



Combining artificial neural networks and circulation type classification: does it improve downscaling models?

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Circulation type classifications may be used for downscaling in so called reference class forecasting (RCF), i.e. to assign atmospheric circulation predictors to a certain type of a circulation type classification and use the value for the target variable associated with this type in the past as a model value. Doing so often already leads to useful statistical assessment models. However a generally superior method is that of artificial neural networks (NNW). Using adequate configuration, the latter are able to outperform the RCF method in virtually all cases. However the adequate configuration of NNWs is often not easy to decide and the training of the network weights may be an extensive and slow process while RCF is relatively fast.

In the context of a starting project dealing with alpine climate change studies (Virtual Alpine Observatory II, VAO₂), this study evaluates if a combination of both statistical approaches (called neural networks of classification types, NNC) may lead to an improvement for statistical downscaling.

Preliminary results suggest that the gain in skill and the computational speed for the network training largely depends on the configuration of both: the circulation type classification and the network configuration regarding, topology, learning rate, predictors and so on. In this context it is important to consider the evolution of the learning process, where sometimes the NNW is superior and sometimes the NNC.