



Model prediction of the timing of jökulhlaups

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Some ice-dammed lakes yield subglacial outburst floods (known as 'jökulhlaups') repeatedly. Predicting the timing of these floods is crucial for hazard mitigation, but the nonlinearity of jökulhlaup systems makes this a challenging problem. Here we use the recorded flood dates of Merzbacher Lake in the Tian Shan, which has outburst many times since the 1950s, to study the predictability of flood timing. A model containing a flood-initiation threshold is used to predict these dates to characterise the probability of reliable predictions. The threshold may be fixed or made dynamically variable; in either case, we conduct trials where the model is tuned to fit a subset of the flood dates, but then used to forecast other flood dates. Through such experiments, we evaluate to what extent modelling is able to give usable operational forecasts. We also consider the issue of predicting the flood magnitude, and the response of these oscillatory systems to climate change.