INSIGHTS INTO THE MY 34 GLOBAL DUST STORM FROM THE ENSEMBLE MARS ATMOSPHERE REANALYSIS SYSTEM (EMARS). H. E. Gillespie[1] , S. J. Greybush[1], and R. J. Wilson[2], [1]Department of Meteorology and Atmospheric Science, The Pennsylvania State University, University Park, PA, USA (hjg5116@psu.edu), [2]NASA AMES, Mountain View, CA, USA.

Abstract: The Mars Year (MY) 34 global dust storm is only the third such storm to occur on Mars since the introduction of long-term orbital measurements of the state of the Martian atmosphere. The storm occurred just after the autumnal equinox, similar to the MY 25 global dust storm, but initial lifting occurred in MY 34 in Acidalia (northern hemisphere) rather than in Hellas (southern hemisphere). Reanalyses are a valuable means for studying the evolution of the Martian atmosphere, as they combine spacecraft observations with the dynamics and physics of a Mars Global Climate Model [1][2][3][4]. We assimilate temperature observations from Mars Climate Sounder (MCS) [5] into the Ensemble Mars Atmosphere Reanalysis System (EMARS) [6] before and during the storm (Ls 170-240). Dust is constrained with a MY 34 column-integrated opacity dust scenario, a provisional product based on the methodology of Montabone et al [7]. In order to allow insight into synoptic-scale dust advection and lofting with full spatial and temporal coverage during the storm, dust in the model is added to or removed from the boundary layer to match the scenario column opacity as a proxy for dust lifting, whereas the 3D dust field is evolved by the reanalysis wind field. The reanalysis can also reveal surface wind stresses that may be responsible, in part, for lifting. We focus on the growth phase of the storm, which is compared and contrasted with the evolution of the MY 25 storm. The EMARS dust field and MCS vertical profiles of dust are compared to assess whether EMARS captures the synoptic scale aspects of the processes responsible for the transport and lofting of dust. EMARS has been used to characterize transient eddies [4], which have been investigated during the storm's initiation. Other topics under investigation include feedbacks between the storm's dust distribution, the global circulation, and tides, and the mechanisms by which the storm becomes global.

Acknowledgements. We thank Armin Kleinböhl and David Kass for facilitating access to version 5.3 MCS retrievals. We thank Luca Montabone and collaborators for providing a provisional dust scenario for the MY 34 global dust storm. This work was supported by NASA MDAP, including grant 80NSSC17K0690.

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