

The New openAMUNDSEN Modular Snow and Hydroclimatological Modeling Framework: Application to Data from the GEWEX INARCH Rofental Catchment and ESM- SnowMIP Meteorological Stations

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ABSTRACT

openAMUNDSEN is the entirely redesigned open source version of AMUNDSEN, a physically based alpine snow model with over 20 years of development history. The new version – now available for the public – is a modular, flexible, and user-friendly framework written in Python. openAMUNDSEN is a fully distributed model, designed primarily for resolving the mass and energy balance of snow- and ice-covered surfaces in mountain regions. Typically, it is applied in areas ranging from the point to the regional scale (from hundreds up to thousands of square kilometers), using a spatial resolution of 10 - 100 m and a temporal resolution of 1 - 3 h. However, due to its modularity and flexible I/O possibilities, the potential applications are very versatile.

For the demonstration of the new model version we present publicly available data from the Rofental catchment, a glacierized GEWEX INARCH hydrological mountain research basin (1890-3770 m a.s.l.) in the Tyrolean Alps (Austria). Further, we use selected sites from ESM-SnowMIP with very different altitudes and snow hydrological conditions. Our numerical experiments show the sensitivity of the model to important parameters and its performance in the default configuration.

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