Earth Science
Flight Mission Overview

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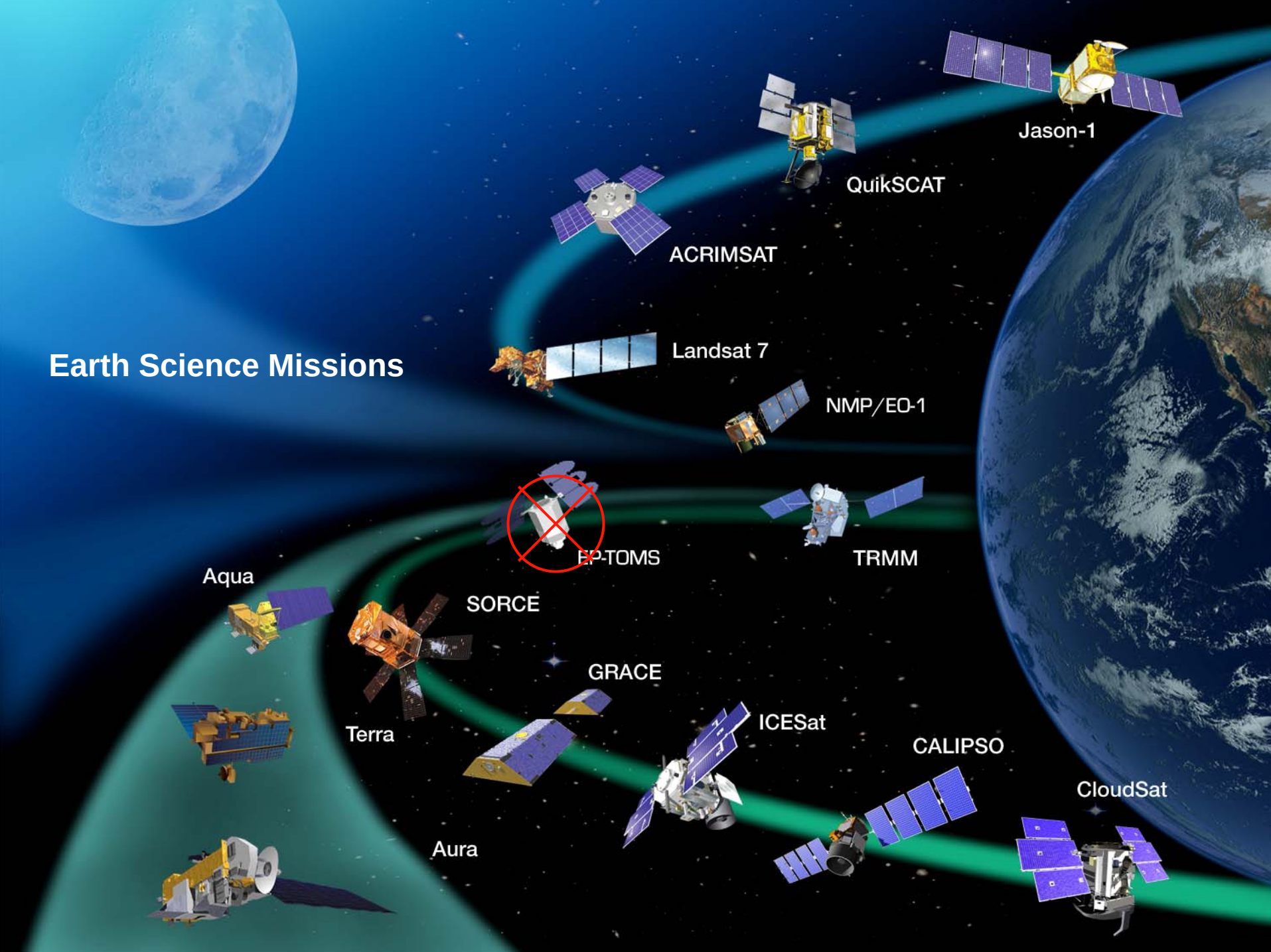
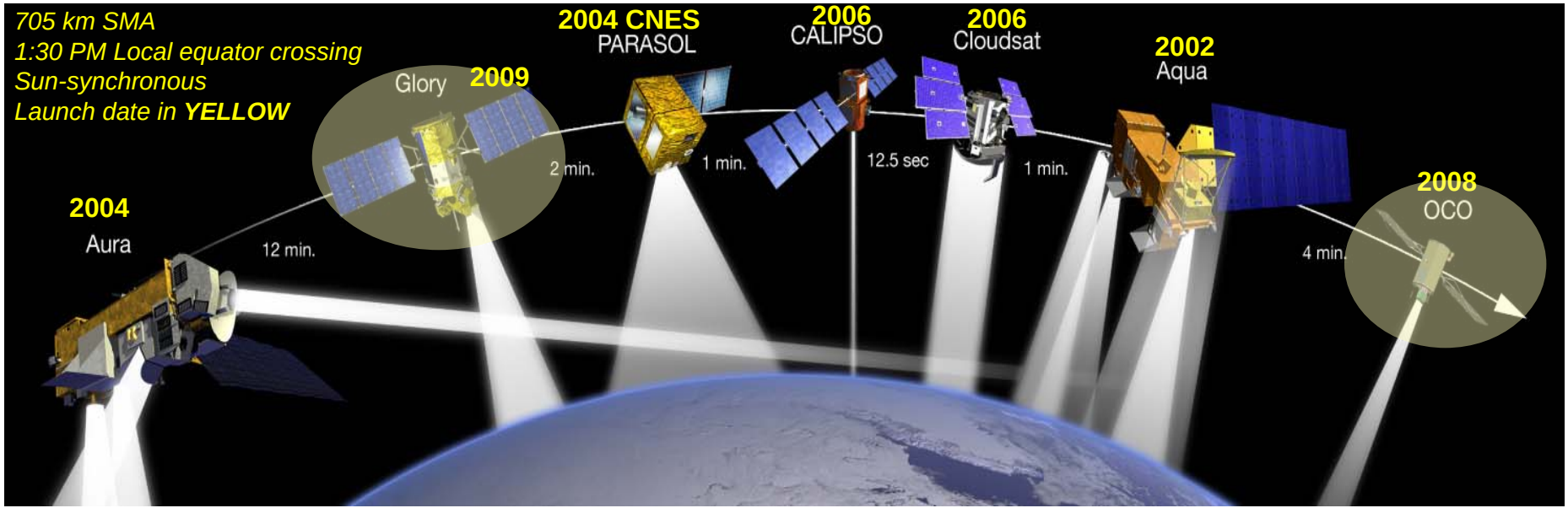

