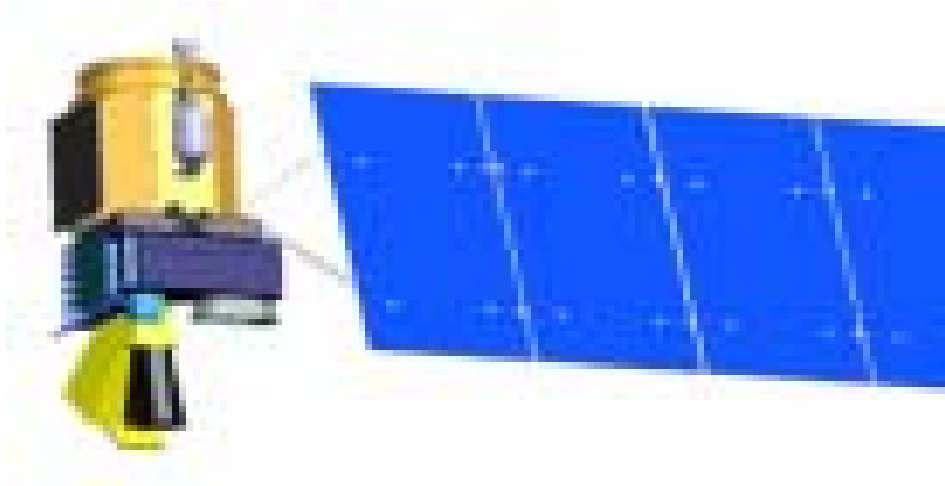


# HyspIRI and the Decadal Survey Missions



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**Backup Program Scientist- HyspIRI Mission**

