INTERACTIVE SIMULATION OF DUST STORMS BY THE MarsWRF GCM ON A 2°×2° GRID C. Gebhardt[1], R. M. Fonseca[2,3], A. Abuelgasim[1], J. Martin-Torres[2,4], and M. P. Zorzano-Mier[2,5], [1]United Arab Emirates University, National Space Science and Technology Center, Al Ain, UAE, [2]Luleå University of Technology, Group of Atmospheric Science, Luleå, Sweden, [3]Masdar Institute of Science and Technology, Khalifa University, Abu Dhabi, UAE, [4]Instituto Andaluz de Ciencias de la Tierra, Granada, Spain, [5]Centro de Astrobiología, Torrejón de Ardoz, Madrid, Spain

Introduction: In interactive dust mode, the MarsWRF General Circulation Model (GCM) allows the user to explicitly simulate the Martian dust cycle. In this configuration, dust is lifted from the surface by 2 mechanisms, dust devils and near-surface wind stress. The lifted dust is injected into the planetary boundary layer, advected by the winds, and deposited back on the surface. In the dust devil and near-surface wind stress parameterization schemes, there are 3 tunable parameters that have to be adjusted by an iterative approach. These parameters are resolution dependent, and have been previously set up on a ~5x5° grid [e.g. 1,2]. However, a finer horizontal resolution is required for the model to better simulate fine-scale wind features related to topography and associated dust lifting, and hence give a more realistic representation of the observed dust cycle [3].

We present global model runs with interactive dust for a considerably high horizontal resolution of 2°×2°. This implies that the model has to undergo optimization in terms of the dust storm generation and simulation of the background dust cycle. With dust storms driving variations of up to several tens of degrees Kelvin, the mid-level atmospheric temperature serves as an indicator of the model performance. To this end, important criteria are the model representation of the interannual variability, onset time, and duration of global dust storms. Moreover, we analyze the spatial redistribution of surface dust.

The presented model runs aim at evaluating a potential refinement of dust storm modelling from enhancing the model resolution to a computationally level that is quite costly to date (for simplicity, an infinite surface dust reservoir is considered). In addition, our model runs may serve as a baserun for future modelling efforts achieving mesoscale/microscale resolution within selected regions of interest by applying the nesting technique.

References: [1] Newman C. E., Lee C., Mischna M. A., Richardson M. I., and Shirley J. H. (2019) *Icarus, 317*, 649-668. [2] Shirley J. H., Newman C. E., Mischna M. A., and Richardson M. I. (2019) *Icarus, 317*, 197-208. [3] Toigo A. D., Lee C., Newman C. E., and Richardson M. I. (2012) *Icarus, 221(1)*, 276-288.