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Supplement of

High-resolution underwater laser spectrometer sensing provides new insights into methane distribution at an Arctic seepage site

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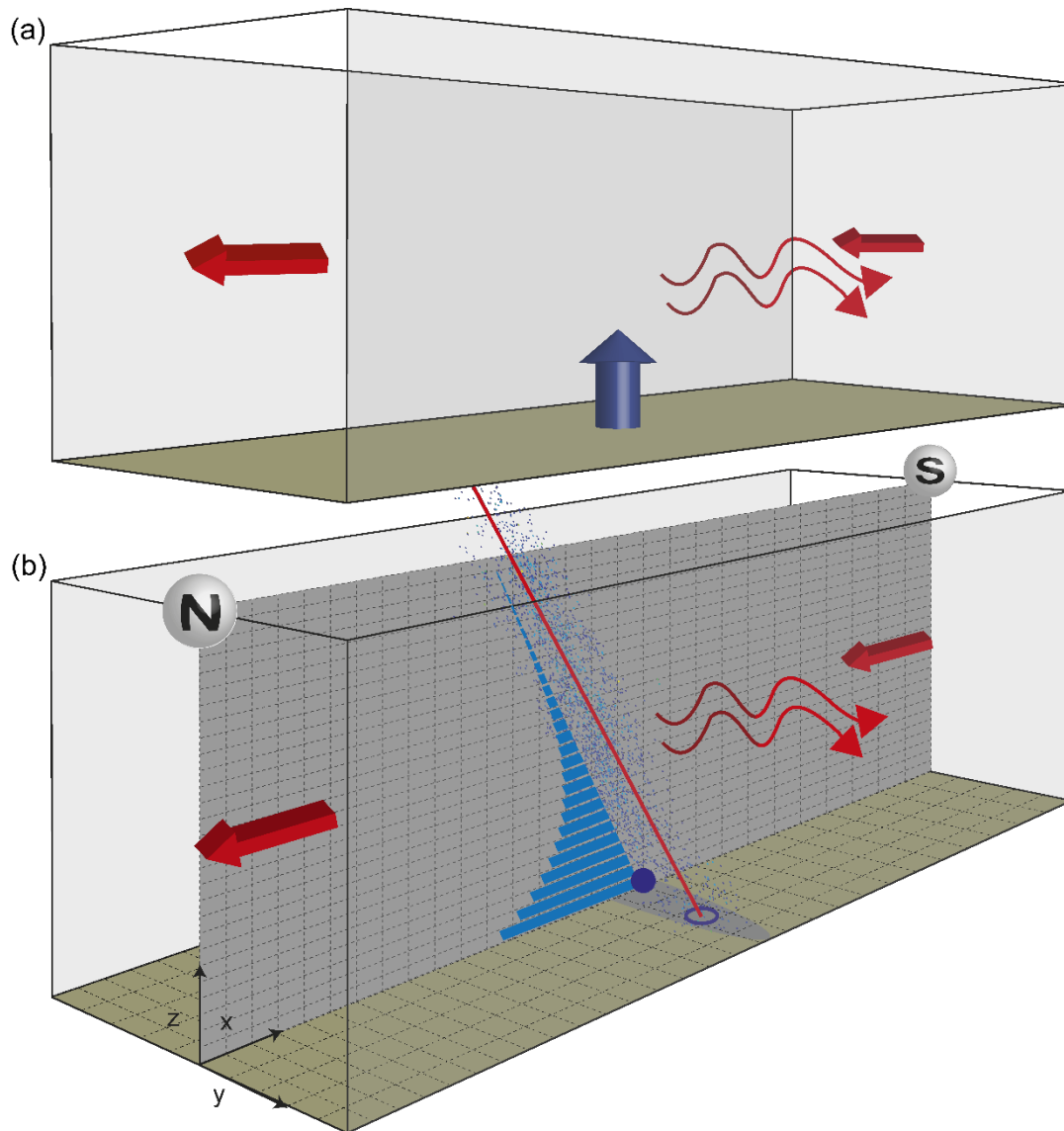


Figure S1. Sketch of the control volume, and 2D model. a) The control volume with the included processes. Advection of water through the volume is indicated by the red block arrows. Diffusion across the domain is shown with squiggly red arrows. The flow of CH₄ from the seafloor (Olive color) is indicated by the blue cylinder arrow. The volume of the box is equal to the size of the 2D model domain. b) The 2D model. The domain size is 4500, 50, and 75 m in the x, y and z direction as indicated by the three connected black arrows and is divided into bins as indicated by the mesh of dashed lines. The echosounder beam footprint from a single ping is shown as a shadow. An example of an observed flare is shown by small coloured dots and the flare inclination is indicated by the red line. The position of the flare origin at the seafloor is indicated by the blue ring inside the beam footprint. The flare is projected on the middle of the domain and the source of methane is distributed vertically as indicated by the horizontal blue bars. The blue dot indicates the flare origin projected on the middle of the model domain. The balls indicate the start (N) and end (S) of line 3, which also delimits the model domain.

