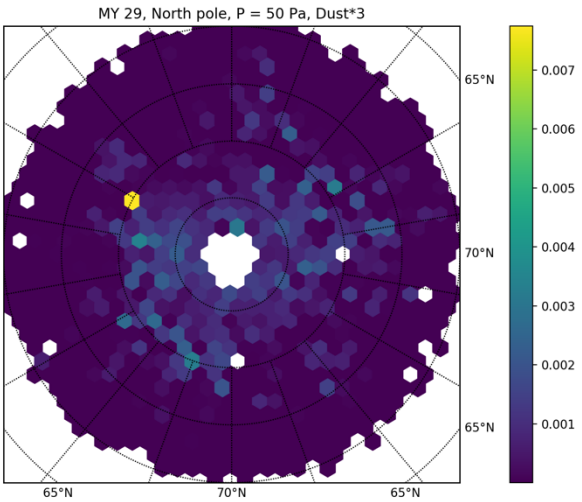
POLAR VORTEX INVESTIGATIONS USING MRO MCS DATA. K.-M. Aye[1] and P. O. Hayne[1], [1]Laboratory for Atmospheric and Space Physics, University of Colorado at Boulder, CO 80303, USA (michael.aye@colorado.edu).

Introduction: The multi-year Mars Reconnaissance Orbiter (MRO) Mars Climate Sounder (MCS) data-set offers rich insight into the Martian polar atmospheres which are driving the whole planet's atmosphere due to its significant CO_2 freeze-out during local winters of up to 30%.

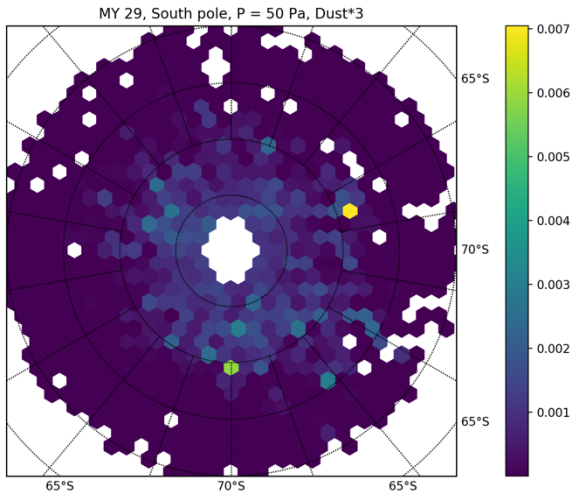
The main objective of this work is to look for variations in the extent and morphology of the polar vortices. We think that the north polar vortex is more unstable than the south. This may lead to differences in the pole-ward transport of heat, dust, and water ice.

Methods: We have established a new full MCS data-set database that allows us to study data slices through time and space with relatively low effort. We are studying how the polar vortex develops over time and altitude/pressure levels by tracking clouds. We are using the "dust opacity" higher level data column of MCS as a proxy for CO_2 cloud opacity during polar winter.

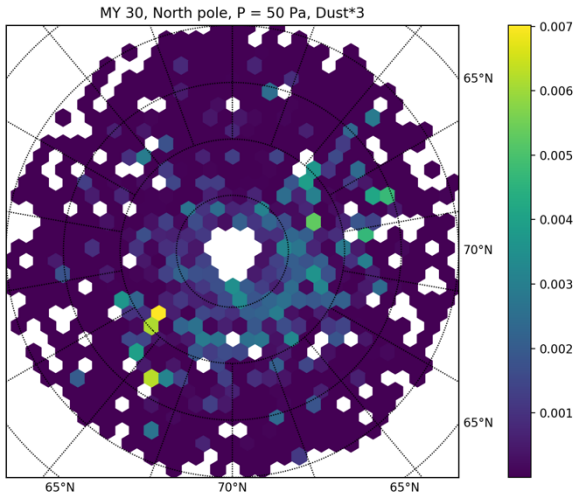
For the preliminary work in here, we have chosen to compare north and south cloud activity 30 Ls after the coldest day of the local winter, because MCS has previous reported on cloud structures at those times [1]. Binning data for 10 Ls together, this results in an Ls range of 300 to 310 for the north pole, and 120 to 130 for the south. The chosen level of altitude is a pressure value of 50 +- 5 Pa. All plots show the dust opacity multiplied by 3 in km^-1, which has previously been used as an indicator of CO2 clouds in MCS data.



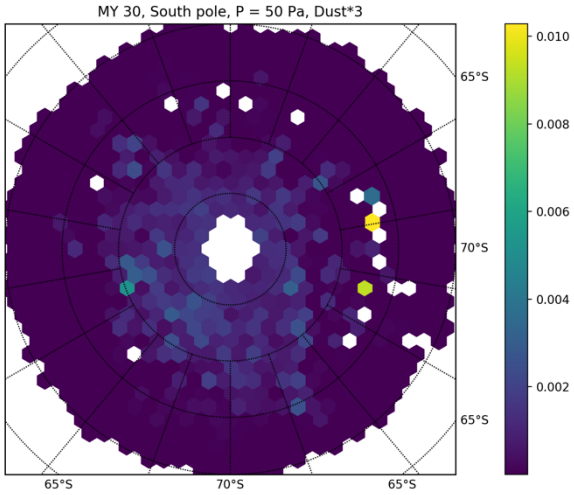
MY 29, North pole, "dust" opacity at pressure altitude 50 Pa.



MY 29, South pole, pressure level 50 Pa.



MY 30, North pole, pressure level 50 Pa.



MY30, South pole, pressure altitude 50 Pa.

Preliminary conclusions: Looking at 2 years of data and only 1 pressure level, it is not necessarily evident that the north pole has a weaker polar vortex structure. In MY 30, the structures seem more clear in the north than in the south. We will present a thorough study through the parameter space at the conference.

References:

[1] P.O. Hayne, D.A. Paige, J.T. Schofield, D.M. Kass, A. Kleinböhl, N.G. Heavens, D.J. McCleese, J. Geophys. Res. 117 (2012).