Planar magnetic structure in the corona, II

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Three-dimensinal structure of the coronal magnetic field is constructed by the Radial-Field model during 1830 Carrington rotation in the maximum phase of the solar activity cycle. Magnetic field lines emerging from small areas in the vicinity of active regions expand into one direction with large

expansion rate making planar magnetic structures (PMSs). Since open field lines come out along closed field lines the tilt angle of the PMS varies case by case. The PMS is not rare but commonly observed near the closed magnetic regions.

The conventional potential model uses the following two assumptions; (1) the corona is current free, (2) the magnetic field line is

radial on the sphere of 2.5 solar radii called source surface. Here we use the Radial-Field model (RF-model, Hakamada; 1999) with the third assumption; (3) the photospheric magnetic field is radial on the solar surface. Three-dimensional structure of the coronal magnetic field is constructed by the RF-model with the synoptic map of the photospheric magnetic field observed at the Kitt Peak. Since the spatial resolution of the synoptic map is about 1 degree in both latitude and longitude the scalar magnetic potential is expanded into 91 x 90 spherical harmonic series.

Many active regions appear during this rotation and corresponding closed field lines appear in the corona. Further, open field lines emanate from the small regions in the vicinity of active regions. This is a magnetic feature of the corona in the maximum phase of the solar activity cycle. Some of open field lines emanating from the small regions expands into one-direction in the corona making planar magnetic structures (PMSs). The similar PMSs are reported during the 1870 Carrington rotation (Hakamada, 1998). The PMS is then a comon feature of the coronal magnetic field.