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Shallow characterization of the subsurface for the 2018 Mission to Mars

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The highest priority scientific objectives of the revised 2018 mission to Mars are (1) to search for evidence of past or present life, (2) to identify the samples that are most likely to preserve potential evidence of life and the nature of the early Martian environment that might have given rise to it and (3) to cache them for later retrieval back to Earth for more detailed analyses than can be performed by the rover's onboard analytical laboratory.

WISDOM is a ground penetrating radar that has been designed to investigate the near subsurface of Mars down to a depth of $\sim$2-3 m, with a vertical resolution of several centimeters - commensurate with the sampling capabilities of the ExoMars onboard drill.
The ability of WISDOM to investigate the geology of the landing site in 3-dimensions will permit direct correlations between subsurface layers and horizons with those exposed in nearby outcrops and the interior of impact craters. By combining periodic soundings conducted during a Rover traverse with targeted, high density grid-type soundings of areas of potential scientific interest, it will be possible to construct a 3-dimensional map of the local radar stratigraphy.

Of all of the Pasteur Payload instruments, only WISDOM has the ability to investigate and characterize the nature of the subsurface remotely. Moreover, the geoelectrical properties of H_2O make WISDOM a powerful tool to understand the local distribution and state of subsurface H_2O, including the potential presence of segregated ground ice and the persistent or transient occurrence of liquid water/brine.

A WISDOM prototype, representative of the final flight model is now being tested. A series of calibrations and verifications have been initiated. The real performance of the instrument is currently assessed for various test environments. Results about the resolution and sensitivity achieved are presented as well as 3D representations of detected subsurface structures. Preliminary estimates of permittivity values are also shown.