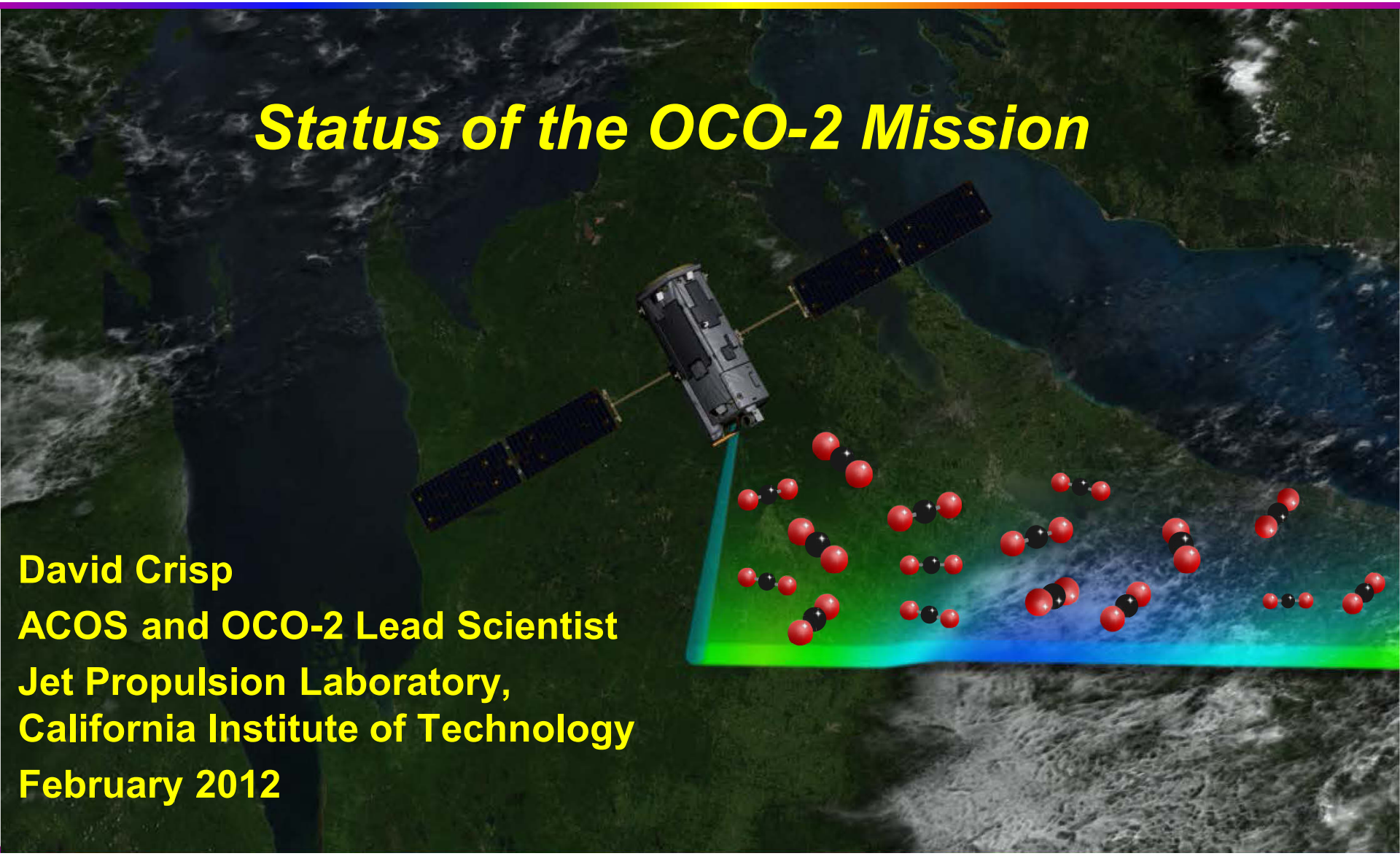
Status of the OCO-2 Mission



David Crisp
ACOS and OCO-2 Lead Scientist
Jet Propulsion Laboratory,
California Institute of Technology

February 2012

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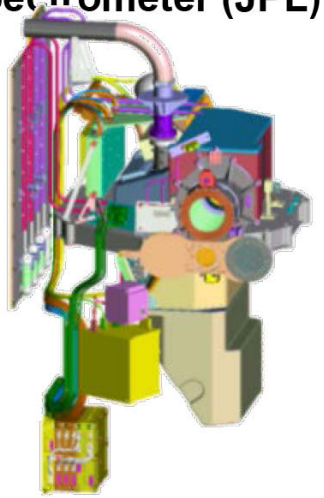
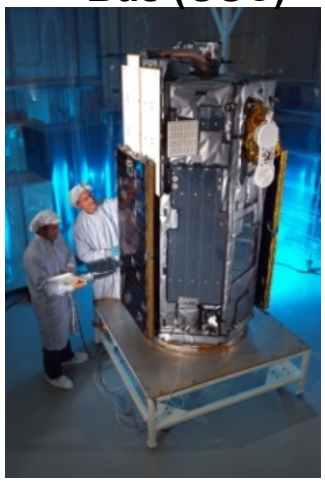
Government sponsorship acknowledged.

