



ASSESSMENT OF FUTURE CLIMATE IMPACTS ON AGRICULTURE IN THE BRAZILIAN SEMIARID

Minella Martins^{*1}, Javier Tomasella², Daniel Rodriguez¹, Paula Siqueira¹

* minella.martins@inpe.br . ¹National Institute for Space Research-INPE . ²National Center for Monitoring and Early Warning of Natural Disasters -CEMADEN

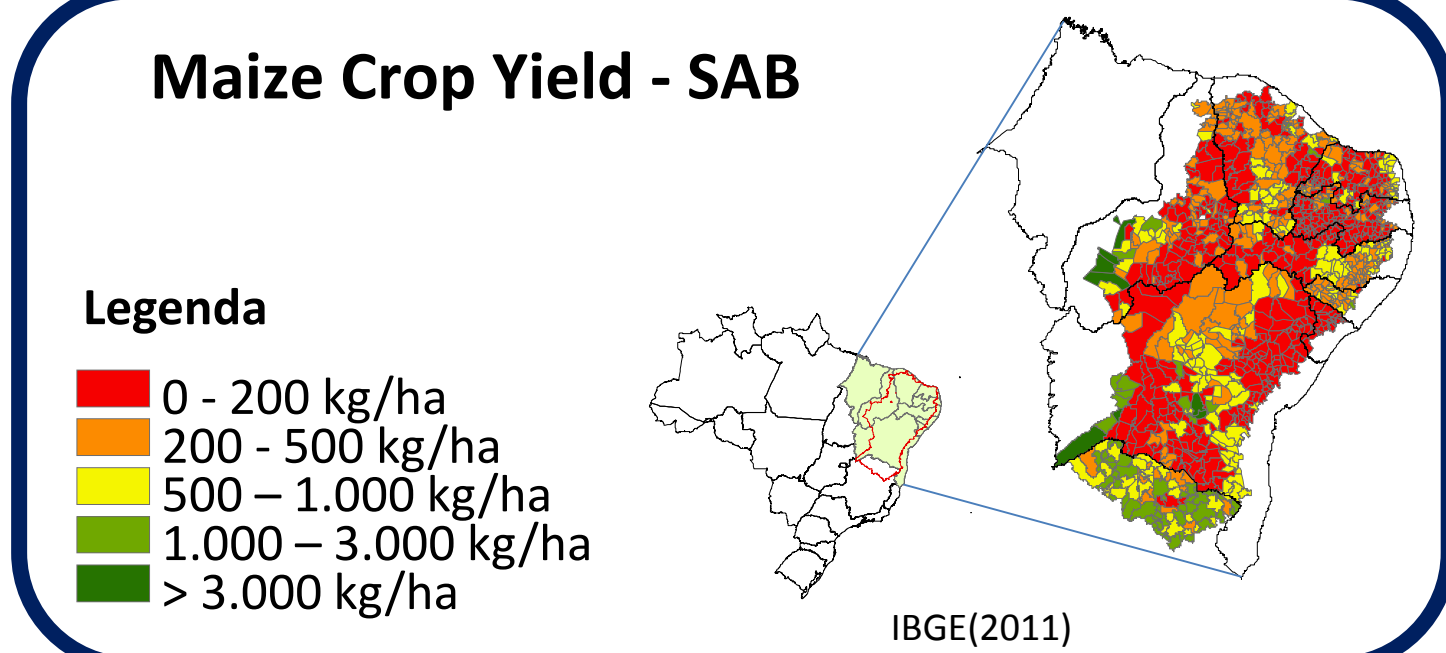
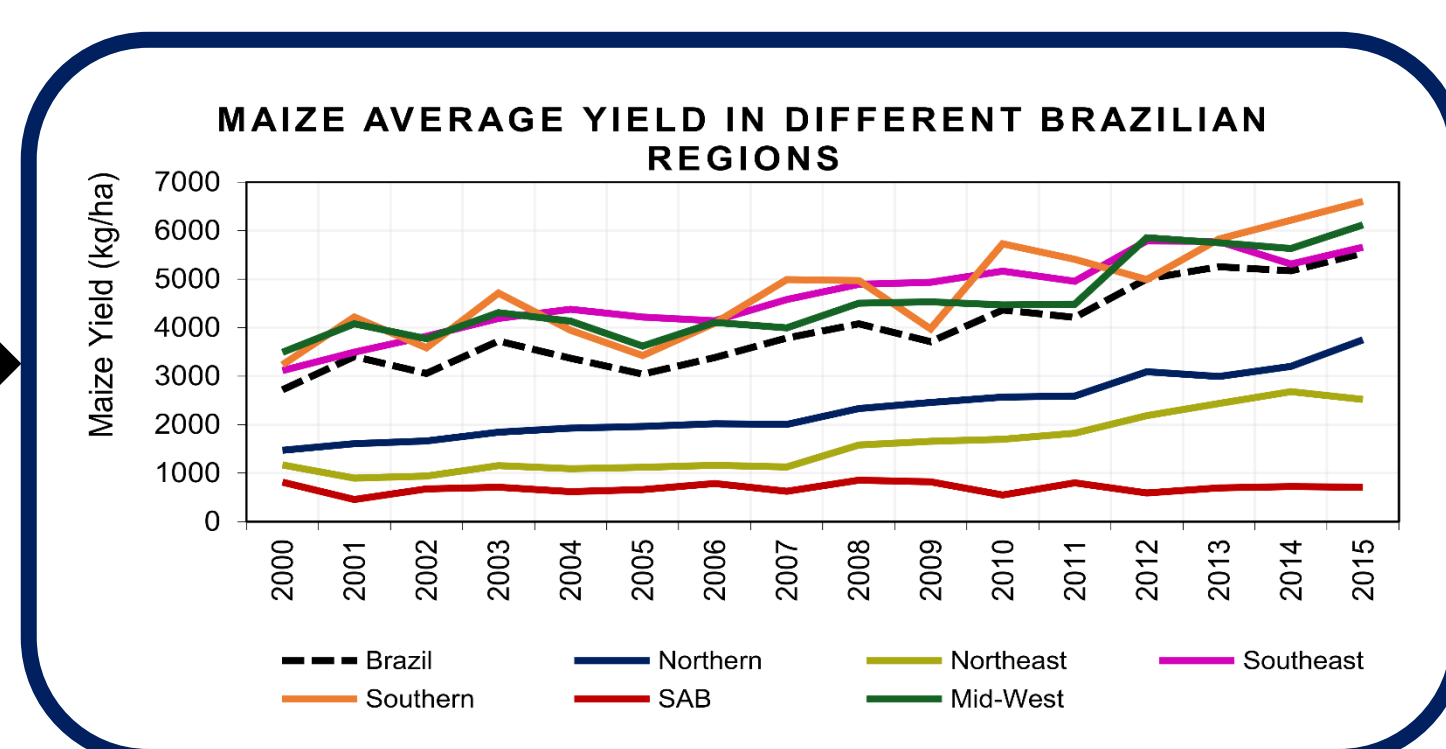


