Appendix 17

Planation Surfaces Uinta Mountains

The Uinta Mountains in northeast Utah are only one of three major east-west ranges in the Western Hemisphere. They are one of about 100 mountain ranges that make up the Rocky Mountains of the United States. The Uintas are similar in many ways to other mountain ranges in the Rockies in that they have significant uplifts immediately adjacent to deep basins.

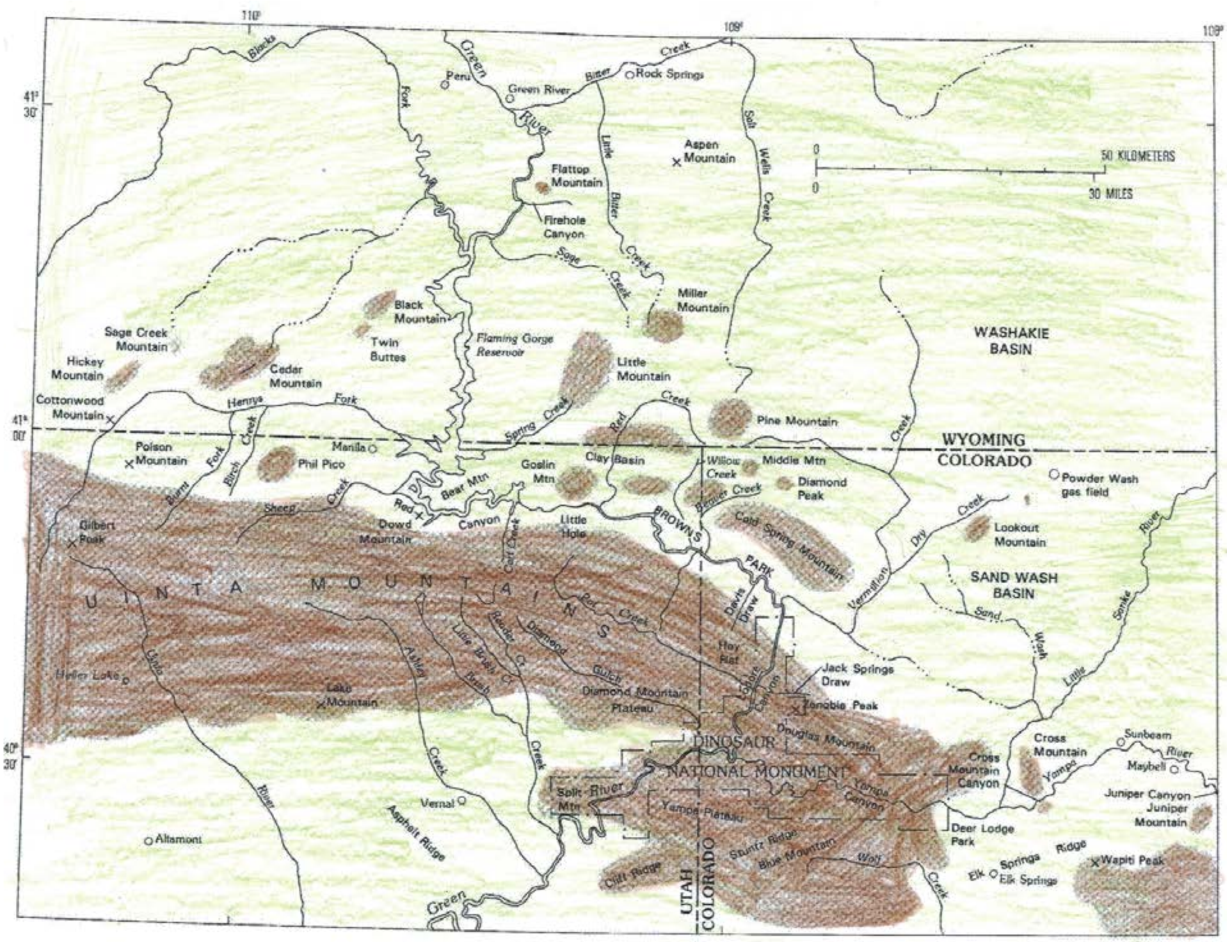

Figure A17.1. Regional setting of the Uinta Mountains with principal features. Grey represents mountainous areas (from Hansen, 1986, p. 4).

