Post-deposition (and ongoing?) modification of Caloris ejecta blocks

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POST-DEPOSITION (AND ONGOING?) MODIFICATION OF CALORIS EJECTA BLOCKS. J. Wright¹, S. J. Conway², D. A. Rothery¹ and M. R. Balme¹, ¹School of Physical Sciences, The Open University, Milton Keynes, MK7 6AA, UK. ²CNRS, Laboratoire de Planétologie et Géodynamic, Université de Nantes, France.

Introduction: Mercury’s circum-Caloris region hosts numerous kilometer-scale knobs [1]. If these landforms, peculiar to Caloris, are its ejecta, then they can provide insight into the deep materials of the planet.

Observations: Circum-Caloris knobs are found up to ~1000 km from Caloris, but they are more densely distributed near the rim [2] (Fig 1a). They are up to ~10 km in diameter and are domal to conical in shape. They can be discrete or coalescent, and exist in isolation, clusters or, importantly, chains radiating from Caloris. This suggests the knobs are ejecta blocks.

Most knobs host few resolvable superposing impact craters, even at MESSENGER’s NAC [3] resolution, on their steep (~20°) upper flank slopes (Fig. 1b). They often have lower-angle basal slopes that grade into the surroundings. Some seem to bury nearby craters (Fig. 1c). These observations suggest mass-wasting modification.

Block modification may have taken place long after their formation, and is possibly ongoing. Knob material abuts a lobate scarp that deforms the Caloris plains, which resolvably post-date the Caloris impact [1]. Hollows (geologically young landforms believed to form by the sublimation of a crustal volatile [4]) are found on knob material, suggesting this Caloris ejecta has a volatile component. We hypothesize that volatile loss plays a role in the ongoing modification of the conical knobs. Thus, their geomorphology may help constrain the enigmatic volatile content of Mercury’s deep interior.

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