

Observed Trends in Indices of Daily Temperature and Rainfall Extremes in Rio de Janeiro City

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INTRODUCTION

• Brazil is vulnerable to climate change. Rio de Janeiro, one of the largest seaside cities in Southeastern Brazil, is expected to be affected by the climate changes projected for the future. According to Marengo et al. (2009), cold days, cold nights and frosts have become less frequent, while the number of occurrence of hot days, hot nights and heatwaves have increased. Significant positive trends in rainfall between 160 and 200 mm/decade have been observed in Southeastern Brazil (Obregón and Marengo, 2007).

OBJECTIVE

• To analyze trends in indices of daily temperature and rainfall extremes in Rio de Janeiro city.

METHODOLOGY

- Observational data: National Institute of Meteorology (INMET);
- Daily maximum and minimum temperatures and total daily rainfall;
- Ordinary climatological station: Alto da Boa Vista – RJ;
- Period: January 1, 1967 to December 31, 2007;
- The station remained in the same location throughout the study period and is located in a forested area (Tijuca Rainforest), without major changes in the vegetation cover around it;
- Indicators of climate extremes calculated using RCLimDex, developed by the Canadian Meteorological Service (Table 1);
- Climatological values (1967 – 1996): used as initial data for thresholds (percentiles) relate to climatic indices;
- Precipitation, maximum and minimum temperatures, respectively – Highest values: 241.5mm, 38.6°C and 29.4°C; Lowest values: 0.0mm, 13.5°C and 6.7°C.



Figure 1 – Meteorological Station of Alto da Boa Vista – RJ.

Table 1 – Some of the major climatological indices used to evaluate the trends.

Indicator	Definition
DTR	Annual mean difference between maximum and minimum temperatures
SU25	Annual count when the maximum temperature (daily maximum) > 25°C
WSDI	Annual count of days with at least 6 consecutive days when the maximum temperature > 90th percentile
CDD	Maximum number of consecutive days with daily rainfall < 1mm
PRCPTOT	Annual total rainfall
RX1day	Annual maximum 1-day precipitation

RESULTS

- Temperature: expressive increase in DTR, SU25 and WSDI, as in Vincent et al. (2005);
- Precipitation: small reduction in CDD, a rise in PRCPTOT and in RX1 day.

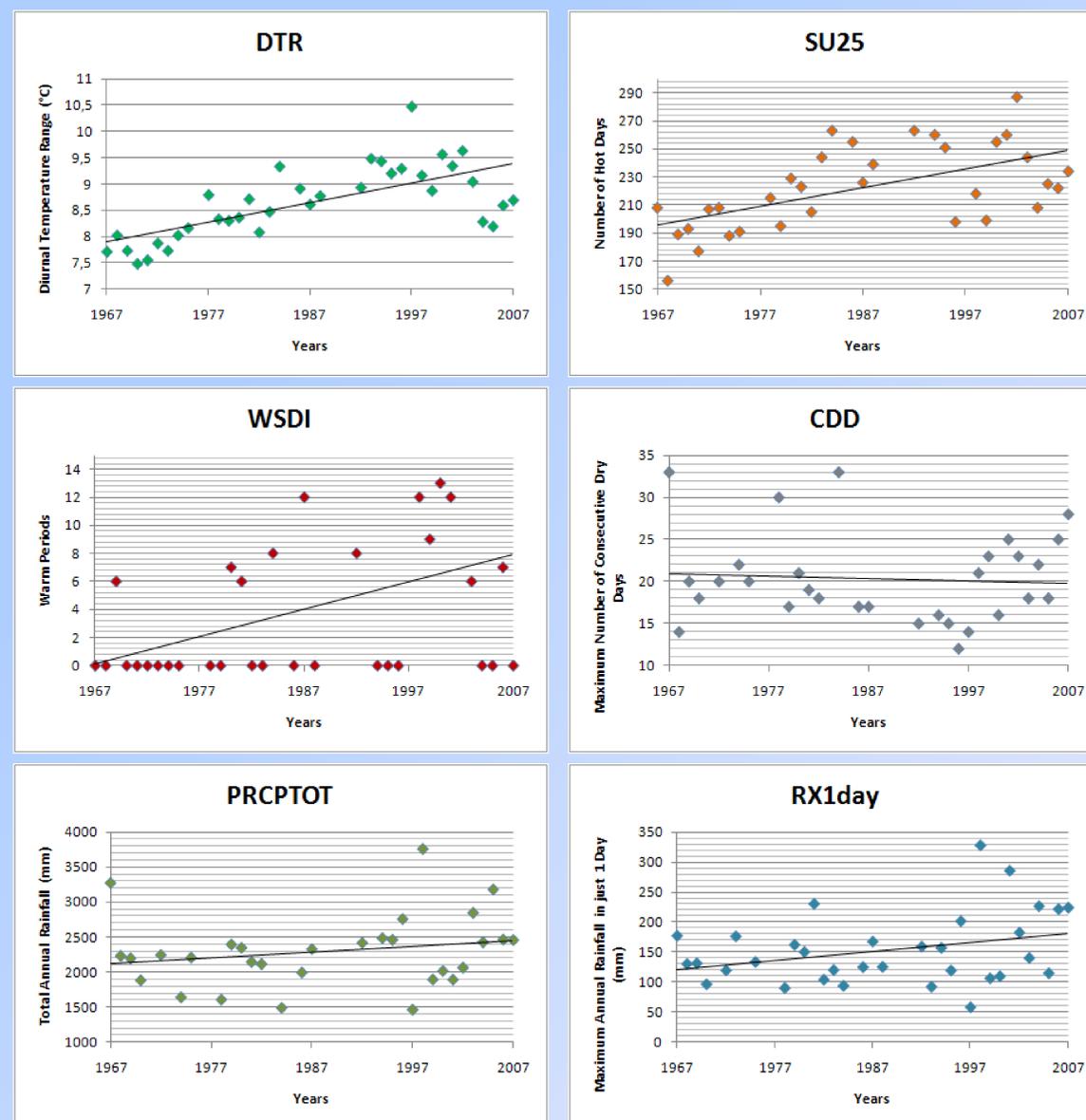


Figure 2 – Trends for climatological indices DTR, SU25, WSDI, CDD, PRCPTOT and RX1day.

CONCLUSIONS

- These results are consistent with an increasingly wet climate over the years in Rio de Janeiro city, with high daytime temperatures and heavy rainfall concentrated in short periods.

BIBLIOGRAPHIC REFERENCES

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