

## GREEN CORONAL EMISSION AND THE GLOBAL SOLAR CYCLE

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We have derived the latitude distribution of polar faculae for four solar cycles (1940-1980) and plotted these together with sunspot butterfly diagram (Makarov and Sivaraman 1989, 1990). The features of the polar faculae noticed by us are the following:

1. The polar faculae (p.f) make their first appearance in the latitude zones of 40-60 degrees immediately after polar field reversal. These zones of appearance of the p.f (in the N & S hemisphere) migrate slowly polewards and reach the high latitude of 70-80 degrees as the cycle progresses.
2. The polarity orientation of bipolar faculae is opposite to that of the spots of the running cycle (Hale's law), but is identical to the polarity orientation for the bipolar spots of the next following cycle for the hemisphere concerned, i.e. while the activity of the preceding cycle (N) is still in progress at lower latitudes in the sunspot phase, the faculae of the (N+1) cycle are already make their appearance at high latitudes (Makarov and Makarova 1984).
3. The new sunspot cycle, which commences after the polar field reversal, thus shows up first as faculae at high latitudes and leads the sunspot phenomenon by 5-6 years.

This gives rise to the concept of the extended solar cycle of 16-18 years as against the traditional value of 11 years, which is based only on the periodic pattern of the butterfly diagram.

It is clear that the global activity manifests as two components on the solar surface; the high latitude component made up of the polar faculae and the low latitude component which is the conventional sunspot activity confined to +40 and -40 degrees latitudes on the solar surface.

Our plot of the two components of the global field agrees quite well with the results from two other studies: the global modes in the magnetic field pattern derived by Stenflo (1988; his Figure 4) and the pattern of coronal emission. This agreement further strengthens the existence of the two components. However, the important questions which remain to be answered are: Are these two components, which manifest as surface fields, causally related and causally involved in the solar cycle? Are these fields connected to the dynamo field in the interior, and, if so, how can the dynamo reproduce

these two components which are spatially and temporally displaced with respect to each other on the surface within the 22 year cycle?

### REFERENCES

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