
Unusual migration of the prominence activities in recent solar cycles

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Abstract

The solar activity in recent solar cycles shows some anomalies. One of the significant anomalies is that few sunspots appeared in this solar minimum. The number of the spotless days from the late phase of Cycle 23 to the early phase of Cycle 24 is largest in the past 100 years. The other significant anomaly is that the period of Cycle 23 was over 12 years. In order to understand the anomalies, it is essential to know the variation of magnetic field distribution at the solar surface. It is well known that a prominence always lies on the boundary between the opposite magnetic polarities and a prominence becomes a good indicator of the global magnetic distribution. Hence we investigated the global magnetic variation of the Sun based on the prominence activities.

Nobeyama Radioheliograph (NoRH) is an interferometer dedicated for solar observations in microwave. NoRH started the observation in July 1992 and is continuing to take the microwave images of the Sun. We developed the semi-automatic detection system of prominence activities and applied it to over 20 years data of NoRH. As a result, 1059 prominence activities were detected. From the detected events, we made the butterfly diagram of the prominence activities, and investigated the migrations of the producing region of prominence activities. The plot shows that the magnetic variation in the southern hemisphere strayed from a usual solar-cycle variation after the solar maximum of Cycle 23, despite the fact that the magnetic variation in the northern hemisphere is usual. The hemispheric asymmetry may help to explain the anomalies of recent cycles.

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