ABSTRACT

Agricultural production occurs in a scenario of uncertainties governed, mainly, by the variations in the climate. In this sense, knowledge of the effects of climate on agricultural production has become essential to ensure the sustainability of agriculture and to guarantee food and water security even in the face of climatic adversities. Such knowledge becomes more important when it is considering the projections of climate change, especially in regions which are already vulnerable such as the Brazilian Semi-arid. In this regard, to know the production and the water requirements of the crops in the face of possible changes in the climate, it is a way of anticipating adaptation actions. In this context, the present work aims to assess the agricultural production of maize for the Semi-arid region of Brazil and to estimate the water requirements of the crop to obtain potential productivity, considering present and future climate conditions. The climate projections used in this work are provided by the regional atmospheric model Eta-CPTec and the coupled atmosphere-ocean global models: HADGEM2. Regarding the scenarios, we used the RCP scenarios, 4.5 and 8.5 versions, of the Fifth Assessment Report - AR5. The projection of maize production and crop water requirements estimates will be based on AquaCrop model (Stetuto et al. 2009). Before using the climate projections as direct input to a crop model, we applied bias corrections methods to eliminate the systematic errors of climate variables and avoid an unrealistic assessment of impacts. Preliminary results have shown a satisfactory performance of AquaCrop to simulate maize yield considering the current climate. By proving the efficiency of the crop model in simulating maize yield with observed data, it is possible to extrapolate its estimates considering the future climate and, therefore, to infer about the future impact on maize production beyond the future water requirements of maize in the Brazilian Semi-arid.