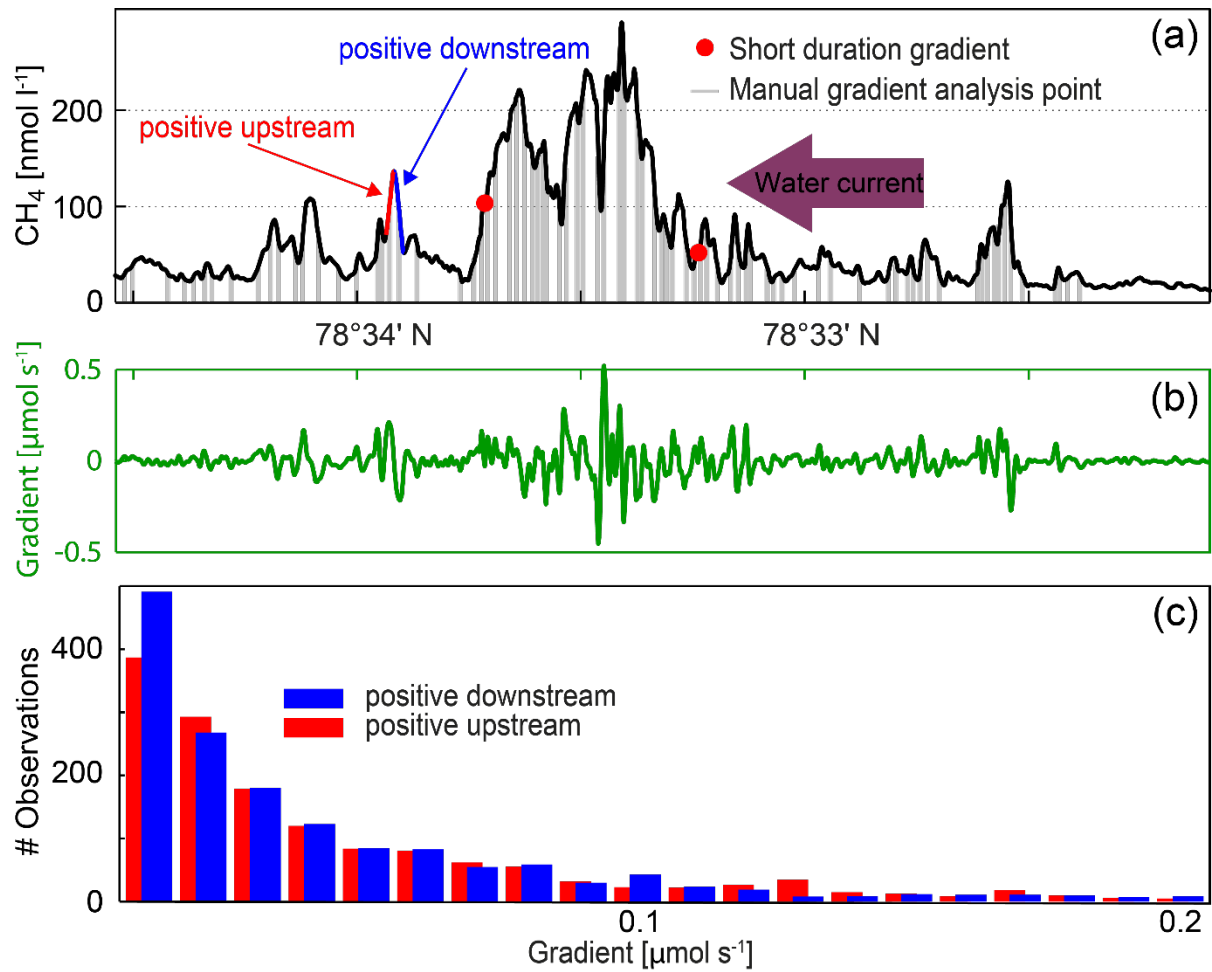


Figure S2. Concentration and gradient analysis along line 3. In panel a, the black solid line denotes the CH_4 concentration. Grey vertical lines indicate the gradients chosen for calculation of the mean gradients away from the CH_4 sources, as described in the main text. Red dots indicate instances where concentrations changed continuously during periods shorter than the MILS response time. Purple arrow indicates the main water current direction (northwards). Green line in panel b indicates high-resolution temporal concentration gradients. The red and blue bar chart in panel c indicates the probability distribution of gradients, which are positive downstream (upstream) in blue (red).