Status report on the current and future satellite systems by NASA

Presented to CGMS-41 Plenary Session

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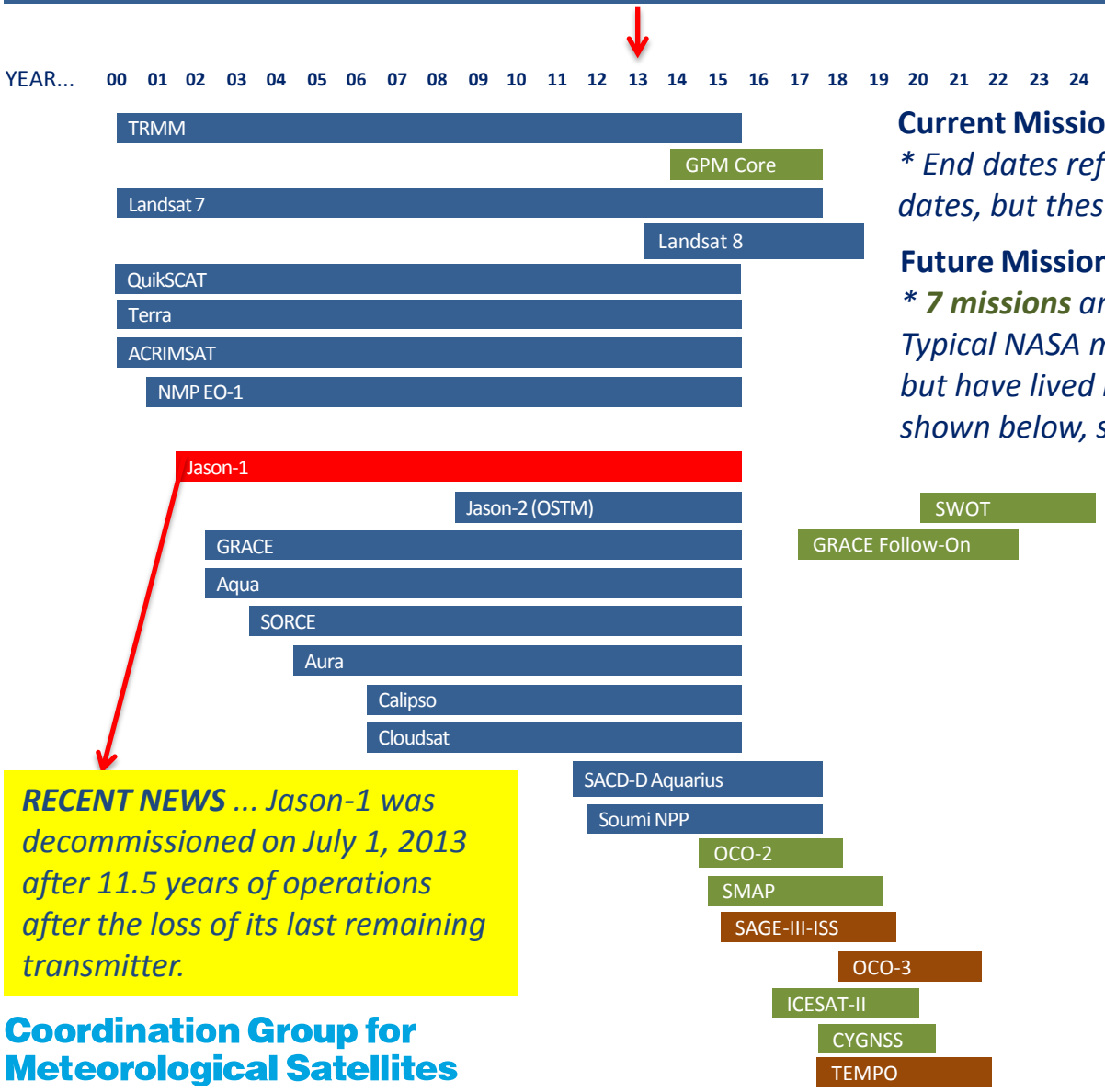
Overview of NASA's current and future satellite systems



Current Missions – 16 total (as of July 3, 2013)

** End dates reflect NASA "Senior Review" approved dates, but these missions will likely operate much longer.*

Future Missions – 10 total through 2020

** **7 missions** and **3 instruments**.*

Typical NASA missions are planned for 3 to 5 years life but have lived much longer in the past. Jason-3 not shown below, since NASA's roles is only science.

