Total and Spectral solar Irradiance Sensor (TSIS) Project Status

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https://www.nasa.gov/goddard/tsis-1
https://sunclimate.gsfc.nasa.gov

TSIS-1 Project Overview

Project Description

- Current status: TSIS-1 on International Space Station (ISS)
    - Launched December 15, 2017
    - Express Logistics Carrier 3, position 5
    - SpaceX Commercial Resupply Service launch
    - Robotic installation/de-installation at end of life
- Category 3, Class C

Science Objective

To maintain continuity of the total solar irradiance (TSI) and spectral solar irradiance (SSI) for climate research

Instruments

- Total Irradiance Monitor (TIM)
- Spectral Irradiance Monitor (SIM)

Ground Segment

- Science Operations Center and TSIS Science Data System at LASP
- Goddard Earth Science Data and Information Services Center (GES DISC)
- ISS Payload Operations Integration Center
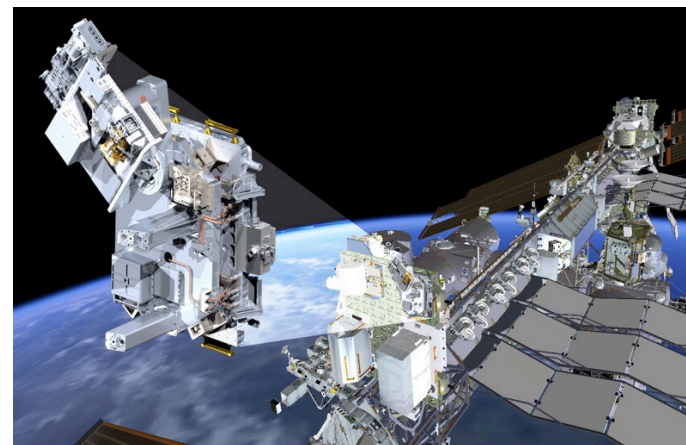
Partners

ISS program

Prime Contractor

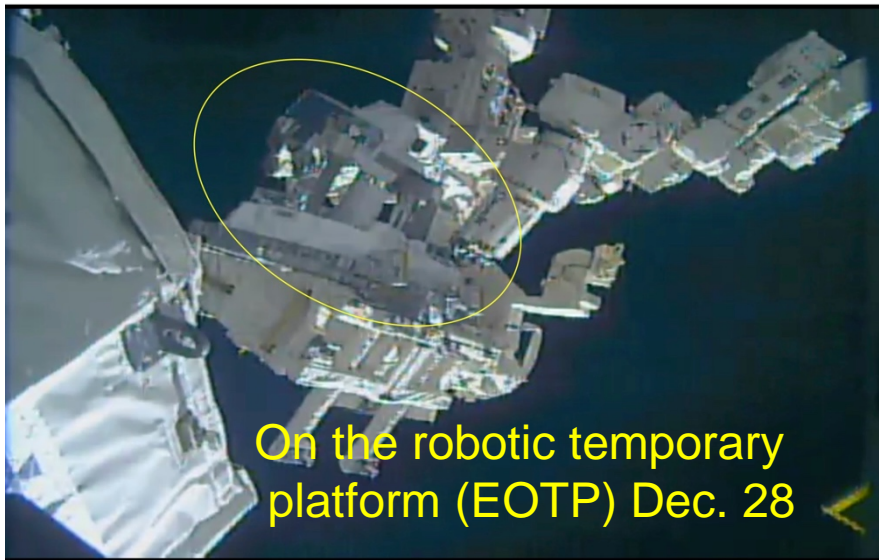Laboratory for Atmospheric and Space Physics (LASP), University of Colorado (CU)

