EPSC Abstracts
Vol. 10, EPSC2015-822, 2015
European Planetary Science Congress 2015

Space weather phenomena at Galilean moons and comets (invited)

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Abstract

The exploration of planetary environments other than Earth has led to the definition of planetary space weather. We will mainly focus on the impact of the solar UV radiation which is responsible for the photoionization and photodissociation processes within planetary and cometary atmospheres. Those studies are of primary importance especially in the framework of the JUICE and ROSETTA missions.

A 1-D model has been developed in order to infer airglow emissions from Europa and Ganymede, from neutral atmospheric models. Considering various production and loss mechanisms, we estimate red and green line emission for atomic oxygen. The impact of precipitating particles has also been studied in order to estimate auroral emission, for the oxygen lines at 130.5 and 135.5 nm using radiative transfer modelling. Comparison with observations such as in situ measurements from Galileo, or remote observations from the Hubble Space Telescope, shows a good agreement that ensures us to provide reasonable constraints for the JUICE mission.

Modelling of the impact of the solar UV flux has also been done regarding cometary atmospheres, using in-situ measurement from the DFMS/ROSINA spectrometer onboard the ROSETTA spacecraft. Airglow emissions for the red line at 630 nm have then been estimated, considering various volatiles within the coma such as water, CO, and CO_2.