



Analysis of Rilles Formed by Dike Intrusion

Langham Creek High School

Ferminians

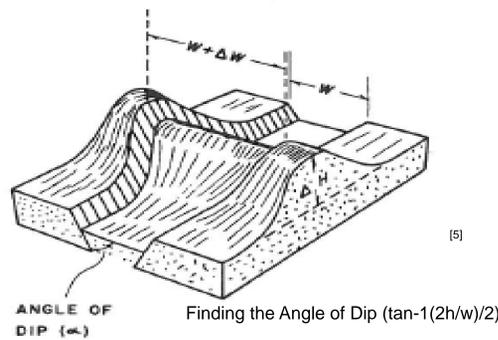
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1. Introduction

Rilles are channels in the Moon's surface. There are 3 types of rilles—straight, arcuate, and sinuous. Straight rilles are long, linear grabens, sunken trenches between two parallel faults.

Arcuate rilles are also grabens, though they have a smooth curve. They can usually be found in the maria, near the highlands.

It is possible that some grabens were formed by dikes, which are intrusions of magma that are now solidified. (Figs. 1, 2) If you know that a graben has a dike underneath it, you can find a low estimate of the dike's width. You can do this by finding two points on the graben with different elevations, then using the formula $1.5 \cdot d \cdot \tan(\tan^{-1}(2h/w)/2)$.^[3] The purpose of our research was to investigate what kinds of dikes can form grabens.



3. Comparisons

In 1997, Jackson, Wilson, and Head studied several grabens that they believed had dikes beneath them. They undertook this in an effort to test the possibility of using magnetic data to find dikes, as well as to continue the work that Head and Wilson did in 1993. As can be seen in this table (Fig. 5), the lowest potential dike width that was estimated was 43 m. Also, only 3 grabens were measured that had a potential dike width of less than 100 m. Rima Hevelius I had a low dike width of 38 m, and Rima Bode II had a low dike width of 14 m, both of which are lower than the lowest dike width estimated by Jackson, Wilson, and Head. However, Rima Hevelius I's dike is only around 5 meters less than the graben in Alphonsus's dike's width, and since this is a low limit, their widths may be the same. However, Rima Bode II's dike, with a low width of 14 m, is around 29 m smaller than the graben in Alphonsus's dike.

Rille Name	Dike Width (m)
Rima Sirsalis	413-534
25S, 28W	367-552
R. Mersenius III	374-422
25S, 25W	189-258
Rima Parry V	93-171
in Alphonsus	43-160
in Hipparchus	106-343
Rima Hyginus	194-346
Rima Ariadaeus	326-367
Rima Hypatia I	118-150
Rima Cauchy I	142-196
Rima Cauchy I	142-196
Fossa Messier	59-260

Fig. 5: Table of Dike Widths

4. Conclusion

The low limit of the width of the dike that created Rima Hevelius I is only 5 m smaller than the lowest probable dike width measured by Jackson, Wilson, and Head, it is possible that Hevelius I was formed by dike intrusion. Rima Bode II's implied low dike width was 29 m smaller than the lowest probable dike measured by Jackson, Wilson, and Head. This implies that either Bode II was not formed by a dike or that our sample size is not large enough to accurately judge the sizes of dikes that can form a graben.

5. Future Research

With an accurate method of finding pyroclastic materials, we would be able to find grabens formed by dike intrusion, as they are often near pyroclastic deposits. By estimating the sizes of additional dikes, we would have a better idea of what sizes of dikes can form grabens. This gives us a more definite answer on whether or not Rima Hevelius I and Rima Bode II were formed by dikes.



Fig. 2: Formation of Grabens

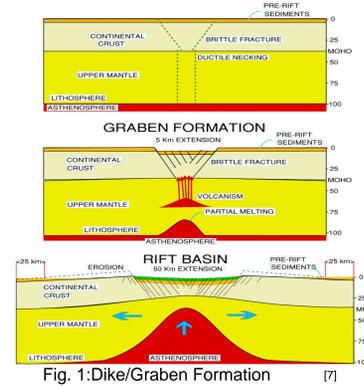


Fig. 1: Dike/Graben Formation [7]

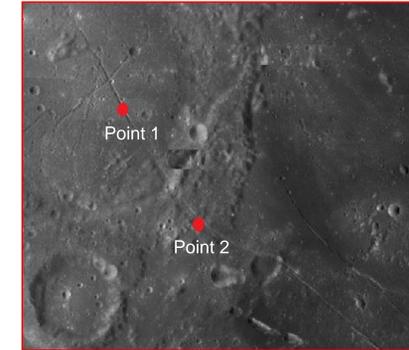


Fig. 3a: Points Used in Rima Hevelius I



Fig. 4a: Points Used in Rima Bode II

Fig. 3b: Point 1

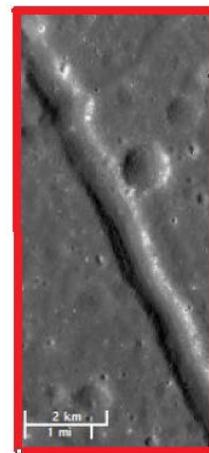


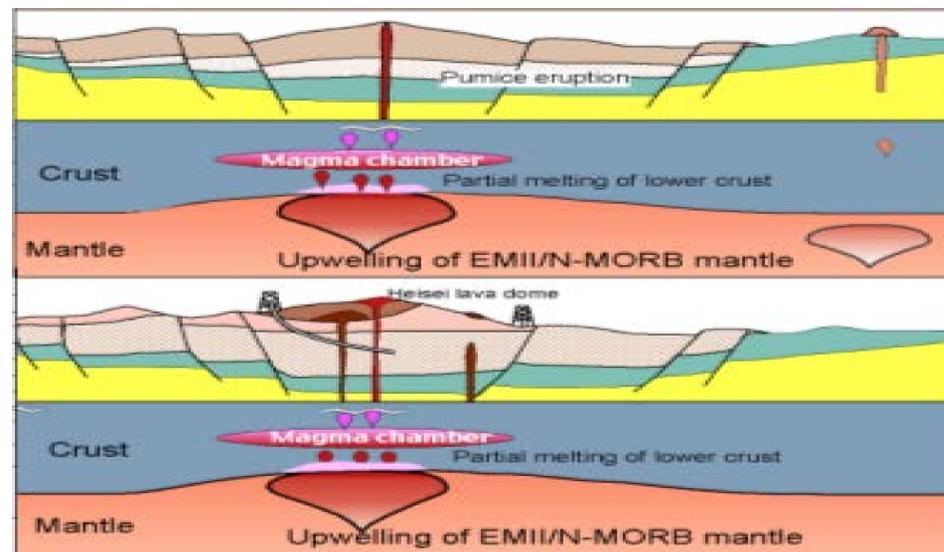
Fig. 3b: Point 2



Fig. 4b: Point 1



Fig. 4b: Point 2



Dike Formation [8]

Acknowledgements

Mr. Andrew Shaner
Dr. Debra Hurwitz
Ms. Deborah Fritz

Citations

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