

Where Does the Chilean Aconcagua River Comes from? Use of Natural Tracers for Water Genesis Characterization in Glacial and Periglacial Environments

Supplementary Materials

Table S1. Stagnant waters electrical conductivity and stable isotopes composition.

Site	EC $\mu\text{S cm}^{-1}$	SD	CV%	$\delta^{18}\text{O}$	SD	CV%	$\delta^2\text{H}$	SD	CV%
Inca lagoon	167	6	4	-14.58	0.25	1.7	-109.88	1.41	1.3
Del Nacimiento wetland	507	43	9	-16.75	0.10	0.6	-123.42	0.42	0.3
Juncal Norte Wetland	218	14	6	-15.82	0.08	0.5	-115.83	0.38	0.3

Table S2: Model average seasonal contribution proportion from water sources different than snow, from glacial, periglacial and groundwater systems.

Season	Contribution
Summer 18	0.67
Outumn 18	0.73
Winter 18	0.68
Spring 18	0.51
Summer 19	0.67
Outumn 19	0.66

Table S3: Total water source contribution for each analysis.

Water source	A	B	C	Analysis average
Glacial	0.28	0.20	0.15	0.21
Periglacial	0.22	0.15	0.13	0.17
Snow	0.31	0.35	0.38	0.35
Groundwater	0.19	0.31	0.33	0.28

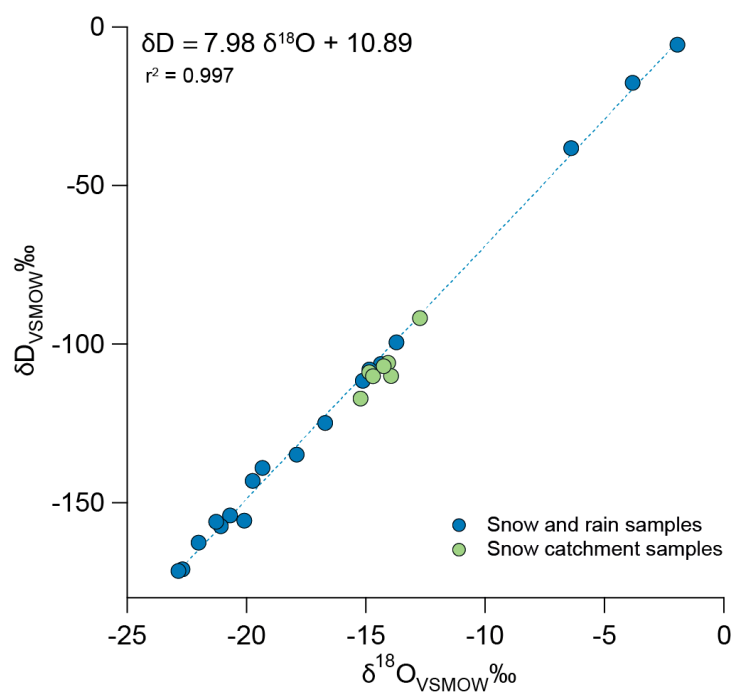


Figure S1. Local meteoric water line and snow catchments. The LMWL was constructed with precipitation samples (blue points) collected during 2018 and 2019. Green points show the snow catchment basin samples.

