Chapter 39

Central U.S. Planation Surfaces

The central United States, from the eastern edge of the Rocky Mountains to the Appalachian Mountains, is predominantly flat. It is likely the entire central United States represents one or more planation surfaces, but discerning this is difficult since in many areas the sedimentary rocks are also generally flat (planation surfaces are easier to spot on tilted sedimentary rocks). However, there are a few areas where the planation or erosion surface stands out, for example like Ozark Plateau mostly in southern Missouri and northern Arkansas, and the Osage Plains of northeast Oklahoma, eastern Kansas, and northwest Missouri where the strata are locally tilted and the planation surface eroded horizontally.

Figure 39.1. Terrain around Buffalo Creek on the Ozark Plateau (Wikipedia). Notice that the ridges are about the same elevation.

Ozark Plateau

The Ozark Plateau, also called the Ozark Mountains, is a deeply dissected plateau. Folds and faults are common in the Ozark Plateau Province. The area itself is thought to be a broad dome around the Saint Francois Mountains.[1] It is about 250 miles (400 km) in diameter and covers an area of about 47,000 mi^2 (122,000 km^2). The top of the dome has a relief of less than 100 feet (30 m), but is dissected by major streams as much as 500 feet (150 m). The area between the canyons is a planation surface as observed by the same elevation of the ridges (Figure 39.1):

> Near accordance of interstream tract altitudes, along with the fact that their surfaces truncate the dipping strata, has led numerous geologists to consider the upland surface of the Salem Plateau a peneplain surface rather than a stripped structural plain.[2]

[1] Thornbury, W.D., 1965. *Regional Geomorphology of the United States*, John Wiley & Sons, New York, NY, pp. 262–276.
[2] Thornbury, Ref. 1, p. 268.

The Salem Plateau is part of the large Ozark Plateau and a peneplain is an obsolete term used for a rolling planation surface (see chapter 50). Both the weak sandstone and hard carbonates of the planation surface are eroded as if they had the same hardness, reinforcing the deduction that it is a planation surface.[3]

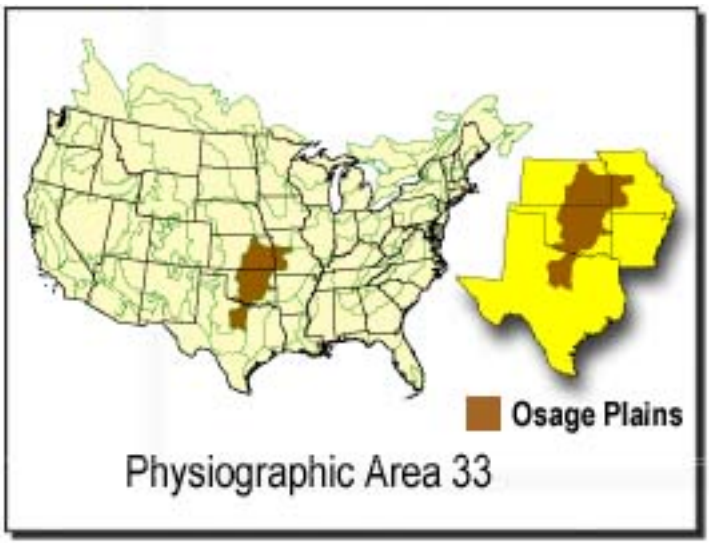

Figure 39.2. Map of the Osage Plain (Wikipedia).

J Harlen Bretz of Lake Missoula flood fame[4]studied the Ozark landforms and noted how the planation surface is eroded across the sedimentary rocks at an angle.[5] He noted a few erosional remnants on the planation surface that were capped with what he interpreted as "stream gravel." It is mostly water-worn chert, a form of silicon dioxide like quartz. Chert commonly outcrops as nodules, lenses, and layers within limestone and so represents an erosional lag of resistant rocks after the limestone was eroded. It gives evidence that abundant erosion has taken place in the area while the planation surface was being carved. But there are larger quartzite rocks which Bretz believed must have come from south-central Wisconsin,[6] about 500 miles (800 km) to the north. This long distance transportation is common in many areas of the United States and indicates more than a local erosional event. Ollier and Pain agreed with Bretz that the Ozark Plateau is a dissected planation surface.[7]

One of the most mysterious features of the Ozark planation surface is that it is incised by rivers and streams that have classic entrenched meanders, vertical walls on both sides of the meandering stream or river. The origin of entrenched meanders is unknown (see volume III on the origin of entrenched meanders). For the Ozarks, Tarr thought the entrenched meanders were from uplift of the area.[8]

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[3] King, L.C., 1950. The study of the world's plainlands: a new approach in geomorphology. *The Quarterly Journal of the Geological Society of London* 106(1):119

[4] Oard, M.J., 2004. *The Missoula Flood Controversy and the Genesis Flood*, Creation Research Society Monograph No. 13, Chino Valley, AZ.

[5] Bretz, J.H. 1962. Dynamic equilibrium and the Ozark land forms. *American Journal of Science* 260:427–438.

[6] Bretz, Ref. 5, p. 436.

[7] Ollier C. and C. Pain, 2000. *The Origin of Mountains*, Routledge, London, U.K., pp. 27–28.

[8] Tarr, W.A., 1924. Intrenched and incised meanders of some streams on the northern slope of the Ozark Plateau in Missouri. *The Journal of Geology* 32:583–600.

The Osage Plain

The Osage Plain covers southeast Kansas, west-central Missouri, northeast and central Oklahoma, and extends south into northeast Texas (Figure 39.2). The Osage Plain, also called the scarped plains, has escarpments generally facing eastward.[9,10] It is sharply separated from the Ozark Plateau and is significantly dissected. The significance of this area is the strata occasionally dip at a significant angle and the planation surface (Figure 39.3) sheered the sedimentary rock signifying the top is a planation surface (personal observation).

Figure 39.3. Osage plain in Osage County, northeast Oklahoma (Wikipedia).

[9] Thornbury, Ref. 1, p. 251.
[10] Fenneman, N.M., 1938. *Physiography of Eastern United States*. McGraw-Hill Book Company, New York, pp. 605–630.