Projected Rainfall Patterns for Puerto Rico 1960 -2100

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Climate Change Implications for Tropical Islands: Interpolating and Interpreting Statistically Downscaled Global Circulation Model Projections for Management and Planning

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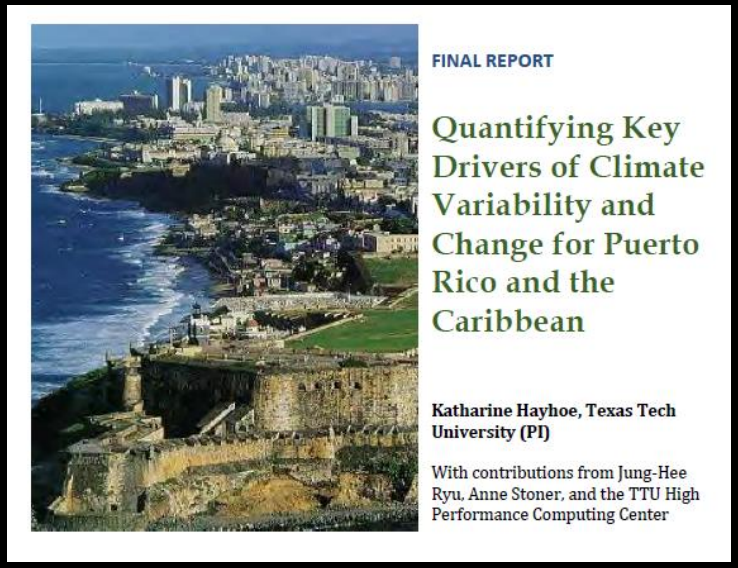
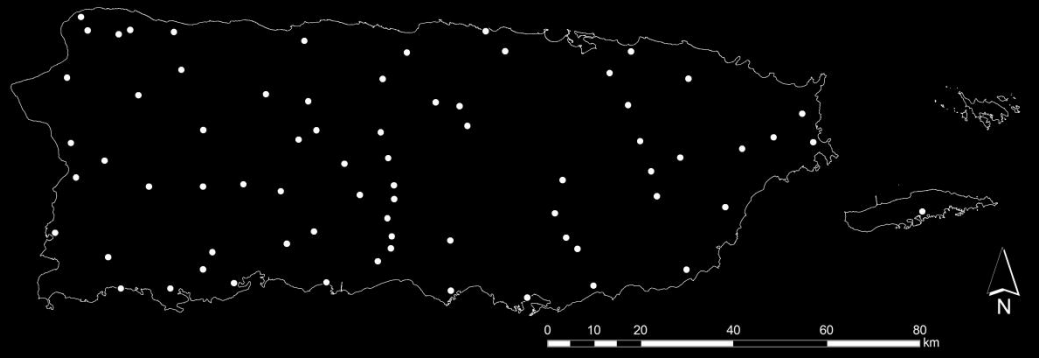
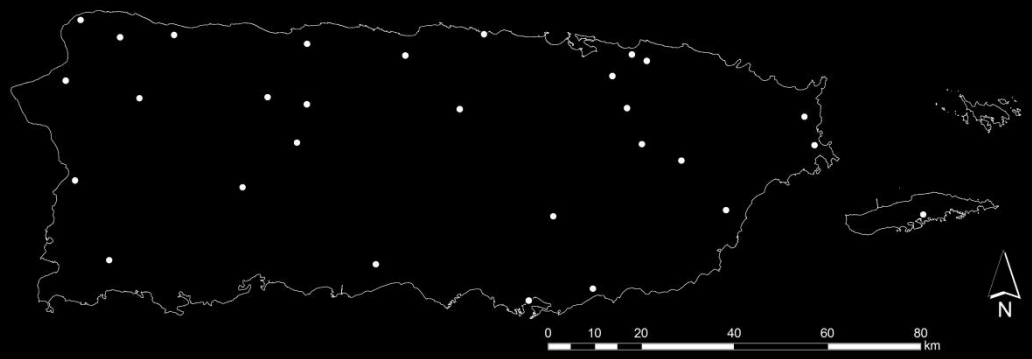
Statistically downscaled climate data





