

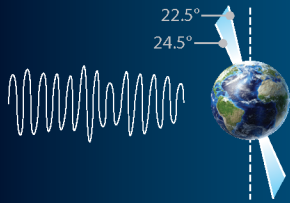
ECCENTRICITY

100–400 thousand years



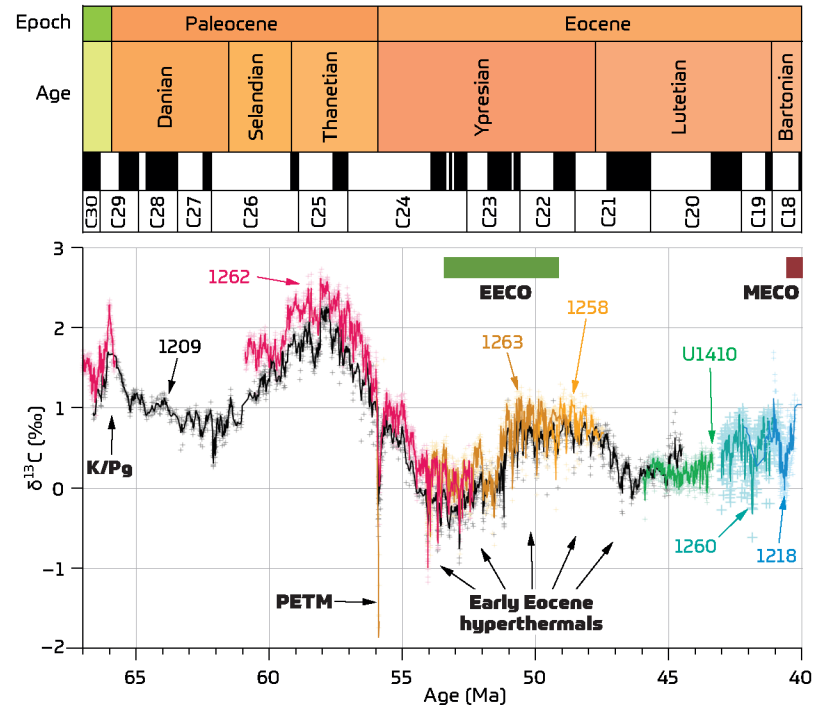
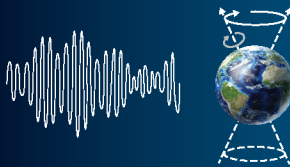
OBLIQUITY

41 thousand years



PRECESSION

19–23 thousand years



Predictable changes in Earth's orbit alter the amount and distribution of solar energy reaching Earth's atmosphere. Scientific ocean drilling has shown that these Milankovitch cycles (left panels), which operate on timescales between 100,000 and 400,000 years (eccentricity), 41,000 years (obliquity), and 19,000 and 23,000 years (precession), have a profound impact on Earth's climate and are captured in the physical, biological, and chemical composition of marine sediments. Marine sediments provide a fundamental tool for developing geochronology and the geologic timescale. The different colors of the $\delta^{13}\text{C}$ records in the right panel correspond to different scientific ocean drilling sites. EECO = Early Eocene Climatic Optimum. K/Pg = Cretaceous-Paleogene boundary. MECO = Middle Eocene Climatic Optimum. PETM = Paleocene-Eocene Thermal Maximum. Source: Modified from Littler et al. (2019), <https://doi.org/10.5670/oceanog.2019.122>