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Atmosphere–cryosphere interactions during the last phase of the Last Glacial Maximum (21 ka) in the European Alps

Costanza Del Gobbo et al.

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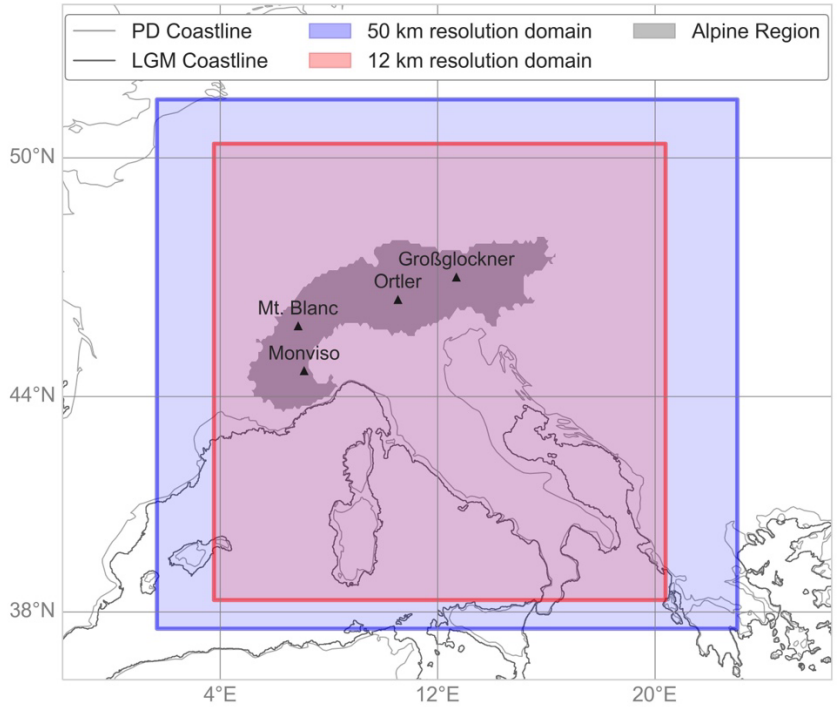

Figure S1: RegCM4 simulation domains. In blue the 50 km resolution domain and in red the 12 km resolution domain.