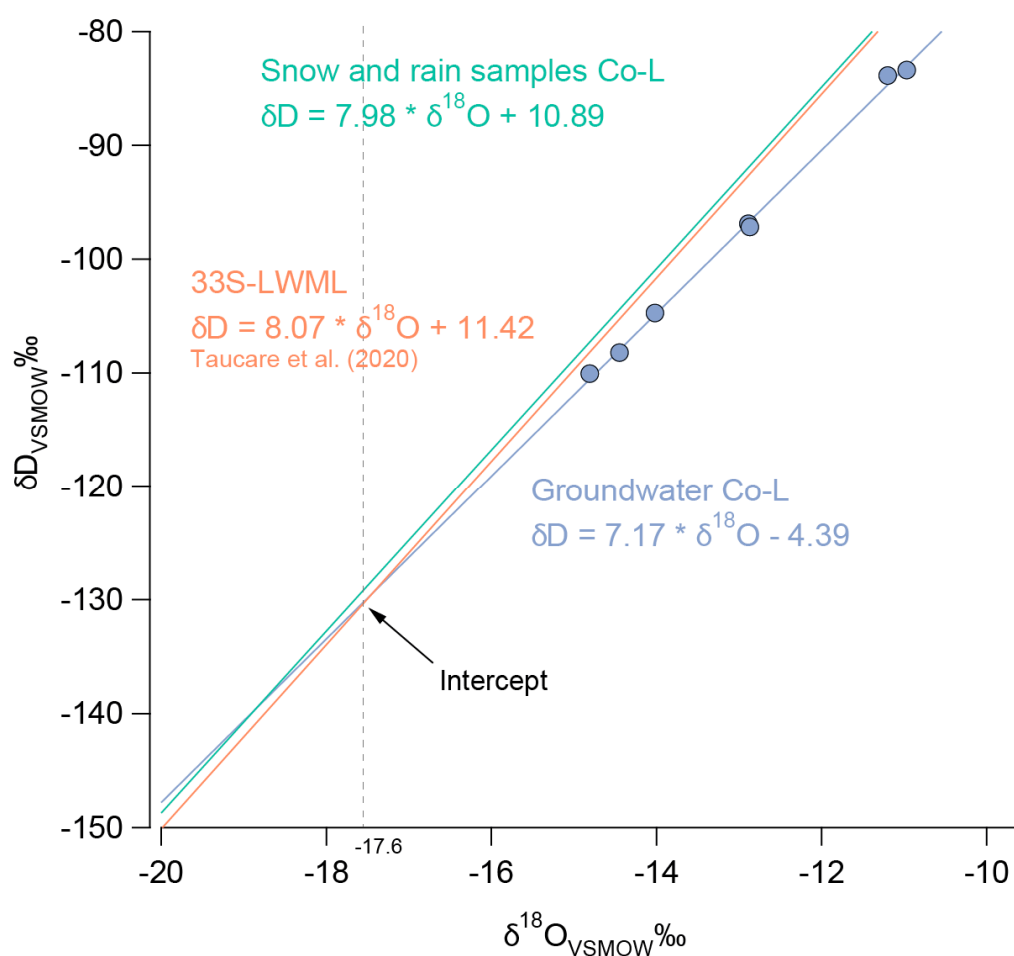


Figure S2. Local meteoric water lines from Taucare et al. [45] in orange and from this work (green) and our groundwater (blue) [45].

