

太阳磁场方向变化对于地球大气温度异常变化的意义

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**摘要** 本文根据苏黎世天文台太阳黑子11年周期资料和太阳黑子磁场磁性变化周期特征, 构建了太阳黑子磁场磁性指数MI (Magnetic Index) 时间序列. 分析表明: 太阳活动磁性周期平均长度为22 2年, 但是每个周期长度是不相等的; 多数情况周期短时磁性指数较大, 对应太阳活动水平强; 周期变长时磁性指数较小, 对应太阳活动水平较弱; 太阳黑子磁场磁性指数序列也具有80~90年的世纪周期.

进一步研究指出, 太阳黑子磁场磁性指数曲线由极小值升至极大值时期, 太阳磁场南向, 行星际磁场磁力线与地磁场磁力线重联, 此时磁层为开磁层, 太阳风将携带大量等离子体从向阳面进入地球磁层, 从而使输入的动量、能量和物质大幅度增加, 与北半球对流层增温时期对应; 太阳黑子磁场磁性指数曲线由极大值下降至极小值时期, 太阳磁场北向, 与磁层顶地磁场同向, 行星际磁场不会与地磁场发生重联, 此时磁层为闭磁层, 这种情况下, 只有少数带电粒子能够穿越磁力线进入地球磁层, 与北半球对流层降温时期对应.

**关键词** [太阳活动](#) [磁性指数](#) [22年周期](#) [太阳磁场方向](#)

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The significance of solar magnetic field direction variation on anomalous variability of the atmosphere temperature on the earth

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**Abstract** In this paper, based on the 11-year's period data of the sunspot and the periodic variation characteristics of the magnetic field of the sunspot, the time series of the magnetic index of the sunspot magnetic field (MI) is established. The analysis indicates that the averaged period of the solar magnetic activity is about 22 2 years, but it is not a constant. In most cases, when the period is short the magnetic index is large, corresponding to strong solar activity; when the period is long the magnetic index is small, corresponding to weak solar activity. The time series of the magnetic index of the sunspot magnetic field also possesses a period of 80 ~90 years.

Further study shows that during the period of MI curve rising from its minimum to its maximum, the solar magnetic field is southward, and the planetary magnetic force lines and the earth magnetic force lines meet together. In this way the magnetic layer is called open layer, with the solar wind carrying a large amount of plasma and entering into the earth magnetic layer from the sunny side of the earth. Through this mechanism a large amounts of kinetic energy, heat and electromagnetic energy are then transferred to the earth, which corresponds to the temperature increasing period in the troposphere in the Northern Hemisphere. During the period of MI curve descending from its maximum to its minimum, the solar magnetic field is northward, the same direction as the top of the magnetic layer, and the planetary magnetic force lines and the earth magnetic force lines do not meet together. In this situation the magnetic layer is called close layer, with only a few electriferous particles entering into the earth magnetic layer through magnetic force lines, corresponding to the temperature decreasing period in the troposphere in the Northern Hemisphere.

**Key words** [Solar activity](#); [Magnetic index](#); [22-year's period](#); [Solar magnetic field direction](#)

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