

MPLNET Measurements of Polar Stratospheric Clouds at the South Pole in 2007

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A NASA Micropulse Lidar Network instrument (MPLNET; 0.523 μm) collects full-time measurements of clouds and aerosols from the NOAA ESRL Atmospheric Research Observatory at the Amundsen-Scott South Pole Station (89.98° S, 24.80° W, 2.835 km M.S.L.). In this talk, we describe polar stratospheric cloud (PSC) observations made during the recent 2007 season. PSC are ubiquitous at the South Pole from late-May through August, where climatological temperatures are coldest and most persistent of any point within the winter polar vortex. Their role in promoting catalytic ozone-loss chemistry in spring is well-known. PSC seasonal occurrence, including particle phase and composition, their vertical distribution and denitrification processes remain lingering aspects of the Ozone Hole paradigm that need reconciling so as to improve and validate numerical simulations of yearly ozone losses. Full-time MPLNET measurements, supplemented by on-site ozonesonde thermal and chemical profiles, are being processed to provide seasonal depictions of PSC macrophysical and thermodynamic structure. These data supplement satellite coverage of PSC and chemical concentrations near the Pole that are limited over the Antarctic Plateau by orbital tracks. We describe the 2007 dataset in relation to previous seasons (2000 and 2003-2006), highlight trends involving the relationship between PSC occurrence and ozone loss and introduce new data products available in May 2008.

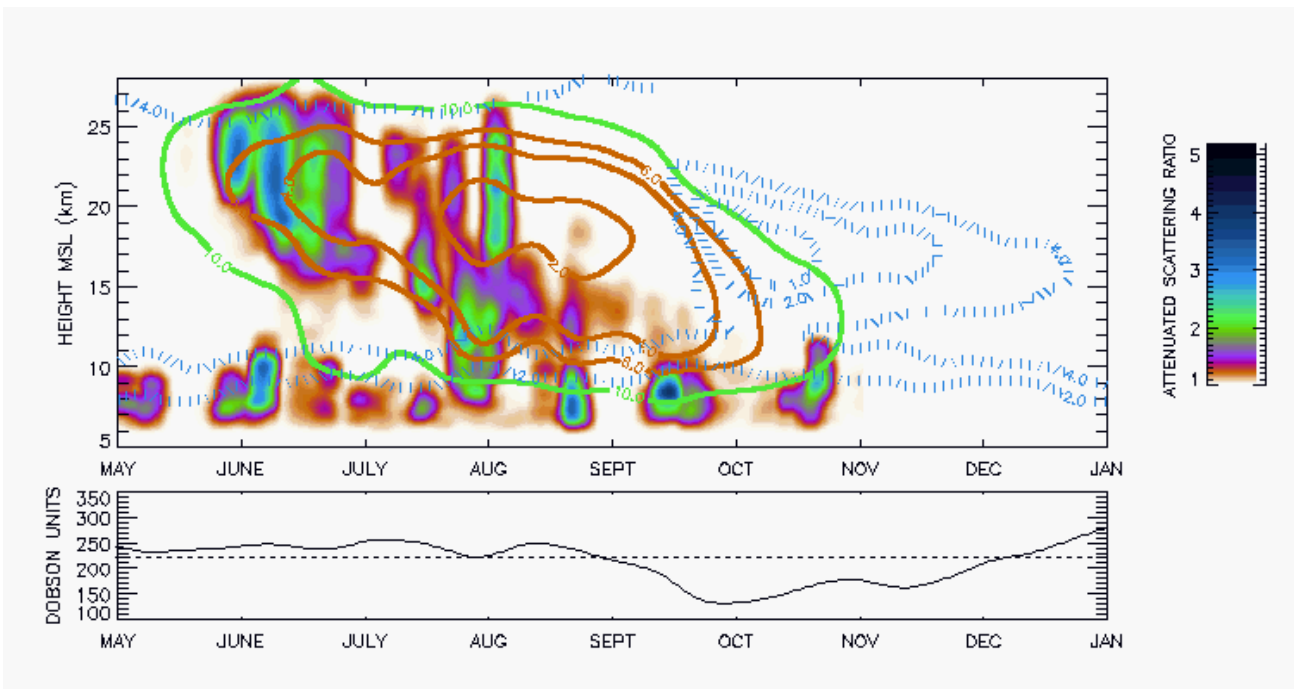


Figure 1. Smoothed MPLNET attenuated lidar scattering ratios for May – October 2007 at the South Pole from 5.0 - 28.0 km MSL. Overlaid for May - December are saturation isopleths for nitric acid trihydrate at 10.0 ppbv HNO₃/4.0 ppmv H₂O concentrations (green), ice frost-point isopleths for 6.0, 4.0 and 2.0 ppmv water vapor concentrations (red) and ozone partial pressure isobars for 4.0, 2.0 and 1.0 mPa (blue dashed). The bottom strip depicts Dobson Unit (DU) measurements for 2.85 km MSL, with the dotted line representing 220 DU, an approx. threshold for Ozone Hole conditions.