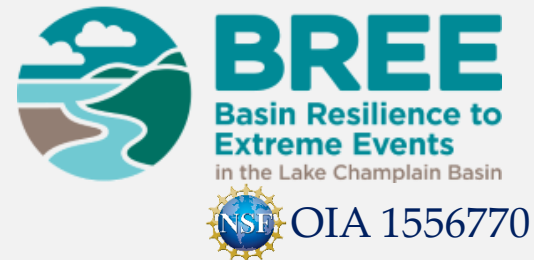


Quantification and simulation of extreme events in BREE IAM

Panagiotis (Takis) D. Oikonomou
Postdoctoral Associate, VT EPSCoR



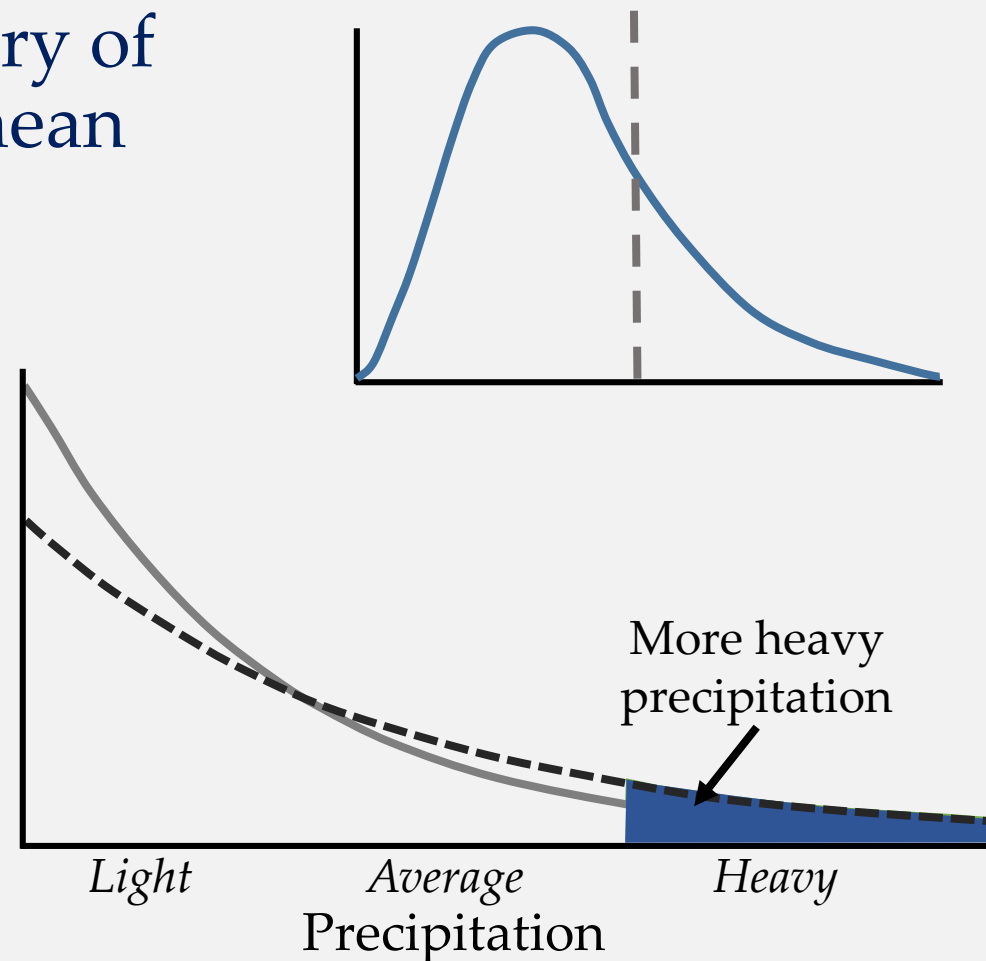
Introduction

- Joined the BREE team on August 2019
- IAM postdoc
- 1st Year Focus
 - Extreme events → Lake blooms
 - Changes in Skewness
 - Persistence of Extremes



What is Skewness and Why is Important

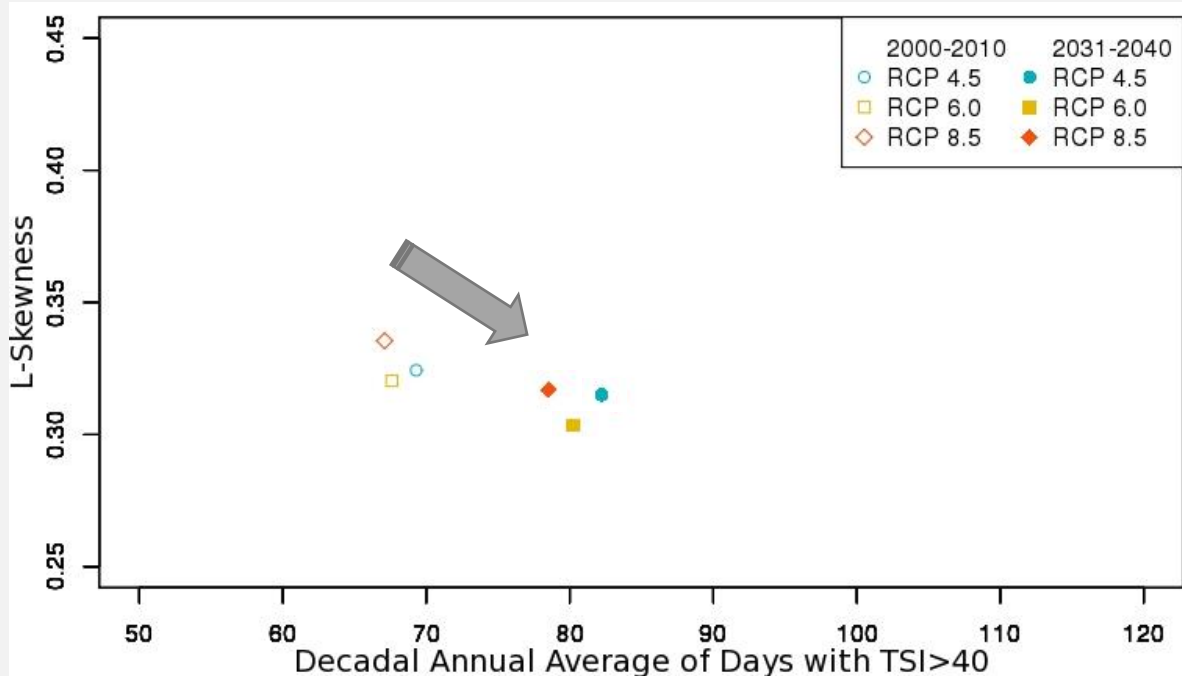
- Skewness is a measure of the asymmetry of the probability distribution about its mean
- Changes in skewness affect the shape of the distribution.



