3 years deployments of the Warp Smartbuoy

The Warp smartbuoy is located in the Thames estuary. The parameters you are given include Temperature, Salinity and Turbidity. You will see a tidal signal and the influence of freshwater in all parameters. The samples are taken in 5 minute ‘bursts’ every half an hour.

The data is flagged 0 = good data, 4 = bio-fouling, 100 = buoy is out-of-water, 12 = suspicious data, unknown cause.

The main things to look at:

* Automatically identify when the buoy is out of the water (QA\_flag=100) and remove these observations.
* Bio-fouling is when stuff such as seaweed grows on the sensor and is one of the main issues when using this data. Try and automatically predict when bio-fouling is occurring. The analyst’s interpretation of when they think it is happing should help here (QA\_flag=4). Salinity and turbidity are more sensitive to fouling than temperature.
* Fill in the gaps in the timeseries along with a measure of uncertainty

Data description:

|  |  |
| --- | --- |
| **Column** | **Description** |
| dateTime | Date and time of sample collection |
| deployment | ID of the deployment. This identifies each time the |
| lat | latitude of deployment - may vary slightly but it can be considered constant |
| lon | longitude of deployment - may vary slightly but it can be considered constant |
| depth | Water depth sample was taken - Can be ignored as they are all 1m |
| QA\_level |  |
| QA\_flag | 0 = good data, 4 = bio-fouling,12 = unknown error, 100 = out of water |
| value | mean of sample |
| stdev | standard deviation of sample |
| n | number of observations |
| sensor | Type of sensor |
| par | Parameter - TEMP = temperature (degC), SAL = Salinity (g salt / kg sea water), FTU = Turbidity (arbitrary unit). |

Further Information:

Data is collected by a datalogger which interfaces with the various off the shelf sensors. If the sensor is analogue the logger handles the analogue to digital conversion on a 12bit ADC. The data is then sent via satellite and processed automatically onto a database. At this time calibration coefficients are applied to correct for the ADC, and data is flagged if it is outside of sensible ranges (negative salinity and other values outside of the sensor specification).

The next steps are typically to flag data by hand (we have various tools for detecting and highlighting suspect areas, but we leave it up to the analyst to make the final call). We are looking for spikes in parameters which should not have spikes, such as salinity and temperature. We expect spikes with the turbidity because it’s measuring floating particles which can clump together. The turbidity sensor is most sensitive to fouling, and you get a sort of exponential rise in values after 3-5 weeks in the water, we use this to better guess where we need to start flagging salinity data also. The stuff growing on the sensor also often sloughs off, so you get a sharp drop in values again. After this semi-manual QC step, we apply corrections based on in-situ samples and lab calibrations.