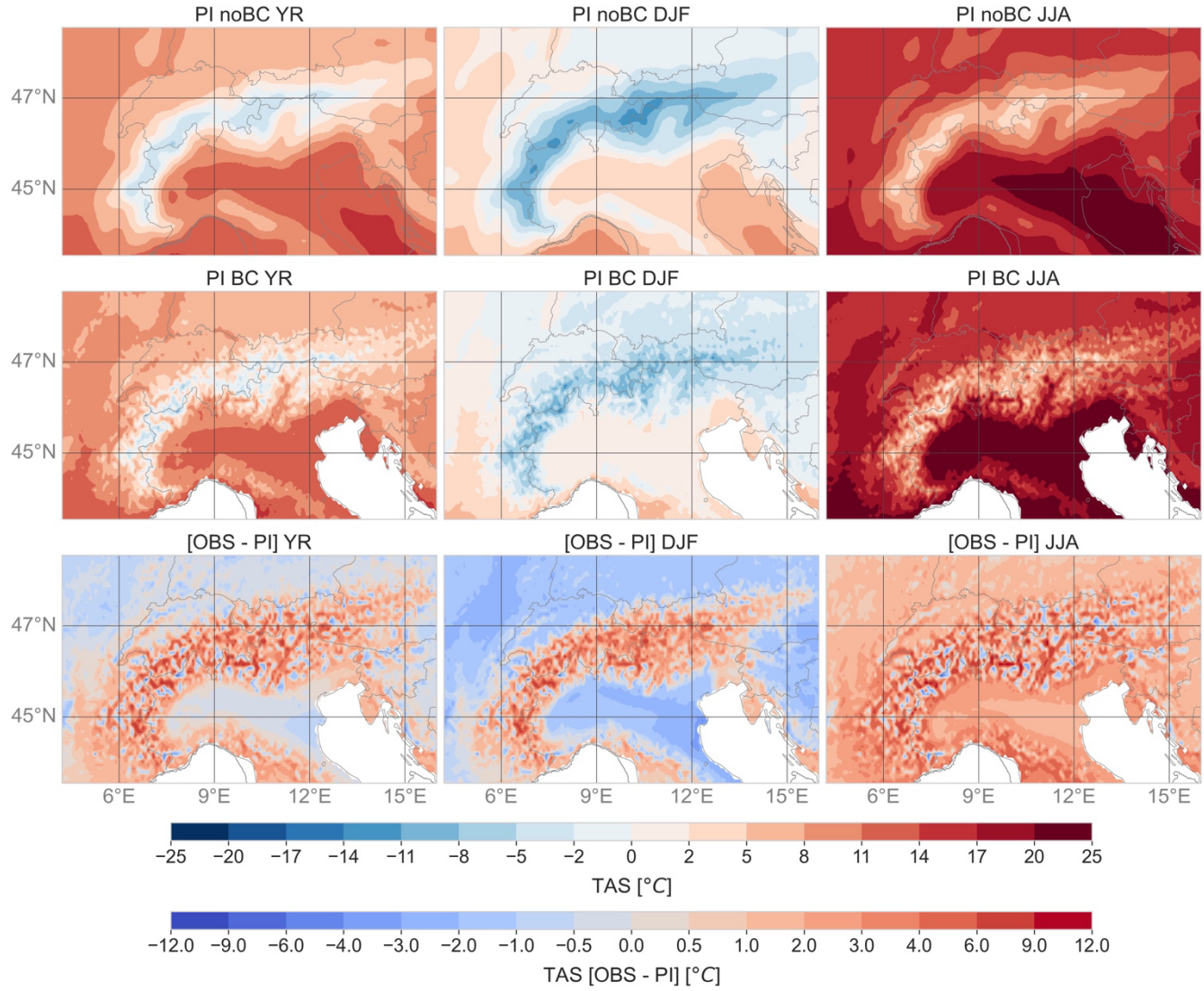

Figure S2: In the columns, yearly, winter and summer temperatures for PI non-bias (first row) and bias-corrected (second row) RegCM4 data, and their bias (third row).

