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The role of the stratosphere in understanding future climate change

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Over the last two decades a growing body of literature has shown that stratospheric processes play a key role for near- and long-term projections of surface climate under different scenarios for anthropogenic and natural forcings. The effect of the stratosphere on surface climate change occurs through two main interconnected pathways: 1) stratosphere-troposphere dynamical coupling; 2) radiative feedbacks predominantly through changes to stratospheric composition. This talk will give some examples of both of these pathways relevant to climate change in the northern and southern hemispheres. Topics will include the role of the strength of the polar vortices for midlatitude circulation change, the stratospheric water vapour feedback and ozone-climate coupling. Two further factors will be discussed that affect how stratospheric processes contribute to surface climate projections: 1) the role of the annual cycle and 2) model biases. In conclusion some thoughts on key future research questions will be offered.