Launch
Dec. 15

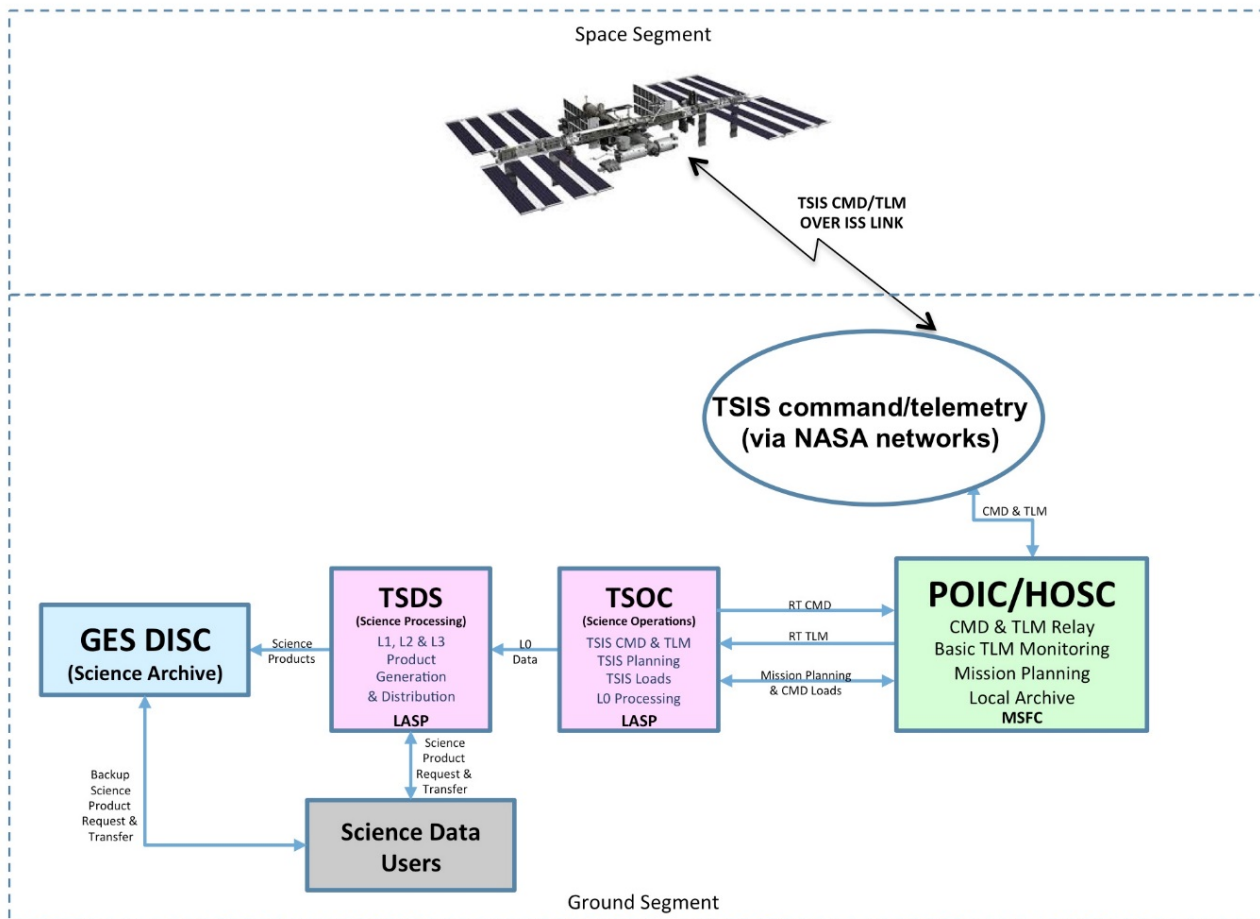In the Dragon trunk Dec. 15

On the robotic temporary platform (EOTP) Dec. 28

Deployed on ISS ELC 3 Dec. 31

