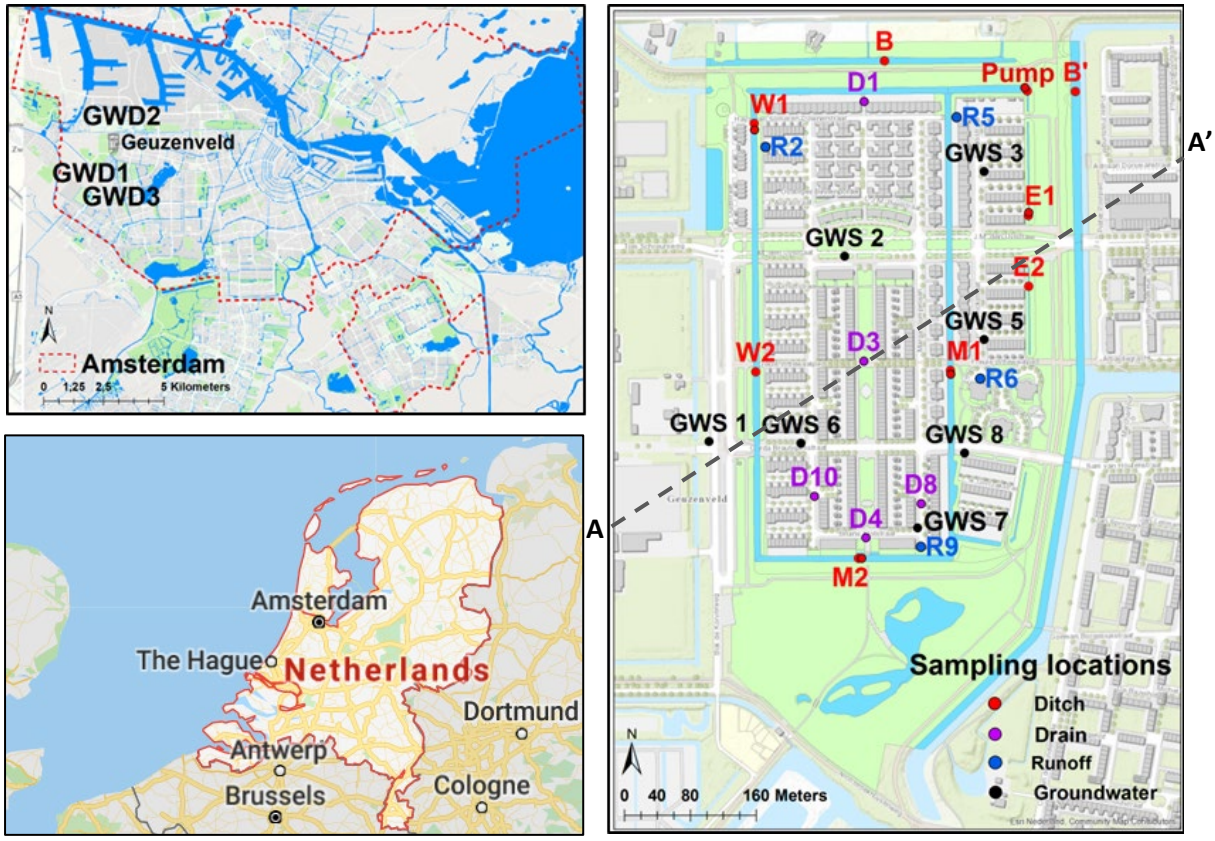

Figure 1 Location of polder Geuzenveld (52°23'01.3"N 4°47'37.7"E) in the greater Amsterdam area (left figure) and detailed map of Geuzenveld (right figure). The Amsterdam map shows the location of polder Geuzenveld and the deep groundwater sampling locations (GWD1, GWD2 and GWD3). The Geuzenveld map shows the sampling locations of the short term (2016-2017) grab sampling (W1, W2, M1, M2, E1, E2, B, and B'), the water quality survey in 2017 of runoff (R2, R5, R6, and R9), ditch (W1, M1, M2, E1, and Pump) and drain water sampling manholes (D1, D3, D4, D8, D10) and shallow groundwater piezometers (GWS 1-3, GWS 5-8).

