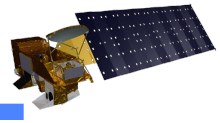
# Aqua Summary

(as of September 30, 2023)



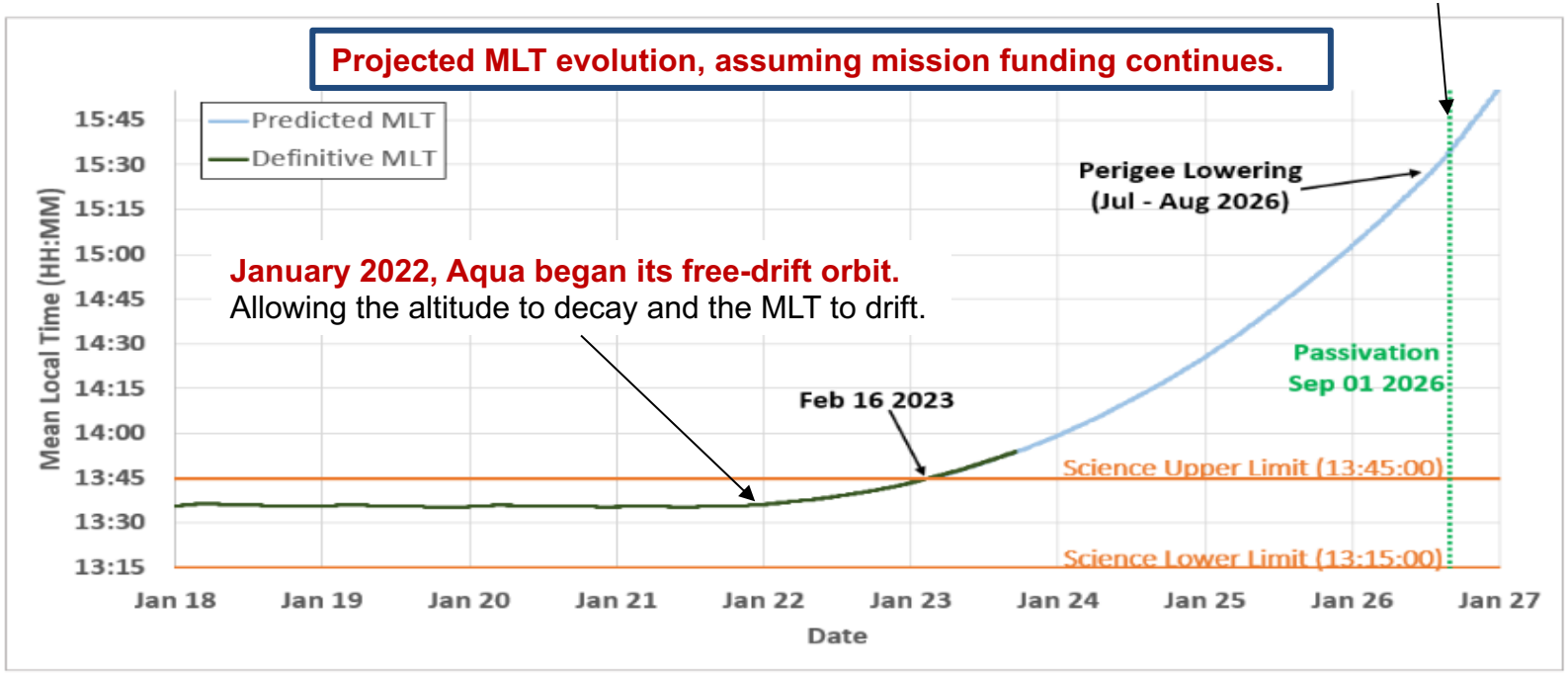
- **Spacecraft Bus** – Nominal Operations (Excellent Health)
  - All components remain on primary hardware.
  - 26 of 132 Solar Array Strings appear to have failed. See slides 3 and 6. Similar failures have occurred on Aura.
  - Significant power generation margin remains.
  - An anomaly with the Formatter Multiplexer Unit/Solid State Recorder on 2/22/2022 was recovered from on 3/23/2022.
  - An anomaly with Power Controller A (PC-A) on 3/31/2022 caused the spacecraft to enter Earth Point Safe Mode and the electrical system Power Controller to shift from PC-A to PC-B. The anomaly is believed to have been caused by a single event upset (SEU) while in the South Atlantic Anomaly (SAA). Recovery to PC-A was completed on 4/13/2022, and all instruments were returned to nominal operations by 4/15/2022.
- **MODIS** – Nominal Operations (Excellent Health)
  - All voltages, currents, and temperatures are as expected.
  - All components remain on primary hardware except 10W Lamps used for calibration.
- **AIRS** – Nominal Operations (<10% of Channels degraded) – (Excellent Health)
  - All voltages, currents, and temperatures are as expected.
  - ~200 of 2378 channels are degraded due to radiation; however, they are still useful.
  - Cooler-A Telemetry, frozen since a 3/28/2014 Anomaly, was restored during recovery activities performed on 9/27/2016.
- **AMSU-A** – Nominal Operations for Its 9 (of 15) Still-Operating Channels (Fair Health)
  - All voltages, currents, and temperatures are as expected.
  - 4 of 15 channels have been removed from Level 2 processing. 2 channels (#1 & #2) are unavailable.
- **CERES-AFT (FM-3)** – Nominal Operations (Excellent Health)
  - All voltages, currents, and temperatures are as expected.
  - Cross-Track and Biaxial Modes are fully functioning.
  - All channels remain operational.
- **CERES-FORE (FM-4)** – Nominal Operations (Good Health)
  - All voltages, currents, and temperatures are as expected.
  - Cross-Track is Nominal. Biaxial Mode is Nominal when used. Successful test of Biaxial Mode conducted March 18, 2019.
  - The shortwave channel failed on March 30, 2005; the other two channels remain operational.
- **AMSR-E** – Off since March 2016
- **HSB** – Non-operational since February 2003 anomaly

# Aqua Orbit Evolution

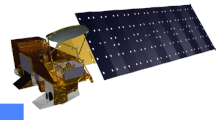
- On 3/18/2021, Aqua completed all spacecraft maneuvers related to maintaining a 13:30 mean local time (MLT) equator crossing. Since May 2002, its northward equatorial crossing MLT had always been between 13:30 and 13:45.
- Aqua began its free-drift, drag down Constellation Exit of the A-Train in January 2022, with no further maneuvers planned except collision avoidance maneuvers and eventual perigee lowering maneuvers.
- Aqua exceeded its 13:45 MLT equatorial crossing science upper limit in February 2023.
- Aqua is predicted to reach an equatorial crossing time of approximately 15:30 MLT in August 2026.
- Science observations and practical applications of the Aqua data continue in concert with the changing MLT.

