GLOBAL METHOD FOR IDENTIFYING BIOLOGICAL AND HELIOGEOPHYSICAL SERIES DEPENDENCIES BY PRE-FILTERING OF PRECEDENTS (OUTLIERS)

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Abstract. This paper proposes a new approach to finding the relationship between heliophysical and meteorological factors and physiological parameters, based on the pre-filtering of outliers. Seeking dependencies are masked by extraneous influences, which can not be taken into account. For this reason, the direct search for correlation between external influences (x) and physiological (y) parameters gives extremely low values and does not allow us to conclusively prove their relationship. We propose a method of removing outliers from the database, based on intellectual exhaustive search for polynomial curves possible dependencies, followed by bolting outliers which are far away from the searching curves and the optimization of nonlinear coefficient of correlation between regular, i.e. remaining, precedents. It is shown that this optimization problem is for the genetic algorithm (i.e., searching for a maximum in the absence of the concept of gradient) and requires the use of genetic algorithm based on a Gray code. The received relationship between the various medical and biological parameters and characteristics of the space and the usual weather were inspected by crossvalidation method. It was proved that the filtering out of 20 % precedents (outliers) may increase of the linear correlation coefficient up to 0.5. Comparison of the filtration method of outliers described in this paper, and determination of the least square method (LSM) of the optimal polynomial dependence by multipleindependent tests of models as close as possible to the real dependencies (Monte Carlo) showed that the LSM method loses much in comparison to our methodology.

Keywords: method of outliers' filtration, arterial blood pressure, pulse wave velocity, weather and geophysical parameters.