

## Long-term Variations of the Open Magnetic Field Lines in the Corona

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In the previous paper, we studied long-term variations of three-dimensional structure of the open and close field lines starting at the photosphere. In this paper, we study three-dimensional structure of open field lines starting at the source surface of 2.5 solar radii. The coronal magnetic field is calculated by the potential field model devised by Hakamada with synoptic maps of the photospheric magnetic field published by the NSO, Kitt Peak, during three hundred and sixty three Carrington rotations (CRs) from CR 1645, the 17th of Aug. 1976, through CR 2007, the 29th of Aug. 2003. The data for about 28 years cover the almost three solar cycles, from around the minimum phase of solar activity cycle 21st through just after the maximum phase of solar activity cycle 23rd. It is found that, by the visual check of the synoptic maps of the photospheric magnetic field, many strong magnetic regions appear in the photosphere during the maximum phases and they disappear during the minimum phases. It is also found that the polar magnetic field in the photosphere changes its polarity in the declining phase just after the maximum phase of the solar activity. The coronal magnetic field also shows the similar features as those of the photospheric field. The three-dimensional structure of the coronal magnetic field shows dipole like structure around the minimum phases and shows complicated structure during the maximum phases because of higher order magnetic multiple poles. The coronal magnetic field also changes its polarity in the declining phase just after the maximum phase of the solar activity. The polarity change of the coronal magnetic field is shown clearly, as the first time, by the motion picture of open field line structure.