

## Supplementary material

**Supplementary Table S1.** In situ parameters and major ions of the Adige river waters collected in May 2015 and August 2016.

Location	Data	Source	pH	T	EC	TDS	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Na <sup>+</sup>	K <sup>+</sup>	Cl <sup>-</sup>
		d. Km									
<i>Resia (source)</i>	10/05/15	0	8.1	12	170	88	16.8	5.50	3.25	1.38	2.15
<i>S. Valentino alla Muta (BZ)</i>	09/08/16	0	8.2	15	180	142	14.7	4.46	1.72	0.90	0.90
<i>Glorenza (BZ)</i>	10/05/15	11	8.1	13	300	207	38.2	11.05	1.49	0.91	2.11
	09/08/16	11	8.2	14	380	952	47.7	14.65	1.37	0.92	1.10
<i>Spondigna BZ</i>	10/05/15	18	7.9	13	300	219	37.1	11.51	3.69	1.58	3.09
	09/08/16	18	7.9	15	350	641	38.3	11.42	3.42	1.95	4.31
<i>Tel BZ</i>	10/05/15	55	8.1	14	240	177	30.7	9.01	3.33	1.52	2.35
	09/08/16	55	8.0	12	250	334	26.4	6.40	1.67	1.15	1.23
<i>Andriano BZ</i>	10/05/15	85	7.9	15	170	115	19.8	5.46	2.75	1.47	1.91
	09/08/16	85	7.8	14	225	286	23.8	5.55	2.70	1.53	2.33
<i>Isarco - Bolzano</i>	11/05/15	92	8.0	12	140	119	20.1	4.93	3.18	1.34	2.57
	09/08/16	92	8.1	16	360	252	23.5	5.29	2.89	1.35	8.88
<i>Vadena Nuova BZ</i>	10/05/15	100	8.0	12	140	113	18.6	4.73	2.97	1.21	2.93
	09/08/16	100	8.1	16	290	317	24.9	5.78	2.64	2.98	5.12
<i>S. Floriano BZ</i>	10/05/15	115	8.0	13	170	120	20.5	5.32	3.07	1.22	2.62
	09/08/16	115	7.9	15	230	269	24.1	5.26	2.60	2.39	3.08
<i>Zambana TN</i>	10/05/15	135	7.8	13	170	124	21.4	5.62	3.39	1.28	3.12
	09/08/16	135	8.2	18	210	287	26.5	6.33	2.86	1.15	3.75
<i>Mattarello TN</i>	11/05/15	155	7.9	13	190	125	24.2	6.55	4.08	1.40	3.33
	09/08/16	155	8.0	14	205	263	25.1	6.12	2.85	1.74	3.17
<i>Pilcalte TN</i>	11/05/15	185	8.0	14	210	156	27.4	7.68	4.10	1.53	3.80
	10/08/16	185	7.9	15	220	258	21.2	6.21	3.07	1.74	3.65
<i>Brentino Belluno VR</i>	11/05/15	205	7.9	14	190	154	26.2	6.83	3.62	1.25	3.25
	10/08/16	205	7.9	15	225	285	25.1	7.35	3.12	1.72	3.38
<i>Parona VR</i>	11/05/15	235	8.1	15	200	153	29.8	7.01	4.59	1.55	3.93
	10/08/16	235	7.9	16	240	307	27.5	7.23	3.32	1.76	4.31

<i>Zevio VR</i>	11/05/15	265	8.5	18	200	131	24.8	6.45	4.58	1.50	4.53
	10/08/16	265	7.9	18	240	308	27.0	7.48	3.63	1.91	4.44
<i>Bonavigo VR</i>	11/05/15	290	8.1	18	210	141	29.5	7.31	4.97	1.60	4.28
	10/08/16	290	8.1	18	260	323	27.2	7.44	3.50	1.94	4.63
<i>Badia Polesine RO</i>	11/05/15	315	n.a.	n.a.	n.a.	155	28.3	6.96	5.15	1.87	4.60
	10/08/16	315	7.9	20	310	315	28.2	8.33	3.77	2.08	4.54
<i>Boara Pisani RO</i>	11/05/15	320	8.0	17.0	210	169	42.2	9.71	7.19	3.19	4.70
	10/08/16	320	8.1	22.0	330	280	26.4	7.34	3.33	2.70	4.87
<i>Rosolina Mare RO</i>	11/05/15	385	8.0	18.0	210	150	30.6	6.85	5.79	2.79	5.19
	10/08/16	385	8.1	23.0	340	309	30.4	7.57	3.51	2.98	5.03

