



Does sunspot number calibration by the "magnetic needle" make sense?

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It has been suggested recently that early sunspot numbers should be re-calibrated and significantly corrected using the observed daily range of the geomagnetic inclination (so called rY values). The suggested "correction" method makes an a priori detrending of the rY series and then extends the linear regression between rY and sunspot numbers established for the last 25 years to earlier times. The suggested "correction" of sunspot numbers by roughly 30% goes far beyond the traditional estimates of observational uncertainties of sunspots. Concentrating here on international sunspot numbers (R_z), we demonstrate that the rY values do not actually imply that the observed R_z values in the 19th century are systematically underestimated. Rather, we find that the R_z numbers are fairly uniform after mid-19th century. The suggested "correction" is largely induced by the detrending of the rY series, which enhances the rY -based sunspot activity in the 19th century relative to later times. We also show that while the annually averaged declinations have a rough relation between sunspots and other related solar parameters, this relation is strongly seasonally dependent and nonlinear and, therefore, not sufficiently accurate or uniform for rY to be used as a very reliable proxy of solar activity in early times.