INTRODUCTION

BRAZILIAN SEMIARID -SAB



- Vulnerability**
- Rainfed agriculture
 - Severe droughts
 - Heavy crop failure
 - High food insecurity (38% of the population)

PRELIMINARY RESULTS

Figure 1: Eta Bias Correction

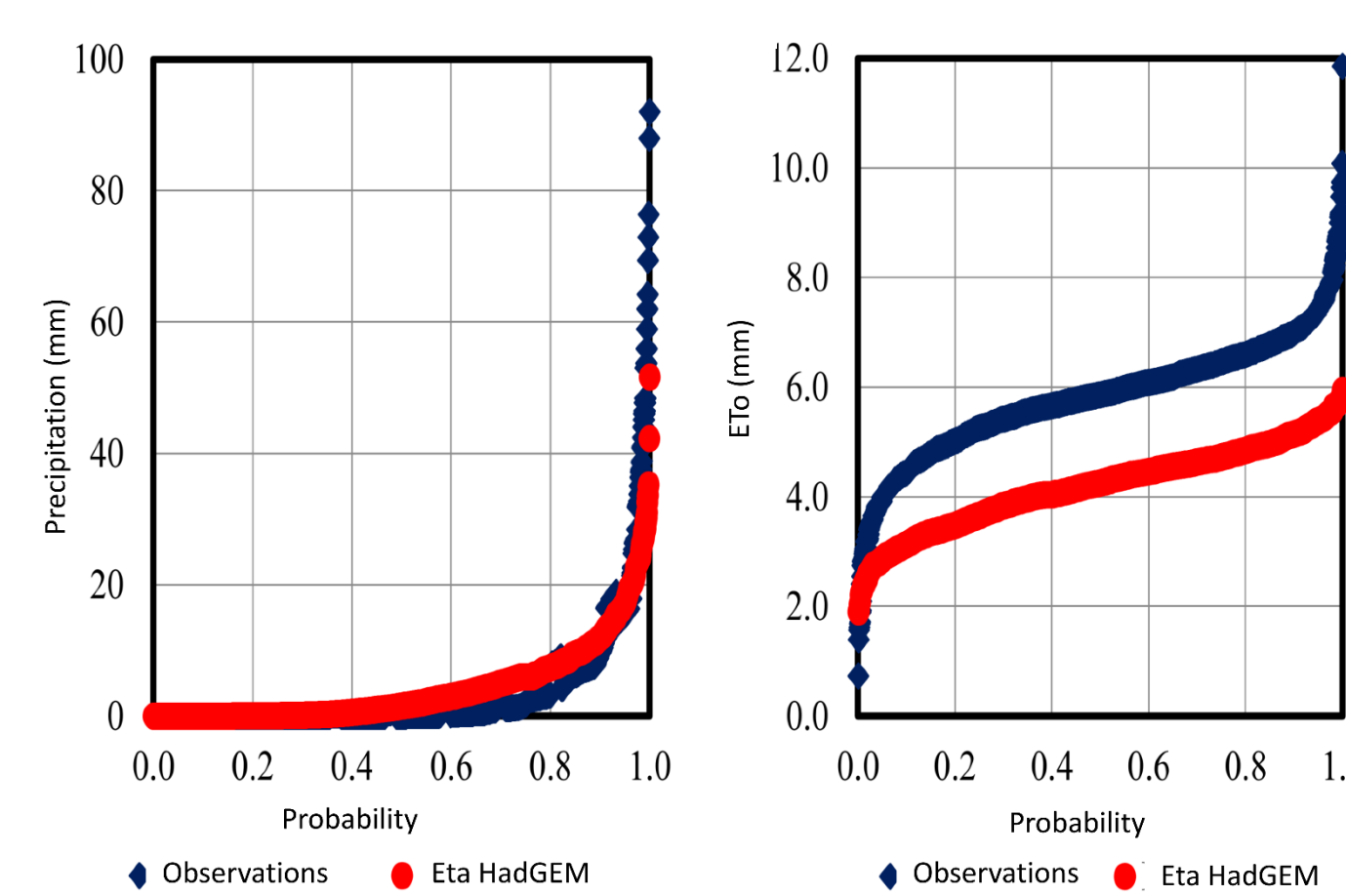


