



New calibrated sunspot group series since 1749

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The largest uncertainty of the long sunspot-number series is related to the "calibration" of the visual acuity of individual observers in the past. A traditional way for such calibration is a daisy-chain regression method, which may lead to significant bias and error accumulation. Here we present a novel method for calibrating the visual acuity of the key solar observers to the reference data set of the Royal Greenwich Observatory sunspot groups for the period 1900 - 1976, using the statistics of the active-day fraction. The observational thresholds is defined for each observer relative to the reference data set. As a result, a new calibrated series of sunspot group numbers is obtained, without any daisy-chain regression. The new series displays secular minima around 1800 (Dalton Minimum) and 1900 (Gleissberg Minimum), as well as the Modern Grand Maximum of activity in the second half of the twentieth century. The new result is fully consistent with the 'classical' group sunspot number series (Hoyt and Schatten, 1998) after 1830 but suggests a slightly higher activity before 1830. On the other hand, the new result implies that a recent correction by Clette et al. (2014) and Svalgaard and Schatten (2016) overestimated sunspot activity before 1900.