The Uinta Mountains are about 100 miles (160 km) east of Salt Lake City, Utah, and range in height from 11,000 to 13,500 feet (3,400 to 4,100 m) with Kings Peak the highest at 13,528 feet (4,123 m), also the highest point in Utah. They extend about 125 miles (200 km) east-west and 40 miles (60 km) north-south in northeastern Utah and extreme northwestern Colorado. The northern boundary is on the southern border of Wyoming (Figure A17.1). The Uinta Mountains are broadly arc-shaped, and concave to the south.[1,2] They are composed of a western, higher dome and an eastern lower dome. The eastern dome collapsed and formed the generally east-west Browns Park valley, which was then in-filled with about 2,000 feet (600 m) of sandstone, with interbedded volcanic tuff and conglomerate[1] High peaks surround most of Browns Park, but it is open to the southeast. The southeast portion of the Uinta Mountains extends out from the main axis and is composed of several anticlines, synclines, and thrust and reverse faults. On the extreme southeast edge of the Uinta Mountains is a steeply-dipping bed (to the south) on the Split Mountain anticline that is Dinosaur National Monument, a dinosaur graveyard in sandstone.[3]

Figure A17.2. The Wild Mountain upland surface at the top of Cross Mountain, a north-south mountain just to the east of the Uinta Mountains. The lower flat surface is the Gilbert Peak erosion surface capped by Bishop Conglomerate.

An examination of the geology of the area suggests the history of the Uinta Mountains can be explained by three phases: (1) the formation and filling of a deep basin; (2) rapid deposition of thick, undeformed strata on top of the deep basin fill; and (3) massive uplift of the area by about

[1] Hansen, W.R., 1986. Neogene tectonics and geomorphology of the Eastern Uinta Mountains in Utah, Colorado, and Wyoming. *U.S. Geological Survey Professional Paper 1356*, Washington, D.C.
[2] Hansen, W., 2005. *The Geologic Story of the Uinta Mountains.* Falcon guide, Guilford, CN.
[3] Untermann, G.E. and B.R. Untermann, 1969. *Popular Guide to the Geology of Dinosaur National Monument*. Dinosaur Nature Association, Dinosaur National Monument, UT/CO.

40,000 feet (12,200 m) accompanied by folding, faulting, massive erosion, and the formation of unique landforms.[4] A global cataclysm better explains the evidence than gradualism, and each of these geological phases provides insight into what happened in the Flood.

There are two planation surfaces in the Unita Mountains.[5] One is at and near the tops of the Uinta Mountains and one is along the edge of the mountains, more like a huge pediment. Initial confusion over the number and names of the planation surfaces has gradually been resolved. Wilmot Bradley thought there were four, and he called the *highest* the Gilbert Peak erosion surface.[6] But he also recognized that extensive faulting and warping had made the identification and correlation of surfaces difficult. Some have suggested that there is only one planation surface—the Gilbert Peak. However, there does seem to be two distinct planation surfaces.

