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CL5.6 - Climate Data Compilations, Homogenisation and Analysis of Variability, Trends and Extremes
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INDICES FOR DAILY TEMPERATURE AND PRECIPITATION BASED ON QUALITY CONTROLLED AND HOMOGENIZED DATA IN MADAGASCAR 1950-2018

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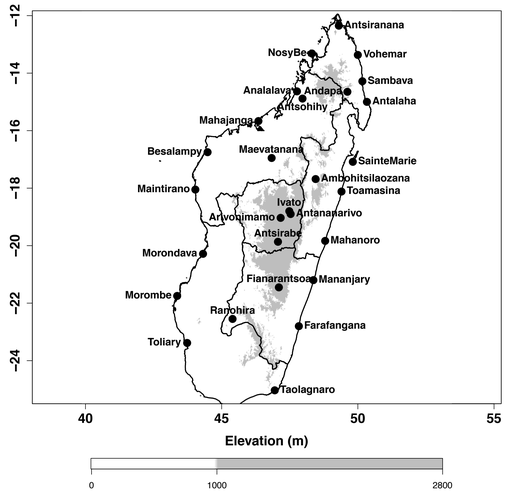
INTRODUCTION

Previous studies by *Tadross et al. (2008)* and *Vincent et al. (2011)* have demonstrated the changes on Madagascar climate, but this study contributes and enhances the approach to assess the quality control and homogeneity of Madagascar daily climate data before developing climate indices over 1950-2018.

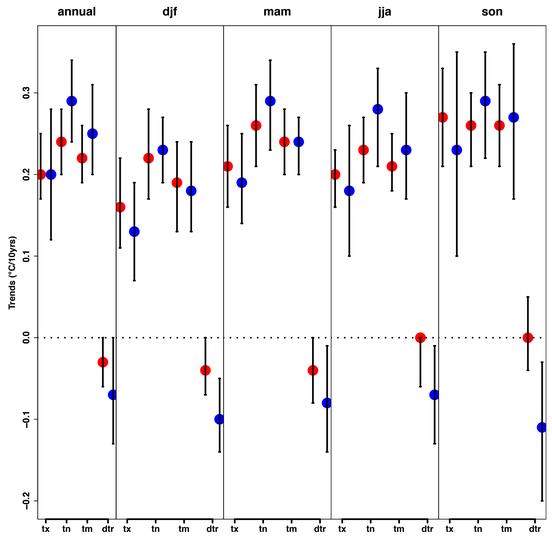
DATA

- Daily climate data of minimum and maximum temperature and precipitation from 28 synoptic stations are exploited.



Map of synoptic weather stations and SRTM digital elevation data

- Quality control is completed with INQC developed and maintained by Centre for Climate Change (C3) of Rovira i Virgili University, Spain (see https://github.com/INDECIS-Project/INQC)
- Daily homogenization is done with Climatol *(Guijarro, 2018)* and HOMER *(Mestre et al. 2013)* complemented by the approach described in *Vincent et al. (2002)*
- produced independently and using completely different approaches, they suggest a strong warming across the island, uniformly distributed through the year and slightly larger in nighttime temperatures, which results small reduction of the DTR.



Decadal regional trends (colored dots) and its 95% confidence interval (black lines) by Climatol (red) and HOMER (blue). **tx**: maximum temperature; **tn**: minimum temperature; **tm**: mean temperature and **dtr**: diurnal temperature range

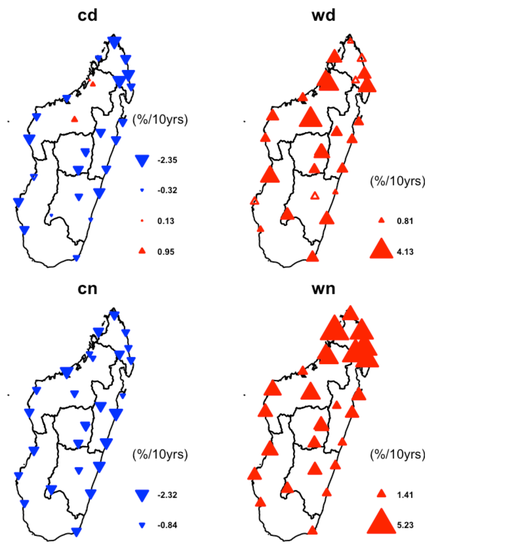
METHODS

- For practical reasons, homogenized data with Climatol are used to calculate 36 climate indices by CLIMIND package developed by INDECIS project (see http://indecis.eu/)
- Station-by-station index anomalies are averaged to have regional index anomalies by taking as reference period 1961-1990
- Decadal station-by-station and regional trends and its significance at 95% are computed from Zhang's trends and Kendall's test

RESULTS

Temperature

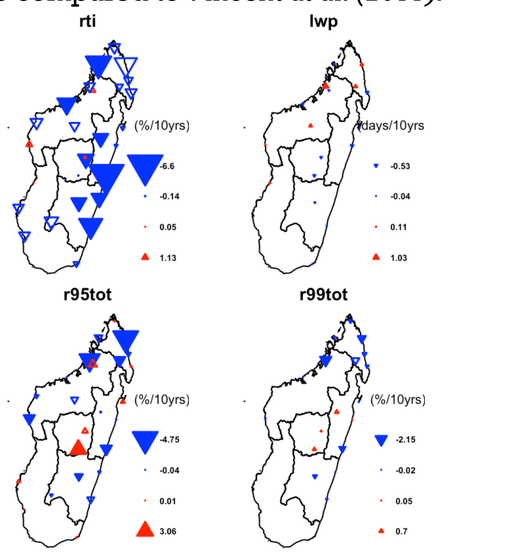
The warming are reflected by the significant increasing decadal trends of temperatures means and extremes at 5% significance level over the 1950-2018. Regional trends of means of minimum and maximum temperature are 0.24°C and 0.21°C per decade over the past 69 years respectively. Warm (cold) days and warm (cold) nights are significantly increasing (decreasing) over 1950-2018. Their absolute regional trends are lower (higher) approximately 1.37% (0.04%) and 0.82% (0.49%) per decade compared to *Vincent et al. (2011).*



Decadal station-by-station trends on temperature extremes. Red (blue) triangles indicate positive (negative) values of trends. Filled triangles are significant trends at 5% significance level.

Precipitation

No significant changes are found but intense precipitation might be possible at central uplands due to shortening of longest wet period (lwp) and occurrence of heavy precipitation (r95tot, r99tot). However, no influence detects on total precipitation (rti) which is still significantly decreasing over 1950-2018 specifically in South east part. Its absolute regional trend is lower 0.56% per decade compared to *Vincent at al. (2011).*



Decadal station-by-station trends on precipitation extremes. Red (blue) triangles indicate positive (negative) values of trends. Filled triangles are significant trends at 5% significance level.

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