The OCO-2 Mission Architecture is Based on OCO

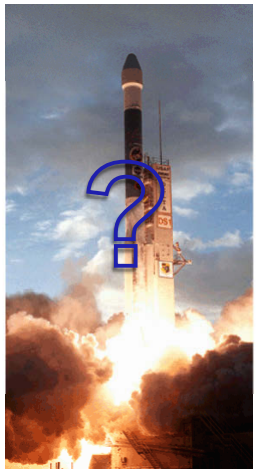
3-Channel Spectrometer (JPL)



Dedicated Spacecraft Bus (OSC)

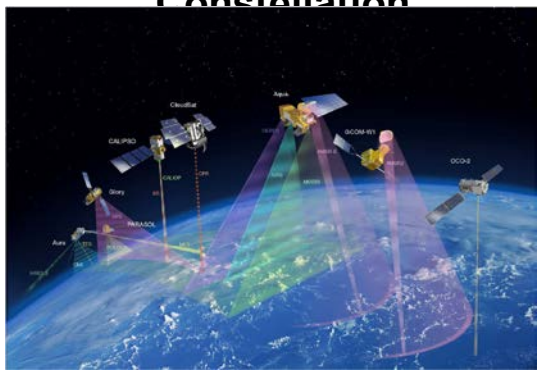


TBD Launch Vehicle



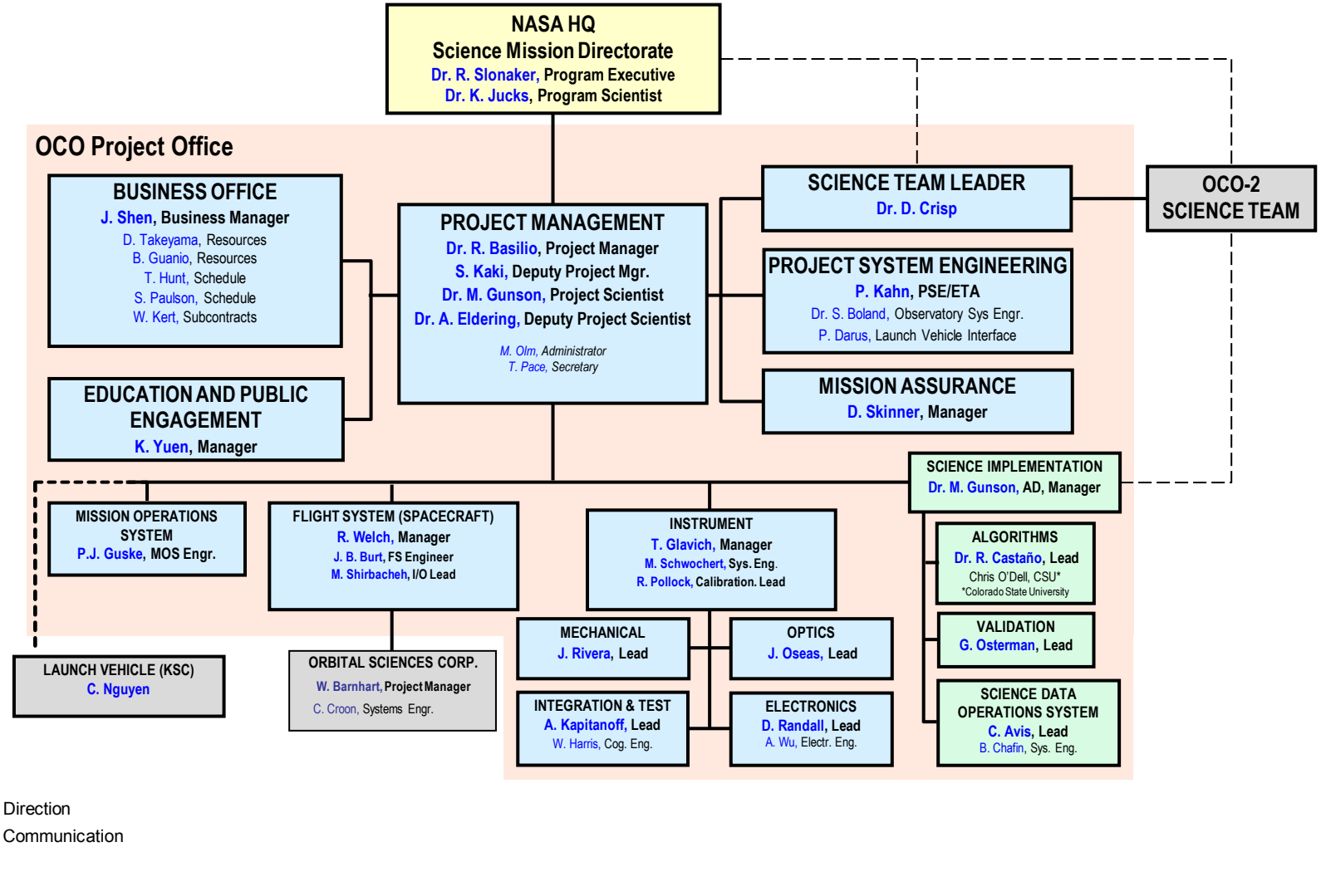
Mission Operations (OSC)

Formation Flying as Part of the A-Train Constellation



NASA NEN (GSFC) and SN (TDRSS)

OCO-2 Project Organization



OCO-2 Science Team Organization

Calibration
R. Pollock, Lead

Instrument
- K. Chance
- I. Polonsky
- D. O'Brien

Vicarious
- C. Bruegge, Lead
- L. Iraci
- A. Kuze
- T. Taylor

ABSCO
- D. Thompson, Lead
- C. Benner
- L. Brown
- M. Devi
- J. Hodges
- Y. Jiang
- C. Miller
- F. Oyafuso
- V. Payne
- K. Sung

