RECURRING SLOPE LINEAE FORMATION ON CHANGING SLOPES. J. A. Heydenreich[1], R. L. Mickol[1], J. C. Dixon[1, 2], V. F. Chevrier[1], and T. A. Kral[1,3], [1]Arkansas Center for Space and Planetary Sciences, 346 ½ N. Arkansas Ave., University of Arkansas, Fayetteville, Arkansas 72701, [jaheyden@uark.edu], [2]Dept. of Geological Sciences, 113 Ozark Hall, University of Arkansas, Fayetteville, Arkansas, 72701, [3]Dept. of Biological Sciences, 601 Science and Engineering Building, University of Arkansas, Fayetteville, Arkansas, 72701.

Introduction: Recurring slope lineae (RSLs) are dark streaks that appear on the martian surface annually [1]. They are hypothesized to be formed from liquid brine flowing downslope in the subsurface. Emerging from bedrock, RSLs occur on steep slopes during the warm spring-summer months and fade when the temperatures decrease in the winter. These features have been identified most commonly in the southern mid-latitudes facing the equator [1]. A distinguishable alcove is formed at the head of the RSL, continuing into a narrow channel and a depositional fan at the bottom of the feature [3].

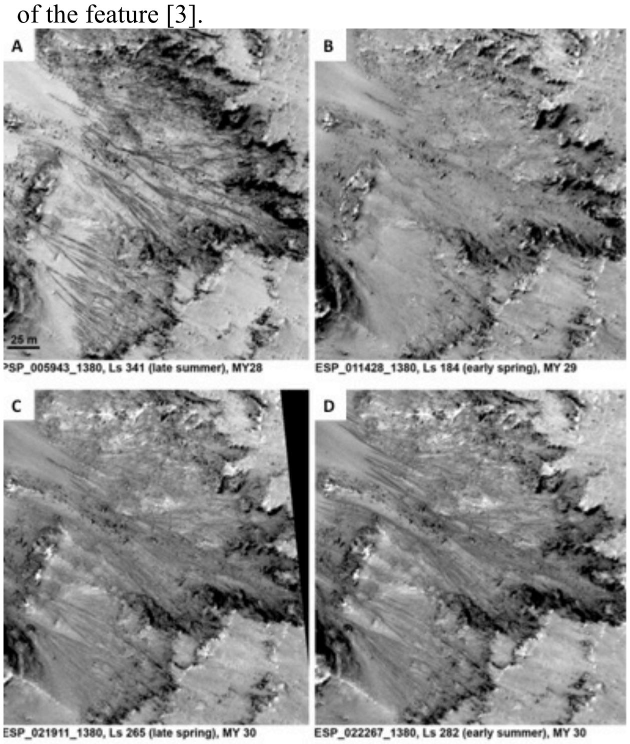

Figure 1: Represents the recurring properties of slope lineae. **A** shows the dark streaks appearing in Late Summer, fading in **B** and **C** in the following year Early Spring and then reappearing that Early Summer in **D.** Figure produced from [1].

The recurring characteristics of RSLs imply that not only are the RSLs dependent on seasonality, but they occur in the same location every year. The presence of recurring water could form suitable, near-surface environments for life [2].

RSLs are generally found on steeper slopes, however lower slopes are better candidates to find extant life. The lower slopes provide a better habitat for organisms or detritus because they are less likely to be flushed out from erosion [2].

Methods: In order to replicate RSLs on the martian surface, experiments were performed in a 0.67 m x 0.51 m wooden flume (Fig. 2). Each experimental run used 8.0 kg of martian regolith simulant, JSC Mars-1. The bulk density of the regolith inside the flume was approximately 1.02+/-0.02 g/cm^3 for each run.

For each run, 8.0 kg of Mars JSC-1 was weighed and added to the wooden flume. The flume was set to the desired height in order to achieve a slope of 12, 15 or 18 degrees. A water source was situated atop a ladder and connected to the flume using rubber tubing (Fig. 2). The rubber tubing was connected to a water flow regulator and the flow was maintained at 5-8 gallons/hour for each run. The entrance of the flume consists of the rubber tubing connected to a copper pipe centered at the top of the flume, just underneath the

Figure 2: The experimental apparatus showing the flume in the lower left corner and the water source in the upper right.

surface of the regolith. Ten separate runs were conducted at each of the three slopes. Each run lasted a total of 25 seconds.

