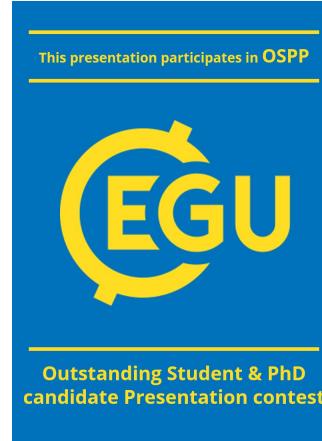


Extending A Posteriori Random Forests for Multivariate Statistical Downscaling of Climate Change Projections

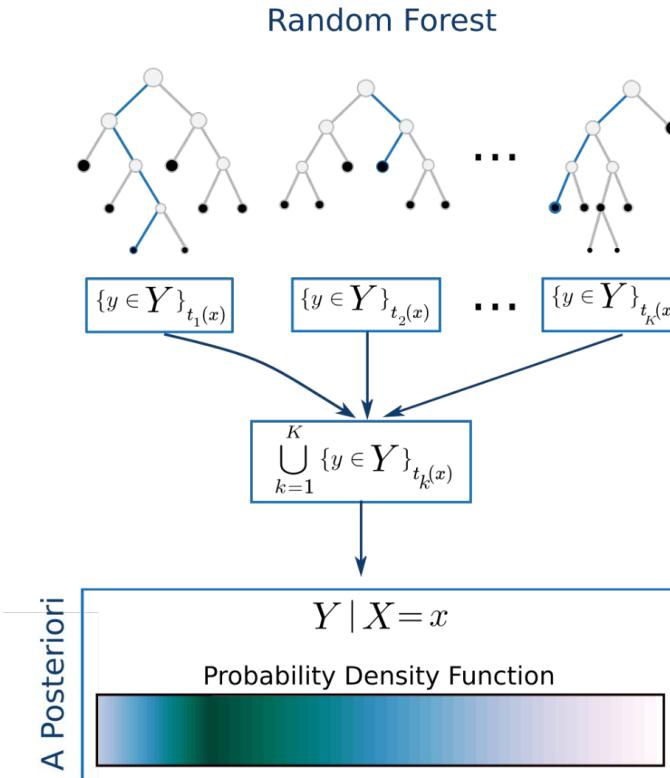
M. N. Legasa, S. Thao, M. Vrac, A. Casanueva, and R. Manzanas

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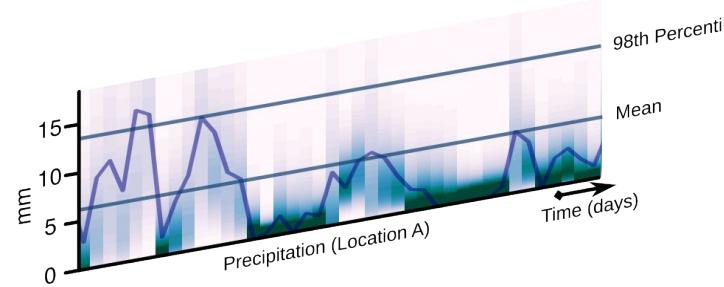