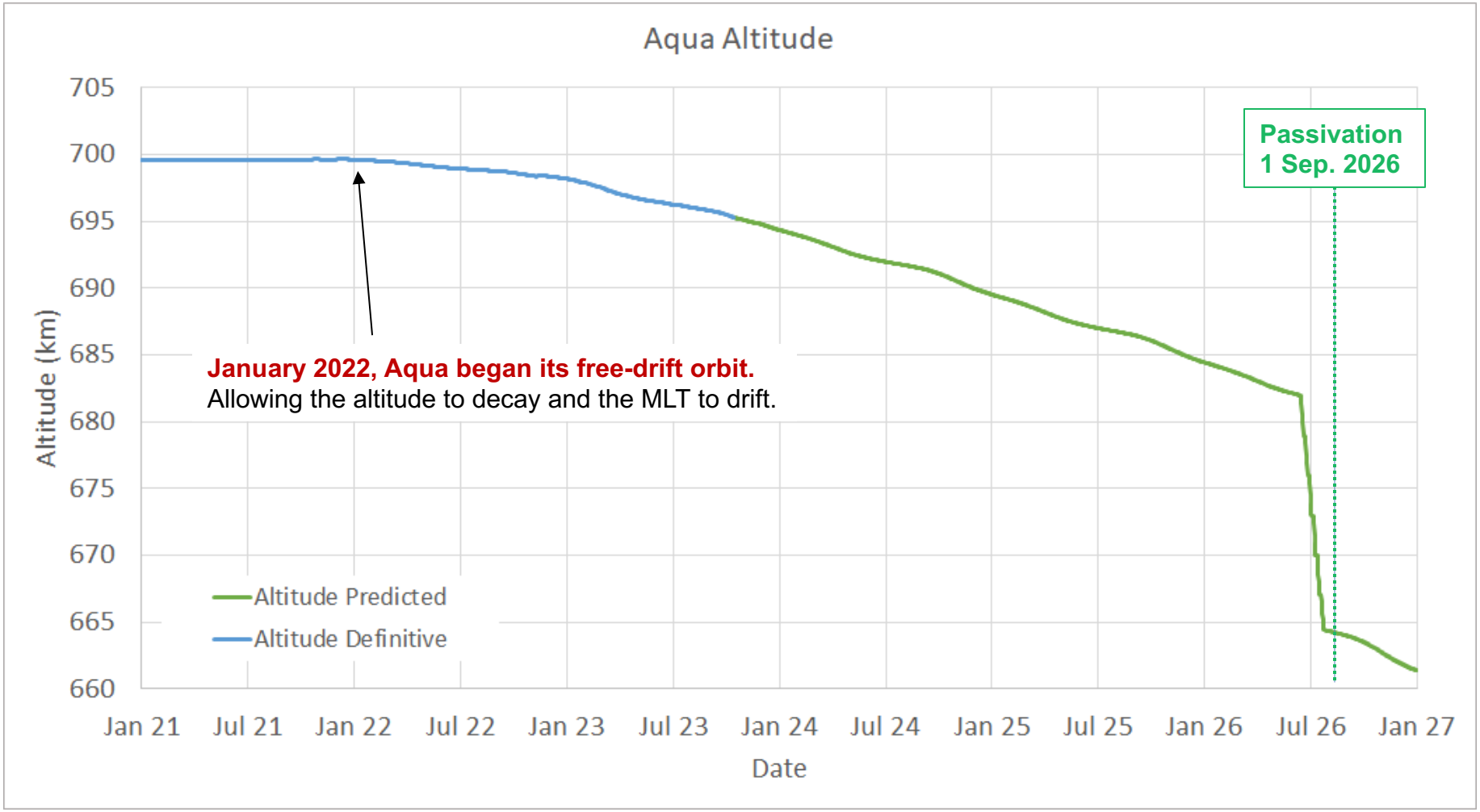
**July 2026, Aqua Instrument Shutdown followed by Spacecraft Passivation.**

Power generation is now the anticipated life-limiting factor for the Aqua Mission.



# Aqua Orbit Altitude Decay and Prediction

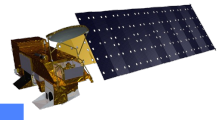





Definitive Aqua Orbital Altitude (blue) and Predicted (green) with Perigee Lowering Maneuvers (PLMs) in July and August 2026. Passivation September 1, 2026.

# Aqua Spacecraft Bus Status

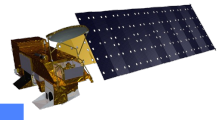
(see Acronyms list at end)

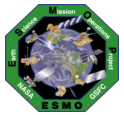


| Subsystem | Component | Design | Current | Capability | Comments |
|---|---|---|---|---|---|
| Electrical Power | Solar Array | 132 Strings | 106 Strings | 80.3% | 26 of 132 strings appear to have failed.The latest failures occurred on 4/20, 6/26 and 7/4/2023, and were confirmed during the 8/9/2023 EPS State of Health Test. |
| | Battery | 24 Cells | 24 Cells | Full | Anomalous performance on BMA-2 Cell 4 in September 2005, returned to nominal within weeks. |
| Thermal Control | TCLs | 42 | 42 | Full | Nominal Performance |
| On Board Controllers | CTC | 2 | 2 | Full | Anticipated 2026 Flight Software Anomaly |
| | GNCC | 2 | 2 | Full | Anticipated 2026 Flight Software Anomaly |
| | PC | 2 | 2 | Full | Anticipated 2026 Flight Software Anomaly. Power Controller A anomaly on 3/31/2022 recovered on 4/13. |
| | ISC | 2 | 2 | Full | Anticipated 2026 Flight Software Anomaly |
| Communications | X-Band String | 2 | 2 | Full | Nominal Performance |
| | S-Band String | 2 | 2 | Full | Nominal Performance |
| Command and Data Handling | USO-1 | 2 | 2 | Full | Nominal Performance |
| | USO-2 | 2 | 2 | Full | Nominal Performance |
| | FMU/SSR | 136Gbits | 136Gbits | Full | Anomalous performance 8/16/2020 - 9/1/2020, returned to Nominal Performance 9/2/2020. Anomalous performance on 2/22/2022, recovered from on 3/23. |
| | C&T Bus | 2 | 2 | Full | Nominal Performance |
| | S/C Support Bus | 2 | 2 | Full | Nominal Performance |
| | PC Bus | 2 | 2 | Full | Nominal Performance |
| | GN&C Bus | 2 | 2 | Full | Nominal Performance |
| Guidance, Navigation and Control | CSSA | 2 | 2 | Full | Nominal Performance |
| | ESA | 2 | 2 | Full | Nominal Performance |
| | MTA | 3 | 3 | Full | Nominal Performance |
| | ODE | 2 | 2 | Full | Nominal Performance |
| | RWA | 4 | 4 | Full | Nominal Performance |
| | STA | 2 | 2 | Full | Monitoring a minor Star Tracker Residual Anomaly |
| | SADA | 2 | 2 | Full | Nominal Performance |
| | TAM | 2 | 2 | Full | Nominal Performance |
| | VDE | 2 | 2 | Full | Nominal Performance |
| | WDE | 4 | 4 | Full | Nominal Performance |
| Propulsion | DTM | 4 | 4 | Full | Nominal Performance |

