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欧州探査衛星 PFS を用いた火星中間圏に存在する CO2 の氷雲の観測
Observation of CO2-ice cloud in the Martian mesosphere by using PFS onboard Mars Express

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Almost all of constituent of martian atmosphere is CO2 (95%). It condenses at very high altitude (60˜100km) and become cloud. CO2-ice cloud have been observed by many instrument , but it was difficult to clearly judge whether observed cloud is made of CO2 or not. However OMEGA, visible and near-infrared imaging spectrometer onboard Mars Express, have provided the first spectroscopic identification of a cloud as being composed of CO2 (Montmessin et al, 2007) CO2-ice cloud has characteristic spectral feature emission peak at 4.26μm. Recent study reported that CO2-ice cloud distributes around equator in spring equinox to early summer and mid latitude in local autumn. (Maattanen et al,2010 , Montmessin et al,2007 2006, Clancy et al 2007) However, it is not clear about cloud feature (particle size or opacity).

We try to observe CO2-ice cloud using high spectral resolution instrument PFS, infrared fourier spectrometer onboard Mars Express. Strong point of PFS is that spectral resolution is ten times greater than that of OMEGA and We can see spectral feature of CO2-ice cloud (spike at 4.26μm) more clearly. Another point is that PFS and OMEGA observe almost the same point , so two instruments can observe CO2-ice cloud at the same time. For the first step, we check the data where OMEGA observed CO2-ice cloud (10 orbits) and found CO2-ice cloud like feature all of the 10 orbits. However emission peak appears at shorter wavelength (at 4.25 μm) . In order to judge whether this signal is real or not, we compared PFS spectra and OMEGA spectra observed at the same point. When PFS observe signal at 4.25μm , OMEGA also show strong signal at 4.26μm ,so we can say PFS signal is real. In some orbit, PFS observed different signal from that of OMEGA. It is double spike feature at 4.25μm and 4.28μm which OMEGA can not resolve. It is possible that double peak feature shows different cloud feature, for example, particle size.Now we are trying radiative transfer model and discuss how cloud spectral feature changes when we changes cloud parameter (size distribution, altitude, cloud opacity).

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