

ALMA望遠鏡を利用した2018年火星全球ダストストームの観測 Observing the 2018 global dust storm on Mars with ALMA

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One of the most striking features in Martian atmosphere is a very large (planet-encircling) storm, "global dust storm". The storm lifts the dust particles from the surface into the air, where the dust particles block sunlight from reaching the surface. This brings a decrease of the surface temperature. In contrast, the thickened dust layer absorbs the radiation, and directly leads to heating the atmosphere. Such a drastic change in the thermal structure in the atmosphere induces significant modulation in the dynamics as well as in the composition.

Starting from the middle of June 2018, a global dust storm has occurred on Mars for the first time in the past 11 years. Taking this unique opportunity, we observed Mars with ALMA on 30 June 2018 and 16 July 2018 that correspond to active periods of the global dust storm.

Observing with submillimeter wavelength has a good advantage compared to other optical and infrared wavelengths, since the dust opacity becomes transparent at the submillimeter wave and the emission from deep inside the global dust storm can be detected. We used Band 5 (183 GHz) and 6 (220 and 230 GHz) on 30 June, and only Band 6 on 16 July. Band 6 measurements allow us to investigate maps of temperature vertical profiles and wind fields from the CO lines. Band 5 measurements enable us to investigate maps of water vapor vertical profiles. The preliminary results from these ALMA observations will be discussed in the presentation.

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