Geophysical Research Abstracts
Vol. 16, EGU2014-15620, 2014
EGU General Assembly 2014

Quantifying the radiative spring in the tropical lower stratosphere

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Strong interactions between dynamics, chemistry and radiation present considerable challenges for understanding the seasonal cycle of temperatures in the tropical lower stratosphere, as well as changes to this cycle under projected increases in long-lived greenhouse gases over the next century. To understand these interactions, it is useful to find simple, but quantitatively meaningful models of these components and their interactions. Radiative heating can, to some degree of quantitative accuracy, be approximated as a linear, local relaxation towards a reference temperature state. We attempt to quantify this radiative 'spring' in the tropical lower stratosphere, in addition to non-relaxational effects, using a combination of comprehensive chemistry-climate model simulations, a regression methodology, and offline radiative transfer calculations. We furthermore test this quantification against simulated changes in the tropical seasonal cycle over the coming century from the comprehensive model.