وزارة التعليم
Ministry of Education

الثانوية ٢٥ بالمدينة المنورة
بالعلم نرتقي

Temperature degrees in Al-Madinah Al-Munawarah during 2015 and 2016

This Research project is a collaboration between two students

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2017

Content

Abstract

The current research aimed to identify temperatures degrees during the years (2015-2016) in Al-Madinah Al- Munawarah. Data was collected using a digital device for measuring the maximum, minimum and the current temperature degrees. Date collected showed variation between the months of both years 2015 and 2916. The months of August, to represent summer season, and the month of December, to represent the colder season (winter), in both years were compared. The compared data showed there was a rise of temperature degrees in August 2016 to that recorded on the same month in the year 2015. No difference between the logged temperature degrees during the month of December of both years 2015 and 2016 in Al-Madinah Al-Munawarah. This results could signifying the importance of recording and analyzing temperature degrees during different year. The comparisons between results of these two years indicated that there might be rise in temperature during summer. However, more data should be analyzed in the years before 2015. Continuing such activity is very important to confirm rise trend of temperature in Al-Madinah Al- Munawarah.

Keywords: temperature degrees, climate changes, Al-Madinah Al- Munawarah, Saudi Arabia.

Introduction

Al-Madinah-Al-Munawara, is the fourth city in Saudi Arabia and it is considered as a part what it called Al-Hejaz region of the western area of the Kingdom of Saudi Arabia. Al-Madinah-Al-Munawara is the capital of Al Madinah province and religiously important city in the kingdom of Saudi Arabia and the Islamic world. Al-Madinah-Al-Munawara environment is a desert climate mainly hot during the day and moderate temperature during nights. In general, the Peninsula of Arabia climate was described by hot dry summers and mild wet winters (Ragab and Prudhomme, 2000). It was found during 1891–1990 that, the temperature of Arabian Peninsula increasedby 0.63°C. It was also recorded in a study in the Kingdom of Saudi Arabia that there was an increase in temperature when by 0.16°C per decade during the dry season (Rehman, 2010).

In a research published in 2016 where temperature recorded during 1959-2011 of Al-Madinah-Al-Munawara was discussed. Researchers found that the mean monthly temperature of 28˚C with maximum temperature mean of 34˚C and minimum mean of 21˚C. They also found that the mean monthly temperature was increased by 1.7˚C. These increases which was recorded 1.2˚C and 1.9 ˚C rise in the maximum and minimum temperature, respectively (Khan and Alghafari 2016). In this current research temperature recorded during years 2015 and 2016 in the GLOBE website were analyzed and compared in two months to represent the Summer and Winter seasons.

Research Questions

The Kingdom of Saudi Arabia climate is generally hot in summer and low rainfall, cold winters with little winter rains. The climate of Al-Madinah Al- Munawarah, The area were this study was carried out, is under the influence of atmospheric high orbital, and its climate is mostly dry and it is characterized by high temperature and drought during Summer and cold weather in Winter. (Saifullah and Alghafari, 2016).

To investigate and compare the difference in temperature between 2015 and 2016, the current study attempted to answer the following question: Is there a difference between temperatures in Al-Madinah Al- Munawarah between 2015-2016?

Hypothesis

There is no variances in temperature degrees recorded in different months of 2015 and 2016 Al-Madinah Al- Munawa.

Material and methods

Temperatures were measured using a digital thermometer to measure minimum, maximum and current temperature degrees according to the GLOBE protocols (Figure 1).

Figure 1. Digital thermometer used to measure temperature degrees.

Temperature measurements were taken on a site in Al-Madinah-Al-Munawara in the Secondary School Number 25. The site location is between Latitude 24505016, North and Longitude 3961573, East (Figure 2).

