



# Simultaneous 2D Imaging of Dissolved Iron and Reactive Phosphorus in Sediment Porewaters by Thin-Film and Hyperspectral Methods

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Titre Simultaneous 2D Imaging of Dissolved Iron and Reactive Phosphorus in Sediment Porewaters by Thin-Film and Hyperspectral Methods

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Auteur Cesbron, Florian [1], Metzger, Édouard [2], Launeau, Patrick [3], Deflandre, Bruno [4], Delgard, Marie-Lise [5], Thibault de Chanvalon, Aubin [6], Geslin, Emmanuelle [7], Anschutz, Pierre [8], Jézéquel, Didier [9]

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Résumé en anglais This study presents a new approach combining diffusive equilibrium in thin-film (DET) and spectrophotometric methods to determine the spatial variability of dissolved iron and dissolved reactive phosphorus (DRP) with a single gel probe. Its originality is (1) to postpone up to three months the colorimetric reaction of DET by freezing and (2) to measure simultaneously dissolved iron and DRP by hyperspectral imaging at a submillimeter resolution. After a few minutes at room temperature, the thawed gel is sandwiched between two monospecific reagent DET gels, leading to magenta and blue coloration for iron and phosphate, respectively. Spatial distribution of the resulting colors is obtained using a hyperspectral camera. Reflectance spectra analysis enables deconvolution of specific colorations by the unmixing method applied to the logarithmic reflectance, leading to an accurate quantification of iron and DRP. This method was applied in the Arcachon lagoon (France) on muddy sediments colonized by eelgrass (*Zostera noltei*) meadows. The 2D gel probes highlighted microstructures in the spatial distribution of dissolved iron and phosphorus, which are most likely associated with the occurrence of benthic fauna burrows and seagrass roots.

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