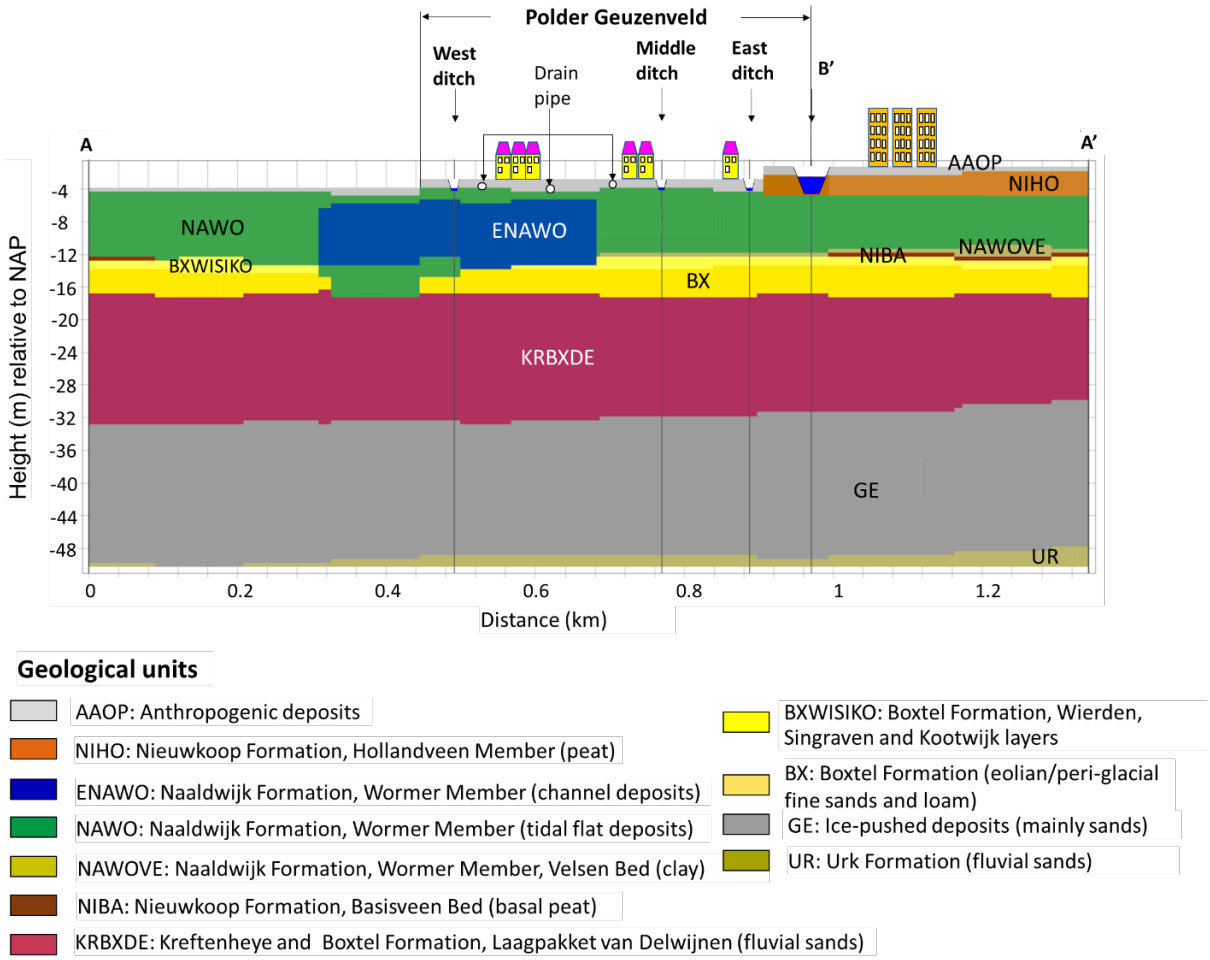

Figure 2 Geological Formations and their main lithology beneath the polder Geuzenveld with indicative positions of the main water courses and drains. A more detailed lithology based on 100 x 100 x 0.5 m voxels (Schokker et al., 2015) for this cross-section is given in Figure 8. The cross-section A-A' is indicated in Fig. 1.