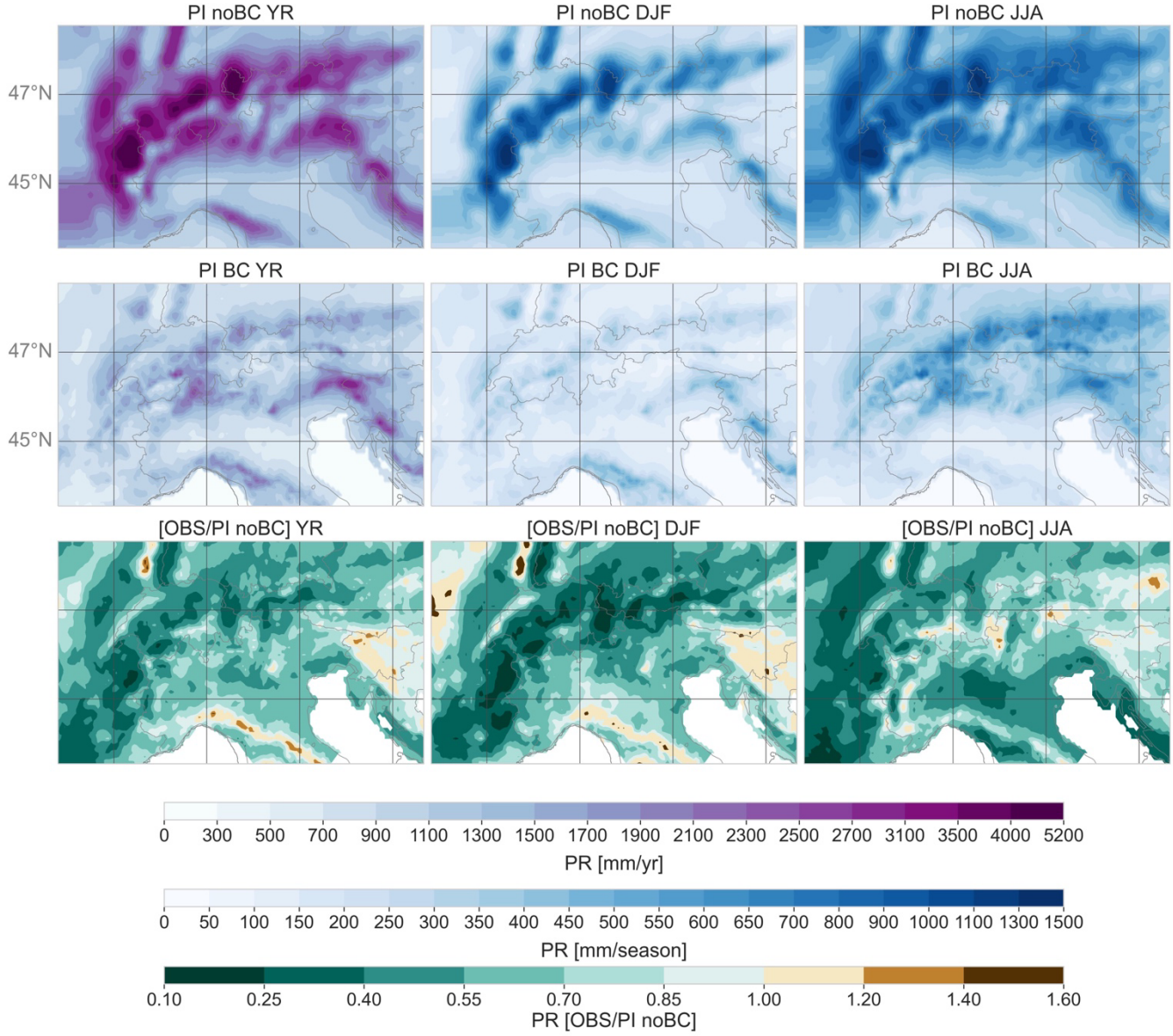

Figure S3: In the columns, yearly, winter and summer precipitation for PI non-bias (first row) and bias-corrected (second row) RegCM4 data, and their bias (third row).

