



Preparing for GOES-R: Post-Launch Product Tests and Activities

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Image credit: Japan Meteorological Agency

Post-Launch Testing (PLT) Objectives

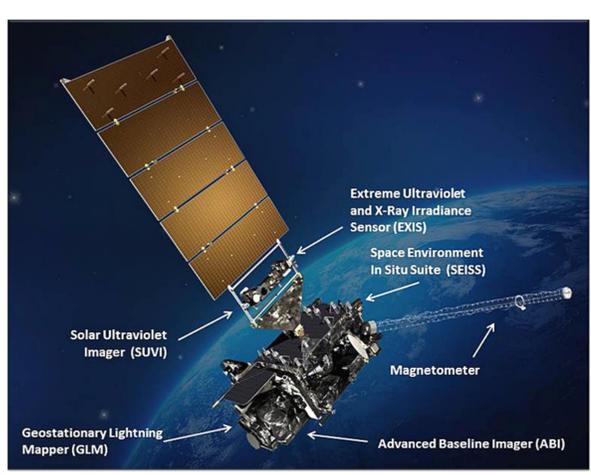
1. Validate observatory and ground system operability and performance.
 - Observatory testing to validate operability and that performance is as expected in on-orbit conditions.
 - Determine the deliverable item satisfies its intended use in its intended environment.
 - Continuous, uninterrupted L0 data can be used to generate calibrated L1b products.
2. Perform conditional validation of L1b and Key Performance Parameter (KPP) products.
 - Ground testing will assess operability and performance of mission management (MM) and product generation/distribution (PG/PD) throughout the system.
 - Demonstrate readiness for operations by OSPO.
3. Perform Beta validation of L2+ products.
 - Post Launch Product Testing (PLPT) will inspect and compare L1b and KPP products with ground truth in order to assess instrument calibration, Image Navigation & Registration (INR)/pointing, and L1b product performance.
 - Demonstrate that L2+ products are generated when and where they should be and fall within expected measurement ranges.

RIMPs

Readiness, Implementation, and Management Plans (RIMPs) are comprehensive documents which highlight the tests, tools, and analyses to be completed for each L1b and L2+ algorithm during PLT and PLPT. There are 5 L1b RIMPs and 19 L2+ RIMPs between all the instruments and algorithms. The PRO Team is coordinating the effort to document the plans of CWG and AWG. They are being treated as "living" documents, with the ability to be updated as new tools, datasets, or methodologies become available. The RIMPs were recently presented in final draft form to the PRO Team and are currently under review in preparation for Configuration Management (CM) within the Ground Segment.

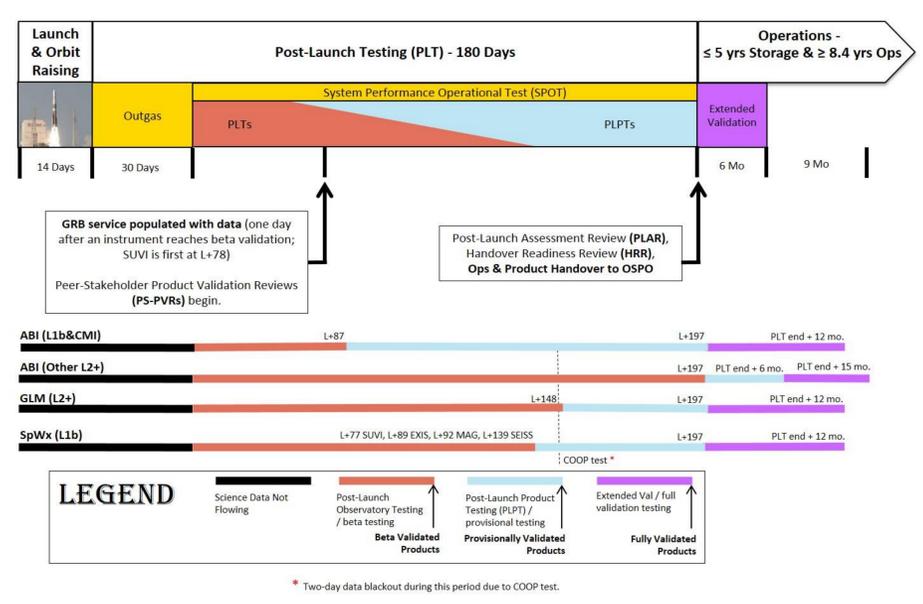
Observatory

Artistic representation of the instruments flying on GOES-R. ABI and GLM are on the Earth-Pointing Platform (nadir) is highly stable and dynamically isolated from the rest of the spacecraft. SEISS and the Magnetometer provide localized measurements of particles and fields in geosynchronous orbit. EXIS and SUVI are installed on the Sun-Pointing Platform along with the solar array. Image credit: goes-r.gov.



GLM

The Geostationary Lightning Mapper (GLM) vendor (Lockheed Martin) is leading 9 PLTs. It will take the bulk of PLT to reach Beta maturity due to the passive calibration and background tests required. The science team at Marshall Space Flight Center (MSFC) is planning 11 series of PLPTs that contain a total of 44 tests. All of the tests are required to reach Beta. The same tests will be conducted for Provisional and Full validation but the number of flashes (data points) required for each phase of testing - Beta, Provisional, and Full - are 10, 100, and 1000, respectively.



