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African climate and vegetation at the roots of humankind during the Pliocene

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This study is devoted to the intricate links between climate, vegetation and hominin population distribution during Pliocene, during which peculiar combinations of climate and vegetation conditions have favored the development of hominin species. The aridification of North Africa from the Late Oligocene to the Tortonian has been recently linked to the Tethys shrinkage and associated changes in monsoon patterns. Since the Tortonian the response to orbital forcing has drastically increased accompanied by the onset of the Sahara desert [Zhang et al , Nature 2014] . Therefore, the context of the emergence and development of hominins is marked by a succession of wet and dry periods driven by orbital forcing factors. We focus here on the Pliocene period during which fossils have been discovered West and East of the African Rift (in the Chad basin and Rift Valley respectively). In order to better understand the climate and vegetation relationships during this period allowing populations to live both West and East of the Rift, we simulated the climate of the Pliocene for different orbital configurations with the coupled model IPSL-CM5A (OAGCM). We then use these simulated climates to carry out an equilibrium vegetation model, BIOME4, for 4 different orbital configurations with high eccentricity. We found that australopithecines occur in areas were primary productivity and precipitation are low, suggesting they were adapted to semi-arid environments.