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Drill cores from key paleoanthropological and paleontological localities in East Africa provide opportunities to investigate Plio/Pleistocene paleoenvironmental changes as related to hominin and faunal evolution. Continuous X-Ray Fluorescence scanning data provide means of evaluating records of past environmental conditions. In particular, Si/Ti ratios that indicate diatom and phytolith accumulation and preservation, are proving to be a useful proxy to study past hydroclimate variability. Geochronology derived from 40Ar/39Ar dating of tephras and magnetostratigraphy provide accurate age constrains. Here we present high-resolution hydroclimate reconstructions from the Turkana Basin (~1.3 to ~1.9 Ma) and Baringo Basin (~2.6 to ~3.4 Ma) HSPDP cores. The power spectrum of Turkana Basin Si/Ti record shows frequencies that correspond to Milankovitch cycles, indicating its utility as a high-resolution climate archive of the period of intensified Walker circulation and the earliest fossils of Homo habilis and ergaster appeared. The Baringo Basin record is characterized by increasing amplitude and lower frequency variability upcore, contemporaneous to the onset of Northern Hemispheric glaciation and the first appearance of Paranthropus and genus Homo. High-resolution terrestrial hydroclimate reconstructions from the Pliocene and early Pleistocene are providing insights into the relationship between climate and evolutionary processes as well as continental correspondence to global climate alterations.