Figure 2.8 Possible glacier near Hellas at 38° S, 104° E. Material has flowed from an alcove in the upper right of the image, south through one crater into another larger crater. Flow over such distances requires substantial fractions of ice. One issue is whether the ice was derived by precipitation that accumulated in the alcove or whether the ice was shed from the massifs around the alcove (HRSC).

the northwest volcano flanks are preferred sites for precipitation of ice during periods of high obliquity (Forget et al., 2006).

While the geologic evidence for large fractions of near-surface ice at high latitudes (>60°) is compelling, and confirmed by direct observations, numerous issues remain. Geomorphic indicators of flow, such as lobate debris aprons, lineated valley fill, and concentric crater fill, suggest large (>30%) fractions of near-surface ice may also be present under a dehydrated layer down to latitudes as low as 30°. The thickness of the ice-rich layer is however undetermined. It could fill bedrock pores to substantial depths (hundreds of meters to kilometers) or be restricted to the interstices of the uppermost fragmental materials. Also unclear is when the ice accumulated. Crater counts indicate that ice-abetted flow has been occurring for at least several hundred million years. Some of the ground ice could have accumulated as early as in the late Hesperian, a consequence of the large floods, or even earlier, the result of the changes in surface conditions at the end of the Noachian. Alternatively it may have accumulated entirely during the Amazonian as a consequence of deposition during obliquity highs.

2.6.3 Fluvial activity

Although the main era of outflow channel formation was over by the end of the Hesperian, a few younger outflow channels have been identified, and more will likely