Approach: A Posteriori Random Forest

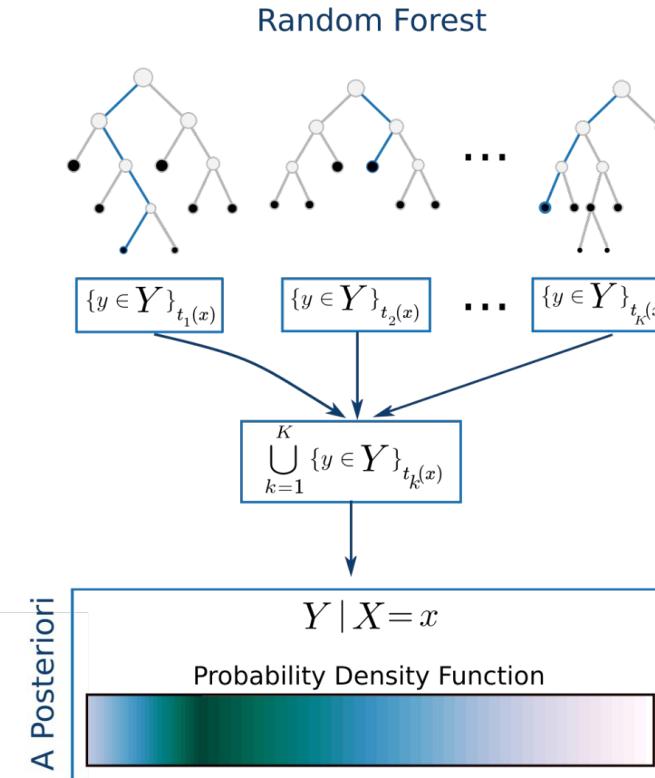
For Each Large-Scale GCM state $X=x$



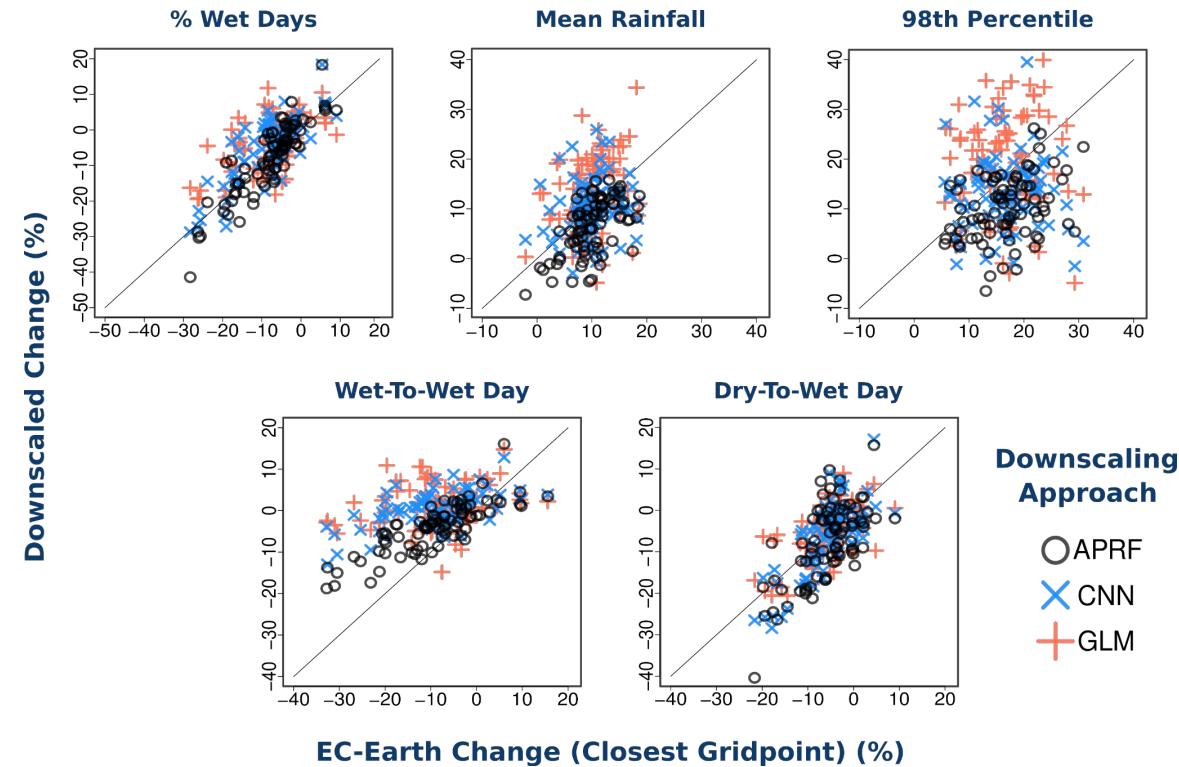
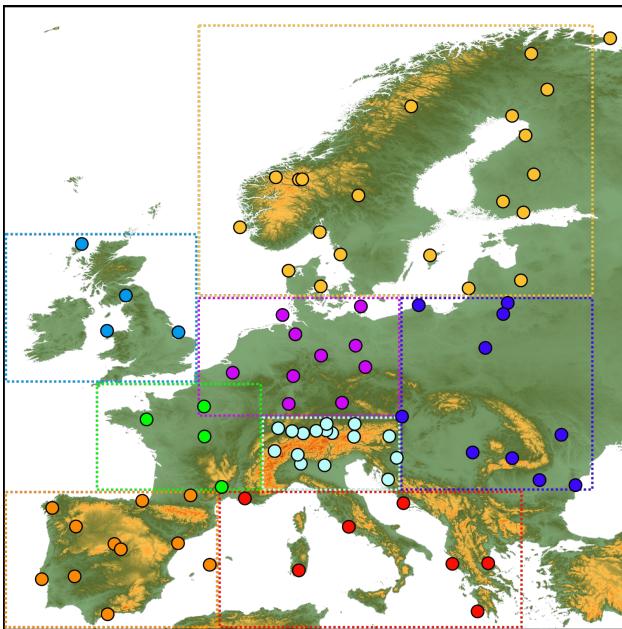
Approach: A Posteriori Random Forest

