

Sediment loads on Arctic macroalgae - Experiment results and implication to Kongsfjorden ecosystem

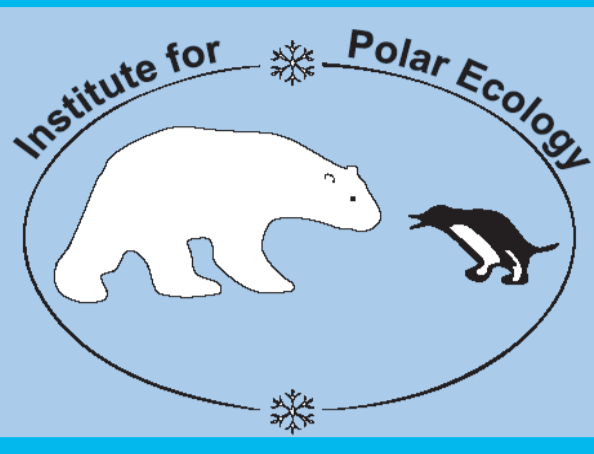
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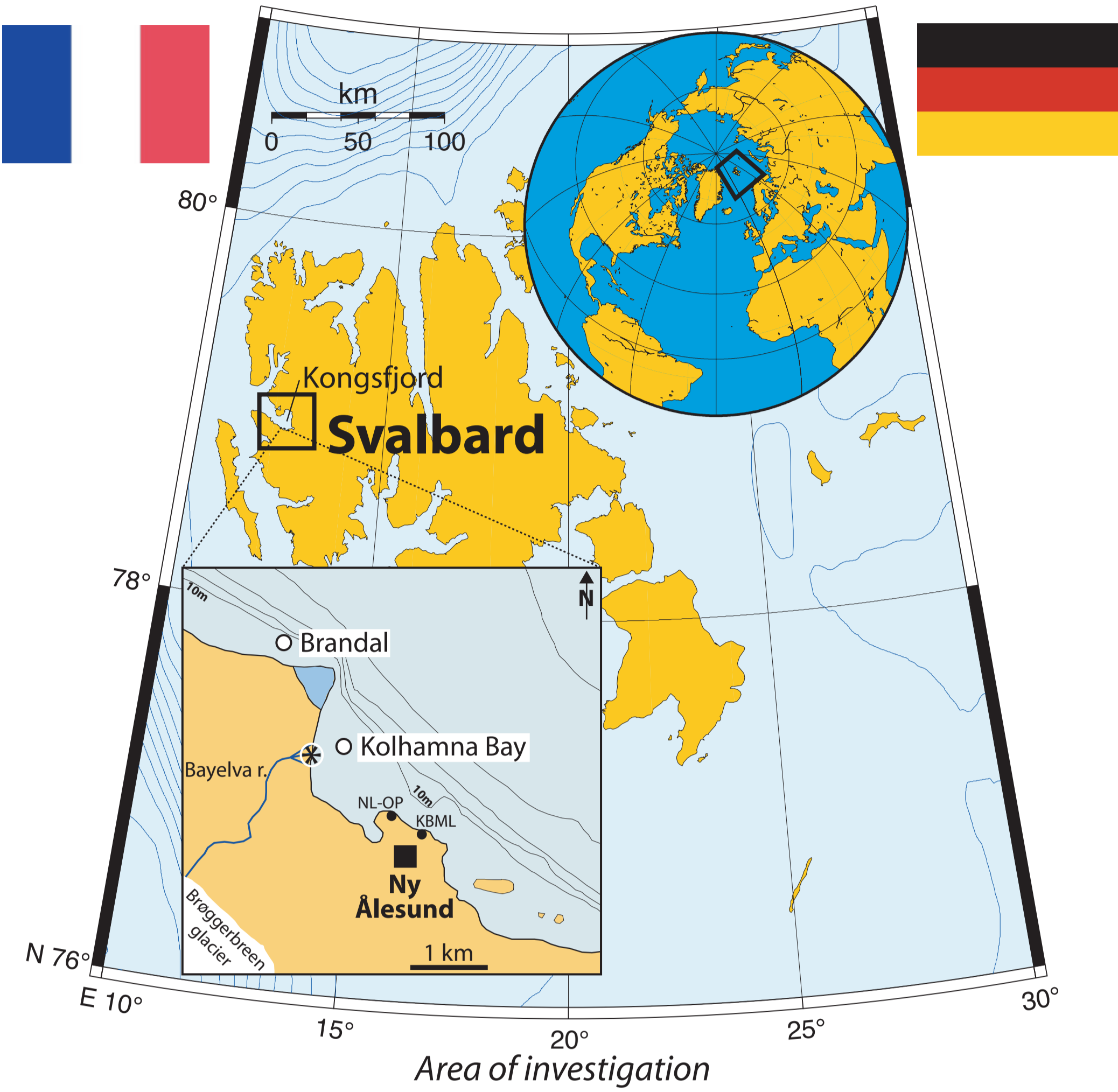
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Joint German-French field work; 2005-2007



