Characteristics of geosynchronous particle flux disturbances caused by the solar wind dynamic pressure enhancement

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When a variation in the solar wind dynamic pressure hits the magnetosphere, various types of disturbances are created. The geosynchronous particle flux disturbance is closely related to the issues of magnetic storms, substorms, and sawtooth oscillations. In this work, using the LANL particle flux data, we have done an intensive examination on how the geosynchronous particle flux in the energy range of tens to hundreds of keV responds to a sudden increase in the solar wind dynamic pressure. We find significant differences in the flux response between different conditions of the accompanied IMF (interplanetary magnetic field). When the IMF remains northward at and prior to the time of the pressure increase, the most common type of the flux response we find is a simple dispersionless increase simultaneously at all availbale MLT positions. However we also find a significant number of events where the flux response is a decrease or virtually no notable change at all. Also, for this northward IMF condition, we find no notable differences in the flux response between protons and electrons. When the accompanied IMF is weakly southward, the flux response to the pressure increase is very similar to that in the case of the northward IMF. However, as the IMF becomes further southward, the flux response becomes more complex. When the IMF remains strongly southward at and prior to the pressure increase, we find a number of events where the flux change is characterized by a combination of global dispersionless increases (or decreases sometimes) and substorm-like injections. The substorm-like injection is often found to occur even near duskside (sometimes late afternoon) sectors. This is more easily seen in the change of proton flux. We will discuss how our result is different from typical substorm injections and and substorm injections under strongly south IMF condition.