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Surface of the comet 67P from PHILAE/CIVA images as clues to the formation of the comet nucleus

Francois Poulet (1), Jean-Pierre Bibring (1), John Carter (1), Pascal Eng (1), Brigitte Gondet (1), Laurent Jorda (2), Yves Langevin (1), Stéphane Le Mouélic (3), and Cédric Pilorget (1)

(1) Institut d'Astrophysique Spatiale, CNRS/Univ. Paris Sud, Orsay Cedex, France (francois.poulet@ias.u-psud.fr), (2) Laboratoire d'Astrophysique de Marseille, CNRS/Univ. d'Aix-Marseille, France, (3) Laboratoire de Planétologie et Géodynamique de Nantes, CNRS/Univ. Nantes, France

The CIVA cameras onboard PHILAE provided the first ever in situ images of the surface of a comet (Bibring et al., this conf). The panorama acquired by CIVA at the landing site reveals a rough terrain dominated by agglomerates of consolidated materials similar to cm-sized pebbles. While the composition of these materials is unknown, their nature will be discussed in relation to both endogenic and exogenic processes that may sculpted the landscape of the landing site. These processes includes erosion (spatially non-uniform) by sublimation, redeposition of particles after ejection, fluidization and transport of cometary material on the surface, sintering effect, thermal fatigue, thermal stress, size segregation due to shaking, eolian erosion due to local outflow of cometary vapor and impact cratering at various scales. Recent advancements in planet formation theory suggest that the initial planetesimals (or cometestimals) may grow directly from the gravitational collapse of aerodynamically concentrated small particles, often referred to as "pebbles" (Johansen et al. 2007, Nature 448, 1022; Cuzzi et al. 2008, AJ 687, 1432). We will then discuss the possibility that the observed pebble pile structures are indicative of the formation process from which the initial nucleus formed, and how we can use this idea to learn about protoplanetary disks and the early processes involved in the Solar System formation.