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**CONTROL ID:** 1480922

**TITLE:** Martian thermospheric temperatures retrieved from $CO_2^+$ SPICAM dayglow measurements.

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**ABSTRACT BODY:** A large dataset of dayside grazing limb $CO_2^+$ observations performed by the SPICAM (Spectroscopy for Investigation of Characteristics of the Atmosphere of Mars) instrument on board Mars Express is analyzed to retrieve Martian thermospheric temperature, as well as its variation with solar activity, season and latitude. The method permits to retrieve the temperature from the scale height of the $CO_2^+$ emission. We also present puzzling features such as limb profiles exhibiting multiple peaks and their characteristics. We furthermore study the behavior of the main emission peak of the $CO_2^+$ vertical emission profiles. The $CO_2^+$ emission at 289 nm arises from the relaxation of the $CO_2^{+*}$ molecule in the $B^2\Sigma^+$ state to the $X^2\Pi$ state. $CO_2^{+*}$ molecules are mainly produced in the Martian dayside through photoionisation and photoelectron impact. The $CO_2^+$ emission exhibits features that constrain the temperature and density vertical profiles of $CO_2$. Comparisons of retrieved temperatures are made with corresponding simulations from the coupled MGCM-MTGCM. We also use a Monte-Carlo code to model the observed intensity limb profiles.

**INDEX TERMS:** [0310] ATMOSPHERIC COMPOSITION AND STRUCTURE / Airglow and aurora.

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