The Kotaphi Hill section (KHS, Cyprus) with its marly-chalky cyclic alternations and numerous organic-rich siltstone intercalations is assigned to calcareous nannofossil Zones NN2-NN7, indicating a late Aquitanian-early Tortonian time span. The increased abundance of *Helicosphaera* spp., *Discoaster* spp., *Sphenolithus* spp., and *Rhabdosphaera* spp. within the laminated siltstone layers at the upper KHS (c. 15.69 to younger than ~11.6 Ma) are associated with sapropel deposition that was triggered by both increased primary productivity and water column stratification under warm oligotrophic conditions. The lower δ¹⁸O *O. universa* values that were observed in the same layers are interpreted as due to high freshwater input from the Nile River into the basin, combined with increased sea surface temperatures. The sapropel layers of the KHS record are considered to be the oldest (early Laghian) in the eastern Mediterranean, implying that sapropel deposition began earlier in the eastern than in the western part of the basin. The variations in the isotopic signals, along with an increase in cold nannofossil indicators at four distinct intervals, are probably linked to a series of cooling episodes that are globally recognized as Miocene oxygen isotope events Mi3a, Mi3b, Mi4, and Mi5, which reflect changes in paleoenvironmental conditions. An observed decrease in the values of δ¹⁸O *O. universa* and the concomitant increment of the fresh-water indicator *Helicosphaera* spp., along with the gradual increasing trend of warm calcareous nannofossil assemblages, imply a pronounced change towards warmer and more humid conditions after ~12.4 Ma.