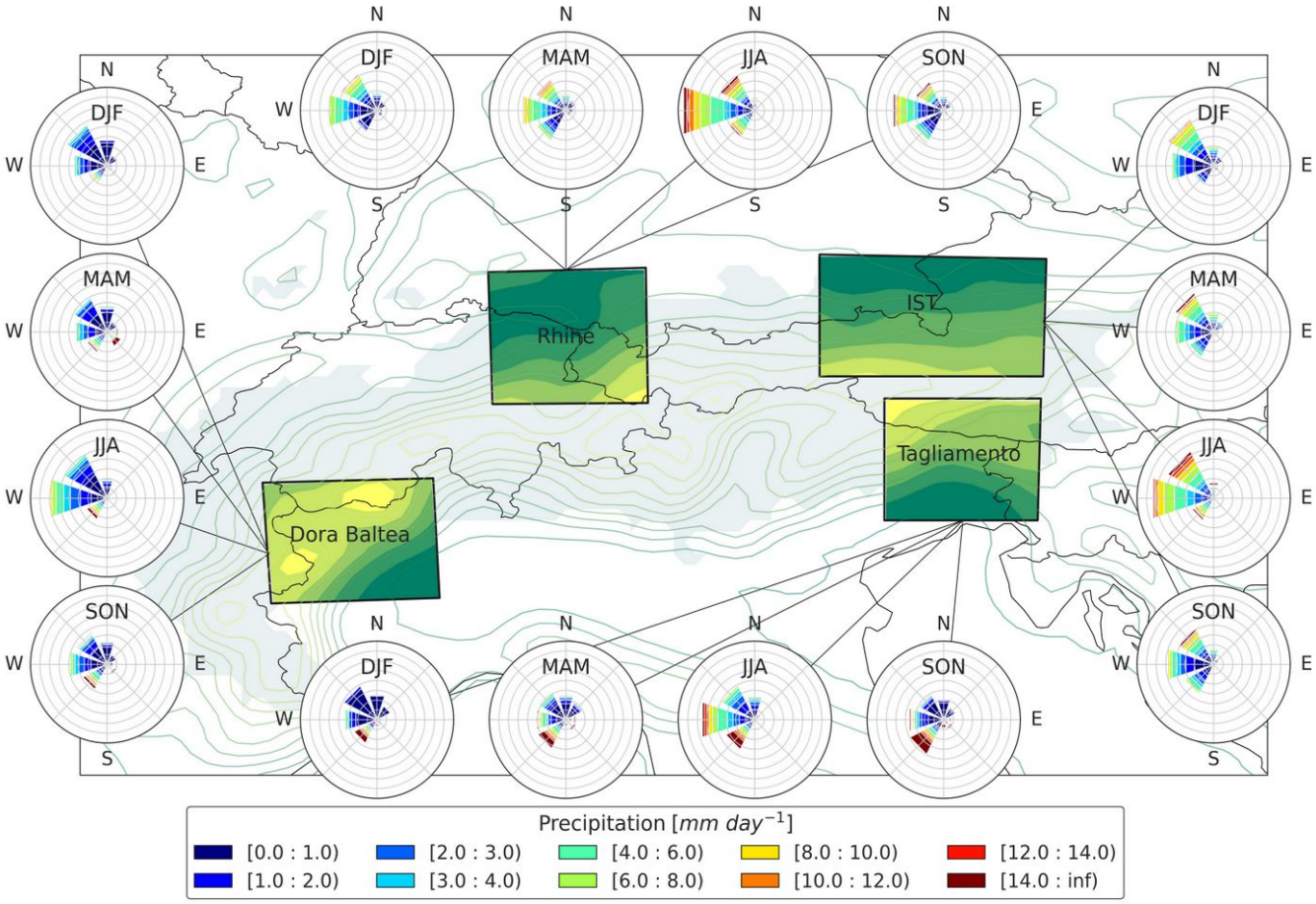

Figure S4: PI seasonal wind origins associated to each of the 19 simulated years precipitation event. This has been done for Rhine, Inn-Salzach-Traun (IST), Tagliamento and Dora Baltea glacier subdomains. Windroses show the main wind directions under the condition that precipitation events occur. Colours represent precipitation intensity in millimetres and colour band width is the frequency of a given precipitation intensity per wind direction. The shadow in the map is the glacier extension (Ehlers et al., 2011), the colour lines as well as the full colour in the boxes represent the topography (yellow for higher elevation and green for the lowers) and the black line is the present-day political boundary.

