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Multipoint observations of the spatial distribution and temporal evolution of the "Nose-like" structures in the inner magnetosphere

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The "Nose-like" ion spectral structures are formed by ions in the near-Earth plasma sheet penetrating into the inner magnetosphere. Many studies had shown that the distribution of the Nose structures was controlled by the large-scale convection electric field, gradient-curvature drift and corotation electric field in the inner magnetosphere during geomagnetic quiet condition. However, during geomagnetic active periods, especially during the storms and substorms, the spatial and temporal characteristics and formation mechanism of different ions are still under debate. In this study, joint observations from Van Allen Probes, THEMIS, and Cluster will be used to statistically study the spatial distribution and temporal evolution of the "Nose-like" ion spectral structures in the inner magnetosphere. Backward tracing method based on Weimer 96 electric field and dipole magnetic field model was applied to simulate the ion structures and compared to the observations. The results show some important characteristics of the ion structures and will help us understand the injection mechanism of the ions from the plasma sheet into the inner magnetosphere and the relation between the storm and substorm, and thus provide important information for ring current formation.