Long-term variation of the coronal magnetic field

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Three-dimensional (3-D) structure of the coronal magnetic field (CMF) is studied by the Radial-Field model (RF-model) deviced by Hakamada with the photospheric magnetic ield observed at Kitt Peak during the maximum phase of the solar activity cycle 22 through the maximum phase of cycle 23. The map of 3-D structure of the CMF can be drawn in every

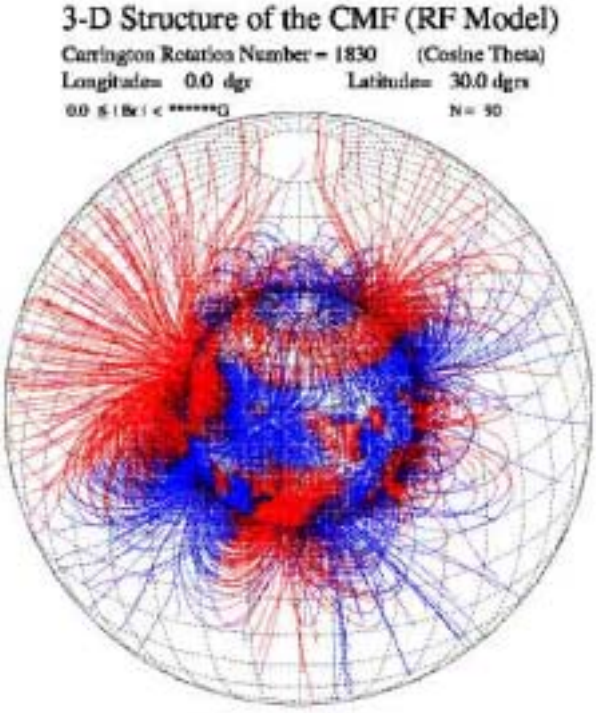
Carrington rotation by the present method. In this study, thirteen maps for CR 1830, CR 1844, CR 1855, CR 1870, CR 1887, CR 1898, CR 1901, CR 1909, CR 1925, CR 1939, CR 1950, CR 1964, and CR 1976, are drawn in nearly every year. We can study the long-term variation

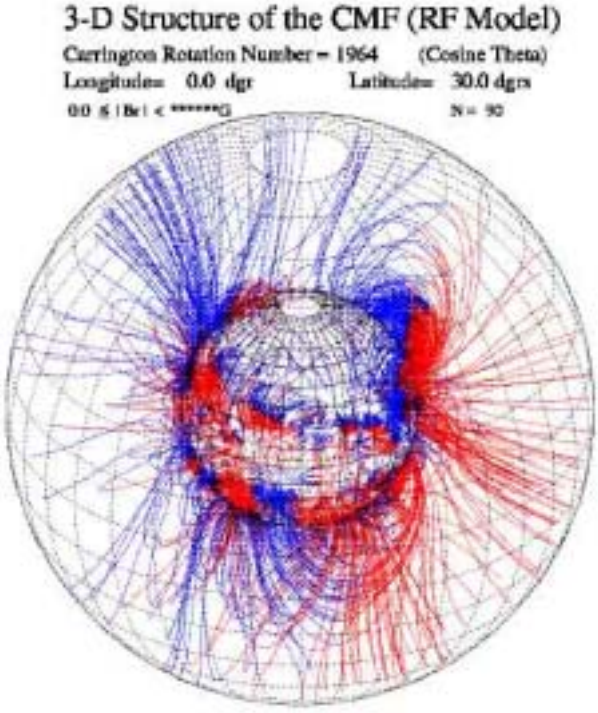
of three-dimensional structer of coronal magnetic field.

The following procedure is used in the RF-model; (1) The coronal magnetic field is represented by a scalar magnetic potential assuming that there is no electric current in the corona. This magnetic potential is expanded into a spherical harmonic series.

Coefficients of these spherical harmonic expansion is determined so that the magnitude of radial component calculated by this potential fits with the one observed at Kitt Peak. (2) Three components of CMF can be calculated at an any point in the corona. Magnetic field lines are traced from the photosphere upward by these components of the CMF calculated by the potential. Number density of filed lines emanating from the photosphere is determined so that it is proportional to the magnitude of the photospheric magnetic field.

The map of 3-D structure of the CMF drawn by this procedure can be compared directly with the oens in different phase of the solar cycle. Therefore, we cna study the long-term variations of the CMF.


3-D Structure of the CMF (RF Model)
Carrington Rotation Number = 1830 (Cosine Theta)
Longitudes 0.0 dgr Latitudes 30.0 dgrs
0.0 ≤ |Br| < ******G
N = 90


3-D Structure of the CMF (RF Model)
Carrington Rotation Number = 1964 (Cosine Theta)
Longitudes 0.0 dgr Latitudes 30.0 dgrs
0.0 ≤ |Br| < ******G
N = 90