

## Observation of Solar-Induced Fluorescence from the Orbiting Carbon Observatory 2&3 Missions

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### Poster

The Orbiting Carbon Observatory (OCO) 2 and 3 instruments have been making continuous measurements of CO<sub>2</sub> and far-red Solar-Induced Fluorescence (SIF) since 09/2014 (OCO-2) and 09/2019 (OCO-3). OCO-2 flies on a dedicated space craft in sun-synchronous orbit with a fixed 1330h equator crossing time and observes at all latitudes. OCO-3 is installed on the International Space Station (ISS), which limits measurements to within a latitude band of about 52°S-52°N due to the ISS orbit inclination but allows observations to be made at different local times between sunrise and sunset. All OCO-2&3 data products are publicly available on the NASA GES-DISCs.

The two OCO instruments have a similarly-sized swath width of 12-15 km across-track subdivided into 8 footprints, with ground pixels sizes between 3.5 km<sup>2</sup> and 4.5 km<sup>2</sup>. OCO-2 measurements consist of three distinct observation modes: nadir over land, glint over ocean, and a target mode over select locations primarily for CO<sub>2</sub> and SIF validation purposes. In addition to these three modes, OCO-3 also includes a Snapshot Area Mapping (SAM) mode, a spatially extended target mode where areas between 50x50 km<sup>2</sup> and 80x80 km<sup>2</sup> are covered continuously. SAM observations are mainly performed over cities to monitor urban CO<sub>2</sub> emissions, but the list of locations includes several sites dedicated to SIF validation.

Both CO<sub>2</sub> and SIF retrievals are performed on all observation modes and at all locations. SIF retrievals are performed in two narrow wavelength regions around the O<sub>2</sub> A band, centered at 757 nm and 771 nm. The raw retrievals are subject to a background correction and are also scaled at the time of overpass with a daily average using solar illumination calculations within  $\pm 12$  hours for each location. The

publicly distributed SIF data product consists of daily files of single-footprint SIF observations, including the fully adjusted and background-corrected SIF values as well as the raw retrievals.

We present an overview of the OCO-2&3 mission design and operations, a summary of the currently available SIF data products from OCO-2 and OCO-3, updates on the release of upcoming product versions, recent work on the collocation of OCO-3 SIF and ECOSTRESS evapotranspiration observations, as well as future plans for mission operations.

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