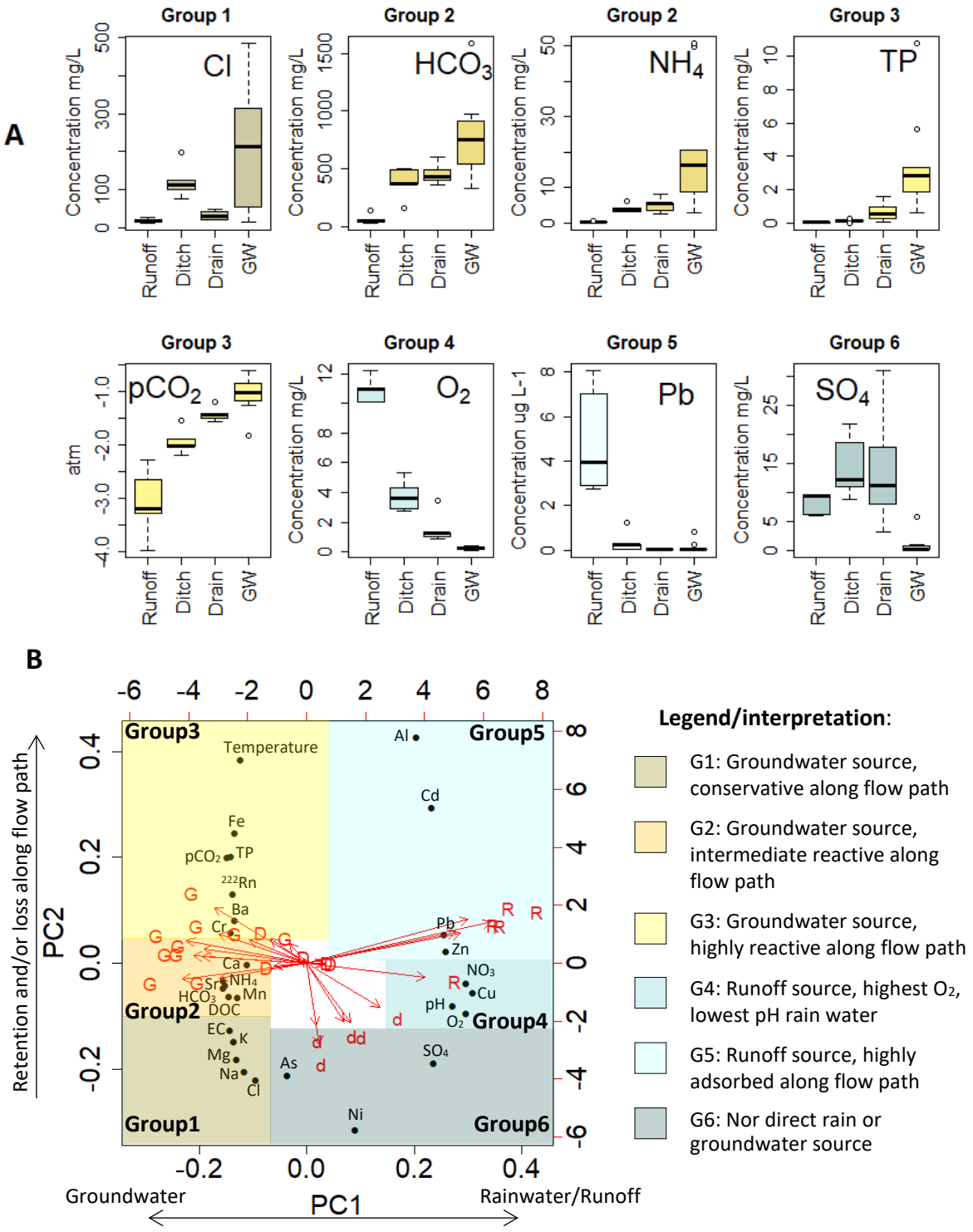

Figure 3 Results of the PCA analysis in graphical form. Panel A: Boxplots of the concentrations of flow route indicators based on the PCA analysis of the data collected during the 2017 spatial survey. PC1 and PC2 explains 76% of the variance. Boxplots for the complete set of solutes are given in SI 2 Figure SI 2.1. At least one solute from each group in the PCA results of panel B is shown. Panel B shows the contributions of the first 2 principle components (PC1 and PC2) to explain the observed solute concentrations. The arrows in panel B indicate the loadings of the flow routes sampled: runoff (R, observation number n = 5), ditch water (d, n = 5), drain water (D, n = 5), and groundwater (G, n = 10).