2<sup>nd</sup> HyspIRI Science Workshop  
August 11-13, 2009  
Pasadena, CA

# Evolution of NASA's Earth Observing Fleet: 2009-2015 & Decadal Survey Era

Aura

Terra

Aqua

ACRIMSAT

GRACE

SORCE

ICESat

Landsat-7

EO-1

QuikSCAT

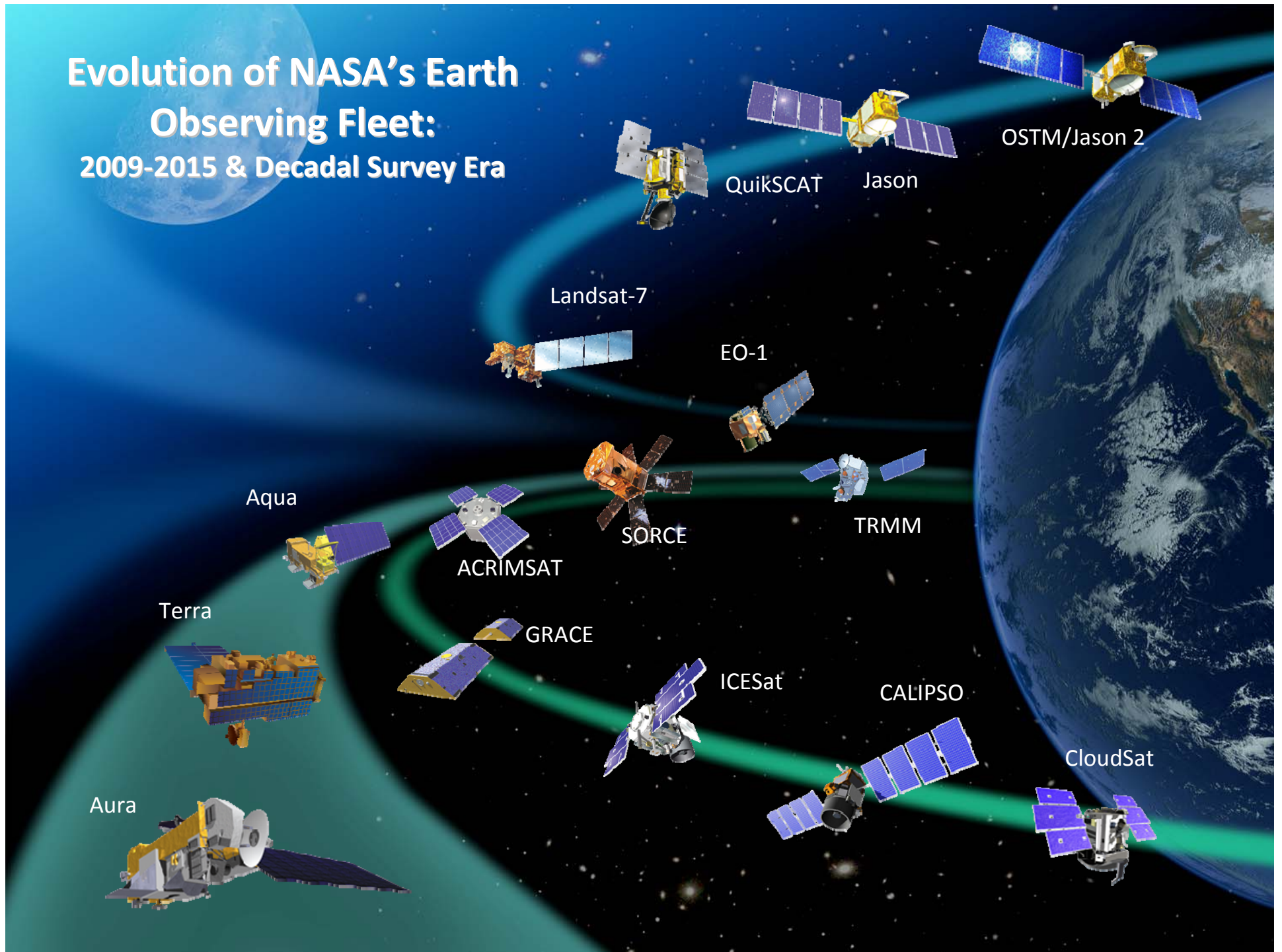
Jason

OSTM/Jason 2

TRMM

CALIPSO

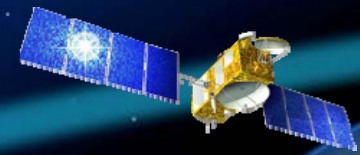
CloudSat



Today's  
satellites  
assumed  
inoperable  
by 2015

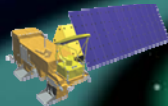


Today's  
satellites  
assumed still  
operable in  
2015



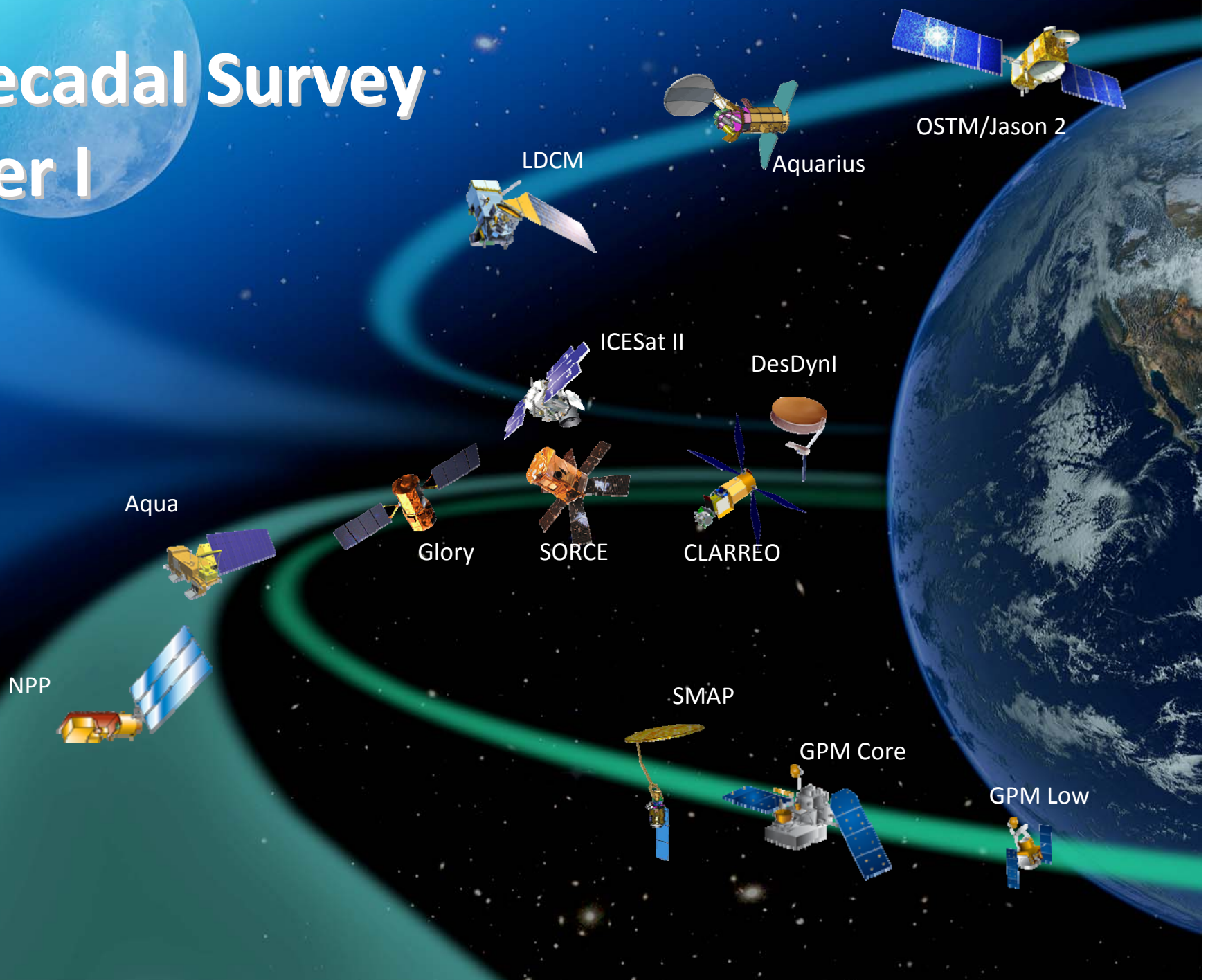
OSTM/Jason 2

Aqua

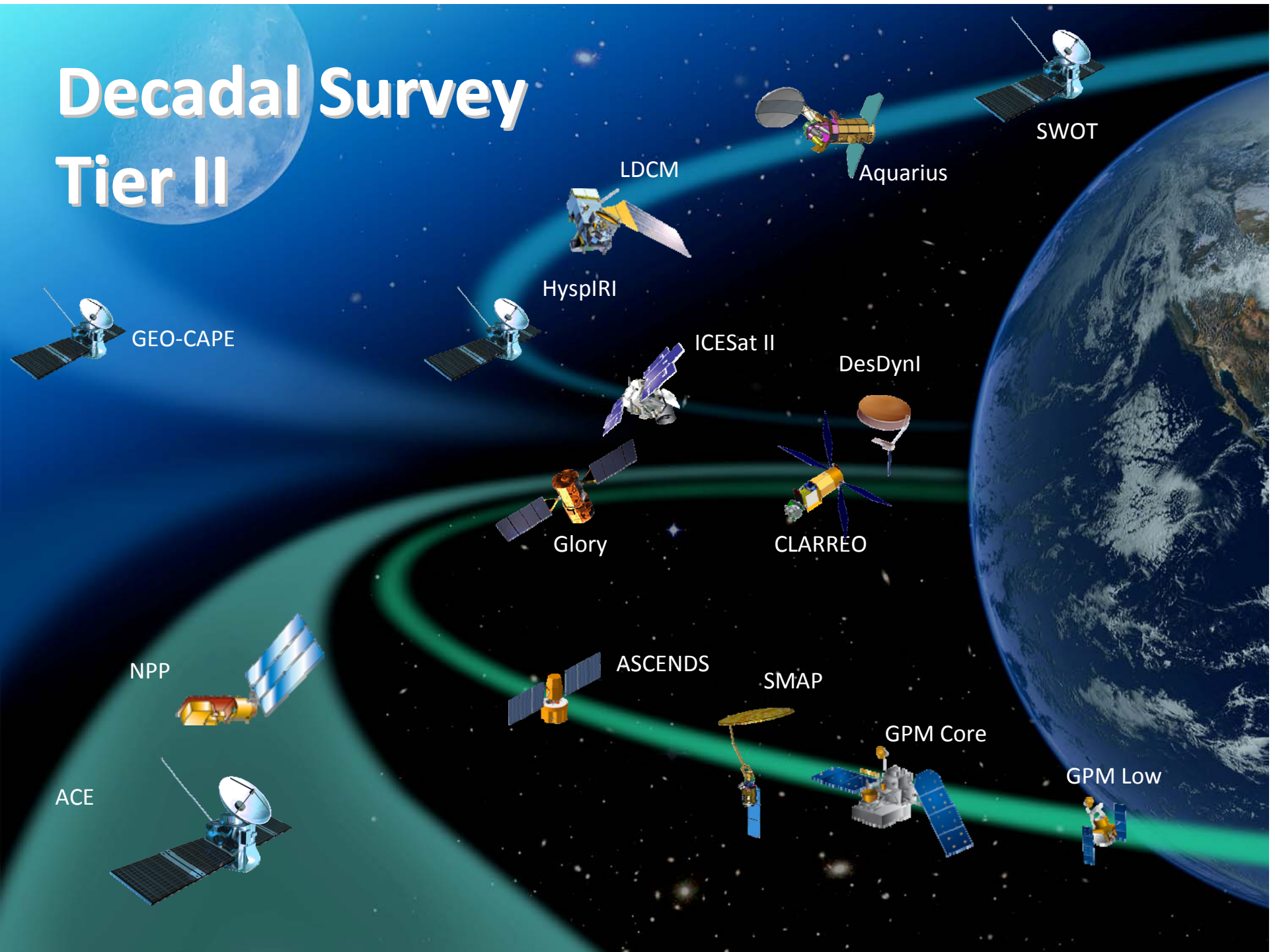


SORCE

# Decadal Survey Tier I



# Decadal Survey Tier II



<b>Mission</b>	<b>Mission Description</b>	<b>Orbit</b>	<b>Instruments</b>
