SURCOM-pH: engineering and quality assessment of an oceanographic instrument for coastal acidification monitoring

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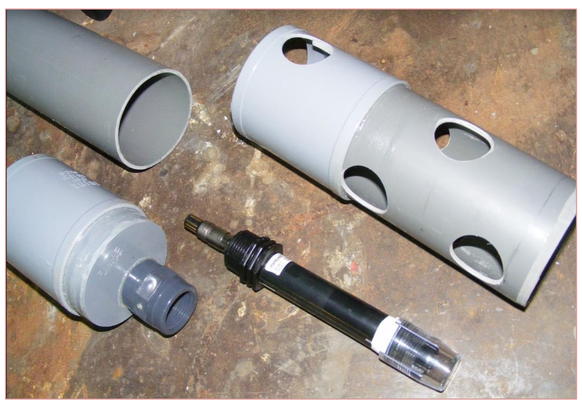
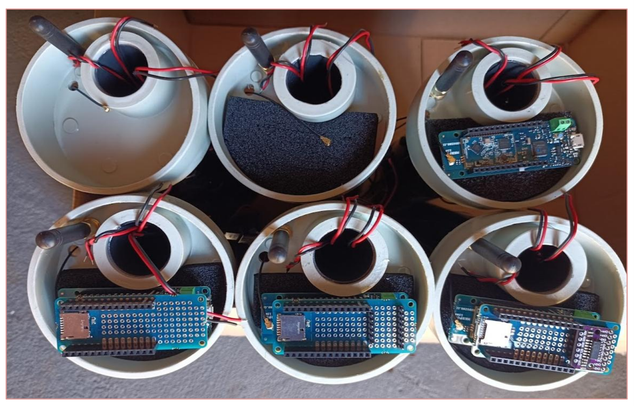
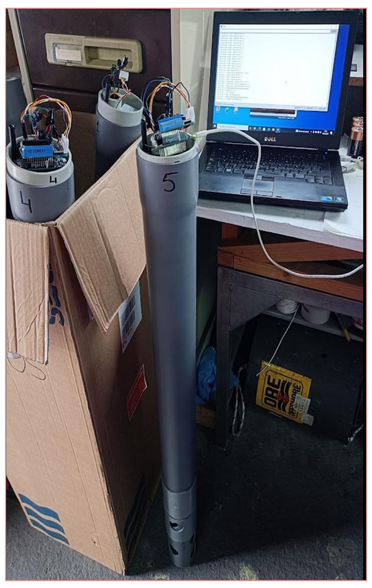
The continued absorption by the oceans of the atmospheric carbon dioxide produced by human activities, causes a reduction in the pH of the oceans known as ocean acidification (IPCC, 2021). Growing concern in the international community about ocean acidification has stimulated the collection of discrete measurements in high-quality time series (Pérez et al., 2020). However, these data sets are not designed to identify relative spatial patterns and short-term variation, so there are several gaps in knowledge about the impact of ocean acidification and ecosystem responses.

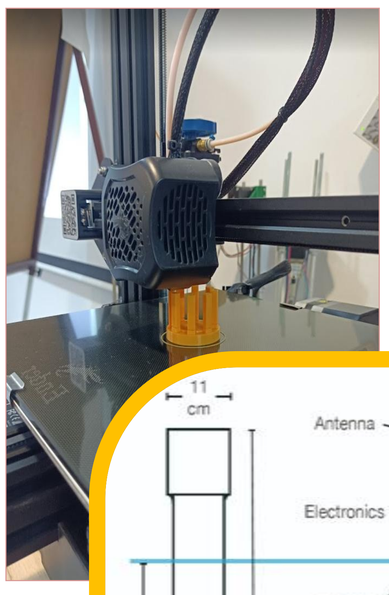
Our group has developed a low-cost pH measurement autonomous system (SURCOM) based on the use of a commercial top-quality ISFET sensor and equipped with a SIGFOX near real-time communication system, that will be used for the deploy of monitoring networks of autonomous pH sensors in coastal systems.
In this communication, we show part of the work previous to the next deployment of these sensors in Arousa and Vigo estuaries, characterized by a high biological production, complex physical and biogeochemical interactions and a set of local processes that cause complex and diverse patterns of pH variability. Moreover, this ecosystems as well as other coastal upwelling areas are more sensitive and seem to respond more rapidly to anthropogenic perturbations (Padin et al., 2020).

