREZ	ARVI	ARZA	ASCC							
ASIA	ASTI	ATBU	ATLO	ATRA	ATTE	AULL	AVE1	AVE2	AVE3	AVE4	AVET	BACU							
BAJA	BAR2	BAR5	BASS	BELP	BERA	BEVE	BGDR	BIEL	BL01	BLNO	BLRA	BOBB							
BOCN	BOLC	BOLG	BOLO	BOLZ	BON1	BOR0	BOR2	BORC	BORM	BOVA	BR0N	BR0S							
BRBZ	BRDI	BREA	BREU	BRGM	BRI1	BRIX	BRNO	BRSE	BRU0	BSSO	BTAC	BUDO							
BUL0	BUSL	BVDR	BZRG	CA02	CA04	CA05	CABU	CAEF	CAFE	CAFV	CAG1	CAGI							
CAGL	CAGZ	CAL0	CALT	CAM3	CAMM	CAMN	CAMU	CANL	CANV	CAOC	CAR0	CAR1							
CARZ	CASG	CASM	CATZ	CAVI	CDRA	CDRU	CECI	CELI	CELL	CERA	CERT	CESI							
CGIA	CGNO	CHIA	CHIV	CHMP	CHRI	CHTN	CIAM	CIGN	CIPV	CIST	CIT0	CITT							
CIUF	CMPR	CMRA	CNTU	CODR	COL1	COLI	COMO	CONC	CONI	COR0	CRAC	CREA							
CREM	CROT	CRRR	CRSN	CRSP	CSIN	CSSB	CTAC	CUCC	CUOR	CURN	CUT2	CVTV							
DARF	DEMN	DEVE	DOMS	EBOL	EDEN	EIIV	ELBA	EMNS	ENAV	ERIC	FAEZ	FASA							
FDOS	FELT	FER0	FERA	FIAN	FIGL	FIOR	FIPR	FIR0	FISC	FIUM	FLDT	FOGG							
FOL1	FON0	FOND	FORU	FOSC	FOSS	FOZA	FR0S	FRES	FRMO	FRRA	FUSE	FVRA							
GAIR	GARI	GATE	GAVO	GAZZ	GBLM	GENA	GENO	GENU	GENV	GEOT	GI0I	GINE							
GINO	GIU0	GNAL	GODU	GOZZ	GR0T	GRA0	GRAM	GRAS	GRAZ	GRDO	GRO1	GROA							
GROG	GROS	GRS1	GRSN	GUAR	GUAS	GUB2	GUMA	HELM	HIMA	HMDC	IENG	IGLE							
IGMI	IMOL	IMP3	ING0	INGP	ISCH	ISE0	ISIL	ITIM	ITR2	ITRA	ITRN	JOAN							
JOPP	KAS0	L0DI	LAME	LAMP	LAMZ	LANO	LANU	LAR0	LAS0	LAT1	LDNS	LEC0							
LECO	LEG1	LEGO	LERO	LESU	LINA	LINZ	LMPR	LNSS	LOAN	LOD0	LTNA	LUC0							
LUIN	M0NC	M0SE	MA0A	MABZ	MAC0	MACA	MACO	MAD0	MAGL	MAL0	MAL3	MALQ							
MANF	MANO	MANT	MAON	MAR0	MASL	MAT0	MAT1	MATE	MATG	MAVE	MCEL	MCIN							
MCRV	MDEA	MEDI	MEL1	MELA	MENG	MFUS	MGAB	MGRD	MIL0	MILA	MILO	MITT							

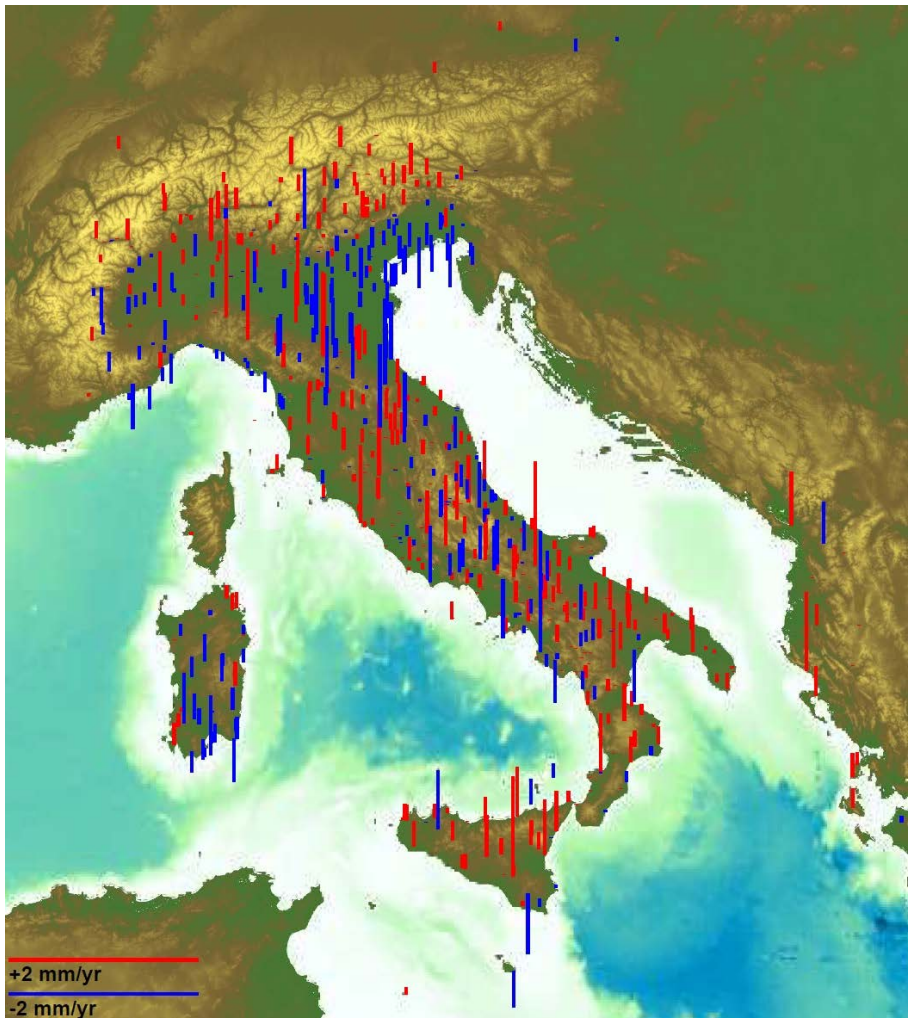




Long Term Solutions: velocities

Horizontal ETRF2000 displacements

Vertical rates



Conclusions

The Italian GNSS Network contributes to several National and International Networks: EPN Densification, EUREF, CEGRN and RDN.

The Italian GNSS Network supports two approaches: daily/weekly and cumulative.

We compute strictly following EPN guidelines and we also take advantage of the numerous IGS products (software included).

Interactive feedback between the AC and the data providers/Agencies is one of our major achievements in order to keep all the logsheets updated.

Our STA file and weekly/cumulative SINEX files are made available to other WGs: Densification (Ambrus Kenyeres), Deformation (Martin Lidberg) and Dense Velocity Field (Elmar Brockmann).

Thank you for your attention