PRELIMINARY STUDY OF UV RADIATION ON MARS FROM SPICAM RESULTS AND ITS RELATION TO SURFACE HABITABILITY.

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Mars-Express has reached Mars orbit in early 2004 and since, its instruments have measured during an entire Martian year. In particular, SPICAM has measured the nadir reflected and backscattered solar light as well as solar occultations with an almost complete planetary coverage. The UV instrument (ranging from 118 nm to 320 nm) covers the entire band of UV sterilizing radiation that could affect survivability on Mars surface. The nadir coverage, illustrated on figure 1, shows that a good climatology of ozone absorption and surface UV doses can be derived from the present data set.

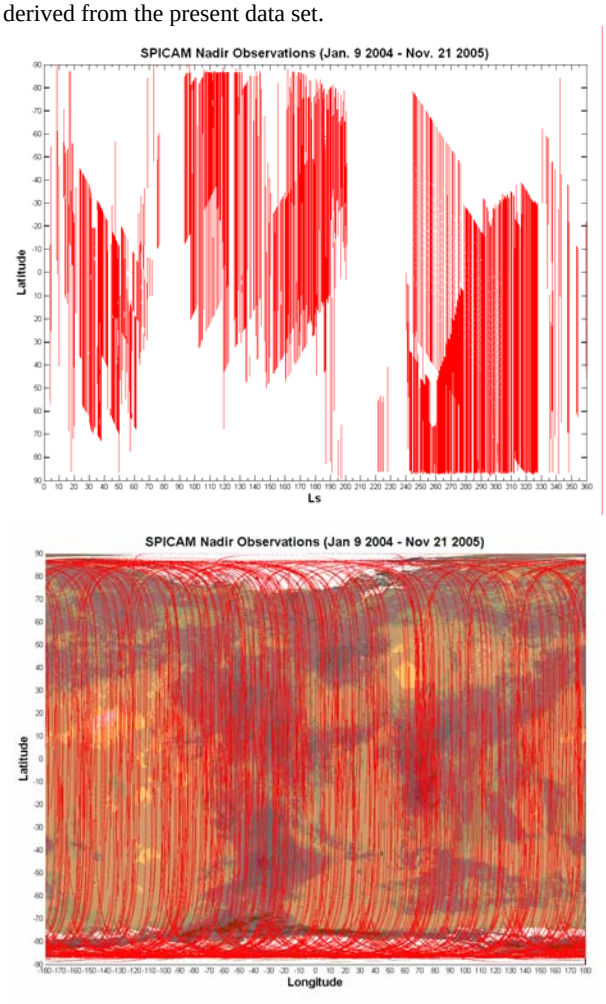

Figure 1.: Nadir coverage of Mars surface during the 1st Martian Year of Mars-Express Mission.

The latest estimations of ozone column and UV penetrations will be presented together with the techniques used to determine them.

The ozone columns already derived in 2005 are much lower than on the earth. Early results confirm a very weak ozone column at low latitudes and more significant ozone absorptions in the Polar Regions. However, no evidence of a significant UV filter protecting the surface from UV-C and UV-B could be observed during this first Martian year, in particular, the effect of dust is still to be assessed and it is hoped that the end of the Mars-Express mission will permit to observe the evolution of a global dust storm.

According to these preliminary results, UV protection of potential microorganisms at the surface should be insured either by a thin layer of UV absorbing dust or by built-in protections. Earth microorganisms being protected by an ozone layer since about 2 billion years, internal UV-protections are rare but not totally inexistent, e.g. complex vascular plants protect themselves against aggressions by flavonoids that constitute also excellent UV filters between 210 and 300 nm. (Figure 2.)

Finally, this property useless on earth could certainly be transferred to other terrestrial organisms by selective evolution and justifies the present concerns about planetary contamination.

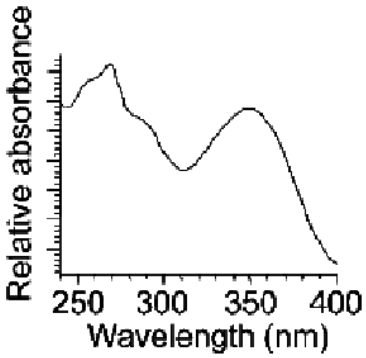

Figure 2.: Spectrum of luteolin from the Antarctic weed Deschampia Antarctica (Ruhhland et al, 2005); This flavonoid is also present on the outer shell of the seed and ensures a very long latency period of seeds in extreme environments.