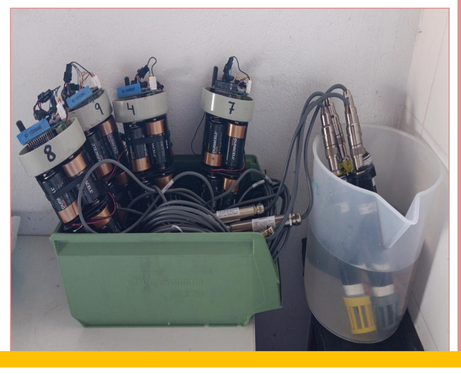
SURCOM-pH assembly

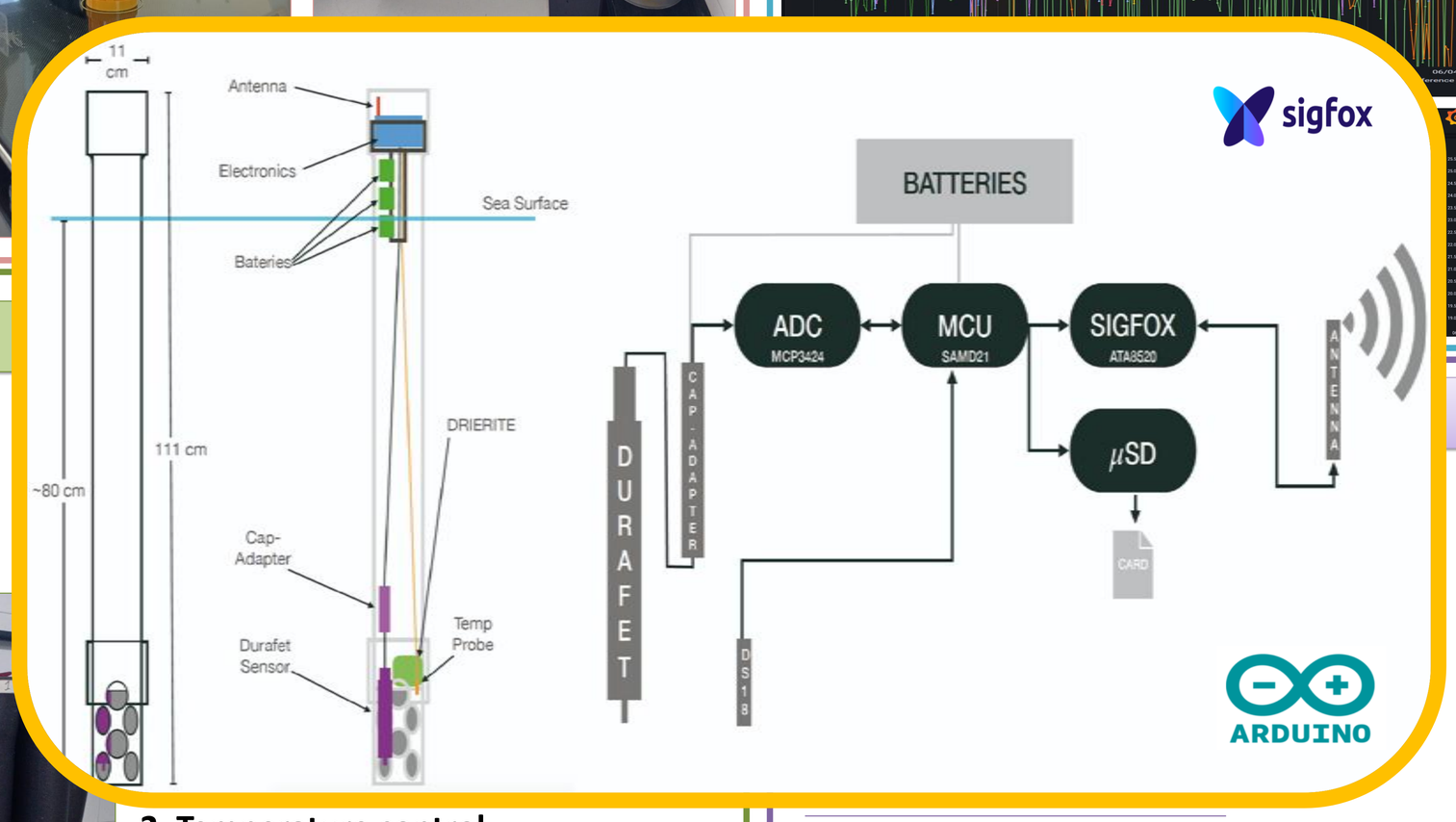




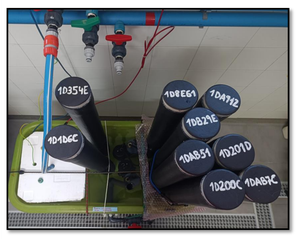


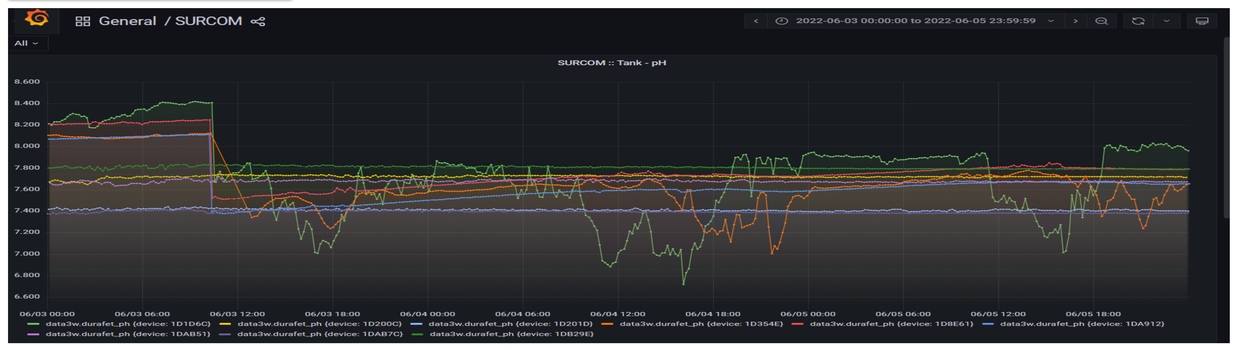


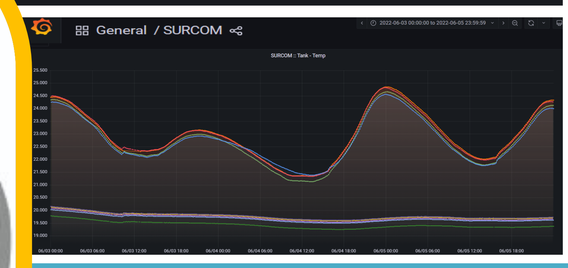




Real time monitoring







