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The effects of geospatial decisions on the accuracy of a distributed blowing snow model

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Wind effects on snow water resources have been broadly recognized by the research community as a relevant factor for meltwater production. The transport (either by saltation or suspension) and sublimation of blowing snow generates a patchy and highly variable snowpack in terms of depth and density, affecting the spatial heterogeneity of energy exchange between the land and the atmosphere. In this work, we examine the effects of using different spatial configurations when quantifying wind effects on snow re-distribution, using a modified version of a spatially distributed snow model that considers the physics of blowing snow transport and sublimation. These modifications include: (i) capability to use a domain discretization based on Hydrologic Response Units (HRUs), (ii) capability to select different transport boundary conditions, and (iii) flexibility to adjust snow transport parameters. We test several domain discretizations using high-resolution ground-based data from the Izas Experimental Catchment, located on the southern side of the Spanish Pyrenees (2000 to 2300 m above sea level). The results of this study have important implications on current and future research. Particularly, our results help to inform the appropriate spatial configuration of snow models needed to quantify blowing snow and its impact on snow water resources.