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Updated model of the planetary magnetic field of Saturn based on Cassini data

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Magnetic field models based on Cassini data from Saturn orbit insertion [Dougherty et al., 2005] and the first few initial orbits [Giampieri et al., 2006] were very similar to those based on data from the Pioneer-11 and Voyager spacecraft almost thirty years ago. There was no noticeable change detected in either the strength or high degree of axisymmetry of the magnetic field. After more than three years in orbit at Saturn, the Cassini spacecraft has completed over 60 periapse passes at a wide variety of latitudes, longitudes and radial distances. Uncertainty regarding the rotation rate of the planet and the nature and origin of the periodic signature observed in the magnetic field [Cowley et al., 2006] and other data sets as well, has complicated the development of an accurate model of Saturn's internal magnetic field. Various periods have been suggested to represent the rotation rate of the deep interior based on different measurements. Using gravitational, radio occultation and wind data [Anderson and Schubert, 2007] found that a period of 10 hours and 32 minutes minimized the atmospheric wind-induced dynamic heights with respect to a mean geoid. Spectral analysis of the magnetic field showed a distinct signature with a period of 10 hours and 47 minutes [Giampieri et al., 2006], close to the variable period associated with the Saturn kilometric radiation (SKR)[Kurth et al.,2007]. We have derived magnetic field models based on these different rotation rates and will compare their features, assess how accurately they fit the observations and discuss the implications for the magnetic field that originates in Saturn's deep interior.