

Identification of Active Longitude from the Solar Magnetograms

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It is well known that the sun has the cycle of 11 years for its activity. In the active time, we can see lots of sunspots on the solar surface and sometime it cause large flares which largely affect the Earth's environments. For example, the release of large-scale plasma called Coronal Mass Ejection (CME) hits the Earth's magnetosphere and causes some effects, e.g. the Earth's magnetic field fluctuation or trouble of the satellite. The appearance of sunspots has several characteristics. For example, sunspots appear around in the higher latitudes at the beginning of the cycle and in the lower latitudes at the end of the cycle on the sun. However, recent studies have shown that the appearances of sunspots also depend on longitudinal direction. The solar longitude where the sunspots are frequently observed is called Active Longitude (AL). The presence of active longitude has been discussed long time. But it is still not clear whether there is an AL or not. In this study, we identified AL using magnetic field observation on the solar surface, not sunspots data. As a result, we can study AL for the magnetic bipoles which do not develop to sunspots. The results show that the phase of AL in the northern hemisphere and the southern hemisphere are different in cycles 23 and 24. Further, we found that there is clear AL in the strong magnetic field data ($|B| > 500\text{G}$), although there is no clear AL in the weak magnetic field data ($|B| < 40\text{G}$).

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