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Comparison of model and measurements derived age spectra in the UTLS

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Mean age of stratospheric air can be derived from observations of sufficiently long-lived trace gases with approximately linear trends in the troposphere. Mean age is the first moment of the transit time distribution of a passive tracer. This transit time distribution, also called the age spectrum, describes the probability of different transit times to reach a certain point in the stratosphere. As individual fluid elements get irreversibly mixed during the transport in the stratosphere the age spectrum is not directly observable. It has been shown by Ehhalt et al. (2007) and Schoeberl et al. (2005), that under certain assumptions some information on the age spectra can be deduced from tracers with chemical loss, especially when using tracers with different lifetimes.
We show observations of a range of trace gases with different lifetimes from the PGS (POLSTRACC/GW-LCycle/SALSA) campaign conducted during Arctic winter 2015/2016 with the HALO aircraft. We have used the observations to deduce age spectra using the method described by Ehhalt et al. (2007). We present a comparison of the observations derived spectra with age spectra calculated from pulse-experiments using the CLaMS model. We also present and discuss the age spectra and the mean age derived from observations of SF6.