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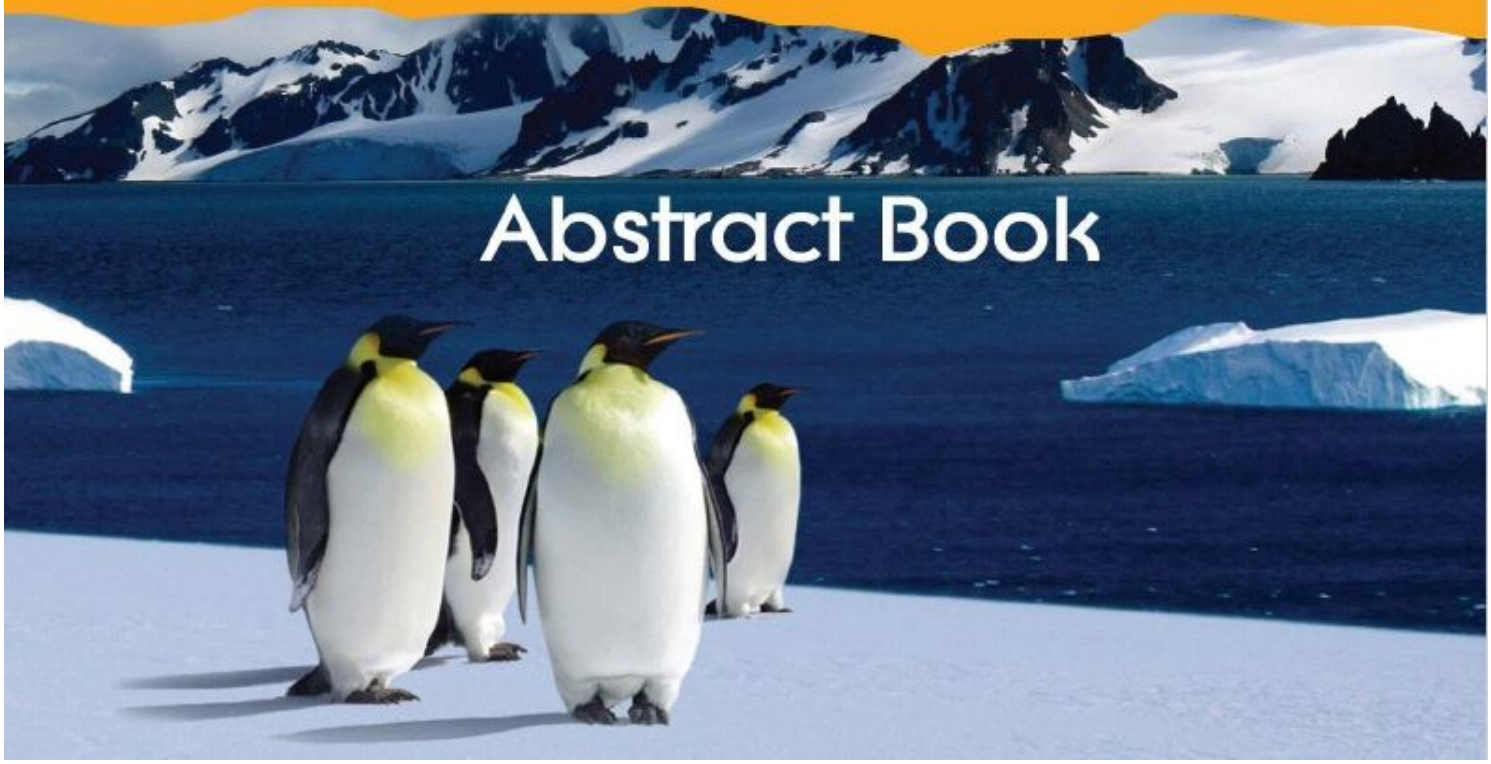
ANTARCTICA IN THE GLOBAL EARTH SYSTEM:
FROM THE POLES TO THE TROPICS



Abstract Book

Solar heating, microclimate, and the formation of peat-accumulating ecosystems in Antarctica

Zicheng Yu[1], David Beilman[2], Julie Loisel[3], Jonathan Stelling[1], Zhengyu Xia[1], Ivan Parnikoza[4]
[1]*Lehigh University, Bethlehem, United States,* [2]*University of Hawaii, Honolulu, United States,* [3]*Texas A&M University, College Station, United States,* [4]*National Academy of Sciences of Ukraine, Kyiv, Ukraine*

(Email: ziy2@lehigh.edu)

Waterlogged peatlands and aerobic moss peatbanks are carbon-rich peat-forming ecosystems. Understanding their environmental controls is important for projecting their future dynamics and trajectories in a changing climate. While peatlands are widely distributed in the boreal and sub-Arctic regions as well as in the tropical and southern-hemisphere temperate regions, peatbanks only occur in the Maritime Antarctic region, on some sub-Antarctic islands, and in the High Arctic. Here we use microclimate measurements, including solar radiation, air temperature, air humidity, soil temperature and moisture content, at several peat sites in the Antarctic Peninsula and Patagonia to evaluate the key differences between peatbanks and peatlands in terms of their microclimate response to regional climate. Our results show that temperatures of moss surfaces in aerobic peatbanks of the Antarctic Peninsula can be 20°C higher than air temperature, in response to direct solar radiation heating. In these systems, high temperatures likely increase primary production and may strongly affect the rate of biomass accumulation during very short growing seasons. On the other hand, moss surfaces in waterlogged peatlands are much cooler during daytime and warmer at night than air temperature due to the influence of waterlogging on heat capacity and latent heat effects. This suggests that current cold climate in the Antarctic may limit the development of waterlogged peatlands, but support aerobic peatbanks and their expansion into hostile environments on the Antarctic Peninsula.

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