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Reconciling the changes in methane sources and sinks between the last glacial maximum and the pre-industrial era

James Levine (1), Eric Wolff (1), Anna Jones (1), Louise Sime (1), Paul Valdes (2), Glenn Carver (3,4), Nicola Warwick (3,4), Alex Archibald (3,4), John Pyle (3,4)

(1) British Antarctic Survey, Cambridge, United Kingdom (javi@bas.ac.uk), (2) School of Geographical Sciences, University of Bristol, Bristol, United Kingdom, (3) Centre for Atmospheric Science, Department of Chemistry, University of Cambridge, Cambridge, United Kingdom, (4) National Centre for Atmospheric Science, University of Cambridge, Cambridge, United Kingdom

Methane (CH_4) is an important atmospheric constituent on account of its potency as a greenhouse gas and its influence on the tropospheric oxidising capacity. We know from the ice record that its concentration, [CH_4], at the last glacial maximum (LGM; 21kyr before present) was roughly half that in the pre-industrial era (PI; $\sim$200yr before present), about 360 ppbv compared to around 700 ppbv, but how much of the difference was source-driven, and how much was sink-driven, remains uncertain.

Here, in view of a recent upward-revision of the estimated change in CH_4 emissions from wetlands during this period, and the possible recycling of OH consumed in isoprene oxidation, we use an atmospheric chemistry-transport model to: re-examine the main factors affecting the oxidising capacity between the LGM and the PI; estimate their net effect on [CH_4], with and without a possible OH recycling mechanism; and show how this can be reconciled with both the larger change in wetland emissions and the observed change in [CH_4].