



Direct Measurement of Coal Seam Gas and Agricultural Methane Emissions in the Surat Basin, Australia

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The Surat Basin, Queensland, Australia, is a hot-spot of methane emissions for Australia. Within the Surat Basin there are over 6000 coal seam gas wells with extensive supporting pipeline networks and processing plants. The region also supports a multi-billion-dollar agricultural industry, and at times accounts for over half of Australia's beef production, with over 500,000 cattle; both grazing and housed in feedlots. Individual feedlots may hold 10,000 or more cattle at any one time. The top 6 emitters in the region and their bottom-up estimated percentage contribution towards regional methane emissions include: cattle (78.1%), CSG processing (8.4%), coal extraction (8.3%), piggeries (1.4%), CSG production (1.1%), and landfill (1.0%) (Luhar et al. 2018). Because there are many methane sources within the Surat Basin it can be difficult to make a top-down assessment of methane emissions that can be attributed to an individual source. Source attribution is particularly challenging because many of the cattle feedlots are co-located with both CSG production wells and processing plants.

This presentation will discuss what activities have been undertaken to date in the Surat Basin, Australia, and the future research aims. In brief, in September 2018 a joint airborne and ground measurement survey campaign was undertaken to make a top-down assessment of methane emissions in the region and investigate methane source attribution. The portion of the Surat Basin that was surveyed in September 2018 extends from Miles to Toowoomba, covering an area of approximately 200 km (NW to SE) by 100 km (NE to SW). Continuous measurements of the methane mole fraction in the atmosphere were recorded during 13 flights over 15 days using an aircraft-mounted LGR greenhouse gas analyser. These flights had a number of objectives aimed at assessing the regional methane flux, with more detailed surveys above major CSG processing and power generation plants. Detailed airborne measurements were also undertaken above the large-scale cattle feedlots. To support the insights from the airborne measurements, continuous methane mole fraction measurements in the ground level atmosphere were recorded along more than 1000 km of main roads using a car-mounted LGR greenhouse gas analyser or a Picarro 2201-i analyser. To assist with source attribution, over 200 grab bag samples of air were collected, and the stable carbon and hydrogen isotope ratios of methane measured ($\delta^{13}\text{C-CH}_4$ and $\delta\text{D-CH}_4$). The presentation will discuss how the surveys complement each other and potentially constrain how we will interpret the results.

Reference

Luhar, A., Etheridge, D., Loh, Z., Noonan, N., Spencer, D., Day, S. 2018. Characterisation of Regional Fluxes of Methane in the Surat Basin, Queensland. Final report on Task 3: Broad scale application of methane detection, and Task 4: Methane emissions enhanced modelling. Report to the Gas Industry Social and Environmental Research Alliance (GISERA). Report No. EP185211, October 2018. CSIRO Australia.