Matera CGS VLBI Analysis Center

Roberto Lanotte[1] and Franco Vespe[2]

Abstract This paper presents the VLBI data analysis activities carried out at the Space Geodesy Center (CGS) of the Italian Space Agency (ASI) in Matera from January 2023 to December 2024. It also outlines the CGS's planned future contributions as an IVS Analysis Center.

1 General Information

The CGS VLBI Analysis Center is located at the Matera VLBI station, near the town of Matera in southern Italy. Operational since May 1990, the station has been actively participating in major international geodetic programs. Managed by E-GEOS S.p.A. (a joint ASI/Telespazio company) under an ASI contract, the center provides comprehensive scientific and operational support in space geodesy, utilizing key techniques such as VLBI, SLR, and GPS. The work presented in this report has been conducted by Roberto Lanotte of the E-GEOS staff.

2 Activities During the Past Two Years

During 2023–2024, 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

- Global VLBI Solutions asi2023a and asi2024a:
  The annual realization of global VLBI solutions continued during this time period. The solutions, named asi2023a and asi2024a, were generated using the CALC/SOLVE software developed at NASA/GSFC. Below are their main characteristics:

asi2023a:

– Data span: 1980.04.11 – 2022.12.29 for a total of 6,510 sessions.
– Estimated Parameters:
  · Celestial Frame: Right ascension and declination as global parameters for 5307 sources and as local parameters for 239 sources.
  · Terrestrial Frame: Coordinates and velocities for 86 stations as global parameters and coordinates as local parameters for 70 stations.
  · Earth Orientation: X pole, Y pole, UT1, Xp rate, Yp rate, UT1 rate, dX, and dY for each session.

asi2024a:

– Data span: 1980.04.11 – 2024.06.27 for a total of 6,726 sessions.
– Estimated Parameters:
  · Celestial Frame: Right ascension and declination as global parameters for 5313 sources and as local parameters for 317 sources.
  · Terrestrial Frame: Coordinates and velocities for 91 stations as global parameters and coordinates as local parameters for 67 stations.

  - Earth Orientation: X pole, Y pole, UT1, Xp rate, Yp rate, UT1 rate, dX, and dY for each session.

- 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 2023–2024. Currently, 2380 sessions have been analyzed and submitted, covering the period from 2002 to 2024. 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 2023-2024. All sessions lasting at least 18 hours were analyzed, and at present, about 6880 sessions have been submitted to IVS.
- Participation in the ITRF2020 Update:
  CGS contributed to the ITRF2020 update by providing 585 S/X session solutions and 100 VGOS sessions.
- Editing of the Sessions:
  Session editing at CGS is performed using in-house software. Currently, nearly 100% of the databases in the daily SINEX production have been edited.

2.1 Staff at CGS Contributing to the IVS Analysis Center

Dr. Franco Vespe serves as the primary scientific and technical contact for CGS/ASI. Dr. Rosa Pacione is responsible for scientific activities at E-GEOS, while Dr. Roberto Lanotte, a geodynamics data analyst at E-GEOS, plays a key role in data processing and analysis.

3 Future Plans

- Continue and enhance the realization of our global VLBI solutions, ensuring regular updates.
- Continue participation in IVS analysis projects.