Identifying Greenhouse Gas Hotspots in Megacities

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Global warming due to the release of man-made greenhouse gases in our atmosphere continues to be a major challenge for scientists today. An accurate and efficient measurement strategy to estimate greenhouse gas emissions from megacities does not currently exist. Commercial greenhouse gas sensors are expensive and ill-suited for urban environments making large-scale, long-term deployment of these sensors illogical. In this research, I construct, calibrate and test an inexpensive sensor with potential for continuous measurement of greenhouse gases (GHG). I collect GHG data from a large network of sensors strategically located in Washington DC using the inexpensive concept of crowdsourcing. Mathematical models for simulating the atmospheric transport of GHGs and frameworks for estimating emissions with the measured sensor data are developed. Data from our low-cost sensors captured fluctuations in CO2 levels with an accuracy of 99.02%. Results also showed that our model accurately predicted emission inventories in the metropolitan area – highlighting large CO2 emissions from the transportation sector. I present Project iSense, an effort to enforce limits on greenhouse gas emissions through a fusion of mathematical models for estimating emission inventories, novel inexpensive sensors for accurate measurements, and crowdsourcing techniques to implement a continuous greenhouse gas monitoring network in megacities.

Awards Won:

Fourth Award of $500