

**THE CORRELATION OF LATITUDINAL  
DISTRIBUTIONS OF SUNSPOT AREAS AND  
MAGNETIC FIELDS WITH THE BACKGROUND  
SOLAR MAGNETIC FIELD IN THE CYCLE 23 AND ITS  
EFFECT ON THE SOLAR DYNAMO**

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The latitudinal distributions of sunspot areas during the cycle (a butterfly diagram) and their resulting (excess) magnetic fields closely correlate with the solar magnetic field in their migration during the cycle from higher latitudes of  $35 - 40^\circ$  towards the equator. The residuals of the sunspot areas averaged over 1 year minus those averaged over 4 years revealed a well defined periodicity of 2-2.5 years that is similar to the period of the North-South asymmetry in sunspot area and active region areas. During the whole period of observations the sunspot areas for the near-equator latitudes are cross-correlated with the WSO Solar Magnetic Field (SMF) that reveal a strong positive correlation around a zero time lag plus minus 2 years. The correlation coefficients are distributed into the four zones reflecting the sunspot migration directions: the two polar zones above  $\pm 45^\circ$  with the positive correlation increasing towards the poles (the sunspot migration towards the poles) and the two equatorial zones from  $-40^\circ$  to  $+40^\circ$  with the positive correlation increasing toward the equator (the butterfly diagrams). These correlations are likely to reflect the modulating effect of the symmetric component of the SMF on the flux tube emergence in the 'royal zone' that, in turn, suggests the magnetic field in sunspots to be a derivative of the global SMF generated by the solar dynamo.