4th plenary meeting of the Subcommittee on Geodesy

NASA Update

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Geodetic Infrastructure is the Foundation for Enabling Many Scientific Applications

ENABLED SCIENTIFIC APPLICATIONS
- Sea level change
- Water cycle
- Geological hazards
- Weather/climate
- Ecosystems
- Geodynamics

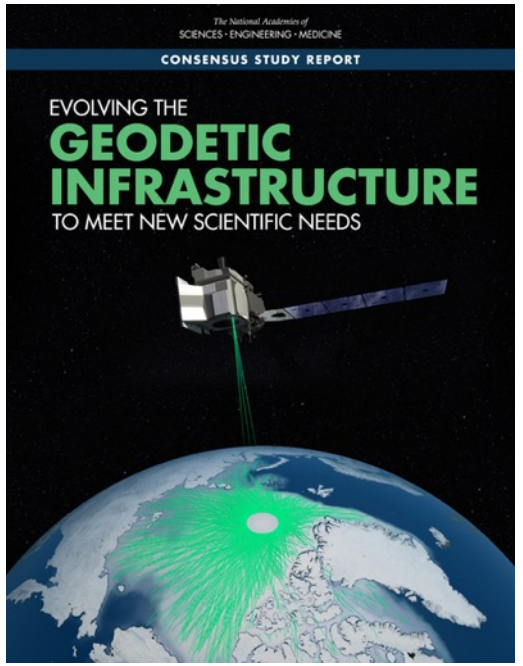
GEOPHYSICAL OBSERVABLES
- Land and ice deformation and change
- Sea surface height
- Atmospheric parameters
- Land and vegetation topography
- Mass change
- Surface and ground water and soil moisture

EARTH ORBITING MISSIONS
- Time variable gravity
- Altimetry
- InSAR and SAR
- Radio occultation
- GNSS reflections from space
- Optical change detection

PRIMARY GEODETIC PRODUCTS
- Precise positions
- Orbit determination
- Earth rotation
- Gravity field
- Reflection and signal-to-noise ratio
- Total electron content and tropospheric delay

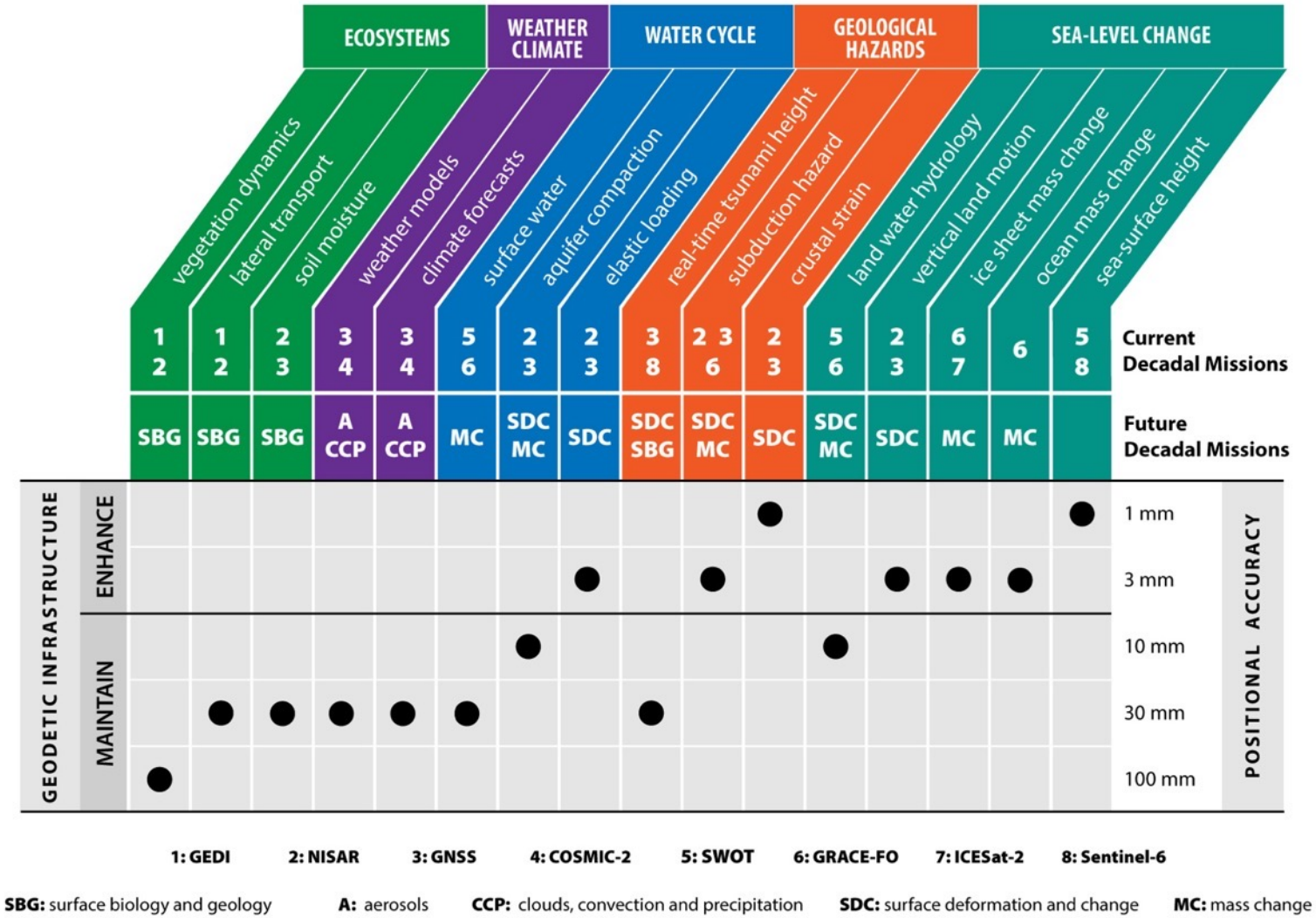
TERRESTRIAL REFERENCE FRAME
- Station coordinates as function of time
- Origin (Earth system center of mass)
- Scale
- Orientation

