



Vegetation cover in a warmer world simulated using a Dynamic Global Vegetation Model for the mid Pliocene

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In this study we employ the TRIFFID (Top-down Representation of Interactive Flora and Foliage Including Dynamics) Dynamic Global Vegetation Model (DGVM) and the Hadley Centre Atmospheric General Circulation Model version 3 (HadAM3 GCM) to investigate vegetation distributions and climate-vegetation feedbacks during the mid Pliocene, and examine the implications of these results for the origins of hominid bipedalism. The TRIFFID model outputs support extant palaeoenvironmental reconstructions for the mid Pliocene provided by the PRISM Group (Pliocene Research Interpretations and Synoptic Mapping). Compared to the pre-industrial, TRIFFID simulates a significant increase in forest cover during the mid Pliocene, composed of needle leaf trees in the higher latitudes of the Northern Hemisphere and broad leaf trees in other regions. Needle leaf trees extend from the Arctic Coast into the northern mid latitudes. The fractional coverage of bare soil declines in North Africa, the Arabian Peninsula, Australia and southern South America, a pattern that is consistent with PRISM's assertion of less extensive arid deserts. A significant increase in the fractional coverage of both broad leaf trees in Africa and South America in the mid Pliocene scenario is not indicative of a major expansion of tropical rainforests. Rather, it represents an expansion of general woodland type habitats. The principal impact of using a DGVM on the GCM predicted climatology for the mid Pliocene is to reduce minimum and maximum temperature extremes, thus reducing the seasonality of temperature over wide regions. The predicted Pliocene expansion in broad leaf trees in Africa is difficult to reconcile with the 'savannah hypothesis' for the evolution of hominid bipedalism. Rather the results lend credence to an alternative hypothesis

which suggests that bipedalism evolved in wooded to forested ecosystems and was, for several million years, linked to arborealism.