actual OGR (Fig. 2). Consequently, the extract would be the major reason for the inhibition of the photosynthesis II reaction. In order to quantitatively evaluate the photosynthesis inhibition effect, the ratio of the OGRs before and after the extract addition was estimated as in terms of the residual activity ratio of the photosynthesis light reaction (RARP). Based on the data between RARP and CTLI, the RARP decreased clearly as the increase in the CTLI. A half-inhibition concentration (IC_{50}) is defined to be the critical CTLI value corresponding to the 50 % value of the RARP. Some IC_{50} values are given for *Prunus* as 1.9×10^{-9} mg/cell、 for *Acer buergerianum* as 1.4×10^{-9} mg/cell、 and for *Quercus acutissima* as 0.8×10^{-9} mg/cell in order, implying that the IC_{50} values would be depending on the sort of the deciduous trees or possibly on the extent of photosynthesis light reaction of the leaves of the trees.

The application of foraminifera and ostracod for long-term ecosystem monitoring in enclosed coastal sea: A case study of Osaka Bay, Seto Inland Sea, Japan

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Foraminifera and Ostracoda are shelled meiobenthos. They are sensitive to anthropogenic activities, and their remains are abundantly preserved as 'fossil' in bay sediments after their death. Thus, they can be used to trace environmental/ecosystem changes over periods of decades and centuries using sediment cores. In this study, we investigated spatial and temporal distributions of foraminiferal and ostracod assemblages in Osaka Bay, one of the most polluted marine areas in the world.
Benthic foraminiferal and ostracod assemblages from surface sediment in Osaka Bay, collected in 2004, were analyzed to characterize the distribution of the modern foraminiferal and ostracod assemblages. The results suggested that low diversity community, typically characterized by exclusive dominance of three eutrophication-tolerant foraminiferal species (Ammonia beccarii, Eggerella advena, and Trochammina hadai), is found in the inner part of the bay, where eutrophication is serious.
Four sediment cores, which obtained along a transect from mouth of the Yodo River (a source of nutrient input) to middle part of Osaka Bay, were examined to trace the development process of modern low diversity community. The records of foraminiferal and ostracod assemblages in the cores clearly documented the development of low diversity community after the urbanization in the early part of the 20th century. Many foraminiferal and ostracod species that are unable to tolerate low-oxygen conditions decreased and three eutrophication-tolerant foraminiferal species increased after the early part of the 20th century, when Japan's industrial revolution started. As a consequence, low diversity community developed rapidly in the inner part of the bay since that time. Low diversity community most progressed as a result of severe hypoxia and food increase by eutrophication during the high economic growth period (~1970's). A sewage treatment program for the Seto Inland Sea was enacted in 1970's in order to reduce the organic pollutant loads. Coincident with the commencing period of the program, the density of eutrophication-tolerant foraminiferal species decreased, but no major changes in the foraminiferal and ostracod assemblages occurred. This study provides new information regarding the use of foraminifera and ostracod as paleoecological indicators of anthropogenic environmental/ecosystem changes.

Annual variations of Oxygen Deficient Water Mass (ODW) in Jinhae Bay

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As a basic study to improve oxygen deficient water mass (ODW), this study analyzed the spatial and temporal variation of the water quality and investigated the characteristics of ODW in Jinhae bay, from 1989 to 2006. By observing the annual variation of water qualities, the severe polluted area was found, and the effects of a special management sea area in Masan bay and the construction of Pusan Newport on the water

