Control/Tracking Number : 12-RC-85-AAS-DPS
Activity :Research Contributed
Current Date/Time : 7/11/2012 5:43:03 PM

Title:
Hesperian-Amazonian Transition Mid-latitude Valleys: Markers Of A Late Martian Climate Optima?

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Abstract:
Recently the inventory of fluvial features that have been dated to the late Hesperian to early Amazonian epoch has increased dramatically, including a reassessment of the ages of the large alluvial fans and deltas (e.g., Eberswalde) to this time period. Mid-latitude Valleys (MLVs) are distinct from the older, more integrated Noachian-Hesperian Valley Networks which are deeply dissected, are generally of much larger spatial extent, and are more degraded. Although some MLVs involve rejuvenation of older Valley Networks, many MLVs are carved into smooth or rolling slopes and intercrater terrain. The MLVs range from a few meters to < 300 m in width, with nearly parallel valley walls and planforms that are locally sinuous. Although the MLVs in Newton and Gorgonum basins extend from the basin rims up to 75 km into the basin interior, most MLVs are shorter and often discontinuous.
The occurrence of widespread MLVs suggest the possibility of their formation during one or perhaps more regional to global climatic episodes, possibly due to melting of seasonal to long-term accumulations of snow and ice. Temperatures warm enough to cause extensive melting may have occurred during optimal orbital and obliquity configurations, perhaps in conjunction with intensive volcanism releasing moisture and greenhouse gasses, or as a result of a brief episode of warming from a large impact. The concentration of MLVs to the northern and western basin slopes of Newton and Gorgonum basins suggests a possible aspect control to ice accumulation or melting. MLV activity occurred about at the same time as formation of the major outflow channels. A possible scenario is that delivery of water to the northern lowlands provided, through evaporation and sublimation, water that temporarily accumulated in the mid-southern latitudes as widespread ice deposits whose partial melting formed the MLVs and small, dominantly ice-covered lakes.

Category:
Mars: Surface and Interior

Facility Keywords:

Additional Information (Complete):
Did you give a contributed presentation in 2010 (Pasadena)?: No
Did you give a contributed presentation in 2011 (Nantes)?: Yes - oral
Student Status: None
I am willing to serve as a Chair: No
I have a video for Press Officer review: No
Newsworthy?: No

Status: Complete