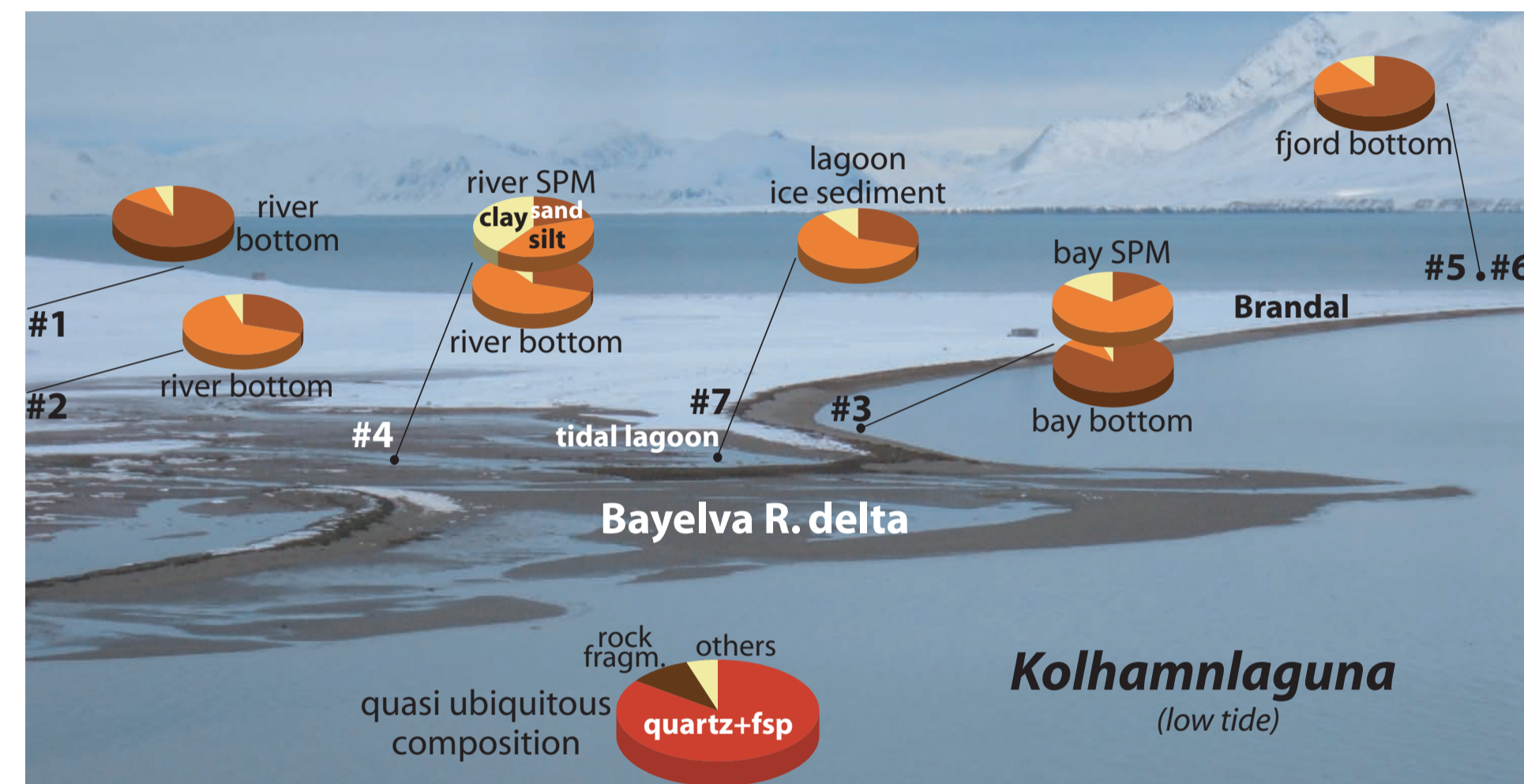
2005 Identification of research targets

Abstract

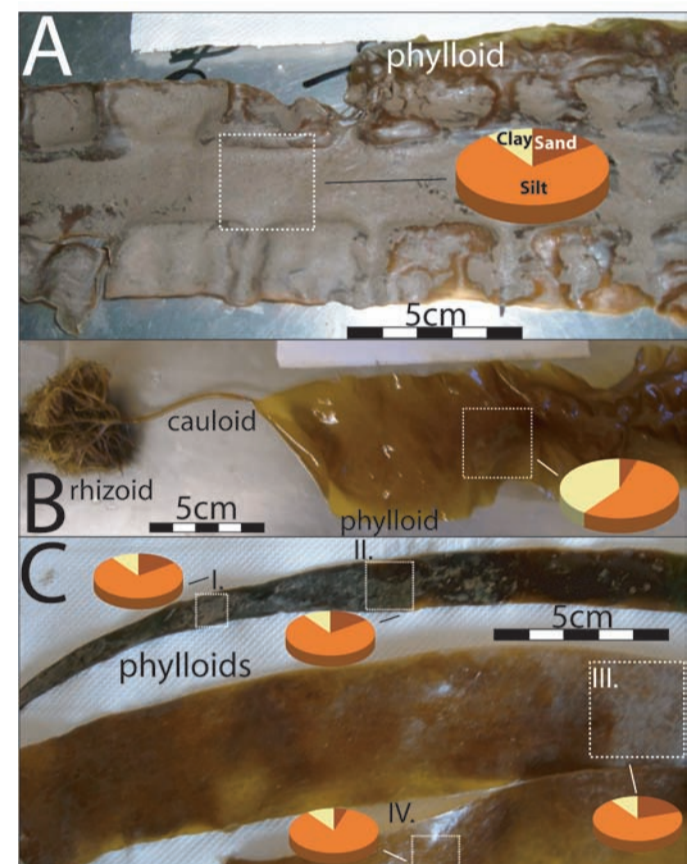
From mid July to mid August, the precipitation is usually strongest on Spitsbergen and, thus, the terrestrial particle discharge toward the Kongsfjorden marine ecosystem is highest during this period. The terrestrial particle discharge has various impacts on littoral environments and habitats. Our aim is to further develop our knowledge on particle dynamics, sedimentological impacts on marine macroalgae, and hydrodynamic-sedimentological coastal processes in the littoral ecosystem of Kolhamna Bay and below the Austre Lovénbreen glacier. Main scopes of our fieldwork