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Denitrification, dehydration and ozone loss during the Arctic winter 2015/2016

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The Arctic winter 2015/2016 has been one of the coldest winters in recent years. A stable vortex formed already in early December and the early winter has been exceptionally cold. Cold pool temperatures dropped below the Nitric Acid Trihydrate (NAT) existence temperature of 195 K, thus allowing Polar Stratospheric Clouds (PSCs) to form. The low temperatures in the polar stratosphere persisted until early March allowing chlorine activation and catalytic ozone destruction. Satellite observations indicate that sedimentation of PSC particles have led to denitrification as well as dehydration of stratospheric layers. Model simulations of the Arctic winter 2015/2016 were performed with the atmospheric chemistry-climate model ECHAM5/MESy Atmospheric Chemistry (EMAC) for the POLSTRACC (Polar Stratosphere in a Changing Climate) campaign. POLSTRACC is a HALO mission (High Altitude and Long Range Research Aircraft) that investigates the structure, composition and evolution of the Arctic Upper Troposphere Lower Stratosphere (UTLS). Especially, the chemical and physical processes involved in Arctic stratospheric ozone depletion, transport and mixing processes in the UTLS at high latitudes, polar stratospheric clouds as well as cirrus clouds are investigated. In this presentation an overview of the chemistry and dynamics of the Arctic winter 2015/2016 as simulated with EMAC will be given. Comparisons to satellite observations such as e.g. Aura/MLS as well as to airborne measurements with GLORIA (Gimballed Limb Observer for Radiance Imaging of the Atmosphere) performed on board of HALO during the POLSTRACC campaign will be shown.