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A comprehensive database of Martian landslides

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During a long-term project, we have identified and classified a large number (> 3000) of Martian landslides especially but not exclusively from Valles Marineris. This database provides a more complete basis for a statistical study of landslides on Mars and its relationship with geographical and environmental conditions.
Landslides have been mapped according to standard geomorphological criteria, delineating both the landslide scar and accumulation limits, associating each scarp to a deposit, and using the program ArcGis for generation of a complete digital dataset. Multiple accumulations from the same source area or from different sources have been differentiated, where possible, to obtain a more complete dataset and to allow more refined analyses. Each landslide has been classified according to a set of criteria including: type, degree of confinement, possible trigger, elevation with respect to datum, geomorphological features, degree of multiplicity, and so on. The runout, fall height, and volume have been measured for each deposit.
In fact, the database is revealing a series of trends that may assist at understanding landform processes on Mars and its past climatic conditions. One of the most interesting aspects of our dataset is the presence of a population of landslides whose particularly long mobility deviates from average behavior.
While some landslides have travelled unimpeded on a usually flat area, others have travelled against obstacles or mounds. Therefore, landslides are also studied in relation to i) morphologies created by the landslide itself, ii) presence of mounds, barriers or elevations than have affected the movement of the landslide mass. In some extreme cases, the landslide was capable of travelling for several tens of km along the whole valley and upon reaching the opposite side it travelled upslope for several hundreds of meters, which is indication of high travelling speed. In other cases, the high speed is revealed by dynamic deformations of the landslide body such as pressure ridges due to the impact of the landslide against a mound.
We find a significant trend toward greater mobility for landslides associated to chaotic terrains and in isolated craters, which is consistent with the presence of a lubricating medium like ice or water, while failures from high reliefs like those in Valles Marineris exhibit average mobility. We also find a peculiar class of high mobility landslides associated with meteoroid impact.