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UV-VIS absorbance, fluorescence and concentration of dissolved organic carbon (DOC) of sea-surface microlayer samples collected at Okinawa, Japan

Yoshihiko Toyama (1), Yusei Miyagi (2), and Takemitsu Arakaki (2)

(1) Graduate School of Engineering and Science, University of the Ryukyus, Okinawa, Japan (k108406@eve.u-ryukyu.ac.jp), (2) Department of Chemistry, Biology and Marine Science, Faculty of Science, University of the Ryukyus, Okinawa, Japan (arakakit@sci.u-ryukyu.ac.jp)

The sea-surface microlayer (SML) covers the ocean surface, and SML has been operationally defined as roughly the top 1 to 1000 micrometer of the ocean surface. SML controls transfer of chemical substances between the ocean and atmosphere, influencing the chemical compositions of atmospheric aerosols that occur in breaking waves. Since solar radiation reaching the ocean surface is relatively strong, compared to the underlying bulk seawater, photochemical reactions on the ocean surface could induce significant chemical changes which in turn change chemical compositions of atmospheric aerosols. This study tries to elucidate the photochemical properties of SML by measuring the UV-VIS absorbance, fluorescence and concentration of dissolved organic carbon (DOC). We collected coastal SML samples around Okinawa Island, Japan. Okinawa Island is located in semi-tropical region and parts of the island coast are covered with coral reefs. We used a glass plate method to collect SML samples, and at the same location and time bulk seawater samples were collected about 10-cm below the surface with high density polyethylene bottles. Results showed that enrichment factors (EF), defined as ratio between SML and bulk seawater, of absorbance (at 300 nm) and DOC were 1.5 to 2.4 and 1.5 to 1.8, respectively. Based on the fluorescence measurements, it is suggested that humic acid-like compounds and aromatic amines were concentrated in the SML, compared to the bulk seawater.