Payload communication through Payload Operations Integration Center (POIC) at Huntsville Operations Services Center
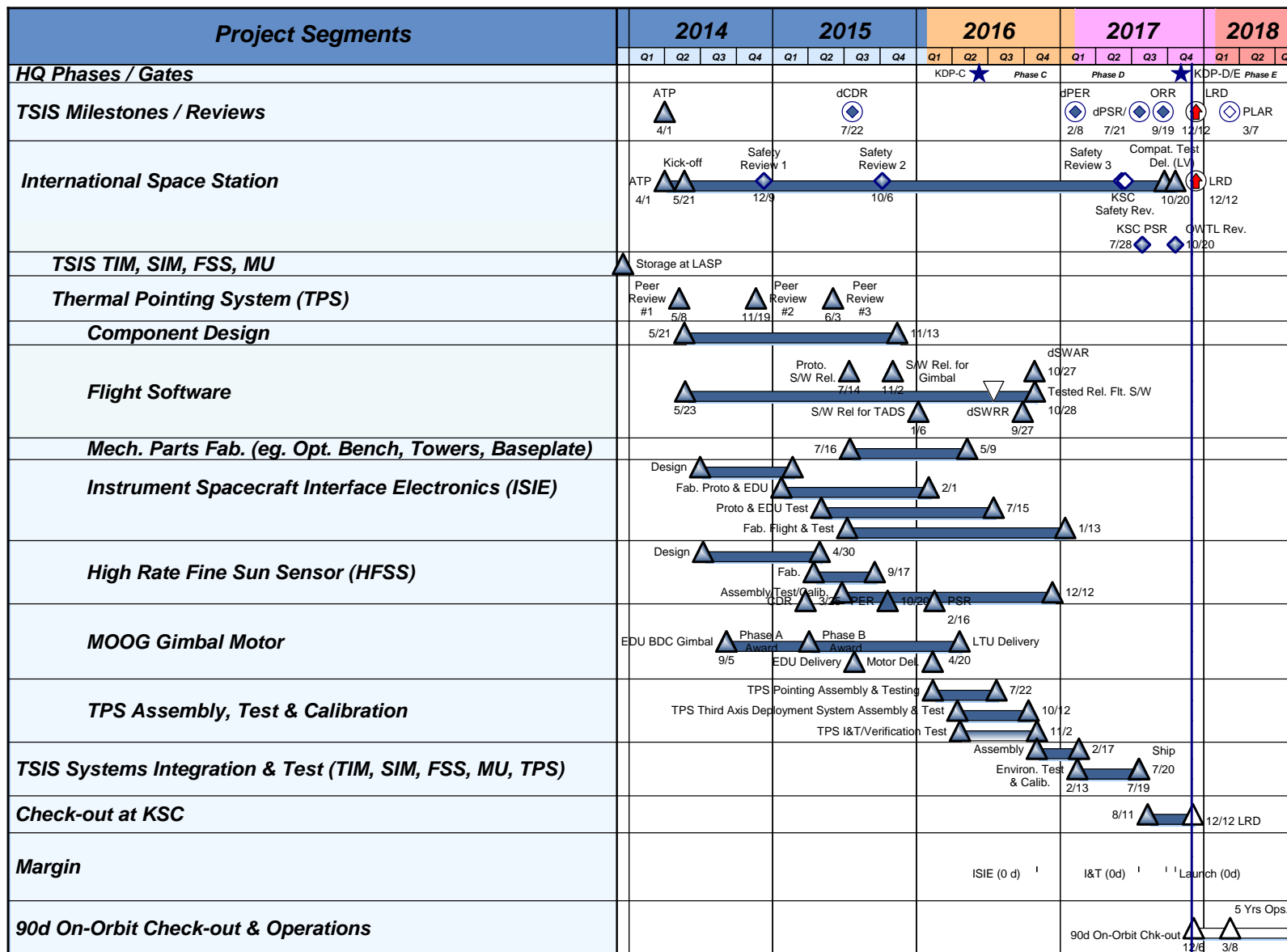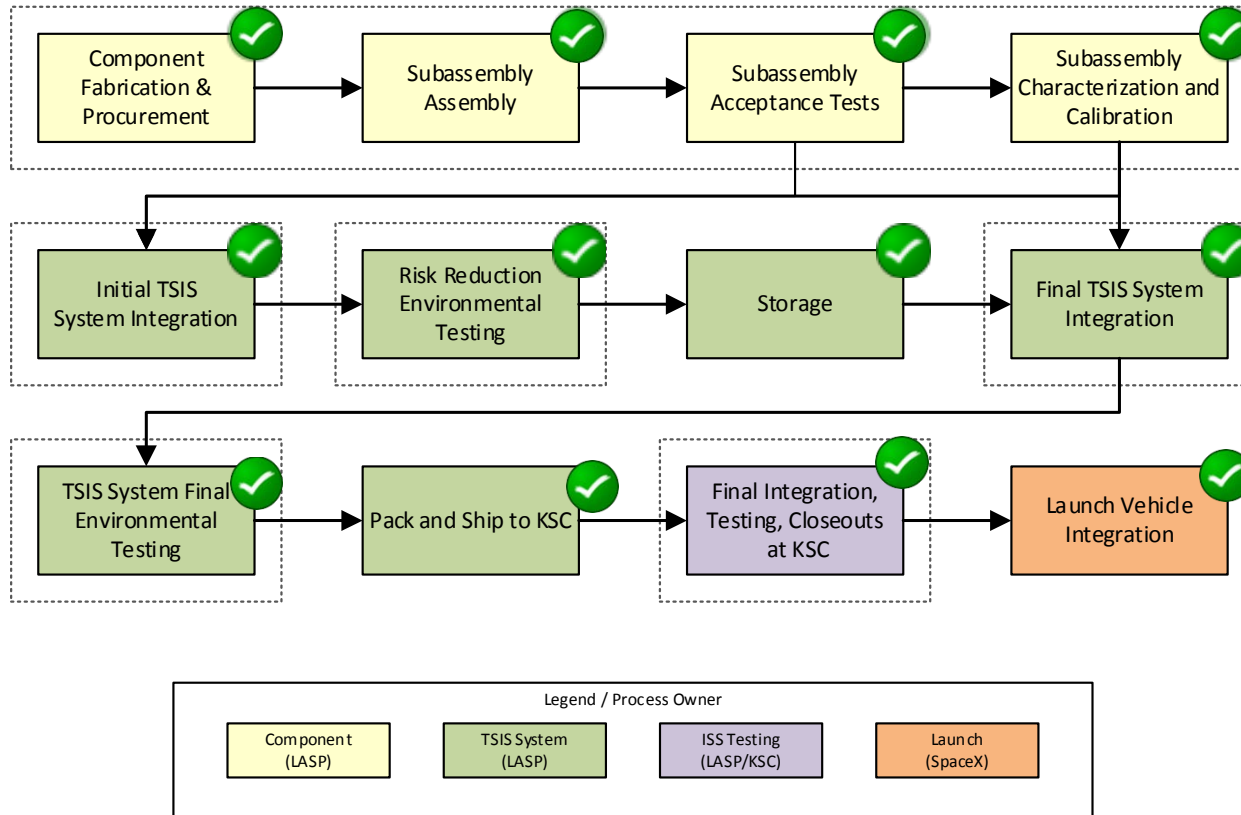

