

## **Linking mesospheric coolings and stratospheric warmings**

Christoph Zülicke<sup>1</sup> and Vivien Matthias<sup>1</sup>

<sup>1</sup>*Leibniz Institute of Atmospheric Research, Kühlungsborn, Germany*

Sudden stratospheric warmings are often accompanied by mesospheric coolings. We analyse this link in 11 years of Aura-MLS data containing 7 major warmings. 5 of these events show a mesospheric cooling. Following the hypothesis that gravity waves realize the link between stratosphere and mesosphere we construct a process model. It includes the spatial structure of the stratospheric planetary wave field which modulates the upward propagating gravity waves. The resulting mesospheric zonal-mean response is influenced by the planetary wave amplitude and the zonal and vertical wavenumber. In the observations, the vertical structure of the stratospheric zonal-mean zonal wind is most important: only deep stratospheric easterlies provide a proper gravity wave guide.