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Tropospheric singular vector growth due to stratospheric perturbations: mechanisms and impact

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The aim of this study is to produce a basic understanding of the impact that lower-stratospheric perturbations (singular vectors), can have on the lower troposphere and to study the mechanisms that are responsible for this growth. Calculations of these stratosphere-to-troposphere singular vectors are performed using the European Centre for Medium-Range Weather Forecast model. Potential vorticity diagnostics are used to analyse the dynamical processes responsible for the singular vector growth of this type of SV's. From our results we conclude that these stratosphere-to-troposphere SV's make use of the same growth mechanisms, unshielding and normal mode coupling, as tropospheric singular vectors. It takes more or less five days before baroclinic growth mechanisms become important.