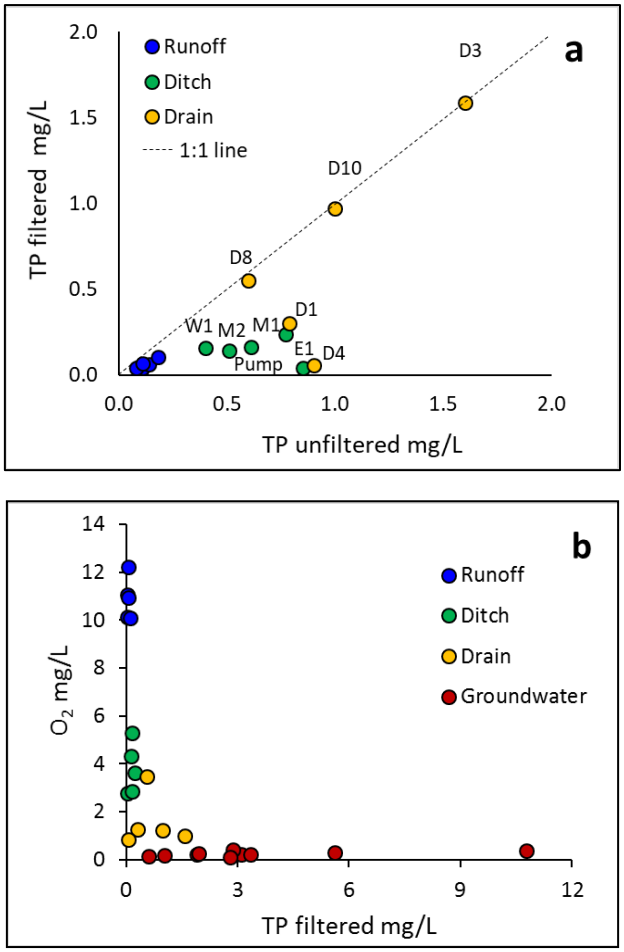

Figure 4 Comparison of TP from filtered and unfiltered samples (a) and TP variation with O_2 (b)