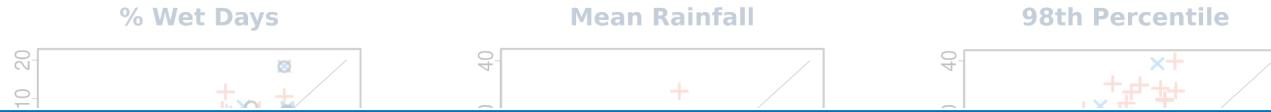


For Each Large-Scale GCM state $X=x$



Performance: Precipitation Downscaling





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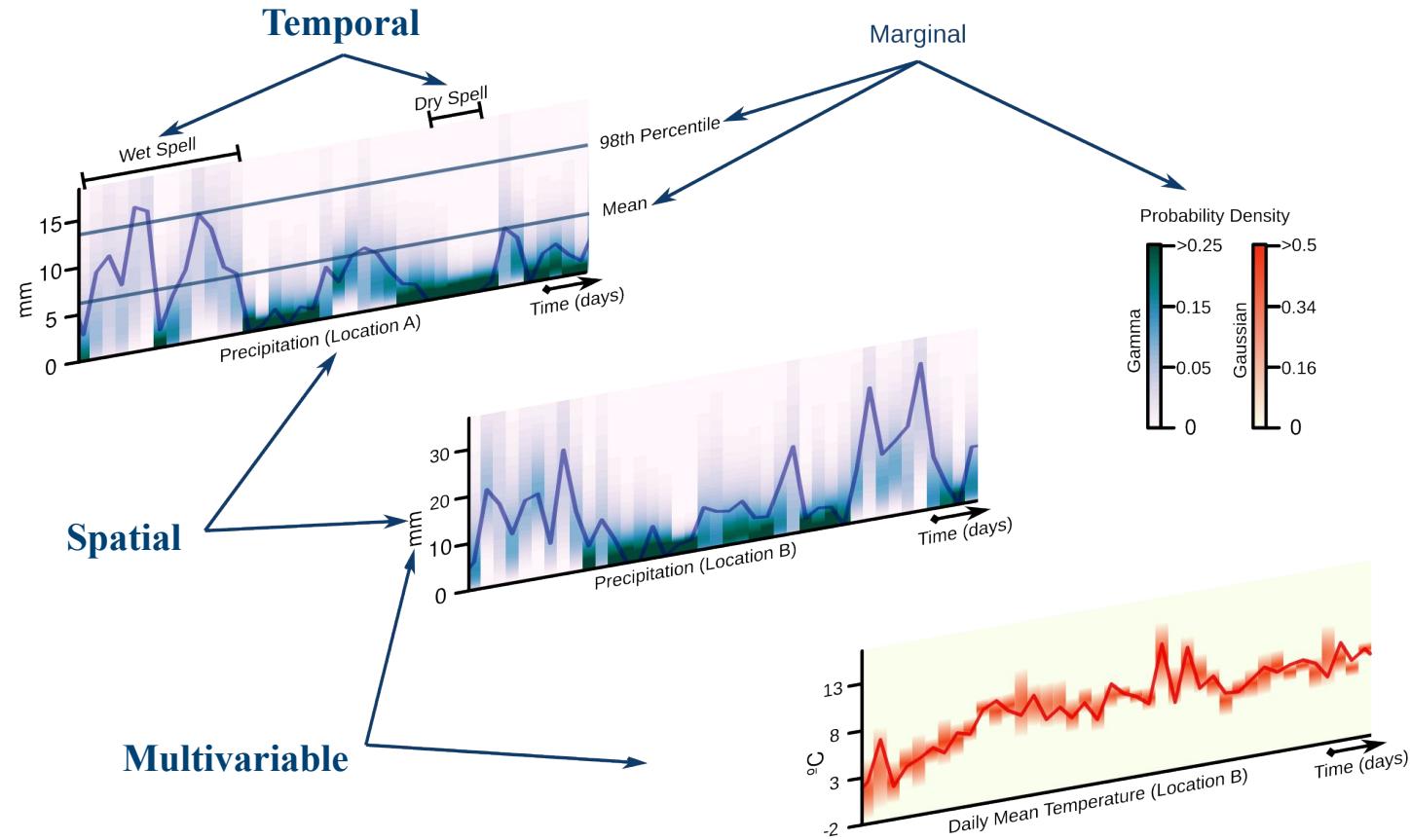
10.1029/2022GL102525

