Geophysical Research Abstracts
Vol. 21, EGU2019-5941, 2019
EGU General Assembly 2019

The OCO-3 Mission: Global Observations of CO_2 and Solar-Induced Fluorescence from the International Space Station – Mission Status, Science Objectives, and Instrument Performance

Thomas P. Kurosu, Annmarie Eldering, Ryan P. Pavlick, Brendan M. Fisher, and Gregory B. Osterman
Jet Propulsion Laboratory/California Institute of Technology, Pasadena, United States (thomas.kurosu@jpl.nasa.gov)

The Orbiting Carbon Observatory 3 (OCO-3) will continue and extend global CO_2 and solar-induced chlorophyll fluorescence (SIF) using the flight spare instrument from OCO-2. The instrument has been through ground testing and thermal vacuum, 16 March 2019, with no significant delay to be expected. This talk will focus on the post-launch mission status, science objectives, science data products, early operations plan, and data availability.
The low-inclination ISS orbit lets OCO-3 sample the tropics and sub-tropics across the full range of daylight hours with dense observations at northern and southern mid-latitudes (+/- 52º). The combination of these dense CO_2 and SIF measurements provides continuity of data for global flux estimates as well as a unique opportunity to address key deficiencies in our understanding of the global carbon cycle. The instrument utilizes an agile, 2-axis pointing mechanism, providing the capability to look towards the bright reflection from the ocean and validation targets. In addition to the nadir-, glint-, and target-mode geometries familiar from OCO-2, OCO-3 includes a new observation mode dedicated to mapping out larger spatial-scale emitters like cities. This Snapshot Area Map (SAM) mode will be used to map areas of up to 80x80 km2 on the Earth surface with the standard OCO-3 ground footprints of 3.5 km2, providing unprecedented high spatial resolution coverage of large-scale CO_2 emitters worldwide. Measurements over urban centers could aid in making estimates of fossil fuel CO_2 emissions. Similarly, the snapshot mapping mode can be used to sample regions of interest for the terrestrial carbon cycle. In addition, there is potential to utilize data from the currently operating ISS instruments ECOSTRESS (ECOsystem Spaceborne Thermal Radiometer Experiment on Space Station) and GEDI (Global Ecosystem Dynamics Investigation), which measure other key variables of the control of carbon uptake by plants, to complement OCO-3 data in science analysis.
In mid-April 2019 OCO-3 will have been in orbit for about one month. We will report updates on mission status and detailed simulations of planned operations and data quality, along with the instrument characterization from thermal vacuum and on-orbit testing. The specific nature of the ISS orbit track produces spatial and temporal coverage that is something of a paradigm shift compared to low-earth-orbiting satellites like OCO-2, which provide observations at fixed overpass times and repeat cycles. OCO-3 observations will necessitate re-evaluation and adaptation of the current approaches of how satellite data are being used in model evaluation and science studies.