Multi-Wavelength Investigations of Solar Activity
Proceedings IAU Symposium No. 223, 2004
A.V. Stepanov, E.E. Benevolenskaya & A.G. Kosovichev, eds.

DOI: 10.1017/S1743921304005344

Fine structure of the butterfly diagram revisited

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Abstract. The latitudinal time distribution of sunspots (butterfly diagram) was studied by Becker (1959) and Antalová & Gnevyshev (1985). Our goal is to revisit these studies. In the first case we check whether there is a poleward migration in sunspot activity. In the second case we confirm the results, and make more quantitative statements concerning their significance and the position of the activity peaks.

1. Check for poleward migration

We have compared our (left panel) and Becker's plot (Becker (1959)) for the same cycle and found that with computer processing of GPR data there is no sign of a poleward migration in sunspot activity. There are similar results in the other cycles.

2. Bimodality of the butterfly diagram

If we calculate the time-integrated sunspot area during a cycle, we find local maxima and minima in the latitudinal distribution. If we consider the histogram of absolute values of local maxima in the area-latitude plots of each cycle, we find that two main groups are visible (right panel). We find that the probability of having zero maxima in the bin around 16° is $P = 0.038$, so the bimodality is significant at the 96% level. The mean latitude of the first group is 12.3° and of the second one is 21.2°.

Acknowledgements

The author thanks for IAU Grant and grateful for K. Petrovay for useful discussions. The author is grateful for support from the European Solar Magnetism Network founded by the European Comission under contract HPRN-CT-2002-00313.

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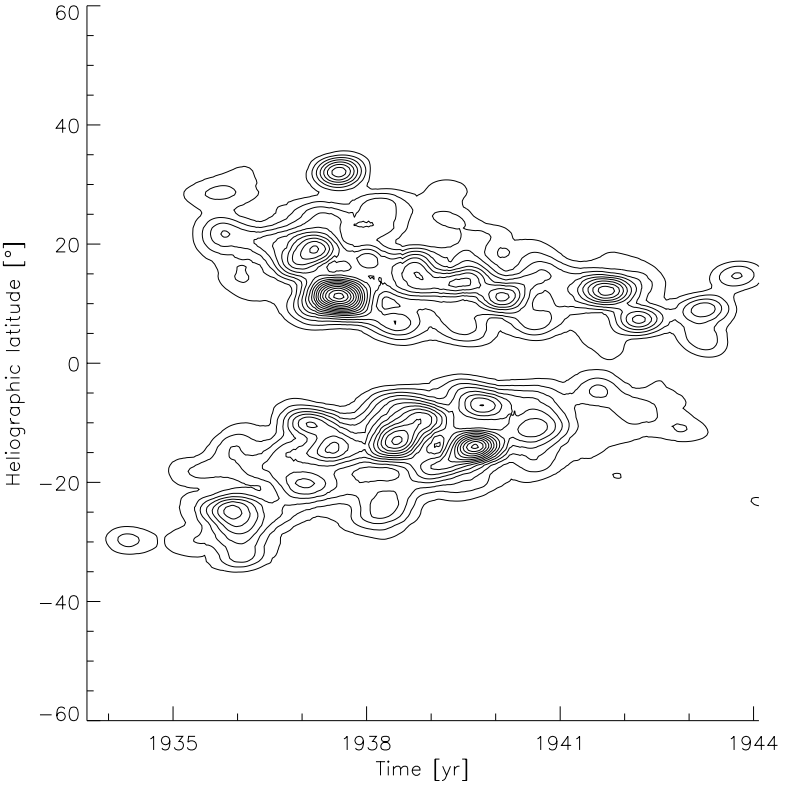

Figure 1.

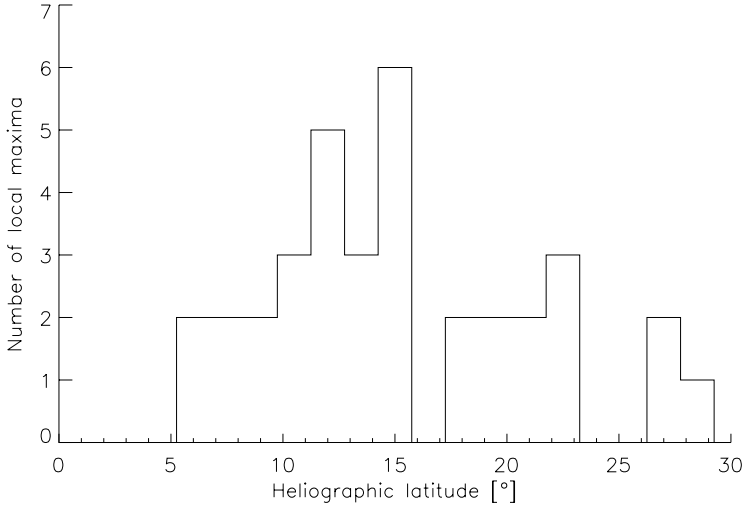

Figure 2.

https://doi.org/10.1017/S1743921304005344 Published online by Cambridge University Press