



# GRAVITE

## Government Resource for Algorithm Verification Independent Testing and Evaluation

Establishing the Technical Validity and Operational Viability of the NPP and NPOESS Data Products

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### GRAVITE Overview

The Government Resource for Algorithm Verification, Independent Testing, and Evaluation (GRAVITE) is being developed by the Algorithms Division within the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Integrated Program Office (IPO) to facilitate government corporate technical knowledge of the NPOESS science algorithms. GRAVITE consists of a logical technical library, data archive, and an analytical toolset. These three components are used by the Algorithm Division at the IPO and various external partners such as NASA's NPP Science Team, the Operational Algorithm Teams (OATs), and Government sensor and algorithm study participants. The existing infrastructure allows for the development of technical insight, the coordination, communication, and facilitation of Subject Matter Experts (SMEs), and the accumulation and sharing of government technical knowledge. A GRAVITE Lab has been set up in the IPO with dedicated connectivity to the data acquisition, web, and processing servers located at NOAA's Satellite Operations Facility (NSOF) in Suitland, MD. The GRAVITE Lab provides access to data and resources required by the IPO staff to perform Independent Verification and Validation (IV&V) on algorithm and instrument performance, develop Calibration and Validation (Cal/Val) tools and techniques, and execute Government responsibilities for intensive Cal/Val (ICV), and long term monitoring (LTM) activities.

### Physical Description

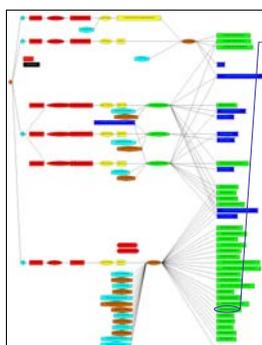
The GRAVITE resource is set up to serve a geographically distributed user base and consists of three segments: (1) the Server Segment, (2) the Development Segment and (3) the Remote Segment. The Server Segment is physically located in the Central Environmental Satellite Computer System (CEMSCS) at the NSOF in Suitland, MD. The Development segment is located in the Sensor Science laboratory at the IPO in Silver Spring, MD. The Remote Segment consists of servers, development workstations and analysis workstations located at various collaborative sites. Some components of the Remote Segment are IPO-owned and are controlled under the same configuration management plan as the Server Segment and Development Segment. Components of the Remote segment that are not IPO-owned are merely instances of the GRAVITE system software running on privately owned hardware.

The Server Segment consists of high-end computing hardware and supporting network infrastructure. The development segment consists of several Linux workstations and is primarily used to locally develop software code and to provide a highly-productive display terminal for remote sessions running on the Server Segment. The remote segment consists of servers and either development or analysis workstations and are located at collaborative sites.

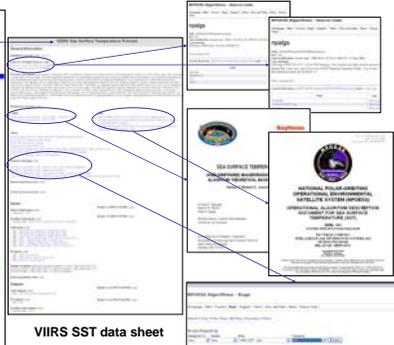
### Technical Library

To facilitate access to technical knowledge, GRAVITE catalogs all NPOESS sensor and algorithm related documentation and data into a Technical Library where it is organized logically and available via the Internet. The following documentation can be obtained through this interface:

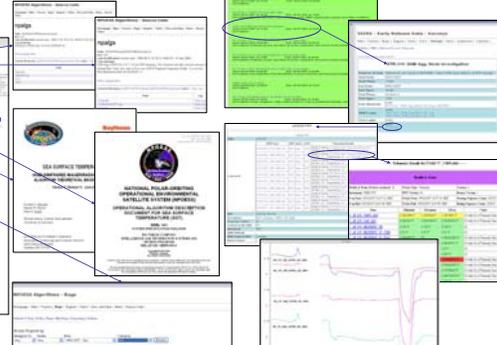
- Sensor Documentation/Data**
  - Sensor Test Data
  - Design Documentation
  - Telemetry Handbook
  - Red Lined Test Procedures
  - Test Log
  - Sensor Drawings/Diagrams
- Algorithm Documentation/Data**
  - ATBDs
  - OADs
  - Data Format Documents
  - EDR-IR/EDR-PR
  - Algorithm Source code
  - Algorithm Test Data