L2 Algorithm
R. Castaño, Lead

Retrieval
- C. O'Dell, Dev. Lead
- R. Bennartz
- H. Boesch
- A. Butz
- B. Connor
- N. Cressie
- A. Davis
- C. Frankenberg
- O. Hasekamp
- B. Irion
- S. Kulawik
- L. Mandrake
- J. McDuffie
- S. Massie
- V. Natraj
- M. Smyth
- T. Yokota
- Y. Yung

Validation
G. Osterman, Lead

- K. Davis
- B. Fisher
- J. Miller
- R. Salawitch
- S. Sander
- C. Sweeney
- D. Winker
- S. Wofsy

TCCON
- D. Wunch, Lead
- C. Roehl
- G. Toon
- P. Wennberg

Flux Inversion
- D. Baker
- F. Chevallier
- A. Jacobson
- D. Jones
- E. Kalnay
- J. Liu
- A. Michalak
- P. Palmer
- S. Pawson
- P. Rayner

Science Data Operations System
C. Avis, Lead
B. Chafin, Systems Eng.

Programmers
- A. Chang
- V. Tang
- J. Zong

Operators
- L. Dang
- J. Foster
- J. Yoshimizu

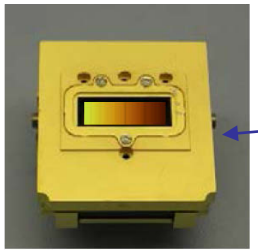
Computer SA
- S. Neely

The OCO Instrument – Optimized for Sensitivity

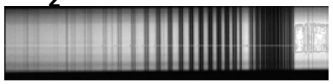
- 3 co-bore-sighted, high resolution, imaging grating spectrometers
  - O_2 0.765 μm A-band
  - CO_2 1.61 μm band
  - CO_2 2.06 μm band
- Resolving Power ~ 20,000
- Optically fast: f/1.8 (high SNR)
- Swath: < 0.8° (10.6 km at nadir)
  - 8 cross-track footprints @ 3 Hz
  - 1.29 x 2.25 km at nadir
- Mass: 140 kg, Power: ~105 W

Changes from OCO

- Modified to mitigate residual image, slit alignment and stay light anomalies found in OCO pre-flight testing
- New cryocooler replaces obsolete unit

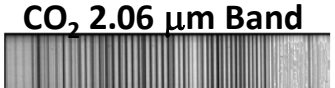


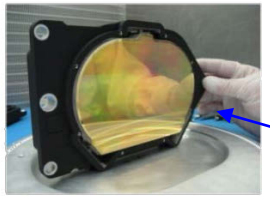
O_2 A-Band

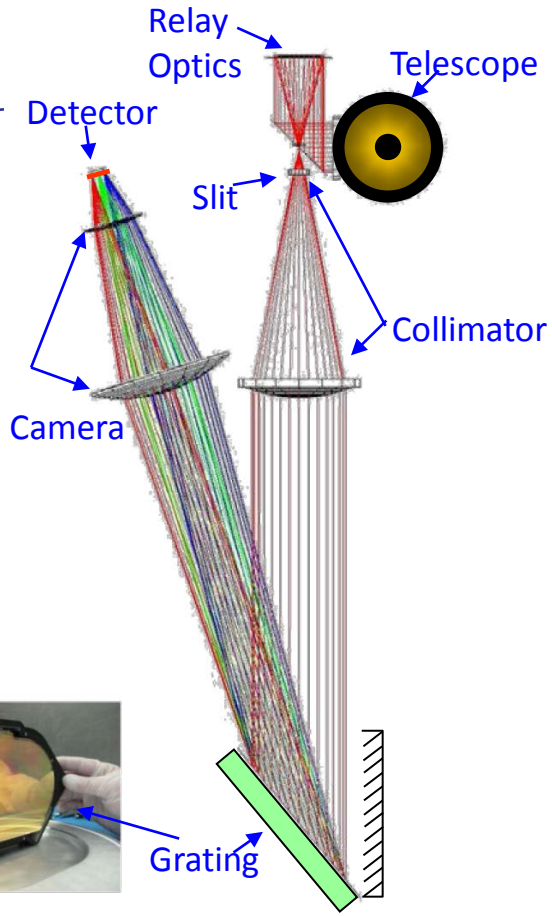


CO_2 1.61μm Band

CO_2 2.06 μm Band

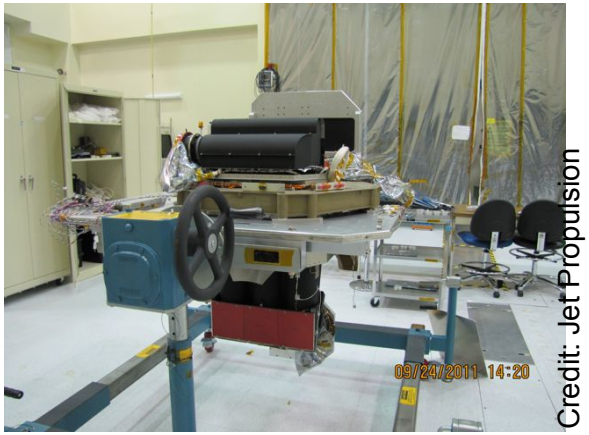






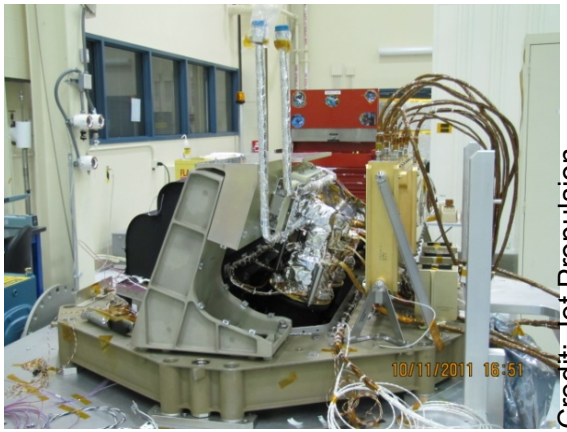
The OCO-2 instrument is more sensitive than the GOSAT TANSO-FTS, especially over dark scenes, and takes 48 to 96 times as many soundings over each orbit.