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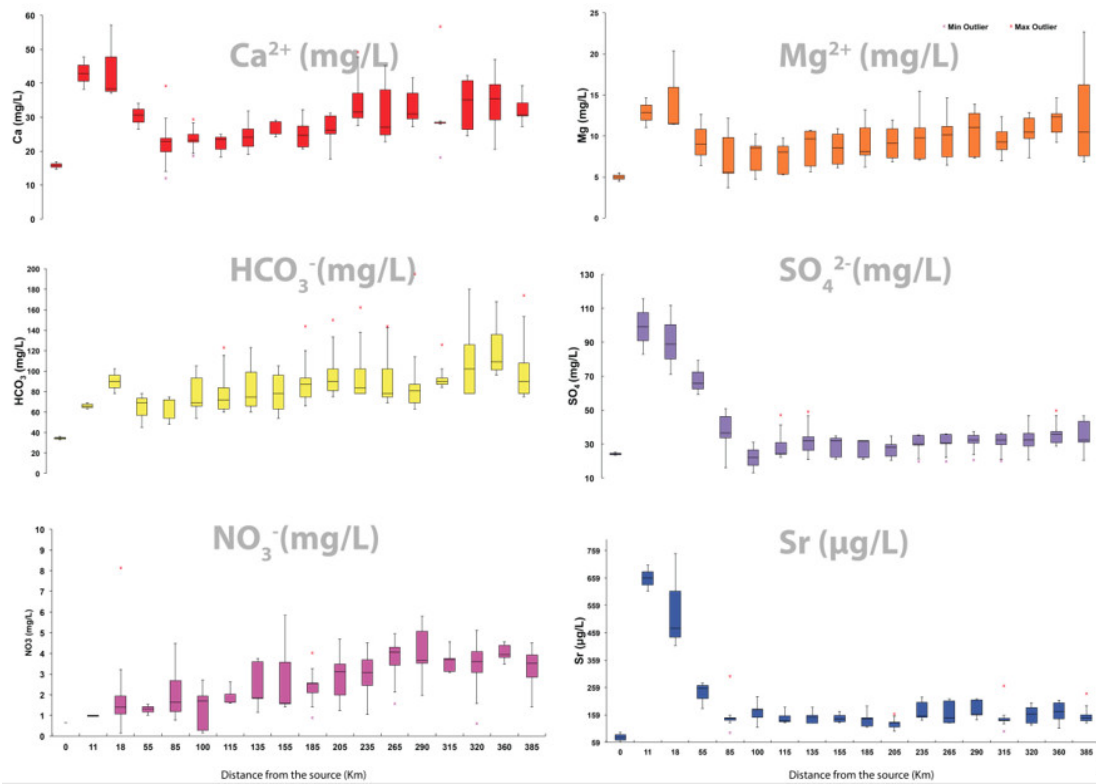
**Supplementary Table S2.** Boron isotopic composition ( $\delta^{11}\text{B}$ ) of rainfall collected at Pacengo di Lazise (VR) in the Adige river catchment.

	Site	$\delta^{11}\text{B}\text{‰}$
GCL1-18		7.4
GCL2-18		9.1
GCL3-18	Pacengo di L. (VR)	11.8
GCL4-18		24.3
GCL5-18		7.3

