Candidate constructional volcanic edifices on Mercury

Jack Wright¹, David A. Rothery¹, Matt R. Balme¹, Susan J. Conway²

¹School of Physical Sciences, The Open University, Milton Keynes, MK7 6AA, UK
²CNRS, Laboratoire de Planétologie et Géodynamique, Université de Nantes, France

1. Mercury’s missing volcanoes?

Smooth plains, broadly interpreted as volcanic in origin, cover ~26% of Mercury’s surface [1] (Fig. 1). Despite widespread volcanism, no constructional volcanic edifices have been robustly identified on Mercury to date [2] (Fig. 2–4). Here, we describe two candidates that we have found (Fig. 5) and discuss how they might have formed.

2. Candidate Volcano #1 ('CV1')

- Fig. 5. (a) CV1. A peak-like landform with a shallow summit crater. (b) A diffuse, red color anomaly coincides with CV1.

3. Candidate Volcano #2 ('CV2')

- Fig. 9. (a) CV2 lies in the northwestern rim of Caloris. (b) MLA data used in the topographic profile C–C’ shown in Fig. 10 and Fig. 12.

4. Comparative planetology

- Fig. 12. Comparison of Mercury candidate volcanoes with small volcanoes on Earth and the Moon. The Mercury landforms have sizes comparable to Skjaldbreidur, an Icelandic shield volcano, and slopes intermediate between shield volcanoes (e.g. Skjaldbreidur and Hortensia 5) and lunar cinder cones (e.g. Marius Hills cones).

5. Conclusions

Even if CV1 and CV2 prove not to be volcanoes, the fact that edifices are rare on Mercury is important. Early eruptions generated LIP-like plains. This eruption style does not typically construct edifices. Large-scale effusions waned abruptly due to global contraction [9]. The lack of edifices may be because Mercury mostly lacked a longer ‘waning’ stage of volcanism (Fig. 13), thought to have been important for construction of lunar edifices [10].

References:

Acknowledgements: JW is funded by UK Science and Technology Facilities Council (STFC) training grants ST/N05421X/1. JW is grateful to the Royal Astronomical Society (RAS) for awarding him a RAS Small Grant to attend this meeting. JW is also grateful to the UK Remote Sensing Society and the British Society for Geomorphology for additional funding provided during the course of this work.