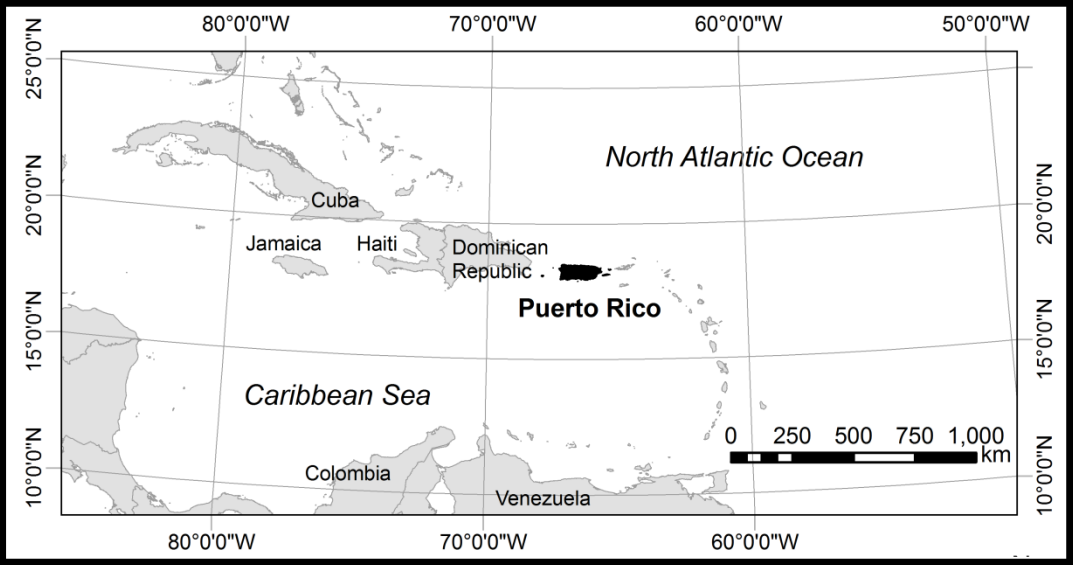
Precipitation: 71 stations

- Hayhoe (2013) downscaled CMIP3 models to station locations
- Asynchronous Regional Regression Model (ARRM) (Stoner et al. 2012)



Temperature (Minimum and Maximum): 29 stations

Model Selection and Averaging



Variables:

- Precipitation
- Maximum temperature
- Minimum temperature

Time intervals:

- 1960-1990
- 1991-2010
- 2011-2040
- 2041-2070
- 2071-2099

Spatial pattern of rainfall
Drought indices
Cooling degree days
Shifting life zone patterns

Models

Bimodal:

