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Will warmer winters induce more forest and crop pests in Switzerland?

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With current global warming, recent winters have often been milder in Switzerland than they were in previous decades and should still become more so in the coming decades. Some insect species sensitive to winter extreme cold events could increase their survival rates during the cold season. Forest pests, such as pine processionary moth (*Thaumetopoea pityocampa*), green spruce aphid (*Elatobium abietinum*), and some crop pests, such as southern green stink bug (*Nezara viridula*), could overwinter more easily in Switzerland. These species are affected by temperatures below -12°C (*Thaumetopoea pityocampa*, *Elatobium abietinum*) to below -8°C (*Nezara viridula*).

This research aims to determine to what extent the evolution of winter minimum temperatures could increase the winter survival rate of some pest species in various places in Switzerland. We examine the trends for winter temperatures, with a special focus on cold events (days with minimal air temperature below -8°C and -12°C). We first analyse daily air temperature between 1980 and 2019 using 67 meteorological stations located all over Switzerland. Then, we use available data from CH2018 climatic scenarios to estimate possible trends along the coming century.

Preliminary results showed that the frequency of cold days has been decreasing in Switzerland over the last 40 years even though winter minimum temperatures have been increasing less than yearly minimum temperatures. By the end of the 21st Century, occurrences of temperatures below -12°C could become irregular up to 1700 m and winters with temperatures below -8°C could become rare at lower elevations in Switzerland. As a consequence, some crop pests such as southern green stink bug could overwinter more easily on the Swiss Plateau, and some forest pests such as green spruce aphid and pine processionary moth could reach higher elevations in

mountain areas by the end of the century.