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Estimation of Martian atmospheric composition change caused by CO2 condensation and its application to radio occultation

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We estimated the Martian atmospheric composition change caused by CO_2 condensation using the Ar measurements obtained by Gamma Ray Spectrometer (GRS) onboard the 2001 Mars Odyssey. We applied this estimation of the composition change to the rederivation of the radio occultation (RO) measurements of Mars Global Surveyor (MGS) obtained at polar latitudes of the winter hemisphere, because the MGS RO standard product which is available to the public did not consider the atmospheric composition change by CO_2 condensation. Using the rederived MGS RO measurements, we investigated the occurrence of CO_2 supersaturation in the Martian polar winter atmosphere and found that there were more supersaturation in the rederived data than in the original data.

Keywords: Mars, CO2, supersaturation, condensation, radio occultation