

MRO-MCS データを利用した火星大気のアスト、気温、水氷雲の間に見られる関係の解析

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Relationship among water ice clouds, dust and temperature in the Martian atmosphere revealed by the MRO-MCS data analysis

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Focusing on the longitudinal distributions of water ice clouds, dust and temperature and their correlations in the Martian atmosphere, we analyzed Mars Reconnaissance Orbiter Mars Climate Sounder (MRO-MCS) data. The data covers Mars Year (MY) 28 to 30, which enables us to conduct interannual analyses.

Results show that the concentration of water ice clouds around Hellas Planitia (30-60S, 50-100E) largely decreases in the southern winter ($L_s=70-110$ deg), while temperature and the concentration of dust in the same region increase simultaneously. The decrease of water ice clouds and the corresponding behaviors of temperature and dust were clearly observed every year during MY29-31, suggesting a strong interannual repeatability. We also compared the observations with Martian general circulation model (MGCM), but we could not find very clear agreement. We extracted the wave components by fitting the data to stationary zonal harmonics through wave number 4. The wave number 1 component is dominant and its typical amplitude in the southern winter is about 6 K. This may be attributed to thermal tides in the Martian atmosphere.

In this study, we compiled a gridded data set in the netCDF format from the original text-based data in order to make data handling much easier. We are planning to make the gridded data available to researchers near future.