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Mapping snow depth return levels: smooth spati modeling versus station interpolation

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Abstract. For adequate risk management in mountainous countrie maps for extreme snow events are needed. This requires the comp of spatial estimates of return levels. In this article we use recent developments in extreme value theory and compare two main app for mapping snow depth return levels from in situ measurements. T one is based on the spatial interpolation of pointwise extremal distributions (the so-called Generalized Extreme Value distribution, henceforth) computed at station locations. The second one is new based on the direct estimation of a spatially smooth GEV distributi the joint use of all stations. We compare and validate the different approaches for modeling annual maximum snow depth measured a sites in Switzerland during winters 1965–1966 to 2007–2008. The show a better performance of the smooth GEV distribution fitting, i particular where the station network is sparser. Smooth return lev can be computed from the fitted model without any further interpo Their regional variability can be revealed by removing the altitudina dependent covariates in the model. We show how return levels an regional variability are linked to the main climatological patterns of Switzerland.

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