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REMS Ultraviolet Sensor: First UV measurements from the Martian surface.

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From its arrival to the Martian surface on August 2012, the REMS-UVS
(Ultra Violet Sensor) has monitored, daily, the down-welling UV irradiance. These are the first UV irradiance measurements ever acquired from the surface of another planet. The UVS consists of one SiC photodiode dedicated to the full UV spectrum 200-400 nm together with 5 filtered photodiodes for narrower band channels. It has a physical aperture of 30º pointing to the sky. When the solar zenith angle of the Sun is beyond this angle, the sensor monitors only the diffuse irradiance of the sky. Furthermore during the daily usual rover operation it can also be protected from the direct irradiance by shadows casted by the rover mast or arm, allowing for a continuous independent monitoring of the direct and diffuse components of the global UV surface irradiance.

The measurements delivered from Gale crater, the landing site of the Mars Science Laboratory (MSL) Rover Curiosity, right after the beginning of operations provide an upper limit to the incident UV irradiance because: i) Gale is almost in the Equator; ii) the Sun-Mars distance was minimal; and (ii) the sky was clear of dust aerosols. These measurements are critical values for the estimates of UV doses on the Martian surface with relevant implications for habitability, and atmospheric and surface photo-chemistry modelling.

With the onset of the dust season, and as the total column of dust above Gale increases, the UVS measurements shows an expected depletion on the irradiance reaching the surface as the UV radiation is significantly blocked.

The REMS-UVS will deliver all through its operational life daily, hourly, values of these quantities providing an unique dataset that will allow to study the interaction of the solar irradiance with the Martian atmosphere and surface and to monitor the dust cycle.