3rd International Conference on Earth System Modelling
Vol. , 3ICESM-106, 2012
3rd International Conference on Earth System Modelling

Projection of permafrost soils for the next decades: extend and CO_2 fluxes.

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The spatial extend and biogeochemical activities of permafrost-affected soils are controlled by multiple factors such as climate, land cover, and human activities. Permafrost soils contain large carbon stocks, estimation of the total northern carbon pool are 495 Pg for the top meter of soils, 1024 Pg to 3 m, and an additional 648 Pg for deeper carbon stored in yedoma (frozen, carbon-rich sediments) and alluvial deposits (Tarnocaï et al., 2009). A decade ago, Northern high latitudes were seen as being future sinks of carbon because of biomass increase in high latitudes due to longer growth season and increasing temperature (Myneni et al., 1997, McDonald et al., 2004). Nowadays, model results taking into account the faith of permafrost soils under changing climate show that the high latitudes could become carbon sources due to the "re-activation" of permafrost soil (Hayes et al., 2011).
In this study, we plan to use the "VOR er PERmafrost Carbon" diagnostic model (VORPER-C) to predict permafrost extend and respiration. The model uses the permafrost-zonation index from Gruber (2012), the soil-carbon dynamics from Wania et al. (2010), and the model of soil organic matter sensitivity to temperature from Roelandt et al. (in prep). The VORPER-C model forced with the CMIP5 future climate scenarios will allow us to compare different projections of permafrost extend for the next decades.

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