- CGCM3(T47)
- HADCM3
- MIROC_MED
- MRI_CGCM2

Single w/MSD

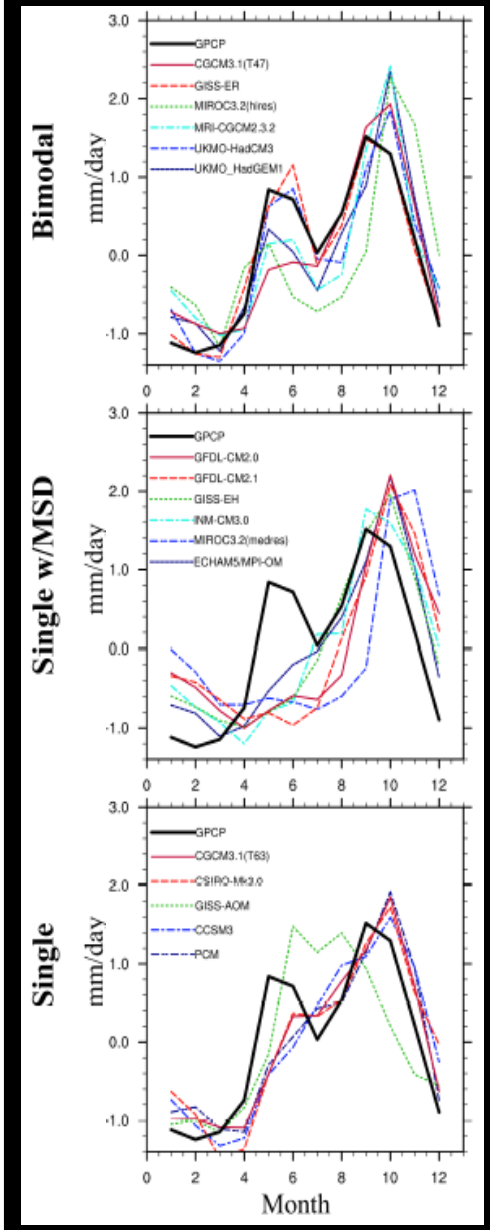
- ECHAM5
- GFDL_2.1

Single

- CCSM
- CGCM3(T63)
- CSIRO
- PCM

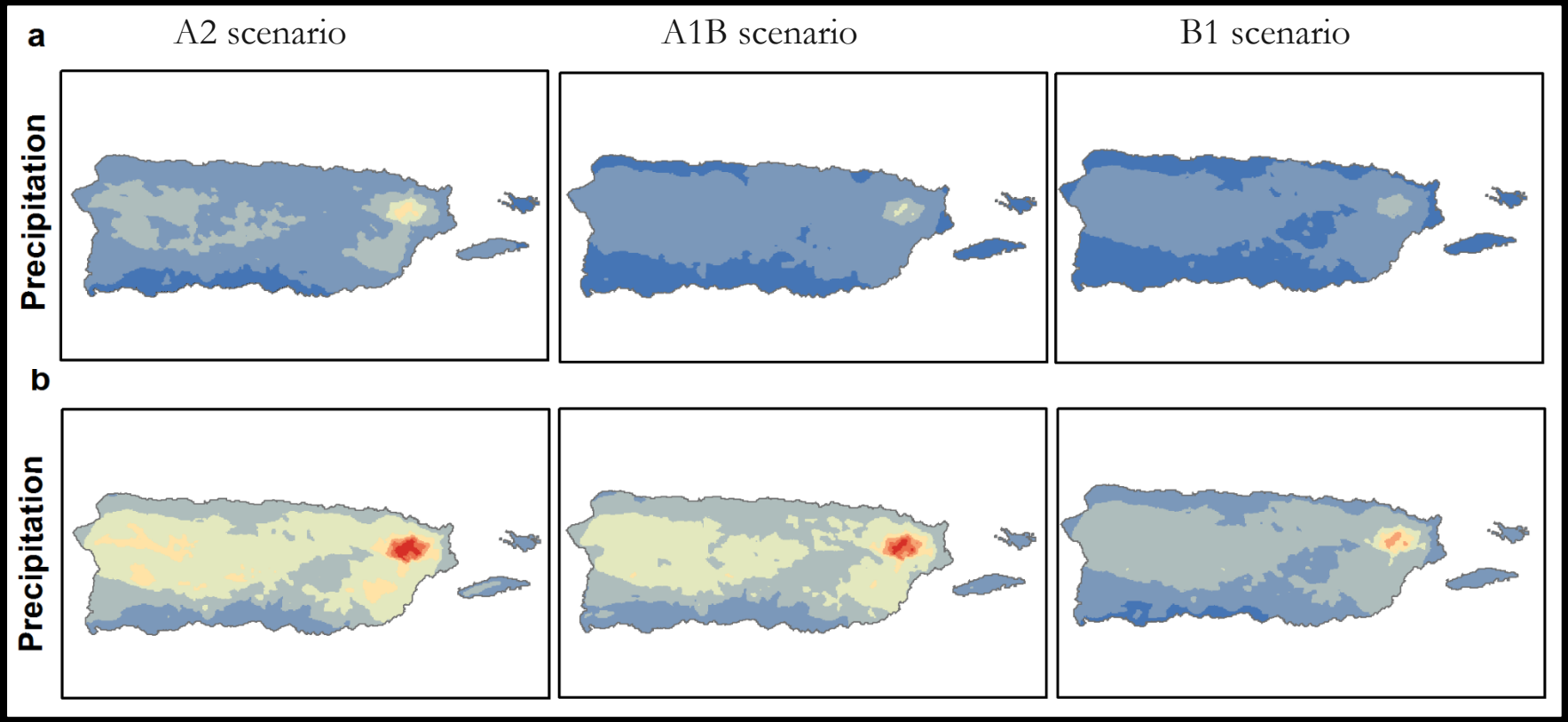
Not evaluated

- CNRM
- ECHO



(Hayhoe, 2013)

Changes in precipitation over next century



Precipitation decline (mm)

- < 300
- 300.1 - 600
- 600.1 - 900
