

Contribution ID: **83** Type: **Poster**

Electron Flux Variations Associated with Plasmaspheric Plumes and Hiss Waves under Different Solar Wind Conditions

Monday, August 17, 2026 11:00 AM (10 minutes)

The variation of electron flux in the energy range from 0.015 to 51.768 keV is analyzed in association with the occurrence of plasmaspheric plumes under different solar wind conditions. During the formation of these structures, regions of enhanced plasma density extend to higher L-shell values, allowing the propagation of whistler-plume waves. The observed flux variations may be associated with wave–particle interaction processes occurring in these regions, suggesting interaction between hiss waves and the low-energy electron population of the plasmasphere. In this work, two distinct periods are analyzed: a geomagnetically quiet interval on 2015-08-04/05 and a disturbed interval during the arrival of an ICME on 2015-03-01. During the quiet period, in the presence of a plasmaspheric plume and whistler-plume waves, a decrease in electron flux is observed in the energy range from 0.043 to 0.140 keV, followed by a rapid enhancement after the plume passage. In the higher-energy channels, between 27.153 and 41.749 keV, an increase in electron flux is observed during the plume occurrence; however, this enhancement does not begin at the exact onset of the plume and decreases before the plume ends, with flux levels increasing again after the plume passage. During the disturbed interval associated with the ICME, electrons in the energy range from 0.526 to 1.047 keV exhibit an enhancement during the occurrence of the plume and the presence of whistler-plume waves, reaching a maximum peak followed by a gradual decrease. In contrast, lower-energy electrons around 0.067 keV and higher-energy electrons above 4.147 keV remain relatively stable throughout the event. These results indicate that plasmaspheric plumes associated with whistler-plume waves may contribute to distinct electron flux responses under different solar wind conditions, particularly within low-energy electron populations in the plasmasphere.

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Session Classification: Poster Session

Track Classification: Machine Learning and AI: Heliophysics & Space Weather