Instrument On Track for 30 April Delivery



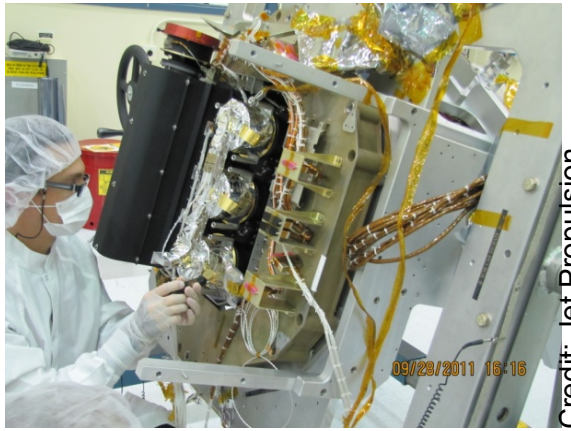
Credit: Jet Propulsion Laboratory

OBA (Optical Bench Assembly) integrated with the instrument deck



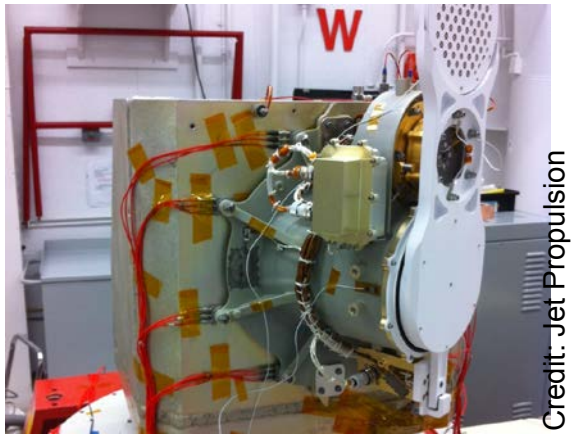
Credit: Jet Propulsion Laboratory

FPA (Focal Plane Arrays) integrated with AFE (Analog Front-end Electronics)



Credit: Jet Propulsion Laboratory

CSS (Cryogenic Subsystem) integrated with OBA

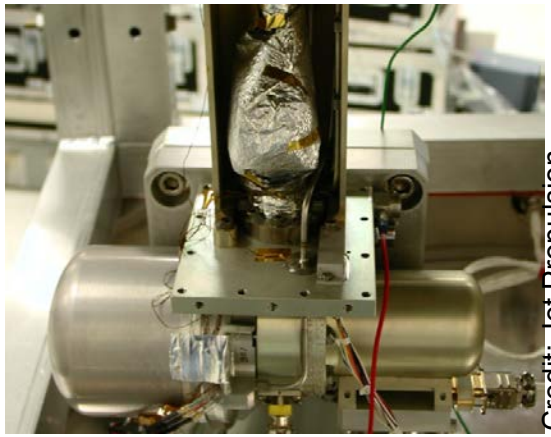


Credit: Jet Propulsion Laboratory

BCA (Baffle/Calibration Assembly)

