BANDING AND TERRACING IN LOWER MOUNT SHARP (AEOLIS MONS), GALE CRATER: COMPARISONS TO RECENTLY-EXPOSED STRANDLINES IN LAKE MEAD, SW USA.

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Introduction: Banding and terracing in lower Mount Sharp is generally interpreted as representing stratigraphy within the mound [e.g., 1-3]. We find a striking similarity in planform and profile shape between these features and very young terrestrial strandlines in the American southwest that have been exposed during the drought of the last several years.

Many of these bands define prominent terraces that can be traced nearly to closure around the mound, potentially providing chronostratigraphic markers [2,3]. However, comparing orbital imagery and digital elevation models with ground-based views from Curiosity's Mastcam suggests much of the banding might instead reflect recessional strandlines and buttressed remnants of now-largely-deflated plains materials that may not extend into the subsurface.

Resistant horizons that parallel the upper surface of the mound can be identified in several erosional pits and along flanks of many of the butte "foothills" of Mt Sharp. These surfaces suggest that Mt Sharp was emplaced as a mound that may not have been more than a few percent larger than the modern remnant. If this interpretation is correct, it suggests that the mound likely never extended across the crater and into the surrounding highlands.

Regional Topography: Gale lies on the north-sloping margin of the cratered highlands, straddling the scarp between highlands and lowlands at Aeolis Mensae (Fig1). Mount Sharp and an unusually tall central peak dominate the interior of the crater, with most of Mount Sharp being in the north half of the crater.

Banding and Terracing in the lower mound: The terracing that is most often discussed is expressed as prominent albedo banding and/or topographic terracing in the lower portion of the mound. It is this characteristic that is most often interpreted as differential erosion of stratigraphy within the mound (Fig2A). The terraces exhibit a gentle tilt outward from the mound of a few degrees or less.

"Mound-Conformal" Stratigraphy: When the terraces are examined closely in perspective (using CTX and HiRISE images and DEMs), other terraces and resistant structures can be identified in several places around the mound that appear subparallel to the upper surface of the mound (Figs 2B,C). These resistant structures appear to be stratigraphy concentric with the mound form and that cut across the sub-horizontal banding usually attributed to stratigraphy. We suggest that the mound-conformal structures are actual stratigraphy within the mound, and that the prominent banding and terracing is eroded into the lower mound, but does not extend into the subsurface.

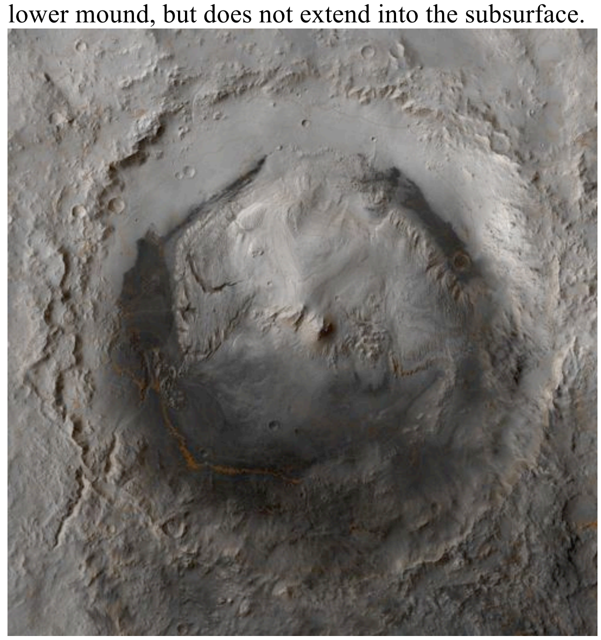


Fig 1: CTX orthoimage/DEM mosaic (Parker and Calef). Mount Sharp is a "fat boomerang"- shaped feature oriented with its "horns" pointing downwind to the south, along Gomer Sinus. Most of Mt Sharp is north of the central peak.

Onlaps of material onto elevated terraces: In several places around the mound, marker horizons can be seen to consist of onlapping relatively bright deposits onto the terrace, with a lobate front and slylight elevated rampart on the upslope side (Fig 2D).

Cuspate shape of terraces across reentrants: Most of the banding and terracing in the lower mound exhibits a cuspate or arcuate planform in HiRISE images (Fig2A). This is similar to the plan form of terrestrial strandlines produce through a combination of wave refraction around headlands and erosional and depositional reworking of pre-existing materials. This differs from the more "U-shaped" valleys in the upper mound, which often separate yardang-like structures and appear to be eolian fluting of sediment. In Lake Mead, at which very young strandlines have been exposed during the current drought in the SW US, The difference in erosional of topography above and below the highest lake level is more obvious, since erosion is dominated by fluvial runoff above the highstand, and wave erosion below it. Strandlines at Lake Mead either cut at angles to local bedrock stratigraphy, or may trend parallel to it (as in Fig 3), but nevertheless display distinguishing characteristic morphologies that can help to distinguish them from one another.

