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IGS Constellations

The Newsletter of the International GNSS Service

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(Banner Image Source: Paul Rebischung (Reference Frame Coordinator) and Arturo Villiger (IGS Antenna Working Group Chair))

Introducing IGS20/igs20.atx: a new framework for the IGS products

by Paul Rebischung (Reference Frame Coordinator) and Arturo Villiger (IGS Antenna WG Chair)

With each new release of the International Terrestrial Reference Frame (ITRF), the IGS changes the reference frame to which its products are aligned and give access. At the same time, the opportunity is taken to update the set of ground and satellite antenna calibrations compiled in the IGS ANTEX file. Following the release of [ITRF2020](#) in April 2022, a new IGS reference frame (IGS20) and a new IGS ANTEX file (igs20.atx) were thus developed. The switch from the current IGS14/igs14.atx framework to the new IGS20/igs20.atx framework is currently scheduled to happen starting with the IGS products of GPS week 2230 (2 October 2022).

Compared to igs14.atx, igs20.atx includes new calibrations for 52 ground antenna types, which cover the full spectrum of GNSS frequencies. igs20.atx also contains revised values for the radial phase center

offsets of the GPS, GLONASS and Galileo satellites, consistent with the scale of the ITRF2020 frame.

The IGS20 reference frame is essentially an extract of ITRF2020 coordinates for a selected set of current and historical IGS stations with long and stable position time series (see their distribution in the map below). Note however that corrections had to be applied to the ITRF2020 coordinates of some of the selected stations, in order to account for several updates from the ground antenna calibrations used in the ITRF2020 computation to those in igs20.atx.

To learn more about IGS20, igs20.atx, and the expected impact of the switch to IGS20/igs20.atx on results of IGS product users, please refer to [IGSMAIL-8238](#).

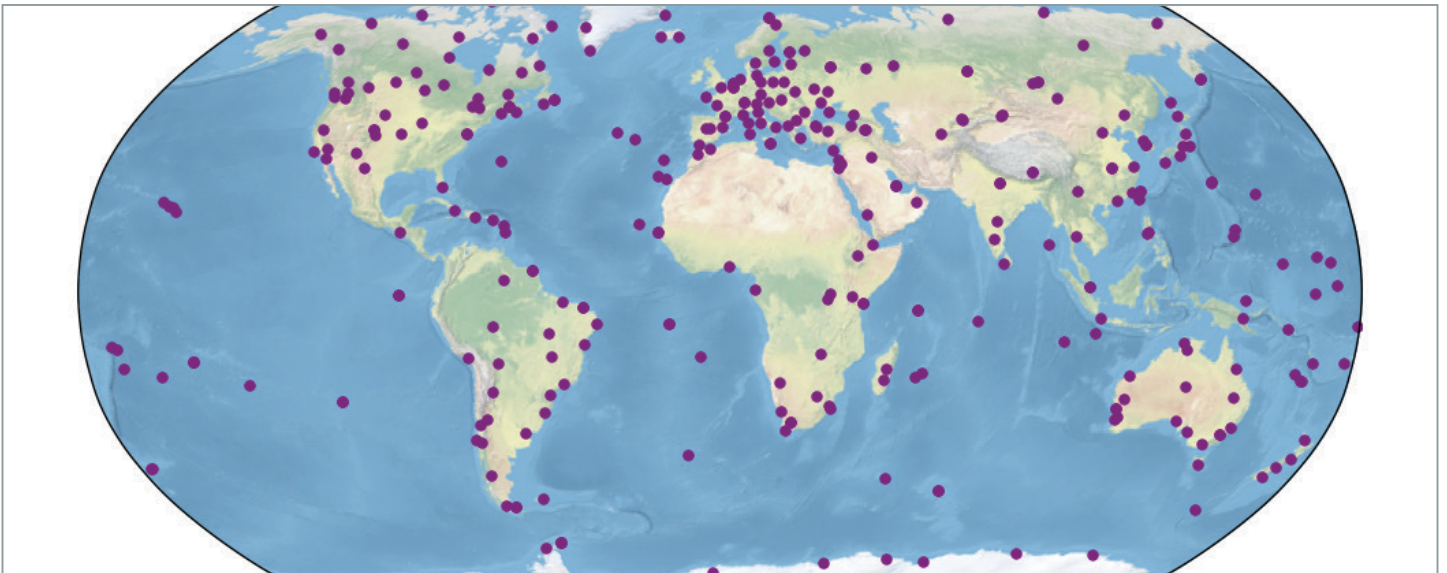


Figure 1: Distribution of the 332 IGS stations part of the IGS20 reference frame (Source: Paul Rebischung, Arturo Villiger)

#GNSS4impact Global Differential Global Positioning System-High Accuracy Service (GDGPS-HAS)

by Al Feinberg, NASA Space Communications and Navigation (SCaN)