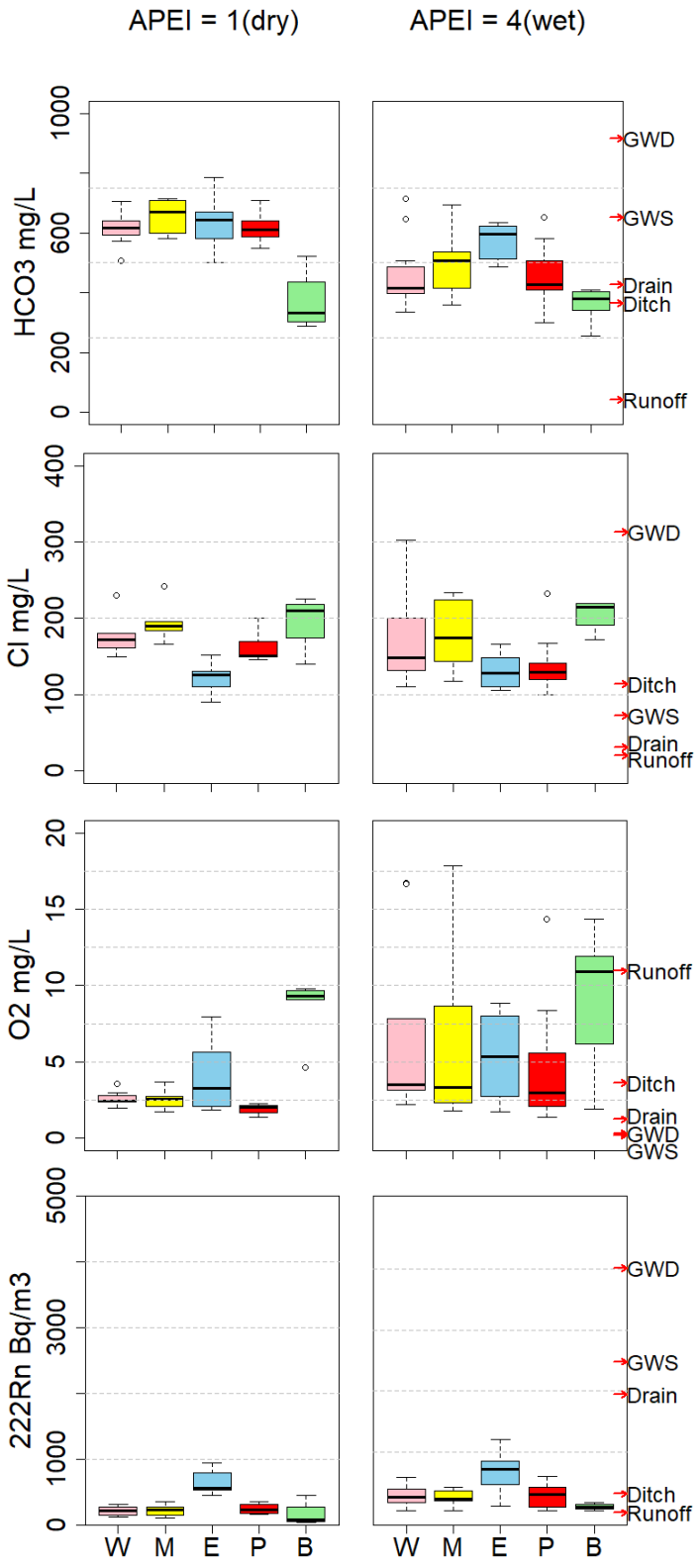

Figure 5 Summary of the measured HCO_3, Cl, O_2, ^{222}Rn, and pCO_2 concentrations in the surface water aggregating the 2016-2017 data for dry periods (APEI class = 1) and wet periods (APEI class = 4) The locations of W, M, E, and B represent the total of measurements in the West ditch, the Middle ditch, the East ditch and boezem water north of Geuzenveld, respectively. “P” represents the measurements at the pumping station. Red arrows are used to illustrate the median concentrations that were observed in the 2017 spatial survey (see section 3.1 and Figure 3). GWD: deep groundwater, GWS: shallow groundwater, Drain: drain water, Ditch: ditch water, Runoff: rain water.

