



A top-down sector-level study of methane emissions from Brazil using satellite data

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In addition to having good coverage over Brazil by satellites measuring column methane, the distinct spatial and temporal distributions of Brazil's methane sources make it an excellent case study for top-down quantification of emissions at the sector level. Wetland emissions are concentrated primarily on the Amazon river and in the western Pantanal region with biomass burning occurring in an 'arc of deforestation' around the Amazon rainforest border. Anthropogenic emissions are split between livestock in the south and central regions and fossil fuels and waste, occurring in populated regions, mainly on the Eastern coast. Temporally, emissions from wetlands peak during the wet season (December-February), whilst biomass burning emissions are more significant following the dry season (August-October).

We use column measurements from the Greenhouse Gases Observing Satellite (GOSAT) to quantify methane emissions for the major source sectors in Brazil spanning 2011-2016. Using the high-resolution transport model Numerical Atmospheric-dispersion Modelling Environment (NAME) to quantify the sensitivity of atmospheric mole fractions to emissions, we apply a trans-dimensional hierarchical Bayesian Markov Chain Monte Carlo (MCMC) approach to quantify the magnitudes and uncertainties in emissions (Ganesan et al, 2014; Lunt et al, 2016). Our preliminary results show that anthropogenic emissions show a discrepancy from the EDGAR v4.3.2 inventory and that, despite the seasonal cycle, there are strong wetland emissions from the Amazon region throughout the year. We compare the emissions derived for all sectors using three different wetland extent maps to determine the extent that uncertainties in wetland distribution have on deriving emissions from all sectors.