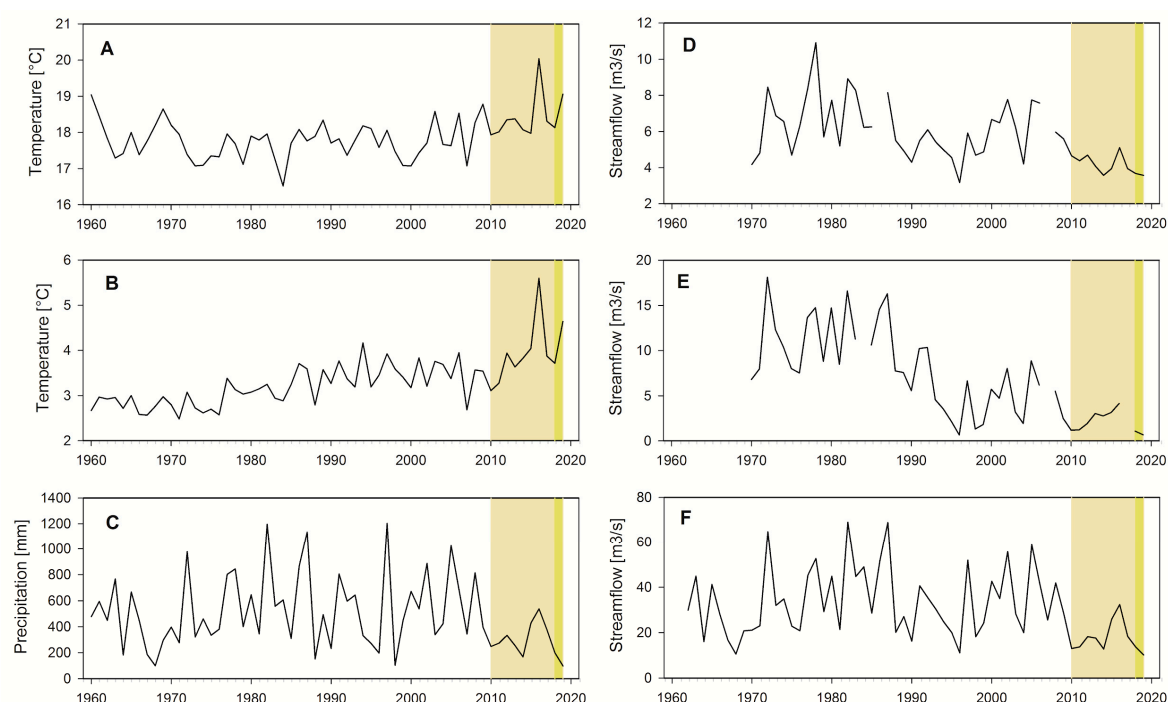


Figure S3. Historical variability of the maximal (panel A) and minimal (panel B) temperature, and precipitation (panel C) near the confluence of Blanco and Juncal rivers. The temperature records were obtained from the TerraClimate Google Earth Engine and the precipitation data came from the Riecillos hydrological gauge, located at 1,290 m a.s.l. (32.9228°S - 70.3553°W) and administered by the Water National Agency (DGA). The streamflow records of the Juncal (panel D) and Blanco (panel E) rivers at 1,800 and 1,420 m a.s.l respectively, were used to characterize the headwaters changes in the superficial river flow, while a longer streamflow record from the Chacabuquito hydrological gauge (32.8503°S - 70.5094°W; 950 m a.s.l) was also included in the (F) panel to provide a longer hydrological perspective of the Aconcagua River. The yellow shade denotes the period of the megadrought starting in 2010. A darker yellow area denotes the years 2018 and 2019, when the sampling was developed. Note the extreme characteristic of these two years, being one of the warmest and driest of the complete historical climate and hydrological available records for the area.