- 900.1 - 1,200
- 1,200.1 - 1,500
- 1,500.1 - 1,800
- 1,800.1 - 2,100
- 2,100.1 - 2,490

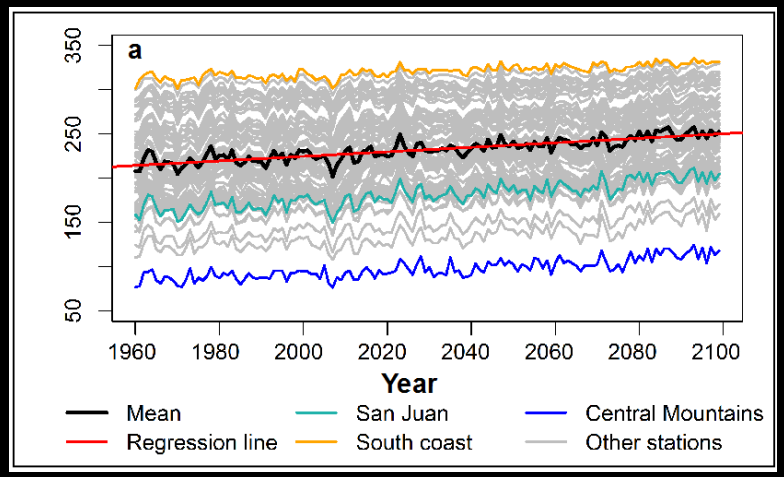
Upper. All model Ensemble:
A2: 29.80
A1B: 20.69
B1: 18.24

Lower. Bimodal Ensemble:
A2: 53.81
A1B: 49.49
B1: 36.39

Additional climate change effects

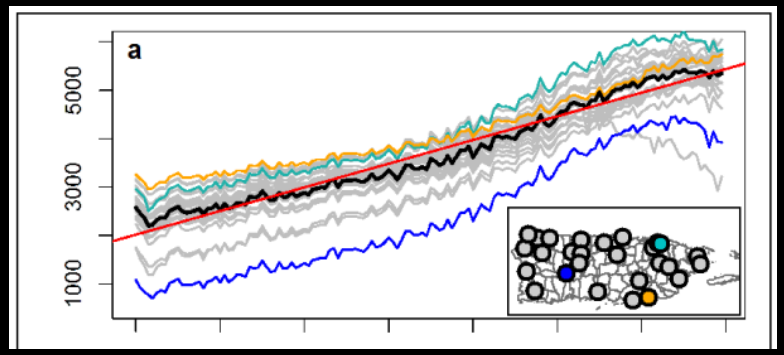
Total dry days

Precipitation less than 1 mm.

