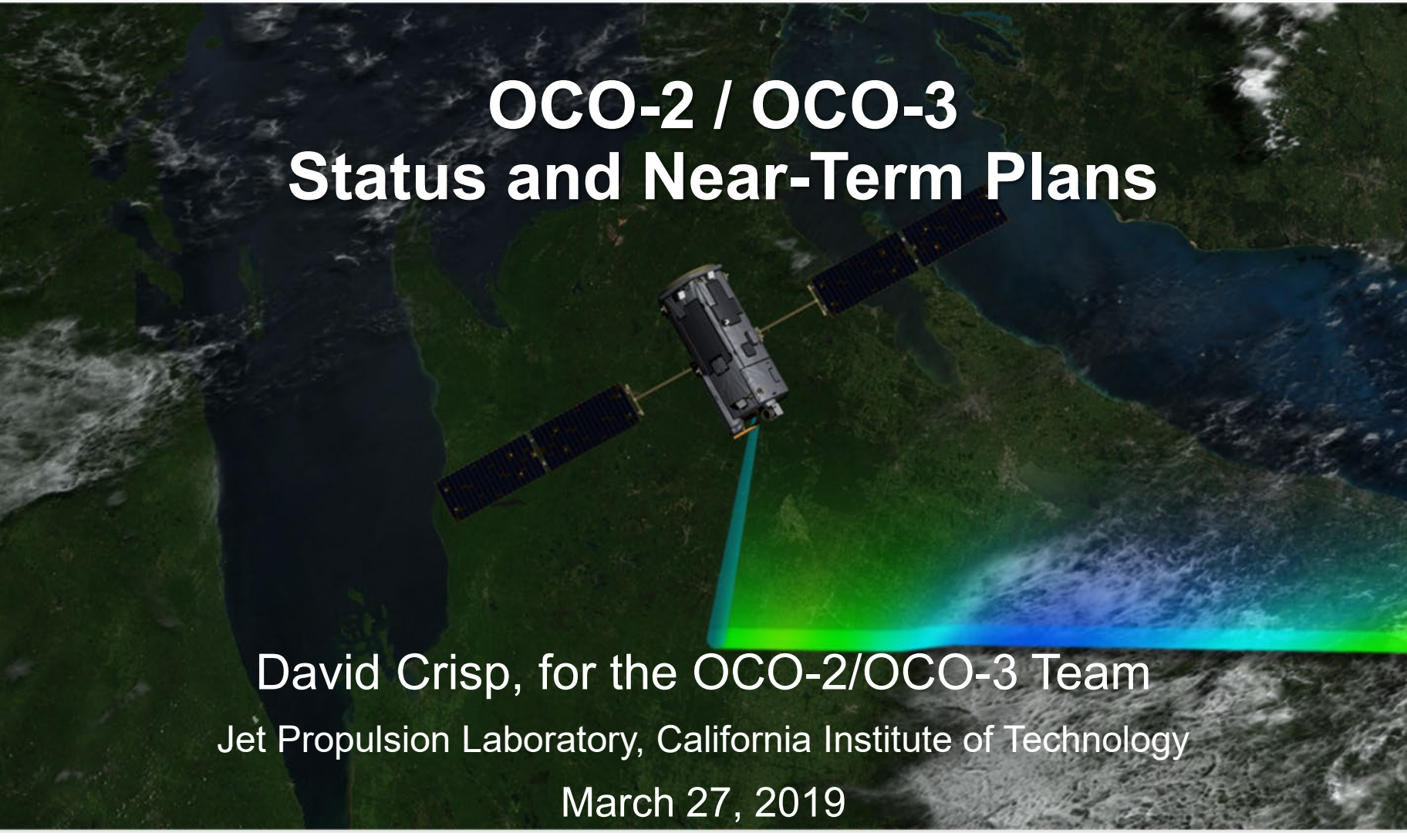

OCO-2 / OCO-3
Status and Near-Term Plans

David Crisp, for the OCO-2/OCO-3 Team

Jet Propulsion Laboratory, California Institute of Technology

March 27, 2019

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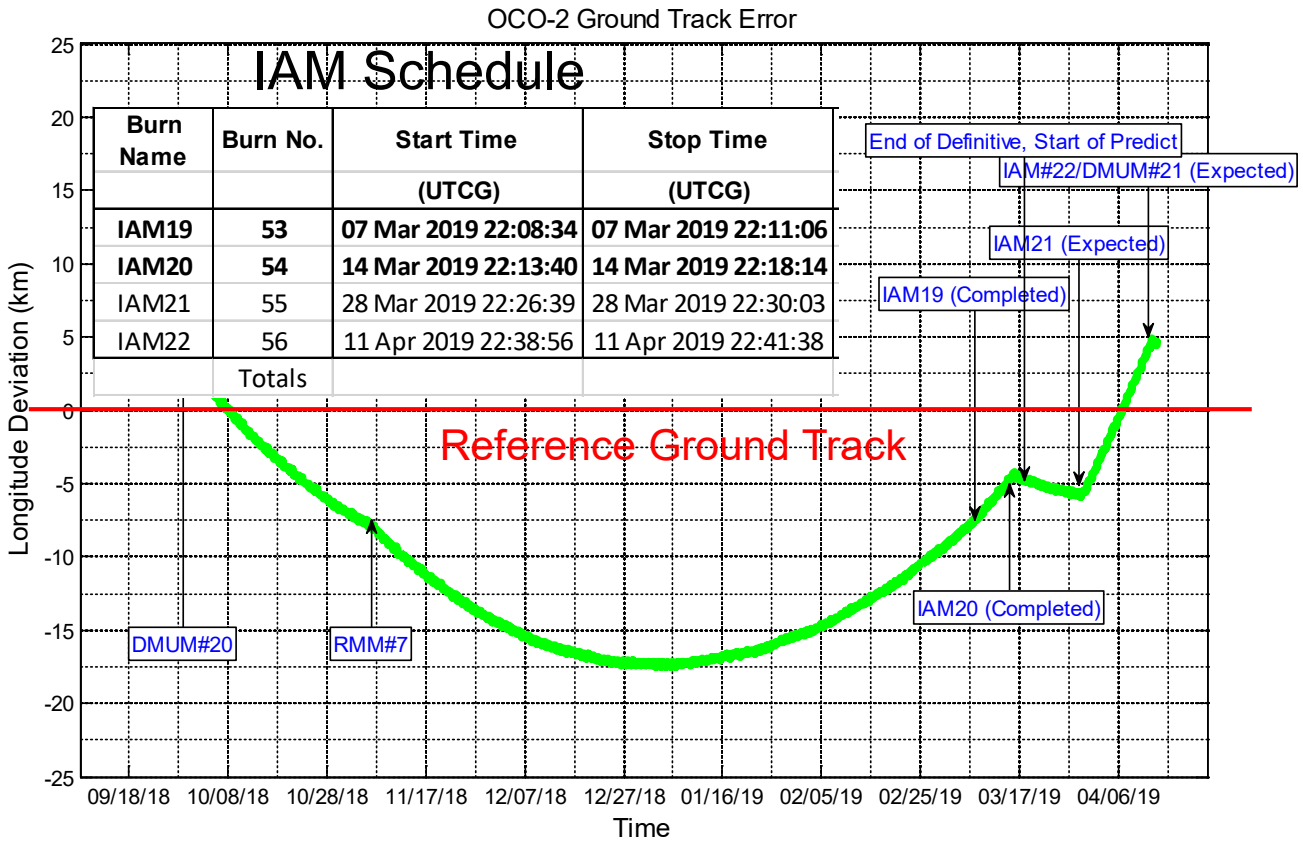
OCO-2 Status Summary

- Observatory Status: Nominal
  - Annual Inclination Angle Maneuver (IAM) campaign in progress
  - Watch Issue – degradation of z-axis gyro in the inertial measurement unit
    - May affect Lunar Cal an other activities
- Instrument Status: Nominal
  - Decon is scheduled for 4 - 11 March 2019 executed nominally
  - The SCO2 digital processor experience a reset anomaly on 19 March
- Science Status: Nominal
  - ACOS/GOSAT version 9 – Test run for 2013 now in progress
  - "Build 10" testing plan beginning to come together
    - ABSCO 5.1, Solar, and preliminary EOFs generated
    - Daily Aerosol Prior and v10 L1b tests next in line
- OCO-3 Launch and Early Operations Status and Plans
  - Integrated on to the SpaceX Dragon capsule on 20 March
  - Nominal launch date still 25 April

