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Longer growing seasons and warm summers boost *Rhododendron ferrugineum* L. growth in the Taillefer massif (French Alps)

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Rhododendron ferrugineum L. is an important and widespread dwarf shrub species growing in high-elevation, alpine environments of the Western European Alps. As such, it is likely to offer unique opportunities which would allow pushing current dendrochronological networks into extreme environments and way beyond the upper survival limit of trees. Given that different species of the same genus have been successfully used in tree-ring investigations, notably in the Himalayas where *Rhododendron* sp. has proven to be a reliable climate proxy, this study aims at (i) evaluating the dendroclimatological potential of the widely distributed *R. ferrugineum* and at (ii) determining the major limiting climate factor driving species growth and the formation of rings. To this end, 154 cross-sections from 36 *R. ferrugineum* individuals have been sampled above local treelines and at elevations comprised between 1800 and 2100 m asl on NW-facing slopes of the Taillefer massif (French Alps). We illustrate a 195-year-long standard chronology based on growth-ring records selected from 24 individuals, and document that the series is well-replicated for almost one century (1920-2015) with an Expressed Population Signal (EPS) >0.85. Analysis using partial and seasonal correlation functions further highlight that growth of *Rhododendron* is governed by temperatures during the growing season (May-July), with increasingly higher air temperatures favoring larger ring widths, a phenomenon which is well known from dwarf shrubs growing in circum-arctic tundra ecosystems. Similarly, the negative effect of January-February precipitation on radial growth of *R. ferrugineum*, rarely observed in the Arctic, is interpreted as a result of reduced growing seasons following snowy winters. We conclude that the strong and unequivocal signals recorded in the fairly long *R. ferrugineum* chronologies presented here can indeed be used for climate–growth studies as well as for the reconstruction of climatic fluctuations in Alpine regions beyond the upper limits of present-day forests.