

Pow Beck Catchment data management

Analogue data - total phosphorus, total reactive phosphate, nitrate and ammonium concentrations, are measured using Hach Lange equipment (for more information visit <http://www.hach-lange.co.uk/>). Samples are pumped from the river to a flow-through cell located in a bank-side kiosk. Nitrate (Nitratax) and ammonium probes are housed in the flow-through cell. For phosphorus analysis, water is sub-sampled from the flow-through cell by a Sigmatax unit, which also homogenises a sub-sample for total phosphorus determination. Total phosphorus and total reactive phosphate analyses are then carried out in turn by a Phosphax analyser, which takes 20 minutes to do both P fractions.

Physical data - A YSI multi-parameter sonde measures turbidity, chlorophyll a, electrical conductivity, dissolved oxygen (concentration and percentage), pH and water temperature. It is also installed in a flow-through cell (separate to the Hach Lange) located inside the kiosk. Analite probes are installed in-stream at each sub-catchment monitoring station to measure turbidity. These data are treated in the same manner as YSI data.

Due to the time constraint of the Hach Lange Phosphax analyser, the highest time resolution that all determinands can be matched is 30 minutes. Raw YSI and Analogue data are recorded by a Meteor logging and telemetry system. Due to the time taken for the Hach Lange to perform the P analysis, data are recorded 30 minutes later than all other measured parameters; for example, a sample pumped from river at 12:00 is analysed over the subsequent 20 minute period, and then recorded by the Meteor logger/telemetry unit at 12:30. However, a sample pumped at 12:00 that goes to the YSI flow through cell (which takes approximately 4 minutes) is analysed near-instantaneously and bears a timestamp of when it was measured instead of when it was pumped; for example, 12:04.

Quality Control

QC files are completed by Eden DTC project scientists. Errors are 'flagged' whereby 'error codes' are generated, which could be due to any of the following reasons: power outage, split pump tubing, sensor malfunction, sensor calibration/maintenance, sensor drift, etc. Erroneous spikes and periods of 'poor data' (sometimes for unknown reasons) are also included.

Error Codes

There are two types of error codes that can be assigned: automatically generated and user specified. Automatically generated errors are assigned if the data exceed some threshold. User specified errors relate to a given time period. There are three levels of user generated error code:

- Low: No known error, but issue with equipment.
- Moderate: Known error in data, must be corrected before use
- Critical: Known error in data, the data must not be used

A Python program is used to concatenate all the raw data and to incorporate the QC error codes. However, no data are removed (only flagged) and the time series are not continuous (i.e. where no water quality data exist the time series is collapsed). Time series are saved to the 'DTCwebinterface' Dropbox directory, where basic monthly data plots can also be viewed.

Remove data with 'Critical' error codes

Any data with corresponding 'critical' error codes (identified in the QC flagging process) are removed from the time series in the data sets. Please refer to the site's associated Error Code document when using Analogue and/or YSI data.

Time stamp corrections

A separate Python program is used to resample all data into continuous 30 minute time series and time stamps are corrected where necessary (so that data represent the time that the samples were drawn from the river):

- YSI data are shifted backwards to the nearest whole 30 minute interval, e.g., 12:04, 12:34 becomes 12:00, 12:30.
- Analogue data are shifted backwards by 30 minutes to account for phosphorus analysis, i.e., water sampled from the river at 12:00 is analysed over a 20 minute period; these data are collected by Meteor at 12:30.