Dynamics of lower-energy (30-250 kev) protons in the inner magnetosphere

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Dynamics of lower-energy protons in the energy range from 30 to 250 keV was studied using data from NOAA satellites. During the main phase of magnetic storms, the spiky enhancement of proton flux in the energy range from 30 - 80 keV was always detected deep in the inner zone almost simultaneously with increase in the outer magnetosphere, and its lower boundary was less than L = 2 during large storms. The flux enhancement usually reached up to 100 folds at around L=2 and 1000 folds at around L=3.5. The time profile of the proton flux variation was quite similar to that of Dst. These observations suggest that ring current protons are injected not only in the outer region but also into the bottom region of the radiation belt. After the main phase, the spiky enhancement disappeared and an inner-belt like proton structure remained in the region around L=2. The structure was more clearly seen in the energy range from 80- 250 keV and seemed to be drifting from the main proton belt to lower L shells during the recovery phase in the L-t diagram. The location of the inner-belt like structure was slightly different from that of the electron inner belt; proton peak was located near L=2.2-2.5, and the electron peak was near L=2.0-2.4. This newly observed proton belt might necessitate the modification of the proton dynamics in the lower L regions.