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Global warming leads to more uniform spring phenology across elevations

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One hundred years ago, Andrew D. Hopkins estimated the progressive delay in tree leaf-out with increasing latitude, longitude and elevation, referred to as "Hopkins' bioclimatic law". What if global warming is altering this well-known law? Here, based on ∼20'000 observations of the leaf-out date of four common temperate tree species located in 128 sites at various elevations in the European Alps, we found that the elevation-induced phenological shift (EPS) has significantly declined from 34 days.1000m^{-1} conforming to Hopkins' bioclimatic law in 1960, to 22 days.1000m^{-1} in 2016, i.e. -35%. The stronger phenological advance at higher elevations, responsible for the reduction in EPS, is most likely to be connected to stronger warming during late spring as well as to warmer winter temperatures. Indeed, under similar spring temperatures, we found that the EPS was substantially reduced in years when the previous winter was warmer. Our results provide the first empirical evidence for a declining EPS over the last six decades. Future climate warming may further reduce the EPS with consequences for the structure and function of mountain forest ecosystems, in particular through changes in plant-animal interactions, but the actual impact of such ongoing change is today largely unknown.