



The First Eighteen Months of NASA's Orbiting Carbon Observatory-2 (OCO-2): Mission Status, Error Characterization, and Preliminary Results

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OCO-2 began taking science data in September 2014 and continues to operate well, returning nearly 1 million observations per day. Approximately 10% of these are sufficiently free of cloud and aerosol contamination to allow for an accurate determination of the column mean carbon dioxide dry air mole fraction, XCO_2 . The measurements have relatively low noise, of order 0.5-1.0 ppm for most nadir soundings over land and sun-glint geometry soundings over water surfaces. A number of changes have been made to the observing strategy to maintain performance and enhance the science quality of the data: change in glint yaw angle in October 2014, change in nadir glint cycling in July 2015, change to nadir yaw and glint orbit optimization in late 2015, in addition to periodic instrument cyclings.

In this presentation, we will summarize the data quality enabled via comparison to a number of validation metrics, discuss the current health and long-term prospects for the instrument, and give an overview of some early science results from the first 18 months of observations. While XCO_2 and other products are still being validated to identify and correct biases, OCO-2's XCO_2 observations are starting to reveal the most robust features of the atmospheric carbon cycle. At regional scales, fluxes from the eastern U.S. and China are most clear in the fall, when the north-south XCO_2 gradient is small. Enhanced XCO_2 coincident with biomass burning in the some parts of the tropics, in particular central Africa, is also obvious in the fall. The annual growth rate of CO_2 was anomalously high in 2015 according to OCO-2, consistent with NOAA surface measurements and in accord with the warmer annual average surface temperature that year. This was also apparent in the decreased northern hemisphere summer uptake, likely due to anomalously warm boreal temperatures in the northern hemisphere summer of 2015.