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Determination of the radial diffusion coefficients from magnetic field measurements at geosynchronous orbit

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It has been shown that the magnetic field perturbations induce two different effects on the particles drifting around the Earth. With a symmetric perturbation, because of the induced electric field, particles are displaced in location, but as their third adiabatic invariant is not violated at all with this motion, the particles come back to their initial drift shell when the perturbation is finished. Only the asymmetric part of the perturbation does induce radial diffusion. Therefore we investigated the possibility to obtain instantaneous asymmetries using magnetic field measurements on board the NOAA GOES satellites. Since 1999, there is always 2 GOES satellites located at longitudes 75°W and 135°W, separated by around 4h in local time. This separation is sufficient to obtain a good determination of the asymmetry, when both satellites are located in the dawn or in the dusk sectors. Using the period between September 1998 and May 2003 and the satellites GOES 8 and 10, it was possible to estimate the asymmetries of the magnetic field for a large range of magnetic activity, and deduce the radial diffusion coefficients. The results for dawn and dusk sectors were compared each other, and compared to pre existing models of radial diffusion. The average coefficients obtained can vary by several orders of magnitude from very quiet (Kp=0) to very active (Kp=9). These results were also compared with the ones obtained using GOES 10 and 12 during the period 2003-2006.