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Time of flight dispersed and repetitive ion structures in the diffuse auroral zone originating from 1-2 Re altitudes

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The AMBRE experiment onboard the ocean topography mapper JASON-3 aims at measuring auroral particle precipitation using two top-hat analyzers for electrons and ions in the 20 eV-28 keV energy range. The JASON-3 spacecraft that has a nearly circular orbit at an altitude of 1336 km with an inclination of 66° , at times probes the equatorward part of the auroral oval in a nearly tangentially manner upon leaving the outer radiation belt. In this region of space, during periods of enhanced geomagnetic activity with small or moderate storms, AMBRE detected recurrent ion bands/micro-injections with energies in the 200 eV-28 keV range and which exhibit clear time of flight dispersions. Ray tracing using single trajectory computations suggests that these ions are launched from a source located in the 8000-12000 km altitudinal range and subsequently propagate downward toward the ionosphere. More radial orbits show that the ion bands are detected inside the diffuse auroral zone up to the encounter of auroral arcs. Such observations of dispersed downflowing ions are new and we argue that these structures are produced by localized wave-particle interactions.