

EGU21-2477, updated on 27 Oct 2021

<https://doi.org/10.5194/egusphere-egu21-2477>

EGU General Assembly 2021

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



Estimating the snow-rain transition zone in a semi-arid Andean catchment

Simone Schauwecker, Gabriel Palma, Shelley MacDonell, and Katerina Goubanova
CEAZA, La Serena, Chile (simone.schauwecker@ceaza.cl)

The height of the snow-rain transition during infrequent but high impact precipitation events, closely related to the 0°C-isotherm, is a crucial variable for snow cover extent, high discharge flows and flash floods in semi-arid northern Chile. Estimations of the snow-rain transition zone and its past and future changes are therefore fundamental for adaptation strategies and might eventually serve to develop early warning systems in this region. However, there are important challenges that hinder the assessment of the snow-rain transition zone in semi-arid environments and little is known about past and future changes under different global warming scenarios. For example, there are few radiosonde observations along the Andes and most weather stations are located in valley bottoms, influenced by local conditions and the assumption of free-air temperature lapse rates contributes to the uncertainty. We combine different data sets to estimate the past snow-rain transition zone of our study site, the semi-arid Elqui river catchment. Pictures of the snow line after precipitation events - available from social networks - are used to visually estimate the snow line elevation. These values are in high agreement with vertically extrapolated temperature from meteorological stations. Furthermore, we identified considerable biases between the extrapolated 0°C-isotherm from meteorological stations and ERA5 reanalysis data. These large biases are probably due to the lowering of the freezing level over complex terrain and need further analysis. Our results contribute to an improved understanding of the snow-rain transition in this region, but also serve to derive a climatology of this key variable along the Andes mountain range, needed for future projections.