

Preliminary Time Series Analysis of Mashhad Air Temperatures (1961-2005)

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Abstract— Air temperature is one of the main climatic elements, and the most important index in every geographic area. In the past few years, Mashhad region located in the north-East of Iran has experienced some meaningful variations in air temperature values. Thus the main purpose of this study is to extract all primary and secondary components of Mashhad, air temperatures in Mashhad, using a few simple graphical and mathematical techniques. Having these purposes, air temperature records (from 1961 to 2005) taken from Mashhad, Synoptic Station were analyzed. In the first step four primary descriptive parameters such as raw data smoothed values, moving averages and fluctuating factors have been graphically displayed. In the second stage, four secondary descriptive such as: trend, cyclic, seasonal and irregular components were calculated and modeled. Finally, the Normalized Residual Mass Curve method was applied to enhance the current temperature changes. As a whole, the results showed indicators of some meaningful variations and fluctuations in all scales over the time addressed.

Keywords:- Time Series, Primary and Secondary components, Fluctuations-Temperature.

I. INTRODUCTION

Now, climate change is macro subject in climatology. Knowing changes and its prediction help to future programming climate changes are important to geographical studies because significant aspects of these changes are related to human roles and performance (urbanization) removing forests, industrial development and growth and increase of green house pollution. At the other hand climate changes due to scientific and practical aspects and environmental and economic - social effects, are very important. Scientific results show earth average temperature has been increased during last century. This trend includes of location - time patterns that are different. Studies of Hansons and Foland and his colleagues

are significant research in this area and confirmed increasing trend of temperature during first decades of century. During recent years, to analysis climate patterns, scientists have more attention to temperature series [1].

Temperature is one of the basic indicators of climate studies that is effective factor to determine other climate factors. There for, this factor fluctuation is very important due to scientific and practical aspects.

Time-series methods are used to climate study specially to evaluate temperature. Some of the time-series studies are related to Mohan and vedual research that used Arima model to predict Bahardora river monthly Debris in south of India. They concluded that recommended model to long term prediction to seasonal trends is very proper and efficient. researches studied changes of annual average temperature in Turkey. Findings show that increase of east Anatoli temperature and decrease of temperature in coastal regions of Turkey are significant. In other research ,light predicted temperature and annual fall using regression model in Portugal and concluded that annual fall and temperature fluctuated during decode and year [2].

Emphasizing on importance of number of samples in climate changes, Sen zekai noted that due to correlation between climate data as fall and temperature, Arima modeling is one of the more realistic methods to evaluate climate changes. Alshal and Mayhoop evaluated Egypt temperature changes using Ferrieh models and provided model to temperature of this country.

Nickelson evaluated fall climate changes in various regions of Africa using time- series methods findings show that fall amount during studied periode have been decreased in half-dry region of Africa. Mimiko analyzed seasonal changes of fall and temperature of Greece.

Findings show that amount of fall in this region have been decreased and annual average temperature have been increased. Alen and his colleagues evaluated increasing trend of earth temperature using time- series and linear transfer function model. Based on this study, CO₂ gas has been increased as 1% and earth average temperature have been