Centennial-scale bioproductivity changes during the earliest Middle-Pleistocene

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Elucidation of the mechanism of global warming in the geological time is important, which may lead to understanding of the present global warming. In this study, we conducted paleoenvironmental analyses of sediments to reveal the rapid climate changes across the warmest interval in the Marine Isotope Stage (MIS) 19 interglacial, which is known as an orbital analogue of the Holocene. In particular, we aim at elucidating the mechanism of the repeated bioproductivity proxy (Ca/Ti ratio) changes dominated by bicentennial cycles for a span from about 777 to 775 ka, which was observed in core TB2 from the Chiba Section. Focused on the time span, we conducted pollen analyses using the Osaka Bay 1,700 m core with abundant pollen fossils, and measurements of ^{10}Be using core TB2. Both cores are stratigraphically correlated with the centennial to millennial scale resolution. The result of pollen analyses revealed that the proportion of evergreen *Quercus* (*Cyclobalanopsis*), a warm proxy, began at about 777 ka to increase with bicentennial oscillations, followed by a sudden drop within 1 kyr. These changes are quite consistent with those in the bioproductivity in core TB2. Therefore, the bioproductivity changed affected by the climate. The ^{10}Be content, an index of the galactic cosmic ray flux, generally showed similar changes with the bioproductivity except some intervals, one of which showed a large disagreement between the ^{10}Be flux and the bioproductivity, coincided with the iceberg discharge event in the North Atlantic. These results suggest that the centennial-scale bioproductivity changes observed in core TB2 probably reflect climate variations, and may be affected by solar activity. Solar activity can affect climate through galactic cosmic rays that control the low cloud (Svensmark effect), in addition to the direct influence through solar radiation.

