EGU2020-21816
https://doi.org/10.5194/egusphere-egu2020-21816
EGU General Assembly 2020

The challenge of sensor selection, long term-sensor operation and data evaluation in inter- -institutional long term monitoring projects (lessons learned in the MOSES project)

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Measuring environmental variables over longer times in coastal marine environments is a challenge in regard to sensor maintenance and data processing of continuously produced comprehensive datasets. In the project “MOSES” (Modular Observation Solutions for Earth Systems), this procedure became even more complicated because seven large Helmholtz centers from the research field Earth and Environment (E&E) within the framework of the German Ministery of Educatiopn and Research (BMBF) work together to design and construct a large scale monitoring network across earth compartments to study the effects of short-term events on long term environmental trends. This requires the development of robust and standardized automated data acquisition and processing routines, to ensure reliable, accure and precise data.

Here, the results of two intercomparison workshops on senor accuracy and precicion for selected environmental variables are presented. Environmental sensors which were to be used in MOSES campaigns on hydrological extremes (floods and draughts) in the Elbe catchment and the adjacent coastal areas in the North Sea in 2019 to 2020 were compared for selected parameters (temperature, salinity, chlorophyll-A, turbidity and methane) in the same experimentally controlled water body, assuming that all sensors provide comparable data. Results were analyzed with respect to individual sensor accuracy and precision related to an “assumed” real value as well as with respect to a cost versus accuracy/precision index for measuring specific environmental data. The results show, that accuracy and precision of sensors do not necessarily correlate with the price of the sensors and that low cost sensors may provide the same or even higher accuracy and precision values as even the highest price sensor types.