Assessing Three Perfect Prognosis Methods for Statistical Downscaling of Climate Change Precipitation Scenarios

M. N. Legasa¹ , S. Thao² , M. Vrac² , and R. Manzanas^{1,3}

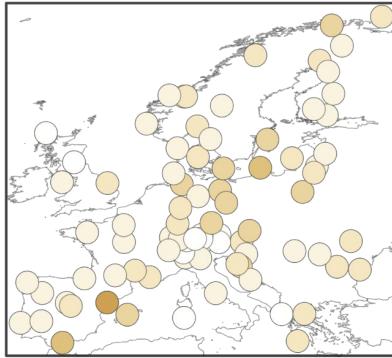
<https://doi.org/10.1029/2022GL102525>



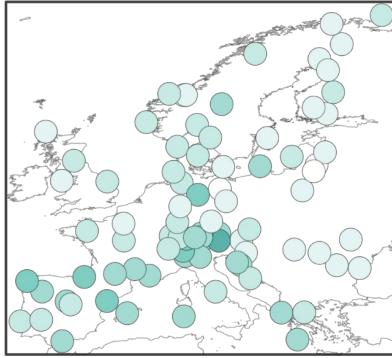


Temporal Component

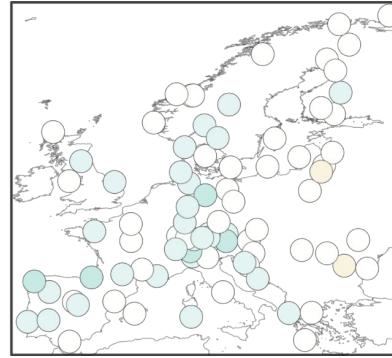
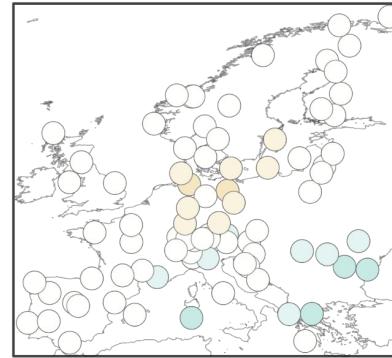
Wet-to-Wet Day



