Agenzia Spaziale Italiana (ASI)

ASI - CGS Local Analysis Center Report

C.Ferraro, F. Vespe
CGS - Telespazio SpA, Centro di Geodesia Spaziale, Matera, Italy

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News about ASI-CGS contribution to EUREF:

More stations into the processing flow:

Santander (CANT) for EUREF
Dubrovnik (DUBR)for EUREF
Sarajevo (SRJV) for EUREF
Camerino (CAME) for EUREF
Prato (PRAT) for the Italian national network
Elba (ELBA) for the Italian national network
Reggio Calabria (TGRC) for the Italian national network

Production/delivery of sinex tropospheric files

ASI-CGS has jointed the recent EUREF proposal to contribute to a first test to obtain a post-processed EUREF ZTD product.

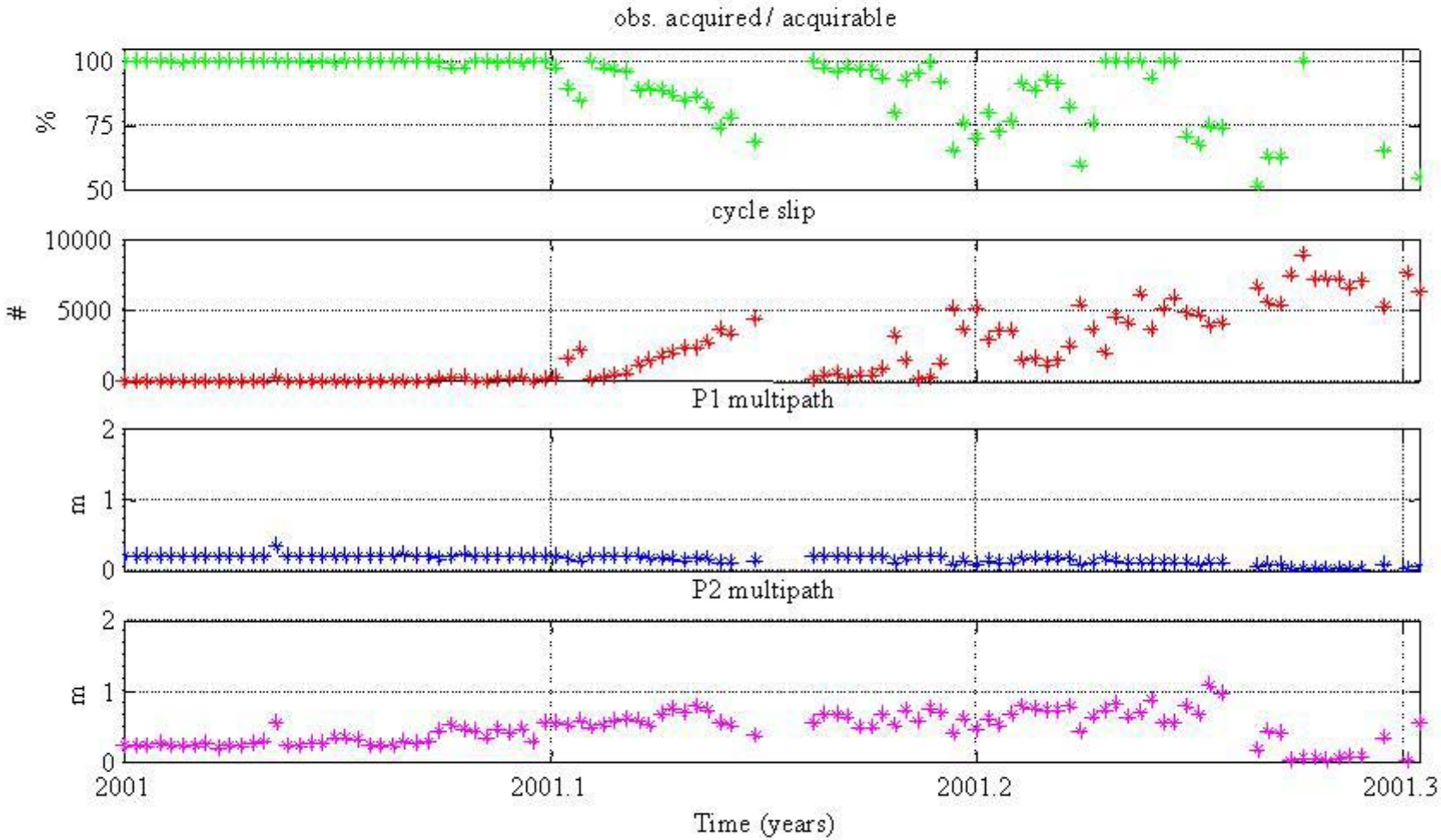
Problem arisen in ASI-CGS weekly solution:

