Investigation of small-scale electron density perturbations observed by the ARASE satellite near the plasmapause: Initial Results

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The region of the Earth's inner magnetosphere, which constitutes a torus of the cold (low energy ˜1-10 electron volt (eV)), dense (10-10^4 cm^{-3}) plasma, trapped to the Earth's magnetic and gravitational field is called plasmasphere. The outer boundary of the plasmasphere termed, plasmapause, separates this dense, cold plasma population in the inner magnetosphere from highly energized, low density plasma of the outer region. Plasmapause is often complicated by the presence of various density structures and can affect the propagation characteristics of different plasma waves such as electromagnetic ion cyclotron waves (EMIC), Extreme/Very Low frequency (ELF/VLF) chorus waves etc. The observations from recently deployed Japanese satellite mission ERG (Exploration of energization and Radiation in Geospace, also known as ARASE) have revealed the occurrence of several small scale density perturbations near the plasmapause location. These density variations often observed in the ARASE observations were less investigated and therefore have not been addressed yet. The present study investigates these small scale density perturbations in detail by probing the electron density data with 1-minute resolution together with 8-sec vector magnetic field measurements from ARASE satellite. The electron density data is obtained from the High Frequency Analyzer (HFA) onboard ARASE, which measures the upper hybrid resonance (UHR) frequency of the plasma in the frequency range between 10 kHz to 10 MHz together with Onboard Frequency Analyzer (OFA), for UHR frequency less than 20 kHz. We have investigated three months of data from April - June 2017 to understand the characteristics of these density perturbations, i.e., their occurrence rate, scale size, location with respect to plasmapause, and dependence on geomagnetic conditions. A preliminary analysis indicates that the occurrence of these density perturbations increases with increasing radial distances from L=3 to 6. In the presentation we will show several case studies together with the statistical results and will discuss the results in the light of possible source mechanisms responsible for their origin.