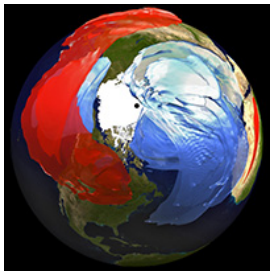

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Chemical, radiative and dynamics interactions in the stratosphere using a hierarchy of models

Tuesday, 19 November 2019 17:30 (30 minutes)

A key region of the stratosphere is the tropical tropopause layer (TTL) – the main entry region of air from the troposphere to the stratosphere. Temperatures at the cold point in this region modulated the concentrations of stratospheric water vapour. The strength of the upwelling in this region affects the transport of chemical tracers across the tropopause. These factors determine composition and chemistry in the stratosphere, and subsequent the radiative impact on the troposphere. The TTL is a complex system where the properties are determined by radiative, dynamical and chemical interactions. In the presentation, we will examine, using ERA-Interim reanalysis data, the processes in the TTL on various timescales and their effect on the rest of the atmosphere. An important aspect of the TTL is how radiative changes arising from ozone and water vapour changes affect the circulation. By analysing the momentum and thermodynamics balances, we will describe the feedbacks occurring in the TTL both in the steady state, seasonal cycle and interannual variations. We will estimating the upwelling in the TTL from the wave torques by imposing it as a forcing in the zonally symmetric dynamical equations, linearised about the annual mean state and with a linearised radiation scheme. This calculation forms part of a hierarchy of model calculations that will allow the different interactions to be separated. These calculations will also be used to understand the impacts of composition changes arising from chemical processes.

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