- Starting from doy 040/2001 station of VILL (Villafranca, Spain) has showen large residuals in ASI solution w.r.t. the combined one (about 1, 2 order of magnitude);

- checks over the processing setup and general inputs have been made, in order to find the cause of this problem with unsuccessful results;

- checks over the quality parameters coming from daily analysis of QC sw have showen an high number of very large cycle slips with low percentage of observations acquired: this avoid MicroCosm algorithm of cicle slips detection/fixing to work well and, as consequence, no double difference has been created for VILL station.

VILL:daily quality parameters



Last activities about ASI-CGS GPS time series analysis:

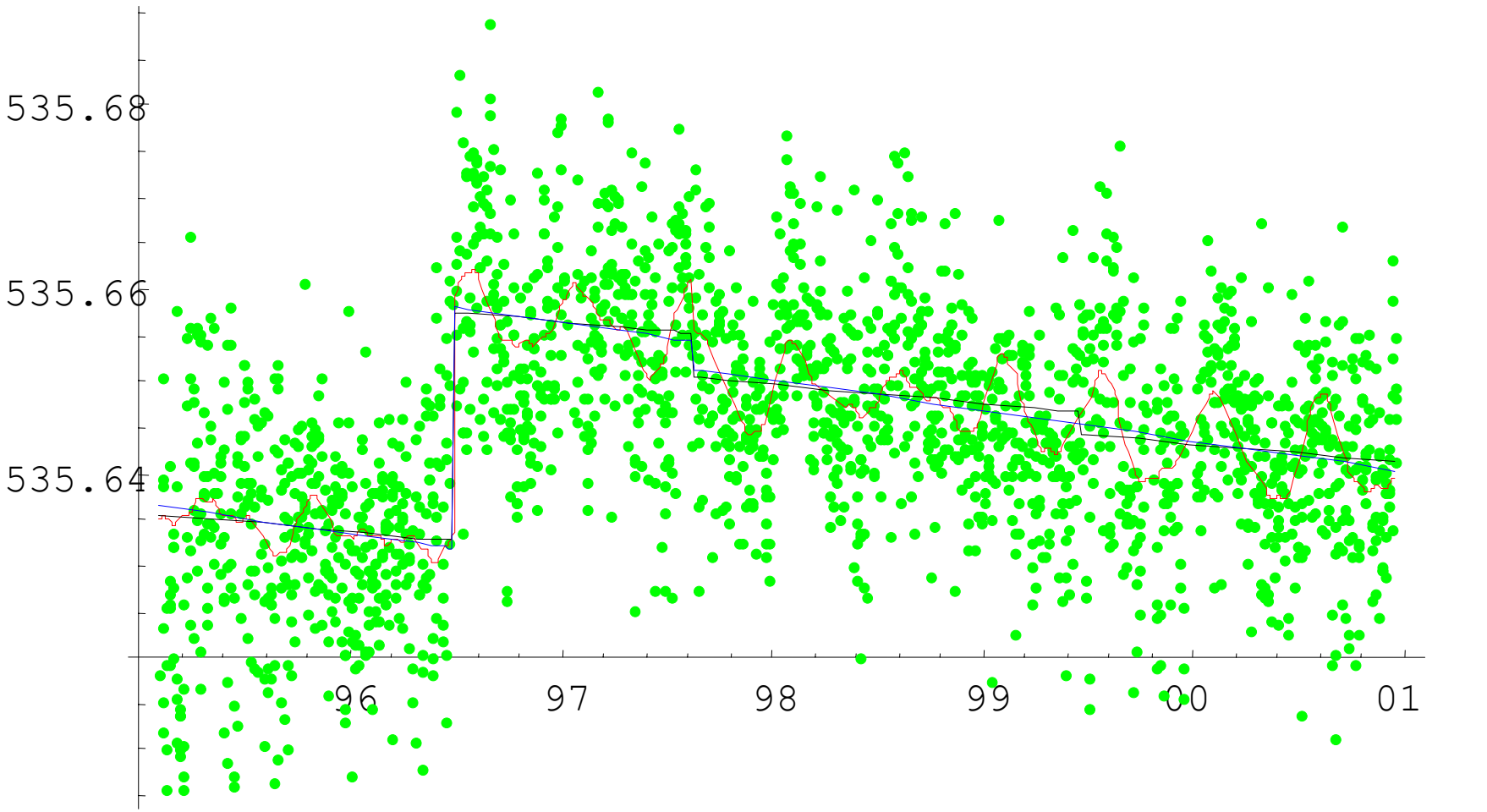
• Long time series from some Italian sites obtained with two different analysis approaches: "*Network*" and "*Precise Point Positioning*": comparison between them;

