Geophysical Research Abstracts
Vol. 21, EGU2019-2784, 2019
EGU General Assembly 2019


# Contrasting carbon sink and source activities in Amazonian and Arctic peatlands under a changing climate

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We used a process-based peatland biogeochemistry model to quantify the carbon accumulation in the Pastaza-Marañon foreland basin (PMFB) in the Peruvian Amazon from 12,000 years before present to 2100 AD. We found that, under warmer and presumably wetter conditions over the 21st century, SOC accumulation rate in the PMFB slows down to 7.9 (4.3∼12.2) g C m̂(-2) yr̂(-1) from the current rate of 16.1 (9.1∼23.7) g C m̂(-2) yr̂(-1) and the region may turn into a carbon source to the atmosphere at -53.3 (-66.8∼-41.2) g C m̂(-2) yr̂(-1) (negative indicates source), depending on the level of warming. Soils in the PMFB may lose up to 0.4 (0.32∼0.52) Pg C by 2100 AD with the largest loss from palm swamp. The carbon-dense Amazonian peatland may switch from a current carbon sink into a source in the 21st century. We also simulated the SOC accumulation in Alaskan terrestrial ecosystems over the last 15,000 years using the model. The simulated average rate of peat C accumulation was 2.3 Tg C yr̂(-1) with a peak value of 5.1 Tg C yr̂(-1) during the Holocene Thermal Maximum (HTM) in the early Holocene, four folds higher than the average rate of 1.4 Tg C yr̂(-1) over the rest of the Holocene. The SOC accumulation slowed down, or even ceased, during the neoglacial climate cooling after the mid-Holocene, but increased again in the 20th century. We found that warmer summer temperature and stronger radiation seasonality, along with higher precipitation in the HTM and the 20th century might have resulted in the extensive peatland expansion and carbon accumulation. Currently, we are evaluating the fate of Arctic peatland carbon during this century.