Discrete samples

Six pH samples
Two salinity samles
Temperature control

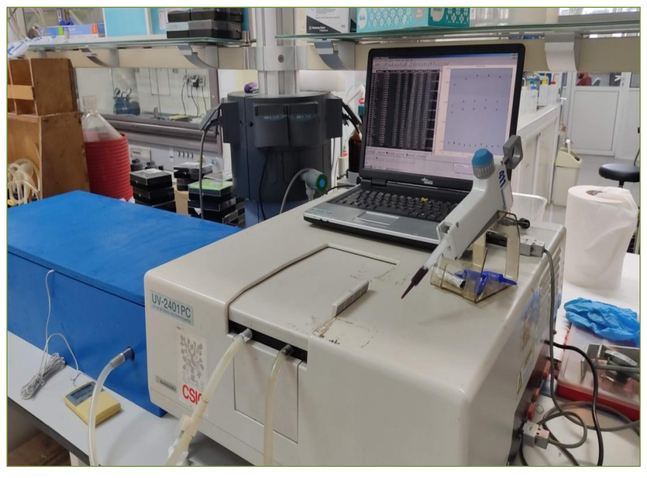
1. Sampling

pH range

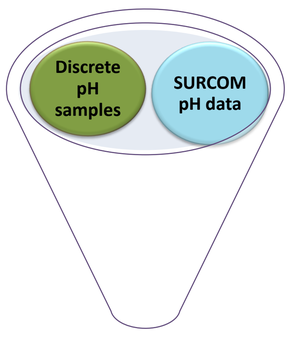
8.1 → 7.9 → 7.2

2. Temperature control

3. Spectrophotometric measurements