References: [1] Malin M. C. and Edget K. E. (2000) *Science*, 8, 1927-1937. [2] Milliken R. E. et al. (2010) *GRL* 37, 6p. [3] Anderson R. B. and Bell J. F. (2010) Mars 5, 76-128.

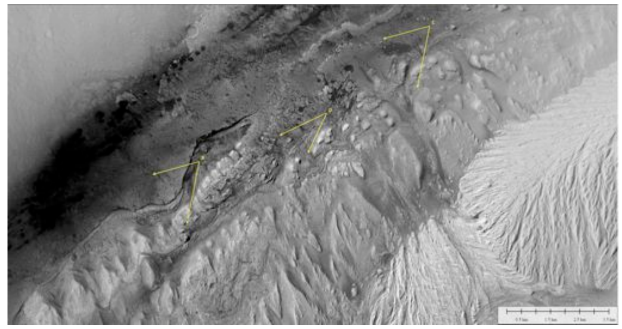
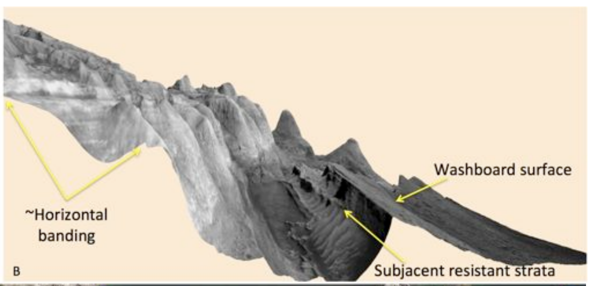
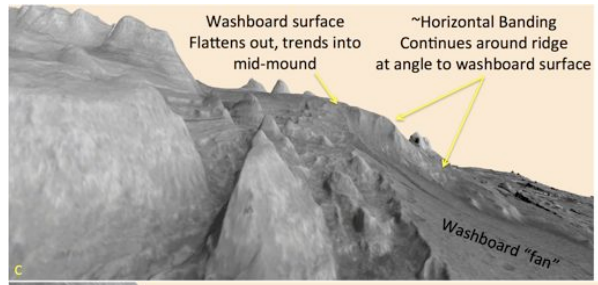
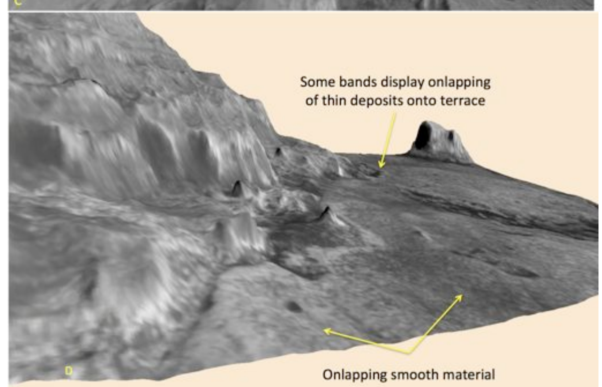


Figure 2A: Portion of lower Mt Sharp SW of Curiosity's current location, showing prominent "canyon" feature to which the rover is heading (right of center). Perspective view locations B-D are indicated.







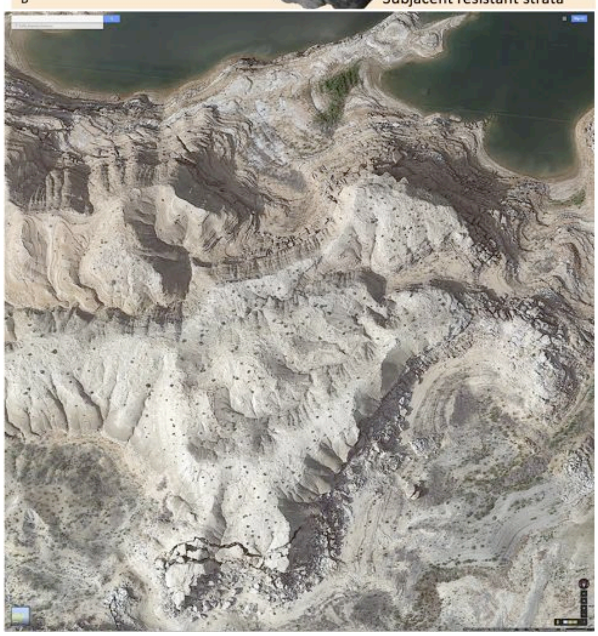


Figure 3: Lake Mead, Nevada. Recent strandlines exposed due to current drought in SW USA. Note arcuate shape of banding (strandlines) below maximum lake level.