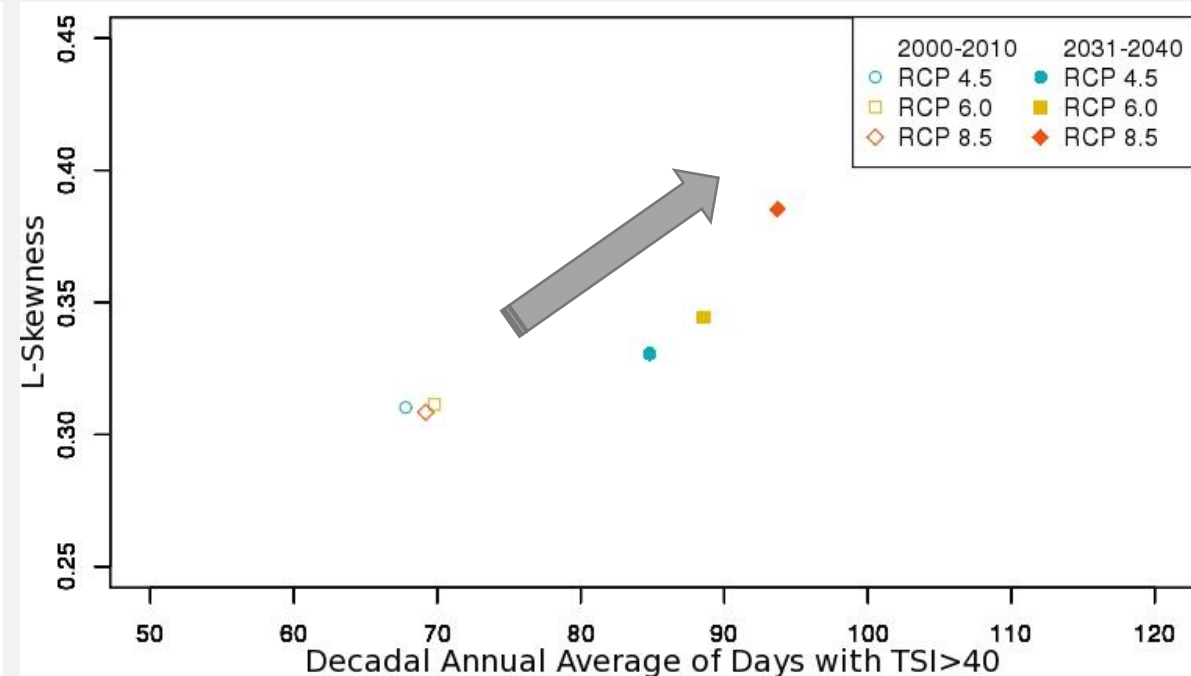
Hypothetical Results

- Dry GCM

Precipitation



- Wet GCM



Motivation

- Most studies focuses on mean and variance and neglect skewness.
- How changes in higher-order moments of projected temperature and precipitation could affect the development of blooms?