are to improve our understanding of processes like (i) fluvial terrestrial particle discharge, (ii) coastal/near shore deposition, erosion and dislocation of sediments, (iii) potential local biological sediment-impact on macroalgae, and (iv) hydrodynamic processes. Sediment-/ macroalgae-related field studies were completed by laboratory- and outdoor tank experiments.



Goule-Aida River system, Austre Lovénbreen



Composition of Bayelva river and Kolhamna Bay sediments



Composition of algae sediments

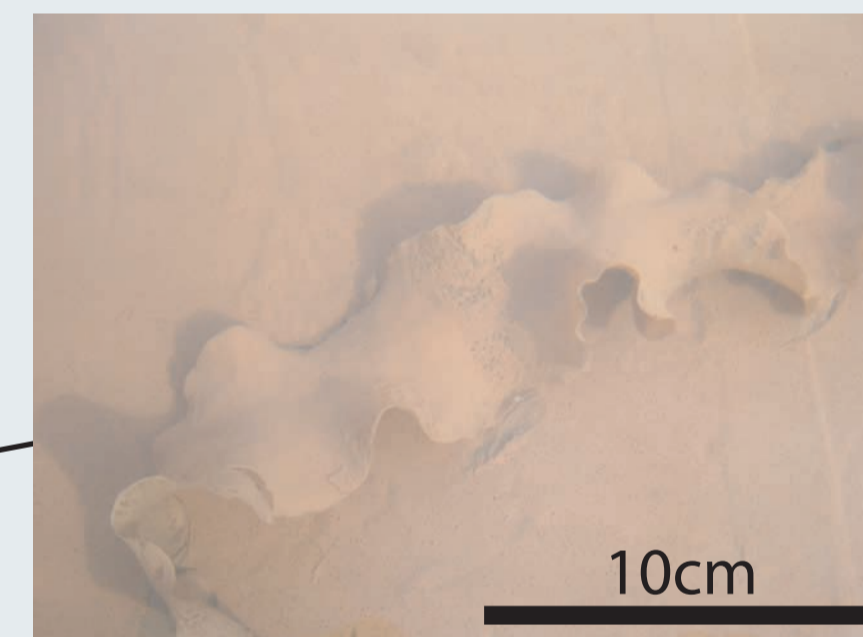
2006 Outdoor tank experiments



Outdoor tank experiments with marine macroalgae (*Saccharina latissima*); sediment-free (rear); sediment-laden (front)



