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Warm winter spells in the Swiss Alps: strong heat waves in a cold season?

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Investigations conducted for several Swiss mountain climatological sites, and in particular the Saentis high mountain site at 2,500 m above sea level, show that positive temperature anomalies during the winter season currently exceed those of all other seasons. These “heat waves” exhibit daily maximum temperature anomalies sometimes in excess of 16°C, and are observed to have increased substantially since the late 1960s. These events are related to the North Atlantic Oscillation (NAO) that exerts significant controls on snow cover and surface-atmosphere temperature feedbacks in the alpine region. A glimpse to the future is provided for the period 2071-2100, based on regional climate model simulations which suggest that warm winter spells may increase by 30%. The impacts of such events, particularly in terms of snow and water availability and the mountain economies that depend on these resources, need to be incorporated into future strategic resource and economic planning in the Alps.