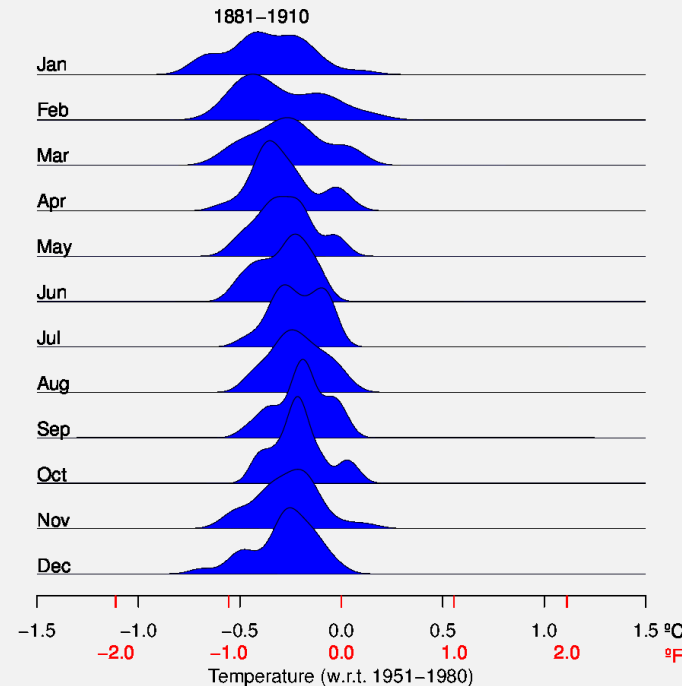
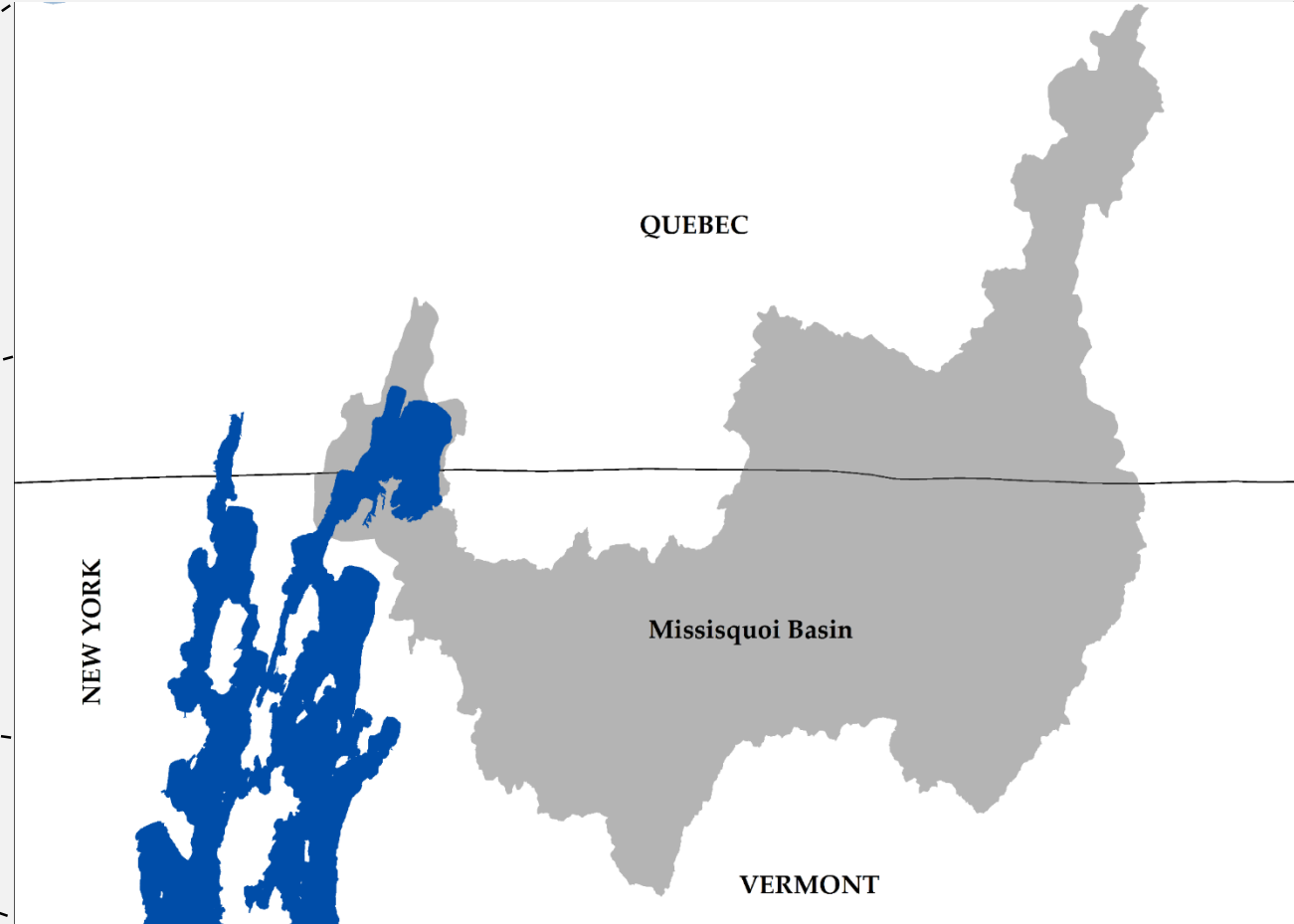