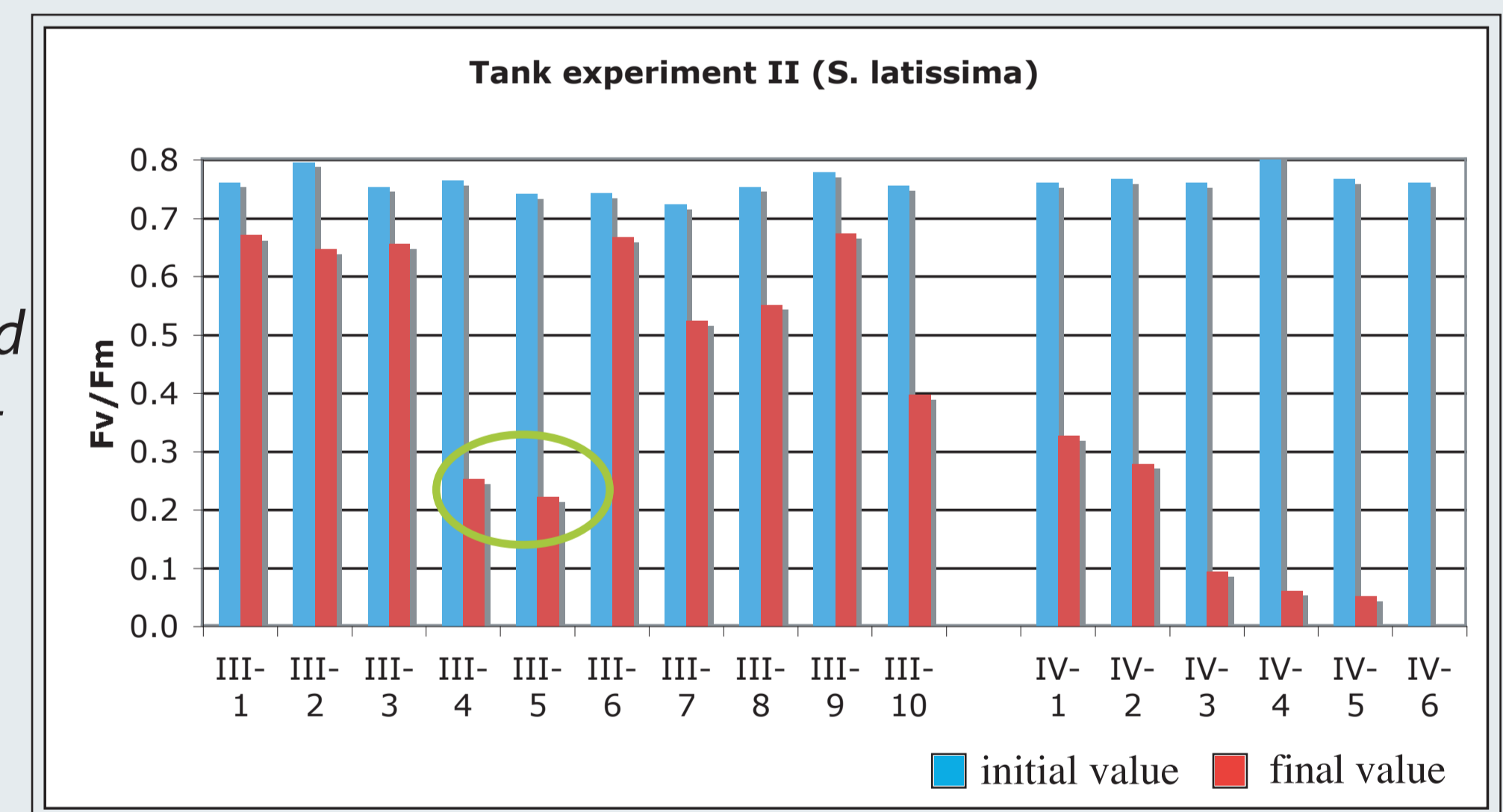
Artificial algae particle load



Detailed algae view

