

## Multi-satellite observations of wave evolution from chorus to HISS

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Whistler-mode chorus waves and HISS are suggested to play key roles in particle acceleration and loss processes in Earth's radiation belts. Full particle computer simulations presented the generation of rising-tone elements of chorus and HISS near the magnetic equator in a dipole-like field, which has been well described by nonlinear wave growth theory. On the other hand, chorus propagated coherently outside plasmasphere can also be the origin of HISS. Recently, Magnetospheric Multiscale mission and Van Allen Probes provide unprecedented opportunity to uncover the nonlinear behavior and connections of these two important waves. In this presentation, we propose a very good event of multiple satellite observations from MMS and VAP to present the temporal and spatial variation of coherent rising tone elements of chorus and HISS in magnetopause. High-resolution wave, particle and field measurements are used here to show the evolution between these two waves near the plasmapause. The results have been compared with theoretical calculations and strongly suggest that nonlinear theory is important in controlling electron physics in radiation belts.

Keywords: Earth's radiation belts, Whistler-mode chorus waves, HISS