

Present and future climate extreme indices

over Sinai Peninsula

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Introduction

Sinai Peninsula will be one of the economically promising areas due to the availability of many natural resources and arable land non-traditional ways as well as being a tourist attraction distinct and unique. It is therefore not surprising that the state is interested by Sinai development economically, socially and had to be attention to protecting the environment and taking into account the environmental dimension in order to preserve the integrity of the land and its inhabitants. Therefore, the study of the climate and weather factors and its characteristics are important to reduce the spread or transport of pollutants to preserve the environment and is also useful in studies of some aspects of economic development such as agriculture, tourism and construction. Sinai Peninsula, is a triangular peninsula linking [Africa](#) with [Asia](#) fig (1), and occupying an area of (61,000 square km).



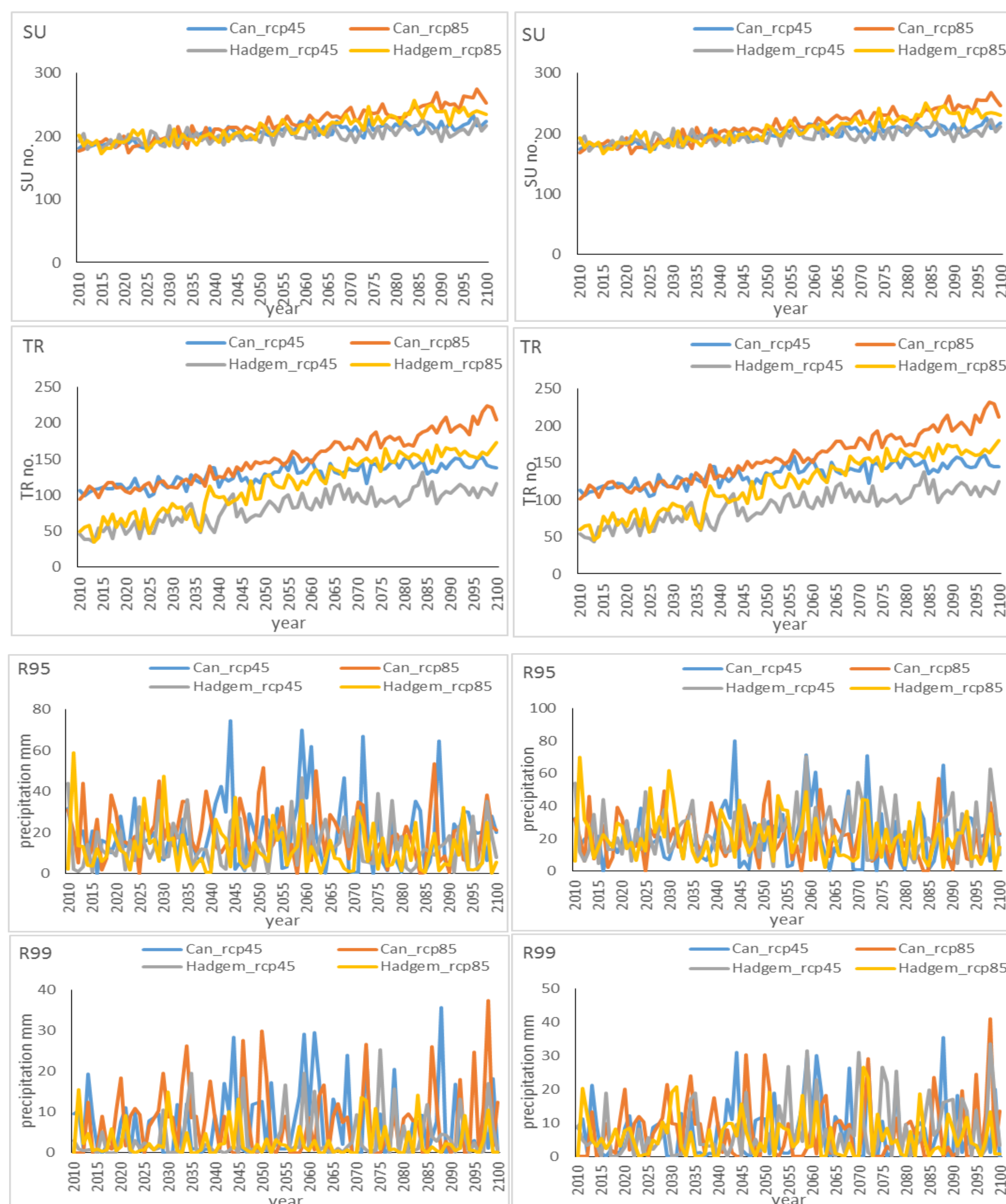
Methods

Daily ERA-Interim reanalysis dataset from 1979 to 2014 run by RCLimDex software used to calculate climate extreme indices for eleven stations selected over Sinai Peninsula. To develop a full picture overall the region we calculate average trend for every index, relative to the period 1980-2010. Before the index calculation, data quality controlled and their homogeneity tested. RCLimDex software and users guide are available from <http://etccdi.pacificclimate.org/software.shtml> Table (1), contains the climate extreme indices which calculated for eleven stations selected over North Sinai, South Sinai and Canal Region fig (2). Table (2) contains the trend values for each parameter calculated by RCLimDex, also figures (9 to 14) explain the time series for each parameter defined in table (1).

	Station	SU25	TR20	TXx	TNx	TXn	TNn	RX1day	Rx5day	PRCP TOT
North Sinai	El-Arish	0.81	1.17	0.05	0.07	0.01	0.001	-0.04	-0.034	-0.15
	Bear El-Abd	0.80	1.14	0.06	0.08	0.02	0.02	-0.01	-0.013	-0.04
	Nekhel	0.68	1.96	0.01	0.05	0.05	0.04	-0.04	-0.05	-0.06