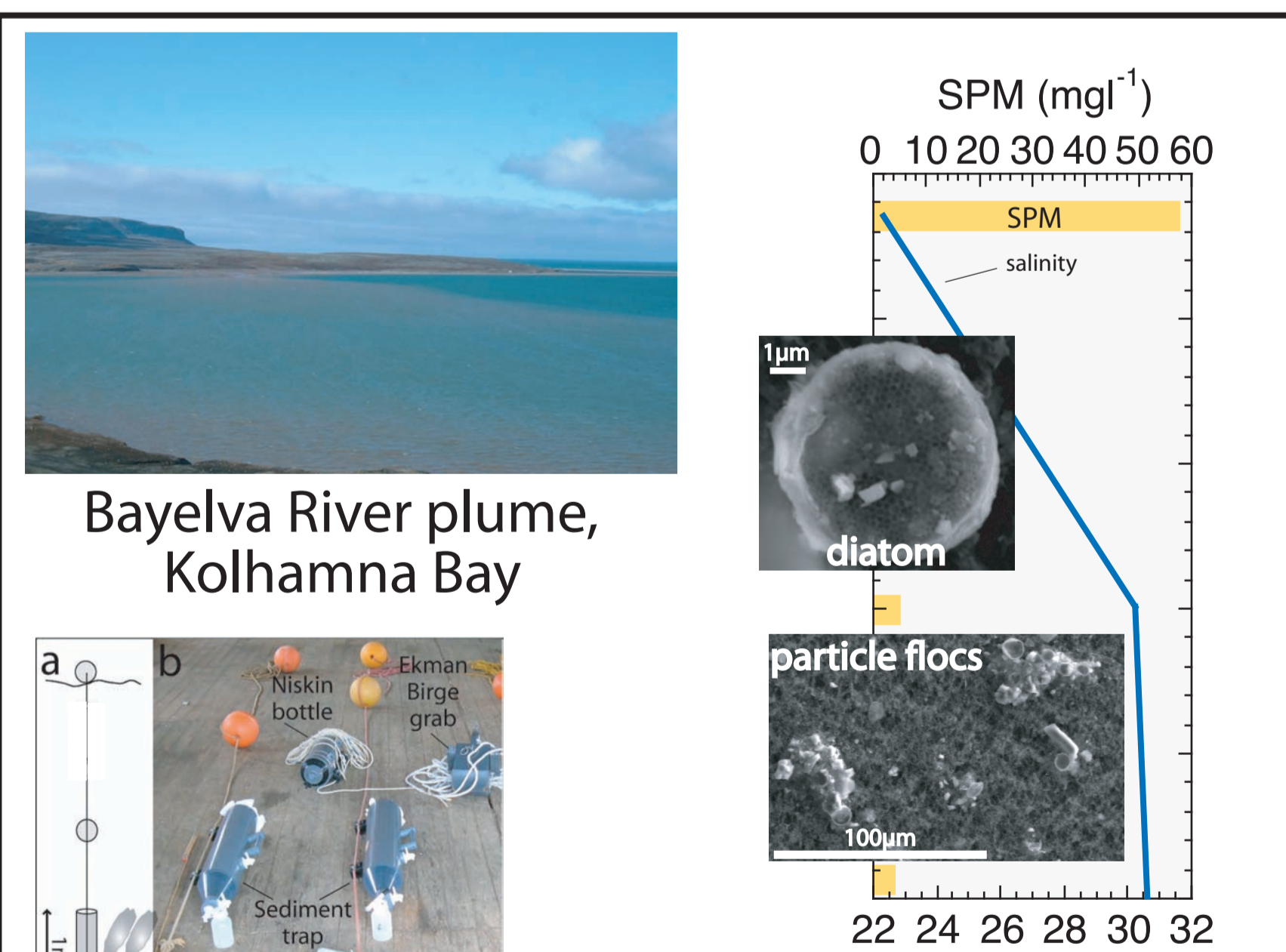


Cut-off of sediment-laden algae discs for maximum quantum yield measurements (PAM)

