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**Title:** *Underestimated role of a dormant period? Dendroclimatological analyses of *Betula nana* from Disko Island (W Greenland)*

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Recent warming is expected to dramatically modify the arctic terrestrial ecosystem and woody plants growth. Many studies dealing with Arctic shrubs growth responses to temperature usually base their estimations on biomass measurements of only the above-ground segments neglecting the below-ground growth. In this context, the study of shrub-rings can additionally provide a retrospective insight into intra-plant temperature responses and seasonal growth allocation.

The whole plant bodies of 15 *Betula nana* shrubs were sampled in a Low Arctic site in Disko Island, (Western Greenland 69°N) in order to investigate how intra-plant growth respond to climatic variables. Tree-rings series were measured within the above-ground and below-ground parts of the shrubs applying the serial sectioning method. Annual radial growth was visually inspected on digital images of the full cross-section along two to four radii to account for the numerous wedging rings. Crossdating was visually performed by first comparing the section of the same plant, then between plants, and finally by quality checked by using COFECHA software. The three steps of a crossdating allowed the detection of partially and completely missing rings especially for the frequently observed the outermost rings of stem and main root sections.

The obtained *Betula nana* chronology spans 127 years, from 1888 to 2011. Climate-growth correlations between air temperature and ring width indicates that *Betula nana* growth positively responds to early summer temperature, especially of June. Furthermore, a strong positive correlation was found with winter air temperature, i.e. with previous December and current January, and also with spring soil temperature.

Correlations with winter and spring thermal conditions has been rarely described



so far for Arctic shrubs. Strong correlations with the dormant season conditions suggest that cambial activity in *Betula nana* is driven not only by growing season conditions, and might be under indirect influence of the heat cumulated in the soil. We hypothesize that other factors, as for example winter microbial activity might be enhanced by warmer soil and thus supply higher nutrient availability for shrubs in early growing season. Such phenomenon need to be further explored for better accounting for shrub responses to increasing trend of mean winter temperature over the last 20 years.