Credit: Jet Propulsion Laboratory

Positioning the instrument inside the 10 ft horizontal thermal chamber

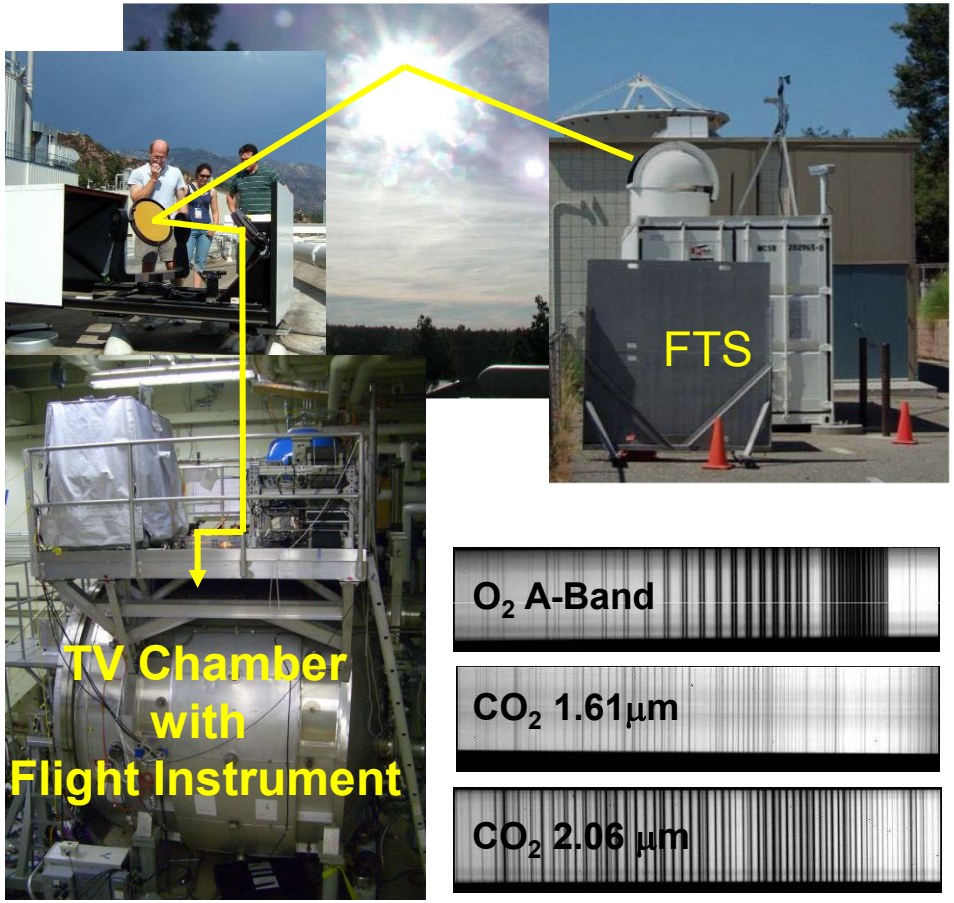


Credit: Jet Propulsion Laboratory

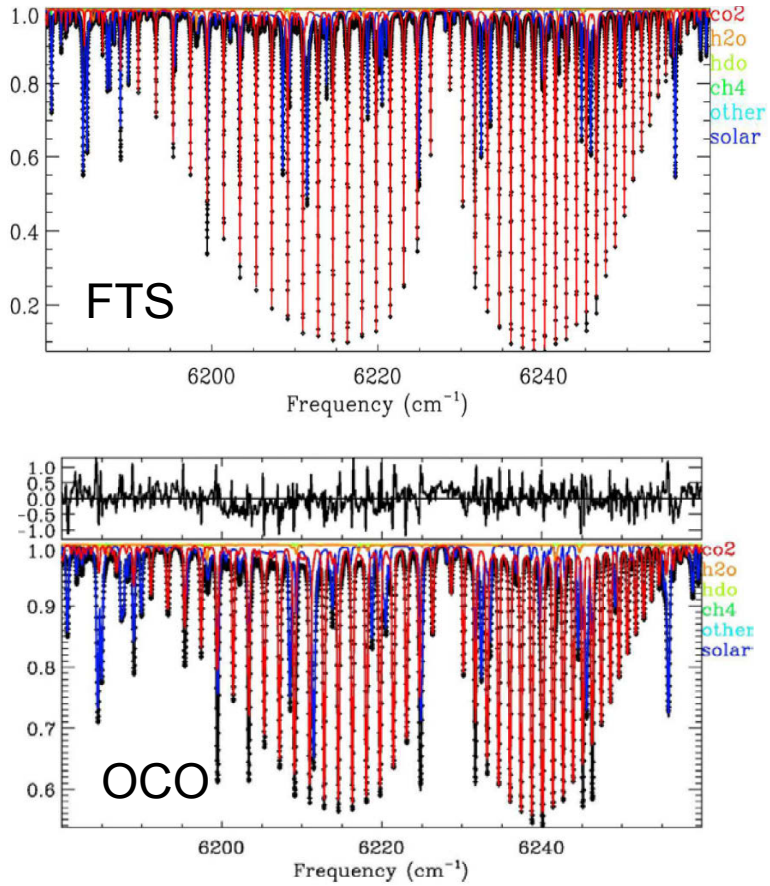
Pulse-tube cryocooler

Pre-Flight Instrument Qualification and Characterization

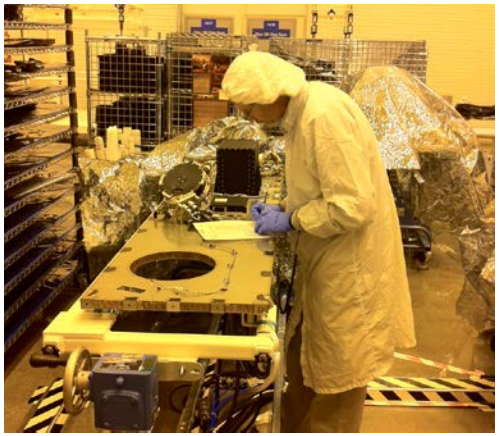
Observations of the sun with the flight instrument taken during the thermo-vacuum tests provided an end-to-end test of the instrument performance.