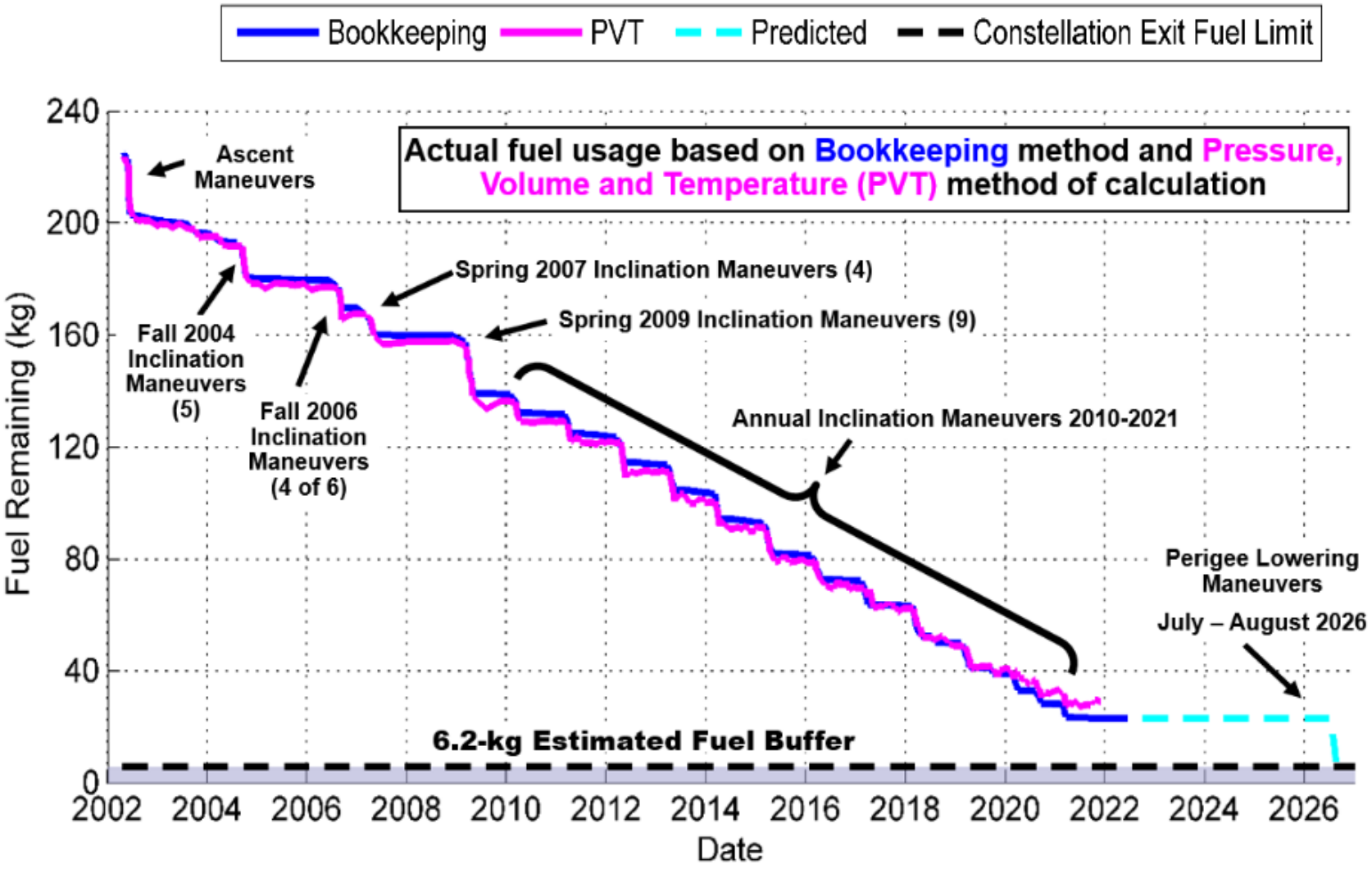
Aqua Spacecraft Bus is in Excellent Health.