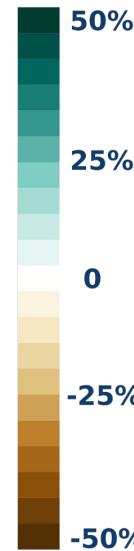
Dry-to-Wet Day



Temporal APRF



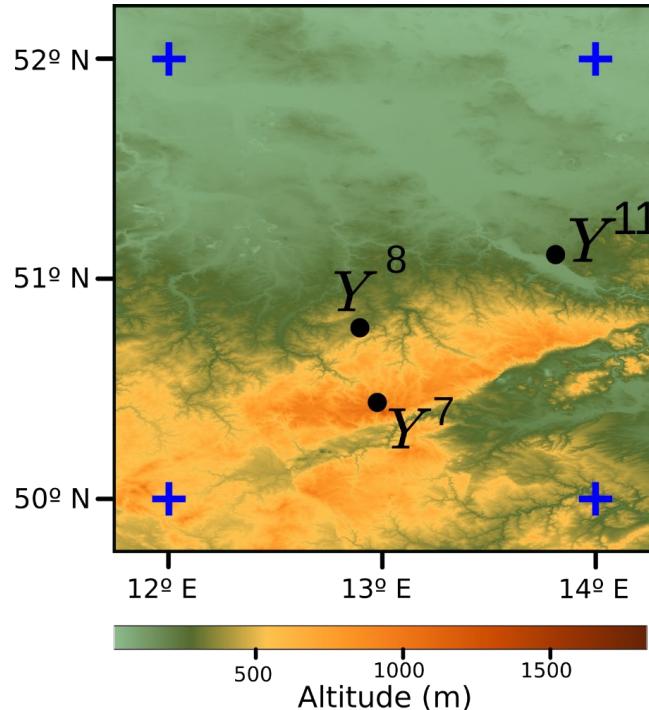
Relative Bias



Bernoulli-Gamma Distribution



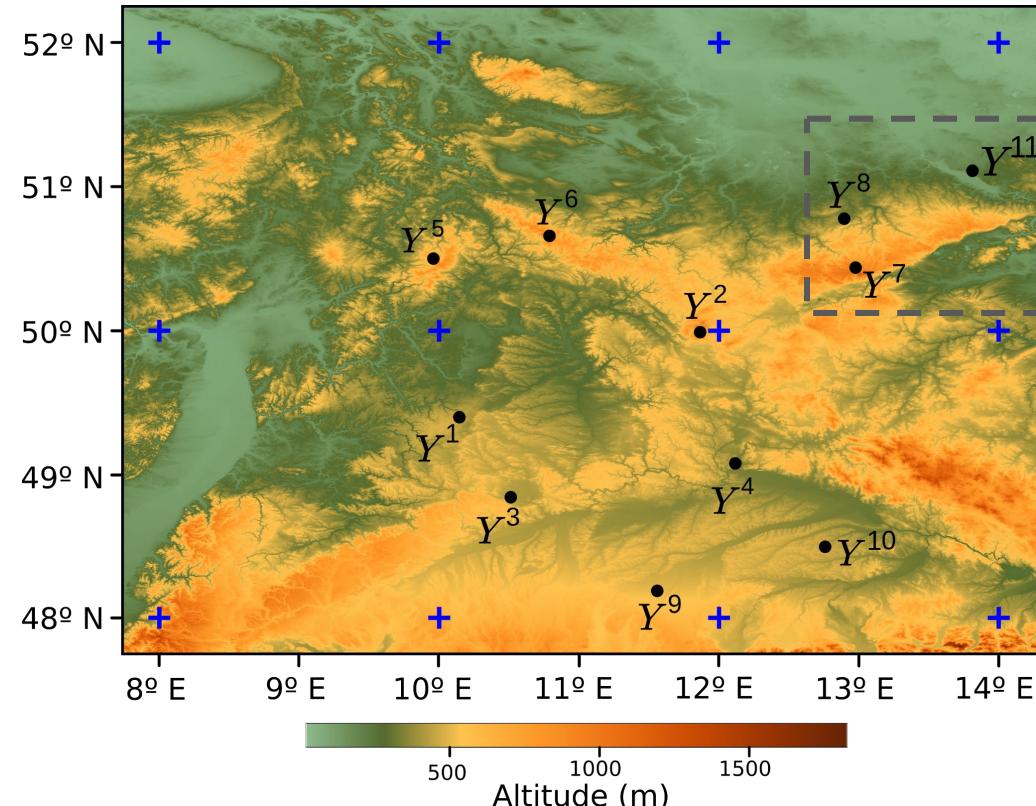
Transition Probability
 $P(\text{Wet Day} \mid \text{Dry Day})$
 $P(\text{Wet Day} \mid \text{Wet Day})$



