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プラズマ圏のモデリング
Modeling the Plasmasphere

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Satellite observations have revealed that ions are heated in the ionospheric polar region and are flowing to the magnetosphere. The fluxes of H+, He+, and O+ are ˜1011 ions m-2 s-1, ˜1011 ions m-2 s-1, ˜1010 ions m-2 s-1, ˜1010 ions m-2 s-1 during the solar maximum and ˜1010 ions m-2 s-1, ˜109 ions m-2 s-1, ˜109 ions m-2 s-1 near the solar minimum condition, respectively, from Akebono satellite observations. The large amount of ions, including heavy ions such as O+, may affect the structure and dynamics of plasmasphere and inner magnetosphere. The ions are formed often as conics / transversely accelerated ion in the topside polar ionosphere. To understand the refilling process, the refilling time scale and the effects to the structure and dynamics of plasmasphere and inner magnetosphere, we have developed a three dimensional model of Atmosphere ? Plasmasphere including Electrodynamics (APE model). The model calculates densities, velocities and temperatures for electron, O2+, N2+, NO+, O+, He+ and H+ at altitudes from 90 km to 10 Re and for N2, O2, O, He and H in the thermosphere, and electric fields in the ionosphere, plasmasphere and inner magnetosphere. We calculate also parallel and perpendicular components of ion and electron temperatures to include the effect of perpendicular heating of ion in the polar ionosphere. The results show clearly the structure of plasmasphere which is affected by the magnetic disturbance. The structure of plasmasphere, the refilling time and the response to the magnetic disturbance vary depending on the ion species.

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