2017/09/8-16 のストームイベント中に観測された長寿命の 2 つピークのリングカレント帯プラズマ圧構造

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Long-lasting double-peak structure of ring current pressure during the 8-16 September 2017 storm

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We report long-lasting double-peak structures of ring current pressure during the 8-16 September 2017 storm event using ion measurements by the Arase satellite in the premidnight sector and the Van Allen Probe B satellite in the noon sector. We found two types of double peak structures: one was shown in the late recovery phase of the first strong storm starting on September 8, 2017 and the other was shown after the subsequent weaker storm starting on September 13, 2017. The inner peak of both events was created at L∗˜3 in both noon and premidnight sectors after the first storm onset, and mainly composed of protons with energy up to 80 keV. This peak lasted for about a week and slowly decayed with a time constant of ˜4 days, which is consistent with a charge exchange lifetime. For the first double-peak event, the outer peak observed by Arase at L∗˜5.5 consisted of protons with energy less than 80 keV. The double peak structure lasted for two days, and there were multiple small-scale injections associated with substorms in the interval. The pileup of remnants of these injections probably maintained the outer peak. On the other hand, Probe B in the noon sector did not observe the corresponding outer peak. For the second double-peak event, the outer peak was observed by Arase at L∗˜4.5 for 1.5 days, and the peak-like bump was observed also by Probe B at the same L∗. The outer peak consisted of protons with the energy range of less than 200 keV provided by the injection associated with the subsequent weaker storm onset. We suggest that a condition of the long-lasting double-peak pressure structure is that weaker injections occur after a strong injection (or convection) that creates the pressure peak consisting of the high-energy protons in the deep inner magnetosphere. We will further investigate the relationship between the pressure structure and field-aligned currents.