SELECTION OF THE GUINSAUGON LANDSLIDE IN THE PHILIPPINES AS A STRUCTURAL AND MORPHOLOGICAL ANALOG TO ROCKSLIDE AVALANCHES IN VALLES MARINERIS, MARS

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Introduction: Numerous studies have been carried out to understand long runout landslides on Mars and Earth, but their underlying mechanisms remain to be understood [1-4]. In this study, imaging from the High Resolution Imaging Science Experimtnt onboard Mars Reconnaissance Orbiter (MRO) and recent analog models of terrestrial rockslide avalanches are used to understand the kinematics and emplacements of Martian rockslide avalanches in Valles Marineris. The analog models show the relationship between deposit morphology and landslide dynamics through associated structures (e.g. faults, ridges, and troughs) in terrestrial rockslide avalanches [7]. Here I present a comparison of the Feb 17, 2006 Guisaungon rockslide-debris avalanche in the Philippines to compare the factors included to present a close examination of the factors that can trigger could trigger large runout landslides in Valles Marineris. The analysis provides insights on landslide mechanisms by identifying structural features and surface morphology that form under different physical conditions.

Landslides in Valles Marineris: Rockslide avalanches in Valles Marineris have very large runout and volume [2] with faults, ridges, and, troughs that have been well-preserved for several million years. Due to minimal surface modification over geologic time, Martian landslides allow for the study of relationship of faults and folds with rock avalanche emplacement mechanisms.

The Guinsaugon Rockslide-Debris Avalanche: The Guinsaugon landslide in St. Bernard, Leyte Island originated on an approximately 800m high escarpment, a surface manifestation of the strike-slip Philippine Fault that bisects Leyte and other islands of the Philippines [6]. The failed rock mass consists of sheared and brecciated, volcanic, sedimentary, and volcanic clastics with a runout distance of 3.8 km and a volume of 15 million m^3 [5]. This destructive landslide occurred after five days continuous heavy rain and followed by a 4.3 magnitude earthquake [6]. The ease of the flow was enhanced by rice paddy fields in the valley [5,6].

Fig. 1. Comparing the Two landslides. *Top:* The Guinsaugon landslide in the Philippines. *Bottom:* Landslide in Capri Chasma, Valles Marineris. A: Zone of Detachment, B: Zone of Erosion, C: Zone of Accumulation

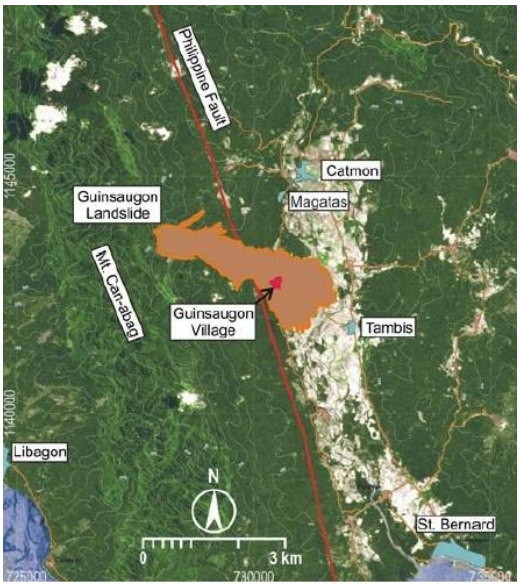

Fig. 2. Geologic Setting of the Guinsaugon landslide [6].

Approach: In this study, ArcGIS 9.3 was used to perform initial study of structures (e.g. faults, ridges, lateral levees, and craters) in Martian rockslide avalanches as showed by HiRISE images. The analog models of Shea and Wyk de Vries for subaerial terrestrial rockslide-avalanches were used to associate the structures in Martian landslides according to types of depositional morphology and landslide dynamics [7].

Based on accessibility, data availability, and previous studies, the Guinsaugon landslide is selected as the best Philippine analog to Mars to be studied that can give insights on the properties of non-volcanic rockslide-debris avalanche with large runout. This makes it possible for comparison with [2-4] large landslide processes in Valles Marineris.

Discussion: Through analog models, it is possible to compare landslides on Valles Marineris with the Guinsaugon landslide in terms of deposit morphology and landslide dynamics.

The Guinsaugon rockslide-debris avalanche is the most catastrophic single landslide event in the Philippines [6]. It has the largest runout among Philippine landslides to date, making it a possible analog example to study large landslides on Valles Marineris. According to Legros, such comparison is possible despite scale differences [1]. The lubricating medium of Martian landslides is still being debated [8], but the comparative analysis in the Guisangon landslide can provide insights on the combined effects of fluids, pore pressure discontinuities, and seismicity in triggering large rockslide avalanches on Valles Marineris.

In summary, although the two landslides have obvious differences,we can still gain insights from comparison. Thus, the structures, kinematics, and deposit morphology of landslides can be similar under different physical or environment conditions. This makes the Philippines a place with potential for terrestrial analog studies.

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