GEODETIC INFRASTRUCTURE
- Geodetic techniques (SLR, VLBI, GNSS, DORIS)
- Software
- Experts
- Archives



National Academies: Evolving the Geodetic Infrastructure to Meet New Scientific Needs https://doi.org/10.17226/25579

Science Driven Geodetic Accuracy



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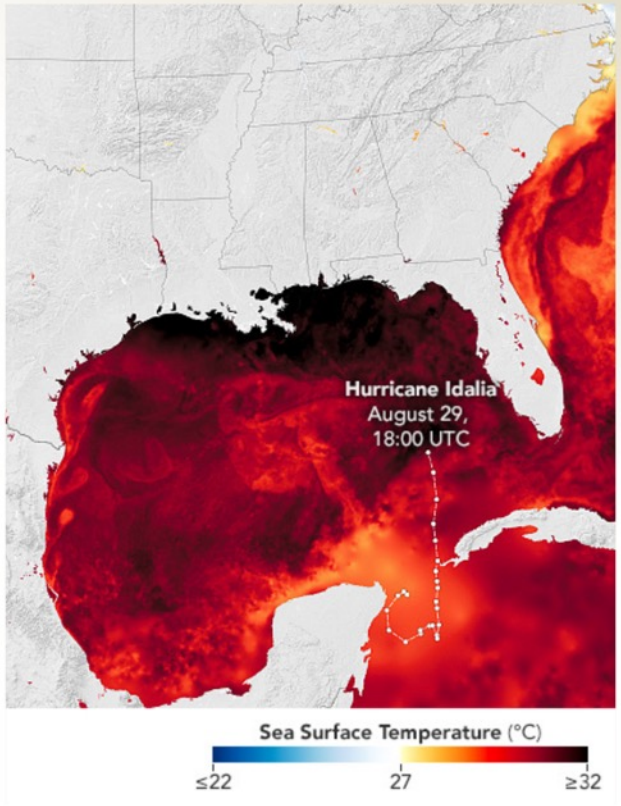
NASA Plans Significant New Investments in Geodesy



CAPTION – Hurricane Idalia track on August 29, 2023 superimposed over Multiscale Ultrahigh Resolution sea surface temperatures modeled from Terra MODIS data.