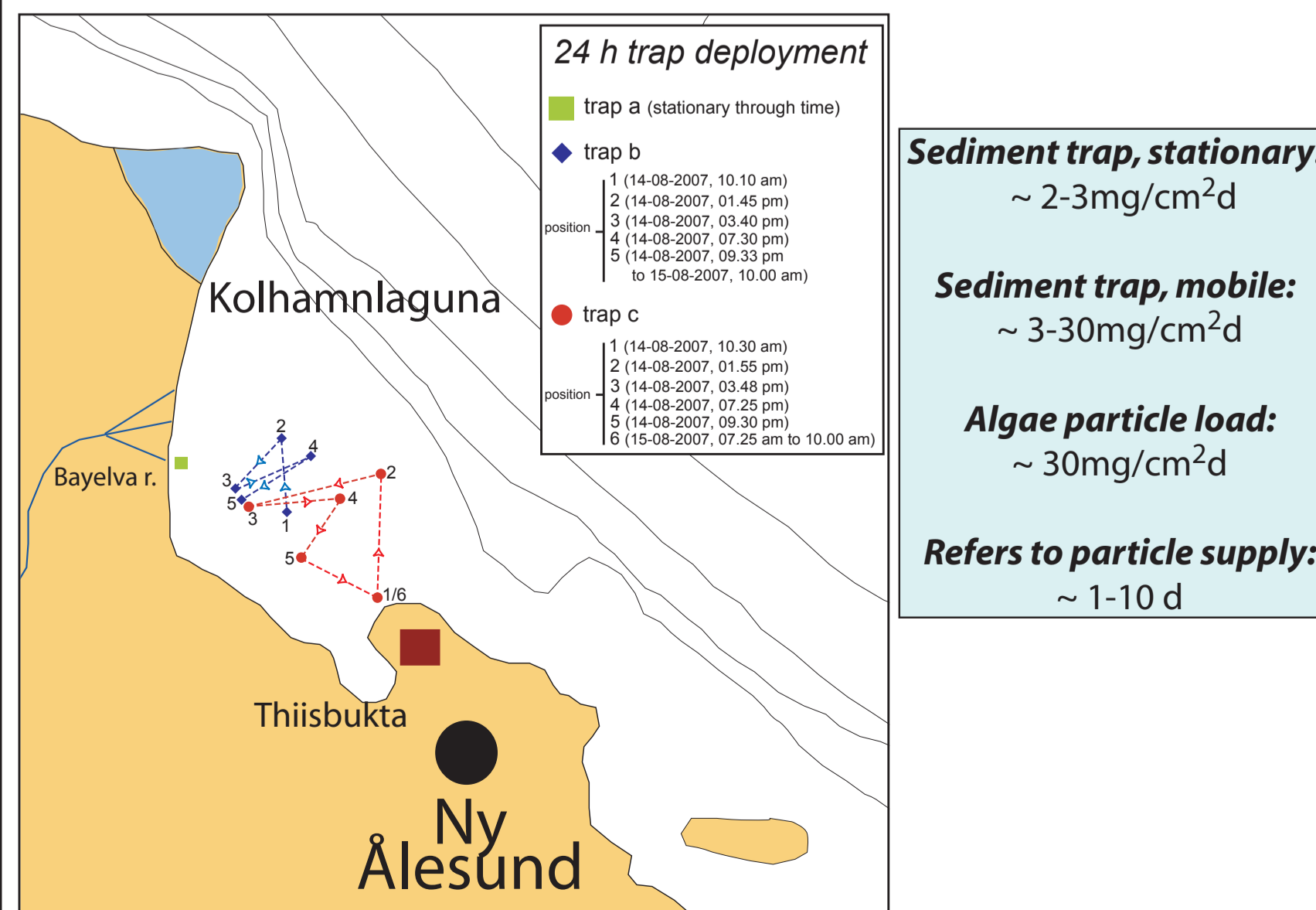


Optimum quantum yield of sediment-covered (III-1 to III-10) and sediment free (IV-1 to IV-6) algae before (blue bars) and after (red bars) 72 h sunlight exposure

