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 (Fig 1). 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 eolian fluting of sediment. In Lake Mead, strandlines produce thin (<1 m) cuspate or arcuate planform in HiRISE images (Fig 2A). 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

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 stylolite 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 (Fig 2A). 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.
trend parallel to it (as in Fig 3), but nevertheless display distinguishing characteristic morphologies that can help to distinguish them from one another.


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.