



Correcting the Long-term Geomagnetic Activity estimated from Eskdalemuir Station Data

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Geomagnetic activity is one of the most important heliospheric parameters, and the most reliable indicator of decadal and centennial changes in solar activity. The long-term evolution of geomagnetic activity has been recently studied using the newly developed IHV (Inter-Hour Variability) index calculated from hourly magnetic data of several stations. Since the IHV index is a measure of variability, it is critically dependent on how the station data is sampled. The hourly data from the beginning of the 20th century are often instantaneous values rather than hourly means. Accordingly, the related early IHV indices will remain, without appropriate correction, artificially large. This correction was recently done for several stations. However, an opposite problem was found in the Eskdalemuir (ESK) station data. Calculating the IHV ratio between ESK and any other station one can find an increase of about 60% from 1931 to 1932. This is due to the fact that the early ESK station data in WDC data bases are actually two-hourly averages which, by reducing variability, leads to artificially low values for the ESK IHV index up to the year 1931. Using more recent data we show that two-hourly averaging of data will decrease IHV indices by a factor of about 1.54 and 1.61 during high and low sunspot activity years, correspondingly. Here we correct the ESK IHV indices, and show that this correction leads to a dramatically smaller centennial increase of geomagnetic activity compared to that depicted by the uncorrected ESK IHV index. Accordingly, all previous results using the ESK IHV indices have reached fundamentally erroneous conclusions.