

Matera CGS VLBI Analysis Center

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Abstract This paper reports the VLBI data analysis activities at the Space Geodesy Center (CGS) of the Italian Space Agency (ASI) in Matera, from January 2019 through December 2020, and the contributions that the CGS intends to provide for the future as an IVS Analysis Center.

1 General Information

The CGS VLBI Analysis Center is located at the Matera VLBI station close to the town of Matera in the middle south of Italy. The Matera VLBI station became operational at the ASI/CGS in May 1990. Since then, it has been active in the framework of the most important international programs. The CGS, operated by E-GEOS S.p.A. (an ASI/Telespazio company) under an ASI contract, provides full scientific and operational support using the main space geodetic techniques: VLBI, SLR, and GPS. The work presented in this report is carried out by the E-GEOS staff consisting of Roberto Lanotte and Simona Di Tomaso.

2 Activities during the Past Years

During 2019-2020, the following activities were performed at CGS:

1. E-GEOS S.p.A., Centro di Geodesia Spaziale
2. Italian Space Agency, Centro di Geodesia Spaziale

CGS Analysis Center

IVS 2019+2020 Biennial Report

- Global VLBI Solutions asi2019a and asi2020a. In these years we continued the annual realization of global VLBI solutions. The solutions are named asi2019a and 2020a and were realized using the CALC/SOLVE software developed at NASA/GSFC. The main and final characteristics of them are:

asi2019a:

- Data span: 1984.01.04–2018.12.29 for a total of 5,080 sessions.
- Estimated Parameters:
 - Celestial Frame: Right ascension and declination as global parameters for 3,850 sources,
 - Terrestrial Frame: Coordinates and velocities for 92 stations as global parameters, and
 - Earth Orientation: X pole, Y pole, UT1, Xp rate, Yp rate, UT1 rate, dX, and dY.

asi2020a:

- Data span: 1981.11.18–2019.12.20 for a total of 3,689 sessions.
- Estimated Parameters:
 - Celestial Frame: Right ascension and declination as global parameters for 4,447 sources,
 - Terrestrial Frame: Coordinates and velocities for 59 stations as global parameters, and
 - Earth Orientation: X pole, Y pole, UT1, Xp rate, Yp rate, UT1 rate, dX, and dY.

- IVS Tropospheric Products. Regular submission of tropospheric parameters (wet and total zenith path delays, east and north horizontal gradients) for all VLBI stations observing in the IVS R1 and R4 sessions continued

during 2019–2020. Currently, 2,030 sessions were analyzed and submitted, covering the period from 2002 to 2020. The results are available at the IVS products ftp site.

- Daily Solution Files (DSNX).
Regular submission of daily sinex files for the IVS project “Daily EOP + station-coordinates solutions” continued during 2019-2020. All sessions lasting at least 18 hours were analyzed, and at the present approximately 5,900 sessions were submitted to IVS.
- CGS contribution to IVS combination for ITRF2020.
Approximately 6,600 VLBI sessions from 1979 to the end of 2020 were analyzed following the instructions provided by the IVS Analysis Coordinator, John Gipson. The produced sinex files were submitted to be included in the IVS contribution to ITRF2020.
- Software development.
We continued the development of the software “*resolve*”. The main goal of this software is the visual editing of a VLBI database. One of the reasons that led us to the development of this software was to have the capability of working on the output obtained from a run of SOLVE in BATCH mode. At present we have used *resolve* to edit approximately all of the databases of the daily sinex production.

2.1 Staff at CGS Contributing to the IVS Analysis Center

- Dr. Giuseppe Bianco, responsible for CGS/ASI (primary scientific/technical contact).
- Dr. Rosa Pacione, responsible for scientific activities, E-GEOS.
- Dr. Roberto Lanotte, geodynamics data analyst, E-GEOS.
- Dr. Simona Di Tomaso, geodynamics data analyst, E-GEOS.

3 Future Plans

- Continue and improve the realization of our global VLBI solution, providing its regular update on time.
- Continue to participate in the IVS analysis projects.