Earth Science Budget Highlights

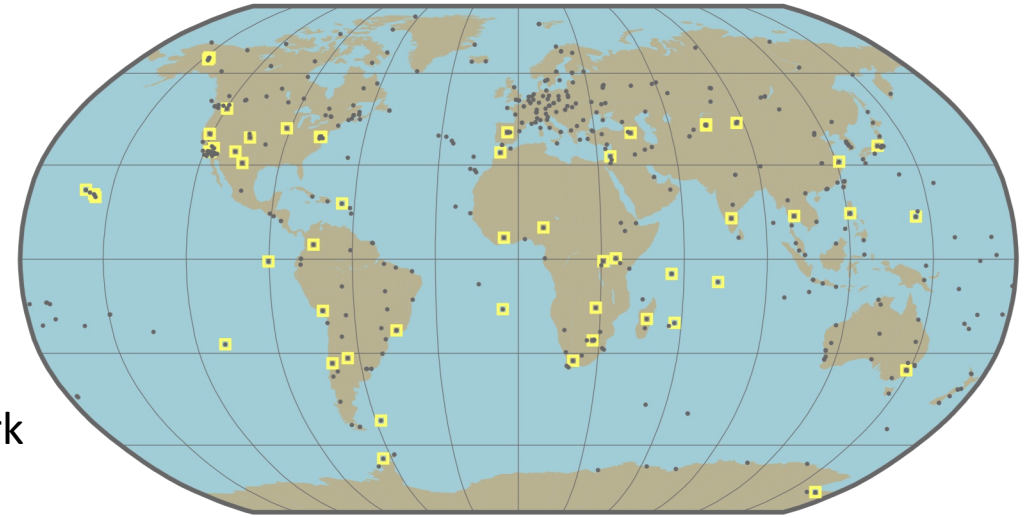
- Extension of **Terra/Aqua/Aura** to end of life, all missions in extended operations through 2026, senior review wedge in 2027 bounds future cost growth
- Supports critical **research, applications, data and technology** for mission schedules
- Consolidation of some mission science teams and discipline research areas for greater synergies across fields
- **Responsive Science Initiatives Program** realigns elements of research, tech, applied, and data programs and will focus on areas of national importance to work with interagency partners and provide products, information, and research with significant societal value
- Includes a sustained budget increase for **Interagency Satellite Observation Needs** (formerly SNWG)
- Doubles the investment in **Geodesy** infrastructure, supporting NASA, civil space and national security needs for accurate Earth positioning
- New content in Earth Science Technology to begin developing the first space-borne **quantum gravity gradiometer (QGG)**.

