



## Millimeter-scale alkalinity measurement in marine sediment using DET probes and colorimetric determination

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Constrained DET (Diffusive Equilibration in Thin films) probes equipped with 75 sampling layers of agarose gel (DGT Research©) were used to sample bottom and pore waters in marine sediment with a 2 mm vertical resolution. After retrieval, each piece of hydrogel, corresponding to 25  $\mu\text{L}$ , was introduced into 1 mL of colorimetric reagent (CR) solution consisting of formic acid and bromophenol blue. After the elution/reaction time, absorbance of the latter mixture was read at 590 nm and compared to a calibration curve obtained with the same protocol applied to mini DET probes soaked in sodium hydrogen carbonate standard solutions. This method allows rapid alkalinity determinations for the small volumes of anoxic pore water entrapped into the gel. The method was assessed on organic-rich coastal marine sediments from Thau lagoon (France). Alkalinity values in the overlying waters were in agreement with data obtained by classical sampling techniques. Pore water data showed a progressive increase of alkalinity in the sediment from 2 to 10 mmol kg<sup>-1</sup>, corresponding to anaerobic respiration in organic-rich sediments. Moreover, replicates of high-resolution DET profiles showed important lateral heterogeneity at a decimeter scale. This underlines the importance of high-resolution spatial methods for alkalinity profiling in coastal marine systems.

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