Geophysical Research Abstracts
Vol. 19, EGU2017-673, 2017
EGU General Assembly 2017


# Holocene temperature trends in the extratropical Northern Hemisphere based on inter-model comparisons

yurui zhang (1,2), Renssen Hans (2,3), Heikki Seppä (1), and Paul Valdes (4)

(1) Department of Geosciences and Geography, University of Helsinki, Helsinki, Finland, (2) Faculty of Earth and life Sciences, VU University Amsterdam, Amsterdam, The Netherlands, (3) Dept of Natural Sciences and Environmental Health, University College of Southeast Norway, Bø, Norway, (4) School of Geographical Sciences, University of Bristol, Bristol, UK

Large uncertainties exist in the estimates of Holocene climate, especially during the early Holocene when the climate system was undergoing reorganization. Multi-model comparisons can facilitate to narrow down these uncertainties. Here we compare four Holocene simulations performed with the LOVECLIM, CCSM3, HadCM3, and FAMOUS climate models to identify consistencies and to examine potential sources of divergences. The averages of these simulations over 30–90° latitude band are generally consistent. On sub-continent scale, commonly simulated temperature trends are also found in Greenland, N Canada, NE and NW Europe. This overall Holocene pattern can be summarized as the early Holocene warming, mid-Holocene warmth and gradual decrease toward 0 ka. The extent of early Holocene warming is stronger in winter than in summer and also spatially varies: 8°C warming is found in N Canada; whereas NE Europe only shows 2°C minor warming. The Greenland and NW Europe show intermediated degree warmings with about 5°C.
In contrast, mismatched temperatures are detected in Alaska, Arctic, Siberia (including E and central-west Siberia). In Alaska, warm early Holocene winter in LOVECLIM might be caused by an intensively enhanced southerly winds induced by the ice sheets, which is probably related to its coarse resolution. In Siberia, intense warm summer in CCSM3 is probably caused by large negative albedo anomalies and ultimately results from its turbulent coefficient formulation. In the Arctic, mismatches in winter temperatures could be attributed to dissimilar sea ice. The early Holocene sea ice anomaly (relative to 0 ka) is more extended in FAMOUS in CCSM3; and September sea ice in HadCM3 is thicker than in LOVECLIM. The simple sea ice representation in the HadCM3 and FAMOUS models probably contribute to their overwhelming sea ice cover.