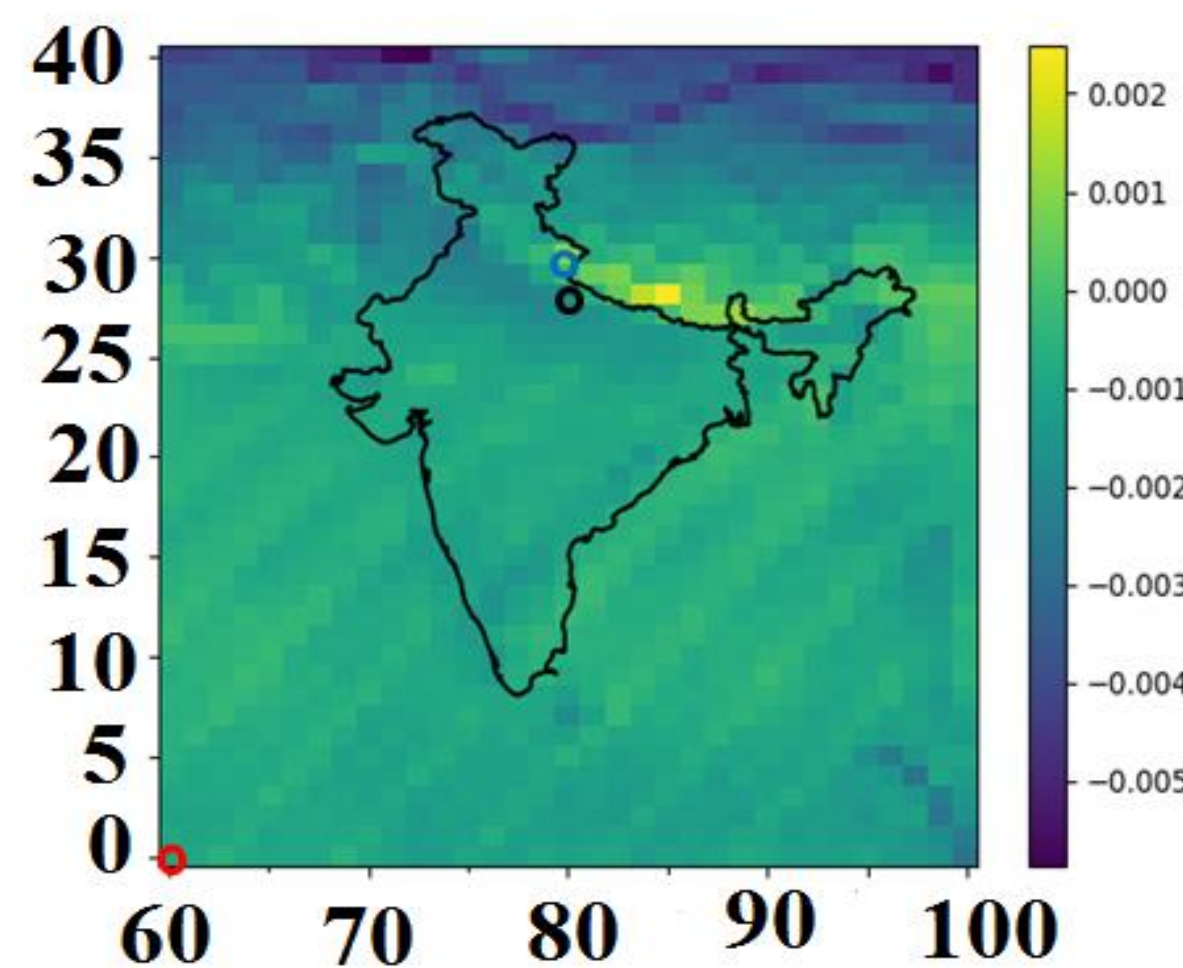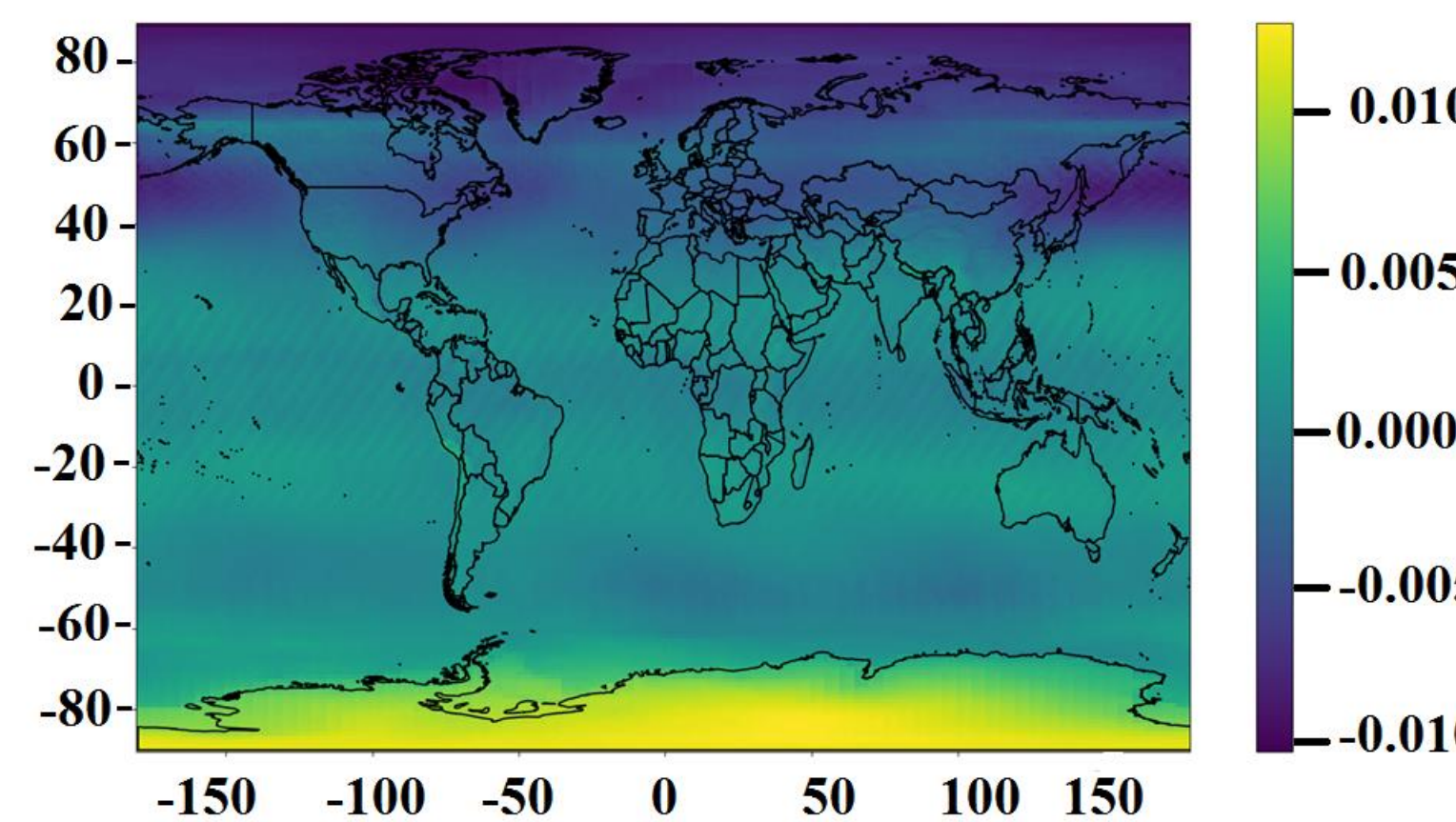# ASSESSMENT OF SPATIOTEMPORAL CLIMATOLOGICAL TRENDS USING ADVANCED DATA ANALYTICS-a case study on Total columnar Ozone (TCO)

