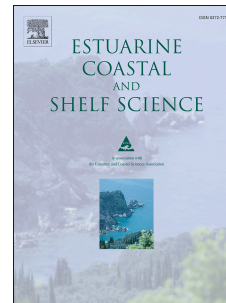


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A laboratory study on the generation of estuarine negatively, neutrally and positively buoyant bio-mediated flocs

Lefebvre Jean-Pierre^{a,b}, Mari Xavier^{c,d,e}, Chu Thuoc Vãn^e

^a *Laboratoire d'Etudes en Géophysique et Océanographie Spatiales (LEGOS), IRD, CNES, CNRS, Université Paul Sabatier Toulouse III, 14 Avenue Edouard Belin, 31401 Toulouse, France*

^b *Center for Environmental fluid dynamics (CEFD), Vietnam National University Hanoi, 334 Nguyen Trai str. , Thanh Xuan dis. , Ha Noi, Vietnam*

^c *Aix Marseille Université, Université de Toulon, CNRS, IRD, Mediterranean Institute of Oceanography (MIO), 13288, Marseille, France*

^d *Laboratoire d'Océanographie de Villefranche (LOV), CNRS, UPMC, Sorbonne Universités, Université Paris 06, , 181 Chemin du Lazaret, 06230 Villefranche-sur-Mer, France*

^e *Institute of Marine Environment and Resources (IMER), Vietnam Academy of Science and Technology (VAST), 246 Da Nang Street, Haiphong, Viet Nam*

Corresponding author: Jean-Pierre Lefebvre (jean-pierre.lefebvre@ird.fr)

Laboratoire d'Etudes en Géophysique et Océanographie Spatiales (LEGOS), IRD, CNES, CNRS, Université Paul Sabatier Toulouse III, 14 Avenue Edouard Belin, 31401 Toulouse, France

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ABSTRACT

In estuaries and coastal areas, the mixing of inorganic and organic sediments results in the production of bio-mediated flocs. Their densities depend on the ratio between the light organic fraction and the mineral ballast. Transparent exopolymer particles (TEP) are ubiquitous in estuarine and marine environments. Because of their positive buoyancy, they form biofilms at the water surface. In order to investigate how the bio-mediated flocculation involving TEP impacts the sedimentation processes in the near the surface layer of estuaries, we determined at the laboratory, the ascending/descending velocity of the mineral particles and their flocs size distributions (FSDs) of sediments sampled from the Cam River estuary (Vietnam), for concentrations ranging from 5 to 50 mg L⁻¹, for two levels of turbulence representative to the slack water and mid ebb conditions of this estuary and for various TEP concentration and stickiness. The obtained results showed that the sediment velocity varied over two orders of magnitude depending of the conditions of the experiment. Ascending velocities were mostly measured for mid ebb conditions. The generated positively buoyant bio-mediated flocs were formed by microflocs coated by a TEP matrix. For the slack water conditions, FSDs were highly dependent of the TEP concentration and stickiness. Positively buoyant bio-mediated flocs were generated for specific concentrations and stickiness of TEP only. The corresponding FSDs were consistent with positively buoyant macroflocs, with TEP located mostly inside the flocs.

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