https://science.nasa.gov/

NASA Space Geodesy Program

NASA Space Geodesy Network

NASA Global GNSS Network



Sustaining the Network

Next-Generation Station Deployment

Ny-Ålesund, Svalbard

Fortaleza, Brazil

Maryland, USA

Texas, USA

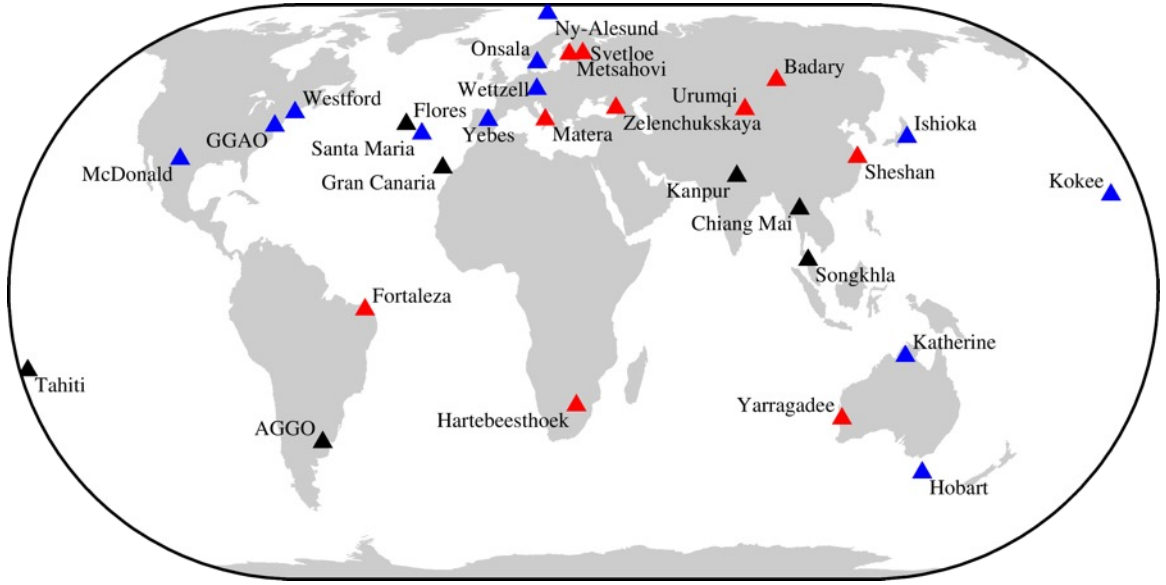
VGOS Continues to Grow

VGOS Network expanded to 12 stations with more on the way.

Hawaii-Germany 1-hour VGOS sessions producing rapid dUT1 predictions used by many operational systems including GNSS.

Correlators cut turnaround time for 24-hour sessions by more than half to ~30 days while cadence increased from 2 to 3 per month.

Evaluations of alternative intensive baselines such as Texas-Germany drive towards a more robust network.