ABSTRACTS

Many satellite and ground-based observations are being collected at regional as well as global scales to study various climate variables in order to assess the climate change and its associated impact. Systematic analysis of long-term data becomes crucial in such studies. This aims to build a data analytics workflow for generating long-term spatio-temporal trends in climate parameters. Present work estimates climatological trend of TCO during 1997-2012 period.

Mann Kendall test based Sen's slope Global Annual trend

Mann Kendall test based Sen's slope Over India.

METHOD

OBJECTIVE

Development of methodologies and tools for pre-processing, processing and visualization of long-term climate data. Development of methodologies and tools for anomaly detection and hotspots identification in the long-term climate data. Development of methodologies and tools for generation of spatio-temporal trends, along with statistical significance, for long-term climate data.
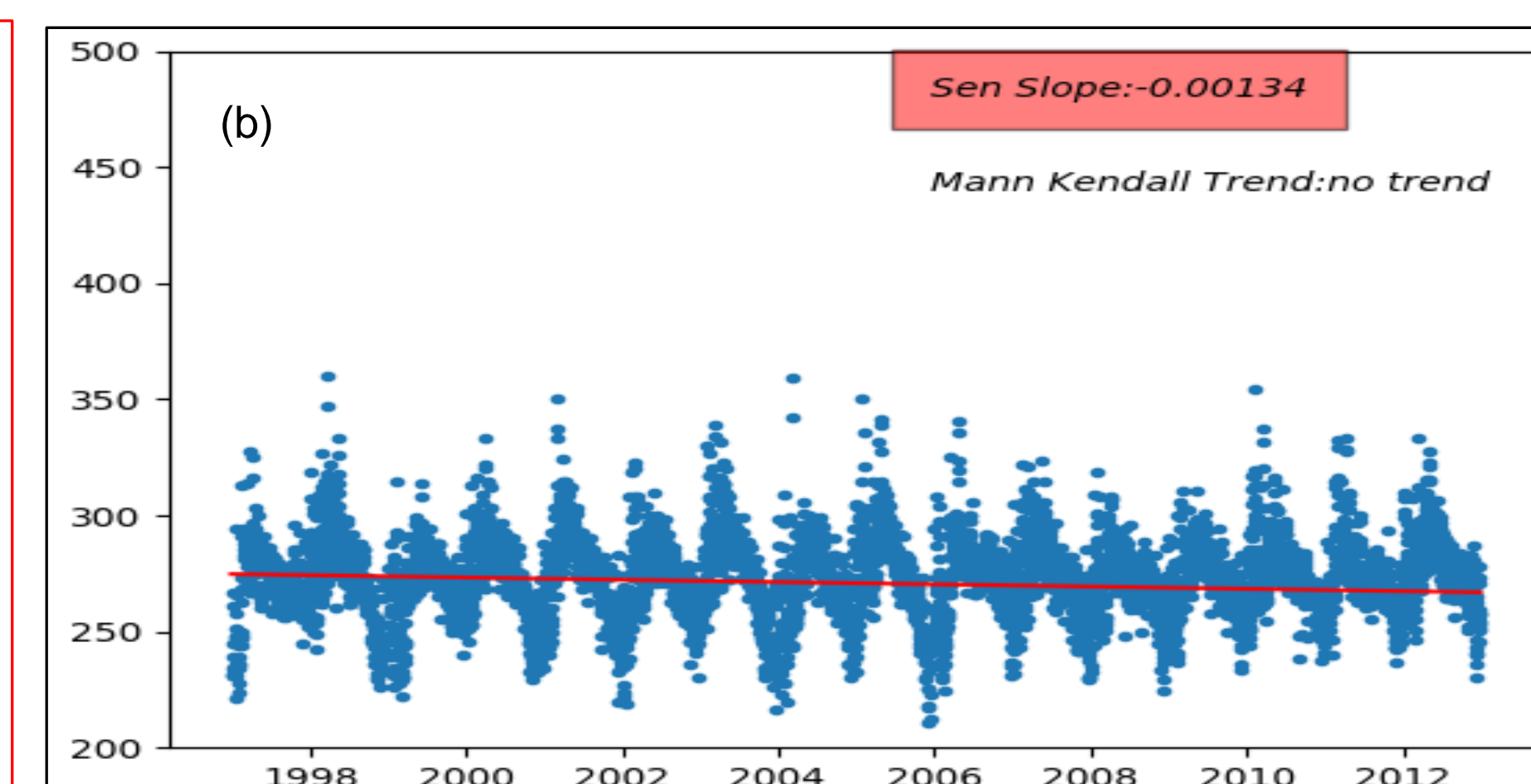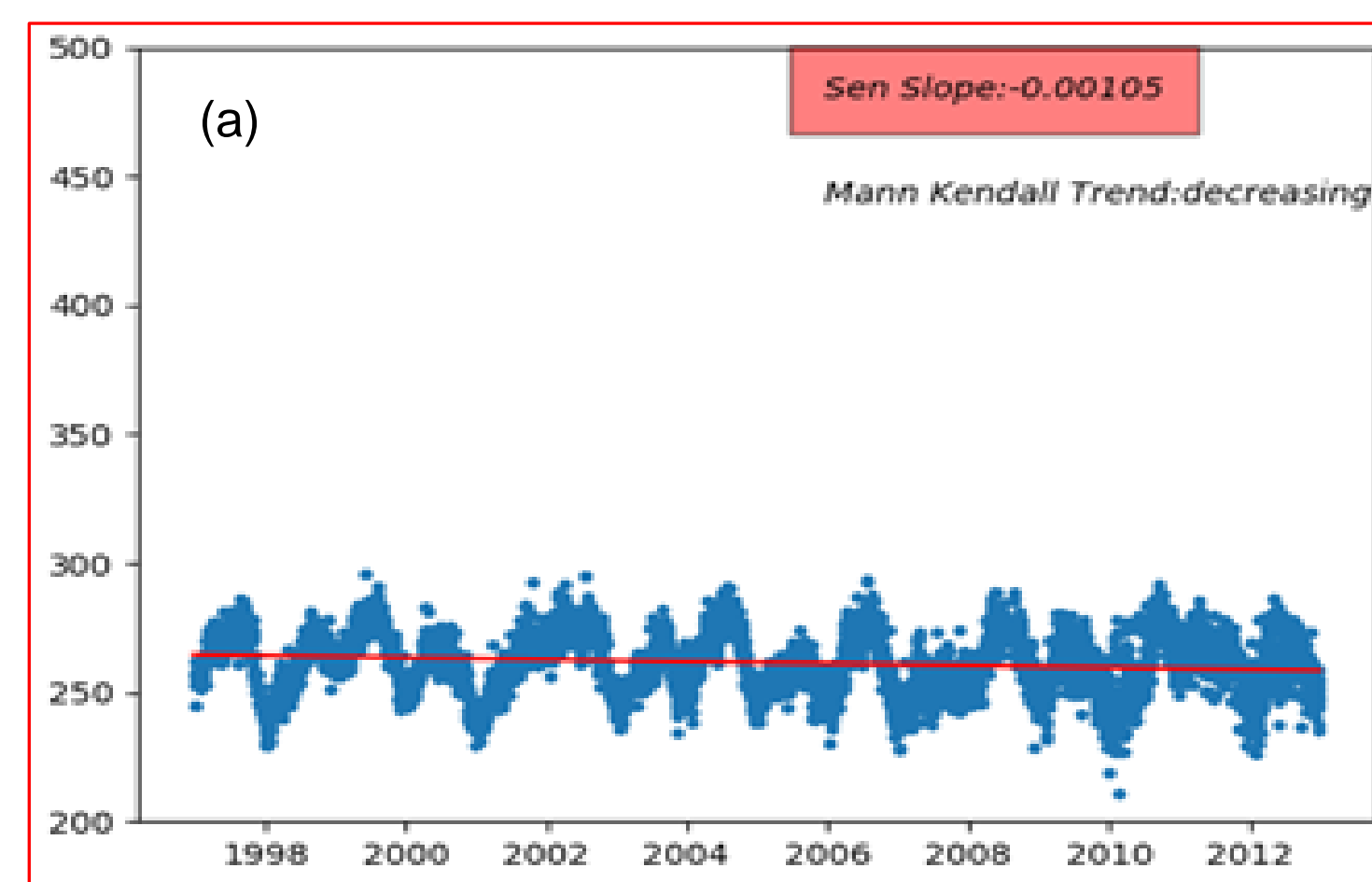
a) Pixel Level Sen's slope over the Indian region using MK test during 1997-2012 showing decreasing trend.
b) Pixel Level Sen's slope over the Indian region using MK test during 1997-2012 showing No trend.
c) c) Pixel Level Sen's slope over the Indian region using MK test during 1997-2012 showing an increasing trend.

