

# Reference PSC data record and climatology based on CALIOP, MLS, and MIPAS observations

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After more than three decades of research, the role of polar stratospheric clouds (PSCs) in stratospheric ozone depletion is well established. However, important questions remain unanswered that have limited our understanding of PSC processes and how to accurately represent them in global models, calling into question our prognostic capabilities for future ozone loss in a changing climate. A more complete picture of PSC processes on vortex-wide scales has emerged from a suite of contemporary satellite missions: the Michelson Interferometer for Passive Atmospheric Sounding (MIPAS) on Envisat (2002-2012), the Microwave Limb Sounder (MLS) on Aura (2004-present), and the Cloud-Aerosol Lidar with Orthogonal Polarization (CALIOP) on CALIPSO (2006-present). These datasets are the foundation of the recent SPARC Polar Stratospheric Cloud initiative (PSCi) to develop a state-of-the-art reference PSC data record and climatology. In this presentation, we will provide an overview of these datasets and PSC climatologies which represent the first observational-based records of PSC occurrence and composition on vortex-wide spatial scales covering decadal time scales. In addition we present climatologies of the bulk particle microphysical quantities surface area density and volume density derived from CALIOP and MIPAS which are useful for comparison with in situ particle measurements and to test parameterizations of the chemical and radiative effects of particles in current and future theoretical models. Finally, we will compare the post-Pinatubo CALIOP PSC and aerosol data record with the 1979-1989 SAM II solar occultation PSC record to investigate possible long-term variability in PSC occurrence.

Key words: PSCs, ozone, CALIOP, MIPAS, MLS