HYDROEGOLOGY JOURNAL – ELECTRONIC SUPPLEMENTARY MATERIAL

Defining the hydrogeological behavior of karst springs through an integrated analysis: a case study in the Berici Mountains area (Vicenza, NE Italy)

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Water level – discharge relations

Fig. S1 reports the graphical relationship between water level (recorded by data logger CTD-Diver) and discharge measurements, obtained for Nanto spring (Fig. S1a) and Mossano spring (Fig. S1b). For both spring, the graphical distribution of water level vs. discharge values are described by linear equations. The equations associated with each interpolation line were used to carry out the conversion of the hourly measurements of water level, recorded by data-logger CTD-Diver, in hourly discharge values. To obtain reliable conversion equations, 31 and 26 water level and discharge measurements were used for Nanto spring and Mossano spring, respectively. The choice to used two straight interpolation lines for each spring, rather than polynomial equations, is to avoid the overestimation/underestimation of the maximum and minimum values of discharge.

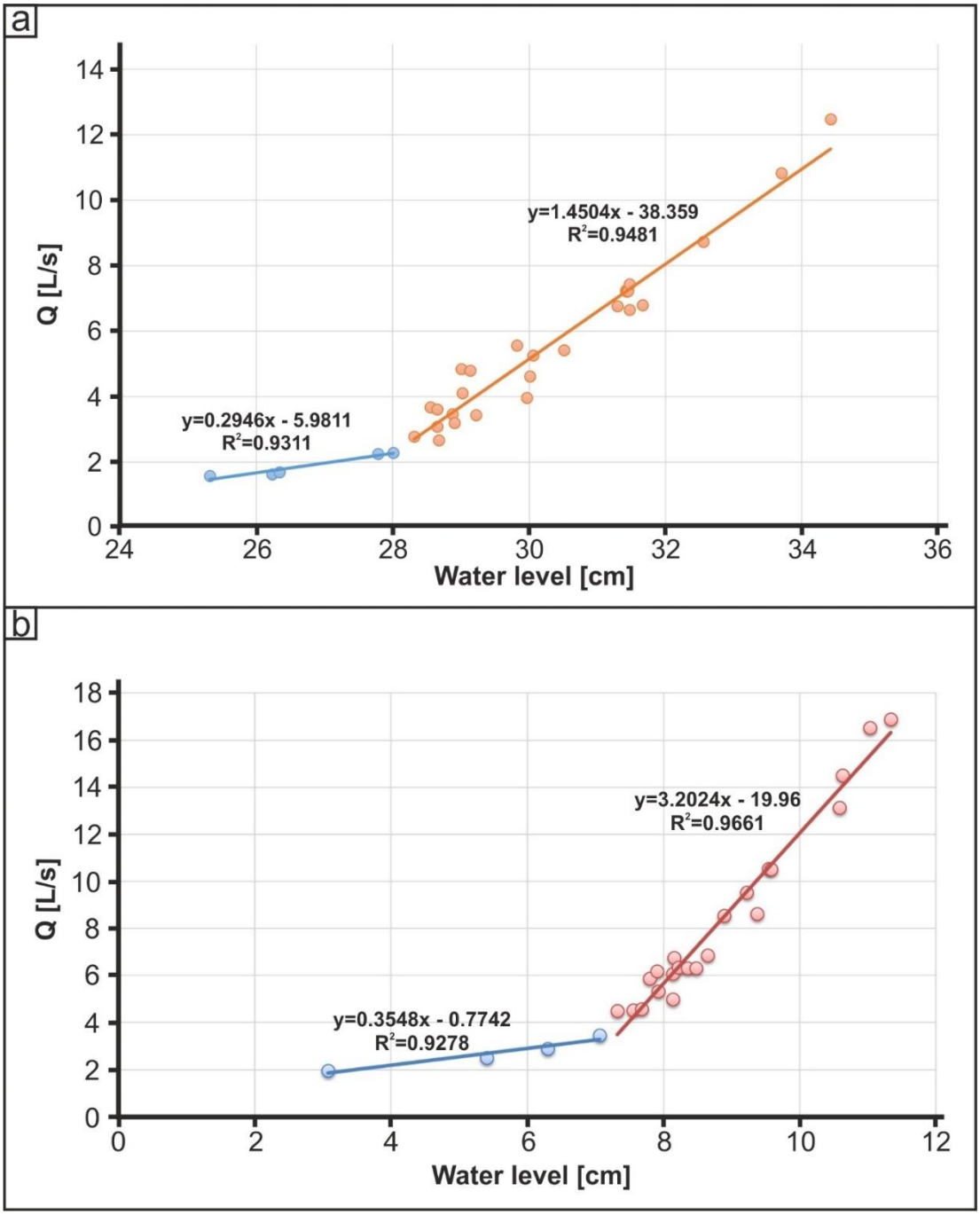
