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Energy dependence of the Jovian ion abundance ratios

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Galileo, as the first orbiting spacecraft around Jupiter, provides the opportunity to study globally the plasma composition of the Jovian magnetosphere. Analyzing data from the Energetic Particles Detector onboard Galileo, we study the relative ion abundance ratios of S/O, S/He, O/He and H/He at various energy/nucleon. A strong energy dependence of the ratios relative to helium is observed in contrast to a minor one for S/O, which points to a common source of sulphur and oxygen ions. A change in the ion spectral shape (spectral kink) from a harder to a softer one is present at energies of several 100 keV/nucleon for all species, most pronounced for helium which explains the observed energy dependence of the ratios relative to helium. The energy of the spectral kink exhibits a species and radial dependence. Combination of different charge states ion distributions as well as various acceleration mechanisms are investigated as possible explanations.