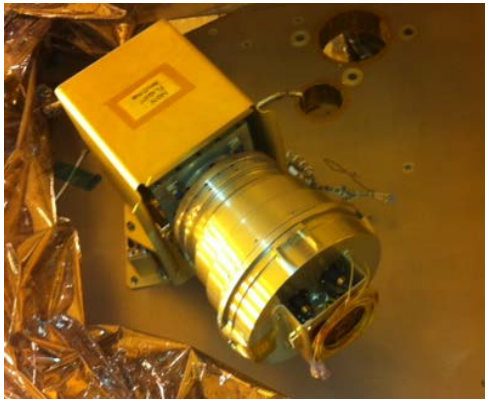


1.6 μm CO2

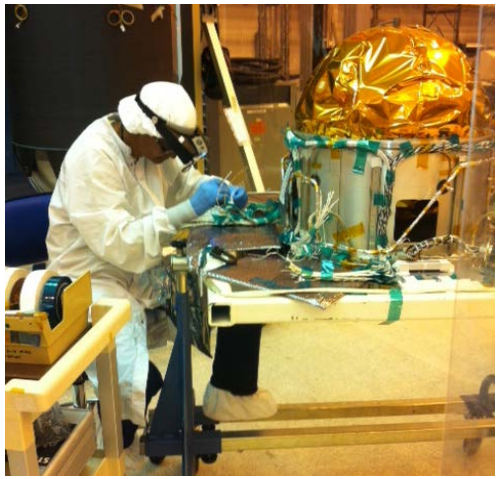


Spacecraft Bus I&T Underway at Orbital, Dulles


Credit: Orbital Sciences Corporation


Credit: John “Brad” Burt, JPL

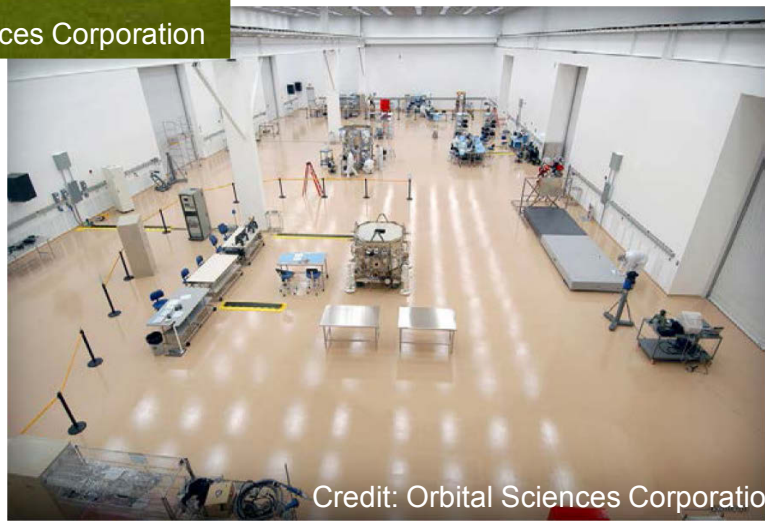
Credit: Orbital Sciences Corporation

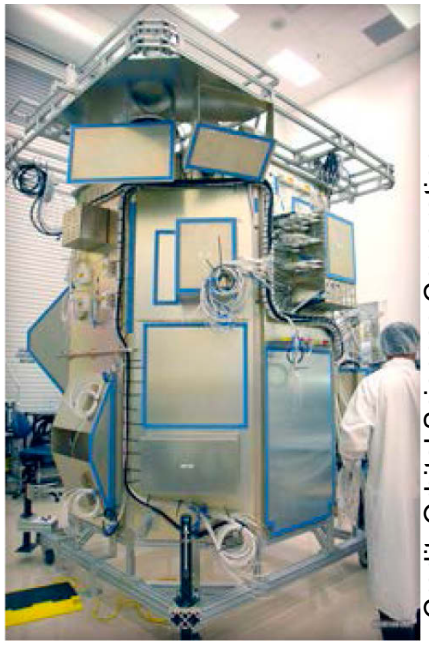

Credit: Orbital Sciences Corporation

- Activities are being performed at the Orbital Sciences Corporation facility in Dulles, VA
- The spacecraft structure, system harness, and avionic assemblies have been integrated and tested
- Most subcontracted items have been received, integrated, and tested
- Spacecraft bus delivery also expected this spring

