Enhancement of pCO$_2$ and pH measurement technologies on observatories

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In the Fixed point Open Ocean Observatory project (FixO$_3$) different pCO$_2$ and pH sensors were evaluated in-situ. First 8 different technologies were compared in shallow water with high biofouling at the Koljoefjord cabled observatory. The E2-M3A observatory in the Ionian Sea (Mediterranean) served for surface water long term testing of pCO$_2$ and pH optodes in oligotrophic waters and the Antares observatory offered its infrastructure for deep water (2500 m) trials of ISFET and optode technology. We will present our experiences from these projects as well as from roaming with autonomous mobile platforms, profilers and surface vehicles.