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An interactive and integrative course for the collection and management of time-space data

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Many master programs in hydrology or environmental science separate the collection, processing and visualization of data into different courses. We argue that by doing so we tend to loose the link between (1) the actual measurement, (2) the compiling of the observed data sets from different sources including error analysis, and (3) the processing and analysis of data. This can be problematic as errors and uncertainties e.g. caused by different measurement methods or spatial/temporal averaging, might appear only during final analysis. Hence, only an integrative approach of collecting, compiling, processing and analyzing a time series from point measurement to a comprehensive report or publication within one course can illustrate these dependencies. This integrated view on error propagation is a key insight usually not covered by data analysis courses.

In our Data Collection, Storage and Management course the students measure a high-resolution 3-week air temperature time series using a small sensor. Every student installs his own sensor at his domicile and learns how to minimize negative effects for data collection. After three weeks the loggers are readout and each time series is corrected for outliers or measurement errors. the students utilize a PostGIS database to compile the individual time series into a common dataset. Measurement uncertainties and external influences on the temperature sensor (e.g. radiation, human influences, heat loss from buildings) are visualized by the heterogeneity of the data set. Affected locations are excluded, before a common, spatial data set is produced. Collaborative tools like the e-learning platform MOODLE or GitHub facilitate consistent data collection and distribution. We will show our tools and how we link them to establish transparent and preferably public working cycles. These workflows like public revie