


Overview of GOSAT-GW TANSO-3 data processing and product distribution in NIES

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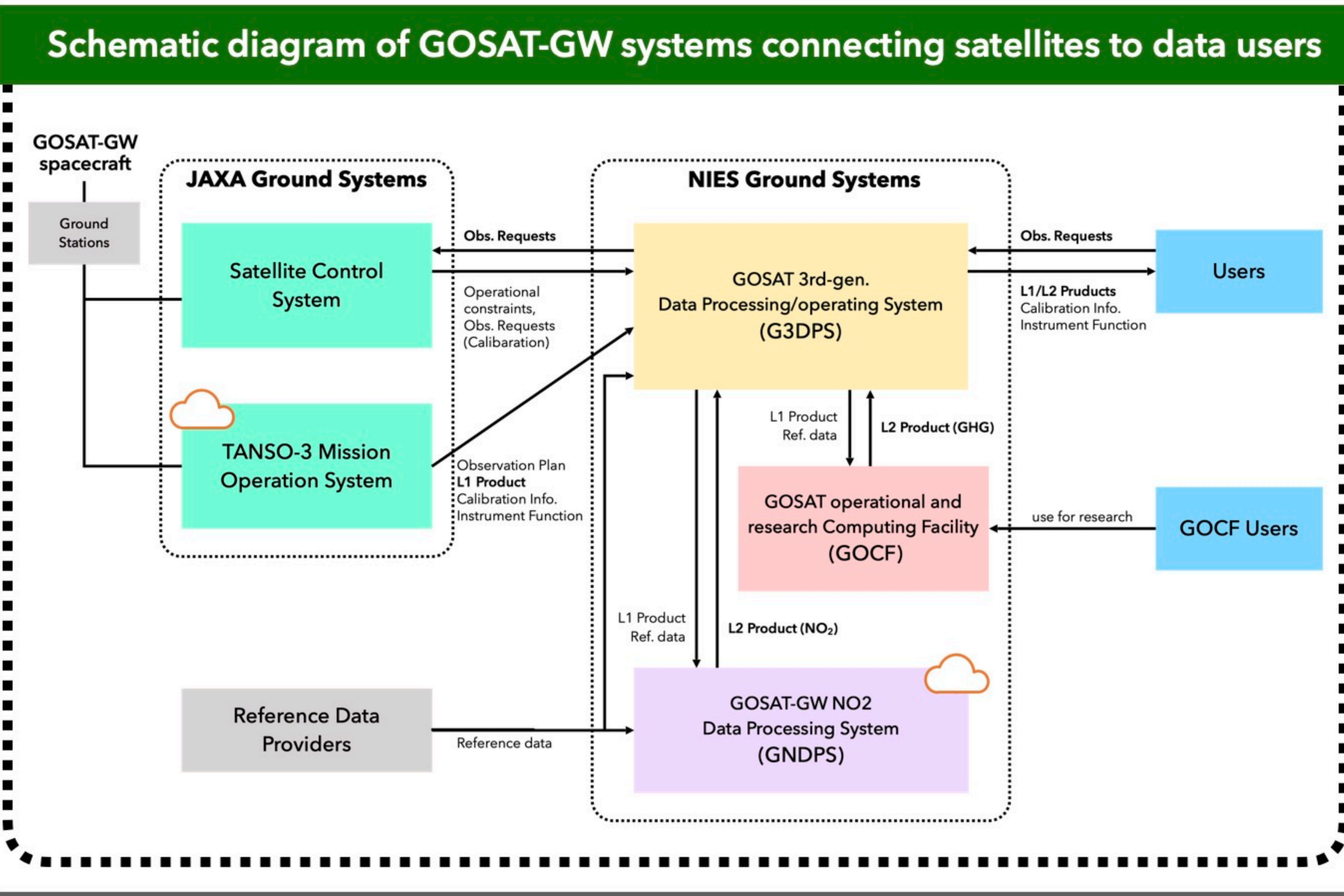
GOSAT-GW specifications



- Launch: Japanese FY2023
- Design lifetime: > 7 years
- Sun-synchronous, Sub-recurrent orbit
- Altitude: 666km, recurrent cycle: 3days, MLTAN: 13:30, ascending

TANSO-3 (Total Anthropogenic and Natural emissions mapping SpectrOmeter-3)

- Imaging spectrometer (3-band grating)
- Spectral bands: 0.45 μm / 0.7 μm / 1.6 μm
- Spectral resolution: < 0.5nm@0.45μm, < 0.05nm@0.7μm, < 0.2nm@1.6μm
- Observation mode
 - Wide-mode: 911km swath, 10km footprint, no pointing
 - Focus-mode: 90km swath, 1-3km footprint, AT/CT pointing
 - Focus mode observations are carried out on request.



