NATIONAL CENTER OF INNOVATION AND ENTREPRENEURSHIP
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YOUTH FUND OF RA
INSTITUTE OF GEOPHYSICS AND ENGINEERING SEISMOLOGY
NAMED AFTER A. NAZAROV NAS RA

SCIENCE AND INNOVATION 2015

PROCEEDINGS

OF THE INTERNATIONAL YOUTH CONFERENCE

«SCIENCE AND INNOVATION 2015»

(REPUBLIC OF ARMENIA, TSAGKHADZOR, SEPTEMBER 25-27, 2015)

NATIONAL CENTER OF INNOVATION AND ENTREPRENEURSHIP
2015

assessing function Progress in Lipid Research, (2005), 44, pp. 303–344

THE ANALYSIS OF SPATIAL DISTRIBUTION OF AIR TEMPERATURE IN JULY USING MODERN MAPPING TECHNOLOGY AND AEROSPACE PHOTOS' DATA IN ARMENIA

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The main objective of this study refers to the determination of thermal characteristics in July using modern mapping technology and aerospace photos' data in Armenia. The analyses were conducted at the Armenian meteorological stations (41 in total) and average temperature data for July was obtained from Hydro-meteorological center of Armenia. The data used for this study embraces 1961-2012 time period (temperature is presented in by °C). The geographic description of the selected stations is given in Fig 2. According to those data have been made temperature distribution map applying TNTmips geospatial software. The data has also been gained through aerospace photos study.

Armenia is characterized by extreme variations of temperature in spatial distribution. Overall air temperature reduces by altitude [1], but according to the complex relief, it is slower in the north than in the south, in the valleys than in the intermountain valleys and slopes. Having this kind of complicated temperature distribution, we have tried to analysis air temperature using a few data sources.

July is considered the hottest month of the year in Armenia. According to our study only in 3 stations (Aragats h/m, Amberd and Shroja) from the covered 41 the yearly mean highest temperature

have been recorded in august. However, the difference is very little compared with July, only 0,3^{0}C, which can be neglected. The mean highest temperature is 19,6^{0}C (according to our calculation for 1961-2012 period) which is observed in July. That temperature is positive, above 0^{0}C throughout the country. The minimum has been recorded in Aragats h/m station (8,8^{0}C), which is situated in 3227m above sea level.

The correlation relation between July air temperature and altitude is higher (r = 0,89) (Fig. 1) than, for example, in January. This is mainly due to the fact that there is no inversion processes in Armenia in July. In these cases the cold air stays longer and longer during winter in valleys, and relatively warm air, which is lighter moves to the slopes of mountains. As, this situation is not usual in summer months the mentioned correlation relation is very high.

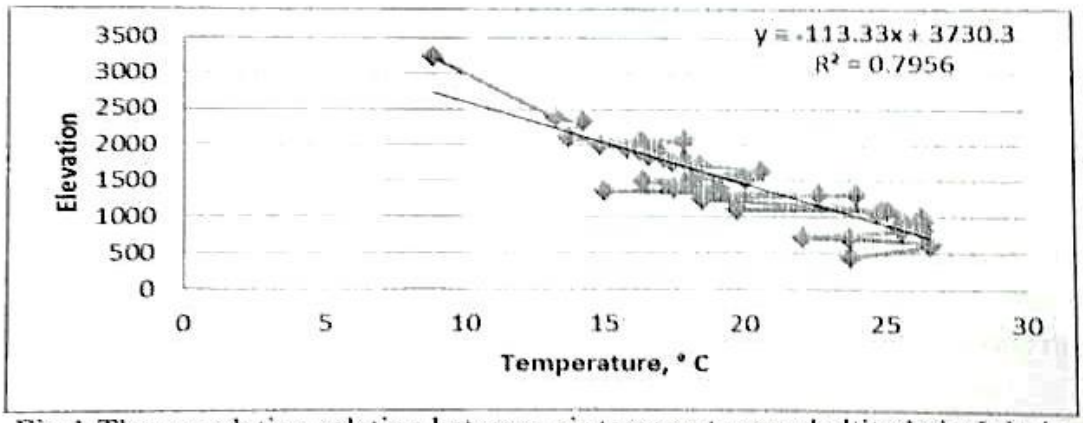

Fig.1 The correlation relation between air temperature and altitude in July in Armenia (1961-2012)

According to the high correlation coefficient we have been able to create a map of spatial distribution of air temperature for July in Armenia (Fig. 2).

In the northern part of the country (Lori plateau) July mean air temperature varies between 16-18^{0}C (for example in Stepanavan (17,5^{0}C), in Tashir (16,4^{0}C)). In south-east (Aghstev and Debed rivers' low streams, in the Noyemberyan and Ijevan) July mean air temperature is higher (22- 24 ^{0}C), particularly in Bagratashen

(23,8^{0}C) and Ijevan (22,1^{0}C). In the middle stream of Pambak river (Vanadzor) it is 18,5^{0}C and in the low stream of the same river the temperature is rising up till 20^{0}C.

According to the analyzed results taken from aerospace photos [2, 3], mountain air temperature decreases from low till high altitudes in summer in Aragats. However, this changes are various in the different slopes of the mountain. The western and south-western, southern and south-eastern slopes get much more energy and obviously, the temperature is higher there than in the other slopes. For instance, in south-west the 21^{0}C (Talin 20,6^{0}C) isotherm is coincided with 1700m altitude and air temperature decreases about 2^{0}C in every 100 meter. Whereas, the 19 ^{0}C isotherm coincides with 1700m izoline in north-western slopes of Aragats (Artik (18,5^{0}C)). In the north-eastern slopes in 1900 meter air temperature is 17^{0}C (Aparan), but in southern slopes in 2000m it is 18^{0}C (Amberd 17,8^{0}C).

