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How much does new particle formation near the tropical tropopause contribute to stratospheric aerosol number concentration?

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Nucleation of ultrafine aerosols near the tropical tropopause, followed by transport throughout the stratosphere by the Brewer-Dobson circulation, is thought to be the primary source of stratospheric aerosol number concentration. However, depending on how rapidly the aerosols grow by condensation, many of the ultrafine particles generated by new particle formation (NPF) may be lost due to coagulation with accumulation-mode aerosols. In this study, we use recent high-altitude aircraft measurements of aerosol size distribution, along with microphysical calculations, to investigate this issue. Initial ultrafine and accumulation-mode size distributions are specified based on the aircraft measurements, and a bin microphysics model is used to simulate the evolution of the aerosol size distributions. Coagulation and condensation of gases such as sulfuric acid, ammonia, and nitric acid are included. Preliminary results indicate that for typical conditions, most of the ultrafine aerosols generated by NPF are removed by coagulation, resulting in a relatively small contribution to the total aerosol number concentration. We have used the model to investigate the sensitivities of total number concentration evolution to aerosol size distributions and condensation rates.