[JJ] Evening Poster | M (Multidisciplinary and Interdisciplinary) | M-IS Intersection

[M-IS10]Paleoclimatology and paleoceanography

convener:Yusuke Okazaki(Department of Earth and Planetary Sciences, Graduate School of Science, Kyushu University), Atsuhiko Isobe(Research Institute for Applied Mechanics, Kyushu University), Akihisa Kitamura(静岡大学理学部地球科学教室, 共同), Masaki Sano(Faculty of Human Sciences, Waseda University)
Wed. May 23, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)
Past environmental changes and events at multi-decadal to tectonic timescale toward an understanding of Earth climate system by an integration of terrestrial and marine proxy studies and numerical modeling will be discussed. We welcome a variety of paleo-environmental studies from a wide range of background. In particular, a series of presentations relating to the Anthropocene will be planned. This is a merged session of A-OS31 "Linkage between oceanography and paleoceanography in marginal, shelf and coastal oceans" and M-IS23 "Paleoclimatology and paleoceanography" sessions at JPGU 2017. We hope that this session will provide an opportunity to promote communication between participants from multidisciplinary field.

[MIS10-P07]Increase in precipitation around the Osaka Bay in the middle of Middle Pleistocene

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The East Asian monsoon has developed in the Quaternary climate characterized by glacial-interglacial cycles. The long-term magnetic susceptibility record from the Chinese Loess Plateau (CLP) shows an intensive summer precipitation increase during interglacial since MIS 13 in the Middle Pleistocene (Hao et al., 2012). In this study, we carried out pollen analysis of a core from Osaka Bay to examine whether there was a climate change corresponding to the summer precipitation increase. We analyzed marine layers correlated to interglacials MIS 15 to 13 in the depth range from 220–340 m of a 1700-m long sediment core. We discuss detailed paleoclimate changes in and around Osaka Bay with the new pollen data, combined with data from previous studies (Nakano, 2016; Kiataba et al., 2013). We adopt an astronomical age model (Yoshizumi, 2017) constructed by tuning a sea-level proxy curve based on sulfur content and diatom assemblage data to the ice volume curve calculated with insolation at 65 deg. N for June 21 (Lasker et al., 2004) and ice volume model (Imbrie and Imbrie, 1980).

In the early stage of MIS 15, the cold climate shown by dominance of *Pinaceae* (more than 40 %) in MIS 16 was replaced by the cool climate characterized by temperate deciduous forest dominated by *Fagus*, a cool proxy (about 20-50 %). The climate and vegetation of the early MIS 15 were replaced by the warm climate and warm mixed forest dominated by *Quercus* (*Cyclobalanopsis*), a warm proxy (more than 30 %). This is the thermal maximum of MIS 15. At the same time, *Cryptmeria* and *Scidopitys*, a precipitation proxy, increased to 30 %, indicating that precipitation increased with warming. In the middle stage of MIS 15, the climate cooled down and temperate deciduous forest was again dominated by *Fagus* (about 20-50 %). From the late stage of MIS 15 to the early stage of MIS 14, *Quercus* (*Cyclobalanopsis*) increased temporarily to 20 %, followed by an increase of *Cryptmeria* and *Scidopitys* to 30 %. This indicates that the climate warmed temporarily, accompanied by precipitation increase. Throughout MIS 14, the proportion of *Cryptmeria* and *Scidopitys* was much higher than MIS 15 (the average proportions of *Cryptmeria* and *Scidopitys* are 22.8 % in MIS 14, and 7.9 % in MIS 15). This indicates that the precipitation in MIS 14 is much higher than in MIS 15. Throughout MIS 13, the temperate deciduous forest dominated by *Fagus* represents cool climate. The proportion of *Cryptmeria* and *Scidopitys* is higher than MIS 15 (16.5 % in average in MIS 13). This indicates the precipitation in MIS 13 was also higher than in MIS 15. In the early stage of MIS 12, this climate was replaced by the cold climate shown by the dominance of *Pinaceae* (about 20 %), such as *Picea*.

Precipitation changes were examined using a precipitation index, defined as sum of wet species *Cryptmeria*, and *Scidopitys* and *Taxaceae-Cupressaceae-Cephalotaxaceae*, and the quantitative estimate of precipitation based on the modern analog technique (Nakagawa et al., 2002). The estimated precipitation in each interglacial shows a large increase after MIS 13. The precipitation even in the MIS 14 glacial shows a large value (average of precipitation indices are 16.4 % in MIS 11, 22.7 % in MIS 13, 31.2 % in MIS 14, 12.7 % in MIS 15, 13.6 % in MIS 17, 11.0 % in MIS 19, and 11.3 % in MIS 21). Even the quantitative summer precipitation (total precipitation from April to September) shows large increases after MIS 13. Therefore, the annual and summer precipitations in each interglacial period largely increase after MIS 13, and the precipitation increase starts from MIS 14. This result is consistent with the summer precipitation change indicated by magnetic susceptibility in the Chinese Loess Plateau.

Thus, the climate in East Asia including the CLP and Osaka Bay became wet since the middle of Middle Pleistocene. This indicates that the East Asian climate system may have changed at about 500,000 years ago.