Three Centuries of Monthly Sunspot Group Numbers

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Svalgaard & Schatten (2016) used a 'backbone' method to reconstruct the Sunspot Group Number since 1610. Five backbones were used, centered and anchored on the Wolfer Backbone, which then defines the scale of the series. Backbones are constructed by scaling observers directly to the primary observer (e.g. Wolfer) without daisy-chaining through intermediary observers thus avoiding accumulation of errors. To improve the time resolution (with better determination of error bars) the new Backbones have monthly resolution rather than the previous one's yearly values. There seems to be several different 'populations' of sunspot group counts by observers over time. One cannot blindly assume the statistical properties of one population to hold about the other. Speculatively we identify four populations the last 400 years. One major population belongs to years before 1881 followed by another major one after ~1915, separated by a transitional period between 1881 and ~1915. Those major populations differ by ~40%. The difference is poorly understood, but may be due to evolving telescope technology and/or increasing understanding of what constitutes a group. The average number of groups over a year by all observers with no normalization at all closely matches (i.e. are proportional to) the yearly numbers of groups in backbones constructed within each population showing that elaborate normalization procedures have almost no effect on the result. This means that we can dispense with the normalization altogether; although adjacent, overlapping backbone segments still have to be stitched together by par-wise comparison. So, it seems that we have a nice non-parametric, non-overlapping, non-k-value-regression, no selection effect, no ranking, no pair-wise comparison, no ADF- or PDF-based, non-whatever method for constructing a backbone segment including estimating its time-varying error bars (from the spread of the observations).