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Liquid interfacial water and brines in the upper surface of Mars

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Interfacial water films and numerous brines are known to remain liquid at temperatures far below 0° C. The physical processes behind are described in some detail. Deliquescence, i.e. the liquefaction of hygroscopic salts at the threshold of a specific "Deliquescence Relative Humidity", is shown to be that process, which on present Mars supports the formation of stable interfacial water and bulk liquids in form of temporary brines on and in a salty upper surface of present Mars in a diurnally temporary and repetitive process. Temperature and relative humidity are the governing conditions for deliquescence (and the counterpart "efflorescence") to evolve. The current thermo-dynamical conditions on Mars support these processes to evolve on present Mars. The deliquescence-driven presence of liquid brines in the soil of the upper surface of Mars can expected to be followed by physical and chemical processes like "surface cementation", down-slope flows, and physical and chemical weathering processes. A remarkable and possibly also biologically relevant evolution towards internally interfacial water bearing structures of dendritic capillaries is related to their freezing - thawing driven formation. The internal walls of these network-pores or -tubes can be covered by films of interfacial water, providing that way possibly habitable crack-systems in soil and rock. These evolutionary processes of networks, driven by their tip-growth, can expected to be ongoing also at present.