2019 Orbit Inclination Adjust Maneuver Schedule

East



West

OCO-2 is currently ~5 km west of its reference ground track.
The next drag make-up maneuver is scheduled for 7 March, and will be executed as part of the annual Inclination Adjust Maneuver (IAM)

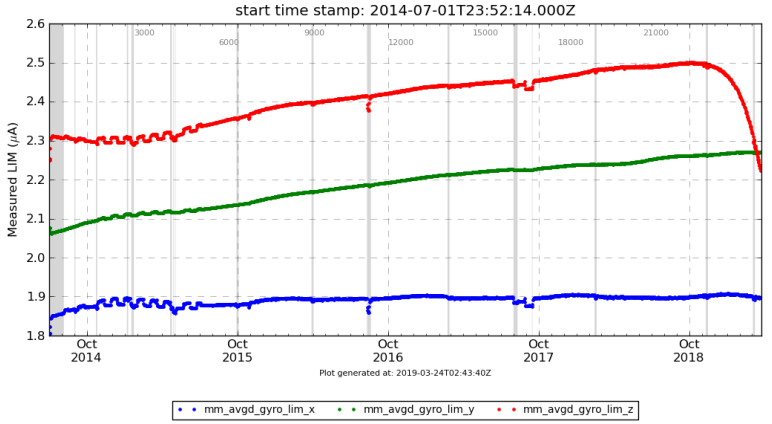
Inertial Measurement Unit Issue

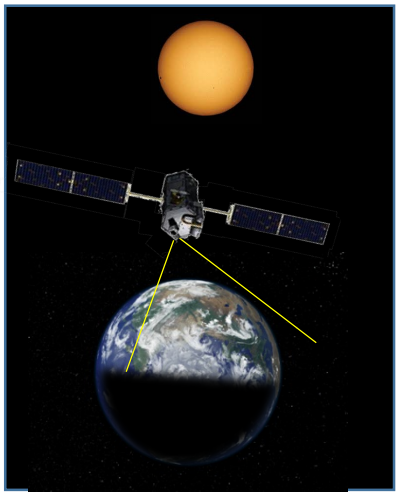
- The OCO-2 attitude control system uses data from a star tracker, an inertial measurement unit (IMU), sun sensors, and a magnetometer to determine the spacecraft attitude.
  - The star tracker is the primary attitude reference, but additional information from the IMU is used to track rotation rates about the x, y, and z axes when the star tracker's field of view (FOV) is occulted by the Earth or contaminated by scattered light from the Sun or Moon
  - The IMU was critical for spacecraft separation from the launch vehicle and for orbit raising maneuvers, where the spacecraft moves too fast for the star tracker to operate

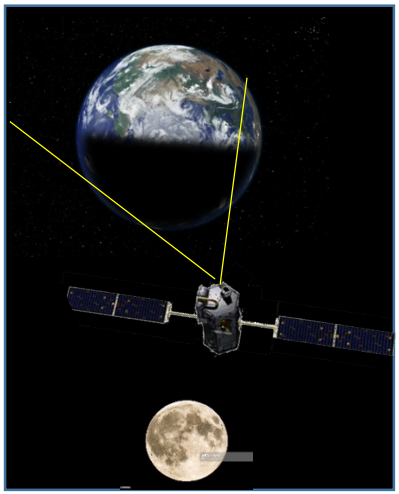
- The IMU includes 3 ring laser gyros for monitoring rotation about the spacecraft's x, y, and z axes. The z-axis is gyro is degrading rapidly.
  - The loss of the z-axis gyro (or the IMU) will not affect nominal operations,
  - The flight software must be modified to remove dependencies on the IMU. That effort is currently in the planning stages. More as we have it.

Gyro Status

- The output of the laser for the z-axis of the gyro started to degrade rapidly in the late fall of 2018
  - The Gyro is currently being removed from the attitude control software.
  - The Star Tracker will then be the only attitude reference for science operations
- This will not affect nominal operations, but will preclude calibration observations when the star tracker is occulted by the Earth
  - Full orbit Solar Doppler calibration
  - Full moon Lunar Cal observations
- The loss of these measurements is not expected to impair the quality of the calibration



