THERMAL ANALYSIS OF AQUEOUS FEATURES ON MARS. D. Nguyen[1], K. Romero[2], N. Cassiani[3], J. Rogers[4], J. Lee[5], and E. Saribudak[6] [1]Klein Independent School District, Klein, Texas.

Introduction: Using high resolution day-time infra-red images from the Mars Odyssey Spacecraft's THEMIS IR camera (IR Images #'s: I08779012, I09389011, I10964001 and I08091021),the MSIP team attempted to address this question: Is there evidence that areas of higher temperature are more conducive to the formation of sinuous and dendritic features that appear to be caused by aqueous processes? (Klein HS MSIP Team, 2004)

Experimental Setup:

1) An image was targeted with the THEMIS camera, and the image was received and processed at the Mars Space Flight Facility at ASU.

2) A control image and two other archive images were selected to be analyzed in the project. The control image (I09389011) and the first archive image (I08091021) were chosen because they were both part of the Kasei Valles, an area with features known to have been formed by water. The locations of these images will help identify which features were more likely to have been formed by water. The other archive image was chosen, because it came from the same area as the original infrared image- Noctis Labyrinthus (targeted by the Mars Student Imaging Team through the Mars Student Imaging Project at the Mars Space Flight Facility at Arizona State University).

3) Next, data was collected from each image. Points were selected throughout all regions of the image. After transferring the image into the image analysis program , we were able to determine the pixel values for each point. The pixel values were then classified into two categories: sinuous features and non-sinuous features. Since the pixel value of a point is directly related to the actual temperature of that point on Mars, we decided to base our conclusions on the results of the pixel values. For each of the four images, a graph was created, charting the pixel values of sinuous features and pixel values of non-sinuous features on two different lines.

Results and Discussion: Results and Discussion: After examining the data and graphs, our hypothesis was proven incorrect. We initially hypothesized that there would be a direct correlation between sinuous features and higher temperature regions. The results from this experiment show otherwise; there is not a correlation between sinuous features and the temperature of a region. It indicated that sinuous features were randomly located in areas of all temperatures. For example, Figure 1 (I08091021) showed that the sinuous features had a relatively constant temperature. A non-sinuous feature though, was shown to have the highest pixel value.

Figure 1

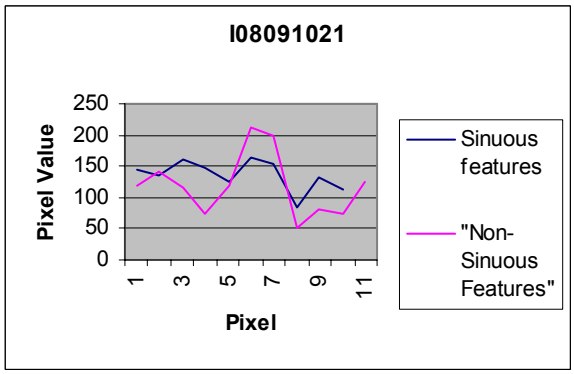


Figure 2 (I08779012) also showed that a non-sinuous feature also had the highest pixel value.

Figure 2

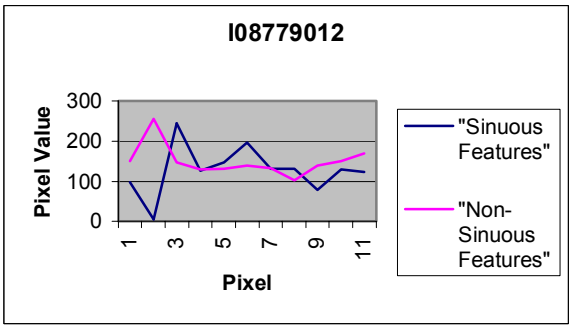


Figure 3 (I109389011) and Figure 4 (I10964011), on the other hand, clearly illustrated the unpredictability of pixel values from both sinuous and non-sinuous features.

Figure 3

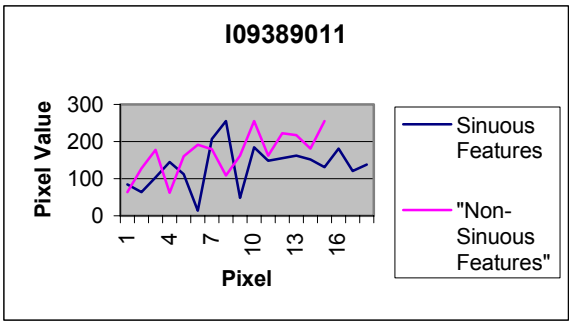
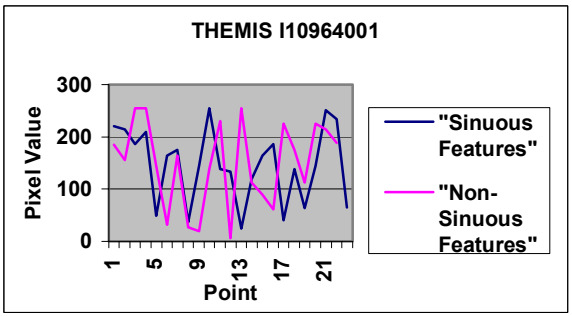


Figure 4



Therefore, areas of higher temperature are not more conducive to the formation of sinuous and dendritic features that appear to be caused by aqueous processes, but instead, an area's temperature appears to have no association with the formation of those features.

References: : [1] Bandfield, Joshua L., et.al. (2000) Science 3. [2] Christensen, Philip R., et.al. (2003) Science [3] Malin, Michael C. and Kenneth S. Edgett. (2003) Science [4] Phillips, Roger J., et.al. (2001) Science [5] Smellie, J.L. and M.G. Chapman. (2002) Volcano-Ice Interaction on Earth and Mars.