The Complex Rotation of the Sun and its Atmosphere

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The sunspots and solar activity cycle through a complex manner are believed to be due to the differential rotation of the Sun. The aim of this paper is to report the recent investigations of differential rotation during a solar cycle using radio images at 17 GHz and Yohkoh soft X-ray images. We split the images with daily cadence in 17 bins along the solar longitude separated by 10^0 in latitude. Thus images of one year gives us a set of 17 time series which can be analyzed to estimate rotation period by correlation technique. The coronal sidereal rotation rate as a function of latitude for each year, extending from 1992 to 2001 for radio and soft X-ray images are obtained. The present analysis reveals that; (i) the equatorial rotation rate of the corona is comparable to the photosphere and the chromosphere, (ii) the latitude differential obtained by both radio and X-ray images is variable throughout the period of the study, and (iii) the equatorial rotation period seems to vary systematically with sunspot numbers and indicates its dependence on the phases of the solar activity cycle. The results are compared and discussed in the light of differential rotation estimated by other techniques used various different observers.