Position paper on potential impacts of climate change on winter sports

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On the Zugspitze summit, researchers of KIT study the impacts of climate change on the Alps. Credit: Markus Breig, KIT

For the first time, experts of European weather and climate research institutions have issued a joint paper on the impacts of climate change on winter sports. The initiators are the Stiftung Sicherheit im Skisport (SIS, Foundation for Safety of Ski Sports), Karlsruhe Institute of Technology (KIT), and the German Sport University Cologne (DSHS).

In their joint position paper and another publication, more than 20 expert scientists from 14 research institutions for the first time summarize the current state of research. They confirm key statements for the Alpine region and the low mountain ranges in Germany, point out knowledge deficits, and recommend actions. "Discussion on climate

change and its impacts needs an objective, understandable presentation of facts. We have succeeded in formulating a joint position and clear statements together with other researchers from Germany, Austria, and Switzerland," says Professor Karl-Friedrich Ziegahn, Head of Division IV – Natural and Built Environment of KIT.

At the Atmospheric Environmental Research Division of the Institute of Meteorology and Climate Research of KIT (IMK-IFU), KIT's Campus Alpine, scientists of KIT study potential impacts of climate change on mountain regions among others. "For Alpine regions in particular, we assume a very rapid and extensive climate change. Both observation time series of the past and our climate computations for the future reveal a higher temperature increase. The existing climate and vegetation zones will move to higher altitudes and also snow conditions will change," says the Head of IMK-IFU, Professor Hans Peter Schmid.

The position paper is a result of the expert forum Klima.Schnee.Sport (climate.snow.sports) that took place at the environmental research station Schneefernerhaus/Zugspitze in October 2018 and in Ruhpolding in January 2019. The forum was hosted by SIS, KIT, and DSHS.

Position Paper – Overview of Selected Findings

The experts agree on the expectation that the annual mean temperature in the Alpine region and in the low mountain ranges will increase by at least another two degrees Celsius by the end of this century. The increase in temperature will affect all seasons. Only when radical emission reduction measures will be implemented as outlined in the Paris Climate Protection Agreement of 2015, will this temperature increase be smaller.

Climate change and its impact on winter sports of tourists and top-class athletes alike will be associated with changed framework conditions and

uncertainties, the experts say.

As a consequence of warming, the natural snow cover used for snow sports will retreat to medium altitudes in the Alpine region and in the low mountain ranges in the long term (by 2100). The duration of the snow cover will be shorter by weeks in late winter and by a little less in early winter. The months of January and February, the most important months for winter tourism, will not be so much affected in these areas. Also climatological framework conditions for technical snow production will change. The number and duration of potential snow times will decrease.

Statements relating to the near future (until 2050) are more difficult to make, as the partly high natural climate variability superimposes the long-term trend. These strong fluctuations may also superimpose the gradual increase in mean temperature by 2050.

The combination of variability and constant warming, however, will lead to new maximum temperatures. Precipitation variability will be very high, as a result of which it is difficult to identify clear trends.

In parallel, winter sports, together with the related products and offers, will further develop under the impact of climate change. Regional adaptation of winter sports to climate change will not take place in a vacuum, but be embedded in dynamic processes on various levels of regional sectors and markets.

Winter sports associations, winter sports places, mountain villages, and cableway companies will be given the chance to actively cope with the challenge of "climate change" by taking measures to adapt to potential consequences and reduce greenhouse gas emissions, the experts say. To secure and further develop winter sports, technological and organizational innovations as well as a diversification of the offers are

required. Use of renewable energy sources must be strengthened and energy and resource efficiency must be enhanced in all winter sports sectors. For sustainable development, it will be of increasing importance to establish partnerships, networks, and information exchange systems on all levels. According to the experts, actors will have to develop strategies to enhance resilience and adaptation of winter sports and improve its innovation capacities.

Provided by Karlsruhe Institute of Technology

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