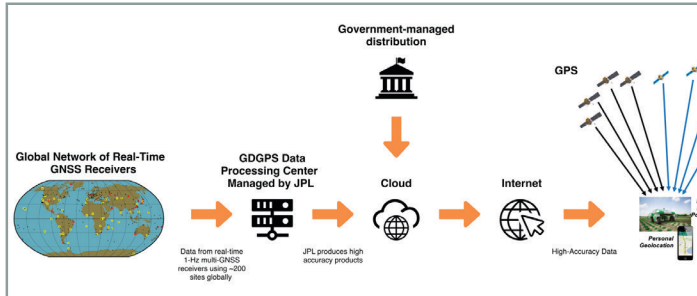


Figure 2: GDGPS High Accuracy Service (HAS) (Source: Attila Komjathy)

Data provided by a new Global Differential Global Positioning System - High Accuracy Service, or GDGPS HAS, could soon be coming to a NASA server near you where they would be freely accessible by the public and commercial sectors via the Internet.

Developed by a NASA Jet Propulsion Laboratory team headed by Dr. Attila Komjathy (ah-TILL-ah kom-YATH-ee), Near Earth Tracking Systems Group Supervisor, and Dr. Larry Romans, GDGPS Chief Technologist, HAS improves upon the standard GDGPS system that streams 1-Hz real-time data provided by more than 100 geodetic quality GNSS ground stations, solves for differential corrections to multi-constellation orbits and clocks (as well as ancillary parameters) and distributes corrections to US government and commercial users via the Internet.

"GDGPS HAS is the 'sweet spot' between existing high-accuracy premium precise point positioning services and the standard GPS positioning solution," says Komjathy. "HAS will provide global users with free, real time, differential corrections (for both GPS and Galileo) that improve accuracy from as many as several meters to within a couple of decimeters, built on the highly reliable infrastructure of GDGPS."

"But at the same time," Komjathy points out, "HAS won't be so exact as to threaten any existing commercial enterprises whose hyper-precise products rely on centimeter accuracy, for example, to monitor the structural integrity of buildings, bridges, and other critical infrastructure."

The team's proposal for a government-funded, official freely accessible GPS HAS was received enthusiastically by the National Space-Based Positioning, Navigation, and Timing (PNT) Advisory Board at its most recent meeting near Washington, DC. The board is the premiere representative of GPS/GNSS users and the U.S. government's primary PNT advisory body.

"The board has long been vocal in its support of improved services such as GDGPS HAS," says James Miller, PNT policy lead for NASA and its Space Communications and Navigation (SCaN) program. "Better performance and resilience will strengthen our user bases across multiple sectors and help maintain American technological leadership as more GNSS constellation services come on-line and are modernized."

Among global users who will benefit from GDGPS HAS are scientists, business entrepreneurs and developers whose applications and products can contribute to improved research and consumer choices while growing their bottom lines.

"Enabling all users to meaningfully increase their positioning and timing accuracies at minimal or no additional cost has some pretty obvious applications, such as improving cell phone positioning and or navigational mapping," says JPL's Romans. "And, of course, there'll likely be new opportunities for commerce and society as a whole that we can't yet imagine."

NASA is seeking to support the extension of GDGPS HAS for public distribution in the coming years in collaboration with other government agencies and stakeholders, such as the U.S. Department of Transportation. The DOT is striving for increased accuracy of lane-changing sensors on automobiles, not to mention improved technologies essential to the viability of safe, self-driving cars.

"As HAS service expands," says NASA SCaN's Miller, "so will the scope of benefits for aviation, maritime, and other transportation and pipeline applications. No doubt other Federal agencies will welcome the infrastructure investment opportunity to significantly improve services for their respective constituencies."

If all goes according to plan, Komjathy and Romans are targeting summer 2023 to begin populating NASA servers with these GDGPS HAS data for wider public use and, predictably, greater convenience and safety for everyone.

"We're confident we'll get there," says Komjathy. "I may be biased, but I do believe it's too good an opportunity for society to pass up."



Introducing the GNSS 4 Weather and Climate Resiliency Pilot Project

by Dr. Mayra Oyola-Merced

We are pleased to announce the approval of a new IGS Pilot Project under the subject of "IGS For Weather and Climate Resiliency" (IGS4WCR). The pilot project will originally focus on the application of IGS data and products towards three specific areas:

1. Global and Regional Air Quality
2. Climate Monitoring
3. Improving Weather Prediction

This activity seeks to use IGS Data, Products and Infrastructure to advance GNSS Science and applications towards protecting life and property and disaster risk reduction (DRR). Our mission is to provide a testbed to incubate and accelerate IGS and GNSS technology towards Weather Climate and Resiliency (WCR) and to support the United Nations sustainable development goals as well as the DRR goals listed under the Sendai Framework.

Working Session Participant or Lead

Those who wish to directly contribute to this Working Group can ask to be included as a task lead to advance the Science and applications or simply by listening in and providing input. Leads will have assigned responsibilities.

