

Online membrane inlet mass spectrometry (Inspectr200-200) for quantification of the methane concentration field around Pockmarks

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Worldwide, the release of methane from sediments of lakes, coastal regions as well as ocean margins is observed. The gas release is often associated with specific features like pockmarks (morphological depressions at the seafloor), mud volcanoes, cold seeps as well as occurrence of gas hydrates. For such sites gas plumes were observed by underwater camera systems as well as acoustic techniques.

Compared to such semi-quantitative information, rather little-known is the concentration field of CH₄ as well as other gases around e.g. pockmarks. This is mainly to the laborious sampling schemes (e.g. by Rosette Water Sampler) and rather time consuming CH₄ analysis by gas chromatography.

We investigated the CH₄ concentration field around pockmarks in Lake Constance by application of membrane inlet mass spectrometry (Inspectr200-200) combined with a submersible pump system. By this means very steep horizontal and vertical gradients of methane concentrations were observed in bottom as well as surface waters. Compilation of the continuous gas analyses allowed a 3D visualisation of the CH₄ concentration field above pockmarks and computation of methane inventories for the water column.