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# Mars: electric properties of clay materials in martian-like conditions to refine radar investigation.

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The orbital radar instruments are giving new opportunities for planetary geological investigation regarding subsurface layering and geometry.
Sedimentary deposits of paleolacustrine environments on Mars have shown the presence of various clay minerals . These clay deposits are very important in planetary exploration because they are strictly linked to the presence of water and to the capability of the analyzed environment to develop life and, as a consequence, to preserve fossilized life marker.
The subsurface stratigraphy and geometry of sedimentary deposits on Mars are investigated by two orbiting radar instruments (SHARAD and MARSIS) and in the next future another radar instrument, a landing one, will be send on Mars (WISDOM).
For small grain size sediments, like clay minerals, the dielectric properties have a strong impact on the penetration depth of the radar signal.
We studied the correct evaluation of these properties and their correlation with chemical and mineralogical phases. The focus of this research is on the dielectric properties of natural clayey materials at different frequencies and temperature, evaluating the correlation among water content , temperature and electric properties.
Several natural clayey material samples, considered as analogues to the Martian ones, have been collected from different geological settings in Italy and we analyzed their water content, mineralogical assemblage and chemical content and the correlation with the permittivity at different frequencies and temperatures using the Network Analyzer technique.
We also changed the water content of the samples, and using the SHARAD, MARSIS and WISDOM operating frequencies, we measured the variation of permittivity and electric properties in the thermal range of 180 K to 298 K.
The goal of the study is to refine the sounding depths of the radar investigation on Mars, exploring the possibility to identify clayey sedimentary layers analyzing the differences between the electric properties of these loose materials and the surrounding rock ones.