Observatory I&T to be Performed at Orbital, Gilbert

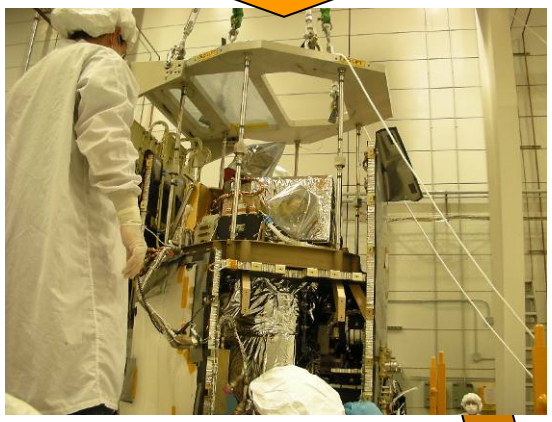
Credit: Orbital Sciences Corporation

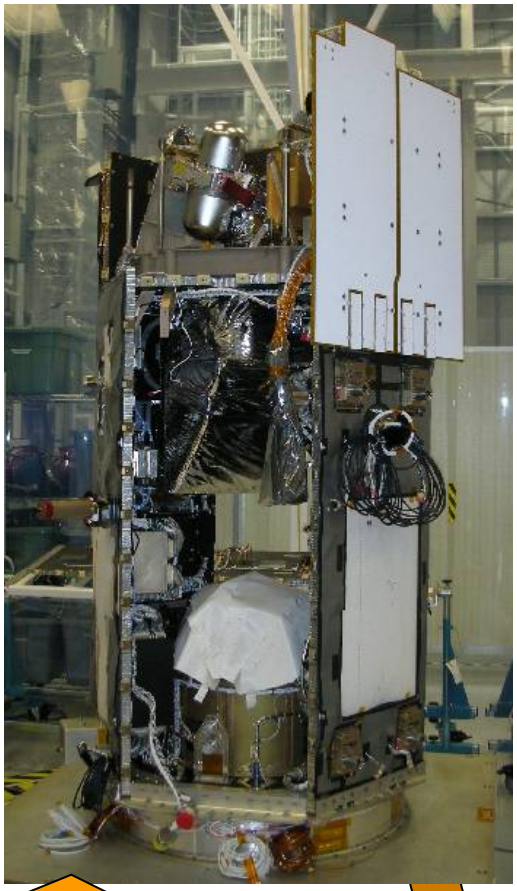

Credit: Orbital Sciences Corporatio


Credit: Orbital Sciences Corporation

LDCM (Landsat Data Continuity Mission) Spacecraft Bus

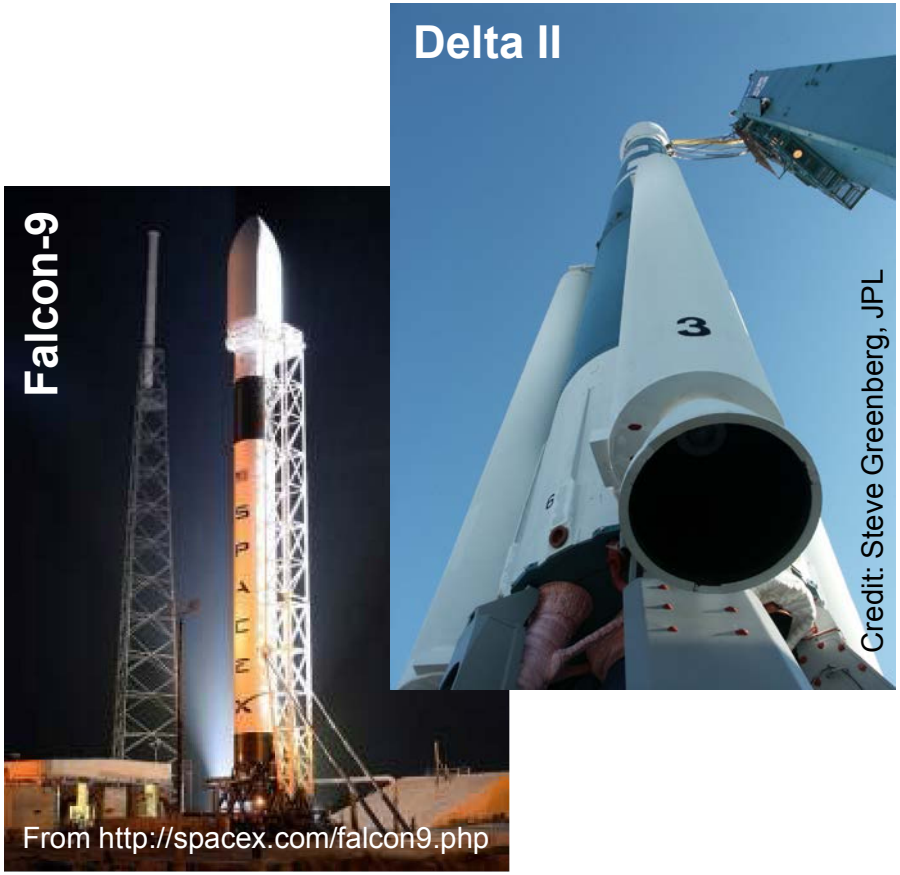
Instrument + Spacecraft Bus = Observatory