The average temperature in July is from 15,8-16,8^{0}C in the coastal zone of Sevan lake. In the southern part of the coasts it is 16,5^{0}C (Martuni, Vardenis), while the eastern part of the lake is the hottest and the temperature is 16,8^{0}C (Shorja). From north-west to the lake, in Sevan pass (Semyonovka) due to frequently observed advective fog the average temperature in July almost never rises from 14^{0}C. The average air temperature difference between the upper stream and lower stream is about 10^{0}C in Hrazdan river basin. The upper stream of the river from Gegham Mountains to the north the average temperature is 17-18^{0}C in July (Hrazdan, 17,5^{0}C).

According to our sources studied during 1961-2012 period, the highest average temperature has been higher than 25^{0}C and has been observed in the ridge south of the country (Meghri, 26,6^{0}C), in Ararat Valley (Ararat and Yerevan agro meteorological stations 26,4^{0}C), in Arpa River valley and in Debed and Aghstev rivers' low streams.

The air temperature is quite complex in the south due to various natural conditions. In mountainous valleys which are above 2000m average air temperature is below 14^{0}C. For instance, the

average air temperature is 18^0C in Vorotan river's midstream, in Sisian valley (1500m above sea level), but in contrast to this, in Goris valley having 1400 m altitude it is 19^0C.

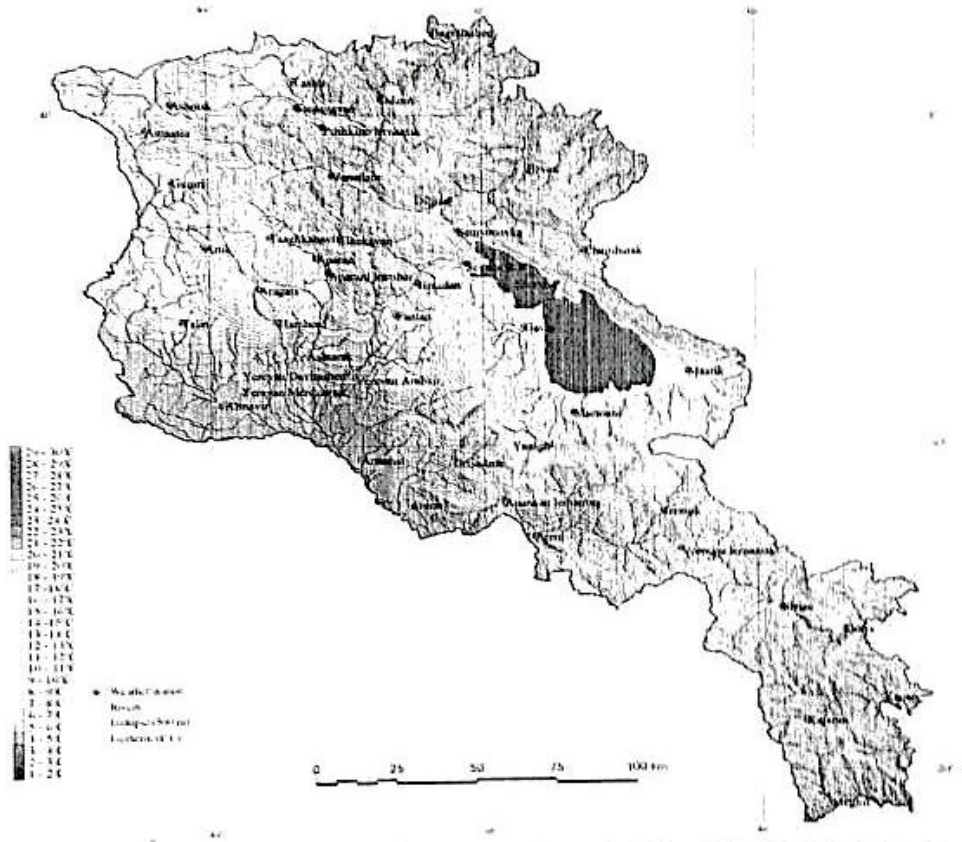

Fig. 2 The distribution of average air temperature in July (1961-2012) in Armenia

Consequently, Armenia has dry and severe continental climate conditions that are visible studying only the temperature distribution in July. The dry air masses come from south in July, especially from Iranian highland, which create hot depressions in Armenia. July and August are the months when agriculture needs more irrigation. Thus, studying air temperature distribution using new technology helps us to have more accurate results and according to this more accurate conclusions and actions in this sphere.

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BINDING OF PORPHYRINS WITH ZEOLITES IN TEMPERATURE DEPENDENCE

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The binding of nanoparticles zeolite with a number of cationic porphyrins are studied. Previously, it was established that the main mechanism of binding the zeolite nanoparticles with cationic porphyrins is an ionic bond. Since binding of porphyrins as ligands to nanoparticles at the initial stage of interaction is determined by the Brownian motion of porphyrins, it is obvious that the interaction of porphyrins with nanoparticles may depend on the temperature. In the present paper by methods of absorption and fluorescence spectroscopy was studied the complexation of porphyrins with zeolite nanoparticles at different temperature conditions. It was established, that there is a clear temperature dependence of the complexation of cationic metalloporphyrins with zeolite nanoparticles, and for correct determination of the percentage of binding must be strict thermostating of the experimental conditions.

Keywords: *zeolite nanoparticles, cationic porphyrins, binding, temperature dependence, thermostating conditions*