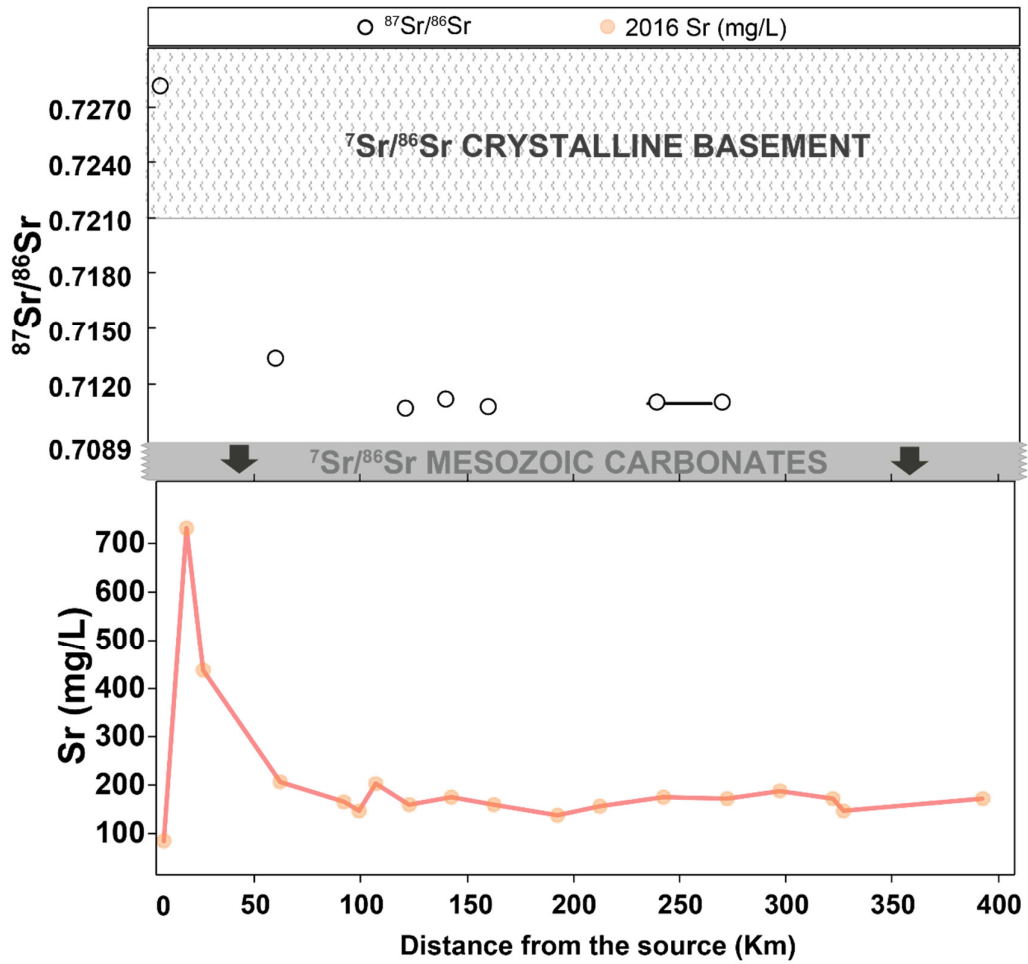
**Supplementary Table S3.** Discharge and TDS values recorded at Boara Polesine site (RO), in the lower part of the Adige river catchment. Dissolved fluxes were also calculated from these data. Data recorded in August 2013, May 2014, March 2015, May 2015 are reported in Natali et al. [18]. Data recorded from September 2016–July 2017 are reported in Chiogna et al. [34].

	Q (m <sup>3</sup> /s)	TDS (mg/L)	Dissolved flux t/day
August 2013	172	226	3,359
May 2014	409	207	7,315
March 2015	172	270	4,012
May 2015	210	210	3,810
August 2016	288	330	8,211
September 2016	97	229	1,918
January 2017	90	249	1,934
April 2017	82	255	1,792
July 2017	73	326	2,059

