

A Standard Law for the Equatorward Drift of the Sunspot Zones

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The latitudinal location of the sunspot zones in each hemisphere is determined by calculating the centroid position of sunspot areas for each solar rotation from May 1874 to June 2012. When these centroid positions are plotted and analyzed as functions of time from each sunspot cycle maximum there appears to be systematic differences in the positions and equatorward drift rates as a function of sunspot cycle amplitude. If, instead, these centroid positions are plotted and analyzed as functions of time from each sunspot cycle minimum then most of the differences in the positions and equatorward drift rates disappear. The differences that remain disappear entirely if curve fitting is used to determine the starting times (which vary by as much as 8 months from the times of minima). The sunspot zone latitudes and equatorward drift measured relative to this starting time follow a standard path for all cycles with no dependence upon cycle strength or hemispheric dominance. Although Cycle 23 was peculiar in its length and the strength of the polar fields it produced, it too shows no significant variation from this standard. This standard law, and the lack of variation with sunspot cycle characteristics, is consistent with Dynamo Wave mechanisms but not consistent with current Flux Transport Dynamo models for the equatorward drift of the sunspot zones.