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The implications of TTL transport processes for trace gas delivery to the stratosphere

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Understanding the transport and chemical processes within the TTL region is vital for determining stratospheric budgets of various biogeochemical cycles as well as ozone depleting trace gases. Using lagrangian back-trajectories driven by clear-sky, all-sky and total radiative heating rates from ERA-Interim, the transport processes through the TTL are investigated. This includes washout processes due to ice sedimentation. The impact that convective injections of boundary layer and free tropospheric air using the ERA-Interim detrainment rates is included and the consequences for trace-gas concentrations is considered. We illustrate the implications for the stratospheric bromine budget. We also describe and apply a microphysical box model along the trajectories and the implications for stratospheric water vapour are discussed.