Dickey-Fuller and Augmented Dickey-Fuller tests

The Dickey-Fuller test is testing if $\varphi = 0$ in this model of the data:

$$y_t = \alpha + \beta t + \varphi y_{t-1} + \varepsilon_t --- (1)$$

$$\Delta y_t = y_t - y_{t-1} = \alpha + \beta t + \gamma y_{t-1} + \varepsilon_t --- (2)$$

- The Augmented Dickey-Fuller test allows for higher-order autoregressive processes by including Δy_{t-p} in the model. But test is still if $\gamma = 0$.

$$\Delta y_t = \alpha + \beta t + \gamma y_{t-1} + \delta_1 \Delta y_{t-1} + \delta_2 \Delta y_{t-2} + \ldots \ldots --- (3)$$

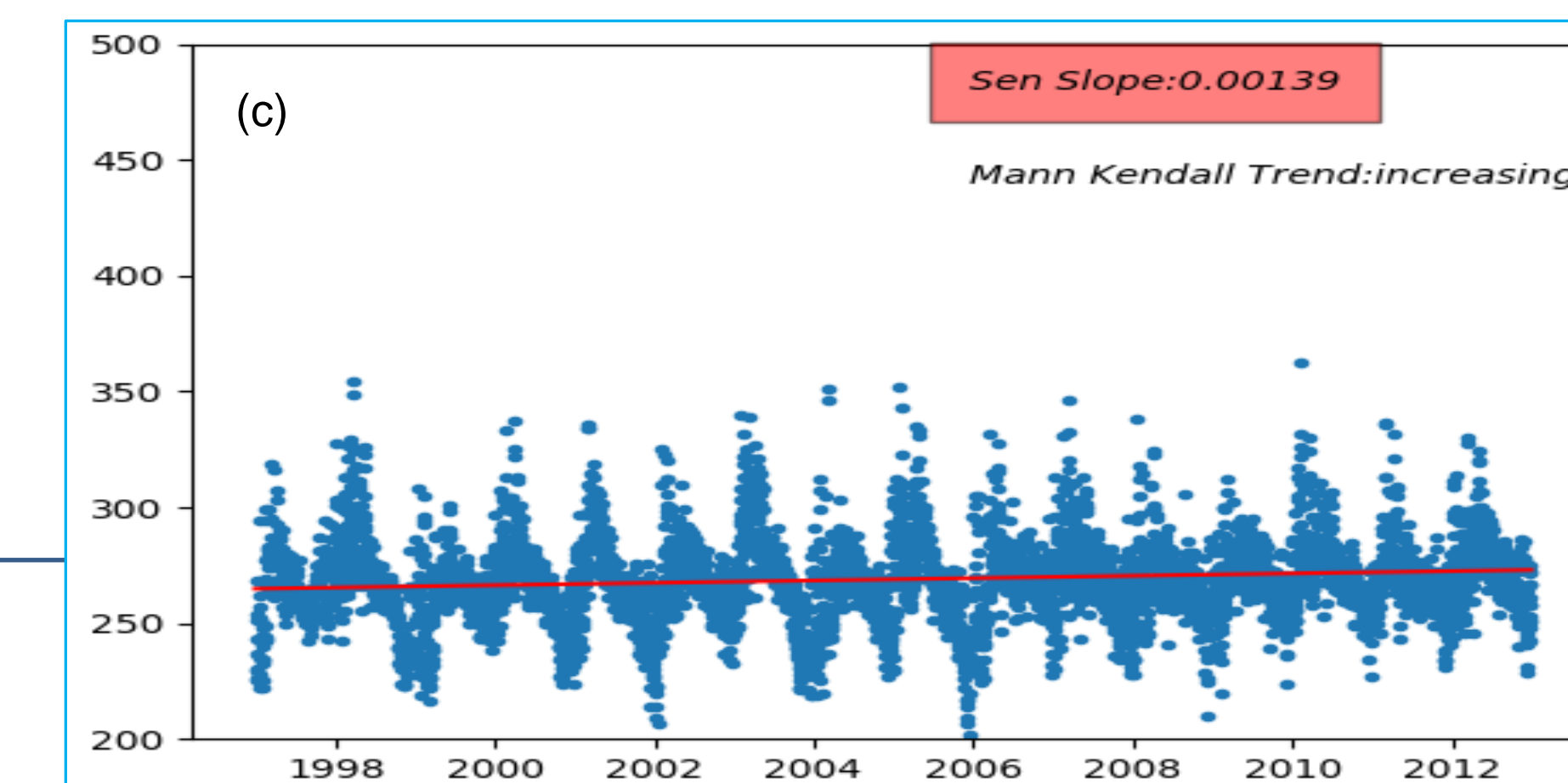The null hypothesis for both tests is that the data are non-stationary. If p-value less than 0.05, we REJECT the null hypothesis for this test.

Results of the study indicates data analytics play an important role in assessing the climatological trends of essential climate variables in this case TCO.

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