Methane in Hong Kong: isotopic characterisation of local and regional methane sources

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Greenhouse gas measurements have recently commenced at the Swire Marine Institute at Cape d'Aguilar, on the southern tip of Hong Kong Island (22.21°N, 114.26°E). Air samples have been collected from the station twice a week since April 2015 for methane mole fraction and $\delta^{13}C$ analysis at RHUL. Methane and carbon dioxide mole fractions are now also measured in situ by cavity ringdown spectroscopy. This station receives air from important source regions: southerly marine air from the South China Sea in summer and northerly continental air in winter. These measurements together with back trajectory analysis will allow an integrated assessment of emissions from the region.

In addition to the regular sampling, RHUL has carried out field campaigns to map out and isotopically characterise local methane sources. Hong Kong has a wide variety of natural and anthropogenic sources of methane within a small densely populated area. Methane mole fraction was mapped out across Hong Kong during a field campaign in July 2016 using a cavity ringdown spectrometer installed in a car. Methane is mostly emitted from large point sources, with highest concentrations measured close to active landfill sites, sewage works and a gas processing plant. Air samples were collected close to sources and analysed by mass spectrometry with Keeling plot analysis used to determine the $\delta^{13}C$ isotopic signatures which ranged from -70 ‰ (cows) to -37 ‰ (gas processing).