Earth Science Missions
Jason-1
QuikSCAT
ACRIMSAT
Landsat 7
NMP/EO-1
EP-TOMS
TRMM
Aqua
SORCE
GRACE
Terra
ICESat
CALIPSO
CloudSat
Aura

Afternoon Constellation, or A-Train, Multi-Satellite Observatory

- The synergy enabled by flying together in the constellation is critical to understanding the Earth as an integrated system
  - *Constellation* of satellites following a fixed orbit tracking making *coordinated*, near-simultaneous observations produce *complementary*, *co-registered* data sets of multiple phenomena
- Constellation inclination maneuvers are required to maintain all satellites on the required orbital inclination.
  - Spring 2007 inclination maneuver series started on March 6 and will be completed by May 17.
  - Each satellite performs up to 4 maneuvers in a choreographed sequence, with minimal interruption of science observations throughout (loss of less than 1 orbit per burn)



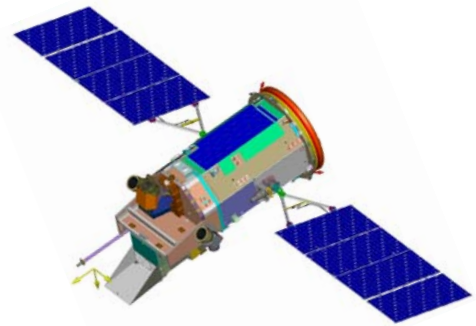
Three Systematic Missions in Implementation

OSTM Mission Science Objective: Provide continuity of ocean topography measurements beyond Topex/POSEIDON and Jason-1 for determining ocean circulation, climate change, sea level rise, and societal applications (El Nino, hurricane forecasting, etc.)

