



## **Distributed, explicit modeling of technical snow production and ski area management with the hydroclimatological model AMUNDSEN**

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In this presentation, a module for simulating technical snow production in ski areas coupled to the spatially distributed physically based hydroclimatological model AMUNDSEN is presented. The module explicitly considers individual snow guns and distributes the produced snow along the slopes. The amount of snow produced by each device is a function of its type, of wet-bulb temperature at the location, of ski area infrastructure (in terms of water supply and pumping capacity), and of snow demand. An empirical rule in the modeling for snow production, derived from common snowmaking practices, splits the winter season into a period of maximum snowmaking and a successive period of selective on-demand snowmaking.

The model is exemplarily set up for a ski area in the Schladming region (Austrian Alps) using actual snowmaking infrastructure data. Integration of these data as model variables, as well as stakeholder-defined indicators and thresholds, have been implemented as defined interfaces in a coupled component model architecture. Comparison of the model results with recordings of snowmaking operation and satellite-derived snow cover maps indicate that the model is capable of accurately simulating the real-world snowmaking practice, and the combined natural and technical snow conditions on the slopes.

The explicit consideration of individual snow guns and ski area infrastructure makes the model a valuable tool for scenario applications, e.g. to assess the effects of different ski area management strategies and changes in snowmaking infrastructure for climate change impact studies.