Fig. S1. Correction of pH data measured at HPA Pile in the Elbe Estuary. Original hourly pH (black) was plotted along with a moving average (red line), and the corrected pH (blue), obtained by subtracting the moving average from the original dataset, and then adding the average of the first 1000 samples, where drift is minimal.
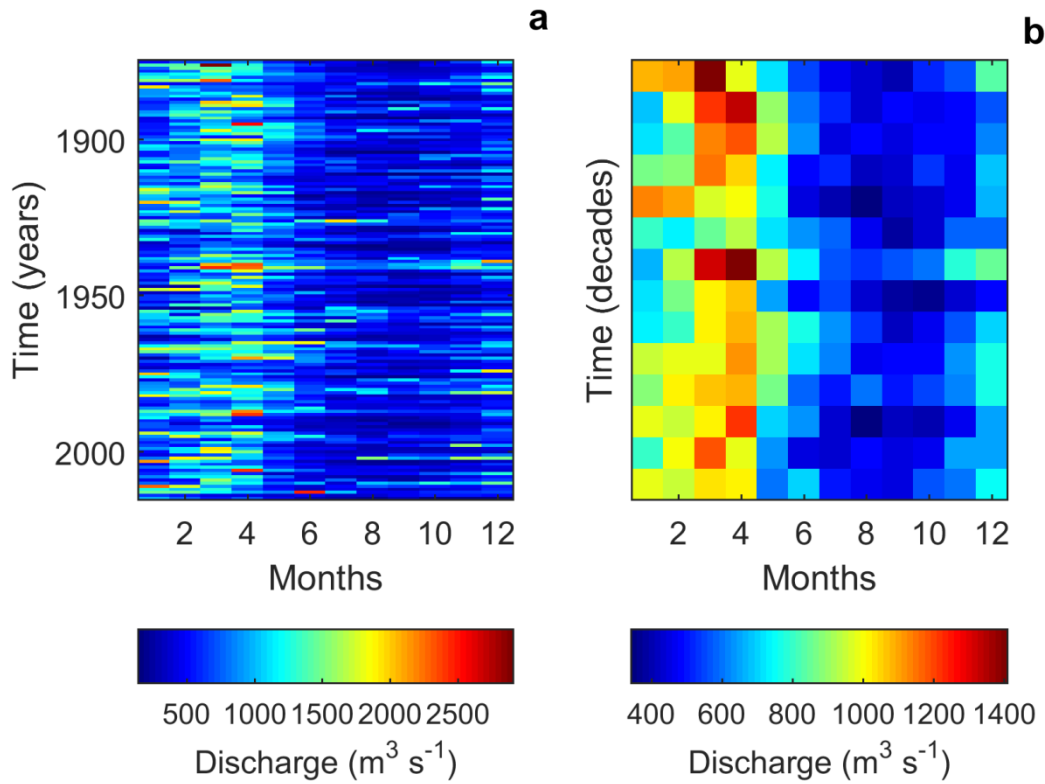
Fig. S2. a. Monthly Neu Darchau station discharge for every year from 1875 to 2015. Note the 2013 June discharge signal in red. b. Decadal discharge from Neu Darchau, averaged by month. Record used for decadal averaging extends only between 1875 and 2015, in order to separate the data in decadal intervals.
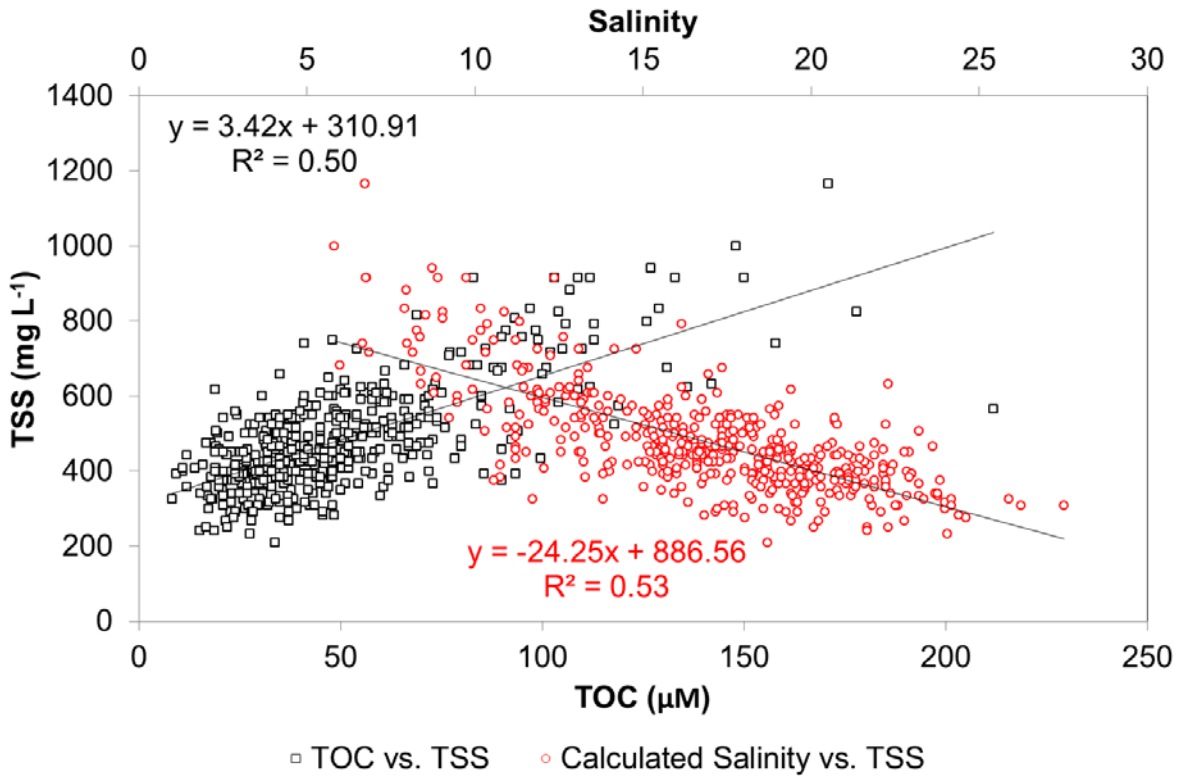
Fig. S3. Total organic carbon (TOC) and salinity vs total suspended solids (TSS) measured by FGG at a station near Cuxhaven. The data are available between 1992 and 2013, from biweekly sampling until 2006, and monthly sampling until 2013.