



Specific weather biotrop factors in the mountain resorts of North Caucasus

Natalia Efimenko (1), Elena Chalaya (2), Nina Povolotckaia (1), Irina Senik (2), and Victor Slepykh (3)
(1) Russian Federation (nauka@gniik.ru), (2) Russian Federation (uch-chast@gniik.ru), (3) Russian Federation (orgotdel@gniik.ru)

SPECIFIC WEATHER BIOTROP FACTORS IN THE MOUNTAIN RESORTS OF NORTH CAUCASUS

Efimenko N.V.(1), Chalaya E.N.(2), Povolotckaia N.P.(1), Senik I.A.(2), Slepykh V.V.(3)

(1)FSBI «Pyatigorsk Research Institute of Curortology of the Federal Medico-Biological Agency», Pyatigorsk, Russia (mailto:nauka@gniik.ru);

Fax:+787934973857/Phone:+787934973856) (2)Obukhov Institute of Atmospheric Physics RAS, Kislovodsk High Mountain Station and Laboratory of Atmospheric Transfer Modeling, Moscow, Russia (3)Kislovodsk branch of the scientific department of FSBI «Sochi National Park» of the Ministry of Natural Resources and Environment of the Russian Federation, Kislovodsk, Russia

Key aspects of weather therapeutic action in the mountain resorts of the Northern Caucasus (RNC) are formed under the combined influence of global, regional and local atmospheric processes, picturesque landscape, vegetation which create specificity and attraction of the weather regime for the interests of resort rehabilitation, recreation and tourism practically during the whole year.

They include high purity of surface atmosphere (background level of aerosols for the countryside, the transparency of the atmosphere 0.780 -0.890); natural hypo barium and hypoxia (5-10%); increased natural aeroionization ($N^+=400-1000$ ion/cm³; $N^- = 600-1200$ ion/cm³; KUI = 0.8 -1.0); the softness of temperature rate (± 600 W/m); regime of solar radiation favourable for heliotherapy.

Pathogenic effects in the mountains can occur both in front atmospheric processes and in conditions of relatively favorable weather. For example, in a stable anti-cyclonic air mass with the sunny weather, foehn effects can happen that are accompanied by excessively low air humidity (lower than 20-30%), the air temperature rises in the afternoon (in winter until 15- 20°C, in summer - up to 25-35°C). The situation can be worsened by ozone intrusion (O₃) with the increase of its concentration by 20 ppb or more, temperature stratification change, formation of pollution accumulation conditions in the gorges and valleys where the resort towns are located. We can observe: the increase in the concentration of aerosol pollution from 1.78 to 4 and even up to 8-10 particles/cm (particle diameter is 500-1000 nm); the rise in mass concentration of submicron aerosol up to 75 mkg/m³ and the gas pollution (CO, COx, O₃) of the surface atmosphere. Against this backdrop the effects of rapid changes in the chemical composition of natural ions due to the formation of positive nitrogen ions (often with a prevalence of positive over negative air ions) can be sometimes developed. In such situations people suffering from disadaptation are under the risk of expanding meteopathic reactions which require medical intervention.

Long-term performance of medical weather forecast system (MWFS) has proved its high social role - the effectiveness of spa rehabilitation of people with disadaptation in RNC through planned meteoprophylaxis increases by 20-30% [1]. Unfortunately, there are still many methodological aspects of forecasting biotropic situations for balneology which are insufficiently studied in the aspect of MWFS. It is necessary to develop new directions in the field of Biometeorology.

Reference

1. The health of the population of Russia: the influence of the environment in a changing climate/monograph. Under the editorship of Academician A. Grigoriev; The Russian Academy of Sciences. -Moscow: Nauka, 2014. - P. 355-370.