CLARREO (NASA portion)	Solar and Earth radiation: spectrally resolved forcing and response of the climate system	LEO, Precessing	Absolute, spectrally-resolved interferometer
SMAP	Soil moisture and freeze/thaw for weather and water cycle processes	LEO, SSO	L-band radar L-band radiometer
ICESat-II	Ice sheet height changes for climate change diagnosis	LEO, Non- SSO	Laser altimeter
DESDynI	Surface and ice sheet deformation for understanding natural hazards and climate; vegetation structure for ecosystem health	LEO, SSO	L-band InSAR Laser altimeter

<b>Mission</b>	<b>Mission Description</b>	<b>Orbit</b>	<b>Instruments</b>
HyspIRI	Land surface composition for agriculture and mineral characterization; vegetation types for ecosystem health	LEO, SSO	Hyperspectral spectrometer
ASCENDS	Day/night, all-latitude, all-season CO <sub>2</sub> column integrals for climate emissions	LEO, SSO	Multifrequency laser
SWOT	Ocean, lake, and river water levels for ocean and inland water dynamics	LEO, SSO	Ka-band wide swath radar C-band radar
GEO-CAPE	Atmospheric gas columns for air quality forecasts; ocean color for coastal ecosystem health and climate emissions	GEO	High and low spatial resolution hyperspectral imagers
ACE	Aerosol and cloud profiles for climate and water cycle; ocean color for open ocean biogeochemistry	LEO, SSO	Backscatter lidar Multiangle polarimeter Doppler radar

