Numerical time-scale for hominids of the Turkana Basin, Northern Kenya

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The sedimentary sequence in the Turkana Basin is especially well known for its remarkable wealth and diversity of hominid fossils that have been recovered over the last three decades by workers associated with the National Museums of Kenya. Approximately 800 m of mainly sands, silts and clays were deposited in environments similar to those observed in the Turkana Basin today, located in an active rifting situation. Numerous rhyolitic tuffaceous beds within the sequence have enabled correlations to be made throughout the basin as well as providing material suitable for isotopic age determination by the K-Ar and ^{40}Ar-^{39}Ar methods. Dating of multigrained separates of alkali feldspar from pumice clasts associated with the tuffs, augmented by ^{40}Ar-^{39}Ar dating of single crystals, has provided a remarkably precise numerical time scale covering the interval 4.2 to 0.7 Ma ago, involving more than 20 different horizons, with excellent concordance with the stratigraphy. The many volcanic horizons now precisely dated mean that most hominid specimens can be assigned an age to better than 0.1 Ma, and usually to better than 0.05 Ma, providing an extremely well constrained time scale for hominid evolution as well as for other vertebrate lineages in the sequence. New finds also usually can be given a numerical age to a similar precision, without further geochronological measurements. Various workers have identified tephra known in the Turkana Basin elsewhere in East Africa, enabling extrapolation of the numerical time scale to wider regions.