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Correction of MSL/REMS UV data from dust deposition and sensor's angular response

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The Rover Environmental Monitoring Station (REMS) onboard the Mars Science Laboratory (MSL) mission has a UV sensor (UVS) that for the first time is measuring the UV radiation flux at the surface of Mars. The UVS is comprised of six photodiodes to measure the UV flux in different bands of the spectral range 200-380 nm [1].
The highest-level UVS data archived in the NASA Planetary Data System (PDS) are the ENVRDR and MODRDR products. The ENVRDR products contain UV fluxes in units of W/m2 for each UVS channel, while the MODRDR products contain identical data but with values of UV fluxes removed when θ is between 20º and 55º and when the rover or its arm are moving.
Due to its location on the rover deck, the UVS has been exposed to dust deposition. Nominal UVS operations lasted until sol 154, when for the first time degradation of the UVS due to dust deposition led to deviations from nominal values above 10%, with increasing deviations in time. In addition, discrepancies between measured and physically-consistent UV fluxes are found when the solar zenith angle (θ) relative to the rover frame is between 20º and 55º. In particular, derived UVS fluxes present a non-physical discontinuity at θ = 30º caused by a discontinuity in the calibration function.
We have developed a methodology to correct the ENVRDR data set from the effects of dust degradation and inconsistencies in the angular response for each of the six UVS channels and to complete the MODRDR products when 20º < θ < 55º for each of the six UVS channels. To perform this correction, we use photodiode output currents (available in the NASA PDS as lower-level TELRDR products), ancillary data records containing the geometry of the rover and the Sun (available in the NASA PDS as ADR products) and dust opacity values obtained from Mastcam [2].
Data products generated by this study will allow to assess risks of UV radiation to the health of human explorers, to analyze the relationship between seasonal changes in UV radiation at Gale Crater and seasonal patterns discovered in the background methane concentration [3], and to compare the UV radiation environment at different locations (ExoMars mission in 2020 and NASA's Mars 2020 mission carry UV sensors in their payloads).

References:
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[2] Smith, M. et al. (2016), Icarus, 280, 234-248
[3] Webster, C.R. et al. (2016), AGU Fall Meeting.