

Report from IGS Workshop

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EUREF Symposium 2026
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Outline

Infrastructure

ACC and multi-GNSS

Data Processing and Reference Frame

Summary

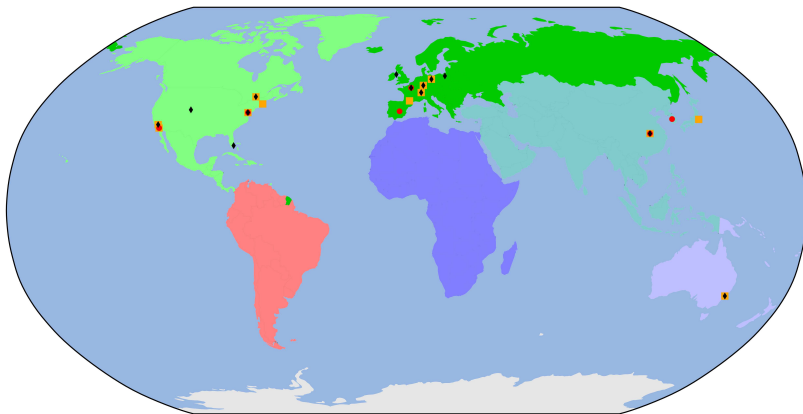
Greetings from Santiago de Chile



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Associate Members per continent

Europe: 119	Asia: 65	Oceania: 20
North America: 74	Africa: 21	South America: 5

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Greetings from Santiago de Chile

		Monday 01 June	Tuesday 02 June	Wednesday 03 June	Thursday 04 June	Friday 05 June		
7:45	8:00	Registration Desk						
8:00	8:15							
8:15	8:30							
8:30	8:45							
8:45	9:00							
9:00	9:15	Welcoming Remarks	Opening Remarks	Opening Remarks	Opening Remarks	Tide Gauge (Room A)	Real-Time (Room B)	
9:15	9:30		S2 08 Gazzino	S4 01 Soja	S5 01 Bravo			
9:30	9:45		S2 09 Guo (Jiang)	S4 02 Cegla	S5 02 Paziewski			
9:45	10:00		S2 10 Duan	S4 03 Wang (Ningbo)	S5 03 Camelo			
10:00	10:15		S2 11 Hering	S4 04 Li	S5 04 Loyola			
10:15	10:30	Dr. Sean Dougherty <i>ALMA: In Search of Our Cosmic Origins</i>	S2 12 Akiyama	S4 05 Reid	S5 05 Soto Reyes			
10:30	10:45							
10:45	11:00		coffee	coffee	coffee	coffee		
11:00	11:15		S1 01 Fernandes	S2 13 Sermanoukian	S4 06 Froh	Announcements		
11:15	11:30		S1 02 Bock	S2 14 Peidou	S4 07 Bock			
11:30	11:45	S1 03 Galera Monico	S2 15 Gini	S4 08 Galera Monico				
11:45	12:00	S1 04 Kawamoto	S2 16 Dach	S4 09 Cherniak				
12:00	12:15	S1 05 Figueroa	S2 17 Zajdel	General de Brigada Aérea Christian Stuardo <i>A Roadmap for Autonomous Technological Development</i>	Capitán de Navío Carlos Zúñiga <i>Chile's National Tsunami Warning System</i>			
12:15	12:30	S1 06 Bradke	S2 18 Kang					
12:30	12:45	Announcements	S2 19 Tarrío Mosquera					
12:45	13:00							
13:00	13:15							
13:15	13:30	lunch (12:15 - 13:15)	lunch (12:15 - 13:15)	lunch (12:15 - 13:15)	lunch (12:15 - 13:15)	Troposphere + Ionosphere (Room A)		
13:30	13:45					RINEX + LEO-PNT (Room B)		
13:45	14:00					lunch (11:45 - 12:45)		
14:00	14:15							
14:15	14:30							
14:30	14:45	S2 01 Kalarus	S3 01 Wang (Ningbo)	S4 10 Song	ACC, WCC, ACs + Reference Frame	SVOD (Room A)		
14:45	15:00	S2 02 Sosnica	S3 02 Zhang	S4 11 Bravo		coffee		
15:00	15:15	S2 03 Gravelle	S3 03 Haro	S4 12 Valdivia				
15:15	15:30	S2 04 Geng	S3 04 Massarweh	S4 13 Galera Monico				
15:30	15:45	S2 05 Schönemann	S3 05 Geng	Eng. Catalina Cáceres <i>IGS and SIRGAS: 30+ Years of GNSS Geodesy in the Americas</i>				
15:45	16:00	S2 06 Li	S3 06 Rolland		short break			
16:00	16:15	S2 07 Katsigianni	S3 07 Martinez					
16:15	16:30							
16:30	16:45							
16:45	17:00	coffee	coffee	group photo	Antenna (Room A)	Clock Products (Room B)	Multi-GNSS	
17:00	17:15			coffee				
17:15	17:30							
17:30	17:45							
17:45	18:00							
18:00	18:15	Posters	Posters	Posters	coffee		Closing Remarks Tarrío Mosquera, Dach, JAXA/GSI	
18:15	18:30		P1 01-13	P3 01-09				P5 01-11
18:30	18:45		P2 01-25	P4 01-11				
18:45	19:00							
19:00	19:15							
19:15	19:30	Icebreaker		Cultural Tour & Dinner	Infrastructure		adjourn 16:30	
19:30	19:45							
19:45	20:00							
20:00	20:15							
20:15	20:30							
20:30	20:45			16:45 - Depart from Santiago	adjourn 17:45			
20:45	21:00			18:00-20:00 Cultural Tour				
21:00	21:15			20:00-22:00 Dinner				
21:15	21:30							
21:30	21:45							
21:45	22:00				adjourn 22:00			
22:00	22:15							
22:15	22:30							
22:30	22:45							
22:45	23:00							
23:00	23:15				adjourn 18:45			
23:15	23:30							
23:30	23:45							
23:45	00:00							
00:00	00:15							
		adjourn 18:45	Informal Gathering for Early Careers, Inclusion, Diversity, Equity and Accessibility adjourn 22:00	22:00 - Return to Santiago adjourn 22:00	AIUB			

