



Statistical characteristics of variability in the long-term records of solar proxies

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During the last century the geomagnetic activity exhibits a positive trend probably caused by solar periodicities with about 200-year or even more prolonged periods. The global aa and the auroral AE indices at the beginning of 21th century have a higher average level than at the beginning of its calculation in 1868 and 1957, respectively. However, the amount of increase may result from the higher values or/and more frequent variations of the original values. These two kinds of behavior are controlled by different factors, for example by the strengthening and by the variability of the solar wind and electromagnetic radiations. The statistical analysis applied to the geomagnetic indices at different ranges of activity reveals the most significant upward trend at the range of moderate activity, downward trend for the quiet periods and no trend for strong disturbances during the period of observations. Upward trend in the variability (frequent occurrence of the abrupt variations) is seen in each month of the year except the solstice months. We discuss the possible connection to geomagnetic field variations, ionospheric conditions and solar activity. We examine the long-term behavior of the parameters characterizing solar activity (TSI, MgII, F10.7, polar magnetic field and sunspot number) in the individual months of the year, i.e. construct their “climatology”, and than show how the annual curve of each index varies in the course of the solar cycle and what trends can be detected.