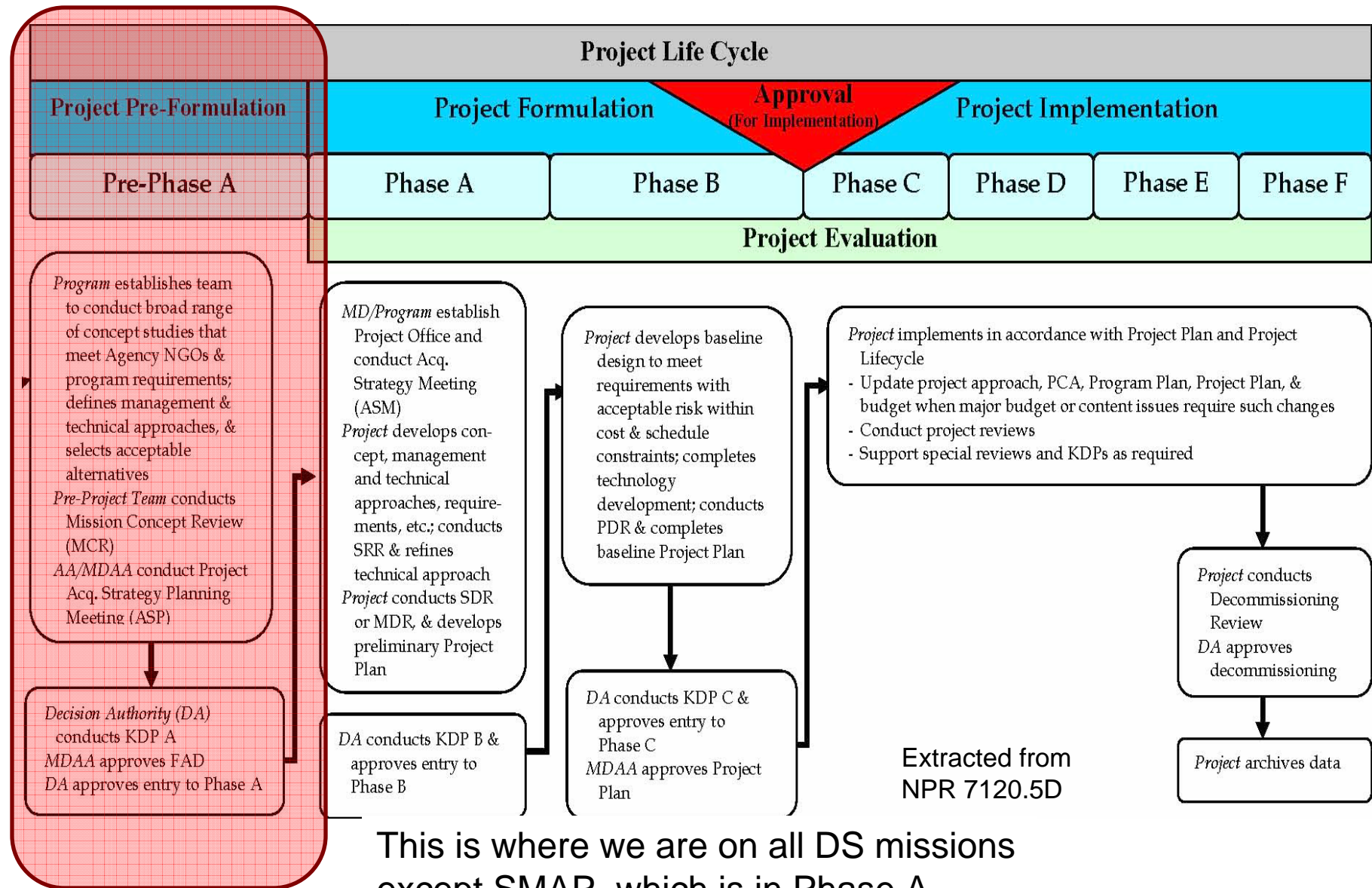
<b>Mission</b>	<b>Mission Description</b>	<b>Orbit</b>	<b>Instruments</b>
LIST	Land surface topography for landslide hazards and water runoff	LEO, SSO	Laser altimeter
PATH	High frequency, all-weather temperature and humidity soundings for weather forecasting and SST*	GEO	MW array spectrometer
GRACE-II	High temporal resolution gravity fields for tracking large-scale water movement	LEO, SSO	Microwave or laser ranging system
SCLP	Snow accumulation for fresh water availability	LEO, SSO	Ku and X-band radars K and Ka-band radiometers
GACM	Ozone and related gases for intercontinental air quality and stratospheric ozone layer prediction	LEO, SSO	UV spectrometer IR spectrometer Microwave limb sounder
3D-Winds (Demo)	Tropospheric winds for weather forecasting and pollution transport	LEO, SSO	Doppler lidar

\* Cloud-independent, high temporal resolution, lower accuracy SST to complement, not replace, global operational high-accuracy SST measurement

## Management and Budget Allocations

- NASA is doing Tier 1 missions first
  - Of the Tier 1, SMAP and ICESat II were identified as the first two missions because of technology and mission concept maturity
  - CLARREO and DESDynI will be the next two following ICESat II and SMAP
- NASA will fund the Tier 2 missions at a lower level, but still significant level.
  - All five tier 2 missions currently are funded at an equal level, as we assess their mission readiness.
  - At the end of FY09 we will make the initial sequencing of the Tier 2 missions
- The available funding for FY10 and beyond will strongly influence this prioritization.