Key :
Registration Desk
Announcements
Keynotes
Orals
Posters
Social Events
Splinter Meetings

Infrastructure

Infrastructure – data holding

- Data centers have to host a huge number of small files on infrastructure designed for big files.

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Infrastructure – data holding (→ **Pilot Project on Data Architecture**)

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→ potentially relevant for **EUREF datacenters**

ACC and multi-GNSS

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- Environment was modernized and prepared for a new combination software
- Start in July with GPS-only (same as today)
- **Multi-GNSS currently as prototype** (to be enabled by 2027):
 - orbit combination: Salim Masoumi (GA)
 - clock combination: Simon Banville (NRCan)
- **Multi-GNSS: Currently GPS+GLONASS+Galileo** (prepared also for other systems)
(ACs are working on the inclusion of BeiDou-3 and QZSS)

ACC and multi-GNSS

Alternative Combination Center

- Pilot Project of **Wuhan Combination Center**
- Alternative combination of AC products for orbits, clocks, and biases considering multi-GNSS
- Target: full consistency with legacy combination by ACC

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Unification of product combination protocols

- initiative by J. Geng (Wuhan University)
- working group established to define a format for combination protocols: (machine and human readable → **YAML**)
- allowing for instance one plotting tool for different combination schemes

Data Processing and Reference Frame

Codeless/Semi-Codeless GPS Access Commitments

These documents describe U.S. government commitments to support codeless/semi-codeless civilian access to the current P(Y) signals and the transition to the modernized L2C and L5 signals. This transition will not affect users of consumer GPS devices that use only the basic civil signal (L1 C/A).

