

Magnetic Field Evolution in the Solar Polar Regions

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The magnetic field of the polar region of the Sun reverses its polarity near solar maximum. We have been monitoring the polar region of the Sun since 2008 with extremely high spatial resolution and high-sensitivity spectropolarimetric observations taken with the Solar Optical Telescope aboard *Hinode*. Then, we have investigated the yearly variation of the distribution of the vertical and horizontal magnetic flux density in the polar regions. We have found that the decrease of total signed flux density in the polar region mainly results from the attenuation of the flux density in vertical, large flux concentrations (more than 10^{18} Mx) with a dominant polarity in each polar region. The flux decrease is first observed in the North polar region. We also found that the flux distribution of vertical, small field concentrations (of both polarities) and of horizontal field concentrations does not vary with solar cycle. Small-scale, mixed polarity flux concentrations pervade the quiet Sun at disk center. These fields are found in the solar polar regions as well, suggesting that an ubiquitous physical mechanism generates and maintains them.

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