Reducing uncertainties in estimates of greenhouse gas emissions from sub-tropical land use systems of Queensland

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Limited data is available with respect to greenhouse gas emissions from agricultural and native land use systems of the Australian sub-tropics. Comprehensive data is lacking over multiple years which incorporate the impacts of climate variability, land use and soil spatial variability on emissions. A systems approach employing the collection, simulation and scaling of greenhouse gas emissions has been employed. Multiple land use systems, ranging from natural to intensive agriculture, across a climatic gradient on the Sunshine Coast of Qld, are monitored for CO_2, N_2O and CH_4 to ensure the broadest possible range of data for model calibration and validation to determine the Global Warming Potential of these land use systems.

An extensive sampling program, utilising sites along a coastal east-west transect from Maroochydore on the Sunshine Coast to Montville on the Blackall Range captures major land use systems - intensified broadacre agricultural production (sugar cane), short-rotation forestry, improved dairy pastures, and horticulture, and generally supported by the higher rainfall conditions east of the range. At each sampling location, small open-ended plastic cylinders are permanently installed as gas sampling chambers. These are monitored on a weekly to fortnightly basis, as well as event driven sampling (e.g. rain) with samples manually analysed with soil moisture and temperature recorded at the sampling time.

An intensive sampling program, focuses on a mixed farming site at Mooloolah within the transect. The data from the intensive sampling program is collected using a fully automated chamber and analysis system and provides high resolution information of emissions from adjacent tree cropping, pasture and (natural) rainforest systems. The site is also fully instrumented for soil water and temperature analysis with soil sampling protocols in place for nitrogen analysis.