The OCO-2 and OCO-3 Missions: Status, results and plans

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The Orbiting Carbon Observatory 2 (OCO-2) was successfully launched into a sun-synchronous polar orbit in July 2014, joined the Afternoon Constellation in August 2014 and has been providing science measurements in nadir, glint and target modes since September 2014. The OCO-2 instrument and spacecraft remain in excellent health. In May 2019, the OCO-3 instrument was installed on the International Space Station (ISS) and has provided science measurements across varying times of day in the latitude range 52S-52N from that inclined orbit starting in August 2019. In addition to nadir, glint and target observations, an agile pointing mirror assembly allows the OCO-3 instrument to collect Snapshot Area Maps (SAMs), which are data collections over ~80km by 80km in 2 minutes. In November 2023, OCO-3 was placed into temporary storage on the ISS, pending re-installation and resumption of science operations in 2024. The extension of OCO-3 on the ISS opens up new opportunities for synergistic use of the complementary sampling and capabilities of OCO-2 and OCO-3.

Together, the long-term, high quality XCO2 and SIF measurements from these missions are enabling advances in our understanding of the global, regional and local-scale carbon cycle and their response to changing human activities, natural climate variability, climate change and extreme events. Here, we present a high-level overview of the status of both the OCO-2 and OCO-3 instruments, including an update on the plans for resumption of science operations of OCO-3 following the storage period. The stability and quality of the OCO-2 and OCO-3 data products have been made possible by sustained efforts in calibration, validation and Level 2 algorithm development. We will present a high-level overview of status and results in these areas and will discuss the corresponding implications for science and applications uses of the measurements.

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