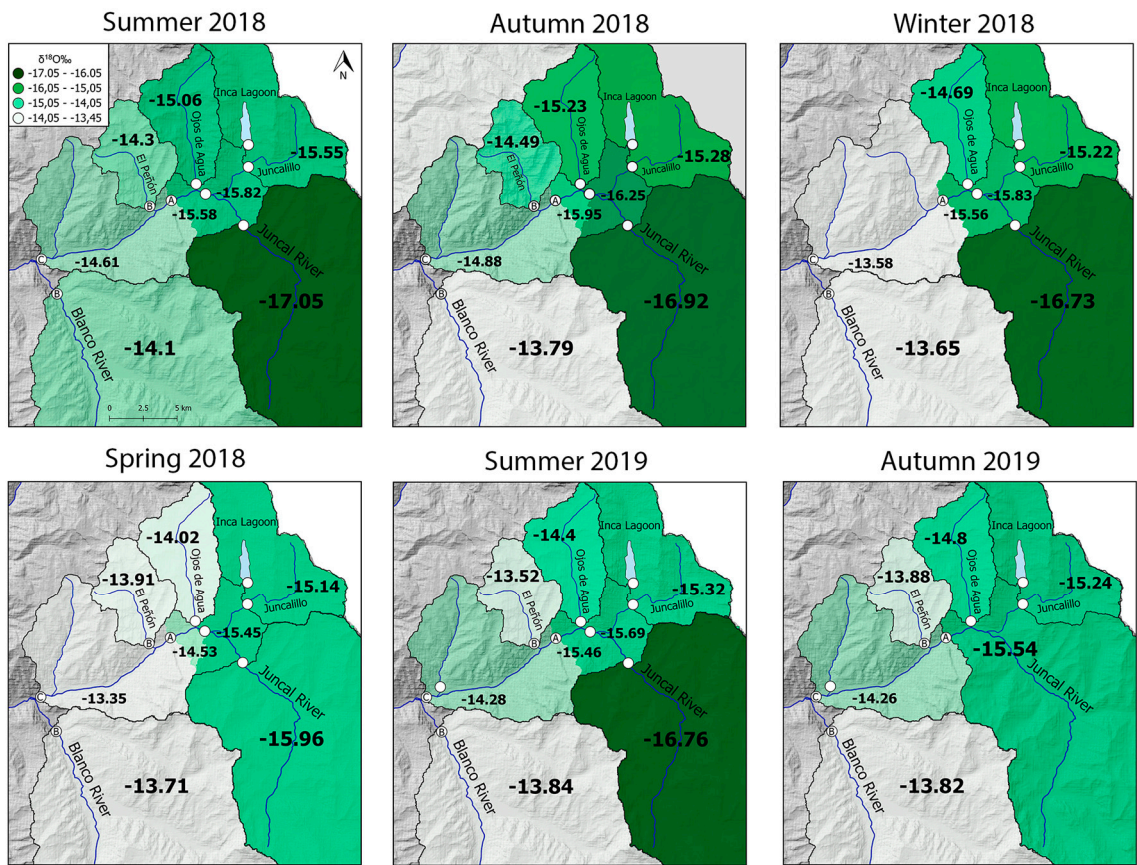


Figure S4: Aconcagua River headwaters seasonal isomap.

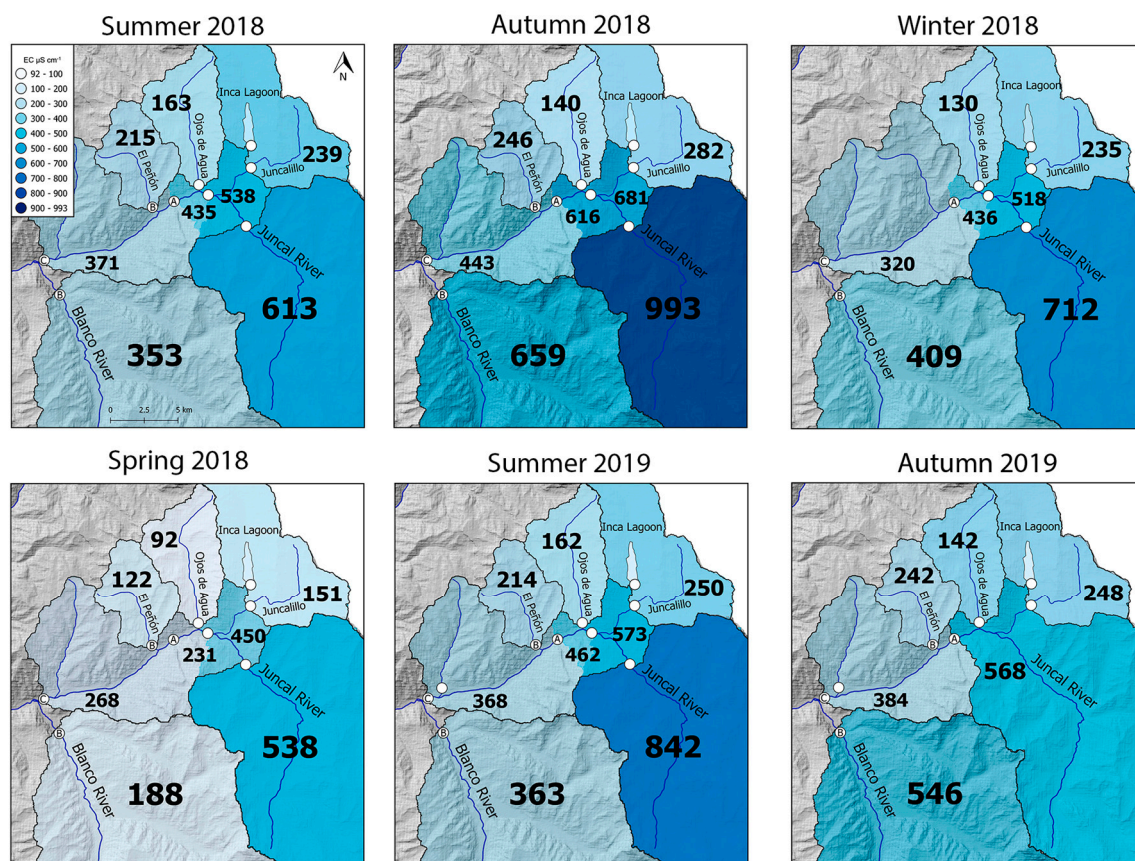


Figure S5: Aconcagua River headwaters seasonal electric conductivity map.



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