Interactive NPP Wiring Diagram



VIIRS SST data sheet



VIIRS SST source code, documentation, and bugs list

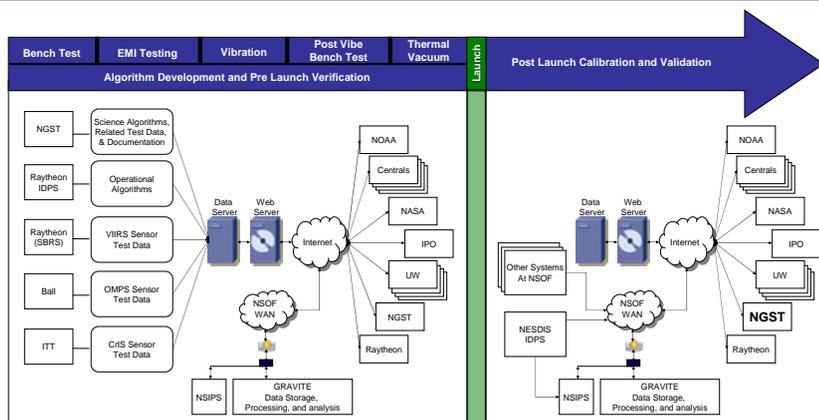
VIIRS sensor test data tracking and analysis

### Data Archive and Distribution

The IPO is actively collecting and storing NPOESS related data for the long term in support of Government calibration and validation activities. These data include the following:

- Pre-Launch Sensor Test data
- Pre-Launch Sensor Characterization data
- Pre-Launch Sensor Calibration Tables
- Pre-Launch Sensor Test Reports
- Pre-Launch Analysis data and reports
- Science Code and associated data files
- Operational Code and associated data files
- Proxy Data
- Simulated Data
- Verification/Validation Data

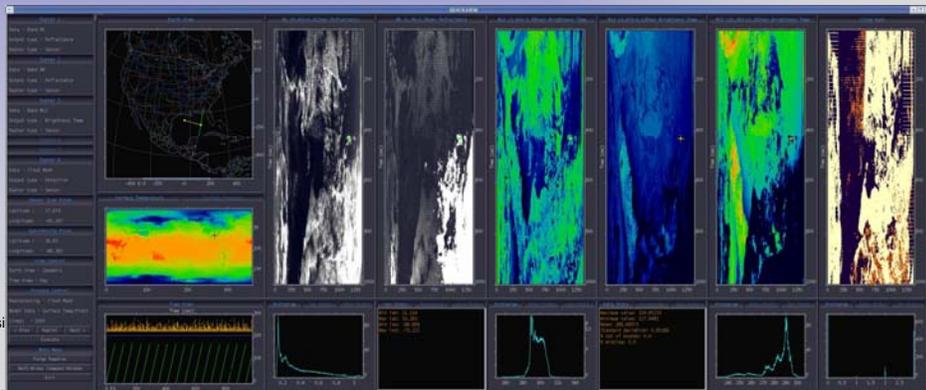
In addition to being archived, the data are available via the Internet to the Government Calibration and Validation Team members. These team members are able to perform critical analysis of sensor test data in a timely manner and provide necessary feedback to the IPO based on their results. The algorithm source code is also archived and distributed to allow team members to gain early insight to the various intricacies of the software.



NPOESS data flow during pre-launch characterization and verification and post-launch calibration and validation

GRAVITE provides access to sensor and algorithm tools ranging from data viewers to statistical plots. These tools are developed in an open-source framework and are intended to be shared across the Cal/Val Team. Additionally, GRAVITE provides the mechanism for any part of the external entities of the Cal/Val Team to develop and share their tools. The types of tools being developed and shared fall into the following categories:

- Tracking and Trending
- Data Visualization and Analysis
- Geoplots
  - Earth/Sensor Pointing
  - Sun Positions
- Sensor/Spacecraft Visualization



NPOESS data triage tool for monitoring key parameters and performing detailed analysis