Estimates of Europa's Jovian magnetospheric ion-induced energy flux

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The Jovian Europa is now unquestionably regarded both as an ocean satellite and as an X-ray emitter. The Chandra X-ray Observatory (CXO) has detected soft X-ray emissions from the Europa, and the magnetometer experiment of the Galileo flyby detected induced magnetic signatures that convincingly revealed the existence of a water ice-liquid outer layer about 100 to 200 kilometers thick beneath its icy crust of average thickness ≈ 25 km. Resurfacing brings the subsurface oceanic material to the surface. In the predominant water-ice composition of the Europa's regolith also accumulate materials through asteroidal, cometary, micro-meteoric, meteoritic impact, and those ejected from the inner volcanic Io. The atmosphere being tenuous, probable sources initiating surface energetics leading to X-ray emission on the Europa are the solar photons, and to a great extent the Jovian magnetospheric charged-particles.

By taking into account energetic photon and particle populations, we developed a model to explain the generation mechanisms of X-rays from the Europa. This is achieved by taking into account the surface composition of the regolith to model the subsequent photon and particle-induced surface energetic process leading to the generation of X-ray emission. The energetic photons under consideration is solar coronal X-ray photons, and the Jovian magnetospheric H^+, O^+ and S^+ ions are the particles. On the basis of Galileo's Near-Infrared Mapping Spectrometer (NIMS) spectra, foremost, we took into account representative models of surface composition depicting an endogenic source, an exogenic source and a general scenario of accumulated material on the regolith. The subsurface ocean of the Europa is taken as endogenic source, the composition formed out of the deposition to the surface of the interplanetary extra-terrestrial materials is regarded as exogenic source. Subsequently, we computed energy flux (erg cm^{-2} s^{-1}) at the telescope of CXO and emitted power (MW) from its regolith due to solar coronal X-ray photons and Jovian H^+, O^+ and S^+ ion-induced process from Europa's representative models of surface composition. Comparative estimates of the results of model calculations with CXO's reported values will be presented.