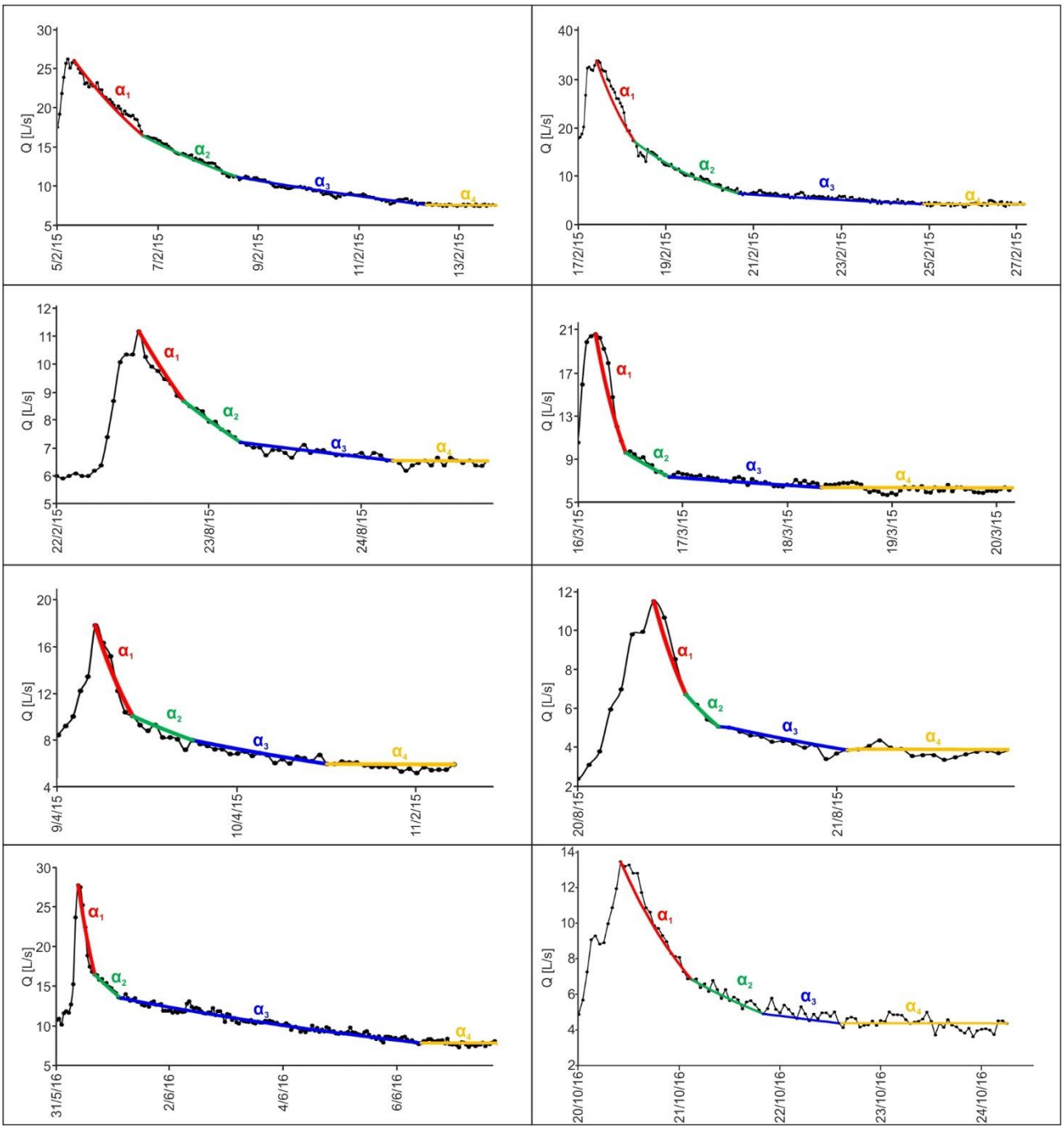


Figure S1 **a** Water level and discharge relations for Nanto spring. **b** water level and discharge relations for Mossano spring

Recession curve analysis

Fig. S2 and Fig. S3 show all the recession curves analyzed for Nanto spring and Mossano spring, respectively, in the monitoring period (January 2015 – June 2018). In Table S1 and Table S2, a summary statistic among all the analyzed recession curves for Nanto spring and Mossano spring, respectively, are reported. For each recession coefficient (α), the corresponding flow-type regime is defined. The recession coefficients with order of magnitude ranging between 1 and 10^{-1} are ascribable to a conduit dominant flow. The α values with order of magnitude of 10^{-3} are related to a diffuse dominant flow, while an intermediate mixed flow (between the conduit dominant flow and the diffuse dominant flow) is attributable to recession coefficients with order of magnitude of 10^{-2} (Baudement et al. 2017; Taylor and Green 2008). The amount of each recession curve analyzed was related to the data continuity, which was impacted by data logger malfunctions.



