Geophysical Research Abstracts
Vol. 19, EGU2017-2514, 2017
EGU General Assembly 2017

Environmental problems of resort towns of Caucasian Mineralnye Vody region during the anthropocene era

Natalia Efimenko (1), Elena Chalaya (1), Nina Povolotckaia (1), Mariya Artamonova (2), Irina Senik (2), and Viktor Slepykh (3)

(1) FSBI «Pyatigorsk Research Institute of Resort Study of the Federal Medico-Biological Agency» , (2) Obukhov Institute of Atmospheric Physics RAS, Kislovodsk High Mountain Station and Laboratory of Atmospheric Transfer Modeling , (3) Kislovodsk branch of the scientific department of FSBI «Sochi National Park» of the Ministry of Natural Resources and Environment of the Russian Federation

There has been studied the influence of ecological factors on rehabilitation properties of the atmospheric surface layer (ASL) in the mountain resorts of the Caucasian Mineralnye Vody Region (CMVR) according to the research methods [1] accepted in balneology. Taking into consideration the data of the long-term complex multiple-factor bioclimatic monitoring (PRIC FMBA, IFA RAS, SNP), it has been revealed:
- the increase in frequency of inter-day variability of the integral index of weather pathogenicity (IIWP) in the range of 0,35<IIWP<0,70 (weak and moderate influence on adaptation organism systems) from 25-50% to 45-65% during the last 30 years;
- the growth of repetition of short-term intra-day "bursts" (<10 min.) and long-term periods (from several hours to several days) of the increase in the level of concentration of aerosol particles from 500 to 1000 nanometers in size (penetrating to alveoli into airways) from "very clean" level of ASL to - "slightly polluted" ASL. Variations of aerosol level are generally connected with atmosphere circulation processes of different scale: advection of continental air masses from arid territories, trans-boundary transport of industrial aerosol, accumulation of local anthropogenic aerosol (from transport, garbage burning and seasonal fires in the condition of blocking anticyclones);
-the appearance of heavy metals in ASL in background mountain territories;
- the extension of space of urban areas with "islands" of hot subcomfort (the thermal balance is higher than 600 W/m2), air deionization phenomena ($\sum$ [(N+) + (N-)]< 400 ions/cm3 and KUI >2,0). These signs are noted on the background of the continuing period of climate warming.
At the present time the rehabilitation potential of ASL in the resorts of Caucasian Mineralnye Vody region is estimated within 2,08-2,68 points (max =3,0 points).
Mountainous areas are more sensitive to anthropogenic impacts, changes of radiation mode and circulation modes. It was revealed that there are a number of phenomena and trends in ASL of the mountainous sites, which are negative markers of urbanization process and advent of Anthropocene era. Therefore, it is actual to form a new concept of sustainable development of mountainous resort towns with scientifically grounded territorial complex system of conservation based on the modern principles of resort town-planning that will contain some scientifically proven and legally defended criteria of environmental pressures, principles of environmentally protective gardening, regulation of transportation flows, ecologically reasonable methods of waste elimination. Finally, all the efforts must be directed to preserving natural medical resources and ensuring of their renewal.
References:
1. Resort study of Caucasian Mineralnye Vody region / Under the general edition of MD, prof. V. V. Uyba. Scientific publication. - Pyatigorsk: PRIC FMBA. Volume 1. – 2009. – 335 p.; Volume 2. – 2011. - 368 p.