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Comparison of bivariate copula-based bias correction of regional climate model (RCM) precipitation and temperature Poster No: EGU2019-10595

1-Introduction

Future climate scenarios, which are simulated by Regional Climate Models (RCMs), are often used as input in hydrological models. These models are then used to study the effects of a changing climate on our water resources. Yet, RCM models face crucial biases, such as systematic wet or cold biases during winter, which are caused by an inadequate parameterization or by an inaccurate representation of physical processes in the RCMs.

In this study, copula-based methods are used to correct for biases in precipitation and temperature timeseries, which are simulated by an ensemble of 11 different RCMs for five Swedish catchments, under varying climate conditions. Univariate quantile mapping is used as a benchmark model.

Due to the fact that observations cannot be used to assess the performance of these methods under future climate conditions, we hereby use a pseudo-reality approach.

2- Approach





Fig1: Schematic Modeling Chain of the Climate Variable Transfer from GCM to Catchment scale

4-Results

4-1 Copula













Storbacken, RCM Climate model, NSE, Quantile Mapping, bias correction								
1961-1990			2021-2050					
Observational		RCM1		RCM2		RCM3		
RCM1	RCM2	RCM3	RCM2	RCM3	RCM1	RCM3	RCM1	RCN
0.81	0.78	0.87	0.83	0.75	0.81	0.76	0.82	0.8
0.70	0.65	0.64	0.69	0.73	0.61	0.68	0.71	0.6
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tive distribution of $(U_1, U_2,, U_n)$: $\leq u_n$] $(U_2),, X_n \leq F_n^{-1}(U_n)$]
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$-\cdots-\theta_q e_{t-q}$
stribution function (CDF) of the model,
each other and are plausible realization of sy to another.
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3- Studied Area



Fig2: Studied Area

Precipitation ____*

5 10 15 20 Lag

Temperature

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	1	961-199	0			2021-	2050			
oxies	Ob	Observational			RCM1		RCM2		RCN	
lodel	RCM1	RCM2	RCM3	RCM2	RCM3	RCM1	RCM3	RCM1		
pitation	0.79	0.71	0.87	0.88	0.89	0.88	0.76	0.82		
perature	0.91	0.88	0.93	0.91	0.90	0.90	0.89	0.79		

5- Preliminary Results:

- Autocorrelation, has negative impact on copula multivariate distribution modeling.
- If autocorrelation could be removed from the timeseries, Copula distribution mapping outperforms quantile mapping.
- ARIMA synthesized timeseries, can be used to remove autocorrelation in the timeseries.

6-Acknowledgment:

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