

Numerical simulation the Effects of Lake Urmia Drying up on the Temperature Regime of Maragheh City

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1. Introduction

The Atmosphere is characterized by phenomena whose space and time scales cover a very wide range. The space scales of these features are determined by their typical size or wavelength, and the time scales by their typical lifetime or period. In reality none of these phenomena is discrete but part of a continuum; therefore it is not surprising that attempts to divide atmospheric phenomena into distinct classes have resulted in disagreement with regard to the scale limits. Most classification schemes use the characteristic horizontal distance scale as the sole criterion. The thermal and dynamic property of water bodies (oceans, seas, lakes, etc.) makes them very important stores and transporters of energy and mass. The exchanges occurring at the air/water interface are, however, complicated by the fact that water is a fluid. This means that heat transfer within water is possible not only by conduction and radiation, but also by convection and advection. As in the atmosphere these modes of transfer greatly facilitate heat transport and mixing, and thereby allow heat gains or losses to be spread throughout a large volume. Although water is not compressible like air, it can be deformed, giving surface waves (Oke, 1978:85). Such conditions lead to the development of special instability phenomena such as miniature whirlwinds known as 'dust devils', and a whole range of unusual optical effects. These include the 'shimmering' of objects viewed through the lower atmosphere, and the well-known mirage, both of which are due to the refraction of light as it passes through media of different density. Shimmering is caused by multiple refraction of light as it passes from the object through a field of vertically-arranged filaments of air of differing density. A mirage is caused by the refraction of light from the sky as it passes through the horizontal temperature (density) stratification of the lower atmosphere, and the amount of bending depends on the lapse rate. Land cover and land use are included in influencing factors on climatic elements in particular temperature regime in spatial and temporal scales. Lakes are considered as natural controls on temperature and moisture regime in interior continents. However, any change in hydro climatic conditions of lakes such as increase or decrease of their levels is reflected into climatic conditions of lake surroundings. Nowadays in Iran there is a national challenging debate because severe fall of water level of

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Lake Urmia and its likely drying up in near future. This paper analyses the temperature regime of surroundings area of Urmia Lake while it drying up by using TAPM model. Of course, it is obvious the changes will not be limited to temperature regime and involved all of the climatic elements and factors.

2. Study Area

The Lake Urmia is located in northwest of Iran and Maraghe city location is in southeast of lake with distance 30 km. Whole area is mountainous and some rivers were discharge to Lake Urmia. Climatic conditions of lake area is humid and cold in winter and moderate to semi warm and arid to semiarid in summer.

3. Material and Methods

Temperature data of synoptic station of Maraghe in southeast of lake was analyzed by using TAPM model for simulation and then for calibration of model outputs. TAPM model is a model for air pollution simulation that made by CSIRO in format comprehensive software. This software had been used and recommended by more than 190 users in 25 countries in different parts of world. In this research for purposes of simulation and evaluation the monthly data of two years; 2003 and 2006 were used. For computing the occurred changes and as such as estimating the errors the observed and simulated data were compared with together. For modeling purposes the water body of Lake Urmia was substituted by an area having coverage of gravel and sand with a texture of loam.

4. Results and Discussion

The classical climatology practiced in the first half of the twentieth century was almost entirely concerned with the distribution of the principal climatological parameters (e.g. air temperature and humidity) in time and space. While this information conveys a useful impression of the state of the atmosphere at a location it does little to explain how this came about. Such parameters are really only indirect measures of more fundamental quantities. Air temperature and humidity are really a gauge of the thermal energy and water status of the atmosphere respectively, and these are tied to the fundamental energy and water cycles of the Earth-Atmosphere system. Consequently, any change in land cover made by both natural and anthropogenic factors mainly can exacerbate the climate change. The results of this research show that the drying up Lake Urmia will cause significant increase or decrease of temperature in different months in Maraghe station. Also, because of increased temperature differences the continental conditions will increase. Status of land cover have important role in the air temperature and in local and micro climate layer. The overall any change in the surface ground In These scales will be have severe consequences of climate. Shrivel domestic lakes is a newly emerging matters in the climate, and shrivel possible Lake Urmia in northwestern of Iran is one of examples. In this study, to understand the effect of shrivel Lake Urmia on the temperature changes in Maragheh station in the years 2003 and 2006 used The simulation model TAPM. Based on the results obtained in this study the mean annual temperature will increase about 0.25 ° C the effect of shrivel Lake, and in hot seasons especially in July and August in mid-day hours, the average temperature is increases about 4 ° C. The simulation

results in the colder months especially in December and January show Temperature decrease during cold nights To - 0.5 ° C. Accordingly in effect of the shrivel lake Urmia annual minimum and maximum temperatures In the study area Show significantly the change.

5. Conclusion

Based on results of this research the mean annual temperature of Maraghe station will increase up to 0.25o C if the Urmia Lake completely be dried up. In summertime particularly in august and July the increase of maximum temperature will be 4o C. And in wintertime particularly in December and January the decrease of minimum temperature will be 3.5o C and less. Due to above mentioned temperature differences the continental conditions in study area will increase dramatically

Key Words: Environmental Change, Temperature Regime, Numerical Simulation , Urmia Lake, TAPM Model, Maraghe.

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