

hemisphere, the question remains as to whether the glacial high-stand interpreted by Dickson et al. (2008) was an isolated occurrence or whether other regions show similar deposits consistent with glaciation and kilometer-scale ice thicknesses. In this paper, the high resolution and large spatial footprint of HRSC (Neukum et al., 2004; Scholten et al., 2005) provides context for the analysis of a second example of a hanging valley filled with glacial-like lobes of comparable inferred past thickness at the contact between the Phlegra Montes and the northern lowlands. HRSC coverage of nearby craters reveals similar landforms that suggest that such massive glaciation was regional, not local.

2. Context and background

The Phlegra Montes trend north–south from the easternmost extent of the Elysium rise northwards into the northern lowlands, from $\sim 30^\circ\text{N}$ to $\sim 52^\circ\text{N}$ (Fig. 1A) (Greeley and Guest, 1987; Tanaka et al., 1992). The

flanks of these mountains frequently exhibit LDAs (Head et al., 2010–this issue; Safaeinili et al., 2009), and impact craters in the region host CCF (Squyres, 1979; Levy et al., 2009). To the northwest of the Phlegra Montes, at the contact with the Vastitas Borealis Formation (42.9°N , 157.8°E), is a ~ 32 km diameter impact crater with a smaller (~ 8 km diameter) impact crater superposed on its northeastern rim (Fig. 1B). The topography is such that the floor of the younger, superposed crater is elevated with respect to the floor of the larger, older crater (Figs. 1b, 2A). While the rim of the larger crater is still preserved, the walls and floor have been heavily modified and exhibit the well-defined concentric ridged terrain that is characteristic of CCF (Fig. 2). The wall itself is heavily dissected with broad ~ 250 m wide valleys incised into it around much of the crater (Fig. 2). The easternmost wall of the crater shows evidence for coalescing of flows, constriction between obstacles (Figs. 2, 6), and a series of convex up lobes on the floor of the crater (Fig. 2). The center of the crater floor is characterized by cusped pitting and several “ring-mold

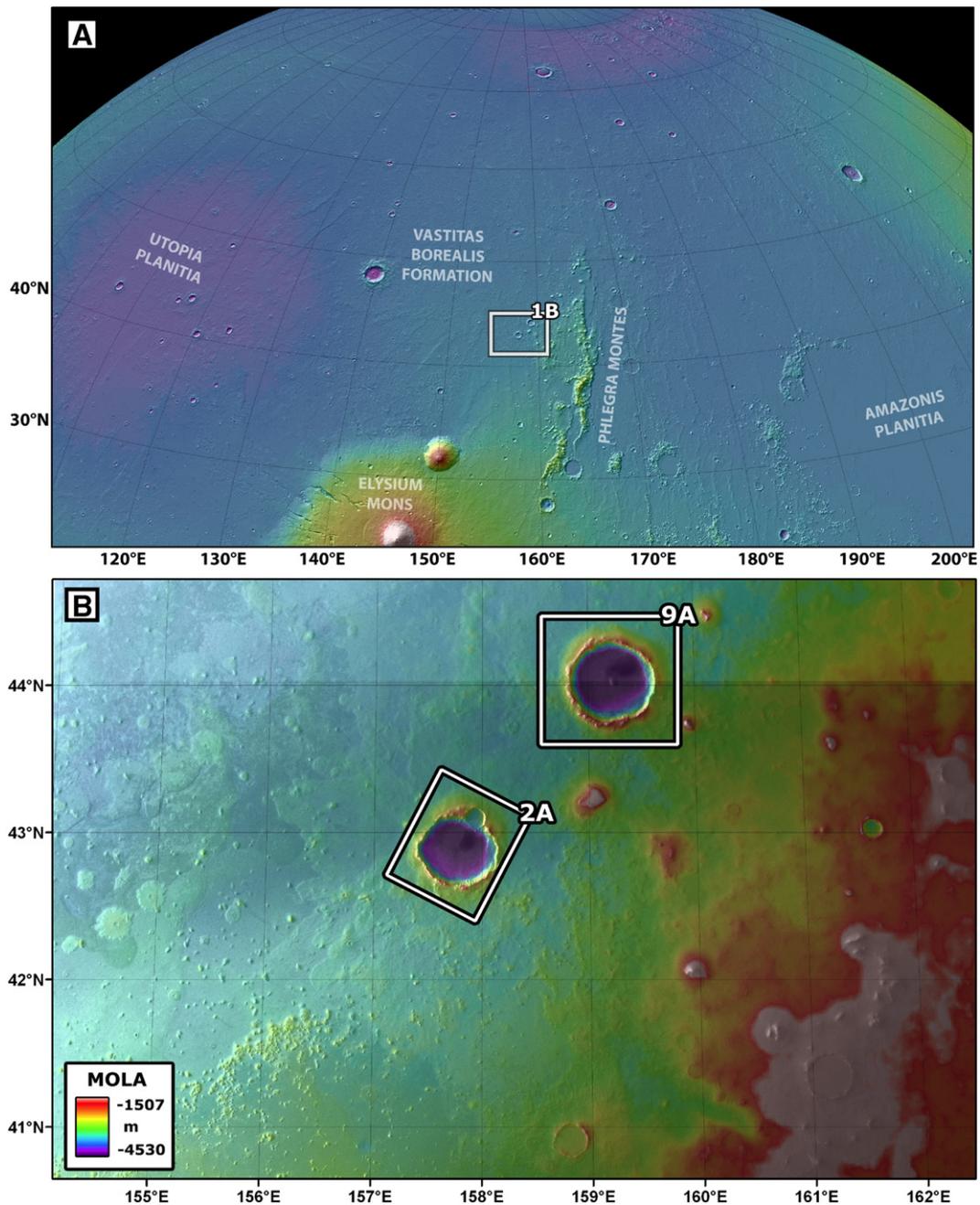


Fig. 1. A) MOLA topography over MOLA shaded relief of part of the northern hemisphere of Mars, centered at 160°E . B) MOLA topography over HRSC image 2841_0000, showing the study area at the contact between the Phlegra Montes to the east, and the Vastitas Borealis Formation to the west.