IGN Argentino Associate Analysis Center Report

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Abstract This report briefly presents a description of the IGN VLBI Analysis Center and its activities from 2021 to 2022. Recent results and plans for the future are mentioned. Since April 2020, IGN has been managed as an IVS Associate Analysis Center by the National Geographic Institute of Argentina (IGN-Ar). During this period, it has incremented its participation in the generation of geodetic products, planning to continue with this in the future.

1 General Information

The IGN Analysis Center is the agency in charge of VLBI processing within the Research Center for Applied Geodesy (CIGA). It is supported and operated by the National Geographic Institute (Figure 1) in Buenos Aires, Argentina.

IGN-Ar is the institution responsible for the determination of Geodetic Reference Frames in Argentina. It is in charge of updating the National Geodetic Reference Frame POSGAR (Argentine Geodetic Positions), the development and maintenance of the Argentine CORS Network (RAMSAC), the National Leveling Network (RN-Ar) and the National Gravimetric Network (RG-Ar). Moreover, its GPS data processing has been contributing with the Geocentric Reference System for the Americas (SIRGAS) since in 2011.

In 2017, IGN developed CIGA aimed to process geodetic data obtained in AGGO and provide solutions

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to different international services such as IVS, ILRS, and SIRGAS. The main activities of the IGN VLBI group consist of routine processing of 24-hour observational sessions to obtain an estimate of Earth Orientation Parameters (EOP), station coordinates, and station velocities, together with radio source positions.

Fig. 1 National Geographic Institute of Argentina.

2 Staff

The National Geographic Institute has approximately 300 employees. Its responsibilities include contributing to the maintenance of international, regional, and national geodetic networks; production and dissemination of knowledge and geographic information on the Argentine Republic, and the management, production, and publication of geospatial information under international standards and norms.

Members who are contributing to the VLBI Analysis Center are listed in Table 1 (in alphabetical order).

Table 1 Staff members.

Name	Function	Email
Barrera, Facundo	Operational data analyst	fbarrera@ign.gob.ar
Carbonetti, Micaela	Head of CIGA group and Operational data analyst	mcarbonetti@ign.gob.ar
Etchegoyen, María del Rosario	VLBI group assistant	metchegoyen@ign.gob.ar
Fernandez, Daniel	Web site and database maintenance	dfernandez@ign.gob.ar
Guagni, Hernán	Head of Geodesy Direction	hguagni@ign.gob.ar

3 Activities during the Past Two Years

During the past two years, 2021 and 2022, our VLBI group has constantly sought to improve the IGN analysis center based on trainings and studies.

Our center is unique in Latin America; however we think that more advances related to VLBI are required in this part of the world. We saw the need to spread the technique over the region in order to increase the interest in it. Because of this, we have presented our work at many congresses and conferences related to VLBI explaining the importance of the technique. We have taken part in the "XIX Scientific Meeting of the Argentine Association of Geodesy and Geophysics", in the "Annual Meeting of the Argentine Association of Astronomy", and in several VLBI seminars within national universities.

Besides this, we have analyzed all R1/R4 sessions available in Data Centers from 2014 to nowadays, among others. We usually do comparisons with different centers' products in order to control our results. A comparison between IERS and IGN results for polar motion is shown in Figure 2.

Additionally, during last year, we studied the AGGO and TIGO stations' performances in their participation in the IVS sessions to determine their influences on the stations' networks. Moreover, a communication channel was opened with AGGO's staff in order to attend to each other within topics related to VLBI.

Finally, we think it is important to mention that in November 2022, the BKG and IGN-Ar signed the extension of an agreement that benefits the development of activities in CIGA.
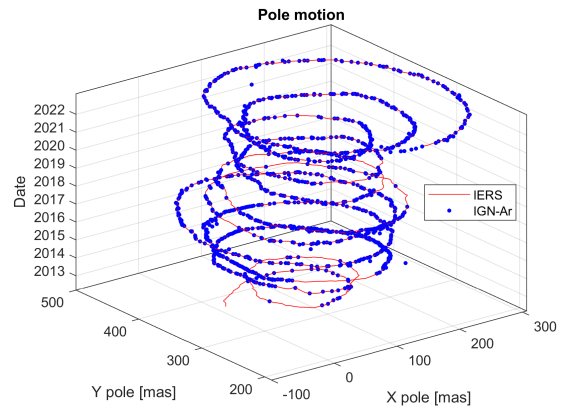

Fig. 2 Polar motion XPO-YPO calculated by IGN and IERS.

4 Current Status

The VLBI group at the IGN-Ar generates daily solution files, containing an estimate of 24-hour Earth orientation parameters and site positions, as well as their covariances and decomposed normal equations. Moreover, results with a 48-hour epoch per session are generated in order to get two EOP offsets. These offsets are estimated at midnight before and after the session. Thereby, our solutions have the faculty to be integrated into the routine IVS combination.

Currently, IGN uses VieVS scientific software (Vienna VLBI and Satellite Software), developed by Vienna University, in the department of Geodesy and Geoinformation. During past years, we applied the following models and international standards:

- Earth Reference Frame: ITRF2014
- Celestial Reference Frame: ICRF3
- Troposphere mapping function: VMF3
- Oceanic loading model: TPX07.2
- Polar drift model: LINEAR IERS2019

- Antenna thermal deformation model: Nothnagel
- Atmospheric loading model: GSFC
- Precession/Nutation model: IAU_2006/2000
- A priori EOPs: IERS C04 14
- High Frequency EOP model (HF-EOP): Desai & Sibois (2016)

Since ITRF2020 was published, however, we are now turning the mentioned models to those adjusted to the new frame.

Moreover, the VLBI group is willing to produce its own global solution routinely.

In addition to improving the VLBI Analysis Center, new activities on geodesy research will be carried out. Furthermore, we want to keep promoting the technique and contribute to the advancement of scientific research in our region.

One of the main goals of the IGN-Ar is becoming an Operational Analysis Center. Its VLBI group will continue its efforts to achieve this.

5 Future Plans

In future activities, IGN-Ar plans to continue with the analysis and submission of 24-hour sessions to IVS, and it plans to extend this to Intensive sessions as well.