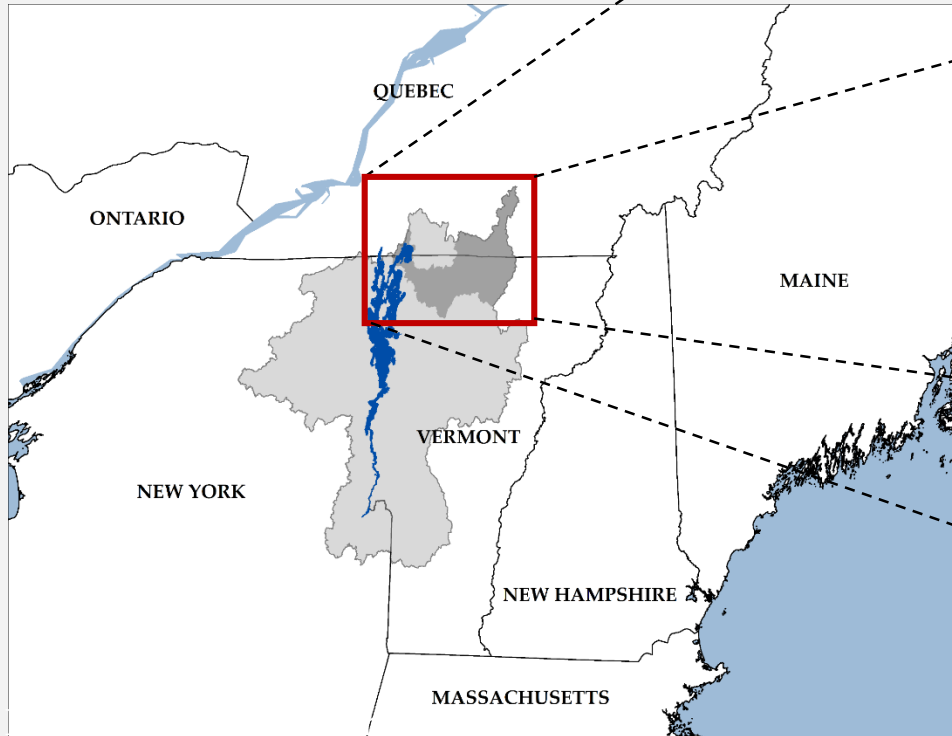
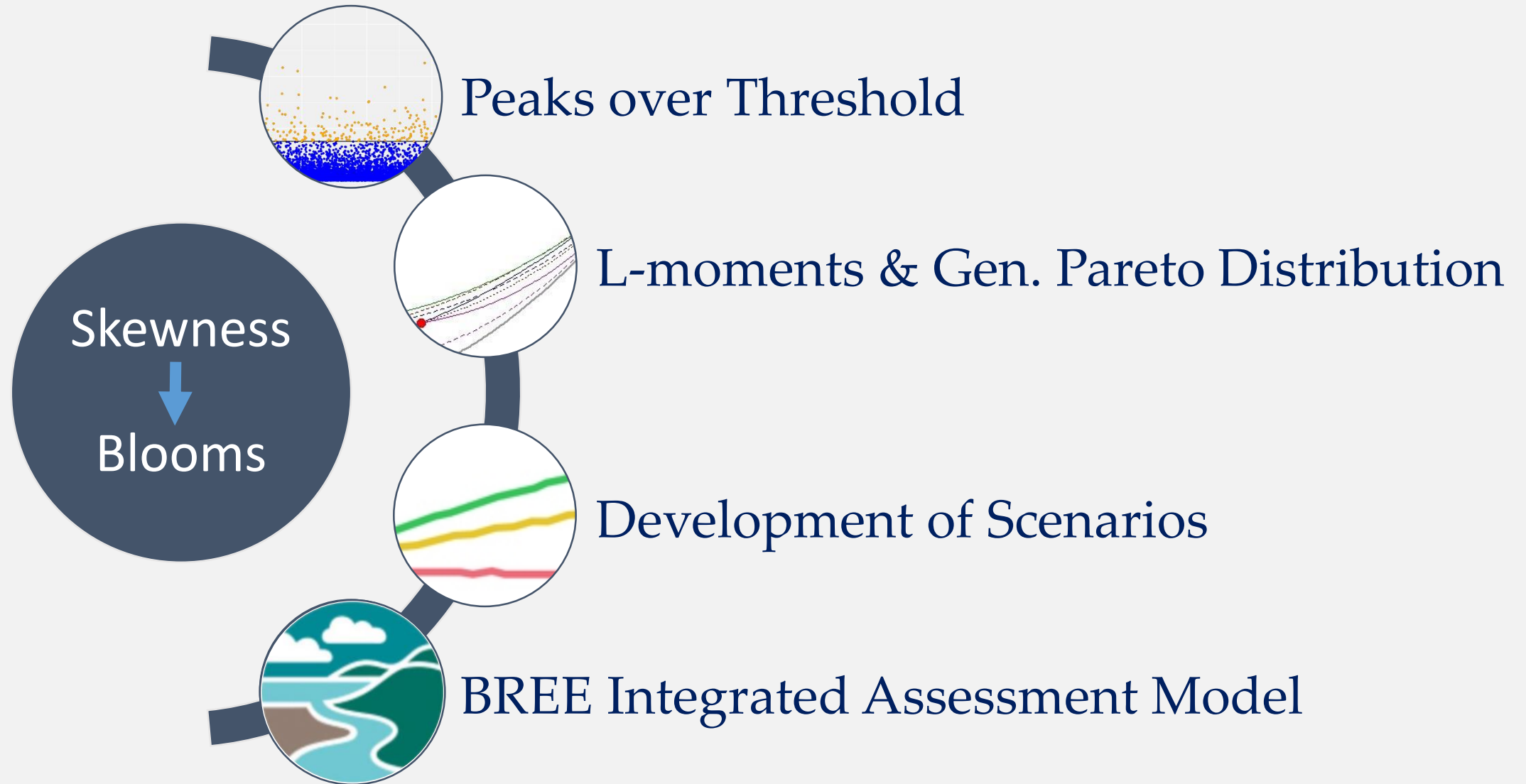