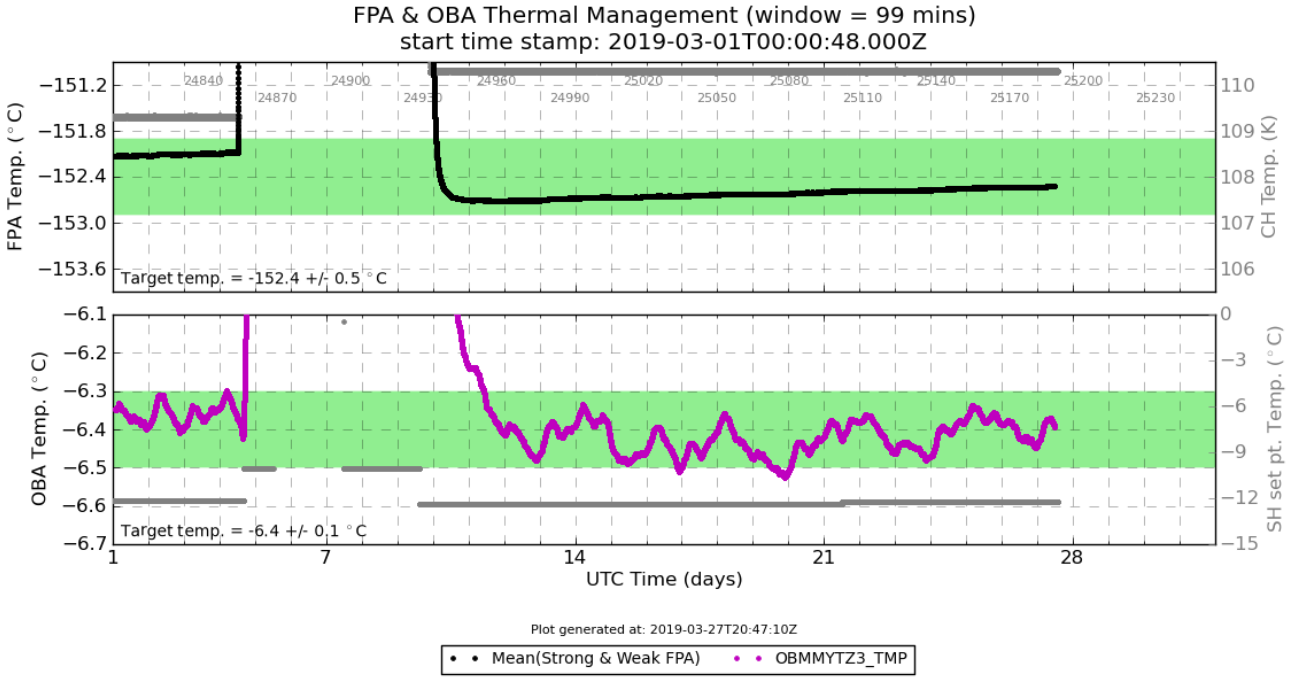




Reset of the SCO2 Digital Processor

- The SCO2 band's digital processor (DP0) experienced a spontaneous reset on 19 March 2019 while over the South Atlantic Anomaly (SAA)
- When it came back up, the Bad Pixel Map version number, and Read_Mode were no longer correct and no usable science data could be collected
- On 20 March 2019, a command was sent to re-assert the nominal instrument settings. The command was successful, and the science data steam was restored
- Impact: The anomaly occurred just following the descending node crossing (i.e., orbit start) for Orbit 25061, and the nominal SCO2 settings were not reestablished until partway through Orbit 25080.
  - A total of 20 orbits of data (33 hours) were lost
  - The GES DISC has been notified about the data loss

