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CALIPSO Observations of PSCs and Cirrus During the 2015-2016 Arctic Winter

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The POLSTRACC (POlar STRAtosphere in a Changing Climate) field campaign was conducted in the Arctic during December 2015 - March 2016 to investigate the chemical, microphysical, and dynamical processes of the Arctic lowermost stratosphere and upper troposphere. The primary measurement platform for POLSTRACC was the German HALO (High Altitude LOng range) research aircraft carrying a large suite of in situ and remote sensing instruments to measure key chemical species, tracers, as well as aerosol and cloud particles and meteorological parameters. Two primary science objectives of POLSTRACC are to improve our understanding of polar stratospheric cloud (PSC) particle characteristics and formation processes and investigate the impact of Arctic cirrus clouds on radiative forcing and chlorine activation. To complement the more focused measurements from the POLSTRACC field campaign, we have used spaceborne lidar measurements from CALIPSO to characterize PSC occurrence and composition, as well as the occurrence of Arctic cirrus during the 2015-2016 season on vortex-wide scales. In this paper, we present a general overview of the 2015-2016 winter, examine in detail the evolution of PSCs and cirrus during the season, and explore the unique aspects of this season in attempt to understand the underlying physical mechanisms.