بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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ESTABLISHMENT OF BOUNDARY MAPS OF CLIMATE CHANGES UNDER DIFFERENT CROP PATTERNS BASED ON REMOTE SENSING TECHNIQUES

By

MOHAMED ABDOU AHMED YOUSSEF

B.Sc. Agric. Sc. (Agricultural Engineering), Ain Shams University, 2015

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ABSTRACT

Mohamed Abdou Ahmed Youssef: Establishment of Boundary Maps of Climate Changes under Different Crop Patterns Based on Remote Sensing Techniques, M.Sc. Thesis, Department of Agricultural Engineering, Ain Shams University, 2020.

Climate changes and agricultural development processes have a dynamic interaction effect. The irrigation water is limited and scarce in many areas in the world, including Egypt. This study aimed to building up the boundary maps of climate change based on GIS and remote sensing techniques through Spatio-temporal climate change analysis from 1985 up to 2019 to illustrate the dynamic interaction between climate change and agriculture.

The study area is located at 32°10′58.46"E to 32°18′31.784"E longitude and 30°26′32.11"N to 30°31′8.204"N latitude in the Eastern part of Nile Delta, Egypt. The percentage of bare soil and vegetation cover was changed from 86.8% and 12.7 in 1985 and 34.1% and 64.3% in 2019. Based on recorded metrological data, the mean annual air temperature, relative humidity, and solar radiation were 21.7°C, 48.8% and 19.8 (MJ/m²/day) respectively.

The satellite crop coefficient (Kcsat) was estimated using the Normalized Difference Vegetation Index (NDVI) while reference evapotranspiration (ETo) was calculated using ETo calculator software. The crop evapotranspiration (ETc) was estimated under different crop patterns in units of (m^3/ha/day) and m^3/total cultivated area/day). Soil Adjusted Vegetation Index (SAVI) and Normalized Difference Water Index (NDWI) were estimated every 5 years. The Land surface temperature (LST) has been generated from Landsat satellite images and utilized to build up the monthly minimum, mean and maximum thermal boundary maps.

In the study period (1985-2019), the results illustrated a -0.5˚c and -1.2˚c decreasing in LST and Air temperature (Tair) respectively. The

relation between LST and Tair is well represented as linear correlation and the coefficient of determination (R^2) as high as 0.76. The analysis of crop evapotranspiration (ETc) data declared a high statistically significant increase (1.7 mm) during the period from 1985 to 2019.

The results conclude that the multispectral vegetation indices are a useful tool for quantifying crop evapotranspiration (ETc) at a regional scale. The boundary maps showed the importance of the new reclamation area to increase the cultivated area to mitigate the increase of global warming besides the increase of population.

Keywords: Normalized Difference Vegetation Index (NDVI), Satellite Crop Coefficient (Kcsat), Crop Evapotranspiration (ETc) and land Surface Temperature (LST).

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