

Seminar “Ocean, Ice and Atmosphere”,  
Institute of Environmental Physics (IUP), Univ. Bremen  
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## The Fine Resolution Explorer for Salinity, Carbon, and Hydrology (FRESCH): A mission idea for the ESA Earth Explorer 12 call

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FRESCH's primary mission objectives are measuring sea surface salinity (SSS) and using it to derive the sea surface partial pressure of CO<sub>2</sub> (pCO<sub>2</sub>) at an unprecedented high spatial resolution of 11 - 14 km. This high spatial resolution is a major improvement in ocean observations, as it enables the study of processes taking place at the interfaces of the ocean with the land, cryosphere, and atmosphere (e.g. river plumes and carbon transport from the land to the ocean). The increase in spatial resolution of SSS measurements is a request of the community and a key to better resolve the evolution of the coastal ocean. The quantification of pCO<sub>2</sub> in coastal and other ocean regions is important for reducing uncertainties in the global carbon budget, and it is needed for reporting under the Paris Agreement. In the past, the IUP in co-operation with the ZMT has investigated the leaching of carbon from the coastal regions of SE Asia into the ocean. We have quantified the associated CO<sub>2</sub> emissions from rivers and the coastal ocean and related them to international and national CO<sub>2</sub> emissions. Problems we faced were missing information on the spatial extent of estuaries and their temporal variability, as well as measurements that did not fully account for the variability of the system. FRESCH would be a way to address such problems in the future and complements the futures strategic expansion of ZMT.