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Exploring causal relationships between vegetation coverage and the environmental parameter of Budyko-type models in the Nakanbe nested watersheds in West African Sahel

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Context: The lack of reliable data for monitoring environmental dynamics limits the performance of hydrological models.

Main objective: Improve runoffs simulation using time series of environmental data from climate-environment co-evolution

Specific objective: Analyze the climate-environment co-evolution in the Nakanbé nested watersheds, West African Sahel

Methodology

Hydro-climatic data:

Precipitation
Potential evapotranspiration
Actual evapotranspiration

Budyko-type model of Chen and Sivapalan (2020)

Budyko-type model parameter (u)

Environnemental data:
NDVI (Normalized Difference Vegetation Index)

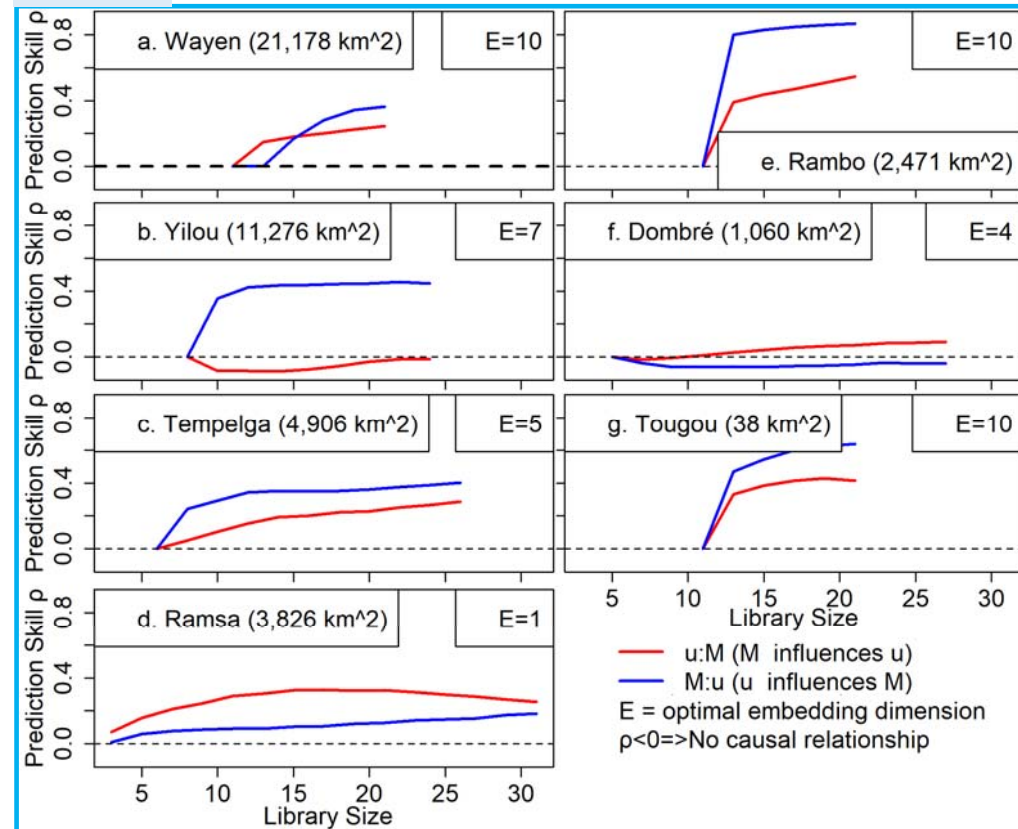
Vegetation coverage (M)

Causal discovery (Sugihara et al., 2020):
Convergent Cross Mapping (CCM)

Climat-environment co-evolution at watershed scale



Results



Conclusion: Reciprocal interactions between climate and environment in 5 watersheds out of the 7 studied