Mapping Global CO2: Impact of Temporal Variability on Geostatistical Gap-Filling for the Orbiting Carbon Observatory (OCO)

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This presentation will describe results from a new project whose goal is to produce the first full-coverage maps of column integrated CO2 dry air mole fraction (XCO2) using data available from OCO. The focus will be on analyzing the impact of temporal variability of XCO2 on the ability to merge data from multiple days/orbits within a single 16-day OCO repeat cycle. Current gap-filled maps from modeled OCO-like data have been created under the assumption that all the measurements within a repeat cycle are representative of a single, static time. This investigation assesses the effect of ignoring temporal variability in the underlying XCO2 fields. We propose new techniques for incorporating temporal variability into the estimation of complete, gap-filled maps and their uncertainties. These techniques are still strongly data-driven and do not rely on atmospheric transport models or estimates of surface fluxes of carbon dioxide. Comparative results from candidate geostatistical gap-filling techniques considering temporal effects applied to modeled data representative of future OCO data will be included.