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Investigation of plasmaspheric plumes observed by Cluster

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Plasmaspheric plumes are frequently observed in the inner magnetosphere. When the geomagnetic activity increases, part of the plasma inside the main body of the plasmasphere is flowing outward. After the geomagnetic activity decreases, a plasmaspheric plume remains. It corotates with the Earth. Even though certain features of plasmaspheric plumes have been revealed, there are still questions on the underlying physics about how the plume is generated and how it evolves. In order to investigate these questions, we examine two topics using data measured by instruments onboard the multi-spacecraft mission Cluster. The first topic is: statistical characteristics of plumes, with in particular analysis of the convection velocity. The motion of and fluxes in plumes are investigated in terms of their dependence on interplanetary and geomagnetic parameters. The second topic is: small-scale structures and waves inside the plume. We investigate some of these regarding their origin and wave modes. We are interested in the relation between large-scale and small-scale structures.