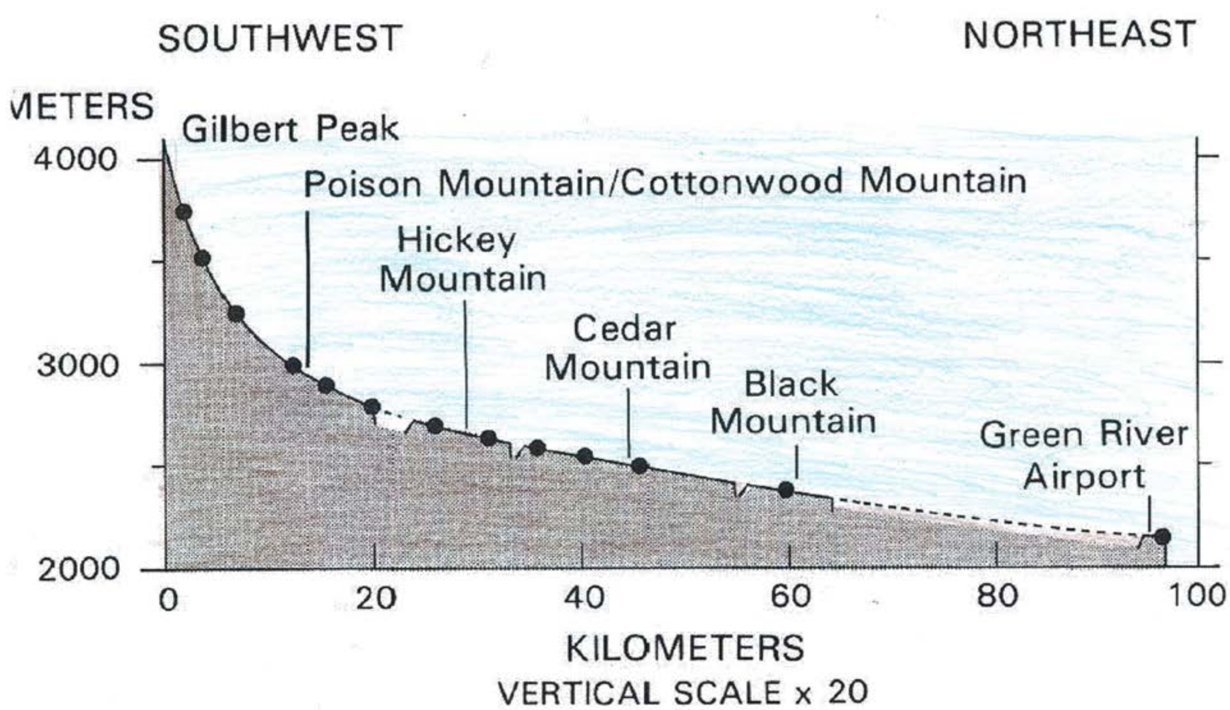

Figure A.17.3. Location of remnants of the Gilbert Peak erosion surface from around Gilbert Peak northward to the town of Green River (from Hansen, 1986, p. 10)

Wild Mountain Upland Planation Surface

Summit flats or planation surfaces occur on top of the Uinta Mountains as well as many ranges in the Rocky Mountains[7] and the world. Their origin has been a mystery to uniformitarian

[4] Oard, M.J., The Geology of the Uinta Mountains and the Flood. *Creation Research Society Quarterly* (in press).
[5] Oard, M.J., The Geomorphology of the Uinta Mountains: implications for Flood Geology. *Creation Research Society Quarterly* (in press).
[6] Bradley, W.H., 1936 Geomorphology of the north flank of the Uinta Mountains. *U.S. Geological Survey Professional Paper 185—I*, Washington D.C.
[7] Small, E.E. and R.S. Anderson, 1998. Pleistocene relief production in Laramide mountain ranges, western United States. *Geology* 26:123–126.

geomorphology for over 100 years.[8,9] Most think these surfaces formed in the mid to late Cenozoic, but there is no convincing explanation or mechanism for them.

The summit flats on top of many of the mountains in the Uinta Mountains cover 75 mi^2 (193 km^2) and occupy 43% of the unglaciated areas above 11,000 feet (3,400 m). Most likely they are erosional remnants of a single pre-existing large planation surface.[10] The summit flats and highest elevations of the Uintas remained unglaciated during the Ice Age. This is shown by pattern ground, polygonal-shaped cracks filled with debris, and uneroded blockfields, a thin accumulation of angular blocks of the bedrock.[11] All of these features are indicative of a cold climate in an unglaciated area. Instead, glaciers were restricted to the high valleys with lobes extending down to lower valleys.

Wallace Hansen called the summit flats the Wild Mountain Upland Surface.[2] Like most planation surfaces it truncates the underlying formations without regard to rock structure or hardness. The surface follows the eastward plunge of the Uinta anticline, and likely extends as far as Cross Mountain, a north-south ridge just east of the Uintas (Figure A17.2).

Figure A17.4. The Gilbert Peak erosion surface with little Bishop Conglomerate on top in the background along the northern edge of the Uinta Mountains. View north across Red Canyon cut into the Uinta Mountain Group quartzite and the path of the Green River, now occupied by the water of Flaming Gorge.

[8] Madole, R.F., W.C. Bradley, D.S. Loewenherz, D.F. Ritter, N.W. Rutter, and C.E. Thorn, 1987. In, Graf, W.L. (editor), *Geomorphic Systems of North America*. Geological Society of America Centennial Special Volume 2, Boulder, CO, pp. 211-257.

[9] Mears, B. 1993. Geomorphic history of Wyoming and high-level erosion surfaces. In Snoke, A.W., J.R. Steidtmann, and S.M. Roberts (editors), *Geology of Wyoming*, Geological Survey of Wyoming Memoir No. 5, Laramie, WY., pp. 608-626.

