Quantitative paleotemperature reconstruction covering the Early-Middle Pleistocene boundary (MIS18-20) based on the pollen record obtained from the Chiba composite section, SE Japan

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Concerning the election of the ‘Chibanian’ defining the Early-Middle Pleistocene boundary, pollen plays an important role for selecting for the Global Boundary Stratotype Section and Point (GSSP) at 770 ka. This results from the high productivity and buoyancy of pollen grains which reflect the terrestrial climate but are easily transported to deep oceans to coincide with marine proxies including foraminiferae. The fossil pollen profile obtained from the Chiba composite section is qualitatively consistent with the benthic $d^{18}O$, particularly in the pollen ratio between broadleaved trees (*Quercus Lepidobalanus*, *Fagus*, etc) and coniferous trees (*Tsuga*, *Picea*, etc), providing a proxy for paleotemperature in the terrestrial regions. Here we present the results of quantitative paleotemperature reconstruction for the transition from the Early to the Middle Pleistocene (MIS18-20) using the modern analogue technique (MAT) based on the comparison between the fossil pollen and modern surface pollen datasets. Although the preliminary MAT result is far from sufficient because of the ambiguous MIS19c signals, an attempt to exclude *Pinus* from both fossil and modern pollen permits a consistency with the marine $d^{18}O$. The reconstructed temperature of MIS19c attains an interstadial level (~10。C in annual mean), being similar to the recent interstadial episodes of MIS5a and MIS5c. In general, *Pinus* pollen dominates deep sea sediments both in glacial and interglacial periods, but *Pinus Haploxylon* type grows in the boreal region of northeast Japan. These features of *Pinus* sp. may reduce the reconstructed paleotemperature based on pollen obtained from deep sea sediments. We note that the paleotemperature anomaly, seen in the horizon of geomagnetic reversal, is not sufficient at least in the Early-Middle Pleistocene boundary. Although the quantified paleotemperature variations show an apparent fluctuation in 2-3。C near the Byk-E tephra, there are no significant changes in the pollen composition (%) at the same horizon. An extraordinary high data resolution around 770 ka suggests that the temperature fluctuation seen in the horizon of the Byk-E tephra is most probably an artefact due to the heterogeneous data resolution. The quantitative paleotemperature reconstruction, performed based on pollen in the Chiba composite section, is skeptical to the hypothesis that the geomagnetic reversal at 770 ka should cause a substantial cooling or warming in the global climate.

Keywords: Chiba composite section, pollen, modern analogue technique, MIS19, Early-Middle Pleistocene boundary, Chibanian

