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Northern Hemisphere Glaciation, African Climate and Evolution

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The hypothesis of a connection between the onset (or intensification) of Northern Hemisphere Glaciation (NHG), the stepwise increase in African aridity (and climate variability) and an important mammalian (including hominin) species turnover is a textbook example of the initiation of a scientific idea and its propagation in science. It is, however, also an example of the persistent popularity of a hypothesis despite mounting evidence against it. The first part of our work analyzes the history of the scientific idea by seeking its roots, including coincidental meetings and exchanges between scientists, at project meetings, conferences and workshops. The consequences of this idea are examined and its influence on subsequent scientific investigations both before and after it has been falsified. In the second part of our investigation, we examine why the idea that the high latitudes have a major control on the climate of the low latitudes and thus early human evolution persists. For this purpose, an attempt is made to understand the original interpretation of the data, with special consideration of the composition of the scientific team and their scientific backgrounds and persuasions. Some of the key records in support of the hypothesis of a step-wise transition will be statistically re-analyzed by fitting change-point models to the time series to determine the midpoint and duration of the transition – in case such a transition is found in the data. A critical review of key publications in support of such a connection and a statistical re-analysis of key data sets leads to three conclusions: (1) Northern Hemisphere Glaciation is a gradual process between ~3.5–2.5 Ma, not an abrupt onset, either at ~2.5 Ma, nor at ~2.8 Ma, or any other time in the Late Cenozoic Era, (2) the trend towards greater aridity in Africa during this period was also gradual, not stepwise in the sense of a consistent transition of a duration of ≤ 0.2 Ma, and (3) accordingly, a step-wise change in environmental conditions cannot be used to explain an important mammalian (including hominin) species turnover.