Title: Drivers and Methods of Addressing Uncertainty in Large Point Sources of CO_2

Type: Research

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Abstract:

Large point sources account for as much as 60% of the anthropogenic carbon dioxide emissions for some countries. Because CO_2 emissions are seldom measured directly but are generally estimated from other data, we need to understand the uncertainty of these estimates. Simply stated, for any given geographic and temporal location, we would like to quantify the emissions and the associated uncertainty with as fine a resolution as possible. While US data on point sources are largely assumed to be among the best available globally, the reported locations of these sources, based on the dataset used in this analysis, are estimated to differ by 0.84km on average from their actual locations.

This poster presents a metric to quantify spatial uncertainty in point sources and explains why the uncertainty in point source data cannot be described with traditional methods. A Monte Carlo simulation is used to calculate expected emissions values for each point source and the associated spatial uncertainty is derived from these expected values. The uncertainty metric can be used to define and calibrate appropriate levels of resolution for regions with more or less reliable data sets. Gridded data are output to be incorporated into other data products reporting emissions estimates and will contribute to NASA's Carbon Monitoring System project.

Large point source data are distinct in nature from other types of emissions data and must be addressed separately with careful attention to their location as well as magnitude estimates. This poster demonstrates the need for consideration of the data reporting errors in the locations of these large emitters and provides a metric to appropriately quantify and, where possible, reduce the consequent uncertainty. While the methodology has currently been demonstrated only for United States data, future versions will extend this to a global scale and will incorporate additional geographic and political data to refine the uncertainty estimates.

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