Figure source: Gavin Schmidt,
<http://www.realclimate.org/index.php/archives/2017/07/joy-plots-for-climate-change/>

Study Area

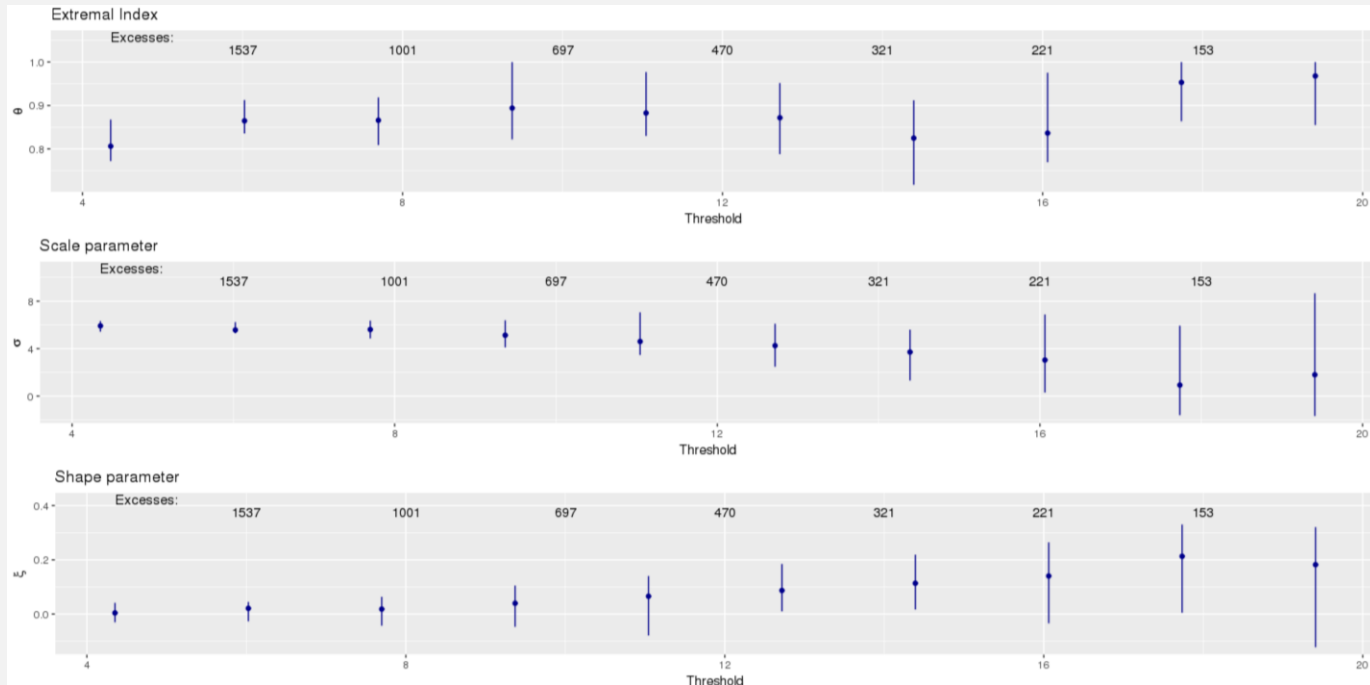


Approach



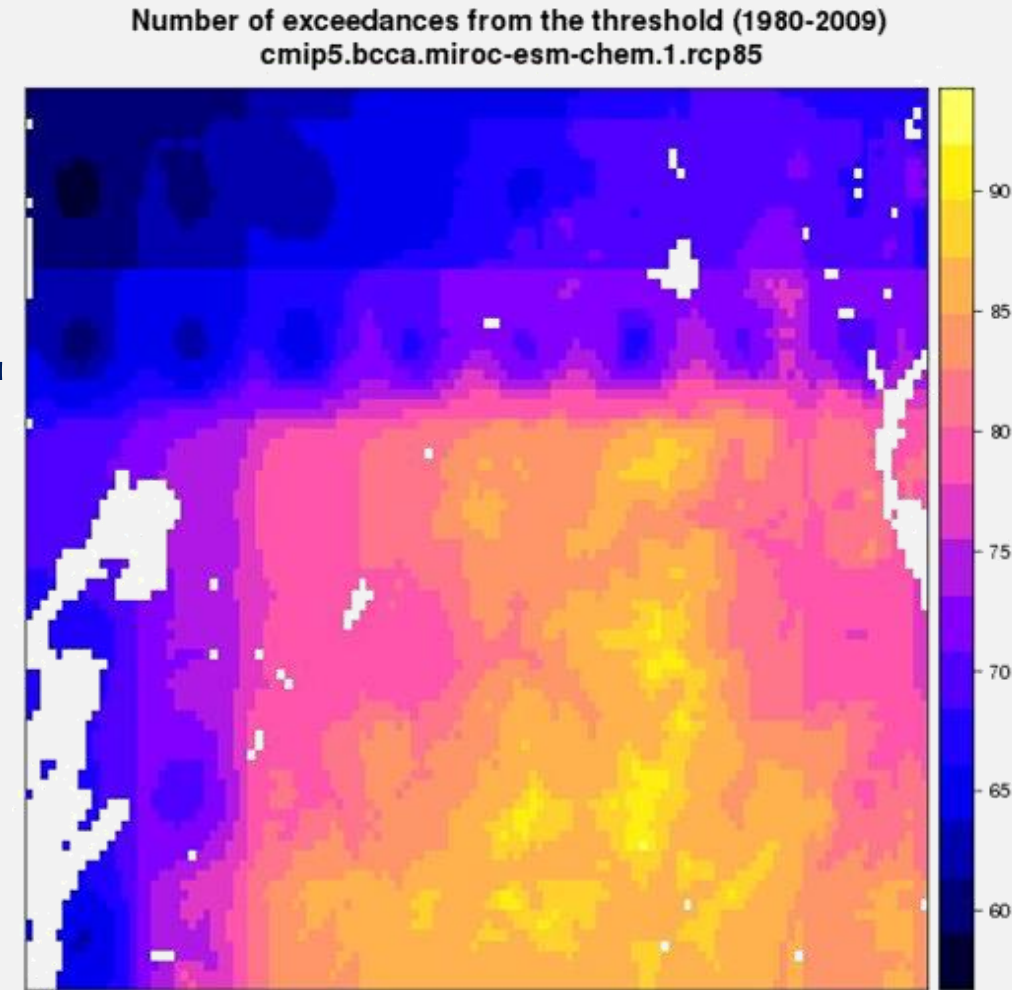
Peaks over Threshold

- Exceedances: Peaks over threshold



Subjectivity is introduced
Unfeasible for the amount of data involved