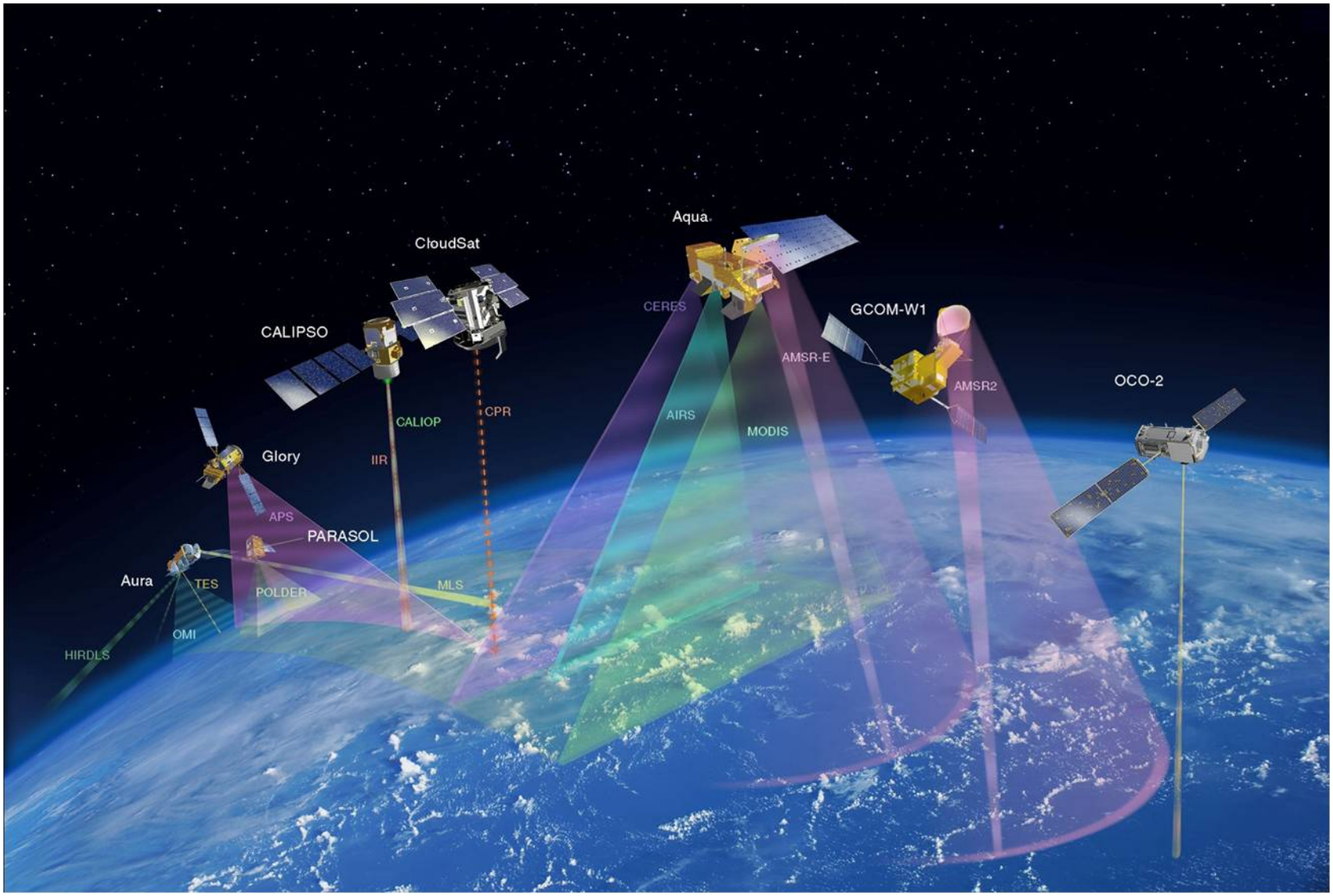
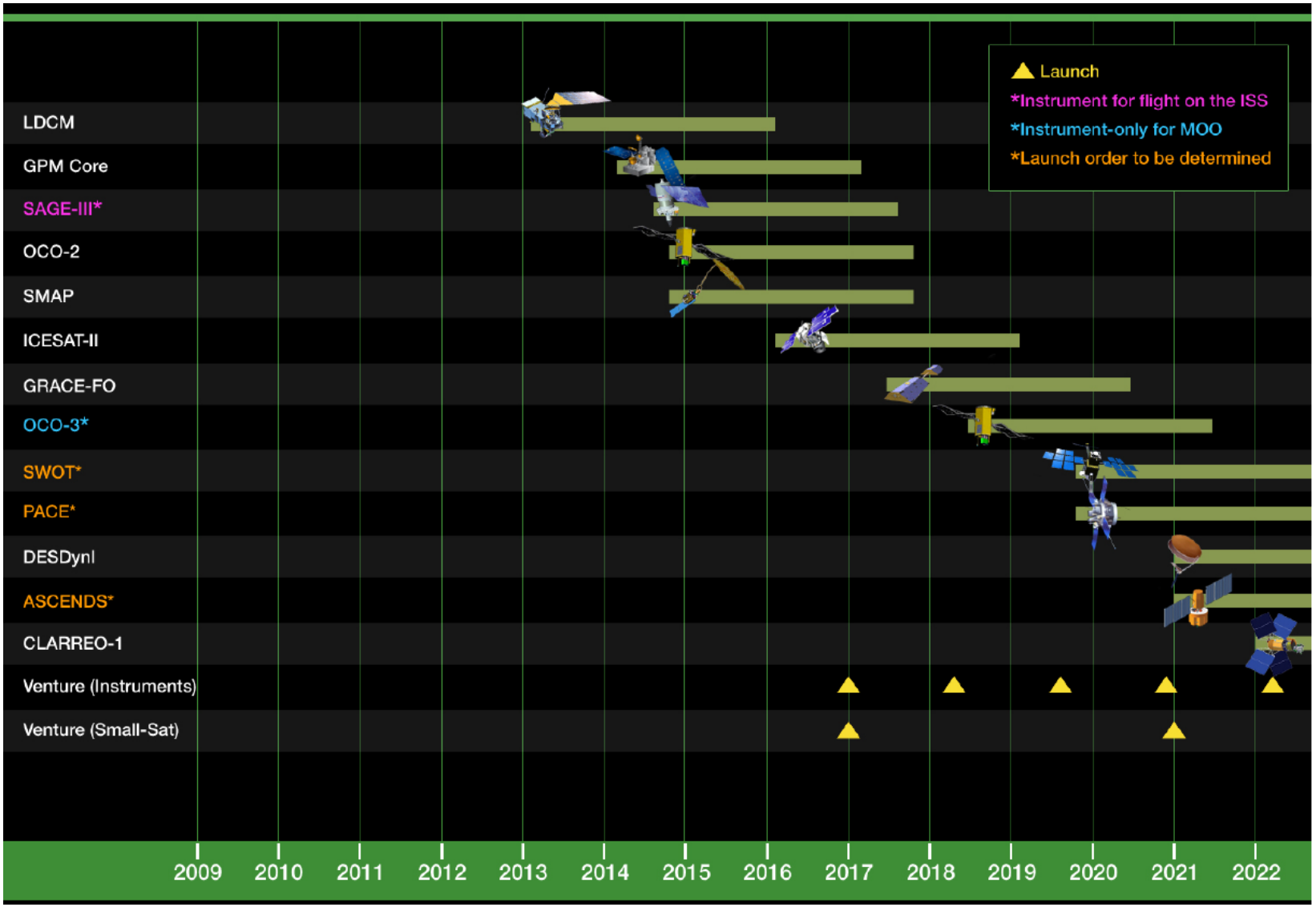
Launch Date Driven by Launch Service Provider

- No root cause identified for either OCO or Glory Taurus XL launch vehicle anomalies
- Competitive selection process for OCO-2 has commenced
- Please, no communications with prospective bidders until a selection is announced



A Couple of Possibilities for OCO-2

Flying in Formation in the A-Train



NASA Future Mission Time Line