[10] Munroe, J.S. 2006. Investigating the spatial distribution of summit flats in the Uinta Mountains of northeastern Utah, USA. *Geomorphology* 75:437-449.

[11] Munroe, J.S. 2007. Properties of alpine soils associated with well-developed sorted polygons in the Uinta Mountains, Utah, U.S.A. *Arctic, Antarctic, and Alpine Research* 39(4):578-591.

The Gilbert Peak Erosion Surface

The second, lower planation surface is called the Gilbert Peak erosion surface. It is actually a very large dissected pediment most prominent on the north side of the Uintas.[1] It was named by Wilmot Bradley based on his investigation of extensive remnants on the north and west slopes of Gilbert Peak on the north flank of the western Uintas.[6] It slopes gradually northward and traces are found about 60 miles (100 km) north (Figure A17.3). Large portions of the planation surface, especially close to the mountains, are bare rock (Figures A17.4 and A17.5) and most of the surface is capped by the Bishop Conglomerate.

Figure A17.5. A lake on the Gilbert Peak erosion surface with the higher northeastern Uinta Mountains in the background (view south).

The Gilbert Peak erosion surface truncates hard and soft rocks of all ages.[1,6] Figure A17.6 shows truncated strata at Diamond Mountain Plateau, a remnant of the Gilbert Peak erosion surface. It is also capped by Bishop Conglomerate with red quartzite boulders up to 6.5 feet (2 m) in long dimension. Hansen states:

> The Gilbert Peak surface truncates hard and soft rocks alike, with little regard for lithology or structure, although resistant rocks stand well above the surface locally as hogbacks or monadnocks.[12]

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[12] Hansen, Ref. 1, p. 10.

The monadnocks are usually close to the mountains. Since modern day erosion preferentially erodes soft rocks, resulting in the dissection of the landscape, not the formation of planation surfaces, such indiscriminate erosion is a mystery for uniformitarian geology.

Figure A17.6. Diamond Mountain in the southeast Uinta Mountains where the Gilbert Peak erosion surface truncates south dipping strata at about a 15° angle.

Once the widespread Gilbert Peak erosion surface formed, it was greatly dissected, especially on the north side of the Uintas. The remnants are capped by the Bishop Conglomerate that was deposited at the time of pediment formation by powerful currents, based on the large size of the boulders.

The Gilbert Peak erosion surface before dissection was well developed on the north side of the Uinta Mountains. Because of faulting and erosion, the surface that once gently slope northward and eastward now slopes southward on the northeast side of the Uintas. The age of the surface is regarded as Oligocene by uniformitarian geologists,[1] yet it shows very little erosion:

> The tops of these mesas [just north of the Uinta Mountain axis] are slightly dissected by differential erosion, mostly along shaley zones, but viewed from a distance, most of them appear as almost perfectly flat plains. Cold Spring Mountain is especially noteworthy, but Dutch John Bench alone is almost pristine, virtually unaltered by erosion since middle

Tertiary time. Being bare of gravel, except locally, all these remnants must have been near the mountainward limit of the pediment…[13]

These pristine features indicate youth, not the Oligocene age (about 30 Ma) they are given. Figure A17.7 shows the flatness of the erosional remnant of the Gilbert Peak erosion surface on Dutch John Bench, where there is an airport. Figure A17.8 shows that the surface bevels northward dipping the quartzite of the Uinta Mountain Group.

It is interesting that the eastern Pyrenees Mountains, as well as many other mountain ranges, are generally similar to the eastern Uinta Mountains in that they have a dissected mountain top planation surface and a lower altitude pediment along the edge of the dissected mountains.[14]

Figure A17.7. Dutch John bench, an erosional remnant of the Gilbert Peak erosion surface, which is so flat that an airport was built on top of it (view west).

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[13] Hansen, Ref. 1, p. 12.

[14] Calvet, M. and Y. Gunnell. 2008. Planar landforms as markers of denudation chronology: an inversion of East Pyrenean tectonics based on landscape and sedimentary basin analysis. In Gallagher, K., S.J. Jones, and J. Wainwright (editors), *Landscape Evolution: Denudation, Climate and Tectonics over Different Time and Space Scales*, pp. 147-166. Geological Society of London Special Publication 296, London, U.K.

Figure A17.8. The north edge of Dutch John bench showing the northward tilt of the Uinta Mountain Group quartzite (view west).