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On the magnetosphere-ionosphere coupling during the May 2021 Geomagnetic storm.

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On May 12, 2021 the interplanetary counterpart of the May 9, 2021 coronal mass ejection impacted the Earth's magnetosphere, giving rise to a strong geomagnetic storm. This work discusses the evolution of the various events linking the solar activity to the Earth's ionosphere with special focus on the effects observed in the circumterrestrial environment. We investigate the propagation of the interplanetary coronal mass ejection and its interaction with the magnetosphere - ionosphere system in terms of both magnetospheric current systems and particle redistribution, by jointly analysing data from interplanetary, magnetospheric, and low Earth orbiting satellites. The principal magnetospheric current system activated during the different phases of the geomagnetic storm is correctly identified through the direct comparison between geosynchronous orbit observations and model predictions. From the particle point of view, we have found that the primary impact of the storm development is a net and rapid loss of relativistic electrons from the entire outer radiation belt. Our analysis shows no evidence for any short-term recovery to pre-storm levels during the days following the main phase. Storm effects also included a small Forbush decrease driven by the interplay between the interplanetary shock and subsequent magnetic cloud arrival.