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Understanding the Radar Properties of Cometary Analog Materials: Experimental Approach in Support of the CONSERT experiment onboard the ROSETTA mission

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In 2014, the CONSERT experiment (COmet Nucleus Sounding Experiment by Radiowave Transmission) on board the ROSETTA mission (2004-2014) will perform a radar tomography of the Comet C67 in an attempt to explore its inner structure. In order to quantitavely invert the upcoming data to access the lithological, mechanical and dust enrichment of comet 67P/Churyumov-Gerasimenko, a good knowledge of the geoelectrical properties of cometary analog material is crucial. In this work, we present laboratory measurements conducted on several types of meteoritic materials and their water ice mixtures that are inferred to be close analogs to cometary and asteroids materials. The measurements are performed in relevant temperatures and pressures in cometary environments. The electromagnetic properties of these materials will be presented as a function of porosity, temperature, frequency and mass percentage of dust contamination in the ice. This resulted in a full parametric space associated with the variation of the geoelectrical properties of cometary analog materials. Our preliminary results suggest that the geoelectrical properties of cometary material are mainly driven by the dust contamination in the ice matrix and by the mineralogical composition of the meteoritic dust inclusion. In particular we observe

dielectric constants ranging from 2.8 to 4.4 and loss tangents from $\sim$0.001 to 0.02 for a chondritic H5 meteoritic dust contamination in the ice ranging from 0 to 75%. The implication of those results in constraining the current geological models of cometary interior will be discussed.