Properties of humic acid fraction of northern Ariake Sea estuarine and riverine surface sediment

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Estuarine field has high bioproductivity, and is important for many living organism to spawn and spend a larval stage of life. Riverine and terrigenous organic material are precipitated and accumulated at the estuarine field. Further, coastal marine organic materials and the organic molecules produced by the estuarine living organism are added to form higher molecular organic material such as humic-like substances. However, the knowledge for the structural feature of the estuarine humic substances is not enough because of high complexity of the organic molecule and the relation of sedimentation rate and higher molecular organic material formation at the field.

We have investigated to the structural feature of humic acid fraction of the sedimental organic material at the surface sediment of northern part of Ariake Sea estuarine field. Now, it is summarized the fundamental characteristics of the structural feature of humic acid Chicago River downstream and corresponding estuarine field. A certain relationships were observed between the several fundamental analytical data of organic material and environmental factor about the estimation of the contribution of terrigenous organics, formation of higher organic material from the terrigenous organics, and several environmental factors.

Samples were obtained at the surface (~ 5 cm) sediment of estuarine field (3 stations) and downstream field (2 stations) at and around the Chikugo River at May, August, and November 2012. The sediments were dried and humic acid fraction was extracted and fractionated along with the method for the terrestrial humic acid extraction protocol. Elemental analysis and molecular ratio estimation (O/C, H/C, C/N) from the analytical data, UV absorption spectra and the ratio of the two characteristic UV- visible absorbance (270 and 407 nm, (A_2/A_4)), carbon and nitrogen isotope ratio was measured. And the relation of the data and the several geographical and environmental factors such as distance from the river mouse, the formation of high-molecular organic material such as humic acid with the counterclockwise ocean current were investigated.

The C/N ratio and carbon isotope ratio is well-known indicator of the contribution of terrigenous organic material at temperate zone. Our data also shows the similar trend for the distance from the river mouse and changes of the two data and good correlation were observed. Further, the ratio of the UV-visible absorbance (A_2/A_4 ratio) and C/N ratio, carbon isotope ratio show a similar trend about the influence of terrigenous compound and good correlation to the change of values of the three. It indicates the A2/A4 ratio is alternative for the estimation of contribution of terrigenous organics at a certain river and river-mouse estuarine system.

In July 14th 2012, northern Kyushu field hit by a massive flood and heavy damages around the Chikugo River basin were occurred. At the samples from August 2012, increasing of terrestrial organic were observed for several data. The surface sediment of the system may be influenced by such an accidental event. The results also suggest that organic portion of the organic material deposited in terrestrial estuaries are those that have been caused by higher huminification.

Pyrolysis gas chromatography of the degradation products will be conducted to the precise structural analysis of their extracted humic acid. Also, we will continue the collection of the samples and extraction in February 2013, and seasonal changes observation will be reported at the presentation.

Keywords: humic acid, estuarine, Ariake Sea, carbon isotope, UV absorption