

## Submitted Abstract

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<b>Title</b>	Upward Range Shift Of A Dominant Alpine Shrub Related To Snow Cover Change.
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## Abstract

Pronounced climate warming has resulted in a significant reduction of snow cover extent, as well as poleward and upslope shifts of shrubs in Arctic and alpine ecosystems. However, it is difficult to establish links between changes in snow cover and shrub distribution changes due to a lack of in situ and long-term snow records in relation to abundance shifts of shrubs at their leading and trailing edges. We used remote sensing to extract long-term changes in both snow cover and shrub distributions in the alpine tundra of the Changbai Mountains, Northeast China. First, we analyzed spatio-temporal changes in snow cover during the snowmelt period (April 1st to June 15th) over the past 54 years (1965-2019). Then, we analyzed distribution changes of the dominant evergreen alpine shrub, *Rhododendron aureum*, using 31 years (1988-2019) of Landsat NDVI archives. Finally, we tested the relationship between snowmelt date and the distribution of *R. aureum*. We found that the fraction cover of *R. aureum* experienced greater loss than gain in the last 30 years. *R. aureum* expanded at the leading edge, establishing in snow-rich habitats, yet retracted further at the trailing edge due to loss of snow habitats. We found that further advances in snowmelt dates would lead to the upward range shift of *R. aureum* in a warming climate. Our study highlights that long-term changes in snow cover due to climate change have already had marked impacts on plant species distributions in alpine ecosystems.