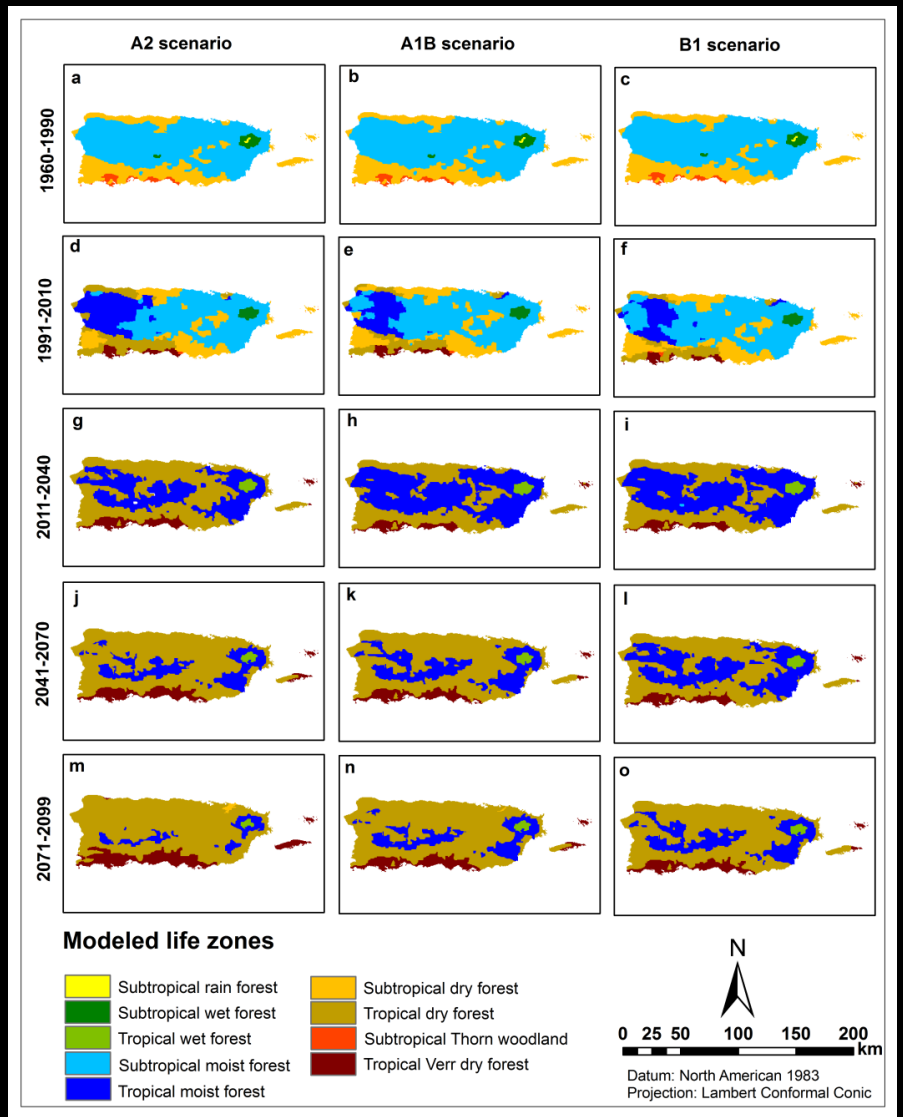


Cooling degree days

Number of days where mean daily temperatures is greater than 18 degrees C



Projected life zone shifts



Conclusions

- Projected precipitation strongly dependent on the model selection strategies
- Precipitation decline of 18.24- 29.8 % from the 1960-1990 to the 2071-2099 period depending on the emission scenario
- Uncertainties in all steps from the global models and downscaling to interpolation, and more uncertainty for precipitation than temperature
- Implications for all sectors of society