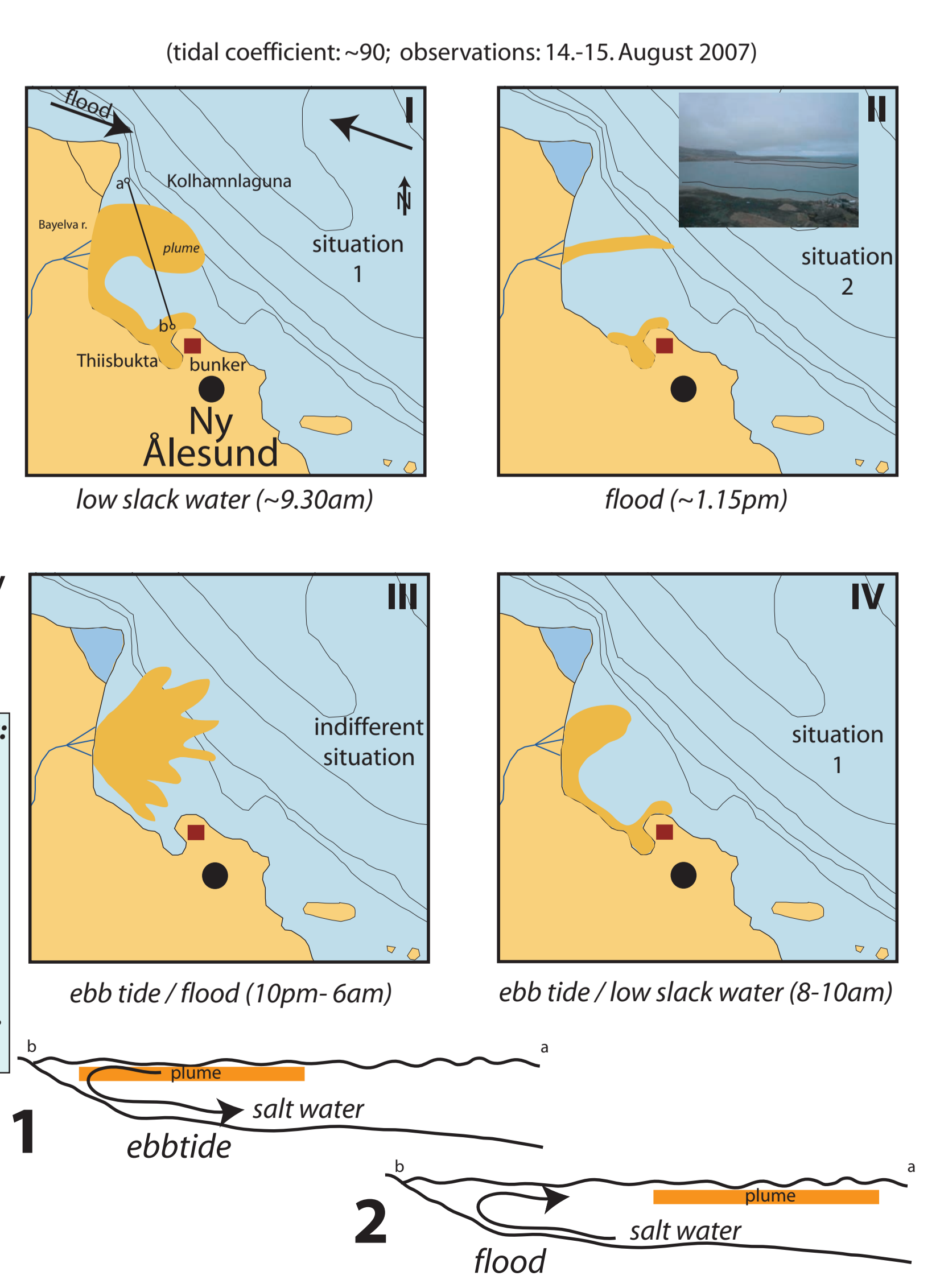
2007 Field work



Suspended particulate matter (SPM) and salinity

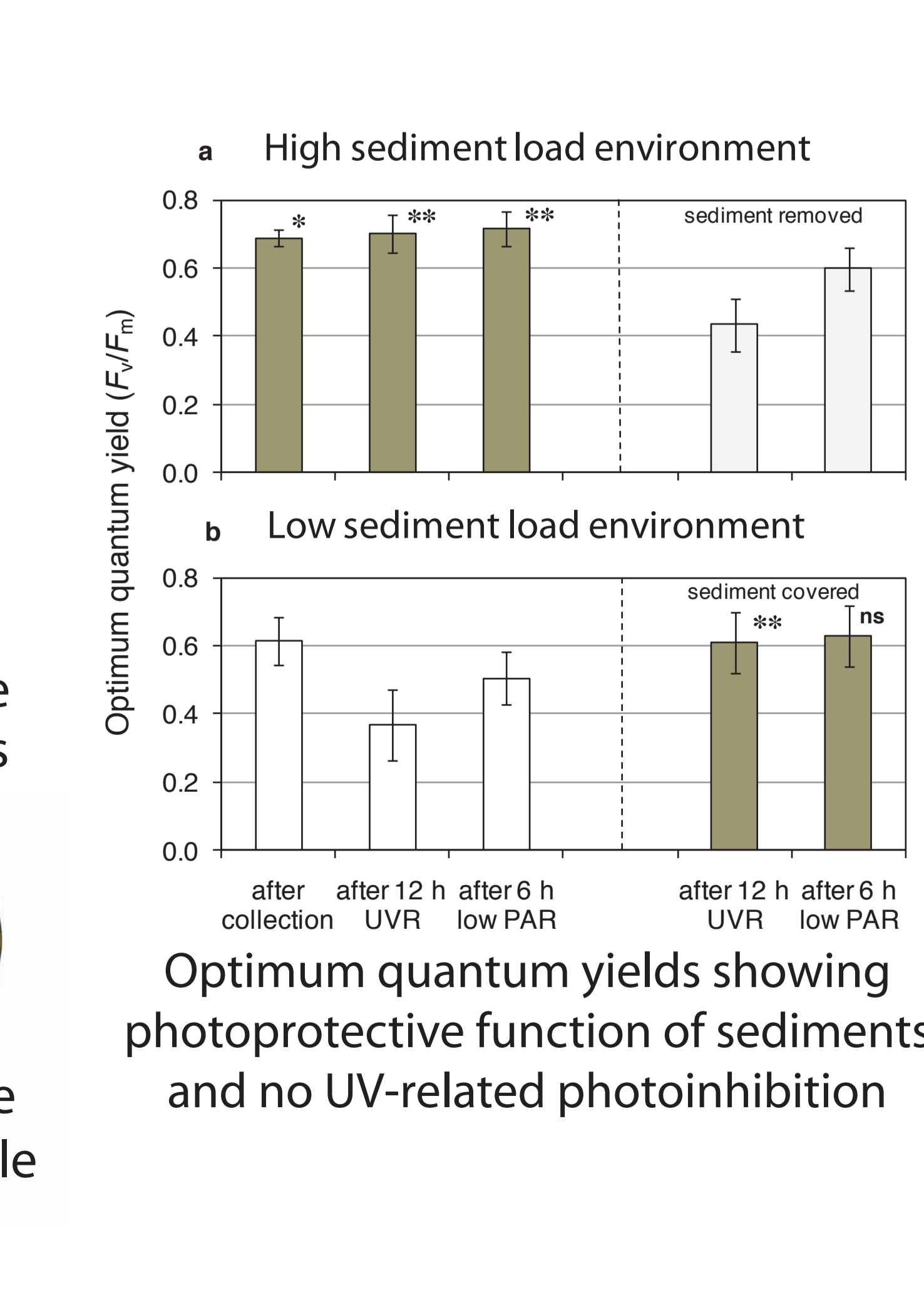
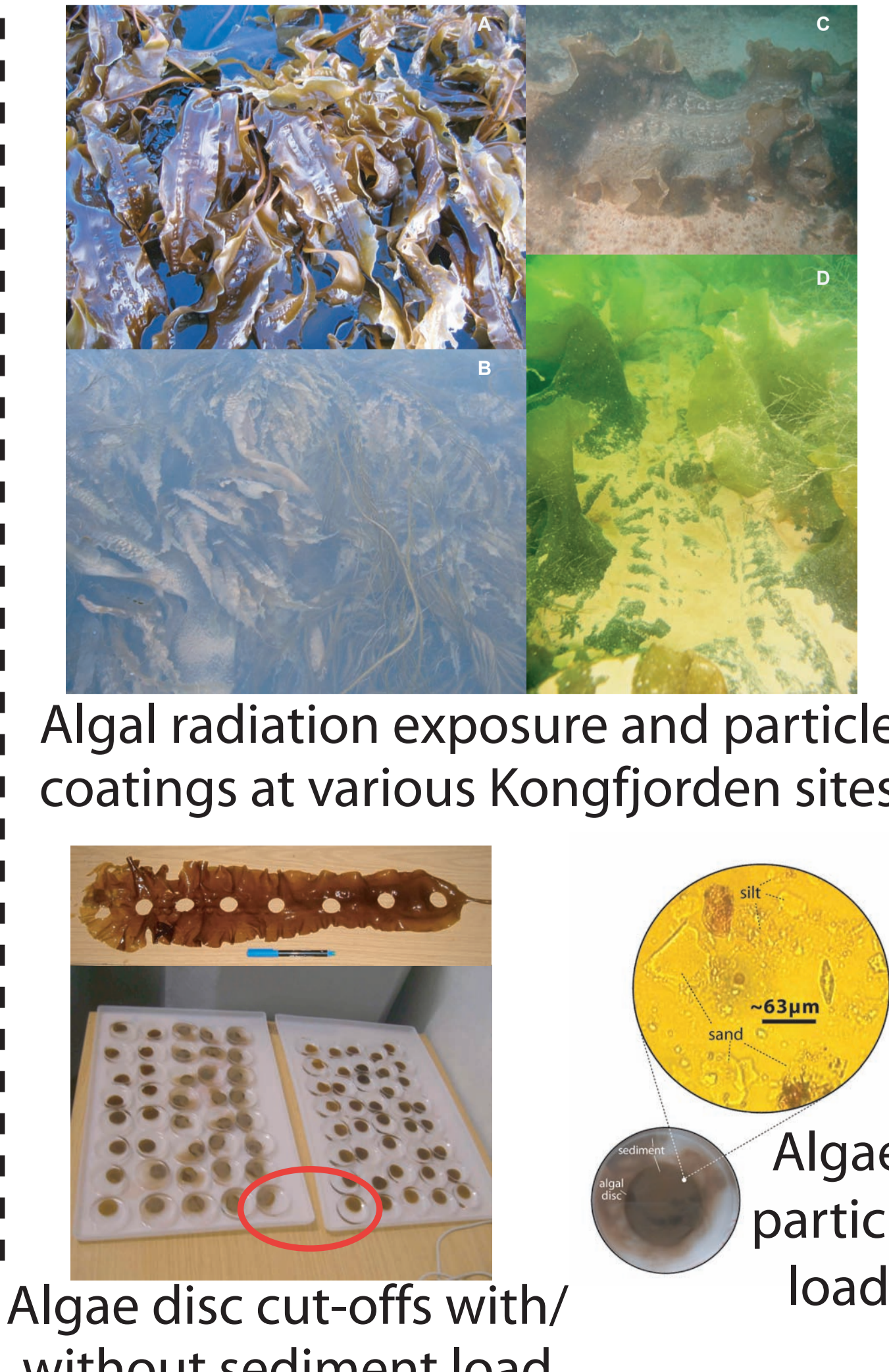


24 h sediment trap deployment following plume development



Bayelva river plume development and related tidal scenarios

Laboratory experiments



Optimum quantum yields showing photoprotective function of sediments and no UV-related photoinhibition