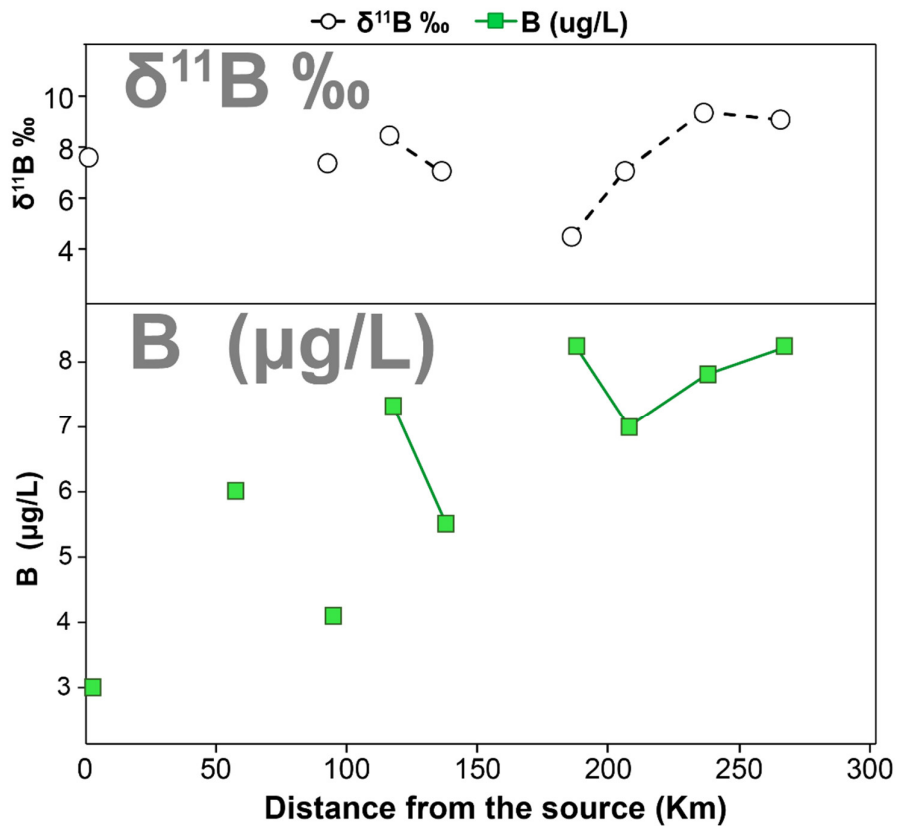
## Supplementary Figures



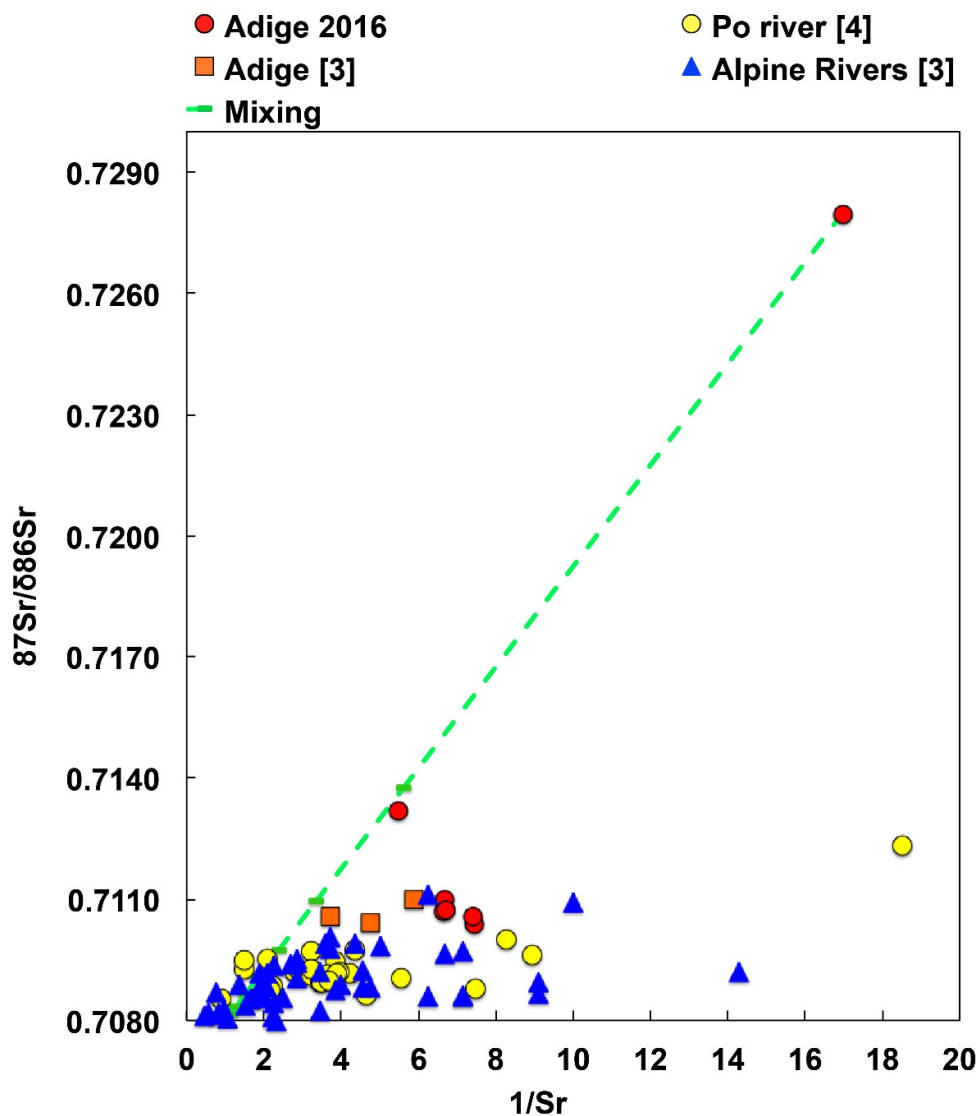
**Supplementary Figure S1.** Composition of the main dissolved components along the River Adige flow path. Data used for this representation are from the present work and from previous papers by Natali et al. [18] and Chiogna et al. [34].



Supplementary Figure S2. Spatial variation of Strontium and relative isotopic composition ( $^{87}\text{Sr}/^{86}\text{Sr}$ ) in Adige river water.



Supplementary Figure S3. Spatial variation of Boron and the relative isotopic composition ( $\delta^{11}\text{B}$ ) in Adige river water.



**Supplementary Figure S4.** Binary diagram reporting the  $1/\text{Sr}$  and the relative isotopic composition  $^{87}\text{Sr}/^{86}\text{Sr}$  of the Adige river waters presented in this paper together with the Po river waters [4] and the isotopic values of the main Alpine rivers [3]. A dashed green line represents the mixing between a carbonate water end member (low  $^{87}\text{Sr}/^{86}\text{Sr}$ , Tagliamento river) and silicate water end member (high  $^{87}\text{Sr}/^{86}\text{Sr}$ , Adige river source).