Thresholds based on percentiles

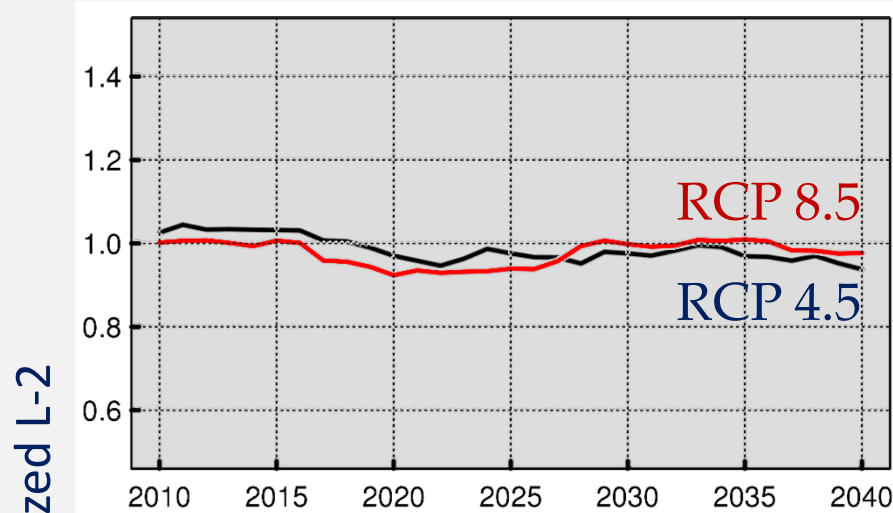


Preliminary Results

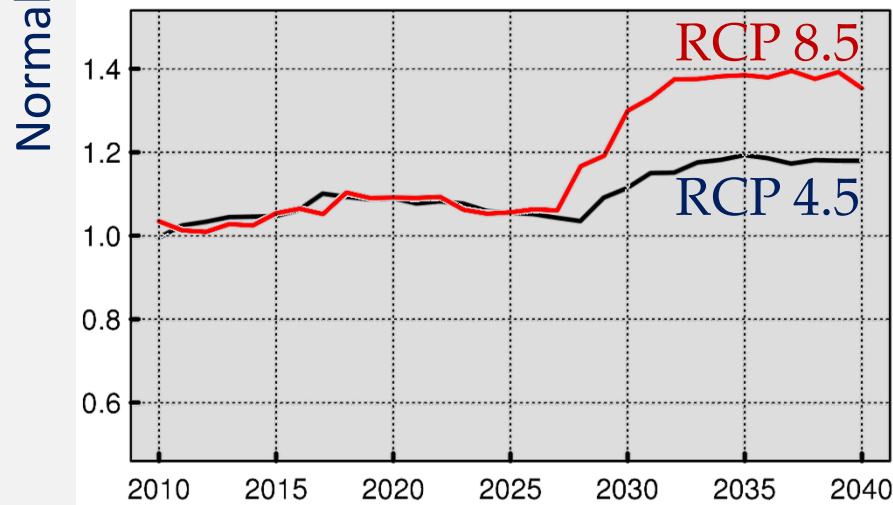
- Sample L-moments of GCM-based Exceedances

Dry GCM (IPSL-CM5AMR)
Wet GCM (NorESM1-M)

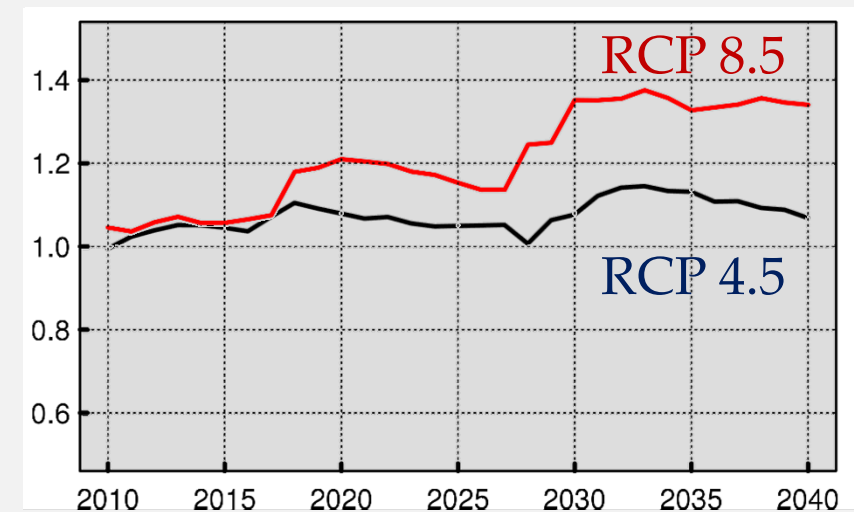
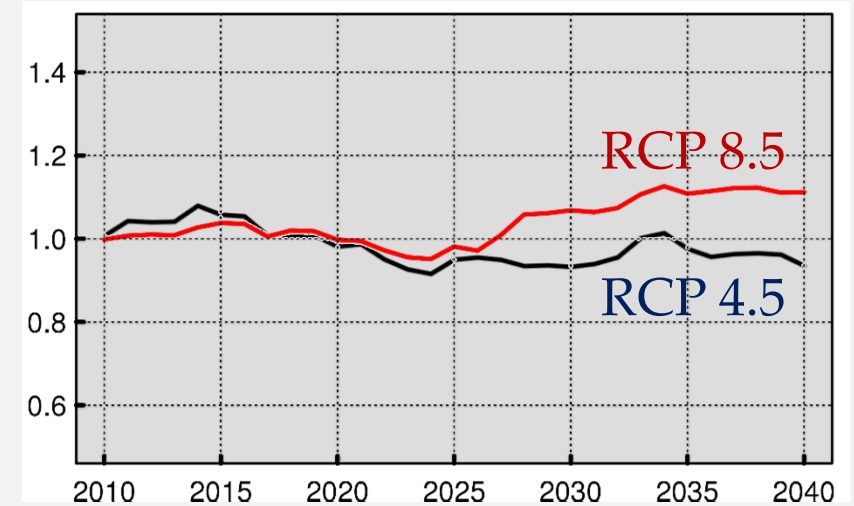
Dry GCM