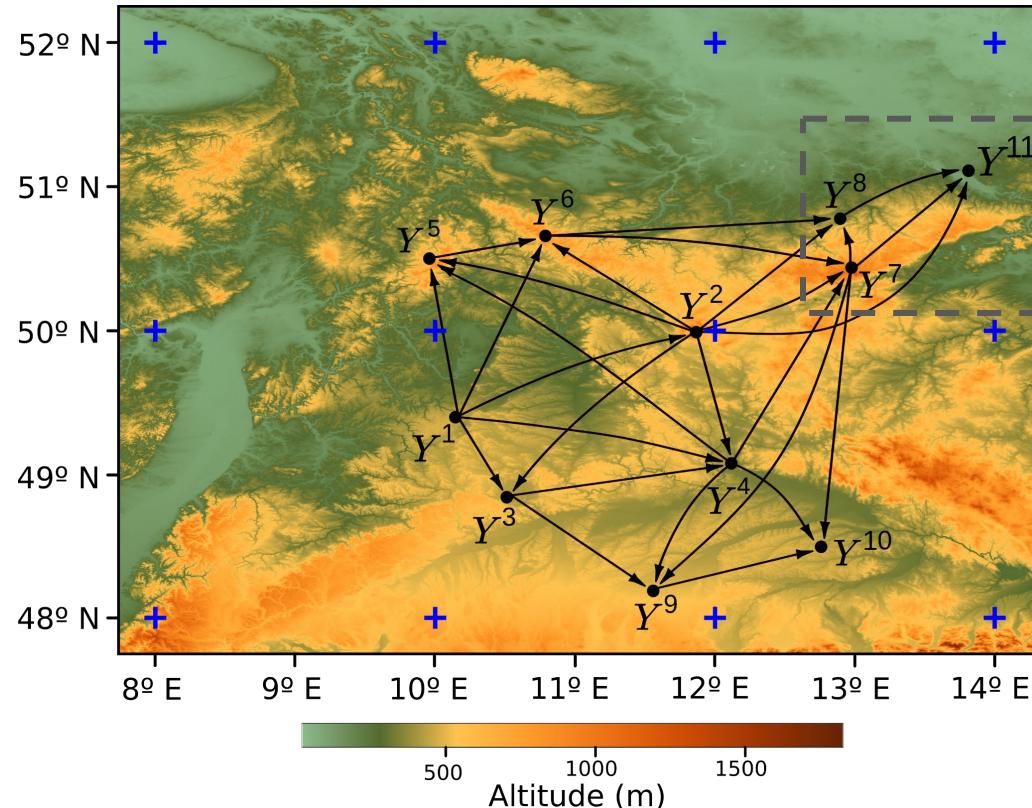
Multisite Precipitation Occurrence

Joint Probability Distribution of (Y^8, Y^7, Y^{11})

Spatial (Multi-Site) Structure



Spatial (Multi-Site) Structure





Water Resources Research

RESEARCH ARTICLE
(Preprint)