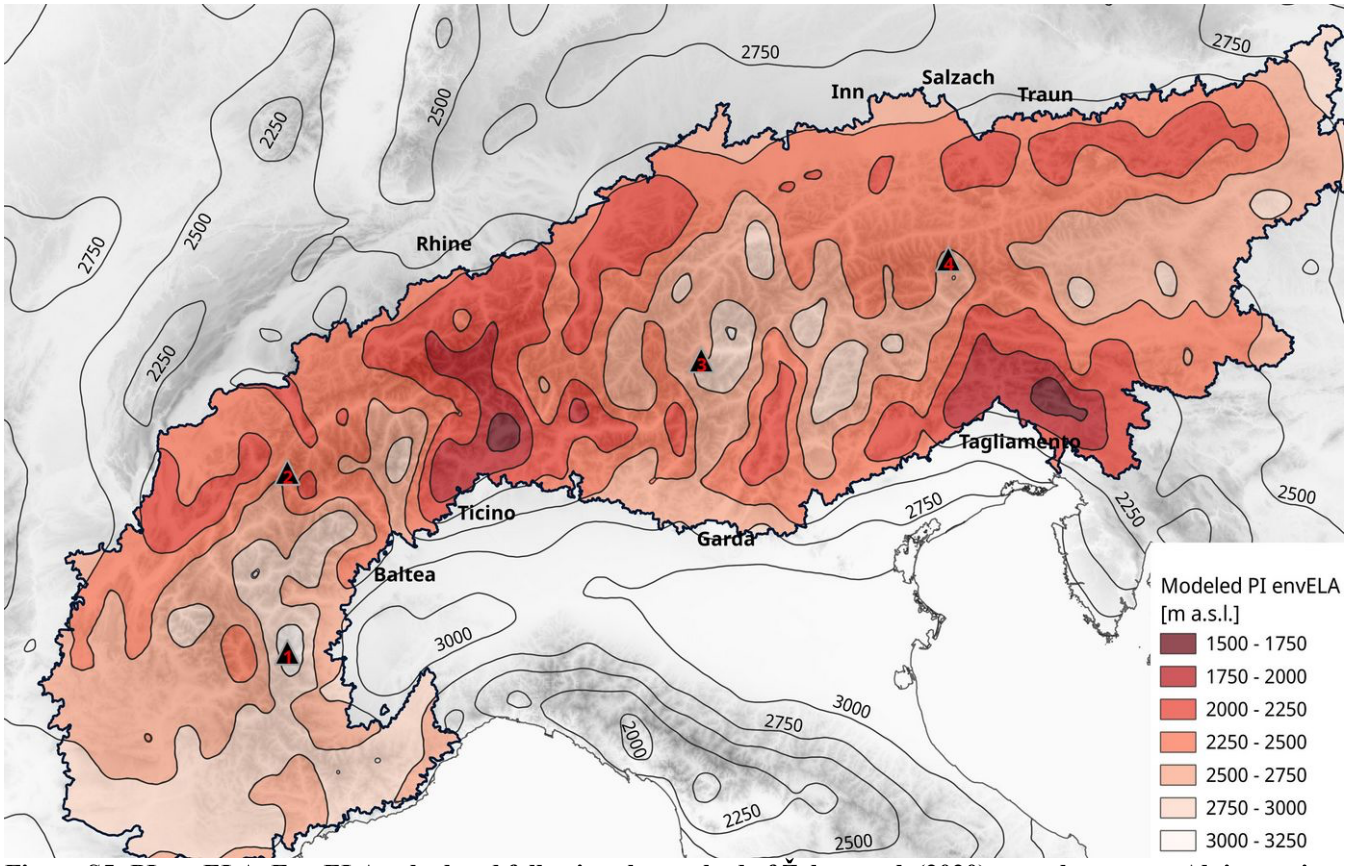

Figure S5: PI envELA. Env ELA calculated following the method of Žebre et al. (2020) over the greater Alpine region. The black triangles indicate: 1) Monviso, 2) M. Blanc, 3) Ortler, and 4) Großglockner.

