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Assessing the sensitivity of Late Miocene vegetation in a fully coupled ASOGCM

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The Miocene climate is characterised by a flattened meridional temperature profile and a warmer than present day climate especially in high latitudes, as indicated by geological evidence. Various hypothesises try to explain the increased poleward heat-transport without alteration of CO2 level in the atmospheric composite. Proposed mechanisms include changes in ocean-gateway configurations, frequency of stormtracks and vegetation pattern. General circulation models used for testing these hypothesises still do not reproduce the temperature gradient sufficiently revealing a lack in understanding the Miocene climate system. One problem of the models may be the limited ability to capture all feedback-mechanisms between the different components of our climate.
Here we use the complex earth system model COSMOS for time-slice experiments of the Late Miocene climate for an integrated view of atmo-, oceano- and biosphere. This allows us to analyse the feedback mechanisms in the coupled atmosphere-ocean-sea ice-vegetation system. In more detail we discuss the sensitivity and the potential of a dynamically modelled vegetation. We show that background conditions in vegetation can strongly affect the land surface albedo and are important for modelling the Miocene climate.