

Power Plant and Megacity CO₂ Observation from Greenhouse Gases Observing SATellite (GOSAT)

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Fossil fuel CO₂ emissions are a major input to the global carbon cycle over decadal time scales. Monitoring of emission changes is required to achieve emission reduction commitments; however, we lack an objective method to measure emissions directly and/or verify the reported emissions. Future carbon-observing space missions are expected to provide an independent tool for directly measuring these emissions. Since 2009, we have made satellite observations focused specifically on intense Large Point Sources (LPS) such as large fossil-fueled power plants and megacities to detect their emission signatures, using the Japanese GOSAT. Those LPS sites (N>300) are not routinely observed, but are targeted occasionally when requested. For this attempt of detecting the emission signatures, we have analyzed five GOSAT X_{CO₂} retrievals available from four research groups (NIES-L2, NIES-PPDF, ACOS, RemoTeC and UoL FP). The number of successfully-retrieved soundings is significantly fewer than the total number of target observations likely due to geophysical difficulties in the retrievals. We, however, have found statistically significant enhancements at some LPS sites where weather conditions were ideal for viewing. We have also implemented simulations of enhanced X_{CO₂} using the Global Eulerian-Lagrangian Coupled Atmospheric transport model (GELCA) and the high-resolution fossil fuel emissions dataset (Odiac) and compared to satellite-derived values.

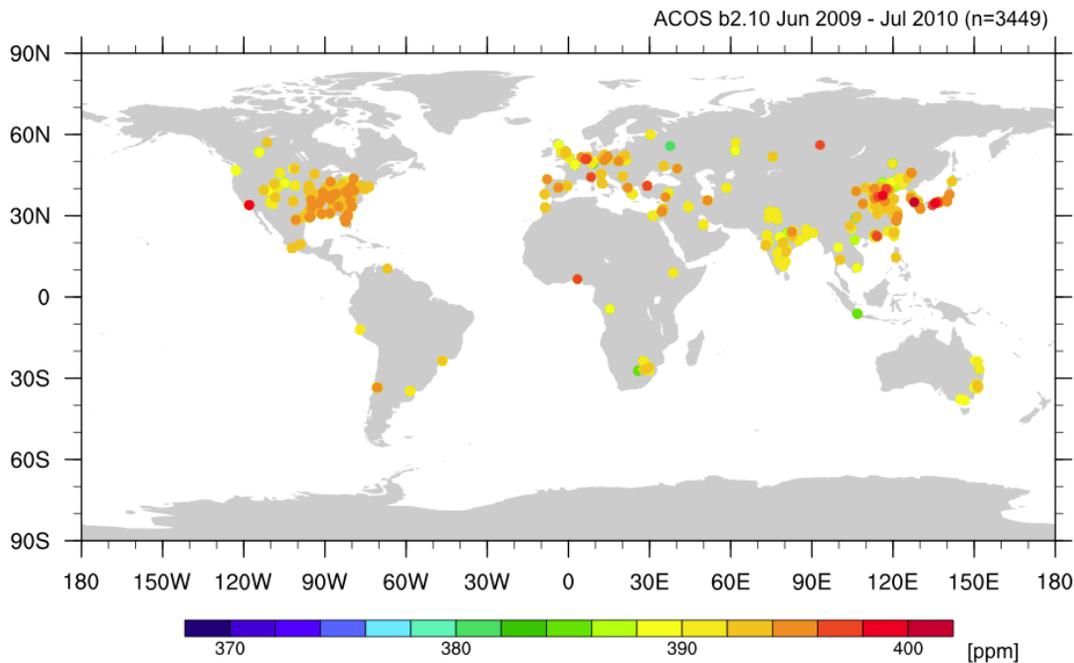


Figure 1. Successful CO₂ retrievals from ACOS b2.10 obtained at dedicated power plants and megacities locations. Soundings available during June 2009 – July 2010 are shown.