

LOW-FREQUENCY FLUCTUATIONS OF GEOMAGNETIC FIELD AND ATMOSPHERIC PRESSURE ON THE HUMAN ACTIVITY

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Medical weather forecast is very important for the prevention of negative effects of weather factors on people health. According to numerous medico-meteorological studies the main significant meteorotropic parameters are air temperature and humidity, barometric pressure and wind velocity. Widespread weather services provide the reliable information on these classical meteorological parameters on different time-scales all over the world. However, very little attention is paid to the effects on people of other non-classical meteorological parameters. Recently, meteorotropic properties have been attributed to the slight atmospheric pressure fluctuations (APF) with second, minute and decaminute periods, related to the far-infrasound ($0.003 \text{ Hz} < f < 1 \text{ Hz}$) and internal gravity waves (from one minute and more) ranges. Such APF are considered as natural noise in the atmosphere, originating from very different source. The most widespread and strong source of APF is chaotic turbulent noise of airflows.

The important feature of APF is that they penetrate buildings and therefore could be responsible for weather sensitivity symptoms indoors, as well as outdoors. The potential risk of APF for people health is aggravated by the fact, that people cannot feel them and standard methods and means for their measurements are not available, and also rise of tick's activity.

We conducted simultaneous long-term monitoring of APF in two regions in Europe (Ukraine and Slovak) and investigated their daily and seasonal dynamics, as well the relationships with other meteorological parameters. For these we used standard high sensitive (1 Pa) microbarometer with high temporal resolution (measuring rate 2 Hz) and specially developed computer program for calculation and visualization of APF spectral parameters. We also tested the relations between physical parameters of APF and rate of emergency transport events due to human circulation systems diseases and unexpected of ticks' activity. Unfavorable for people health were high mean daily values of APF in the far infrasound range (3 s – 120 s), as well the high ratio of the APF values during the nighttime to those during the daytime. We did not found the adverse effects on people with health problems of the APF in the range of longer periods (120 s – 1200 s). Moreover, the obtained results point that their high values could be considered as activating factor promoting successful adaptation to mental and physical loads. Our studies of physical parameters of APF, and their relations with physiological, biomechanical and behavioral reactions, as well the rate of transport emergency events suggest the important role of APF as a potentially risky meteorological factor for people health and environment safety, e.g. in traffic or at the workplace. From this point of view the systematic monitoring and forecasting of APF bioeffective physical parameters could be considered as actual task for weather services.

On the basis of results and hypotheses gained in the joint scientific research during 2008-2010 the main purposes within the framework of this project are as follows: the further acquisition and completion of the atmospheric pressure and geomagnetic field data-base of their fluctuations in a range less than 1 Hz in some localities of Slovakia and Ukraine; amplitude-frequency data analysis; development of algorithms and software to investigate the correlations between low-frequency fluctuations of these geophysical fields; determination of peculiarities of human biophysical reactions (electrical, temperature and etc.) to natural fluctuations of these geophysical factors; comparative analysis of obtained data to determine the mechanisms of effects of relevant factors on a human organisms and correction means with regard to the degree of effects.