# Fuel Usage: Life of the mission



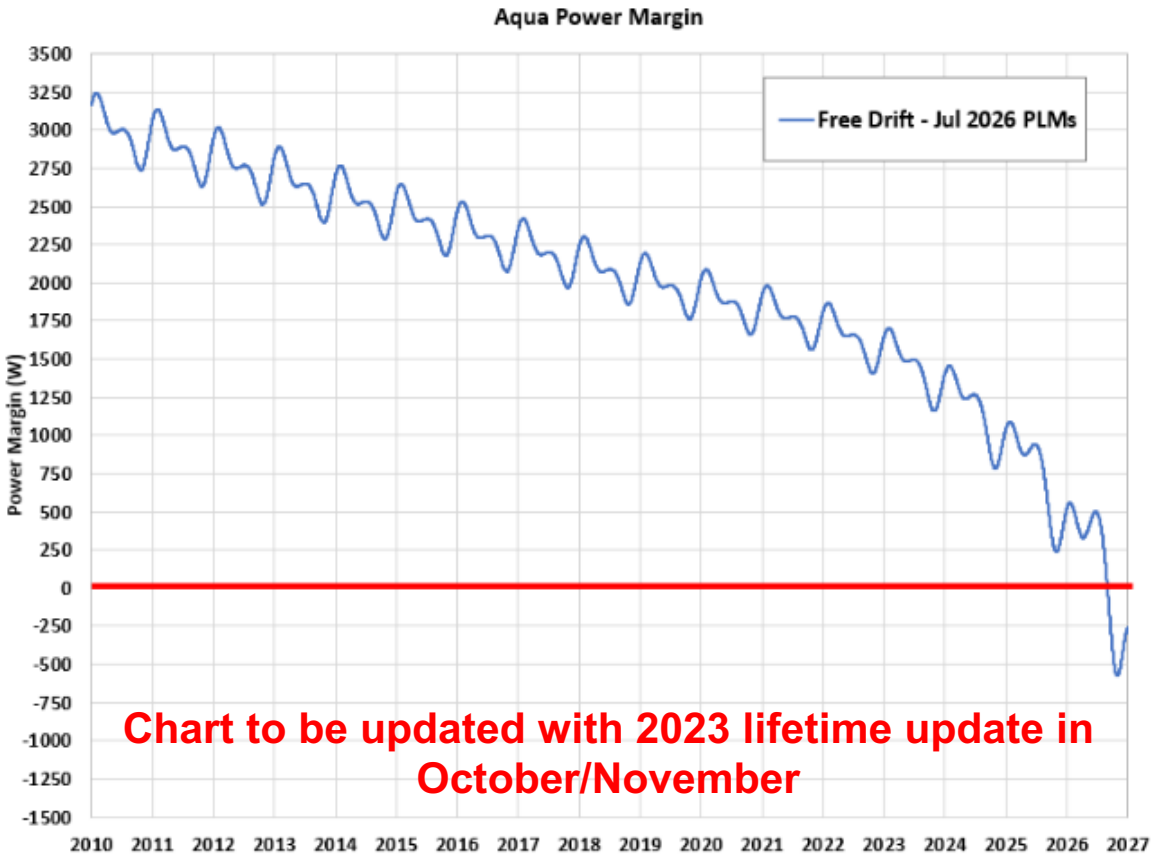


(April 2023)



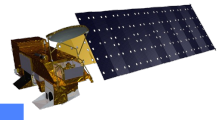

Fuel usage continues to follow prediction.

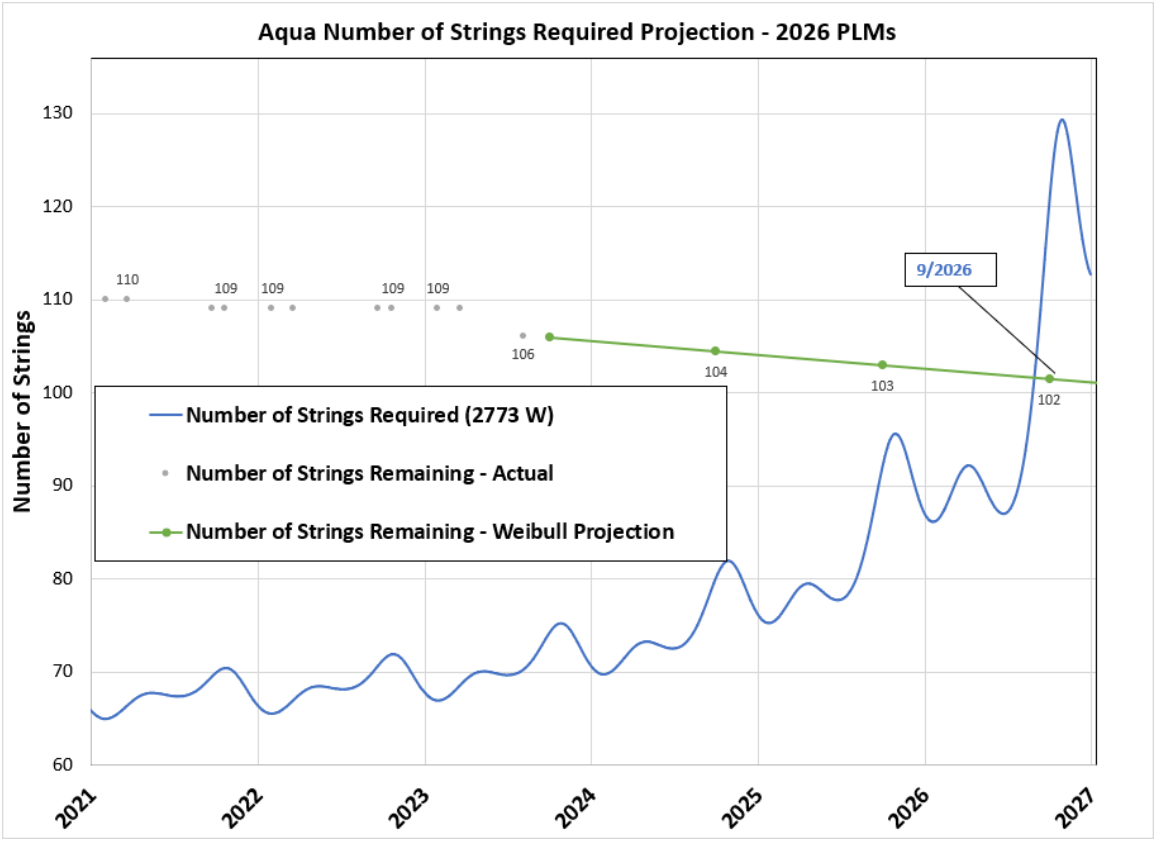
# Aqua Power Margin Analysis




Gradual decrease in Power Margin as the Solar Array (SA) power generation capacity decays due to known and anticipated SA degradation. Several factors play role in SA power generation degradation due to long-term exposure to low Earth orbit. The Power Margin is zero when the power generation capability of the SA just meets the spacecraft and instrument operational load. This is predicted to occur in September 2026 according to the modeling of future string losses.

