



The gelatinous nature of the sea-surface microlayer

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The sea-surface microlayer (SML) represents the interfacial layer between the ocean and atmosphere and covers the ocean's surface extensively. Gel-like transparent exopolymer particles (TEP) in the SML were studied in oceanic and coastal SML and subsurface water samples. The TEP enrichment factor, determined as the ratio of the TEP concentration in the SML to that in the corresponding subsurface water are typically in a range of 2 to 5. The enrichment of gel-like particles include three mechanisms: (i) ascend of positive buoyant gels, (ii) adsorption and aggregation of dissolved pre-cursor material to gels on ascending bubbles, and (iii) aggregation processes in the SML through dilation/compression of the water surface. For example, the aggregation rates in the SML were generally enhanced over those in the bulk surface waters by factors of 2 to 30. Based on our studies investigating the gelatinous nature of the SML, the new emerging consensus is that the SML is a biofilm-like and microbial-rich habitat. The hypothesis of a biofilm-like coverage of the ocean's surface has wide implications on biogeochemical cycling, air-sea gas exchange and the production of organic-rich aerosols affecting formation of cloud condensation nuclei.