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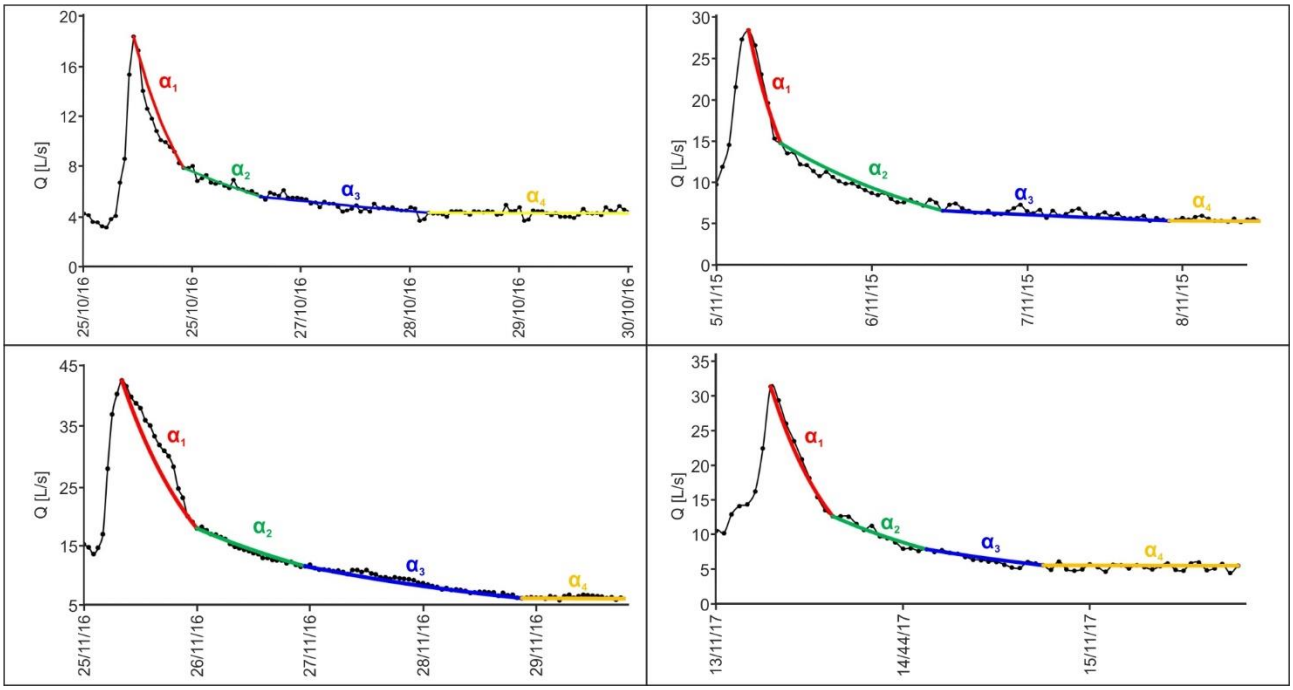

Figure S2 Recession curves analyzed for Nanto spring in the monitoring period (January 2015 to June 2018)

Table S1 Summary statistics of the recession coefficients (α) related to the recession curves analyzed for Nanto spring. Type of regime defined in according with Baudement et al. (2017) and Taylor and Green (2008)

Nanto Spring α	Minimum	Mean	Maximum	Type of regime
α_1	0.334	1.953	4.286	Conduit dominant flow
α_2	0.203	0.691	2.277	Conduit dominant flow
α_3	0.094	0.236	0.572	Conduit dominant flow
α_4	0.002	0.007	0.009	Diffuse dominant flow