	Rafah	0.73	1.31	0.04	0.05	0.02	0.02	-0.05	-0.04	-0.17
South Sinai	Taba	0.55	1.7	0.04	0.06	0.05	0.03	-0.06	-0.07	-0.1
	El-Tor	0.6	0.6	0.05	0.06	0.05	0.04	-0.02	-0.02	-0.02
	Sharm El-Shiekh	0.89	0.60	0.06	0.07	0.03	0.02	-0.04	-0.04	-0.04
	Ras Sedr	0.68	1.37	0.01	0.08	0.04	0.06	-0.02	-0.03	-0.04
Canal Region	Suez	0.61	1.2	0.02	0.07	0.01	0.04	-0.004	-0.01	-0.02
	Port Said	1.1	0.67	0.05	0.06	0.01	-0.03	-0.003	-0.02	-0.07
	Ismailia	0.38	0.97	-0.003	0.03	0.01	0.06	-0.01	-0.02	-0.02

Future climate extreme indices over Sinai Peninsula and Canal region:

Model	Institution	Spatial resolution
CanESM2	Canadian Centre for Climate Modelling and Analysis, Canada	128 × 64L35(T63)
HadGEM2-ES	Met Office Hadley Centre, UK	192 × 145L40



Conclusions

The results show warming of the surface air temperature at land stations. The annual mean of daily maximum and minimum temperature (TXMean and TNMean) have increased for the past 36 years, leading to no discernable change in the diurnal temperature range. Summer days and tropical nights have become more frequent. Overall, warm extremes have changed more than cold extremes and this was also seen in the highest and lowest temperatures of the year. There is an indication of more consecutive dry days (CDD), especially in Taba, also there is a small changes in consecutive wet days (CWD). Although no significant change was detected regionally for the extremes, fewer days above 10 and 20 mm (R10mm, R20mm), and a decrease in the annual highest daily amount (RX1day) and highest 5 consecutive days (RX5day) of precipitation were found at Taba stations. The increase in tropical nights (TR) is more visible than summer day (SU) by about two days in RCP8.5 and by one day in RCP4.5. For frost days (FD) which has a negative trends for all RCP for Canal region and Sinai Peninsula. R99p show a slightly positive trend for both CanESM RCP and HadGEM-rcp4.5 only which a negative trend appear in HadGEM-rcp8.5. Both the 95th percentile rainfall (R95p) and the 99th percentile rainfall (R99p) show more intense rainfall for shorter time period in the future.

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