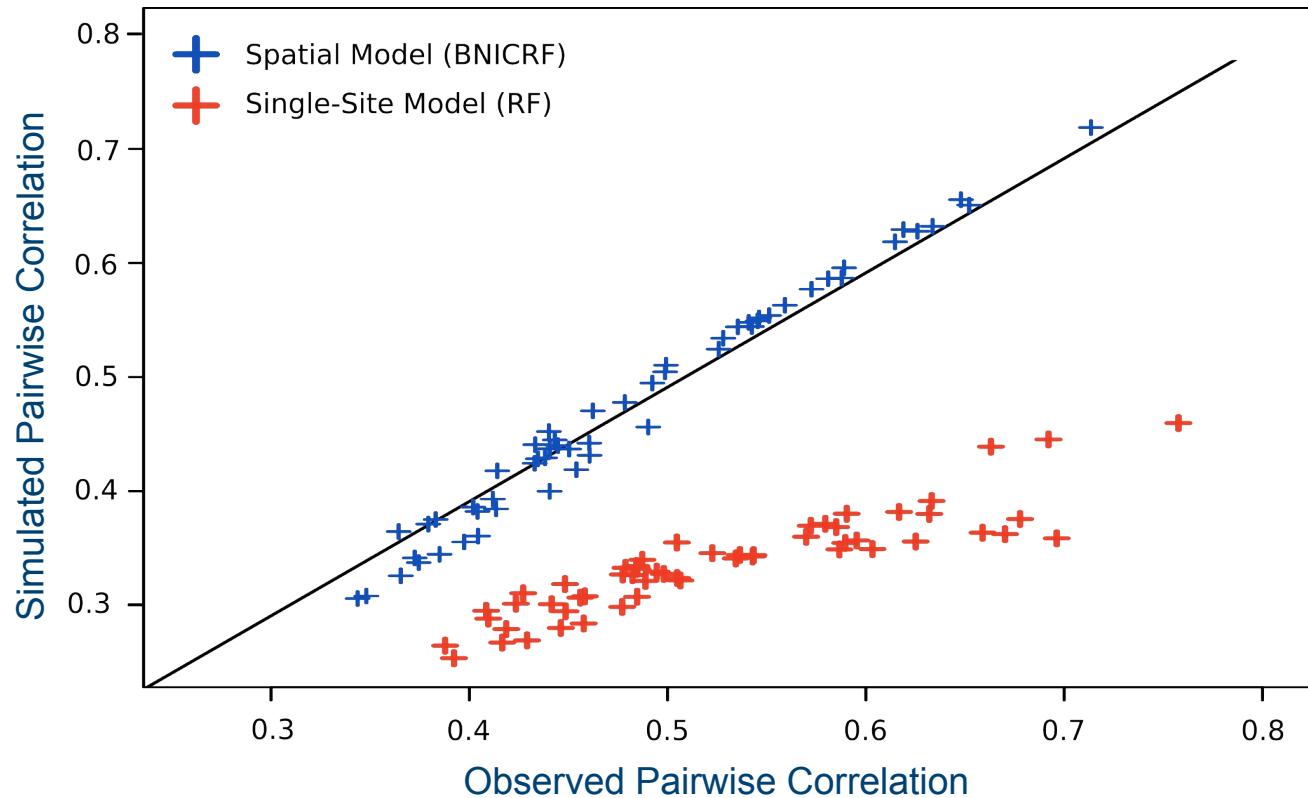
Bayesian Network-Informed Conditional Random Forests for Probabilistic Multisite Downscaling of Precipitation Occurrence

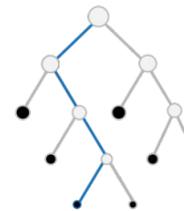
M. N. Legasa , R. E. Chandler , and R. Manzanas

<https://doi.org/10.22541/essoar.168167381.15060857/v1>

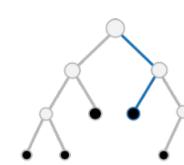


Spatial (Multi-Site) Structure: Performance



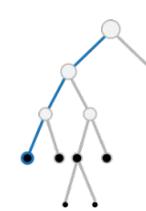


$$\{(y_1, y_2) \in (Y_1, Y_2)\}_{t_1(x)}$$



$$\{(y_1, y_2) \in (Y_1, Y_2)\}_{t_2(x)}$$

...