Figure 2: Eta Bias Corrected

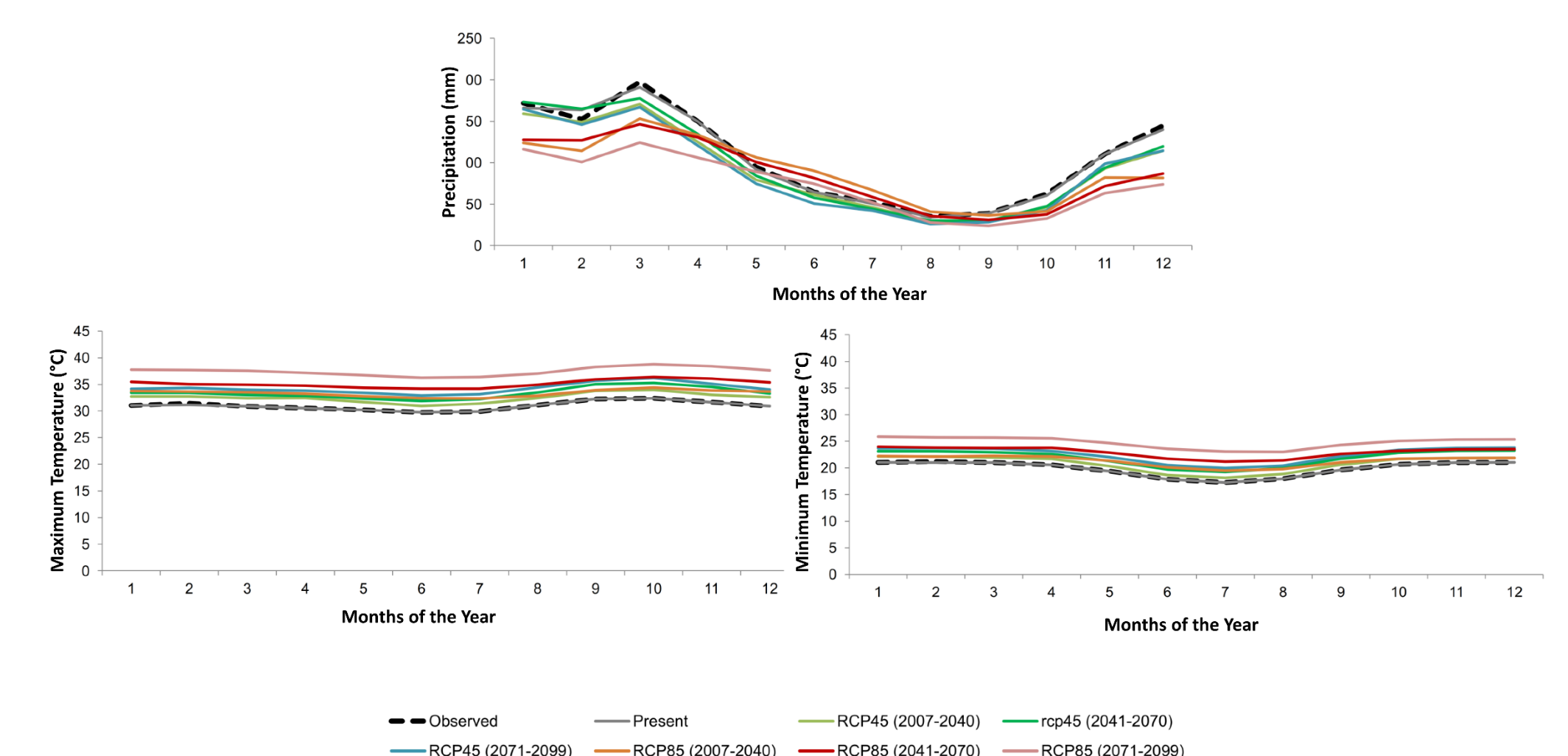


Figure 4: AquaCrop performance in SAB

