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The Stratosphere-Troposphere connection explored by Singular Vectors

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In order to get insight in the instability mechanisms in the stratosphere and the dynamical processes that play a role in the interaction between the stratosphere and troposphere, we have calculated and studied stratospheric singular vectors (SV's). To that end we have used a recent version of the ECMWF model with 60 levels in the vertical and the top level at 0.1 hPa.

We will discuss the results we have obtained for two experimental set-ups. For both set-ups, the SV's are located in the low stratosphere (between 10 and 100 hPa) at initial time. In the first set-up the SV's remain in the stratosphere (above 100 hPa), while in the other set-up SV's are forced to propagate downward to the low troposphere (below 500 hPa). The properties of both types of SV's will be discussed in terms of amplification, preferable geographical position, possible mechanism for perturbation growth, and their relation with tropospheric SV's. Also the impact of a stratospheric sudden warming on the stratospheric SV properties will be considered.