The 4-11 March Decon Cycle

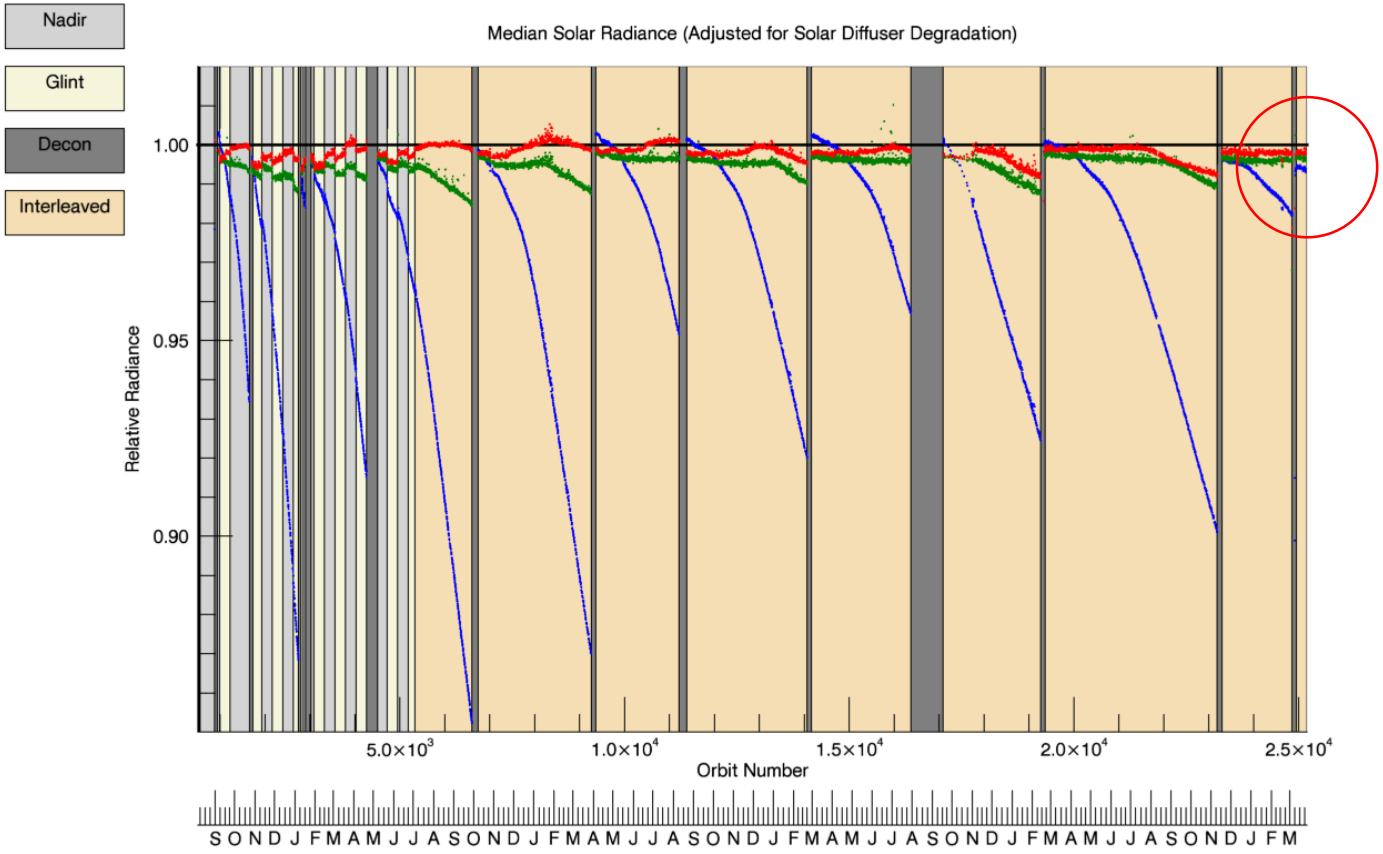


Cryocooler off:
Orbit 24847

Return to Science:
Orbit 24,946

- A standard Decon Cycle was executed on 4-11 March.
- The throughput was still quite high (~98% in the ABO2 channel) but this time was chosen to delay the next Decon until after the primary growing period in the Northern hemisphere

Throughput Trending



The March 4-11 Decon restored the throughput to > 99% in all 3 channels.

Nominal B10 Testing Plan

- ABSCO update - Initial tests completed, nominal ABSCO v5.1 selected
- Solar model update - Done
- Daily aerosol prior - Ongoing
- CO_2 prior update (in coordination with TCCON) - Ongoing
- Examine processes that affect CO2_grad_del behavior - Ongoing
- Revise SIF calculation in L2
- Assess value of a CO_2 column (or profile eigenvector) retrieval
- Assess impact of including a non-linear albedo slope
- Investigate including radiance offsets in ABP and in all bands for L2
- Assess convergence criteria and impact of restricting unphysical states
- Include temp profile (or temperature profile eigenvectors) in retrieval
- Assess impact of effort to detect/correct biases due to 3D effects of clouds
- Additional L1b calibration updates