# Flight Project Life Cycle



# Mission Requirements for Pre-Phase A

## Scope of Major Pre-Phase A Activities:

### Headquarters

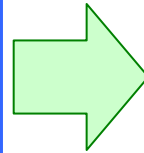
- Approve a Formulation Authorization Document
- Develop DRAFT Level 1 Requirements
- Conduct Acquisition Strategy Planning Meeting

### Technical Activities:

- Develop and document preliminary mission concepts
- Conduct internal Reviews
- Conduct Mission Concept Review Project Planning, Costing and Scheduling
- Develop and document a DRAFT Integrated Baseline, including:
  - High level Work Breakdown Structures (WBS)
  - Assessment of Technology Readiness Levels
  - Assessment of Infrastructure and Workforce needs
  - Identification of potential partnerships
  - Identification of conceptual acquisition strategies for proposed major procurements

### KDP Readiness

- Obtain KDP A Readiness products
- Approval through the governing PMC



## Areas the Science Community must work:

- Φ Development of Level 1 Science Requirements
- Φ Support development of preliminary mission concepts
- Φ Support the assessment of Technical Readiness Levels
- Φ Identify potential partnerships

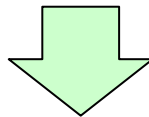
# HyspIRI Baseline

## Key Pre-Phase A Questions

- What science **MUST** this mission achieve?

- What specific measurements?
- To what accuracy?
- What are the required data products?

Should be resolved ~ 12 months prior to KDP A



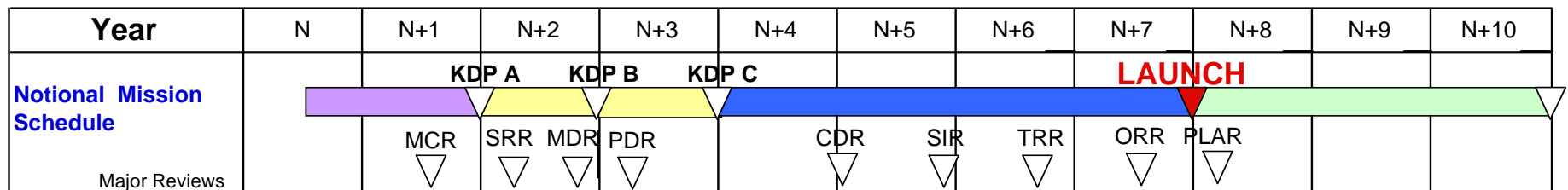
- What mission parameters can achieve the science?

- What orbit (inclination/altitude)?
- Which instruments?
- What is the baseline mission duration?

- How can NASA achieve these measurements?

- Are there other missions required/desired to achieve the science?
- Who can NASA partner with to achieve this mission?

Should be resolved ~ 6 months prior to KDP A



## **HypSIIRI is a Tier 2 mission to be launched in the 2020 time frame**

This time line is well beyond both political and budgetary horizons.  
There is not much that we can do about Political and Fiscal Challenges  
but ....

We can identify the synergies with first tier missions and the role within  
international global change priorities and national preparedness.

Advancement of the HypSIIRI timeline will benefit from:

- 1.TRL readiness
- 2.Affordability
- 3.Low latency delivery of data
- 4.Ready for launch within 5 years

## Present a Compelling Argument of Early Launch of HypsIRI

1. HypsIRI is extremely capable and cost competitive –
2. Emphasize cutting edge observational capability and new science-  
There is a perception that optical imaging is mature technology and commercial territory- how is HypsIRI different?
3. What new science,
  - a) 3-D vegetation
  - b) Tectonic emissivity
  - c) Polar ecology
  - d) Carbon emissions and sequestration
  - e) Cap and Trade monitoring
  - f) Urban environments
4. What new technology will HypsIRI demonstrate-
  - a) Optical communications
  - b) Next Gen Landsat
5. Partnerships with other Agencies: national and international