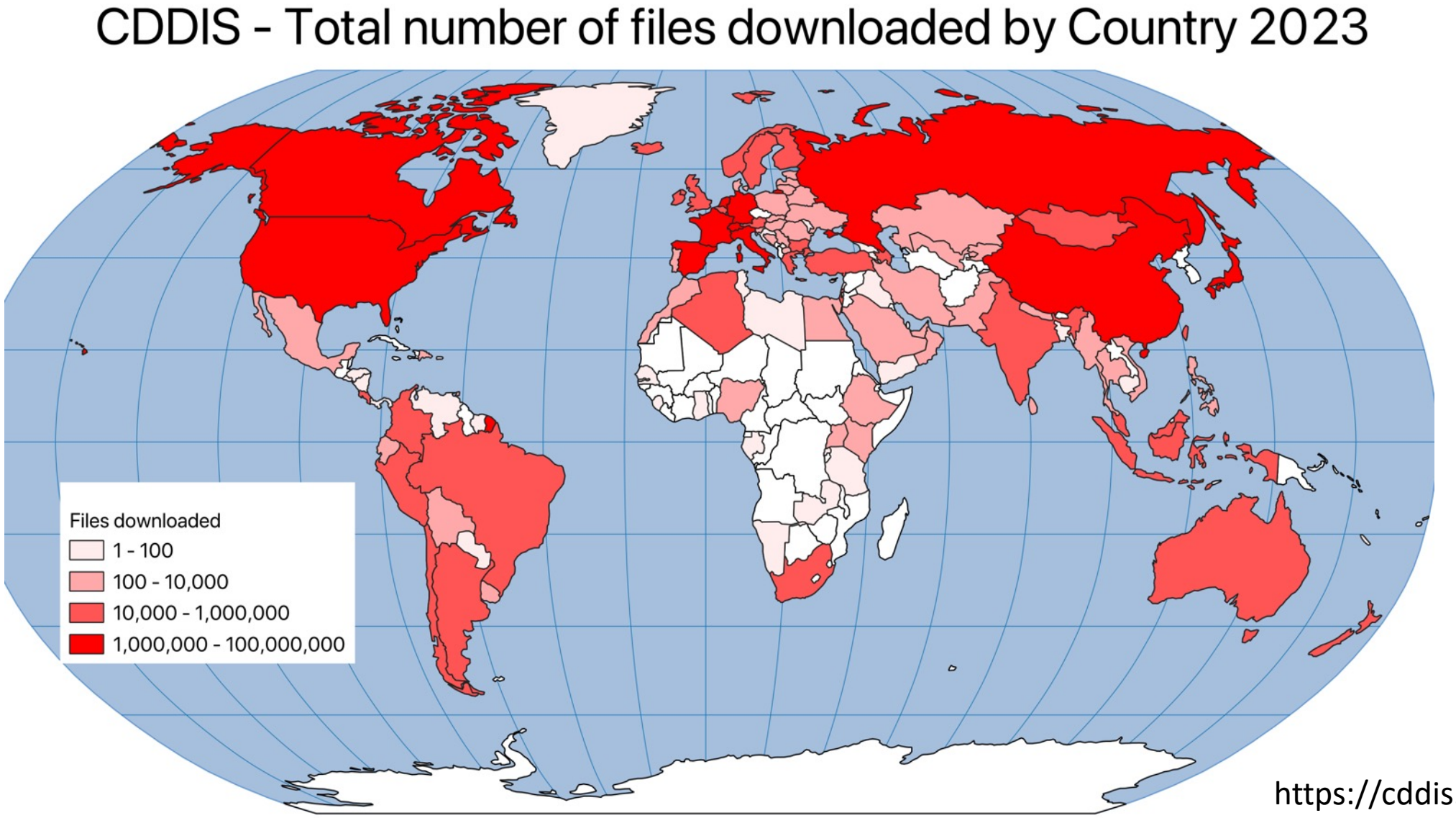


Hawaii

Goddard

Texas

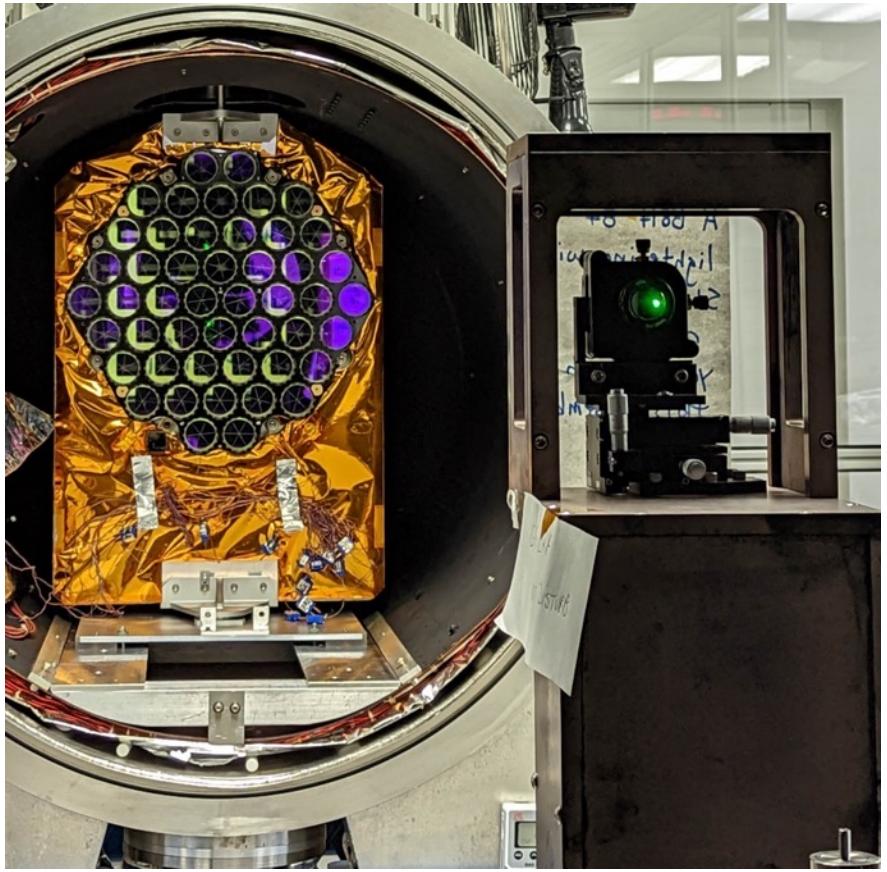
Geodetic Products Deliveries



https://cddis.nasa.gov

Laser Ranging to GPS Coming Soon

First GPS III vehicles with NASA provided laser retroreflectors available for launch in 2025

