Oral Presentation at the AGU Fall Meeting 2019, San Francisco: "Long Runout Landslides – Morphological Features and Internal Structures of the Final Deposit as Keys to Understand Mechanisms Involved During Emplacement."

Giulia Magnarini, Department of Earth Sciences, UCL, giulia.magnarini.14@ucl.ac.uk

In order to better understand the mechanisms responsible for the behaviour of long runout landslides we use a comparative planetary geology approach. On Mars, the availability of the latest high-resolution imagery allows us to conduct measurements that are not granted on our planet because of erosion. On the other hand, on Earth, we can conduct fieldwork and make direct observations. We discuss two case studies. 1) a 63-km-long martian landslide, in Coprates Chasma, Valles Marineris, Mars, that exhibits well-developed longitudinal ridges for almost the entire extent of its deposit; we show the existence of a scaling relationship between the wavelength of the longitudinal ridges and the thickness of the deposit; observations suggest that a basal rapid shearing layer over a rough surface is necessary for the development of mechanical instabilities within the sliding mass that give origin to longitudinal ridges, rather than the presence of a basal layer of ice, as other works propose. 2) a 4-km-long terrestrial landslide in the Atacama Desert, Chile, which shows longitudinal ridges at the terminal part of each lobe; we discuss the internal structures of the landslide deposit in relation to the presence of the ridges; observations do not seem supporting the convective-style mechanism at the origin of the longitudinal ridges, as suggested for the martian landslide. Further analysis of the morphometry of the Chilean landslide of two lunar landslides that we are currently working on will provide more data to discuss.

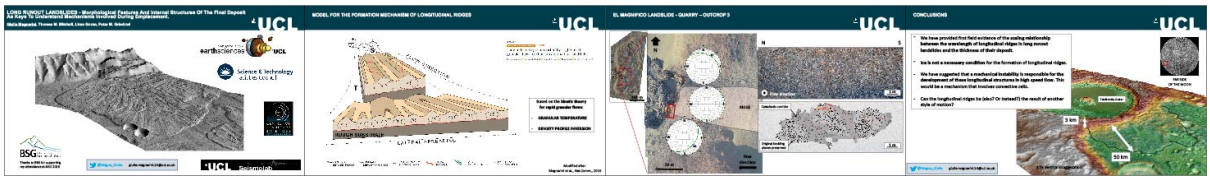

Fig. 1: Extract of the powerpoint presentation I presented at the AGU Fall Meeting 2019.

COMMENTS.
By attending the AGU Fall Meeting 2019, I was able to meet professor H. Melosh, who reviewed my recent paper, and discuss about theories and methods in the long runout landslides research area, as he is the most prominent person in the planetary surface processes community. We agreed on further discussing opportunities to design experimental work using granular material. This is great news as it could be included in research proposals I am writing to apply for post-doctoral positions.
During the meeting I also had the chance to finally meet one of my supervisors, Apollo 17 astronaut geologist Harrison Schmitt, and discuss in person about lunar landslides.
It has been also an opportunity to reconnect with Maximillian Van Wyk De Vries, a peer from University of Minnesota I have met at the BSG Annual Meeting in Sheffield, where we started discussing about collaborating on modelling of martian landslides.

MEDIA STATEMENT.
From comparative planetary geology study, we show that longitudinal ridges in long runout landslides could form without ice, challenging their use as unequivocal evidence of past ice on Mars.