High Priority

As Time Allows

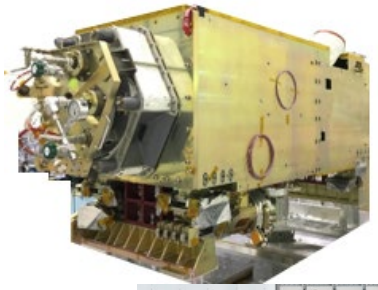
GOSAT v9 Progress

- Before initiating the full 10-year production run, SDOS is running one full year (2013) to validate the production system
- This test should be completed by the end of next week (5 April) and analysis will proceed through the following week.
- If everything checks out, we could be starting the full 10-year production run during the week of 15-19 April

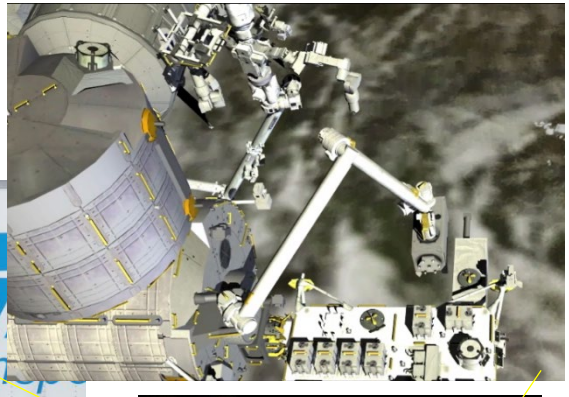

OCO-3 Status

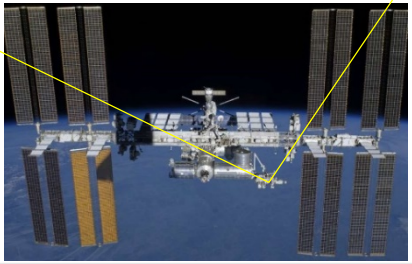
OCO-3 Status Update

- OCO-3 was integrated into the Dragon trunk on 20 March
- Current launch date: No Earlier than 25 April 2019
- We are still planning to hold a Science Team meeting in conjunction with the launch
  - Make hotel reservations now
  - Hold off on airline reservations until 1 April



The OCO-3 Team





Key Near Term Activities

Blue text indicates items that have been updated since the last report. Red text indicates that there may be a changes.

Planned Date	Activity Description
25-28 Mar	CEOS The Infrared and Visible Optical Sensors (IVO2), Perth
25 Apr	OCO-3 Launch, Cape Canaveral, FL
24-26 Apr	OCO-2/OCO-3 Spring Science Team Meeting, Coco Beach, FL
7-12 Apr	EGU General Assembly, Vienna
13-17 May	ESA Living Planet Symposium, Milan, Italy
21-22 May	NOAA ESRL GMD Annual Conference, Boulder
3-5 Jun	IWGGMS-15, Sapporo, Hokkaido, Japan
10-12 Jun	CEOS AC-VC, Tokyo, Japan
17-20 Jun	CALCON, Logan Utah
30 Jun-5 Jul	2019 RRV Campaign
7-18 Jul	27th IUGG General Assembly 8-18 July, Montreal, Canada
26-29 Aug 2019	Chapman Conference: Carbon-Climate Feedbacks, San Diego

IWGGMS-15 Activities

- Sunday, 2 June – GeoCarb Science Team Meeting,
  - Hokkaido University, Sapporo, Japan
- Monday – Wednesday, 3-5 June: IWGGMS-15
  - Hokkaido University, Sapporo, Japan
- Thursday, 6 June – GOSAT RA PI Meeting
  - Hokkaido University, Sapporo, Japan
- Sunday, 9 June – CEOS AC-VC/WGCV/WGClimate Roadmapping
  - JAXA HQ, Tokyo, Japan
- Monday – Wednesday, 10-12 June – CEOS AC-VC Annual Meeting
  - Nakano Sunplaza, Tokyo, Japan

Retirement plans

- Carol Bruegge will retire winter 2019/ 2020
- JPL interim employee program offers retirees part-time employment for specific tasks.
  - Available for consulting, reviews, MAIA launch & IOC, and RRV field trips!! Will depend on project needs.

- New JPL team leads
  - RRV field operations: Mark Helmlinger
  - OCO-2/3 calibration lead: Rob Rosenberg; VicCal data analyst: Shanshan Yu
  - MISR/ MAIA/ AirMPSI calibration lead: Gerard Van Harten