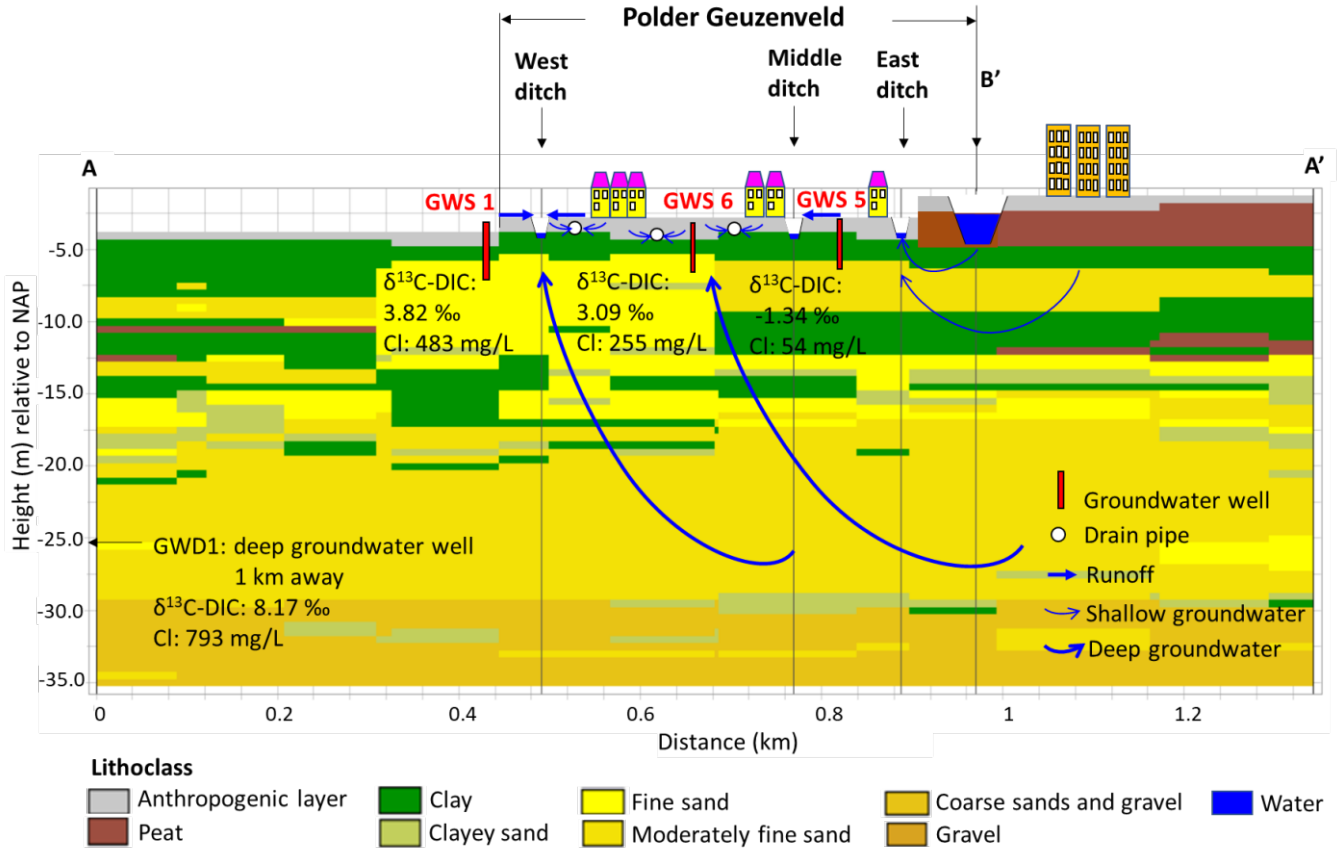

Figure 6 Interpreted flow routes along the SW-NE cross-section showing the most probable lithology as provided by geostatistical characterization in GeoTOP (Schokker et al., 2015) and the water levels that are maintained in the waterways. Cl and δ^{13}C-DIC data are shown for a number of shallow groundwater observation wells and the deeper groundwater sampled 1 km SW of the polder.

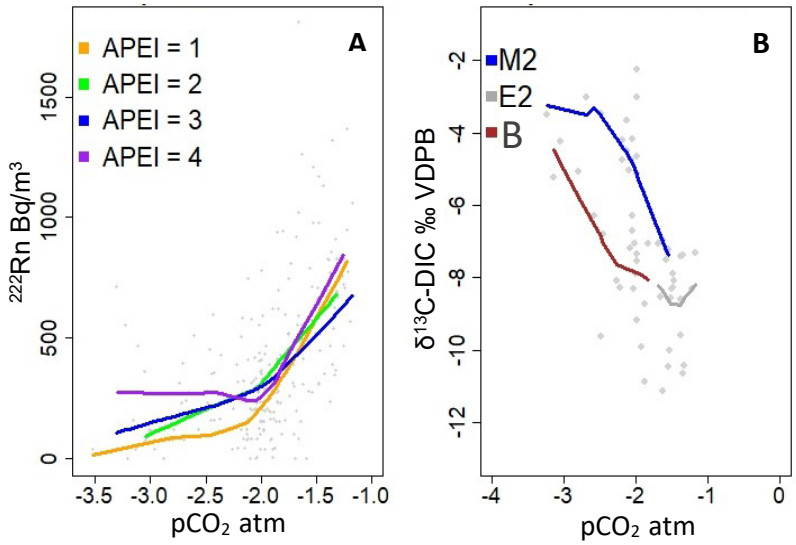

Figure 7 Relations between ^{222}Rn, $\delta^{13}C$-DIC and pCO_2 during the 2016-2017 monitoring campaign. A: ^{222}Rn versus pCO_2 for all 9 locations and divided over 4 APEI classes (1 = dry, 4 = most wet, LOWESS smooth represent the central tendency in the scatter), B: $\delta^{13}C$-DIC versus pCO_2 for the location B, M2 and E2. LOWESS trend lines (Cleveland, 1979) were used to identify patterns in the scatter plots.