G3DPS: System for product management and user contact

- Software-defined IT infrastructure will be used : (hyper-converged) virtualization infrastructure and object storage
- Features
 - Interface with users
 - Interface with the JAXA system
 - Observation (pointing) planning
 - Management of L2 product processing
 - Collect, archive and distribute level 1 and level 2 products

GOCF: Supercomputer for GHG retrieval processing

- Homogeneous compute node and parallel file system
- Co-location with G3DPS, ensuring sufficient network speed
- System location
 - G3DPS and GOCF will install in a server room at the University of Tsukuba (7 km away from NIES): facilities suitable for installing a supercomputer
 - Joint research with the Center for Computational Sciences, University of Tsukuba has started, and software acceleration research has also started

Products

Standard Products

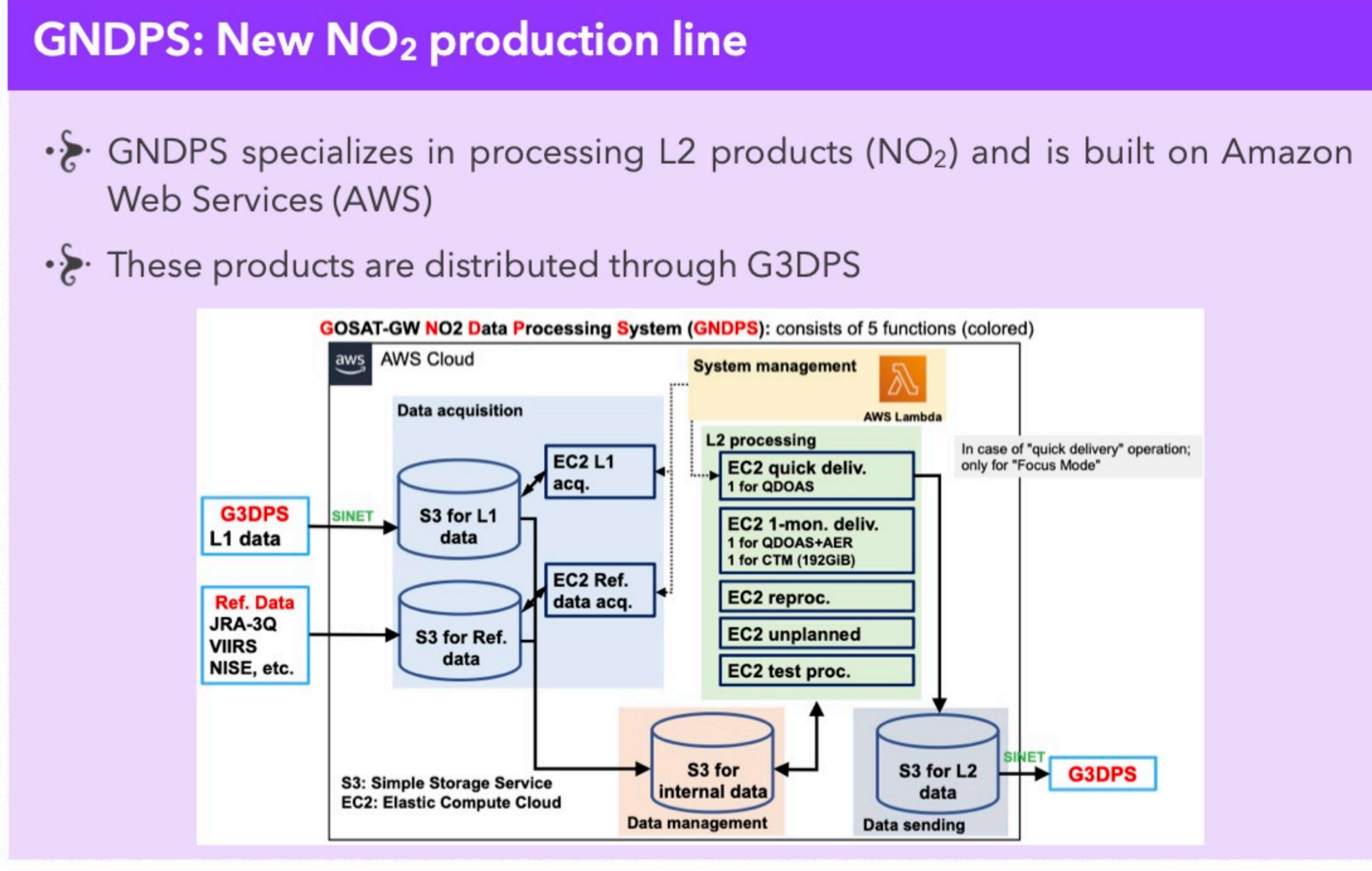
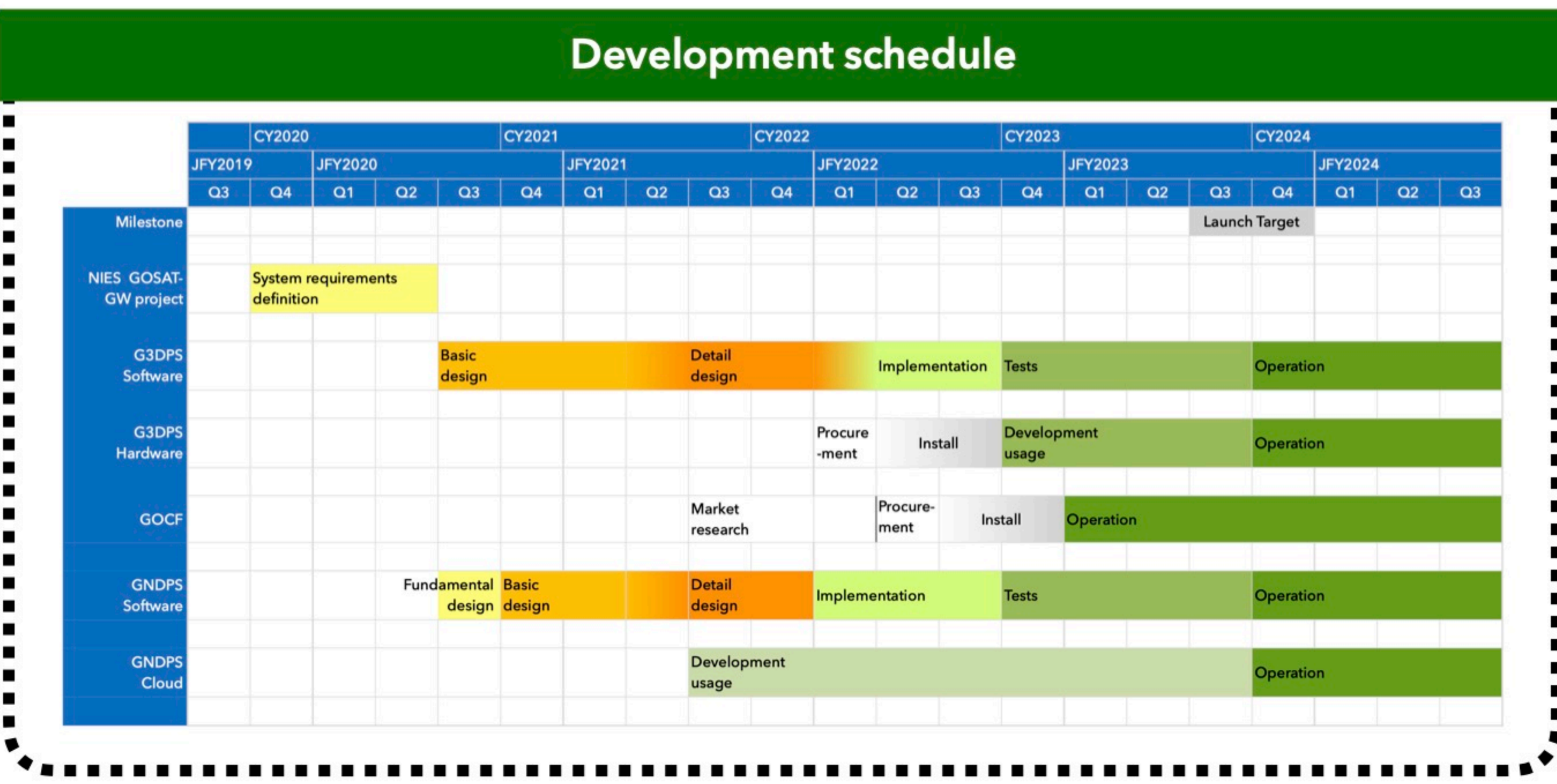
- **Level 1B** (geolocated and calibrated spectral radiance)
 - **Wide-mode 10km res.:** one file per cycle*
 - **Focus-mode 3km res.:** one file per scene*
- **Level 2** (atmospheric products derived from the L1B)
 - **Wide-mode 10km res. GHG:** one file per day* (including full-physics XCO₂&XCH₄, proxy XCH₄, and SIF)
 - **Wide-mode 10km res. NO₂:** one file per day*
 - **Focus-mode 3km res. GHG:** one file per scene*
 - **Focus-mode 3km res. NO₂:** one file per scene*
 - **Quick delivery products** are planned for **focus-mode 3km res. GHG&NO₂**

* One cycle means the orbital period between the descending point and the next descending point. The scene corresponds to each pointing request. Daily data contains 14-15 cycles.

- Daytime data only
- File format: HDF5
- Level 2 products for a month are planned to be processed within the next month
- **All the products will be distributed from "GOSAT-GW TANSO-3 Product Archive" site**

Challenges in the NIES GOSAT-GW project

- **Large computational workload:** the number of points for full-physics retrieval is expected to increase, and the computational workload will increase by more than x300 compared to GOSAT/GOSAT-2.
 - ➔ Preparation of supercomputer, and computational tuning of retrieval algorithm
- **Focus-mode observation execution plan:** focus-mode is mainly used for frequent observation of C40 cities, comparison with ground-based observations, and glint observation over the ocean. We are not able to obtain the observations of wide-mode while the focus mode is on.
 - ➔ Detailed design of the appropriate pointing sequences is important



Summary

- Development of NIES ground systems for GOSAT-GW TANSO-3 is underway with the aim of smooth product release after satellite launch.
- We plan to deliver products such as CO₂, CH₄, and NO₂, obtained by wide- and focus-mode observation under GOSAT-GW TANSO-3 data policy.