# Aqua Solar Array (SA) Strings Required



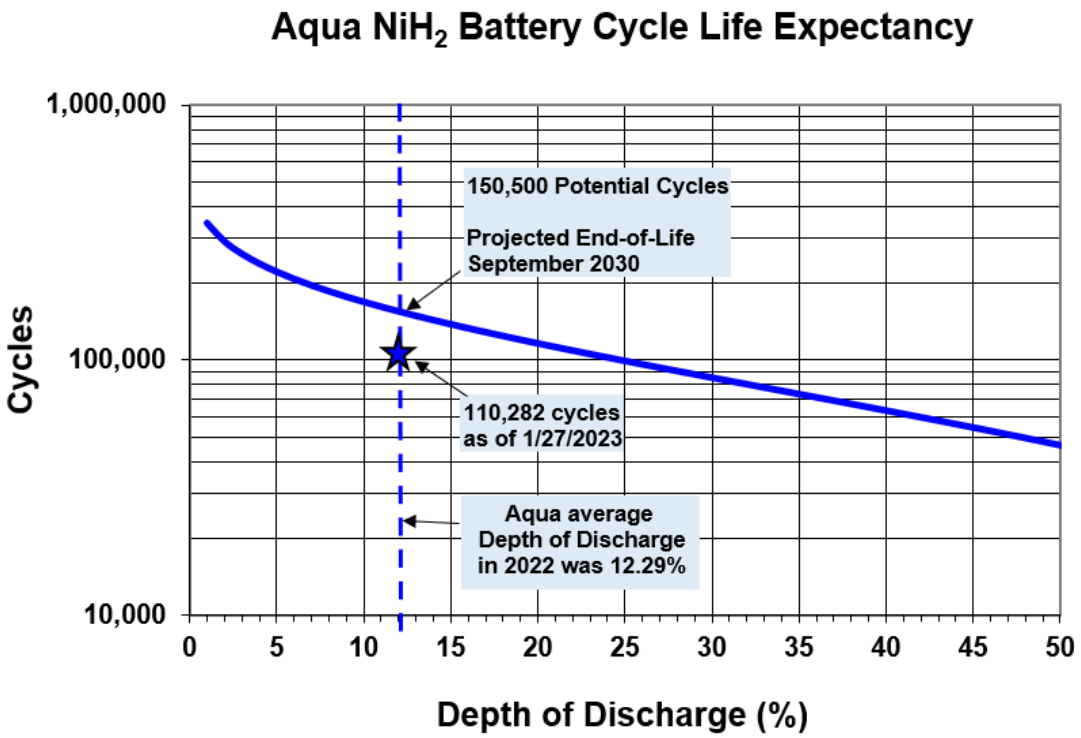



Number of functioning strings on the Aqua SA 2010-2022 (gray dots), projected number of strings 2023-2026 (black dots), and estimated number of strings required to generate the minimum required power of 2,773 Watts (W) 2019-2027 (green curve), based on an A-Train free-drift, drag-down exit in January 2022 and the average power generated per solar string from the EPS ARE SOH test results. FOT analysis, leads to the conclusion that the SA will be capable of generating the minimum required power for spacecraft bus and instrument operations until September 2026. **Chart reflects 26 string losses**.

# Aqua Battery Life Projection

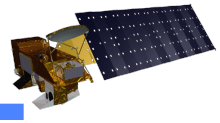
(January 2023)

- Extrapolating the Eagle-Picher $NiH_2$ Battery Cycle Life Capability data for the average Aqua Depth of Discharge (12.29%) in 2022 leads to a potential 150,500 cycles from launch that might be achievable with the cells.
- Aqua is projected to reach 150,500 cycles in September 2030.




Aqua Battery Life Capability projected through September 2030.

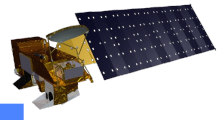
# 2023 Reliability Study



In January 2023, the Safety & Mission Assurance Directorate (Code 300) Reliability and Risk Analysis Branch (Code 371) at NASA Goddard Space Flight Center updated reliability analysis based on current on-orbit performance, constraints and wear effects due to 20.67 years on-orbit for extended mission out to the end of 2027. There is a 95.8% probability Aqua Spacecraft (S/C) Bus will function past 2026. Year identified is end of year.

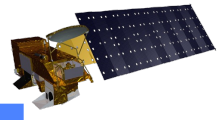
| Spacecraft Subsystem or Instruments | Probabilty of Continued Success at the End of Each Calendar Year | | | | | |
|---|---|---|---|---|---|---|
| | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 |
| AIRS | 1.000 | 0.989 | 0.978 | 0.967 | 0.957 | 0.946 |
| AMSU - A1 | 1.000 | 0.921 | 0.848 | 0.782 | 0.720 | 0.663 |
| CERES | 1.000 | 0.997 | 0.988 | 0.975 | 0.958 | 0.938 |
| MODIS | 1.000 | 0.981 | 0.962 | 0.944 | 0.926 | 0.909 |
| Communications | 1.000 | 0.999 | 0.997 | 0.996 | 0.995 | 0.993 |
| Thermal Control | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Propulsion | 1.000 | 0.997 | 0.994 | 0.991 | 0.988 | 0.985 |
| Structures & Mechanisms | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Guidance, Navigation & Control | 1.000 | 0.998 | 0.995 | 0.993 | 0.991 | 0.988 |
| Electrical Power System | 1.000 | 0.998 | 0.996 | 0.994 | 0.992 | 0.991 |
| Electrical Power Distribution | 1.000 | 1.000 | 0.999 | 0.999 | 0.998 | 0.998 |
| Command & Data Handling | 1.000 | 0.999 | 0.997 | 0.996 | 0.994 | 0.993 |
| Spacecraft Bus TOTAL | 1.000 | 0.989 | 0.979 | 0.969 | 0.958 | 0.948 |
| Spacecraft Bus Plus AIRS | 1.000 | 0.979 | 0.958 | 0.937 | 0.917 | 0.897 |
| Spacecraft Bus Plus CERES | 1.000 | 0.986 | 0.968 | 0.945 | 0.918 | 0.890 |
| Spacecraft Bus Plus MODIS | 1.000 | 0.971 | 0.942 | 0.915 | 0.888 | 0.862 |
| Spacecraft Bus Plus AIRS, CERES & MODIS | 1.000 | 0.957 | 0.911 | 0.863 | 0.814 | 0.765 |

# Aqua MODIS Instrument Facts



- 36-band cross-track scanning radiometer, also on Terra
- Visible to thermal infrared measurements at 0.4-14.5 μm
- Spatial resolution: 250 m to 1 km
- Swath width: 2330 km
- Global coverage every 1-2 days
- Heritage: AVHRR, HIRS, Landsat TM, Coastal Zone Color Scanner (CZCS), SeaWiFS
- Prime Contractor: Raytheon Santa Barbara Remote Sensing (SBRS)
- Responsible Center: NASA Goddard Space Flight Center

