Kurdistan Regional Government-Iraq
Ministry of Higher Education & Scientific Research
University of Salahaddin - Erbil

INVESTIGATION AND ANALYSIS OF PRECIPITATION VARIABILITY AND DROUGHT CONDITIONS IN THE FEDRAL REGION OF KURDISTAN - IRAQ

A Thesis
Submitted to the Council of College of Science, University of Salahaddin/Erbil in Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy

In

Physics

(Meteorology)

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2008	1429	2708

Abstract:

In this thesis, precipitation variability and drought conditions in Kurdistan region were investigated and analyzed. Daily values of minimum, maximum and average surface air temperatures recorded at 26 locations in Kurdistan region were collected and analyzed. Monthly average of these parameters, are calculated and from these, mean annual values are determined, the results are presented as isothermal contour lines. The spatial variation of annual mean daily temperature, were inter-related to the elevation variation and orographic effect.

Data records from (55) station were used in spatial rainfall distribution for the period (2001-2006). The spatial rainfall distributions were also confirming the orographical effect and the effect of elevation on rainfall.

Seven stations with long period data record (Suleimaniyah, Dokan, Darbandikhan, Erbil, Salahaddin, Shaqlawa and Duhok) were used in seasonal and annual rainfall trend analysis. Sen's test method was used to detect the trend in rainfall data, the results showed decreasing trends in most stations, but also increasing trends in others. The non-parametric Mann-Kendall statistical test was also used and showed that decreasing trends in rainfall at Darbandikhan and Dokan stations were statistically significant at 95% significance level. The results also showed that Duhok station had a statistically significant seasonal increasing trend.

The drought conditions were also studied for seasonal and annual periods, through determining the standardized precipitation index SPI and the percent of normal precipitation PN; for this purpose a special program was developed and written in (*VISUAL BASIC 6*). The results determined from historical rainfall data records showed that drought is a recurrent feature in Kurdistan region and that there is a small difference in the drought phase and intensity in each station included in the study. The study also showed that prolonged drought events of up to five years and some rare cases in which drought index SPI is less than (-3) exists, especially on seasonal bases.