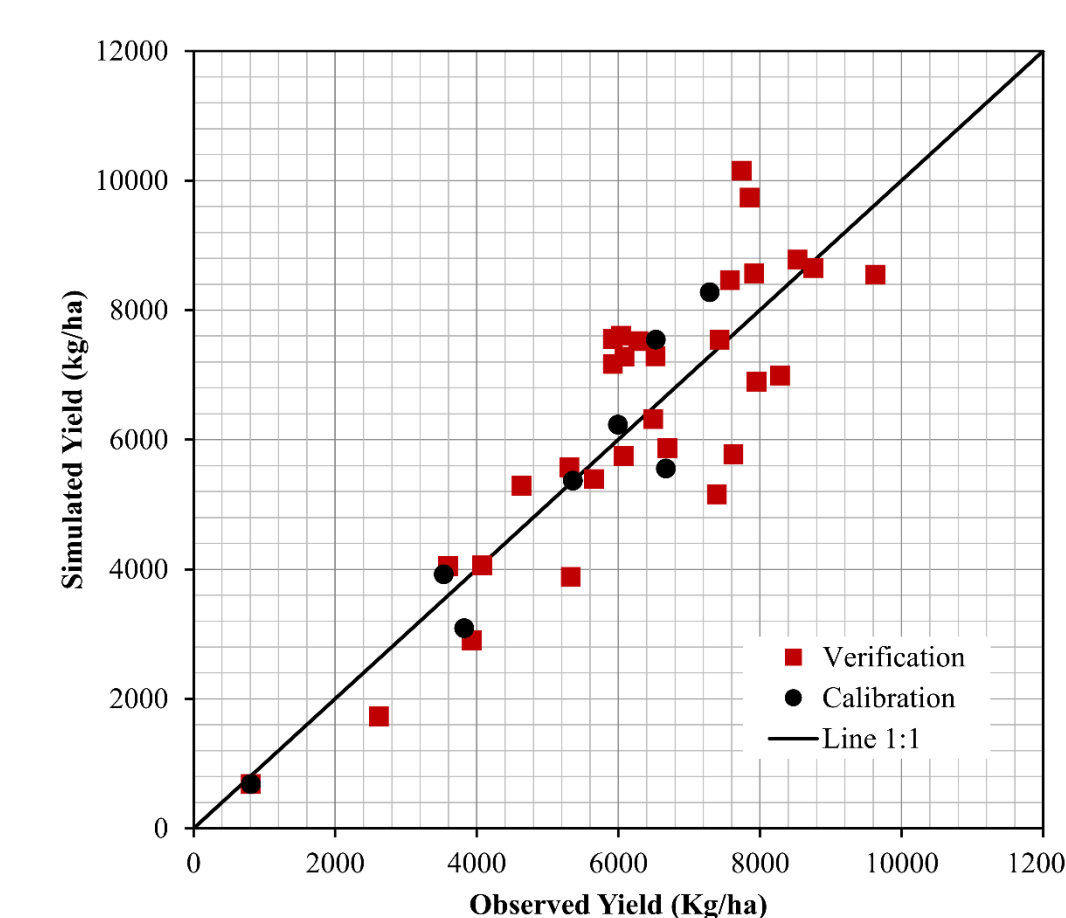
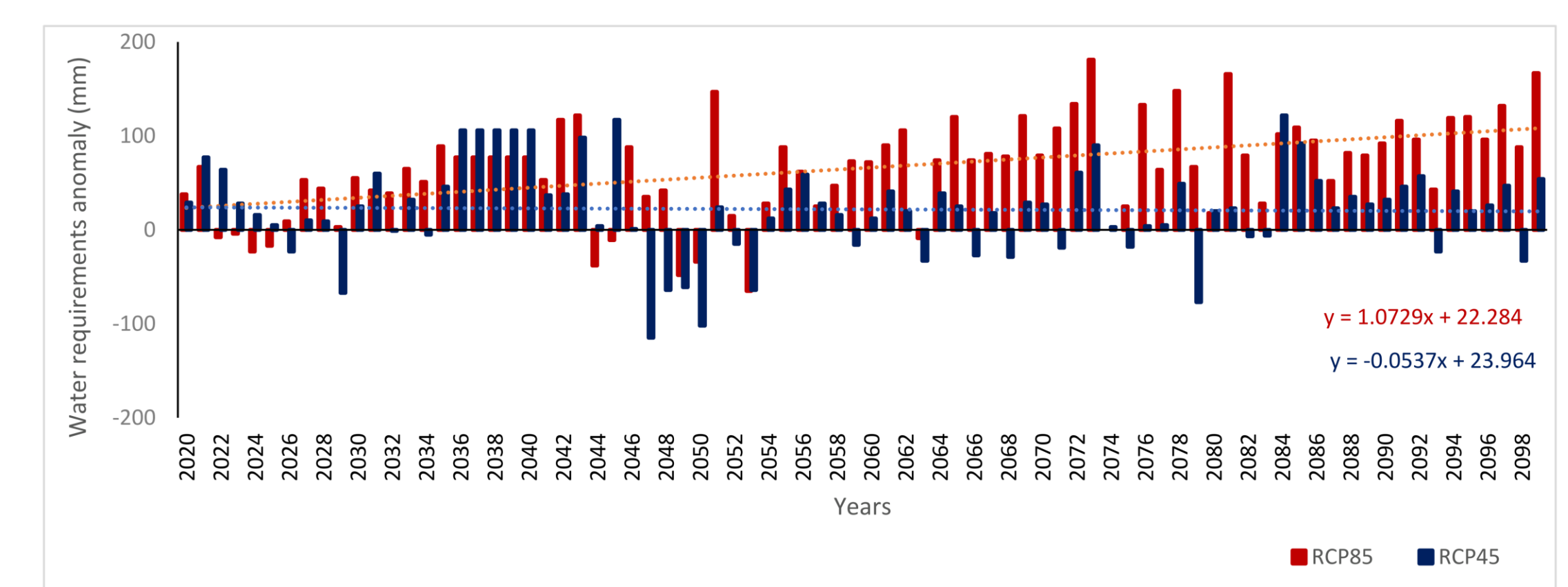
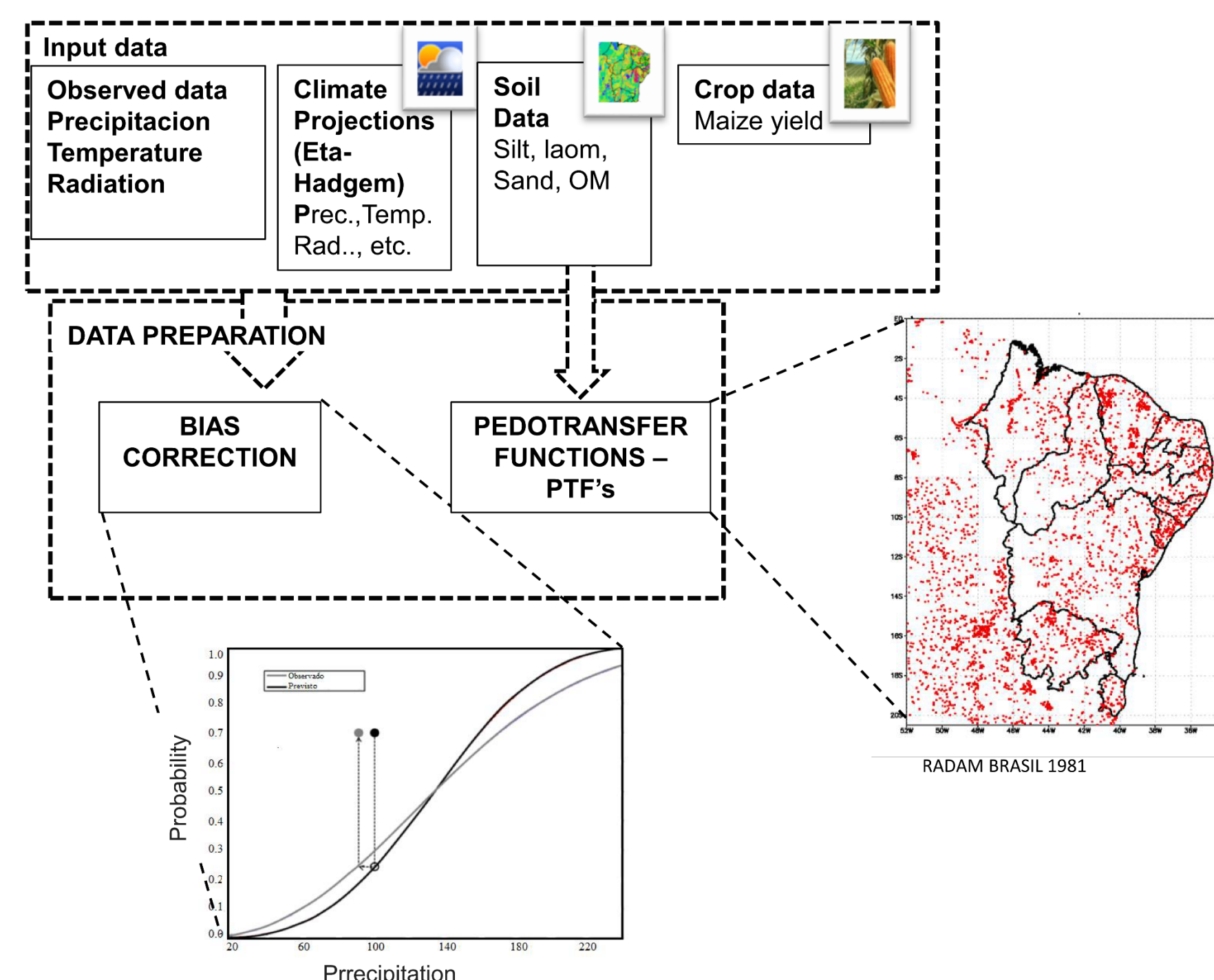


