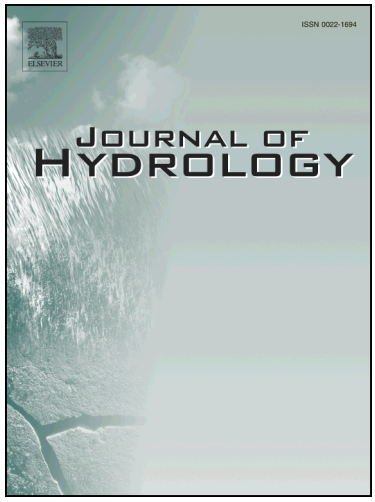

Using Genetic Algorithms to Optimize the Analogue Method for Precipitation Prediction in the Swiss Alps

Pascal Horton, Michel Jaboyedoff, Charles Obled

PII: S0022-1694(17)30239-1
DOI: http://dx.doi.org/10.1016/j.jhydrol.2017.04.017
Reference: HYDROL 21948

To appear in: *Journal of Hydrology*

Please cite this article as: Horton, P., Jaboyedoff, M., Obled, C., Using Genetic Algorithms to Optimize the Analogue Method for Precipitation Prediction in the Swiss Alps, *Journal of Hydrology* (2017), doi: http://dx.doi.org/10.1016/j.jhydrol.2017.04.017

Using Genetic Algorithms to Optimize the Analogue Method for Precipitation Prediction in the Swiss Alps

Pascal Horton[a,b,*], Michel Jaboyedoff[a], Charles Obled[c]

[a] *University of Lausanne, Institute of Earth Sciences, Lausanne, Switzerland*
[b] *University of Bern, Oeschger Centre for Climate Change Research, Institute of Geography, Bern, Switzerland*
[c] *Université de Grenoble-Alpes, LTHE, Grenoble, France*

Abstract

Analogue methods provide a statistical precipitation prediction based on synoptic predictors supplied by general circulation models or numerical weather prediction models. The method samples a selection of days in the archives that are similar to the target day to be predicted, and consider their set of corresponding observed precipitation (the predictand) as the conditional distribution for the target day. The relationship between the predictors and predictands relies on some parameters that characterize how and where the similarity between two atmospheric situations is defined.

This relationship is usually established by a semi-automatic sequential procedure that has strong limitations: (i) it cannot automatically choose the pressure levels and temporal windows (hour of the day) for a given meteorological variable, (ii) it cannot handle dependencies between parameters, and (iii) it cannot easily handle new degrees of freedom. In this work, a global optimization approach relying on genetic algorithms was able to optimize all parameters jointly and automatically.

The global optimization was applied to some variants of the analogue method for the Rhône catchment in the Swiss Alps. The performance scores increased compared to reference methods, especially for days with high precipitation to-

*Corresponding author
Email address: pascal.horton@alumnil.unil.ch (Pascal Horton)