# Aqua MODIS Instrument Status



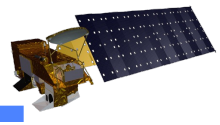
- All voltages, currents, and temperatures are as expected.
- There are no disturbing trends in any engineering parameter.
- Aqua MODIS continues to operate on prime equipment.
  - Full redundancy exists except for 10 W Lamps used for calibration
    - Lamps #2, #3 and #4 failed prematurely.
    - Able to use remaining lamp for calibration purpose
    - If the last 10-Watt Lamp (Lamp #1) would also fail, the impact to MODIS science data would be minor. The MODIS scientists have nearly phased out data corrections based on calibration, as the MODIS data have been very stable.

| Life Limiting Items | Designed | 5/4/2002 | 10/13/2023 |
|---|---|---|---|
| SRCA 10 W Lamp #1 (Hours of use) | 500 | 200.2 | 390.4 |
| SRCA 10 W Lamp #2 [1] (Hours of use) | 500 | 175.7 | 188.1 |
| SRCA 10 W Lamp #3 [1] (Hours of use) | 500 | 178.5 | 205.7 |
| SRCA 10 W Lamp #4 [1] (Hours of use) | 500 | 57.7 | 135.0 |
| SRCA 1 W Lamp #1 (Hours of use) | 5000 | 499.5 | 534.0 |
| SRCA 1 W Lamp #2 (Hours of use) | 5000 | 269.8 | 320.1 |
| Solar Diffuser Door Movements (Open or Close) | 3022 | 1630 | 4034[2] |
| Nadir Aperture Door Movements (Open or Close) | 1316 | 1046 | 1055 |
| Space View Door Movements (Open or Close) | 1316 | 624 | 636 |

1. Spectroradiometric Calibration Assembly (SRCA) 10 W Lamp #2, Lamp #3 and Lamp #4 are no longer functional.
2. Solar Diffuser Door Movements have exceeded design. Use of Door has been reduced from once per week to once every 6 weeks. Use of Screen was reduced from once per week to once every three weeks. Modified calibration is possible if door fails.

**Aqua MODIS is in Excellent Health.**

# MODIS Lunar Calibration

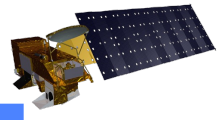


- MODIS Lunar Calibration is performed ~4 days before full moon.
  - Performed when spacecraft roll is less than 20$^{o}$
  - Executed ~10 times annually
- MODIS formatter rate is changed from night rate to day rate during the calibration period.
  - Done every Spacecraft-Day/Night
  - No additional risk to instrument
- Modify sector rotation
  - Done in software only
  - MODIS scan mirror rotation at constant speed regardless of MODIS Roll or nominal science
  - No additional risk to instrument

There are no door or screen closing or mechanical changes to MODIS during MODIS Roll Maneuvers, therefore there is no risk specific to MODIS instrument.

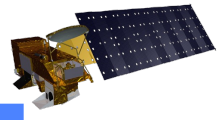
The only added risk regarding MODIS Roll Maneuvers is with the spacecraft being off-pointing during the calibration.

# AIRS Instrument Facts



- 2378-channel (3.7-15.4) μm grating spectrometer, with 4 additional VIS/NIR imager channels (0.41-0.94 μm)
- Spatial resolution: 13.5 km (IR) and 2.3 km (visible) at nadir
- Swath width: 1650 km
- Global coverage every 1-2 days
- Heritage: Advanced Moisture and Temperature Sounder (AMTS), High Resolution Infrared Sounder (HIRS)
- Prime Contractor: BAE Systems
- Responsible Center: NASA Jet Propulsion Laboratory (JPL)

# AIRS Instrument Status

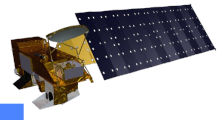


All voltages, currents, and temperatures are as expected.
- Includes scanner currents, cooler drive levels and heater currents
- On September 25, 2016, Cooler-A experienced a shut down anomaly. Anomaly recovery occurred two days later and also cleared a condition that had disabled Cooler-A telemetry since an earlier Cooler-A anomaly in March 2014.

- There are no disturbing trends in any engineering parameter.
- Design has considerable spectral redundancy and channels have a pair of detectors whose outputs are combined onboard allowing for correction if only one detector is degraded.
- Approximately 200 of 2378 infrared channels are degraded, primarily due to radiation.
  - Symptoms: increase in Gaussian and non-Gaussian noise
  - These channels are degraded; however, they are still useful for climate studies where averages over many data samples are taken.
  - Uploaded gain change to correct degraded channels for non-Gaussian Noise. Usually, a degraded channel has had only one of the two detectors affected.
    - Corrected 106 Channels on January 21, 2012
    - Corrected 10 Channels on June 10, 2013
    - Corrected 91 Channels on March 23, 2015
    - Corrected 46 Channels on October 3, 2019
    - Additional channels can be corrected depending on science team request
  - Increased solar activity may increase degradation rate since the channels are susceptible to radiation.

**AIRS is in Excellent Health.**

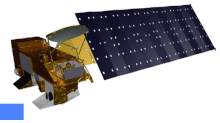
# AMSU Instrument Facts



- 15-channel microwave sounder, also on NOAA satellites since 1998
- Microwave measurements at 23-90 GHz (0.3-1.3 cm)
- Spatial resolution: 40.5 km at nadir
- Swath width: 1690 km
- Global coverage every 1-2 days
- Heritage: Microwave Sounding Unit (MSU)
- Prime Contractor: Northrop Grumman Aerospace Systems (NGAS)
- Responsible Center: NASA Goddard Space Flight Center

Note: “AMSU” here is the same instrument as the “AMSU-A” mentioned on other slides in this package.