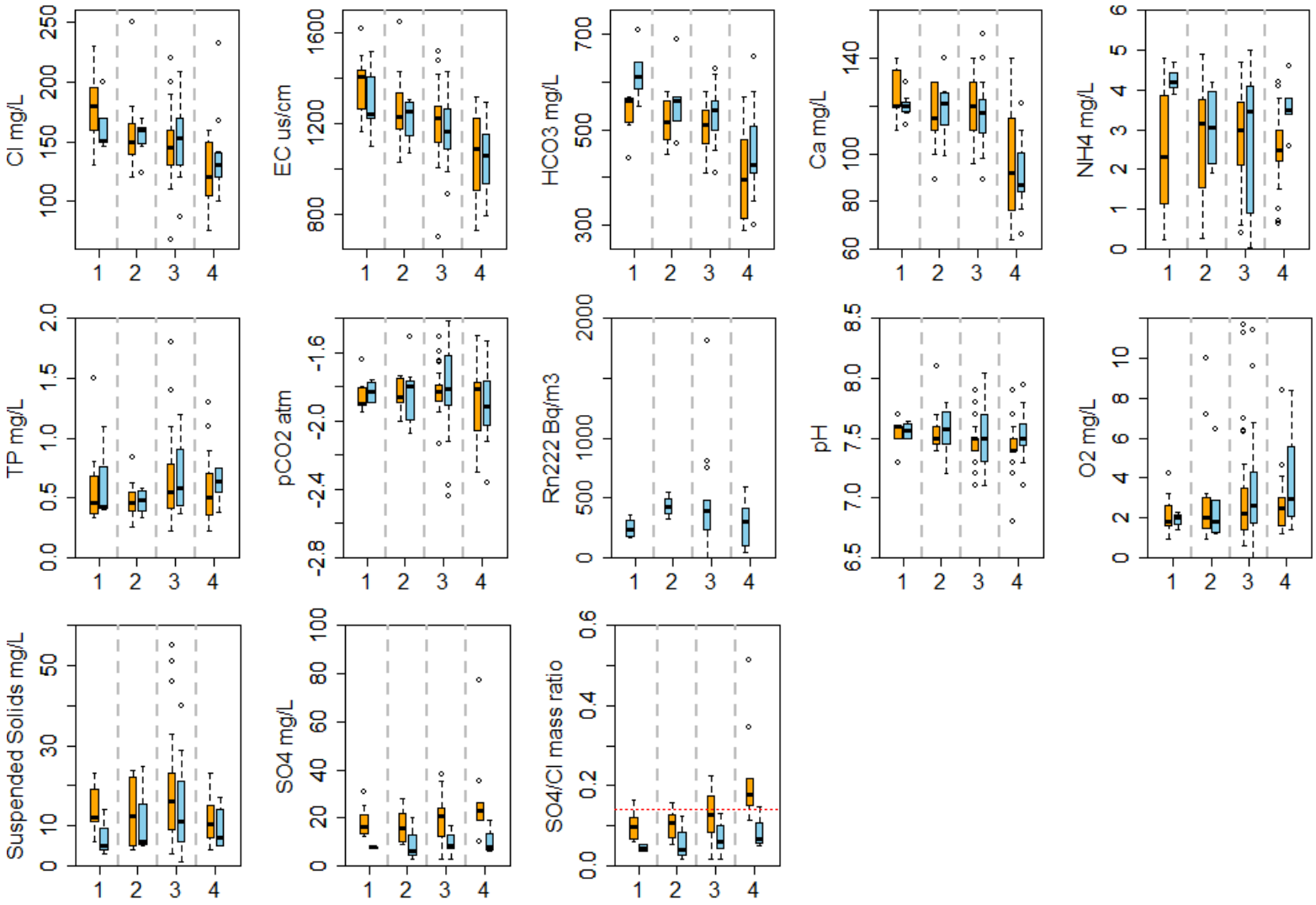

Figure 8 Water quality at the main outlet as a function of catchment wetness (APEI classes 1 to 4, very dry to very wet). Orange: 2006-2016 long time series, blue: monitoring campaign 2016-2017. Red dash line indicates in SO_4/Cl 0.14.