Wet GCM



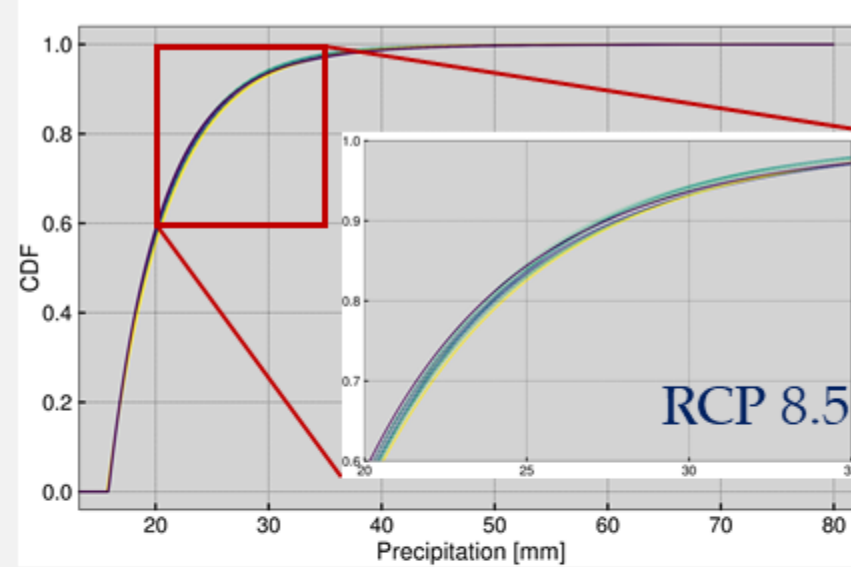
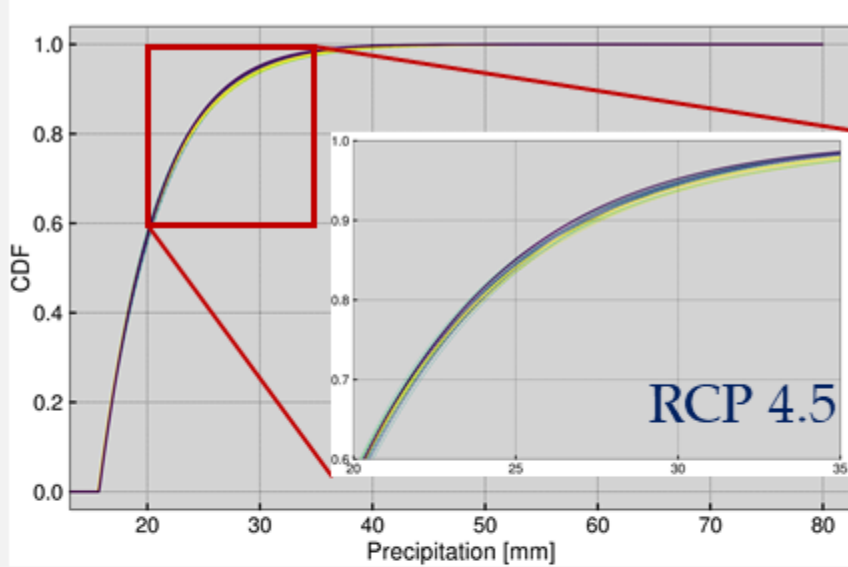
Normalized L-Skewness