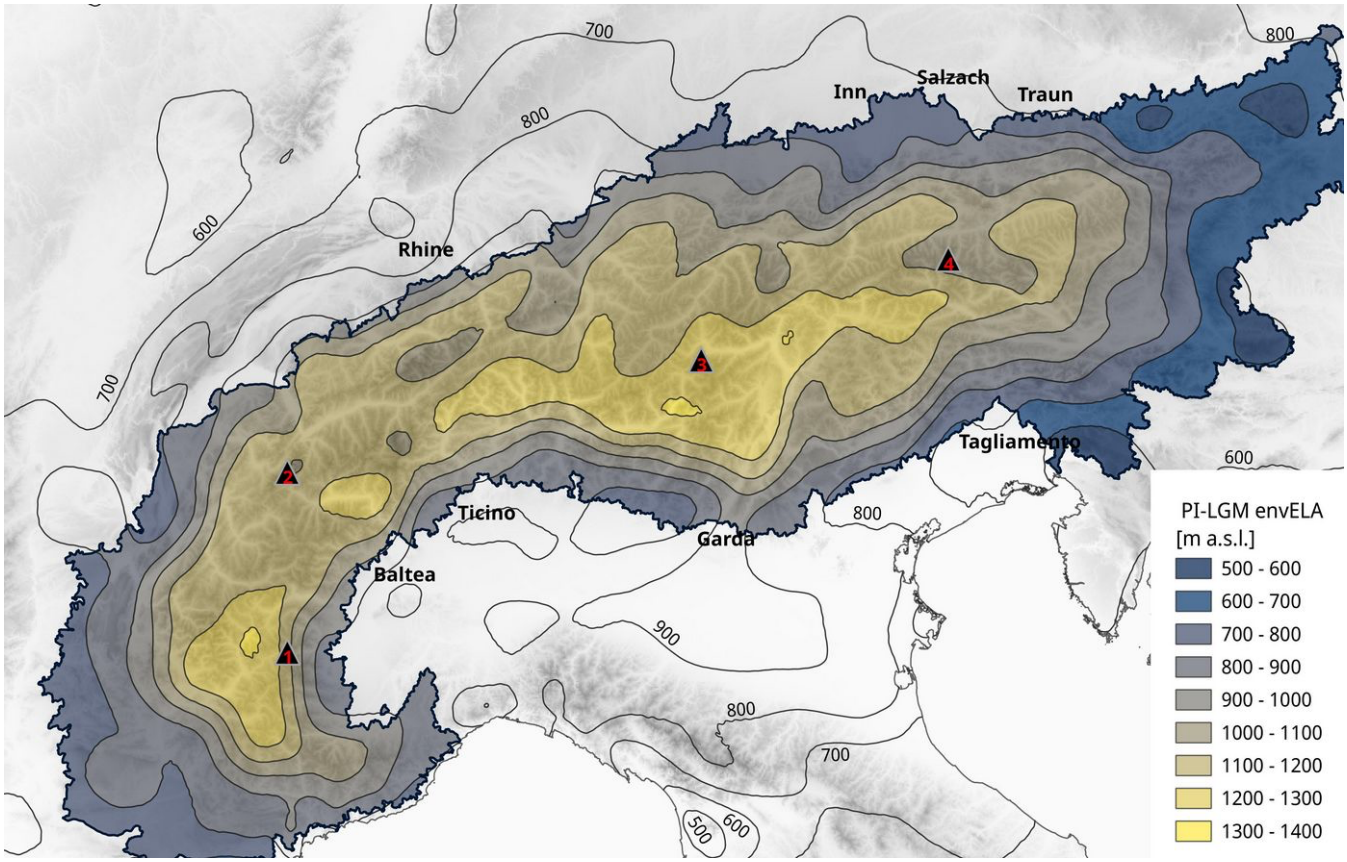

Figure S6: EnvELA drop. Env ELA difference from PI to 21 ka BP over the greater Alpine region. The black triangles indicate: 1) Monviso, 2) M. Blanc, 3) Ortler, and 4) Großglockner.

