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Treeline resposes to 2K warming in the Alps in half a century

Christian Körner
Basel, Institute of Botany, Basel, Switzerland (ch.koerner@unibas.ch)

Since climatic treelines track the elevational position of isotherms across the globe, it is not the question if, but when and how they will arrive at a novel steady-state position. After briefly recalling the essential difference between the edge of the realized and fundamental niche of the life form tree (not to be confused with species' range limits), I will present data on recent climatic trends in the Alps based on long term meteorological records. Two years of in-situ temperature records from *Pinus cembra* trees growing right at the current upper edge of tree size individuals in Eastern Tyrol (supplemented with data from the Swiss Engadin region), make it obvious that the current high elevation record positions around 2500 m elevation are lagging substantially behind the upslope shift of the isotherm. This explains, why these trees grew so exceptionally rapid over the past 10 years, partly growing a meter in height in only 6-8 years. The locations with rapid tree radiation are all under nutcracker control. These data permit projections on forthcoming treeline shifts. For the Austrian Alps, the current uppermost trees represent all-time elevation records, and will soon out-range the uppermost fossil elevation records of trees that date back to the warmest period of the Holocene. Suggested reading: Körner C, Hoch G (2023) Not every high-elevation or high-latitude forest edge is a treeline. J Biogeography, open access.