E-mail Updates

Those who wish to merely stay informed, access the website and receive e-mail updates, can simply sign up for our email distribution list. Please contact wcr@igs.org and state your interests. Early career individuals, academics, and other researchers are welcome to participate.

Scheduled 2022 Events

- Working Group Kickoff Meeting- TBD - Early Fall 2022
- Hybrid Meeting - in the margins of AGU in Chicago, USA

To learn more about this pilot project, visit igs.org/wcr.

For more information, please contact the Pilot Project Chair, Dr. Mayra Oyola-Merced at oyolamerced@wisc.edu or wcr@igs.org

IGS Community Spotlight



Dr. Kristel Chanard

Research Scientist, IPGP/IGN
Paris, France

I am an early career research scientist at IPGP/IGN in Paris, France. My research aims at bringing together Geodesy and Geophysics to develop tools to monitor the changing water cycle. It is a fascinating field that presents scientific and technological challenges that are intimately related, and requires hand-in-hand improvements of geodetic observations and of our understanding of interactions between the solid Earth and climate. Coming from a Geophysics background, I was warmly welcomed into the Geodesy community after joining the research team responsible for the International Terrestrial Reference Frame (ITRF), which serves as the foundation for positioning, orbit determination, and Earth orientation measurements. Indeed, one key task for further improving the reference frame is to more precisely determine its origin, one of the current limiting factors for sea-level measurements, closely related to the evolution of the global water cycle. Today, I am also a proud member of the IGS community, which provides an open access to constantly improving high quality data products GNSS data for a wide range of applications. I am impressed by the fundamental work of IGS, which is supported by strong international collaborations and a culture of sharing expertise, data and resources. This work not only greatly benefits the study of the solid Earth but is becoming a useful tool to investigate some of today's pressing societal questions pertaining, for example, the evolution of freshwater water resources.

Introducing the new IGS Governing Board Vice Chair - Professor Rolf Dach, AIUB, Switzerland



In the course of the IGS Governing Board meeting in June 2022 Prof. Rolf Dach was elected as the new vice-chair of the Governing Board. In this position he will support the current chair Dr. Felix Perosanz in his activities and initiatives.

Rolf Dach studied Geodesy at the University of Technology in Dresden. In 1999 he finished the PhD thesis on the

determination of ocean loading from GPS data. Since August 1999 R. Dach joins the satellite geodesy research group at AIUB where he got involved in the activities and development of the activities of the CODE analysis center (CODE: Center for Orbit Determination in Europe). In September 2006 Rolf Dach became the successor of Prof. Urs Hugentobler as the head of the group. In 2011 he received the *venia docendi* (Habilitation) for fundamental astronomy at Faculty of natural sciences of the University of Bern and the title as Assoziierter Professor in 2019.

In the context of his scientific work at AIUB, Rolf Dach represents CODE in several IGS working groups. In 2015 he was elected as an Analysis Center

representative into the IGS Governing Board. Meanwhile he is a member of the Executive Committee of the IGS as well. Since 2016 R. Dach also acts as a representative of the IGS in the IERS Directing Board.

Rolf Dach's focus for future development of the IGS is primarily keeping the scientifically open character of the organization even in the politically demanding time where we are currently living in. An essential achievement of the IGS that also has to be kept in future is the mainly scientifically driven activity, which results in a neutral position with respect to commercial interests on the GNSS market but also being neutral with respect to the different GNSS authorities.

Tour de l'IGS

4th Stop: BDS Constellation Spotlight

27 September 2022 12:00-14:30 UTC

by Prof. Jianghui Geng, Event Scientific Organizer

The 4th stop focuses on the latest progress of the BDS constellation. BDS is actively promoting international cooperation in an all-around way. GNSS users will learn information on BDS featured services, BDS data usage, and the performance of BDS data processing. Presentations include:

- **BDS PPP-B2b Service**
Dr. Jun Lu (China Satellite Navigation Project Center)
- **BDS Network Analysis in GAMIT**
Prof. Tom Herring (MIT)
- **Official BDS Satellite Antenna Phase Centers**
Dr. Jing Guo (Wuhan University)
- **BDS Orbits and Clocks**
Dr. Peter Steigenberger (Technische Universität München)
- **BDS Short Message Communication**
Prof. Xiangwei Zhu (Sun Yat-Sen University)
- **BDS Coordinate Reference Frame**
Dr. Xiaogong Hu (Shanghai Astronomical Observatory)

To learn more and register for this event, visit igs.org/tour-de-ligs

Upcoming Events

27 September 2022

[Tour de l'IGS 4th Stop](#)

November 2022

[Tour de l'IGS 5th Stop](#)

11 December 2022

[IGS Associate Members Meeting](#)

12 - 16 December

[AGU Fall Meeting 2022](#)

CREDITS

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