The wider context of the impact of solar activity on mortality by cause in the Czech Republic

Abstract

The presented dissertation investigates the influence of extraterestrial phenomena, in the whole scope of their possible effects, on human population. It analyses the influence of climate-change induced fluctuation of solar activity on the population, as well as the impact of the concentration of cosmogenic radionuclides on human health. In the introduction, the manifestation of solar activity on Earth is described, the results of the present research is summarized, and the used methods of data processing and the data sources are described.

The primary focus of this work is the *association of mortality from the causes of death* recorded under chapter IV. Diseases of the nervous system and chapter IX. Diseases of the circulatory system of the International Classification of Diseases, 10th revision (ICD-10) in the Czech Republic *with the changes in the level of solar activity and its exceptional fluctuations*. The main aim is to determine the possible link between the daily numbers of dead by the respective causes of death, by sex and age groups in the Czech Republic, on global as well as on geographically specific daily values of solar, ionospheric, and geomagnetic parameters in the years 1994–2013. These are achieved by means of statistical analysis of multivariate data. Based on the calculations by the method of *general linear regression models*, characteristics of the influence of solar activity on human health for the analysed timeframe are obtained.

For the time period of seven strong solar storms, which occurred in the period 1994–2015, we performed an analysis of daily numbers of dead by diseases of the nervous system and diseases of circulatory system by sex and age groups in the Czech Republic. For this analysis, the method of *mixed graphic models of conditional independence* was emloyed.

The following part of the thesis summarizes the influence of the Sun-doped natural background dose radiation on human health and mortality. It estimates the changes in the levels of the dose of natural background radiation in the period of extremely low solar activity and their impact on the incidence of oncological diseases in the population of the Czech Republic. The lifetime attributable risks by sex induced by the annual dose of natural background radiation is calculated for three scenarios of radiation level. The summarizing chapter also describes the results and methods of historical climatology, based on analyses of written records, geophysical measurements, and proxy data. It explains the basic mechanisms of the impact of solar activity on the environment of Earth and on human population as a whole.

Keywords: mortality, causes of death, solar activity