Preliminary Results

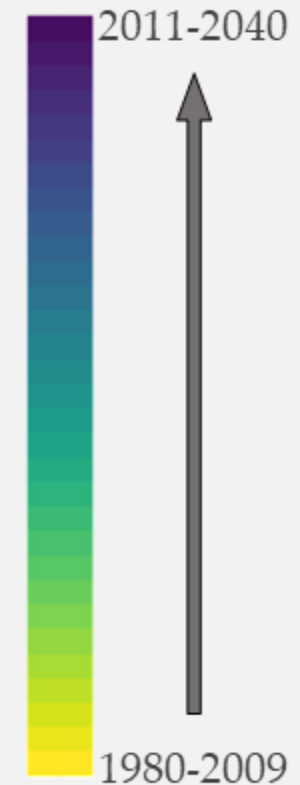
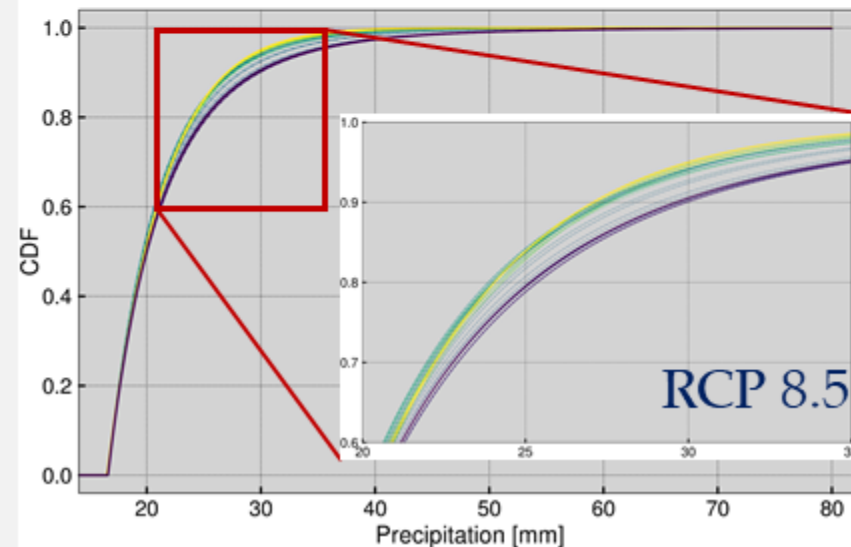
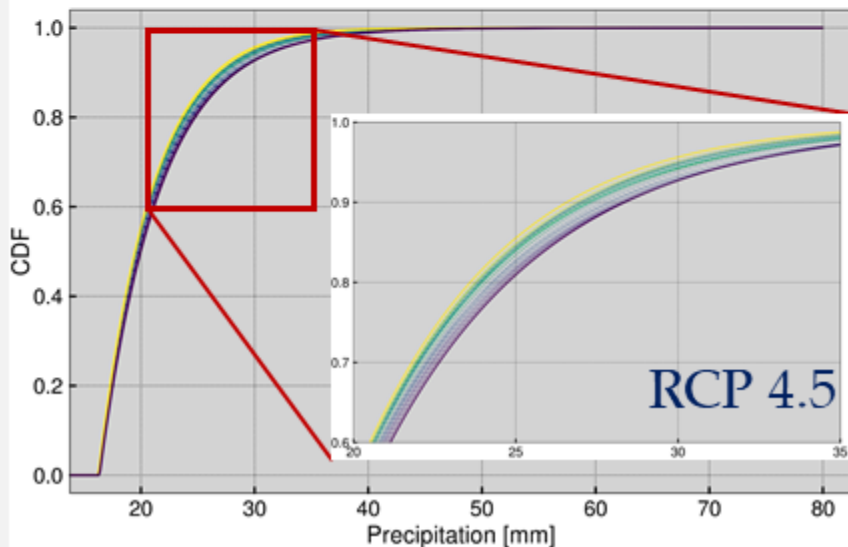
- GCM-based Modeled Exceedances

Dry GCM

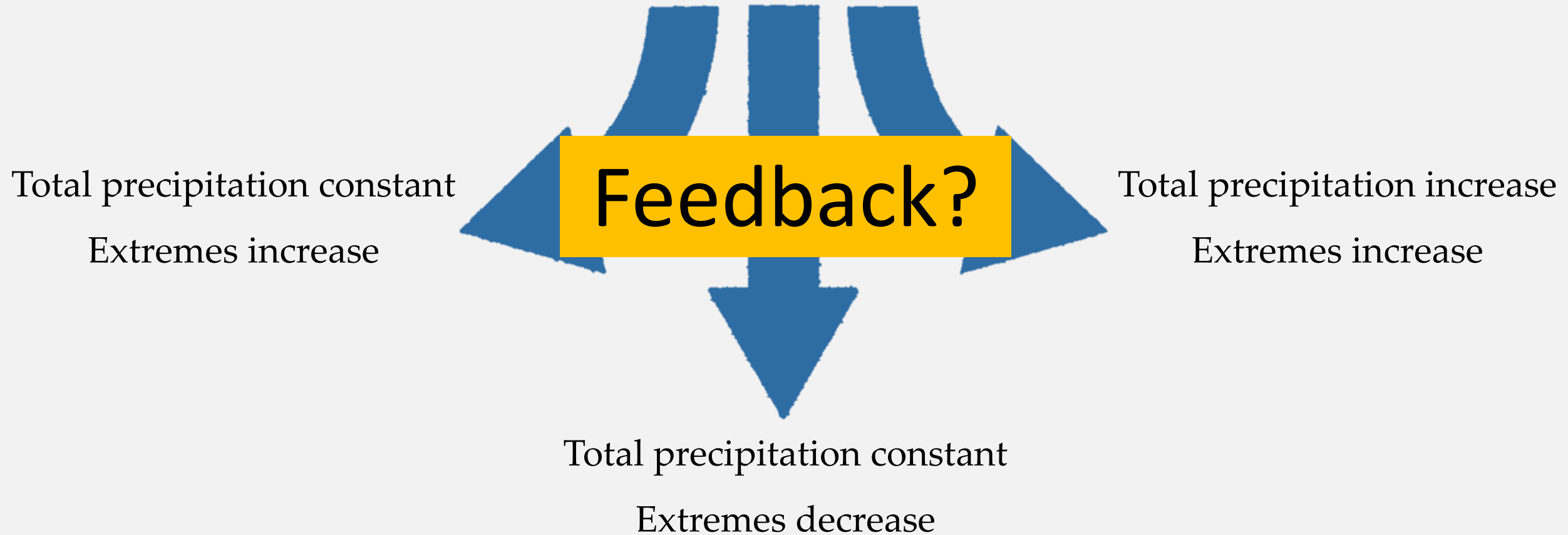


Dry GCM (IPSL-CM5AMR)
Wet GCM (NorESM1-M)

Wet GCM



Development of Scenarios



Moving forward

- Automated techniques for Extreme Value Analysis
- Design scenarios for changes in skewness in precipitation and temperature
- Perturb downscaled ERA5 (Reanalysis Dataset) for precipitation and temperature
- Sensitivity Analysis

THANK YOU!



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