• More detailed analyses of long time series have been performed in order to check if the velocities obtained are due only to geodynamical signal, in particular for the height component.

Approach for the Evaluation of Height Velocities

- Identification of jumps mainly due to replacement or displacement of the antenna;
- Iterative Outliers Rejection (Δ between data and fitted slope+jumps > 3 rms of the fit);
- Use of FFT (other algorithms are investigating) applied to final residuals to identify possible harmonic signatures in the time series;
- Non linear fit for final assessment of the main harmonics;
- Final estimation of the slope together with jumps, amplitudes and phase of the selected harmonics;
- Test on four Italian stations: Cagliari, Matera, Medicina, Noto.

MATERA


Plot of slope+jumps + harmonics
Slope +jumps without harmonics (v1)
Slope +jumps with harmonics (v2)
535.68
535.66
535.64
96
97
98
99
00
01

Matera

V1= -3.3±0.5 mm/yr rms=10.5 mm

V2= -2.0±0.5 mm/yr rms=10.0 mm

Period (days)	amp (mm)
219	1.6
182	**4.4**
134	1.3
92	1.1

Cagliari

V1= -3.61±0.36 mm/yr rms=12.5 mm

V2= -3.64±0.35 mm/yr rms=12.0 mm

Period (days)	amp (mm)
359	2.2
180	**3.7**
121	1.8

Noto

V1= -5.22±0.40 mm/yr rms=13.2 mm

V2= -5.26±0.40 mm/yr rms=12.8 mm

Period (days)	amp (mm)
251	1.8
219	1.6
182	**3.3**
120	1.6

Medicina

V1= -5.44±0.28 mm/yr rms=9.5 mm

V2= -[illegible]±0.27 mm/yr rms=9.2 mm

Period (days)	amp (mm)
182	**2.0**
122	2.1
88	1.5

Conclusive Remarks

•Upgrade in ASI-CGS EUREF products;

•A more detailed investigation of time series is necessary to make reliable velocities of the sites for geodynamical purposes: starting from the longest time series we have checked the rates of the up component;

•This analysis has showen that jumps could produce changes in the slope if they are not taken into account correctly; the periodic signals seem to not disturb the evaluation of the geodynamical signal when the time series is “plane” (without discontinuities) (see Noto, Medicina and Cagliari); on the contrary, when large jump(s) is(are) present on it, velocities could be significatively different with or without the harmonic evaluation (see Matera);

•The periodic signals found into the time series analysed have been characterised with frequency and amplitude and the strongest one seems to be the harmonic with period of 180 days.