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Temperature increasing trend due to solar activity at Western Saudi

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Abstract. The Sun influnce on climate has been discussed globaly by many authors and at different latitudes. In this article we will discuss this connection for the Kingdom of Saudi Arabia, which spans a large area, i.e. 16-32 North and 36-50 East. We started our invistigation in this paper by looking into the temperature at the Western coast of the Kingdom, namely Yenbo and Jeddah. In order to find the correlation between temperature and solar variations we employed one of the most relevant solar quentity, i.e. the solar cycle length. From our invistigations we found an increase in the temperature averages reaching up to 1.0 degree Celsius in certain cities since 1970. It is also found that the temperature increase is strongly correlated with the solar Cycle length, reaching up to 0.8 in some sites.

Key words. Sky turbidity

1. Introduction

Temperature is generally considered to be the fundamental indicator of the state of the climate system and presumably the most accurately measured parameter.

In these series of articles the study is achieved for the Kingdom of Saudia Arabia which spans nearly 14×16 degrees in latitude and in longitude, respectivily. A region that have not been studied before, hence it has its importance in the newvality of this study, and which will certainly help for advancing the global solar climate relation studies.

The sun-climate interactions can be accomplished vie different channels: tropospheric heating caused by changes in total solar irradiance, stratospheric chemestry influnced by changes in the solar UV spectrum, or cloud coverage affected by the cosmic ray flux which is produced by variations in the Sun's open magnetic flux. Different studies have found a good correlation between solar magnetic activty and the temperature of the Earth's atmosphere on a time scale of decades to centuries, e.g. Lean et al. (1997), Friis-Christensen and Lassen (1991), Solanki and Fligge (1999).

In our study we have delt with changes in temperatures, due to data availability, namely since 1970. This year marks the onset of a surge in temperature as mentioned by some authors, e.g. Parker et al. (1995), where they indicated that the global surface temperature since 1970 has by the same amount as in the century prior to that.

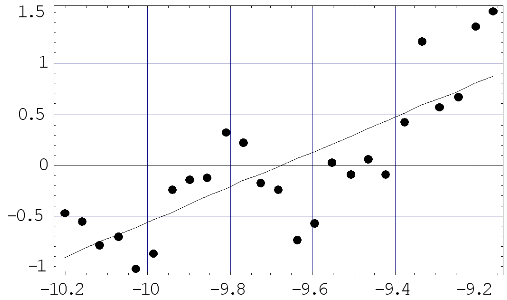

Fig. 1. The temperature increase in Yenbo, versus the solar cycle length.

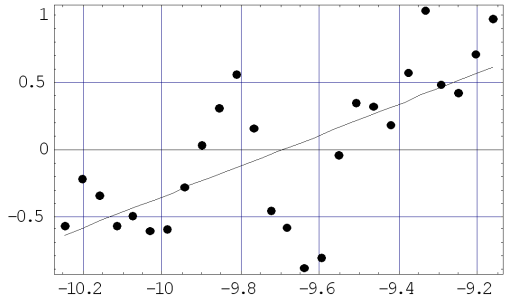

Fig. 2. The temperature increase in Jeddah, versus the solar cycle length.

2. Data analysis and conclusion

By analysing the annual mean temperature variations for each station, it is evedent that there is an encreasing trend of about 1 degree C in the air temperature from the year 1970. This temperature variation is considered to be a very significant increase. We made the analysis for : Yenbo and for Jeddah cities which are on the west coast of Saudia.

Concluding the paper, we obtained some correlation coefficients between the annual mean temperatures and the Solar Cycle Length. The values of these corerlation coefficients indicates that there is an influnce of the sunspots on the temperature of these cities, and this influnce is variance from a city to another, i.e. in Yenbo the correlation was 0.8 , and in Jeddah 0.687, as in Fig. 1 and 2.

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