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# Ephemeral conditions for life at the South Polar Region of Mars

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Several new pieces of information from the last years strengthen the possibility that suitable conditions for possible living organisms may be present ephemerally at the Southern Polar region of Mars. We summarize these results in the lecture, as well as our new model that fits to these results. Among the new information it is proven that the seasonal frost on the polar dunes is layered with water ice at the bottom and carbon-dioxide ice at the top. Some slope structures hint at melting and seepage of the lower water ice layer in springtime/summer. New information was also released on the radiation tolerance of extremophiles, and many possible analogous organisms were analyzed on the Earth.

Authors improved their original DDS-MSO hypothesis to a new synthetic model that incorporates the gas geyser and the liquid seepage models. In this synthetic approach the important stages of events are the following: 1. In autumn with decreasing temperature first H2O, then later CO2 freezes onto the surface (above all onto dark dunes) forming a layered structure. 2. In springtime the sunshine causes the outburst of CO2 gas jets (forming the diffuse fans), and the thinning or disappearance of the upper CO2 layer there (forming dark spots). 3. As spring advances the stronger insolation absorbed by the dune surfaces warms up the dune grains at the localities where earlier the gas jets formed a hole in the CO2 ice. In this stage a very thin ephemeral water layer may form on the dune grain surfaces, below the water ice, and between the liq-

uid water and the solid ice roof a layer of water vapor layer may also appear. During this period the liquid layer itself, or the lubricated grains may seep down, or even the front of the phase change may move downwards – forming the slope structures. 4. By the end of spring the surface ice disappears, but among the grains ice or liquid water may still be present in some mm depth for a very brief period of time. 5. In the last phase all the near-surface H2O is sublimated or evaporated. The possible presence of ephemeral near/surface seasonal liquid water on Mars is of high importance for any kind of possible life there. The theoretical background, observational evidence and the still open questions will be presented.