完新世における別府湾の半遠洋性泥およびイベント砂の鉱物組成変動
Variability of hemipelagic and event depositions in the Beppu Bay during Holocene

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The Beppu Bay located in the northeast Kyushu Island, the southwestern Japan receives detrital materials mainly from two drainage systems, the Ohno River and the Oita River. The Ohno River has the head water region at the Mt. Kuju and Mt. Aso, flows eastward combining some tributaries from the south, and then flows northward to the Beppu Bay. Surface geology of the drainage area is roughly divided into two as intermediate to felsic volcanic area covered with andosol in the northeast and Paleozoic to Mesozoic sedimentary rocks covered with brown forest soil in the south. The drainage basin of the Oita River is located in the north of the Ohno River drainage, which is characterized by mafic volcanic rocks in the headwater region. Since the provenance of the Beppu Bay sediments has such geologically contrasted drainage systems, the temporal changes in the provenance for the sediment can be utilize to seek for the interrelationship among the western Pacific paleoceanography, East Asian monsoon, ecological response (fishery, vegetation, land use), and the erosion and sediment supply from hinterland basin. For this purpose, we examined mineral composition of BP09-3 core collected from the center of Beppu Bay as well as sediment from surface soils and river beds using X-ray powder diffraction.

As a result, quartz / feldspars ratio of the Beppu Bay sediment was within the range of surface soils in the drainage of Ohno River and Oita River. Detailed examination of peak shape of feldspar in X-ray diffractogram suggests grain size dependency of feldspar composition. Feldspars in finer materials showed more “mafic” composition suggesting that fine materials are dominantly supplied from Oita River drainage and / or mafic rock is more easily weathered and forms fine materials. We also applied statistical unmixing of mineral assemblage using PARAFAC algorithm on XRD profiles. Statistically distinguished subcomponents could be attributed to biogenic subcomponents, detrital subcomponents from the Ohno and Oita Rivers in hemipelagic mud as well as two detrital subcomponents in event sands with different origin.

Temporal variation of these statistical subcomponents in hemipelagic mud suggests that vegetation and / or land use change in the drainage area affected the relative importance of suspension loads from the Ohno River associated with the increase of detrital flux for the last 3,000 yrs. Composition of event sands also shows a consistent compositional change characterized by the relative increase of contribution from sandy material of the Ohno River bed. Increase in surface erosion in the Ohno River drainage may have been responsible for increases of fine and coarse materials supply and development of the delta at the river mouth.

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