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Modelling Methane during the Holocene

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Ice core records provide a valuable insight into how atmospheric methane concentrations have varied over the past few millennia, but also pose questions about the relative importance of changes in the main sources (emissions from wetlands) and sinks (reaction with atmospheric OH radicals). One of the ways of testing our understanding and ability to model natural sources and sinks is to investigate changes that occurred during the paleo record. We have applied an Earth Systems modelling approach to the Holocene to investigate this problem. We present results from a series of simulations over the Holocene using a fully 3D climate-chemistry model (HadCM3L coupled to STOCHEM). This is driven by a series of emission models estimating methane, isoprene and other trace gas emissions. Sensitivity tests using the PMIP2 and observational climate (CRU) data suggest that small differences in climate and parameter choice can cause large variations in methane emissions. However, changes in emissions between different time periods appear to be more robust. The effects of these different emissions on the overall atmospheric composition will also be shown.