

Aurora phenomena in the Jupiter system

Lorenz Roth

South-West Research Institute, Texas, USA

e-mail: lorenz.roth@swri.org

A variety of interesting aurora phenomena occur in Jupiter's huge and powerful magnetosphere, which results from planet's strong magnetic field, its fast rotation and an extensive plasma source. The planet itself has the most energetic and brightest aurora in the Solar System and aurora signals have been observed from X-ray to radio emissions. Unlike at Earth, Jupiter's continuously present main ovals are almost independent of solar wind conditions, but are triggered by inner-magnetospheric processes. Besides the continuous emissions, spatially confined auroral spots have been found to correspond with the locations of Jupiter's large moons Io, Europa, Ganymede and Callisto. Currents originating from the moons are mapped along the magnetic field into Jupiter's upper atmosphere, where they generate these so-called auroral footprints. Interestingly, observable auroral emissions are also triggered in the moons' tenuous gas envelopes enabling studies of their environments and interiors with Earth-bound aurora observations. Aurora images by the Hubble Space Telescope recently provided first signs of water vapor plumes on Europa. The discovered plume activity might provide the unique possibility to sample Europa's potentially habitable subsurface ocean during spacecraft flybys.