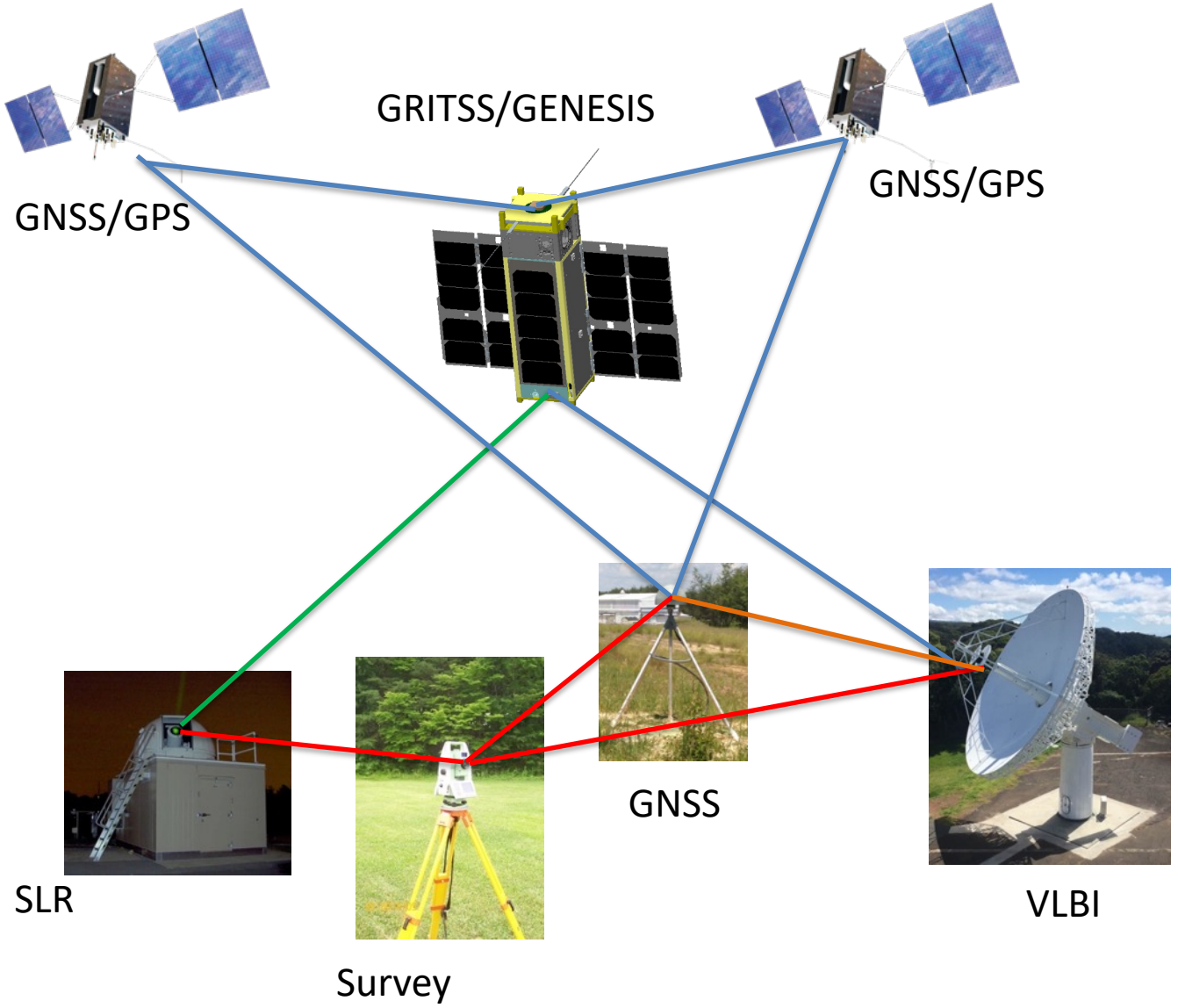


Fight unit under optical testing

Geodetic Colocation In Space

Observations of a common space-based reference has the potential for reducing the uncertainty in the local-ties to the mm level thus improving the ITRF combination

NASA GRITSS Demonstration Mission targeting launch in Fall 2025



Outreach and Training the Next Generation

Liceu High School visitation - Brazil

Open House at TLRS-3 - Peru

VLBI School - Brazil

NASA STEM Enhancement in Earth Sciences – Texas, USA