Long-Term Datasets for the Understanding of Solar and Stellar Magnetic Cycles
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Migration of polar prominences in 13-24 cycles of activity

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Abstract. We are performed the digitization of the prominences from the full disk observations of the Sun in the CaIIK line Kodaikanal Observatory for the period 1904-1954. These data were supplemented by digitization of prominences data on Wolfer atlases for the period 1887-1900 and observations of Kislovodsk Observatory in the period 1957-2017. Particular attention was paid to study of the polar crown prominences drift time. The time interval of the prominence drift is ambiguous from the sunspot cycle amplitude.

Keywords. Sun, solar activity, prominences, long-term variations

1. Introduction

Regular observations of the solar chromosphere in the CaIIK line at the Kodaikanal Observatory provide the possibility of allocating prominences on photographic plates. According to observations in the CaIIK line of the Kodaikanal observatory for the period 1904-1954 we are performed digitization of images. In total, more than 90 thousand prominences were allocated. These data were supplemented by data on the digitization of prominences on Wolfer atlases Wolfer (1897) for the period 1887-1900 and observations of Kislovodsk Observatory in the period 1957-2017.

2. Data

We are performed the digitization of the prominences from full disk observations of the Sun in the CaIIK line Kodaikanal Observatory for the period 1904-1954. Special software was developed to distinguish solar prominences. The algorithm includes several steps. Initially, the search for points belonging to the solar disk was carried out. The marker of the North Pole and the initial overlay of the heliographic grid was determined. Then there was a subtraction of the background over the solar disk, to increase the contrast of prominences. After that, the program selected bright objects over the solar disk.

These data were supplemented by data on the digitization of prominences on Wolfer atlases for the period 1887-1900 and observations of Kislovodsk in the period 1957-2017 (http://solarstation.ru/).

3. Conclusion

Figure 2 shows the trajectory of prominences drift 13-24 cycles of activity for the northern and southern hemispheres. In the case of 3-fold polarity reversals, we chose the first. On the basis of these data, we measured the time of passage the midline migration line of prominences from latitude 60 to latitude 80 degrees. The dependence of this time

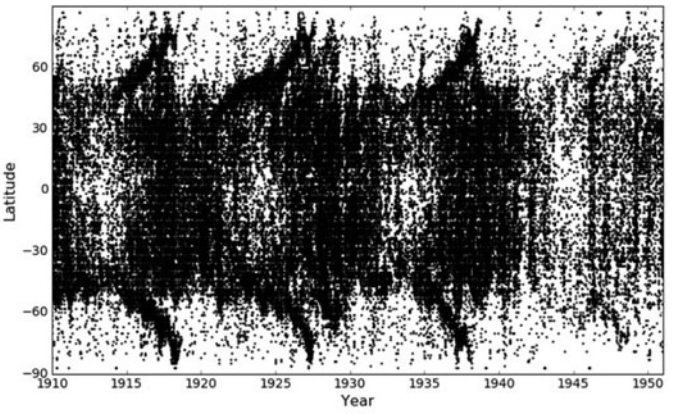

Figure 1. The latitude-time data of the prominences position from the digitization observations Kodaikanal observatory in the CaIIK line.

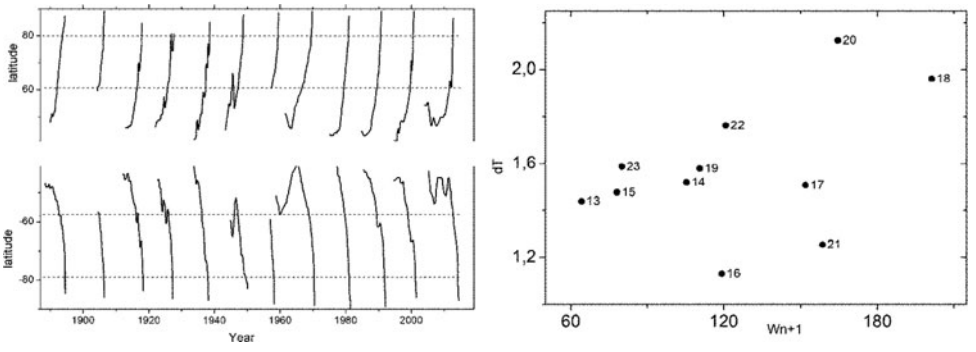

Figure 2. The trajectories of drifting polar crown prominences in the northern and southern hemispheres.

Figure 3. Dependence of the drift time interval in the latitude interval 60-80 depending on the amplitude of the sunspot cycle.

interval, averaged over both hemispheres, is presented in Figure 3. The drift time is ambiguously dependent on the amplitude of the sunspot cycle.

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