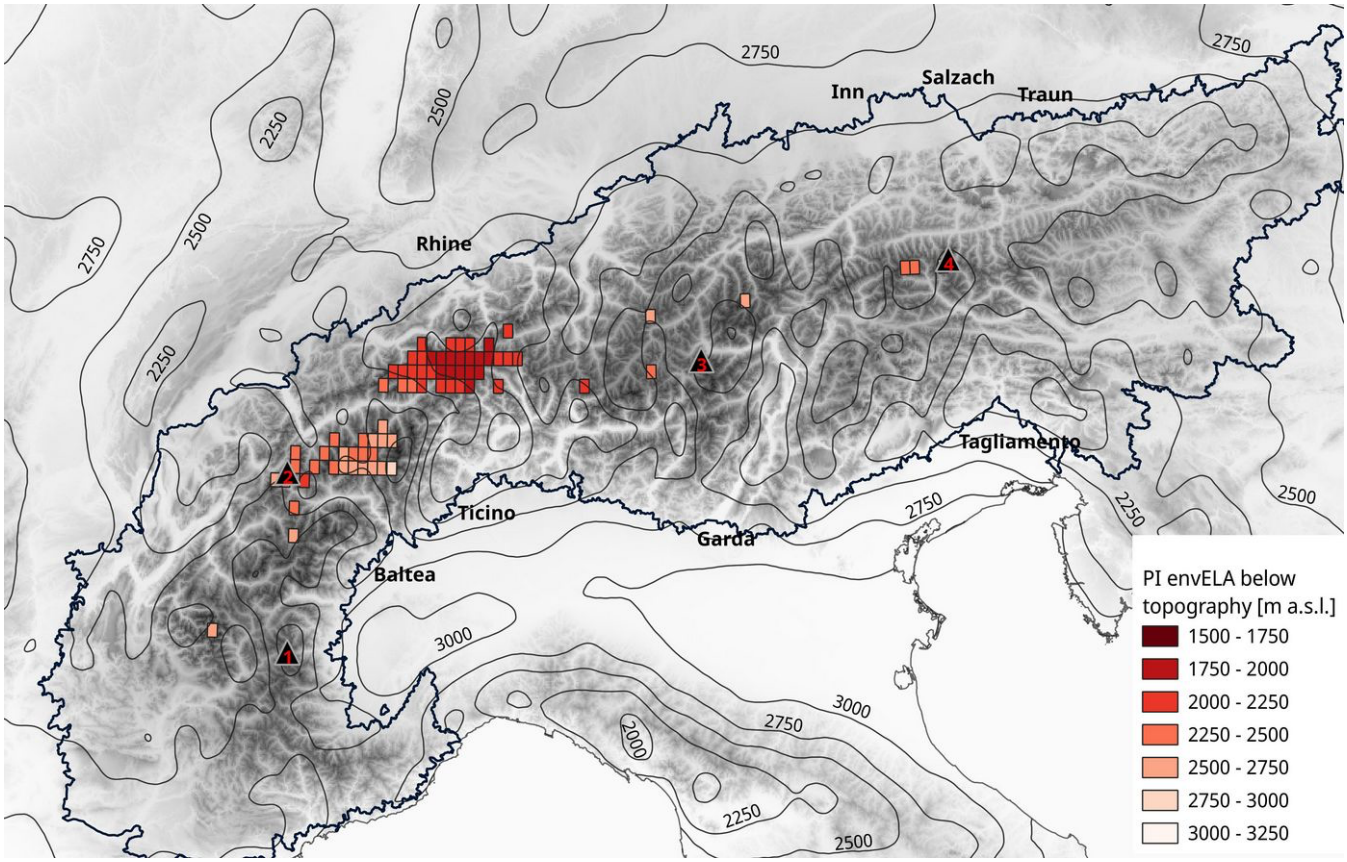

Figure S7: Comparison between PI EnvELA and topography: grid-cells where the envELA is lower than the topography are shown in the map. The black thick line represents the greater Alpine region. The black triangles indicate: 1) Monviso, 2) M. Blanc, 3) Ortler, and 4) Großglockner.

		ΔT_{JAN}		ΔT_{JUL}		ΔP_{JAN}		ΔP_{JUL}	
LAT	**LON**	**Proxy**	**RegCM**	**Proxy**	**RegCM**	**Proxy**	**RegCM**	**Proxy**	**RegCM**
†47.73	6.5	-17.6	-9.5	-11.8	-5.1*	-17.0	-13.0	-23.7	-18.4
†45.67	4.89	-11.4	-7.7	-7.6	-5.4	-19.4	-1.5	5.3	5.6
‡45.27	11.74	-23.0	-10.2*	-9.6	-6.5*	/	/	/	/

Table S1: 21 ka BP-PI temperature and precipitation anomaly of January and July. The values are averaged over the 19 years of the RegCM4 simulations considering the nearest model grid point to the pollen site. Pollen-based reconstructions are from: Wu et al. (2007)† that provide a central value and a 95% confidence interval corresponding ±60 mm month⁻1 for precipitation anomaly, ±10– 20 °C for January temperature anomaly and ±3–5 °C for July temperature anomaly; and Pini et al. (2022)‡ whose error is 4.4 °C for ΔT_{JAN} and 2.0 °C for ΔT_{JUL}. * The value falls out of 95% confidence interval or the method error range.