***RECENT NEWS** ... Jason-1 was decommissioned on July 1, 2013 after 11.5 years of operations after the loss of its last remaining transmitter.*

- *Note: This chart does not include cases where we have one instrument (e.g., GPSRO) on a partner's satellite.*

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CURRENT NASA LEO and R&D SATELLITES ... Mission News

- NASA is currently operating **16 Earth Science missions**. 4 missions are operational LEO (Jason-2, NPP, Landsat 7, Landsat 8) and 12 are R&D satellites.
- Most recent launch was **LDCM** (Feb 2013). Operations were turned over to USGS in May 2013 and mission was renamed, **Landsat 8**.
- 9 of NASA's 16 operating missions utilize international partnerships.
- 4 of NASA's missions (Aqua, Aura, Calipso, Cloudsat) are part of the international "A-Train" Constellation with OCO-2 planning to join the A-Train in 2014.
- NASA's missions are aging ... except for Suomi-NPP (Oct 2011), SAC-D/Aquarius (Jun 2011) and Landsat-8 (Feb 2013), all missions have passed their nominal design life, and are currently in extended operations.
- Battery aging is observed in GRACE, CloudSat, and SORCE, which reduces sampling.
- Instruments with reduced capability are Landsat-7 ETM+ (failed Scan Line Corrector), QuikSCAT's SeaWinds (antenna no longer rotates, used primarily to cross-calibrate with other on-orbit scatterometers), Terra's ASTER (SWIR module is no longer functional), Aqua AMSU (Channel 4 has failed) and Aqua AMSR-E (restarted Dec 2012 at 2-rpm for cross-calibration with AMSR-2 allowing a merged climate data record).
- Instruments that are not operating are Aqua's HSB, TRMM's CERES, Jason's TRSR, and Aura's HIRDLS.

CURRENT NASA LEO and R&D SATELLITES ... Non-Mission News

- NASA's missions were conceived as research missions, but have supported **operational and near-real-time applications** due to their recognized value, longevity, sustained calibration and validation, and data quality. Interagency partners have rated all NASA missions as High Utility for operational applications, with Terra, Aqua, TRMM and Suomi-NPP rated Very High.
- Continued operation of the missions is determined through a biennial science review process, called the "**Senior Review**", which considers operational use but primarily uses science for defining factor for continuation. Continued operations (2 more years) was approved for all NASA missions in May 2013. The next Senior Review is scheduled for 2015.
- **Direct Broadcast** is currently available for three NASA missions including: Aqua, Terra, and Suomi-NPP. More information can be found at NASA's Direct Readout Laboratory (DRL) website: http://directreadout.sci.gsfc.nasa.gov
- NASA also provides access to **Near Real-Time (NRT)** products from the MODIS (on Terra and Aqua), OMI and MLS (on Aura), and AIRS (on Aqua) instruments in less than 2.5 hours from observation from the Land and Atmosphere Near real-time Capability for EOS (LANCE) data system at http://earthdata.nasa.gov/lance

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FUTURE NASA LEO and R&D SATELLITES

- NASA's **Earth Systematic Mission (ESM)** program includes 5 missions ...
  - Global Precipitation Measurement (**GPM Core**) in 2014, Soil Moisture Active-Passive (**SMAP**) in 2014, Stratospheric Aerosols and Gas Experiment (**SAGE)-III** in 2015, the Ice, Cloud, and Land Elevation Satellite (**ICESat)-2** in 2016, and the Gravity Recovery and Climate Experiment Follow-On (**GRACE-FO**) mission in 2017.
  - NASA continues with the pre-formulation studies, formulation, and development of 11 other missions with launch dates that extend well beyond 2020 (see tables in CGMS paper).
- NASA's **Earth System Science Pathfinder (ESSP)** program provides competitive opportunities for small and innovative instruments and missions. ESSP currently includes two satellites and one instrument and also includes the **Earth Venture-class (EV)** line of competitive opportunities:
  - The Orbiting Carbon Observatory (**OCO-2**) mission will launch in 2014, the Cyclone Global Navigation Satellite System (**CYGNSS**) in 2017 and the Tropospheric Emissions: Monitoring of Pollution (**TEMPO**) instrument will be launched in 2017 as a hosted GEO payload.
  - Future solicitations for will be released every 4 years (EVS-science, EVM-mission) and >18-month intervals for EVI-instrument (EVI-I). The EVI-I Announcement of Opportunity (AO) was released for comment on June 4 with comments due on June 28.