



Wetland methane modelling over the Scandinavian Arctic: Performance of current land-surface models

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Wetlands are generally accepted as being the largest, but least well quantified, single natural source of CH₄, with global emission estimates ranging from 100-231 Tg yr⁻¹ [1] and for which the Boreal and Arctic regions make a significant contribution [2, 3]. The recent review by Melton et al. [4] has provided a summary of the current state of knowledge on the modelling of wetlands and the outcome of the WETCHIMP model intercomparison exercise. Melton et al. found a large variation in the wetland areas and associated methane emissions from the participating models and varying responses to climate change.

In this paper, we report results from offline runs of two land surface models over Scandinavia (JULES, the Joint UK Land Environment Simulator [5, 6] and HYBRID8 [7]), using the same driving meteorological dataset (CRU-NCEP) for the period from January 1980 to December 2010. Although the two land surface models are very different, both models have used a TOPMODEL approach to derive the wetland area and have similar parameterisations of the methane wetland emissions.

We find that both models give broadly similar results. They underestimate the wetland areas over Northern Scandinavia, compared to remote sensing and map-based datasets of wetlands [8]. This leads to lower predicted methane emissions compared to those observed on the ground and from aircraft [9]. We will present these findings and identify possible reasons for the underprediction. We will show the sensitivity to using the observed wetland areas to improve the methane emission estimates.

References

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