



21st Century Climate Change in the European Alps

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The Alps are particularly sensitive to global warming and warmed twice as much as the global average in the recent past. In addition, the Alps and its surroundings are a densely populated areas where society is affected by climate change in many ways, which calls for reliable estimates of future climate change. However, the complex Alpine region poses considerable challenges to climate models, which translate to uncertainties in future climate projections. Against this background, the present study reviews the state-of-knowledge about 21st century climate change in the Alps based on existing literature and additional analyses.

It will be demonstrated that considerable and accelerating changes are not only to be expected with regard to temperature, but also precipitation, global radiation, relative humidity, and closely related impacts like floods, droughts, snow cover, and natural hazards will be effected by global warming. Under the A1B emission scenario, about 0.25 °C warming per decade until the mid of the 21st century and accelerated 0.36 °C warming per decade in the second half of the century is expected. Warming will most probably be associated with changes in the seasonality of precipitation, global radiation, and relative humidity. More intense precipitation extremes and flooding potential are particularly expected in the colder part of the year. The conditions of currently record breaking warm or hot winter or summer seasons, respectively, may become normal at the end of the 21st century, and there is indication for droughts to become more severe in the future. Snow cover is expected to drastically decrease below 1500 – 2000 m and natural hazards related to glacier and permafrost retreat are expected to become more frequent. Such changes in climatic variables and related quantities will have considerable impact on ecosystems and society and will challenge their adaptive capabilities.

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