$$\{(y_1, y_2) \in (Y_1, Y_2)\}_{t_K(x)}$$

$$\bigcup_{k=1}^K \{(y_1, y_2) \in Y_1, Y_2\}_{t_k(x)}$$



Temperature | $X = x$



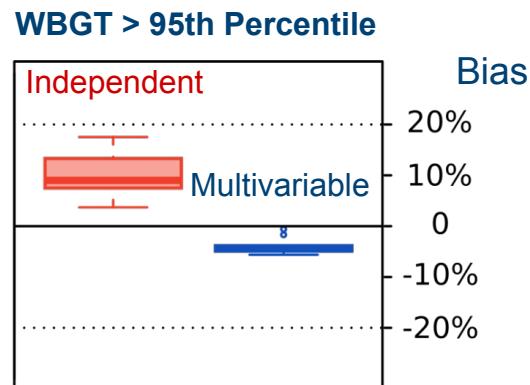
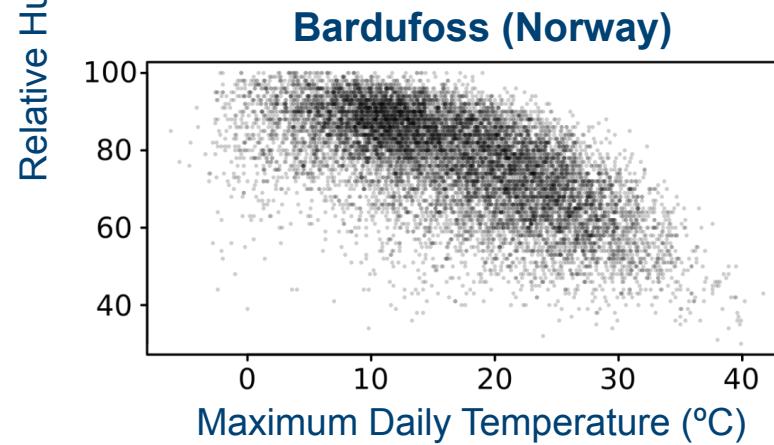
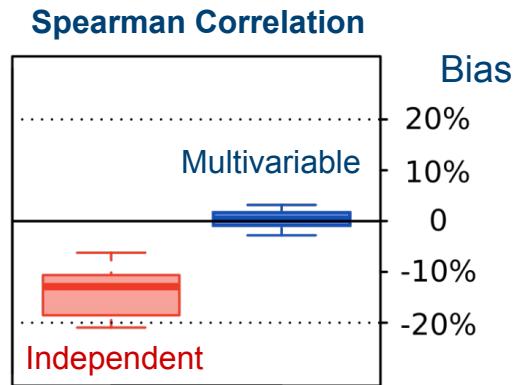
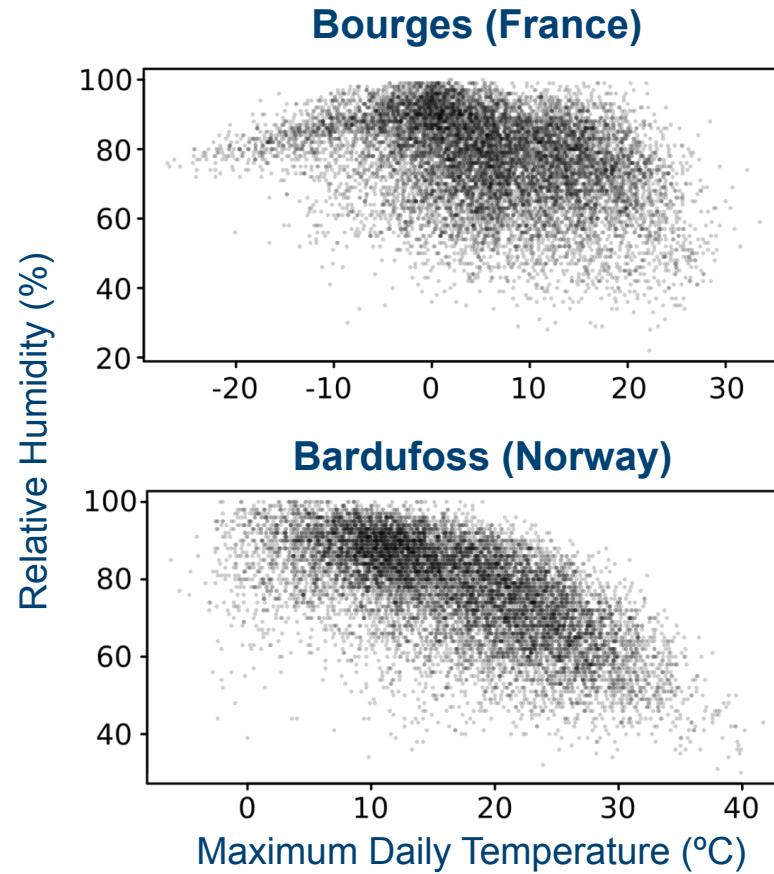
Schaake Shuffle



Humidity | $X = x$



Multivariable Structure: Performance



- **Promising results capturing the local distributional aspects**
 - Wet/Dry-to-wet day transition probabilities
 - Multisite precipitation occurrence
 - Temperature + Relative humidity
- **Extend the approach to more complex cases**
 - Multisite & multivariable
 - More climate variables
- **Changes when applied to future periods?**



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