Mission Life: 3 years
Launch Date: 06/15/08

Glory Mission Science Objective : Improve our understanding of climate variability and change by determining the global distribution of natural and anthropogenic aerosols and clouds with accuracy and coverage sufficient for significantly improved quantification of direct and indirect aerosol climate effects, and also extend measurement of the Total Solar Irradiance (TSI) to determine the Sun's direct and indirect effect on Earth's climate

Mission Life: 3 years
Launch Date: 12/15/08



NPP Mission Science Objectives: Bridge Mission: Provide NASA with new observations to continue the time series for a selected group of global change observations initiated by the Earth Observing System (EOS) Terra, Aqua, and Aura missions; **NPOESS Risk Reduction**: Provide the NPOESS operational community with pre-operational risk reduction demonstration and validation for selected NPOESS instruments, and algorithms, as well as ground processing

Mission Life: 5 years
Launch Date: 9/30/09

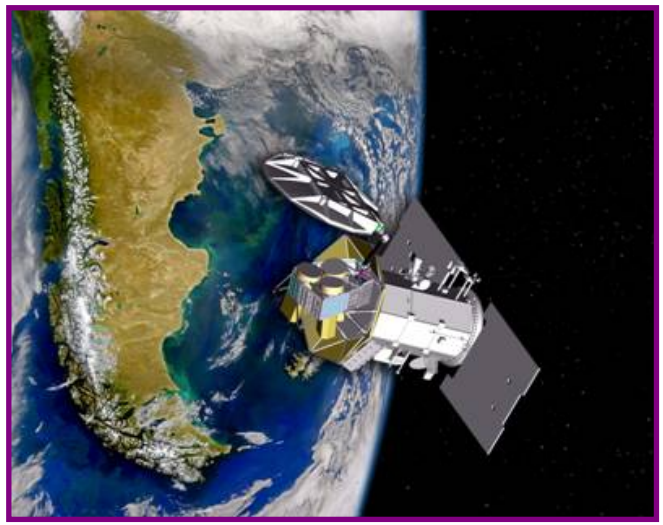
Two ESSP Missions in Implementation

OCO Mission Science Objective: Collect the first space-based global measurements of atmospheric CO2 with the precision, resolution, and coverage needed to characterize its sources and sinks on regional scales and quantify their variability over the seasonal cycle

Mission Life: 2 years
Launch Date: 12/15/08

Aquarius Mission Science Objective: Make pioneering space-based measurements of Sea Surface Salinity (SSS) with the precision, resolution, and coverage needed to characterize salinity variations and investigate the linkage between ocean circulation, the Earth's water cycle, and climate variability

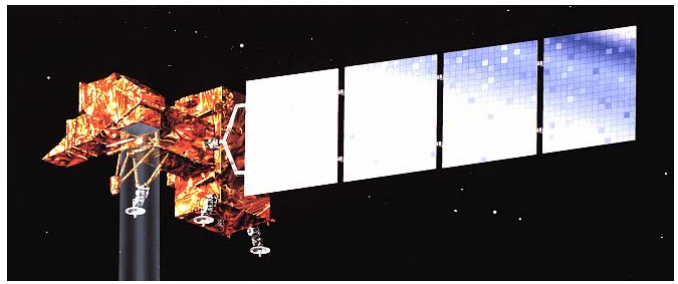
Mission Life: 3 years
Launch Date: 7/14/09



