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Characterization of the uncertainties of CO2 retrievals from OCO (Orbiting Carbon Observatory) observations

H. Boesch (1), B. Connor(2), D. O'Brien(3), D. Baker(4), C. E. Miller(5), D. Crisp (5), J. McDuffie(5)

(1) University of Leicester, Leicester, UK, (2) National Institute of Water and Atmospheric Research, Lauder, New Zealand, (3) Colorado State University, Fort Collins, USA, (4) Woods Hole Oceanographic Institution, Woods Hole, USA, (5) Jet Propulsion Laboratory, California Institute of Technology, Pasadena, USA

The Orbiting Carbon Observatory (OCO) mission will make global, space-based measurements of atmospheric carbon dioxide (CO_2) with the precision, resolution, and coverage needed to characterize CO_2 sources and sinks on regional scales. During its 2-year mission, OCO will fly in a 1:26 PM sun-synchronous orbit with a 16-day ground-track repeat time, just ahead of the EOS Aqua platform. It will carry a single instrument that incorporates three bore-sighted high-resolution spectrometers designed to measure reflected sunlight in the 0.76-micron O_2 A-band and in the CO_2 bands at 1.61 and 2.06 microns. OCO is specially designed to be sensitive to near-surface CO_2 concentrations and, due to its nadir and sunglint modes, will provide soundings over land and ocean.

Here we will discuss the characteristics of OCO soundings and their measurement uncertainties, given by an analysis of the OCO forward model for different surface types, aerosol loadings, and solar zenith angle and we will assess merits of OCO's nadir- and glint-viewing modes. We will examine aerosol and cloud statistics derived from MODIS and other satellites to determine the spatio-temporal distribution of the OCO measurement errors and to obtained the expected number of cloud-free OCO soundings from which multi-shot measurement errors are calculated. Finally, we will

discuss how well we expect OCO's column-CO_2 measurements can constrain the surface sources and sinks. These investigations will provide important feedback to help isolate areas where the retrieval must be improved and give guidance on the optimal observation and sounding selection strategy for OCO.