Long-term Variations of the Coronal Magnetic Field and the Photospheric Magnetic Field

Kazuyuki Hakamada[1]

[1] Natural Sci. and Math., Chubu Univ.

We study long-term variations of three-dimensional structure of the coronal magnetic field. The coronal magnetic structure is calculated by the potential field model with synoptic maps of the photospheric magnetic field during two hundred and one Carrington rotations (CRs) from CR 1800 through CR 2000, which covers 15 years from just before the maximum phase of solar activity cycle 22 through just after the maximum phase of solar activity cycle 23. 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 phase and those disappear during the minimum phase. It is also found that the polar magnetic field in the photosphere changes its polarity in the dclining phase just after the maximum of the solar activity. The coronal magnetic field also shows the similar features as those of photospheric field. The three-dimensional structure of the coronal magnetic field shows dipole like structure around the minimum phase and complicated structure during the maximum phase because of higher order magnetic multiple poles. The coronal magnetic field also changes its polarity in the dclining phase just after the maximum of the solar activity. The coefficients of multiple-ploes of the photospheric magnetic field show nearly dipole like structure in the minimum phase and so-called 'sector structuers', like the interplanetary magnetic field, in the maximum phase. The long-term behavior of the magnetic multiple-poles are reported with their motion picture.