2019 Federal Radionavigation Plan

Section 3.2.8 of the 2019 Federal Radionavigation Plan states the following:

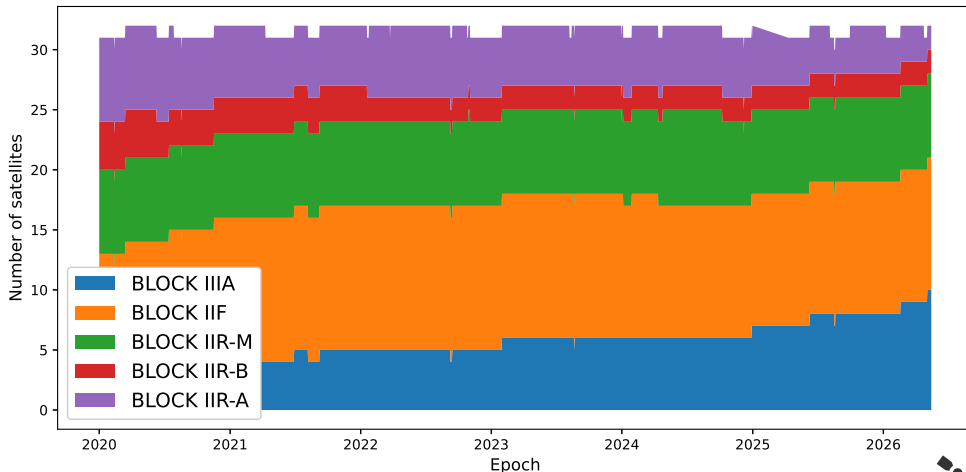
Discontinuation of Codeless and Semi-Codeless GPS Access

The USG commits to maintaining the existing GPS L1 C/A, L1 P(Y), L2C, and L2 P(Y) signal characteristics that enable codeless and semi-codeless GPS access until at least two years after there are 24 operational satellites broadcasting L5 with fully functional navigation messages. Barring a national security requirement, the USG does not intend to change these signal characteristics before then. The availability of 24 satellites broadcasting the L5 signal is estimated to occur in 2027. Maintaining the legacy signal characteristics for the stated period of time will allow for the orderly and systematic transition of users of semi-codeless and codeless receiving equipment to the use of equipment using modernized civil-coded signals. Note that it is expected that 24 operational satellites broadcasting L2C will be available by 2020, with the corresponding ground segment control capability available by 2023, enabling transition to L2C by 2023. Civilian users of GPS are encouraged to start their planning for transition now.

The above text supersedes the previously announced commitment in Federal Register Notice Vol. 73 No. 185 (see below) to maintain such signal characteristics through December 31, 2020.

Data Processing and Reference Frame

Number of GPS satellites supporting L5 is now at 21



Data Processing and Reference Frame

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- The reference for our clock products are defined by the ionosphere-free linear combination of L1W/L2W (GPS).
 - Change this definition? When to change?
 - What to do with older satellites (and stations)?

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 - Change this definition? When to change?
 - What to do with older satellites (and stations)?
- What does this mean for the **reference frame**?
 - IGS has a long heritage of L1/L2 station coordinates
 - Should we go for a transition to L1/L5 processing for station coordinate series?
 - Frequency plan across the systems:

	1.57 GHz	1.23 GHz	1.12 GHz
GPS:	L1	L2	(L5)
Galileo:	E1		E5a
BeiDou-3:	B1A/C		B2a
QZSS:	L1	(L2)	L5

What does this mean for the IGS?

- From where do we get the L5 satellite antenna corrections for the GPS Block IIF space vehicles?
 - We can just use the L1/L2-based estimated corrections from the IGS.ATX.
 - Do we need a dedicated estimation campaign (for the L1/L5 corrections)?
 - Can we use the Lockheed Martin/Boeing pre-launch calibrations (see Montenbruck et al., 2023)? (as we have for all GPS Block IIIA and Galileo satellites)

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Support of CODE, ESA, GFZ, GRGS, JPL, JXG, and MIT (as of today).
- **The discussion on the future has started.**

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- Combined IGS products are slowly moving **towards multi-GNSS** under the new ACC teams
- GPS announced in 2019 to **switch off P(Y) signals**. This may become effective in a few years.
The IGS started to discussion how to handle this...
- Many other topics like, L5-clock product series, orbit modeling using grid files, Genesis, LEO-PNT are on the table.

THANK YOU

for your attention



Publications of the satellite geodesy research group:

<http://www.bernese.unibe.ch/publist>