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Development of the Canadian Ionosphere and Atmosphere Model

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Current status of the Canadian Ionosphere and Atmosphere Model (C-IAM) project is described. The C-IAM has been composed from two pre-existing first principles models: the extended Canadian Middle Atmosphere (CMAM) and the ionospheric part of the Upper Atmosphere Model (UAM). The model domain extends from the surface to the inner magnetosphere and two-way coupling between the neutral atmosphere and ionosphere is implemented. These features make the C-IAM a self-consistent whole atmosphere model that is capable of studying both the impact of the lower atmosphere on the thermosphere and the ionosphere and the impact of geomagnetic conditions on the neutral atmosphere. In addition to the first principles modelling blocks, the C-IAM includes alternative empirical models (e.g., MSISE) which can optionally be used for specific studies. In order to reproduce the response to specific space weather events, the model has an option to accommodate the real (observed) high-latitudinal electric field and auroral energetic electron distribution. The C-IAM has been successfully applied to reproducing a number of observed thermospheric/ionospheric features. These include simulating the wave number 4 features observed in the nighttime O ionospheric emission at 135.6 nm, modeling the 732 nm O+ daytime emission and retrieving from it the atomic oxygen concentration, and explaining disturbances measured by the GOCE satellite accelerometers over high latitudes during geomagnetically active days. The presentation will introduce the model and describe these results.

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