DISTRIBUTION AND ORIENTATION OF AEOLIAN-LIKE WIND-TAILS ON COMET 67P/CHURYUMOV-GERASIMENKO

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Introduction: High resolution image data of the ROLIS and OSIRIS instruments on-board the Rosetta spacecraft and its lander Philae revealed the presence of aeolian-like morphologies on 67P's surface [e.g. 1, 2, 3], such as elongated wind-tail like deposits around some larger boulders (> 5 m, Figure 1). Such features are commonly associated with wind accumulation and wind erosion on Earth and other planets [e.g. 4, 5]. However, the formation mechanism of wind-tail-like features on Churyumov-Gerasimenko appears to be of different origin. It is probable that they form as a result of abrasion of a sand-bed of air-fall particles [3].

In this work, we investigate the distribution and orientation of aeolian-like wind-tails on 67P aiming at a better understanding of how they form and what they tell us about particle distribution on the comet.

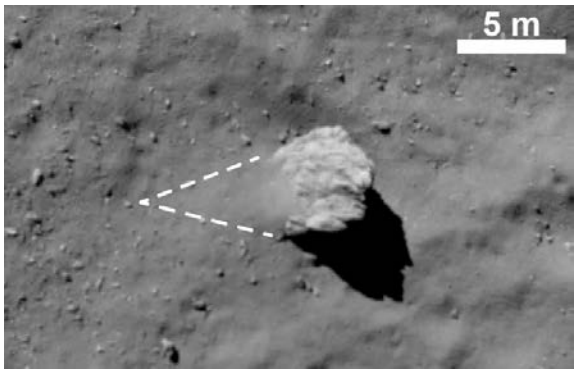

Figure 1. Boulder with wind-tail like feature. The boulder is approximately 5 m across and possesses a moat opposing a wind-tail like feature pointing to the left (dashed line). Image extracted from Mottola et al. (2015) [3].

Method and Data: We investigate boulders with wind-tail like morphologies on OSIRIS images of resolution better than 50 cm/pixel. For each boulder with associated wind-tail like morphology we estimated the size and direction of the wind-tail like feature and thus, we were able to derive a preferred direction of particle infall associated with the abrasion of the sand bed. Mottola et al. (2015) [3] suggest that infalling particles remove the grains of a particle bed by abrasion whereas the area behind a boulder is procted from this abrasion forming the observed wind-tail like morphology. Thus, it is possible to estimate the infalling particle direction from the direction of the wind-tail like features.

Results: We found approximately 50 wind-tail features in pre-perihelion images. Most of them were found in the Ma'at region on the small lobe of 67P (Figure 2). Our analysis suggest an abrading particle infall from the south, in agreement with the particle transpot direction suggested by Keller et al. 2017 [6].

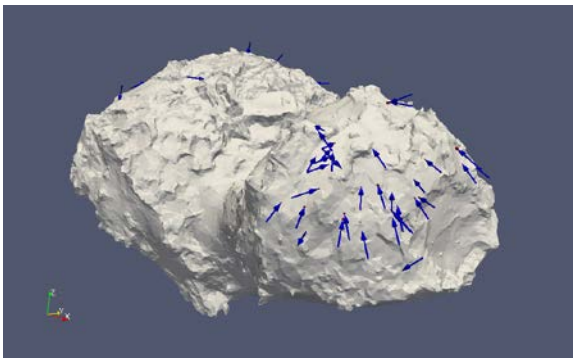

Figure 2. The directions of wind-tail features on Churyumov-Gerasimenko observed in pre-perihelion images. The wind-tail features cluster in the Ma'at region and preferentially point north suggesting an abrading particle infall from the south.

References: [1] Thomas N. et al. (2015) *Science, 347*, aab0440-1–6. [2] Thomas N. et al. (2015) *A&A, 583*, 1–18. [3] Mottola S. et al. (2015) *Science, 349*, aab0232-1–4. [4] Greeley R. et al. (2002) *JGR, 107*, 1–5. [5] Greeley R. et al. (2008) *JGR, 113*, 1–17. [6] Keller et al. (2017) *ACM 2017*, this meeting.