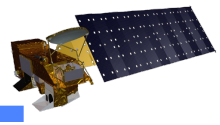
# AMSU-A Instrument Status



- All voltages, currents, and temperatures are as expected
- There are no disturbing trends in any engineering parameter
- Designed for 3 years (now well beyond design life)
- 9 of 15 Channels continue to perform well, and of those, 8 show no signs of degradation
- 5 of 15 Channels have degraded and are no longer used for science
  - 5/4/2002: Channel 7 has not met noise specifications since launch (suspect launch related damage) and has never been used
  - 3/5/2008: Channel 4 data removed from level 2 processing; Declared non-operational in November 2007
  - 4/13/2012: Channel 5 data removed from level 2 processing; Declared non-operational in April 2012
  - 9/24/2016: Channels 1 and 2 (AMSU-A2) suffered a power anomaly; efforts to restore power to AMSU-A2 were unsuccessful, and since the exact cause of the anomaly was unknown, the instrument manufacturer recommended not switching to the A-side to attempt recovery; on 11/29/2016 the Anomaly Recovery Team (ART) recommended no further commanding, and since the Anomaly Closeout Review at JPL on 1/31/2017, the Anomaly has been considered Closed
- 1 Channel (# 14) underwent an unexpected anomaly on 6/21/2018, but, just as unexpectedly, recovered on 6/19/2019.
- 1 Channel (# 6) is slowly degrading but has many years of useful performance remaining based on current degradation rate. The channel is considered problematic.
- The scanner and 9 channels appear capable of lasting several more years

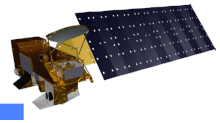
**AMSU-A is in Fair Health.**

# AMSR-E Instrument Facts



- *Instrument type:* Passive microwave radiometer, twelve channels, six frequencies, dual polarization (vertical and horizontal); offset parabolic reflector, 1.6 m in diameter and drum designed to rotate at 40 rpm; six feedhorns to cover six bands in the range 6.9–89 GHz with 0.3–1.1 K radiometric sensitivity.
- *Channels:* 12
- *Spectral Range:* 0.34–4.35 cm
- *Frequency Range:* 6.9–89.0 GHz
- *Swath Width:* 1445 km
- *Spatial Resolution:* 6 km × 4 km (89.0 GHz), 14 km × 8 km (36.5 GHz), 32 km × 18 km (23.8 GHz), 27 km × 16 km (18.7 GHz), 51 km × 29 km (10.65 GHz), 74 km × 43 km (6.925 GHz)
- *View: Forward-looking conical scan*
- *Incidence Angle: 55°*
- *Instrument Field of View (IFOV) at Nadir: Ranges from 74 km × 43 km for 6.9 GHz to 6 km × 4 km for 89.0 GHz*
- *Sampling Interval: 10 km for 6–36 GHz channels*
- *Calibration: External cold load reflector and a warm load for calibration*
- *Accuracy: 1 K or better*
- Global coverage every 1 to 2 days
- Heritage: SMMR (on Nimbus-7 and Seasat), SSM/I (on DMSP), AMSR (on ADEOS II)
- Prime Contractor: Mitsubishi Electric Company (MELCO)
- Responsible Center: Japan Aerospace Exploration Agency (JAXA)

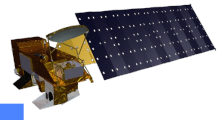
# AMSR-E Instrument Status



- In October 2011, AMSR-E was no longer able to maintain 40 rpm rotation and was spun down to 0 rpm.
- The cause of anomaly is likely to be a bearing and/or lubrication issue. The AMSR-E instrument far exceeded 3-year design life as the instrument performed nominally for 9+ years although signs of bearing/lubrication wear were obvious.
- To facilitate calibration with the AMSR2 instrument on Japan's Shizuku satellite, the instrument was spun back up to 2 rpm on December 4, 2012 after addressing the risk of potential AMSR-E momentum imbalance that could trip Aqua into safe-hold.
- Antenna was spun down from 2 rpm to 0 rpm due to stall indications observed in telemetry on December 4, 2015. Since AMSR-E spin-down was already planned for December 8, 2015, no recovery actions were conducted.
- Configured the instrument to Survival Mode on December 8, 2015, concluding AMSR-E Operations.

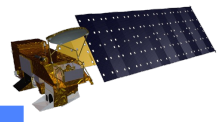
AMSR-E was turned off on March 2, 2016.
No plans to turn AMSR-E back on.

# CERES Instrument Facts



- Quantity on Aqua: 2 (CERES-AFT and CERES-FORE)
- Operational On-Orbit: 2-Aqua, 2-Terra, 1-Suomi National Polar-Orbiting Partnership (SNPP), 1-NOAA 20 (Formally known as the Joint Polar Satellite System (JPSS-1) satellite)
- Channels: 3 radiometers per instrument
- Spectral Range: One channel each measuring total radiance (0.3 to >100 μm), shortwave radiance (0.3-5 μm), and the radiance in the atmospheric window at 8-12 μm
- Spatial Resolution: 20 km at nadir
- Swath width: Limb to limb of the Earth view
- Field of View: ±78$^{o}$ cross-track, 360$^{o}$ azimuth
- Instrument IFOV: 14 mrad
- Global coverage Daily
- Heritage: Earth Radiation Budget Satellite (ERBE)
- Prime Contractor: Northrop Grumman Aerospace Systems (NGAS)
- Responsible Center: NASA Langley Research Center

# CERES Instrument Status



CERES-AFT (FM-3)

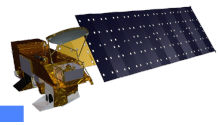
- All voltages, currents, and temperatures are as expected.
- There are no disturbing trends in any engineering parameter.
  - Bi-axial Mode – Nominal, when used. Two-orbit test conducted 1/15/2023.
    - Became primary Bi-axial instrument on 3/22/2023
  - Cross-Track Mode – Nominal, when used

CERES-FORE (FM-4)

- All voltages, currents, and temperatures are as expected.
- There are no disturbing trends in any engineering parameter.
  - Bi-axial Mode – Nominal, when used
    - CERES FM-4 sensor stopped collecting valid Shortwave channel radiometric measurements on March 30, 2005
    - Failure of the Shortwave channel on one CERES did not prevent the accomplishment of any of the mission's scientific objectives
    - Successful test of Biaxial Mode conducted March 18, 2019.
  - Cross-Track Mode – Nominal
    - Became primary Cross-Track instrument on 3/22/2023

**CERES-AFT is in Excellent Health.**
**CERES-FORE is in Good Health.**

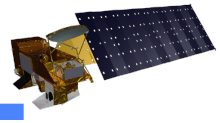
# HSB Instrument Facts



- Heritage: AMSU-B
- Instrument Type: Microwave radiometer
- Aperture: 18.8 cm
- Channels: 4
- Spectral Range: 150–190 GHz
- Swath Width: 1650 km
- Coverage: Global every 1 to 2 days
- Spatial Resolution: 13.5 km at nadir
- FOV: ± 49.5° cross-track from nadir
- Instrument IFOV: 1.1° (13.5 km at nadir)
- Pointing Accuracy: 0.1°
- Scan Period: 2.667 s
- Scan Sampling: 90 × 1.1°, in 1.71 s
- Sensitivity: 0.3–0.68 K, depending on spectral region
- Prime Contractor: Astrium (formerly Matra Marconi Space, United Kingdom)
- Provider: Instituto Nacional de Pesquisas Espaciais (INPE, the Brazilian Institute for Space Research)

HSB has been non-operational since February 2003 due to an apparent electrical component failure in the scan drive system.