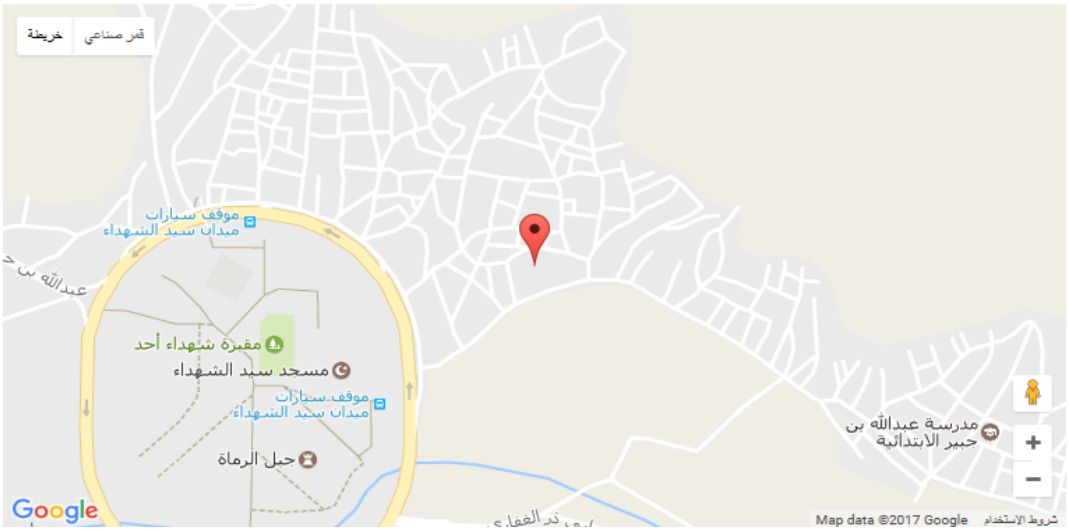

Figure 2. Study site the Secondary School 25 Al-Madinah-Al-Munawara

Results and discussion

Data recorded showed that the highest temperature degree recorded for year 2015 was 41 ˚C, and 45 ˚C for year 2016 (Figure 3). From the preliminary results recorded there was an indication that there was an increase in temperatures when general date collected compared for both years 2015 and 2016. Two months from both years then were compared. The month August represented the summer months whereas the month December represented the Winter months. In the month of August the highest temperature were recorded in years 2015 and 2016 41 and 45 ˚C, respectively (Figure 3 and 4). The increase in temperature in Al-Madinah-Al-Munawara by 4 ˚C was higher than that which was recorded before in 1.7˚C. (Khan and Alghafari 2016). Therefore, it is important to continue recording temperature in the coming years. When the temperature degrees were compared of the month of December which was chosen to represent the Winter months, no differences were found (Figure 3 and 5). The highest mean of temperature for December in both years was similar 34 ˚C.

2016 **2015**

Figure 3. Temperatures degrees blot for the years 2015 and 2016.
Note that there were missing data (data not available in GLOBE entry data

August 2016 **August 2015**

Figure 4. Temperature degree recorded in August of both years 2015 and 2016.

December 2016 **December 2015**

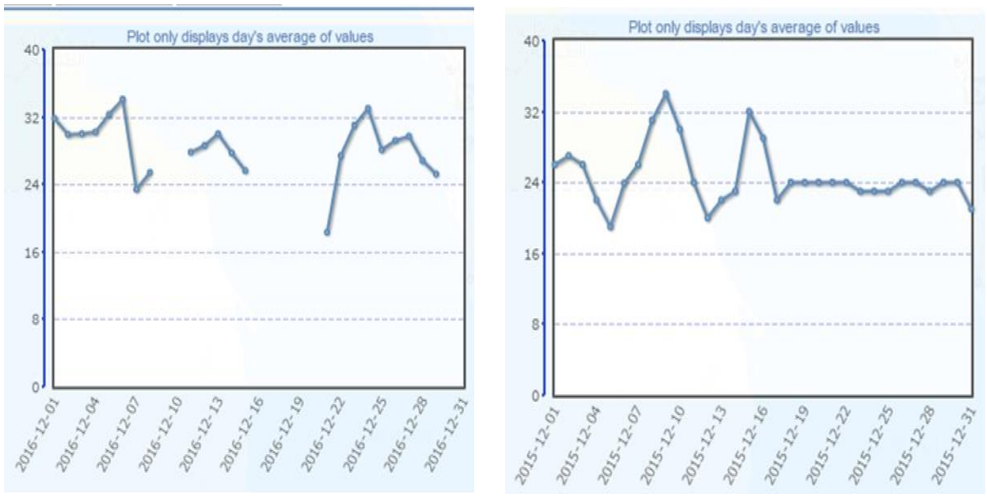

Figure 5. Temperature degree recorded in December of both years 2015 and 2016.

Khan and Alghafari in 2016 analyzed the Meteorological data recorded from Meteorological Department inn Al-Madinah-Al-Munawara, Saudi Arabia for years between 1959-2011. The results showed that the temperature annual cycle rises from

January to August and then slacken to the month of December. They described the reasons behind the variation in temperature mean in the area for few reasons such as annual rainfall and others (Khan and Alghafari, 2016). They also concluded that there were two main seasons in Al-Madinah-Al-Munawara area, summer and Winter. The summer season lasts seven months from April to October whereas the Winter months lasts five months starting from November and end in March (Khan and Alghafari, 2016). In another study the maximum, minimum and mean of temperature found to increase at a rate of 0.71°C and 0.48°C and 0.60 °C, repectively per decade (Almazroui *et al.*, 2012). The authors stated that "the information is invaluable to consider in any climate impact assessment studies in Saudi Arabia".

One of the difficulties that was faced in this research was to extract all the data entered in GLOBE especially for year 2015. In general, continuing measuring temperature in future and analyses it is important.

Recommendations

- Continuing recording and analyzing the data collecting in the school in GLOBE website.

Acknowledgment

We would like to thank Dr. Nadia Al-Kaff (Biology Department, Collage of Science, Taibah University Al-Madina *Al-Munawarah*) for her general supervision and guiding and helping in English translation, to Dr. Afnan Hafez for supervising in writing the Arabic version of this study, to Ms Ebtisam Nahhas (GLOBE teacher) for her guiding throughout our study, to Ms Mona Almrwane (GLOBE coordinator Al-Madina *Al-Munawarah*) for her encouragement and support, to Ms Abeer M. Alhejaili (Science activity head, Department of Education, Al-Madina *Al-Munawarah*) for her support.

References

Almazroui M. Mansour Islam Nazrul, Athar Jones H. P. D. and Ashfaqur Rahman M. (2012). Recent climate change in the Arabian Peninsula: annual rainfall and temperature analysis of Saudi Arabia for 1978–2009. International Journal of Climatology 32: 953–966. DOI: 10.1002/joc.3446

Khan, S. and Alghafari, Y. (2016). Temperature and Precipitation Fluctuation of Madinah-Al-Munawara, Kingdom of Saudi Arabia (1959-2011). Atmospheric and Climate Sciences, 6, 402-414. http://dx.doi.org/10.4236/acs.2016.63033

Ragab R, Prudhomme C. (2000). Climate change and water resources management in the southern Mediterranean and Middle East countries. The Second World Water Forum, 17–22, March 2000, The Hague.

Rehman S. (2010). Temperature and rainfall variation over Dhahran, Saudi Arabia (1970–2006). International Journal of Climatology **30**: 445–449.