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Space weather issues for the Aurora programme

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Space Weather is pervasive throughout the solar system and thus will be an important technical constraint on the design and operation of Aurora missions, as it is for near-Earth missions. However, the impact of space weather will vary from location to location, e.g. Mars orbiters do not encounter radiation belts but are much more exposed to solar proton storms. There is a need to characterise the space weather effects expected at various locations (including by landers) and, in particular, to identify open areas where space weather studies are needed for better support of Aurora mission design and operations. Simple extrapolation of space weather effects from Earth is unwise because the near-Earth space environment has properties that are atypical in the solar system, e.g. the pre-dominance of oxygen in the composition of the upper atmosphere. Some space weather characterisation is already taking place as part of the Aurora preparatory activites, e.g. modelling of radiation environment for interplanetary flight. But broader activities are needed including (1) understanding of space weather effects in planetary upper atmospheres, e.g. spacecraft drag and ionospheric effects on radio propagation, and (2) developing methods to monitor and predict solar activity as experienced at other planets. The latter includes (a) understanding the phase delays between activity experienced at Earth and at other planets, and (b) monitoring farside solar activity (e.g. through refinements of methods pioneered on SOHO) so that we have warning of its impact on planets when they are on the farside as seen from Earth.