



A data-to-model comparison tool for evaluating transient glacier simulations against empirical evidence

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The past glaciations have shaped the Alpine landscape, creating features such as foreland lakes and valleys that are still visible today. These geomorphic imprints provide constraints for reconstructing the past glacier evolution. By integrating these landscape-based constraints into numerical models, we not only enhance our understanding of glacier dynamics but also iteratively refine the models themselves.

Direct and indirect glaciological evidence for past glacier evolution from the Alps has recently been compiled in the 'AlpIce' database (Kamleitner et al., in preparation). This data collection contains age constraints ranging from the Last Glacial Maximum to the present day, retrieved from a variety of geomorphological and sedimentological deposits (e.g., moraines, peat bogs) as well as archaeological finds. With this new database in place, we developed a novel data-to-model comparison tool, which we use to evaluate our transient glacier model simulations against empirical observations. The core of our tool is an automated evaluation algorithm, which calculates a spatio-temporal agreement for each dated entry. This automation streamlines the evaluation of model performance and facilitates the adaptive exploration of parameter configurations. While still in its early stages, we are improving our tool to identify the climate signals and physical and non-physical glacier model parameters that can reproduce the glacier-formed landscapes we observe today.