TSOC = TSIS Science Operations Center
TSDS = TSIS Science Data System
GES DISC = Goddard Earth Science Data and Information Services Center

TSIS Ground Elements	NASA Ground Elements	ISS Ground Elements	External Ground Elements

Road from ISS Decision to TSIS-1 Operations

TSIS-1 Integration and Test Summary

Flowchart:

Component Fabrication & Procurement ✓ → Subassembly Assembly ✓ → Subassembly Acceptance Tests ✓ → Subassembly Characterization and Calibration ✓

Initial TSIS System Integration ✓ → Risk Reduction Environmental Testing ✓ → Storage ✓ → Final TSIS System Integration ✓

TSIS System Final Environmental Testing ✓ → Pack and Ship to KSC ✓ → Final Integration, Testing, Closeouts at KSC ✓ → Launch Vehicle Integration ✓

Legend / Process Owner

Component (LASP)	TSIS System (LASP)	ISS Testing (LASP/KSC)	Launch (SpaceX)

- 4 Environmental Tests
- 2 Comprehensive Performance Tests
- 29 Limited Performance Tests
- ~50 Special Performance Tests
- End-to-End Tests
- Simulations

TSIS-1 Project Status

- TSIS on orbit and 90-day commissioning activities complete
- As expected, ISS is a very dynamic environment and the TSIS team is learning more about it
  - Solar array Beta extreme (~26 days per year estimated)
  - Visiting vehicles, Extra Vehicular Activity (EVA) operations, payload maintenance, ISS re-boost, etc. (~17 days per year estimated)
- TSIS-1 transitioned to Earth Science Mission Operations

project after successful Post Launch Assessment Review
- 5 year mission with potential 2-year extension
- Expect data available at Goddard Earth Science Data and Information Services Center (GES DISC) within 6 months
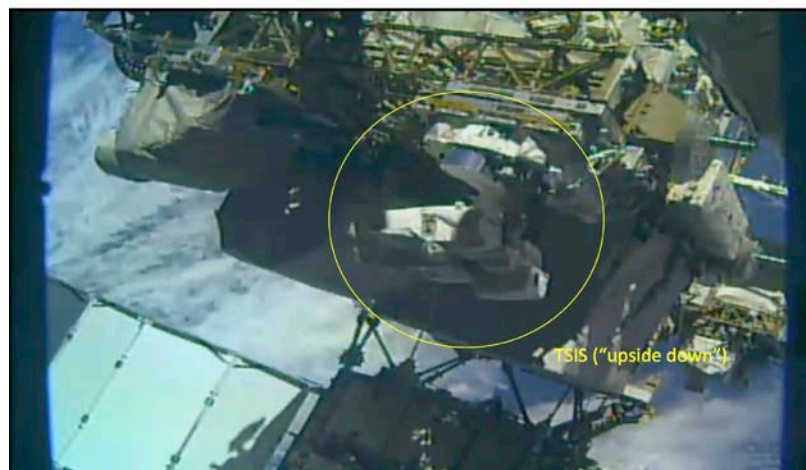
TSIS-2 Project Status

- NASA initiated TSIS-2 pre-formulation work in April 2017
  - Two study contracts with LASP in progress to study implementation approaches for TSIS-2

- Per FY2019 President's Budget, NASA is planning to implement TSIS-2 as a CubeSat mission
  - Takes advantage of compact SIM/TIM technology development efforts funded by NASA's Earth Science Technology Office
  - Project will begin formulation in calendar year 2018