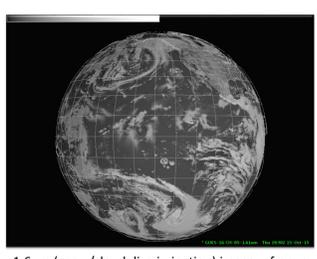
Schedule of Events

- Launch and Orbit Raising (LOR): 14 days
- Includes launch through to achieving final geostationary mission orbit at 89.5° W.
 - Performed by Missions Operations Support Team (MOST) and the flight system vendor.
- Post-Launch Testing (PLT): 6 months
- Outgas: 30 days
 - System Performance Operational Test (SPOT): approximately 5 months
 - PLTs led by Flight and instrument vendors
 - PLPTs led by science teams
 - First public images will be released per instrument as qualitative criteria are met.
 - For each product, there will be a PS-PVR to determine each maturity stage, and after Beta is declared, data will be released publicly over GRB.
 - Provisional maturity for all L1b products and the GLM L2 product will occur after the PS-PVR just before Transition & Handover to OSPO.
- Operations: approximately 8 years
- Extended Validation (EV) occurs during the first 6 months of operations. PLPTs continue for all instruments during this phase, and ABI L2+ products reach Provisional validation maturity by the end of EV and after a PS-PVR.
 - ABI L1b and CMI, GLM L2+, and space weather L1b products reach fully validated maturity within 1 year of Handover.
 - ABI L2+ products have 15 months to achieve both Provisional (6 months) and Full (9 months) maturity.

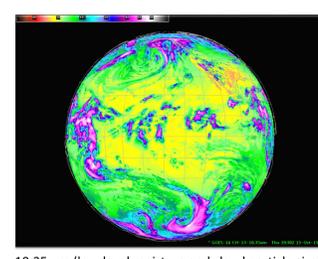
ABI

The Advanced Baseline Imager (ABI) science teams of the Calibration Working Group (CWG) and the Algorithm Working Group (AWG) are conducting PLPTs to advance the maturity of the L1b and L2+ products, respectively.

- L1b and CMI**
- For Beta maturity, all Flight led Cal/INR PLTs must be successfully completed. The CMI team will conduct 7 PLPTs to assure CMI reaches Beta maturity.
 - For Provisional maturity, CWG will conduct 18 PLPTs including 6 North-South Scan tests. The CMI team will conduct 3 PLPTs.
 - For Full validation, CWG is planning 21 EVs (Extended Validation tests).
 - CMI will undergo 7 tests for Beta, 3 tests for Provisional, and 3 tests for Full validation. CMI is the only KPP.
 - At Handover, CMI will be at Beta maturity, meaning the reflectances and brightness temperatures are properly derived from the L1B radiances, and that any issues with the Imagery are identified and properly documented.
- L2+**
- AWG will work on advancing the maturity of the 24 baseline products (plus CMI).
 - By Handover, all L2+ ABI products should be Beta validated.
 - Provisional maturity should be achieved within 6 months of Handover.
 - After Handover, CWG and AWG will further progress the maturity of the products to Full validation over an estimated 21 months.



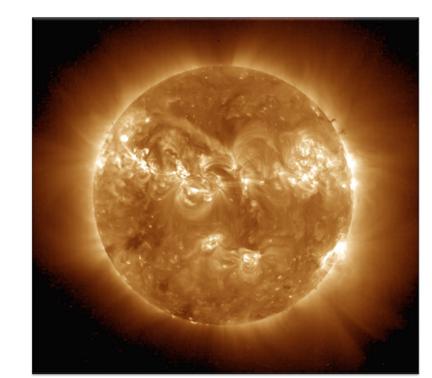
1.6µm (snow/cloud discrimination) imagery from a pre-launch exercise created at NWS headquarters.



10.35 µm (low-level moisture and cloud particle size) imagery from a pre-launch exercise created at NWS headquarters.

EXIS, MAG, SEISS, SUVI

The Space Weather group at the National Centers for Environmental Information at Boulder, CO (NCEI-CO) are doing a lot of testing during PLT and PLPT. For all instruments, there are 34 PLTs (Flight-led) and 109 PLPTs (NCEI-led) between them. The SUVI team will be conducting many inter-calibrations. The SEISS team will undertake trending and cross-comparisons for all 4 of its sensors. The EXIS group has bootstrap degradation tests, threshold tests, and an inter-satellite comparison. The MAG team will do some inter-calibrations among a few other tests. MAG & SUVI will both reach Beta maturity after PLTs alone, while EXIS & SEISS will undergo some product testing before reaching Beta maturity.



Simulated SUVI image using SDO/AIA and SOHO/EIT data at 195 Angstroms; corona (Fe XII / XXIV).

SUMMARY

After launch of GOES-R, there is a 6 month period of testing known as Post-Launch Testing (PLT). During this time, both observatory tests and product tests will be conducted. All tests effect the advancement of product maturity from all instruments. Planning and coordination of these tests is done by both the Flight Project and Ground Segment, external vendors, science teams at NOAA, and others.

RELATED TALKS/POSTERS

- Matt Seybold, Preparing for GOES-R: Supporting User Readiness of Level 1b Data
- Wayne MacKenzie, Preparing for GOES-R: Supporting User Readiness of L2+ Products
- Ryan Williams, Application of a Consistent Algorithm Change Approach to the NESDIS Ground Systems
- Kathryn Miretzky, Poster 749, Preparing for GOES-R: Pre-launch Data Operations Exercises (DOE)
- David Pogorzala, Poster 768, GRATDAT: A novel approach to monitoring and processing radiometric data from GOES-R ABI
- Ryan Williams, Poster 357, Application of an Algorithm Change Process to the GOES-R Ground Segment

