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Acceleration of the oxygen and protons in the terrestrial magnetosphere

E. Kronberg (1), S. E. Haaland (1,2), P.W. Daly (1), E. E. Grigorenko (3), M. Fränz (1), L. M. Kistler (4), and I. Dandouras (5)

(1) Max-Planck Institut für Sonnensystemforschung, Katlenburg-Lindau, Germany (kronberg@mps.mpg.de), (2) Department of Physics and Technology, University of Bergen, Norway (stein.haaland@ift.uib.no), (3) Space Research Institute, Russian Academy of Sciences, Moscow, Russia (elenagrigorenko2003@yahoo.com), (4) University of New Hampshire, Durham, NH, USA (Lynn.Kistler@unh.edu), (5) IRAP, University of Toulouse/CNRS, Toulouse, France (Iannis.Dandouras@irap.omp.eu)

The composition of ions plays a crucial role for fundamental plasma properties in the terrestrial magnetosphere. We investigate the oxygen and proton abundances in the Earth's magnetosphere at radial distances from 6 to 10 Re. The results are based on 7 years of ion flux measurements in the energy range $\sim$10 keV to $\sim$1 MeV from the RAPID and CIS instruments on board the Cluster satellites. We found that (1) Magnetic storms are more effective in production of the oxygen than magnetic substorms; (2) The oxygen intensity dominates for the >274 keV ions during magnetic storms and southward IMF; (3) The $\sim$10 keV protons do not show significant spatial asymmetries and dependences on the geomagnetic and solar wind conditions, although oxygen does. Therefore, the acceleration mechanisms of these two species are different. (4) The acceleration processes in this part of the magnetosphere are energy-dependent, as the O+/H+ ratio behaves differently at energies about 10 keV and >274 keV.