



The Orbiting Carbon Observatory Glint and Target Modes: Simulations and First Results

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The Orbiting Carbon Observatory (OCO) mission was proposed to quantify the sources and sinks of CO₂ by making highly precise measurements of its column abundance. The OCO spectrometers measure absorption of reflected sunlight at the top of the atmosphere (TOA) in three narrowband near infrared (NIR) spectral regions. Since OCO flies over ocean (which is very dark in nadir mode) 70% of the time, the glint mode (where the specular reflection from ocean surface is measured) is critical. In this work, we perform simulations of OCO sunglint measurements and then linear error analysis to assess the sensitivity of the retrievals to forward model assumptions, particularly with respect to polarization by the ocean wave facets. The errors in the retrieved column-averaged dry air mole fraction of CO₂ (X_{CO_2}) using the OCO Level 2 retrieval algorithm are much lower than the “measurement” noise and smoothing errors. We also show results from target mode simulations, where the spacecraft pointing is no longer restricted to the principal plane. Data permitting, we will also present first results for X_{CO_2} retrievals from actual OCO measurements.