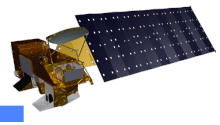
# Data Latency



- EOS Data and Operations System (EDOS): Latency refers to the amount of time between the start time of the observation and the time that EOS Data and Operations System (EDOS) Level 0 products are delivered to the data processing facilities (DAAC, SIPS, MODAPS, etc.). Latency for the Aqua mission is generally between 30 minutes and two hours. NOTE: In early 2021, NOAA requested that they no longer receive Rate Buffered Data (RBD) files from EDOS; as a result, EDOS stopped sending the files to NOAA on 3/9/2021.

- Land and Atmosphere Near-real-time Capability for EOS (LANCE) latency: Average time based on the following calculation: from the mid-time of each granule to the time that Level 1, 2, and 3 products are available at the ftp website. *Note:* Each instrument granule has a specific duration, e.g., MODIS granule period is 5 minutes. For the period August 27, 2023 – September 23, 2023, the average latency was 94 minutes for AIRS and 102 minutes for MODIS. NOTE: Data is a week older than normal due to an error in the 9/10 – 10/7 report.

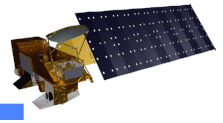
# Data Access



- Realtime Direct Broadcast to over 168 stations world-wide
- Processed data are available at the following centers*:
  - The Goddard Earth Sciences Data and Information Services Center for the AIRS and AMSU data (disc.gsfc.nasa.gov/AIRS)
  - The National Snow and Ice Data Center for AMSR-E data and MODIS snow and ice data (nsidc.org/data/amsre and nsidc.org/data/modis).
  - The Langley Research Center (LaRC) Distributed Active Archive Center (DAAC) for CERES data (eosweb.larc.nasa.gov)
  - The Land Processes DAAC for MODIS land data (lpdaac.usgs.gov)
  - The Level 1 and Atmosphere Archive and Distribution System for MODIS atmosphere data (ladsweb.nascom.nasa.gov)
  - The Ocean Biology Processing Group site for MODIS ocean color data (oceancolor.gsfc.nasa.gov)
  - The Physical Oceanography DAAC for MODIS sea surface temperatures (http://podaac.jpl.nasa.gov/datasetlist?search=AQUA)
  - The Land and Atmosphere Near real-time Capability for EOS (LANCE) (https://earthdata.nasa.gov/data/near-real-time-data/about-lance)

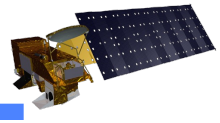
** funded under the ESDIS Project*

# Acronym List, p. 1



| | |
|---|---|
| AIRS | Atmospheric Infrared Sounder |
| AMSR-E | Advanced Microwave Scanning Radiometer for EOS |
| AMSU | Advanced Microwave Sounding Unit |
| AMTS | Advanced Moisture and Temperature Sounder |
| ARM | Array Regulator Module |
| AVHRR | Advanced Very High Resolution Radiometer |
| CERES | Clouds and the Earth's Radiant Energy System |
| CSSA | Coarse Sun Sensor Assembly |
| CZCS | Coastal Zone Color Scanner |
| C&DH | Command & Data Handling |
| C&T | Command & Telemetry |
| CTC | Command and Telemetry Controller |
| DAAC | Distributed Active Archive Center |
| Delta-i | Inclination Maneuver |
| DMSP | Defense Meteorological Satellite Program |
| DTM | Dual Thruster Module |
| EDOS | EOS Data and Operations System |
| EOS | Earth Observing System |
| ERBE | Earth Radiation Budget Experiment |
| ESA | Earth Sensor Assembly |
| ESDIS | Earth Science Data and Information System |
| ESMO | Earth Science Mission Operation |
| FM | Flight Model |
| FMU | Formatter Multiplexer Unit |
| FOV | Field of View |
| GN&C | Guidance, Navigation & Control |
| GNCC | Guidance, Navigation and Control Controller |
| HIRS | High Resolution Infrared Sounder |
| HSB | Humidity Sounder for Brazil |
| IFOV | Instrument Field of View |
| INPE | Instituto Nacional de Pesquisas Espaciais |
| IR | Infrared |
| ISC | Instrument Support Controller |
| JAXA | Japan Aerospace Exploration Agency |

# Acronym List, p. 2



| | |
|---|---|
| JPL | Jet Propulsion Laboratory |
| LANCE | Land and Atmosphere Near-real-time Capability for EOS |
| LOS | Loss of signal |
| MELCO | Mitsubishi Electric Company |
| MODAPS | MODIS Adaptive Processing System |
| MODIS | Moderate Resolution Imaging Spectroradiometer |
| MSU | Microwave Sounding Unit |
| MTA | Magnetic Torque Assembly |
| NASA | National Aeronautics and Space Administration |
| NGAS | Northrop Grumman Aerospace Systems |
| NOAA | National Oceanic and Atmospheric Administration |
| ODE | Orientation Drive Electronics |
| PC | Power Controller |
| RBD | Rate Buffered Data |
| rpm | revolutions per minute |
| RWA | Reaction Wheel Assembly |
| SA | Solar array |
| SADA | Solar Array Drive Assembly |
| SBRS | Santa Barbara Remote Sensing |
| S/C | Spacecraft |
| SeaWiFS | Sea-viewing Wide-Field-of-View Sensor |
| SIPS | Science Investigator-led Processing System |
| SMMR | Scanning Multichannel Microwave Radiometer |
| SNPP | Suomi National Polar-Orbiting Partnership |
| SOH | State of Health |
| SRCA | Spectroradiometric Calibration Assembly |
| SSMI | Special Sensor Microwave Imager |
| SSR | Solid State Recorder |
| STA | Star Tracker Assembly |
| TM | Thematic Mapper |
| TAM | Three-Axis Magnetometer |
| USO | Ultra Stable Oscillators |
| VDE | Valve Drive Electronics |
| WDE | Wheel Drive Electronics |