

Interdisciplinary study of space plasma waves in solar terrestrial environments

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Waves in space plasmas play important roles in dynamics variation of the Earth's radiation belts. Whistler-mode chorus emissions excited by several tens of keV electrons can acceleration a small fraction of the energetic electrons to MeV energy range, contributing to formation of radiation belts. Electromagnetic ion cyclotron (EMIC) rising-tone emissions, on the other hand, can scatter relativistic electrons effectively, and induce precipitation into the polar atmosphere. The precipitated MeV electrons can penetrate deep into the middle atmosphere, and they may affect the atmospheric chemistry. Thus these nonlinear plasma wave emissions in the magnetosphere connect the variation of solar activity and that of the atmospheric compositions. The variations in the past could also be detected in ice core samples. The ERG satellite for observation of wave-particle interactions in geospace is being developed under close collaboration of the STE laboratory and other research institutes and universities. Through the reorganization of the related research institute at Nagoya University, we expect promotion of the interdisciplinary studies related to the radiation belts and relativistic electron precipitation into the atmosphere.

Keywords: plasma waves, magnetosphere, radiation belts, relativistic electrons, middle atmosphere, nonlinear process