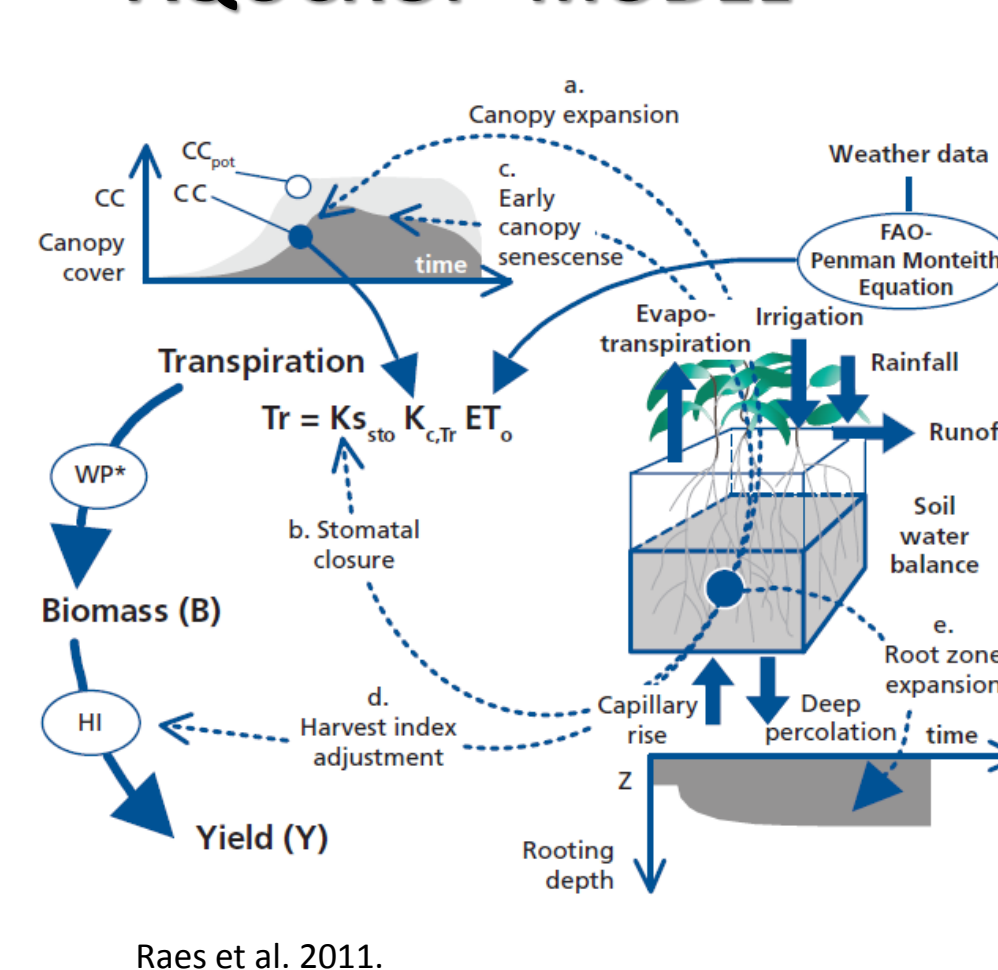
Figure 4: Crop Water requirements Anomaly



DATA AND METHODOLOGY



AQUCROP MODEL



CONCLUSIONS

- ✓ AquaCrop + Eta have a great performance to estimate crop yield and water requirements in SAB.
- ✓ The bias correction technique contributes to eliminating systematic errors, avoiding an unrealistic assessment of impacts.
- ✓ With the presented methodology, future crop yield and crop water requirements can be estimated and these information should be beneficial for stakeholders and policy makers to help them to prioritize adaptation actions.

Reference

Martins, M.A., et al. Improving Drought Management in the Brazilian Semi-arid through Crop Forecasting. Submitted to Journal of Agricultural System. 2017.