**Fig. S1**. Field photograph of the exposed reddish mudstone, siltstone, and gypsum beds at the newly sampled Ria Zhong (RZ) section. The section is located in the Nangqian Basin, Yushu area, Tibet (N32° 12’ 10”, E 96° 27’ 19.42”, altitude 3681 m), and represents the uppermost Gouriwa Member of the Eg3 unit in the Cenozoic Gongjue Formation. The lithostratigraphy and geochemistry of the RZ section are further described in Yuan et al. (in prep.).

**Fig. S2**. Pollen diagram of the Ria Zhong (RZ) section in the Nangqian Basin, Yushu area, Tibet with all palynological taxa grouped into seven different Plant Functional Types (PFTs) that represent various ecological groups. The diagram was plotted using TGView© and Tilia© 2.0 software (Grimm, 1991) and comprised > 200 identified and counted grains from each of the 21 productive samples. Palynomorph percentages of the total pollen sum are plotted on the x-axis, and zones and subzones are based on a CONISS ordination; see Methods section for further details. Where only the genus name is listed for a particular count, this implies the (possible) presence of multiple morphospecies that were unable to be separated on their morphology alone, and are therefore represented under a single genus.

**Fig. S3.** Pollen diagram of the Ria Zhong (RZ) section in the Nangqian Basin, Yushu area, Tibet, plotted in exactly the same way as SI Fig. 1, but excluding the “Other / Unknown / Unresolved NLR” group. A new CONISS ordination excluding this group produces similar stratigraphic zones to the original pollen diagram, demonstrating the robustness of these zones for illustrating climatic changes recorded in the section through time.