



Simultaneous Nitrite/Nitrate Imagery at Millimeter Scale through the Water-Sediment Interface

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Titre Simultaneous Nitrite/Nitrate Imagery at Millimeter Scale through the Water-Sediment Interface

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The present study describes new procedures to obtain at millimeter resolution the spatial distribution of nitrite and nitrate in porewaters, combining diffusive equilibrium in thin films (DET), colorimetry and hyperspectral imagery. Nitrite distribution can be easily achieved by adapting the well-known colorimetric method from Griess (1879) and using a common flatbed scanner with a limit of detection about 1.7 $\mu\text{mol L}^{-1}$. Nitrate distribution can be obtained after reduction into nitrite by a vanadium chloride reagent. However, the concentration of vanadium chloride used in this protocol brings coloration with a wide spectral signature that creates interference only deconvolvable by imaging treatment from an entire visible spectrum for each pixel (spectral analysis). This can be achieved by hyperspectral imaging. The protocol retained in the present study allows obtaining a nitrite/nitrate image with micromolar limit of detection. The methods were applied in sediments from the Loire Estuary after different treatments and allowed to precisely describe two-dimensional millimeter features. The present technique adds to the combination of gel-colorimetry and hyperspectral imagery a very promising new application of wide interest for environmental issues in the context of early diagenesis and benthic fluxes.

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