

Answer Sheet for Mars Hydrology – GIS

A. Local Hydrologic Environment (answer these questions for each grid):

- a. Which is the major direction of flow for this grid?
 - i. Kasei – east, Lucas – north, Margaritifer – northwest
- b. What % of the grid is covered by basins (10,000 pixels or greater)? By streams?
 - i. Kasei – 78% (b), 3% (s); Lucas – 80%, 4%; Margaritifer – 87%, 3%
- c. What is the highest stream order you found?
 - i. 5 (for all)
- d. Does the basin shape reflect topography or stream networks?
 - i. Kasei and Lucas – stream networks, Margaritifer – combination/topography
- e. What is the drainage density for this grid? Is the drainage density value high (closer to 1) or low (closer to 0)? What does this mean?
 - i. First must compute stream length totals: Kasei = 5,959 km, Lucas = 8,059 km, and Margaritifer = 5,563 km.
 - ii. Must compute total basin areas: Kasei = 67,935 km², Lucas = 69,637 km², Margaritifer = 75,023 km².
 - iii. Drainage density: Kasei = 0.09, Lucas = 0.12, Margaritifer = 0.07; all low.
- f. Would you say that this area has a highly developed stream network or a poorly developed network?
 - i. Lucas and Kasei show evidence for moderately developed systems, Margaritifer poorly.
- g. Suggest a comparable hydrologic environment on Earth for this grid compatible with the results of your analysis.
 - i. Answers vary. Some suggestions – Kasei: stream; Lucas: delta, stream network; Margaritifer: flood zone.

B. Global Hydrology

- a. Where would most water on Mars drain towards?
 - i. Towards the Northern Plains
- b. Do these systems connect?
 - i. Answers vary. Should have supporting evidence either way.
- c. Can you suggest a global history of surface flow for Mars based on these three different hydrologic environments?
 - i. Answers vary.