Water vapour is the strongest greenhouse gas and although stratospheric concentrations are very low, they play a key role in lower stratospheric ozone destruction and radiative balance at the Earth’s surface. Here we present a detailed study of the dehydration processes through the tropical tropopause layer combined with convective influence using a microphysical model combined with Lagrangian transport to accurately capture the air parcel’s temperature history. Aerosol formation via binary, ternary and ionic nucleation processes are included, ice formation via homogeneous and heterogeneous nucleation of existing aerosol, growth/evaporation (sublimation), coagulation, and sedimentation processes are included. Convective detrainment into the Lagrangian advected airmasses using ERA-Interim detrainment rates is also considered. The seasonality of the stratospheric water vapour at 400K is reproduced and the sensitivity to convectively delivered sulfur is discussed.