A Process Driven Downscaling Technique to Improve Confidence in Climate Projections

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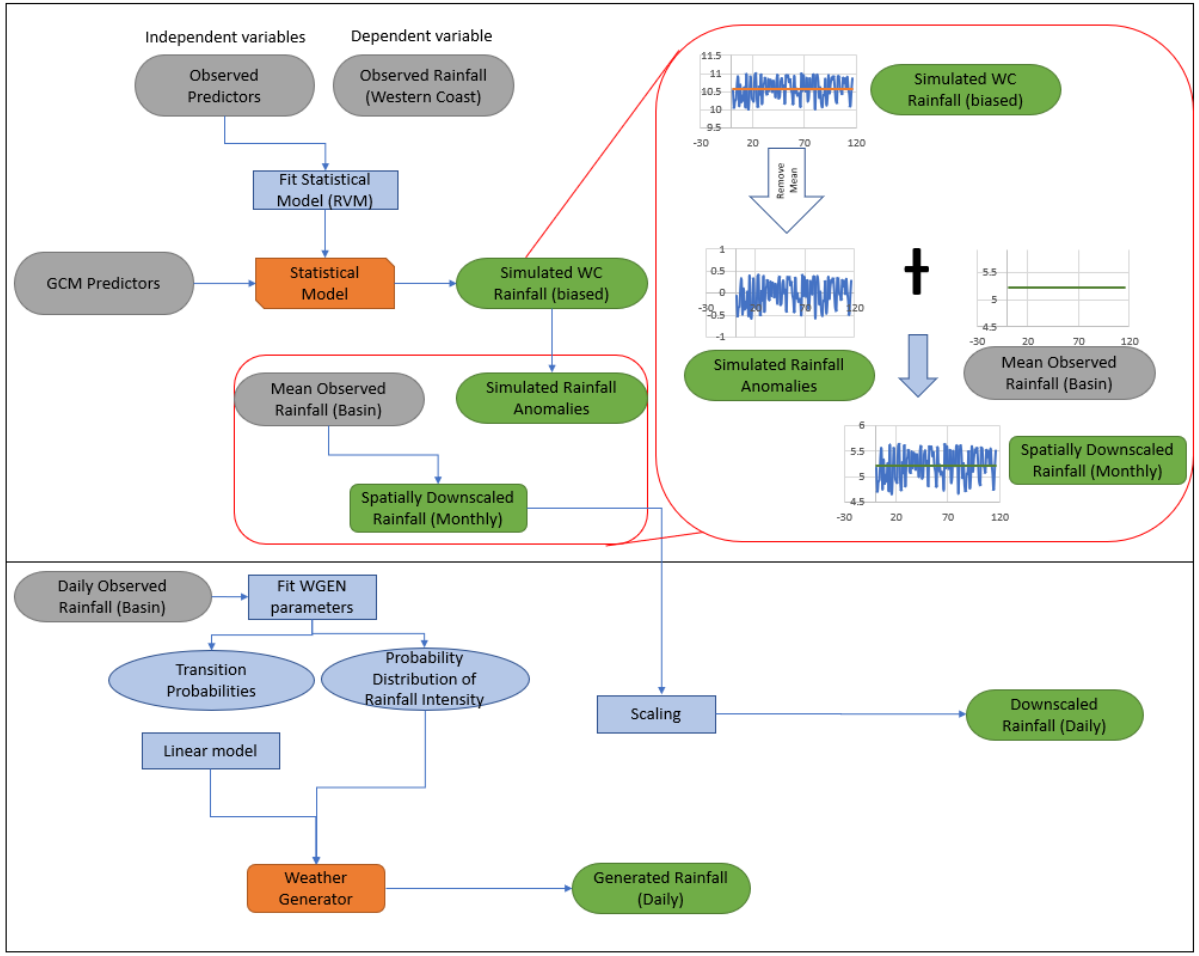
MOTIVATION

- Statistical Downscaling; Primary assumption - Statistical relation between predictor (Large Scale Variables) and predictand (Rainfall or temperature) remains same in the future **Cannot validate because of Unknown future**
- Statistical models using predictor variables that drive the predictand will provide better performance (Liu et al., 2019)

Liu, Yonghe, Jinming Feng, Yuehong Shao, and JianLin Li. "Identify optimal predictors of statistical downscaling of summer daily precipitation in China from three-dimensional large-scale variables." Atmospheric research 224 (2019): 99-113.

METHODOLOGY



Combine spatial downscaling using Relevance Vector Machine with temporal downscaling using Weather Generator

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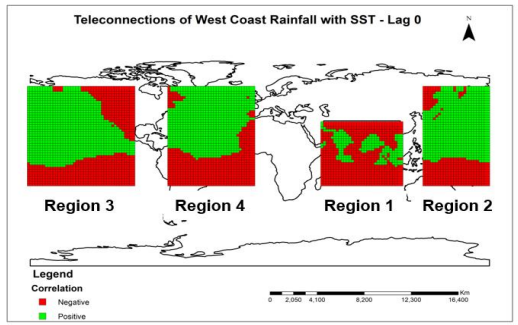

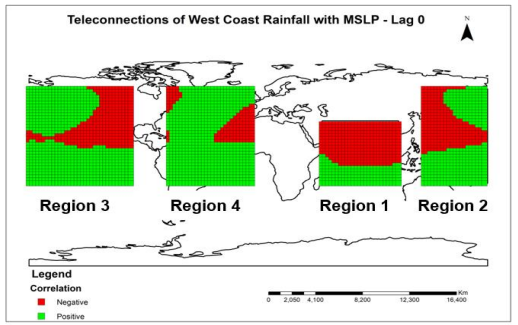

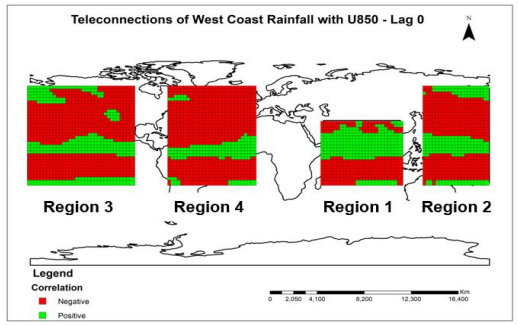

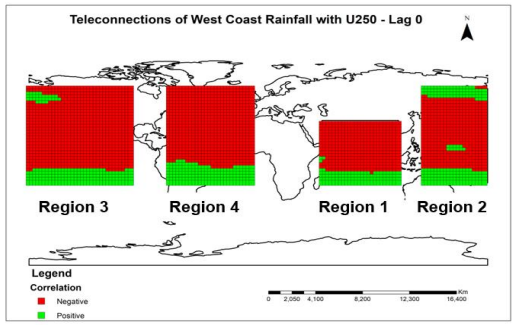

Setting Up the RVM Model

RVM Model Performance	Calibration (1981-2018)	Validation (1949-1980)
NSE	0.75	0.68
Correlation Coefficient	0.86	0.82
RMSE	113.87	136.91

Statistic – Daily downscaled	Observed	Downscaled
Mean	5.69	6.47
Variance	139.47	209.87
Skewness	3.60	3.81
98th Percentile rainfall	44.30	54.97
P98th percentile of wet series	54.58	75.25
Frequency of below 15 mm rainfall	0.87	0.85
Frequency of Above 15 mm rainfall	0.05	0.06
Precipitation Concentration Index	17.84	16.64

- Methodology validated at Bharathapuzha catchment for the GCM: **BNU-ESM**
- Physical relations modelled using RVM
- Occurrence characteristics of rainfall events added in weather generator

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THANK YOU

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