Geophysical Research Abstracts
Vol. 19, EGU2017-14310, 2017
EGU General Assembly 2017


# Response of permafrost carbon to post-glacial warming

Tommaso Tesi (1,2,3), Francesco Muschitiello (4,5,6), Rienk Smittenberg (6,3), Martin Jakobsson (6,3), Pete Hill (7), Jorien Vonk (8), August Andersson (2,3), Nina Kirchner (9,3), Riko Noormetsriko (7), Oleg Dudarev (10), Igor Semiletov (10,11,12), Örjan Gustafsson (2,3)

(1) Institute of Marine Sciences-CNR, Italy (tommaso.tesi@bo.ismar.cnr.it), (2) Department of Environmental Science and Analytical Chemistry (ACES), Stockholm University, Sweden, (3) Bolin Centre for Climate Research, Stockholm University, Sweden , (4) Lamont-Doehrty Earth Observatory, Columbia University, USA, (5) Uni Research Climate, Norway, (6) Department of Geological Sciences (IGV), Stockholm University, Sweden, (7) University Centre in Svalbard (UNIS), Svalbard and Jan Mayen, (8) Faculty of Earth & Life Sciences, Department of Earth Sciences, The Netherlands, (9) Department of Physical Geography (NG), Stockholm University, Sweden, (10) Pacific Oceanological Institute FEB RAS, Russia, (11) Tomsk Polytechnic University, Russia, (12) University of Alaska Fairbanks, USA

The last glacial-interglacial transition represents a major climatic reorganization during which the Northern Hemisphere became warmer while the atmospheric $CO_2$ rose from ca. 190 parts per million by volume (ppmv) to ca. 270 ppmv. Recent hypotheses, based on atmospheric records and models, suggest that Permafrost Carbon (PF-C) accumulated during the last glaciation may have been an important source for the atmospheric $CO_2$ rise. However, direct physical indications for such PF-C release have so far been absent. Here we use sediment cores from the Laptev Sea (Arctic Ocean) to investigate PF-C destabilization during the last glacial-interglacial period. Our paleoenvironmental reconstruction indicates massive supply of PF-C from Siberian soils in response to the warming. We infer that the rapid active-layer deepening during the last glacial-interglacial transition released large quantity of soil carbon resulting in high land-derived OC supply to the Laptev Sea. Thawing of PF-C must also have brought about enhanced organic matter respiration on land and, thus, these findings suggest that thermal reactivation of dormant permafrost might have been an important source of carbon. This study presents observation-based evidence of massive PF-C destabilization during past warming events and contributes a new angle to the ongoing debate on mechanisms driving the increase of atmospheric $CO_2$ during the last deglaciation.