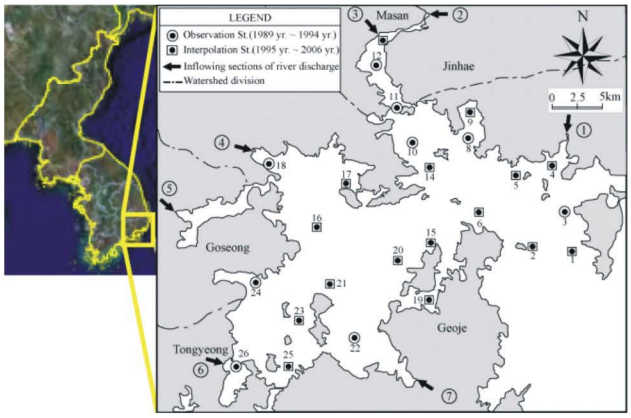

Fig.1 The map shows inflowing point of river discharges and divided area for calculated of pollutant load and observation stations of water quality in this study

qualities was investigated. Jinhae bay is a representative semi-enclosed bay which is located on the south-eastern coastal sea of Korea, and be surrounded by Masan, Jinhae, Changwon, Geoje, Tongyeong, and Goseong. The latitudinal and longitudinal length is about 25 km and 35 km, respectively. The average water depth in Jinhae bay is about 10 m and freshwaters from seven rivers inflowing into the sea area (The Korea ministry of Environment 1991). In this study, the analysis of annual variation for oxygen deficient water mass (ODW) in Jinhae bay was carried out. For the purpose, first, 26 stations where the construction of Pusan Newport is being processed were selected to investigate the characteristics of water quality in Jinhae bay. Second, the cluster analysis was conducted using the water quality data of the 26 Stations from 1989 to 2006, which were collected from the National Fisheries Research and Development Institute, KOREA (NFRDI). Third, Jinhae bay was divided into regions having similar water quality based on the collected data. Forth, by observing the annual variation of water qualities, the severe polluted area was found, and the effects of a special management sea area in Masan bay and the construction of Pusan Newport on the water qualities was investigated. Finally, we estimated oxygen deficient water mass (ODW) area, ratio and volume in Jinhae bay. **Fig. 1** The map shows inflowing point of river discharges and divided area for calculated of pollutant load and observation stations of water quality in this study. Finally, we estimated ODW_{area}, ODW_R and $ODW_{vol.}$ In Jinhae bay. From the study, it is shown that overall water quality at 2000s has been improved by investigating the variations of dissolved oxygen, chemical oxygen demand, etc. From cluster analysis, Jinhae bay was classified into four regions. The four regions were defined as Southern (I), Central (II), Northern (III), and Eastern (IV). ODW was occurred in all areas of Region I in 1993 and 2002~2004. The value of 1.92 km^3 is the highest value of Region I in 1993 and 2002~2004. ODW were not occurred in Region IV because seawater was well exchanged in the eastern part of Jinhae bay. On the other hand, ODW was generated every year in Region I, this means the southern part is the most polluted area in Jinhae bay. ODW_R was decreased in Region III; hence, it is shown that water quality of Region III has been improved since operating wastewater treatment plant in 1994.

Continuous surface sea water surveillance on Poly Aromatic Hydrocarbons (PAHs) from the Tokyo Bay, through the East China Sea, then to the South China Sea

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Purpose: Although the toxicity of most PAHs is much weaker than that of dioxins, the total toxicity of PAHs on earth is bigger, because a much larger amount of PAHs is produced than dioxins, and their harmful influence could be more serious. Many reports on the distribution of PAHs in large cities and in coastal sea areas are available; however, only a few exist on the high seas. The aim of this study is to elucidate the situation of pollution by PAHs in the East China and South China Seas.
Materials and methods: Surface water, from 200 km south of the Shikoku Island to the Straits of Malacca (8 samples, 765— 1079 L/day), was collected continuously on a long voyage (Nov. 21— 29, 2005) of the *Umitaka-maru*, a research and training ship of the university. PAHs were adsorbed by Blue Rayon, eluted with methanol, and then analyzed by HPLC (Wakosil-PAHs). Sample #2 and part of #3 were collected along a line parallel to the southeastern edge of the East China Sea, and samples #4-8 were collected along a diagonal line in the South China Sea in the direction of northeast to southwest. Water depth