



Autonomous pH and alkalinity sensors for the characterization of the carbonate system in coastal areas

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The comprehensive documentation of the rapid changes in the carbonate chemistry due to the increased uptake of CO₂ from the atmosphere is very important. The CO₂ forms carbonic acid in seawater and leads thus to the phenomenon of ocean acidification causing expansive follow-ups for the ecosystem in the oceans. However, there are areas such as shelf seas and other coastal areas including river deltas and estuaries having a significant contribution to the CO₂ budget which show large natural variability where the direction and the magnitude of the CO₂ flux is varying and often even unknown. This lack of knowledge is caused by the high variability of coastal regions which cannot be sufficiently covered using research cruises and discrete samples due to the limiting effect of high costs for ships, staff, and time. The relevant processes and rates, however, can only be determined with knowledge of the fully characterized carbonate system using high spatial and temporal resolution data. Here we present fully automated systems for the determination of the pH value and the total alkalinity providing high quality data for a comprehensive determination of the carbonate chemistry in seawater.