Two Systematic Missions in Formulation

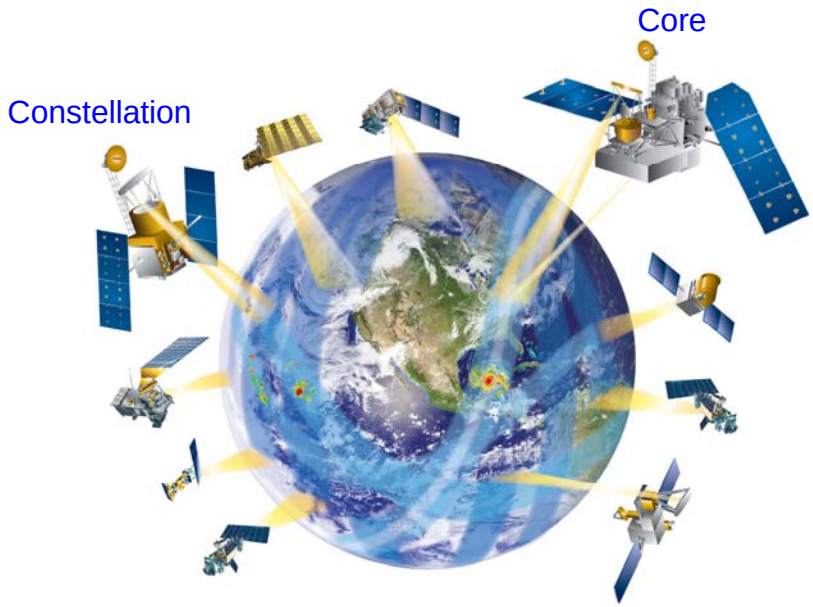
LDCM Mission Science Objective: Extend the multi-decadal Landsat land surface observations to study, predict, and understand the consequences of land surface dynamics

Mission Life: 5 Years
Launch Date: 07/3/2011



GPM Mission Science Objective: Initiates the measurement of global precipitation, providing uniformly calibrated measurements every 3 hours for scientific research and societal applications.

Mission Life: 3 years (for both Core and Constellation)
Launch Date: 06/01/13 (Core), 06/01/14 (Const.)



NRC Earth Science Decadal Survey

- **First-ever** comprehensive survey of all Earth sciences that could benefit from spaceborne observations
  - Study requested and supported by NASA, NOAA, USGS
  - Initiated 2004, preliminary report 2005, final report released 15 January 2007
- The Decadal Survey provides **scientific priorities *indirectly*** through a **time sequencing** of recommended missions
- NASA is developing a **mission roadmap for the next decade** incorporating:
  - General scientific and societal impact guidance from the Decadal Survey
  - Potential mitigation for removal of climate sensors from NPOESS
    - NRC workshop report on NPOESS/Climate issues, due mid-July, 2008
  - NASA assessment of technical challenges and mission costs
  - International collaborations
  - Agency-wide and national budget priorities
  - Draft NASA roadmap to be completed in Fall, 2007
    - NAC and NRC review
    - Includes an update to the Earth Science portion of the SMD Science Plan
- FY08 Budget Request funds NASA precursor missions identified in Survey
  - Global Precipitation Measurement mission
  - Landsat Data Continuity Mission
  - NPOESS Preparatory Program

Next Steps

- Continue/complete “building block” calibrations of NRC missions
  - Ensure consistent, rational basis for costs
  - Full mission cost (including NASA science teams/analyses)
- Continue joint (with NOAA) examination/planning for NPOESS climate sensors
- Discussions with International Partners (Spring 07)
  - Determine common interests, complementary capabilities
  - JAXA/METI first substantive bilateral meeting (April 07)
- Early mission workshops
  - Confirm/refine match between science objective and notional mission
  - Determine necessary “context” measurements for science objective
- Manage existing precursor mission developments
- Develop integrated NASA mission roadmap
  - Revised NASA Earth Science Plan
  - Identify specific near-term missions to be initiated
  - Interacting with FY09 budget development process
  - Coordinated with NOAA