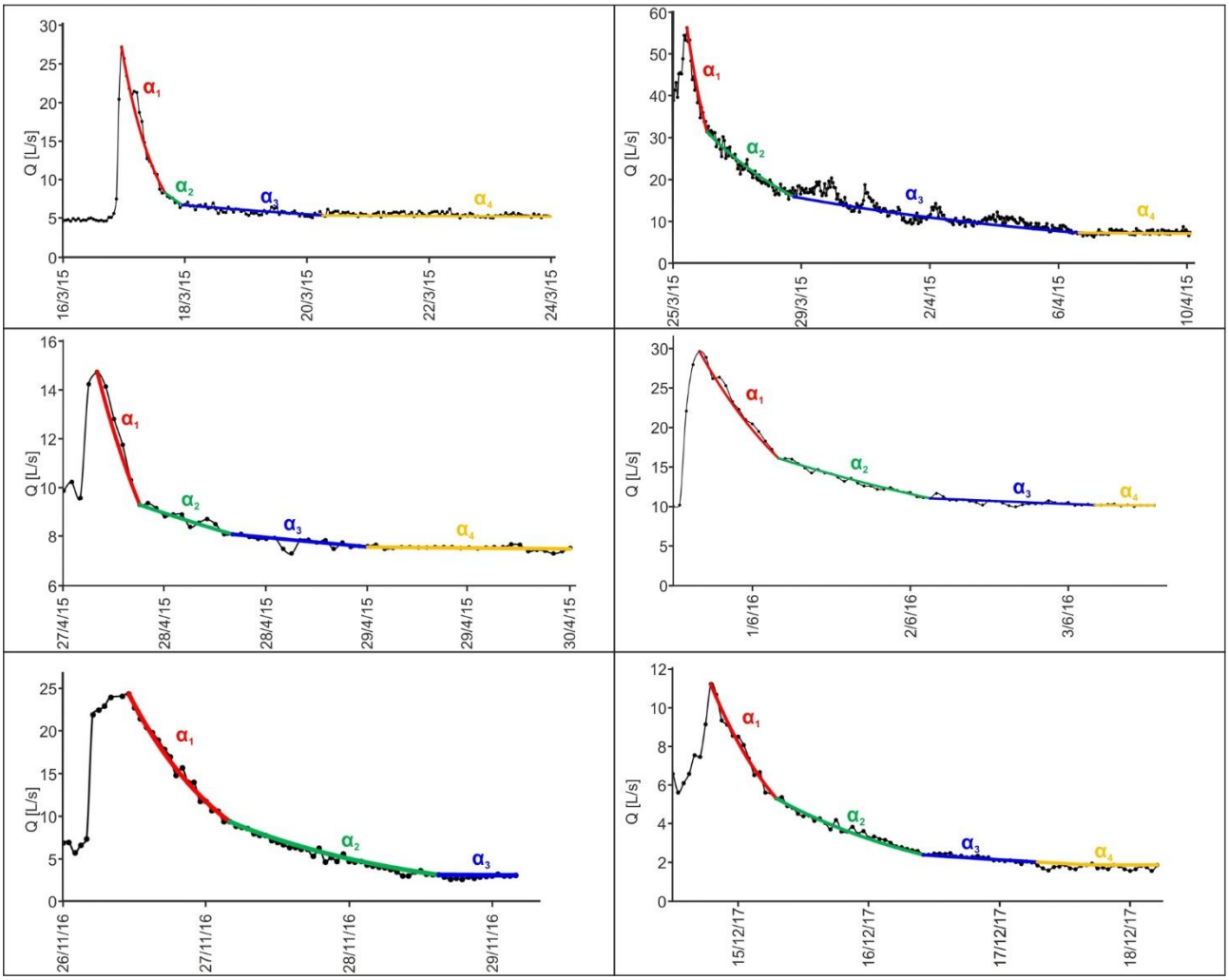

Figure S3 Recession curves analyzed for Mossano spring in the monitoring period (January 2015 to June 2018)

Table S2 Summary statistics of the recession coefficients related to the recession curves analyzed for Mossano spring. Type of regime defined in according with Baudement et al. (2017) and Taylor and Green (2008)

Mossano Spring α	Minimum	Mean	Maximum	Type of regime
α_1	0.933	1.478	2.206	Conduit dominant flow
α_2	0.250	0.521	0.741	Conduit dominant flow
α_3	0.035	0.099	0.200	Mixed flow
α_4	0.005	0.008	0.010	Diffuse dominant flow

ESM References

Baudement C, Arfib B, Mazzilli N, Jouves J, Lamarque T, Guglielmi Y, (2017) Groundwater management of a highly dynamic karst by assessing baseflow and quickflow with a rainfall-discharge model (Dardennes springs, SE France), Bull. la Soc. Geol. Fr. 188(6) https://doi.org/10.1051/bsgf/2017203

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