MIS34-11 Room:301A Time:May 28 12:30-12:45

Reconstruction of changes in marine primary productions by biomarker analysis of sediments from the Gulf of Cadiz during

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The Gulf of Cadiz (GoC) has been regarded as an important area for investigating water exchange through the strait of Gibraltar. Particularly, change of Mediterranean Outflow Water (MOW) circulation was evaluated by contourite depositional pattern in the GoC (e.g. Hernández-Molina et al., 2014). The Azores Front (AF), which is known as northeastern margin of the subtropical gyre and regional upwelling area, is located at around the Canary Islands. Although the AF is not penetrated into the GoC at the present, microfossil records suggested penetration of the AF and enhanced productivity during the last glacial period (e.g. Rogerson, 2004). Thus, the GoC is sensitive to change of Atlantic ocean circulation, and can be key region of mid-latitudinal paleoclimatic and paleoceanographic circulation. However, sediment core samples prior to the Pleistocene had not been recovered until IODP Exp. 339 (2011 Nov. to 2012 Jan.), and paleoceanographic records have been hardly reported. Hence, we performed biomarker analysis on the sediment samples recovered by IODP Exp. 339 to reconstruct variations in marine primary production and paleoceanographic change around the GoC from late Miocene to late Pliocene.

We detect C_{27} to C_{29} sterols (eukaryotic algae biomarker), long-chain alkenones (haptophyte biomarker), dinosterol (dinoflagellate biomarker), and long-chain alkyl diols (eustigamatophyte and diatom biomarkers) from all studied samples. The C_{28} and C_{30} 1,14-diols are known as *Proboscia* diatoms biomarker, while esutigmatophyte are assumed as the main origin of C_{28} and C_{30} 1,13-diols and C_{30} 1,15-diol in marine sediment. Recently, upwelling indices based on diol composition such as Diol Index 1 and 2 (DI1 and DI2) were proposed (e.g. Rampen et al., 2014). Concentrations of long-chain alkenones and C_{28} sterol to total organic carbon (TOC) increased at ca. 4.2 Ma. The C_{28} sterols were mainly composed of brassicasterol, which is the major sterol alkenone-producing haptophyte. Thus, these results suggest increase of haptophyte production. While, consecutive contourite sediment was found after 4.5 – 4.2 Ma. Hence, we cannot eliminate possibility that the increases of these biomarker concentrations are attributed to efficient preservation of sedimentary organic matter due to development of contourite depositional system. On the other hand, the 1,14-diol concentrations as well as DI1 and DI2 values increased during 3.4 – 3.2 Ma, which indicates high contributions of *Proboscia* diatom to marine production. Benthic foraminiferal δ^{18}O records indicate that global climate was thought to be colder during 3.4 – 3.2 Ma even in the warm Pliocene epoch (Lisiecki and Raymo, 2005). Particularly, local maximum of foraminiferal δ^{18}O values was observed at cold period of the MIS M2 (ca. 3.35 – 3.24 Ma). Thus, increases of diatom productions in the GoC might be explained by ocean and wind circulation changes caused by global cooling. Furthermore, sea surface temperature (SST) estimated in the IODP U1313 site (mid-latitudinal Atlantic Ocean) indicated that the North Atlantic Current (NAC) was weakened and glacial-like ocean circulation was established from 3.4 Ma to MIS M2 (Naafs et al., 2010). From these results, it is concluded that diatom productions increased as results of penetration of the AF into the GoC permitted by the glacial-like ocean circulation and enhanced vertical mixing during 3.4 – 3.2 Ma.

Keywords: North Atlantic Ocean, Pliocene, MIS M2, Biomarker, Diatom, Mediterranean Outflow Water