Improving and Extending a CO_2 Observation Network in the Pacific Northwest

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Our CO_2 study in Oregon aims to improve understanding of the mechanisms driving carbon exchange processes and associated uncertainties within a region by maintaining and extending a ground-based network of CO_2 observation sites in Oregon and aircraft sampling of boundary layer profiles, and continuing development and application of a high-resolution data assimilation system with regional atmospheric inverse modeling. The Pacific Northwest and Oregon in particular is characterized by its strong precipitation and vegetation gradient from the mesic coast with its large carbon sink in evergreen forests to the inland cold desert. In addition, the region is characterized by relatively isolated larger urban areas and other anthropogenic CO_2 sources. Hence, the spatio-temporal distribution of sources and sinks can provide great insights into changes in atmospheric CO_2 from incoming air off the Pacific Ocean. The new towers within our model domain will greatly improve data quality and footprint coverage. Our modeling studies are considered a test for larger scale applications in a small scale and data-rich environment. The mixing ratio time series from these sites would also provide a valuable addition to the CarbonTracker database for constraining flux fields in the Pacific Northwest U.S., and monitoring incoming CO_2 boundary conditions at the transition from Pacific Ocean to the North American continent. This tower setup allows testing biosphere process models at different levels of complexity (BioFlux, CLM4) and evaluating the influence of resolution settings and data availability on final flux products and their uncertainties.

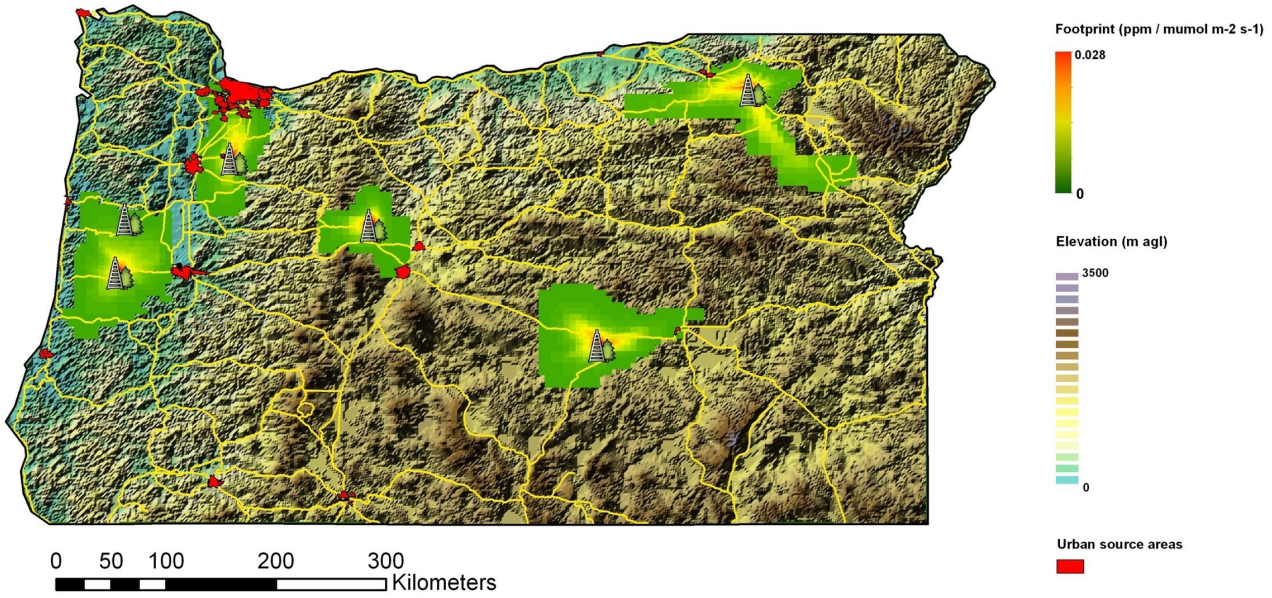

Figure 1. Map of Oregon showing the tall tower positions and the corresponding footprint strength of the surface area on the atmospheric CO_2 concentration at measurement height. The yellow lines mark major highways and roads.