



Quantifying the Arctic methane budget

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The Arctic is a major source of atmospheric methane, containing climate-sensitive emissions from natural wetlands and gas hydrates, as well as the fossil fuel industry. Both wetland and gas hydrate methane emissions from the Arctic may increase with increasing temperature, resulting in a positive feedback leading to enhancement of climate warming. It is important that these poorly-constrained sources are quantified by location and strength and their vulnerability to change be assessed. The MAMM project (Methane and other greenhouse gases in the Arctic: Measurements, process studies and Modelling') addresses these issues as part of the UK NERC Arctic Programme.

A global chemistry transport model has been used, along with MAMM and other long term observations, to assess our understanding of the different source and sink terms in the Arctic methane budget. Simulations including methane coloured by source and latitude are used to distinguish between Arctic seasonal variability arising from transport and that arising from changes in Arctic sources and sinks. Methane isotopologue tracers provide a further constraint on modelled methane variability, distinguishing between isotopically light and heavy sources (e.g. wetlands and gas fields). We focus on quantifying the magnitude and seasonal variability of Arctic wetland emissions.