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Solar UV variability impact on airglow emissions from comets and Galilean moons

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Planetary space weather research has started with the exploration of planetary environments other than the Earth. Regarding the current and futures solar system missions, this is today a growing research area of interest. We are looking here at the impact of the solar UV variability from sporadic events such as solar flares to long-term variability with the 11-year solar cycle on the airglow emissions from comets and Galilean moons such as Europa, especially the oxygen line emissions in the UV and the visible. Those bodies do share similar atmospheric volatiles such as the molecular oxygen, although its origin is different. Using the results from the Rosetta mission, we have developed a 2D transport-photochemistry-emission coupled model for estimating the forbidden oxygen lines airglow emissions at 630 and 557.7 nm and their ratio. Since both cross sections and solar UV variability are wavelength-dependent, the solar activity levels play here an important role. Regarding Europa and within the context of ESA JUICE and NASA Europa Clipper missions, we will estimate the oxygen line emission in the UV (at 135.6 nm) and the visible using a 3D Electron-excitation-transport-emission coupled model. The electronic precipitations are clearly the main contributor to those emissions. However, the solar UV variability could still have a minor influence which then limits the precision of the neutral atmospheric models. Both examples show how important solar activity levels have to be characterized within the planetary space weather context.