



**CALIFORNIA STATE SCIENCE FAIR  
2005 PROJECT SUMMARY**

<b>Name(s)</b> <b>Ashley S. Hall</b>	<b>Project Number</b> <b>S0609</b>
<b>Project Title</b> <b>Mars Global Surveyor Image Analysis</b>	
<b>Objectives/Goals</b> The purpose of this project was to measure the ratio of dune spacing to dune height of sand dunes on Mars. I expected this number would be different than ratios from other areas on Mars. I analyzed a photo taken by the Mars Global Surveyor of an area of Mars called Ophir Chasma, containing sand dunes near the rim of a crater. I used geometry and trigonometry to determine that the average height of the dunes is $15.8 \pm 4.54$ meters and the average spacing is $36 \pm 8.28$ meters. The ripple wavelength to height ratio is $\sim 2.3:1$ . Due to the standard deviation, the ripple wavelength to height ratio could be as high as $3.9:1$ and as low as $1.4:1$ . This is smaller than the ratio found by other researchers. I have yet to conclude what affects this difference, whether it is the air on Mars, the wind, or the grain size and material. Other possibilities include the crater's affect on the dunes or the chance that there may be frozen water underneath the dunes that may have slightly melted causing the sand to stick together and increase the angle of repose, which would increase the height, which would decrease the ripple wavelength to height ratio.	
<b>Abstract</b>	
<b>Summary Statement</b> The purpose of this project was to measure the ratio of dune spacing to dune height of sand dunes on Mars and compare my results to those of other researchers.	
<b>Help Received</b> My astronomy teacher Mr. Jeff Adkins assisted me with some math techniques and some grammatical and organizational issues in the paper. Malin Space Science Systems and the Mars Global Surveyor Orbiter Camera-Narrow Angle provided the photo of the dunes on Mars. NASA provided the observations.	