Results and Discussion: The results from each experiment show channels of varying lengths, along with aprons and alcoves (Fig. 3). The channel length, on average, was 42.3+/-4.7 cm at 12 degrees, 36.6+/-9.1 cm at 15 degrees and 37.4+/-6.1 cm at 18 degrees (Fig. 4). The alcove is designated as the location where the water exits the copper pipe and creates a depression in the regolith. Alcove lengths averaged 1-3 cm at all slopes. The depositional fan creates an apron at the bottom of the RSL at an average length of 17-20 cm on all slopes. Although the lengths of the channels did not change drastically, the width of the stream channel decreased with increasing slope.

It has been observed that channel widths decrease as slope increases [1]. Thinner channels were noticeable with the highest slope at 18 degrees. Future work will test additional slopes in order to better mimic the steeper slopes associated with RSL formation. Additional martian simulant regoliths such as Mojave Mars Simulant and Mars JSC-2 will also be used.

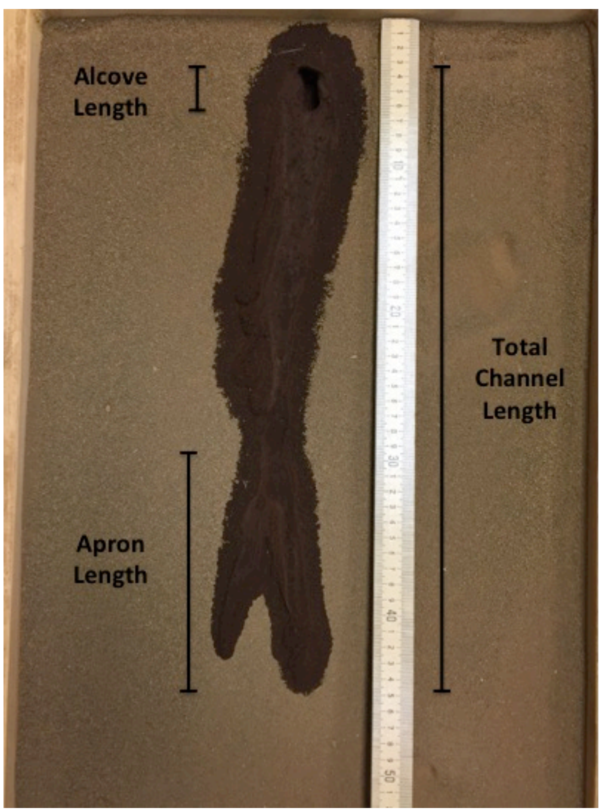

Figure 3: Gully formation following RSL simulation conducted with water for 25 seconds of a slope of 12 degrees. The alcove, total channel length and apron are labeled.

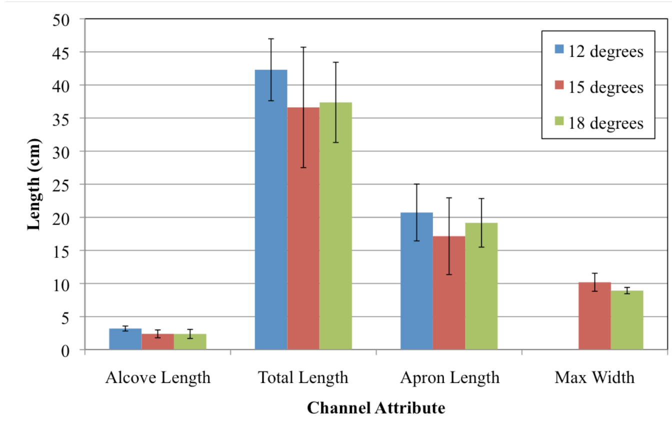

Figure 4: Average lengths (in cm) for each of four channel attributes (alcove, total length, apron and max width). Channel attributes correlate with lengths in Fig. 3. Measurements are averaged over ten runs for each slope. Error bars indicate one standard deviation.

Conclusion: There was no significant difference in the total channel, apron and alcove lengths at the varying slopes (12, 15, and 18 degrees). The width of the channels did appear to decrease with increasing slope. Further experiments will include steeper slopes and different types of martian analog regolith.

References: [1] McEwen, A. S. et al. (2001) *Science* 333, 740. [2] Stillman, D. E. et al. (2014) *Icarus*, 233, 328-341. [3] Dickson, J. L. et al. (2007) *Icarus*, 188, 315-323.