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UNDERSTANDING THE NUCLEUS OF 67P/C-G THROUGH LABORATORY EXPERIMENTS

Abstract

On August the 6th 2014 the Rosetta spacecraft arrived at Comet 67P/Churyumov-Gerasimenko and on November the 12th the Philae probe landed, sending the most detailed close-up pictures, with a few meters resolution, of the surface of the comet. A large flux of ice grains was observed to emanate from the central part "the neck" of the nucleus. In this study we will present an explanation of the observed surface features on the comet nucleus, as derived from our laboratory experimental results, such as craters, boulders, active areas and smooth terrains, due to ice sublimation and evolution of gases from the interior of the nucleus. Our experiments demonstrated that a huge flux of ice grains is ejected together with gas jets from the ice, forming craters and smooth surfaces. Our experimental results on the density, thermal conductivity and mechanical strength are similar with the in situ results of comet 67P/ C-G. The authors acknowledge support from the Israel Ministry of Science, Technology and Space through the Israel Space Agency.