RSPP seminars

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Met Office

"Towards Coupled Space Weather Models: extending the Met Office weather and climate model into the thermosphere"

The Met Office Space Weather Operations Centre (MOSWOC) has been running a 24/7 service for over 4 years and during this time the range and quantity of space weather models it runs has steadily increased. This includes new models to forecast the radiation belts and the aurora and the development of an ensemble prediction system for solar wind and coronal mass ejections. These MOSWOC developments, and planned future developments, shall be summarised.

These models are the building blocks for an eventual coupled to Sun to Earth model forecast system. Another important part of this system is a model that connects the lower and middle atmosphere with the thermosphere and ionosphere. While the thermosphere and ionosphere are largely driven from above, recent research has shown that the coupling between this region and the lower atmosphere is also important. For example, non-migrating tides forced in the tropical troposphere have been linked to variations in the ionospheric F region. In addition, solar energetic particles and variations in solar radiation can affect the stratosphere and any resultant interactions with the troposphere can have implications for seasonal to decadal forecasting.

The second part of this talk focuses on the development of a "whole atmosphere" model (spanning the neutral atmosphere from the Earth's surface to the top of the thermosphere), which would be able to represent the coupling between different atmospheric levels in a self-consistent manner. The basis of this model is the Unified Model (UM), which is the Met Office weather and climate model. The UM currently has an upper boundary near 85 km altitude, but its dynamical setup makes it potentially very well suited to the thermosphere. Since developing a whole atmosphere UM is a huge task, initial steps largely focus on an extended UM with an upper boundary around 120-170 km. In this presentation, work on assessing and developing the UM dynamics to make it more robust
in the thermosphere is presented, together with initial assessment of a 100 km upper version of the UM. Further work to develop thermospheric neutral and ion chemistry, and new model radiation schemes, will be described, as will the Met Office's role in the Horizon 2020 project SWAMI, where the aim is to produce a quick to use whole atmosphere model for satellite users.

Wednesday, November 14th at 2 pm in Physics LTD