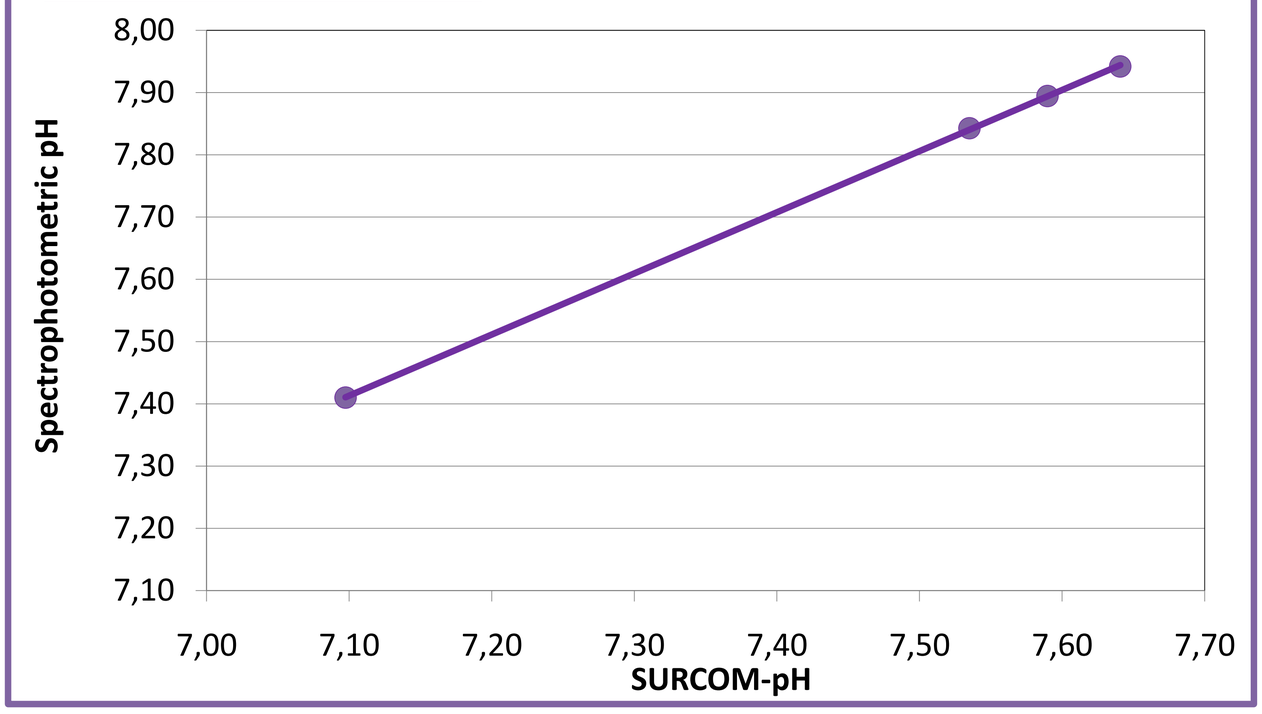


Calibration



time	SURCOM-pH	pH samples
10:55	7.5350	7.8426
11:55	7.5897	7.8944
12:37	7.0974	7.4099
14:00	7.6408	7.9419

Spectrophotometric pH= 0.982 surcom pH+ 0.438
R^2= 0.9999



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