



## **The future evolution of the Alpine zero-degree line**

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A range of recent studies and national climate scenario initiatives have shown that 21st Century global climate change will also importantly affect the climate of the European Alps. Among others, a continued near-surface warming larger than the global mean warming is consistently projected, with the average warming rate depending on the emission scenario considered. The projected warming pattern is subject to some horizontal variability and also shows elevation dependencies. These factors will influence the future evolution of the regional zero-degree line elevation in the Alps. This elevation, in turn, often serves as an illustrative but also quantitative proxy for climate change impacts on different sectors.

We here assess the future evolution of the zero-degree line in the European Alps under different emission scenarios. For this purpose the EURO-CORDEX regional climate projection ensemble is exploited. The zero-degree line evolution is analyzed in the raw climate model output and, focusing on the region of Switzerland, in bias-corrected scenario products. Overall, we find a consistent rise of the zero degree line elevation with some seasonal and regional variation. In Switzerland, for instance, the mean winter zero-degree line is projected to rise from today's ~800m to ~1700m by the end of the Century and for the strong RCP8.5 emission scenario. The rise per degree Celsius warming approximately corresponds to standard atmospheric lapse rates in today's climate.