

How vegetation change contribute to polar amplification in warm climate?

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In projections of future global change induced by CO₂ emission using general circulation models (GCMs), globally averaged surface air temperature increase is ranged between at the end of 21st century range from 2K to 4.5K, even higher in the high latitudes, known as the 'polar amplification'. We investigated the contribution of vegetation change to global warming and polar amplification in doubled atmospheric CO₂ condition using an atmosphere-ocean-vegetation coupled GCM. We compared the result in doubled CO₂ experiment with another warm period experiment which focuses on the mid-Holocene (about 6000 years before present). Paleo-evidences indicate that mid-Holocene was warmer and more humid than present-day, caused by a different shortwave radiation pattern which corresponds to earth's orbit at that time. For example, annual averaged temperature over northern hemisphere continent is about 2K warmer than that of today. By this comparison, we suggest difference mechanisms of vegetation feedback to the atmosphere in these two warming experiments.