Chapter 45

Planation Surfaces United Kingdom and Ireland

It is important to show that planation surfaces grace all continents and are common. In this chapter and the next chapter, I will briefly summarize the planation surfaces on the continent of Europe.[1] This chapter will point out the planation surfaces in the United Kingdom and Ireland. The United Kingdom includes England, Wales, Scotland, and Northern Ireland.

Southeast England

The geomorphology of southeast England has been a classical geomorphological area of study for more than 200 years.[2,3] This is the area south of the Thames River, which runs through London eastward to the North Sea. This area is called the Weald and is an eroded east-west uplift or anticline (see Figure 2.1). The amount of erosion from the center of the anticline is estimated to be over 4,260 feet (1,300 m),[4] and fits nicely with the Retreating Stage of the Flood.[5,6] The top formation eroded is the chalk that outcrops along the English Channel. The erosion caused cliffs of chalk on the Weald. The prominent ridge on the north limb of the anticline is called the North Downs and the ridge on the south limb is called the South Downs.

Despite the massive study of this area, geomorphologists have had a difficult time understanding the origin of the landscape, as David Jones states: "The Weald must rank as one of the best-known denuded dome landscapes in the world, and yet great uncertainty still exists as to its geomorphological evolution."[7] Clayton reminds us that despite extreme confidence in geomorphic hypotheses over the years, the explanation of the landscape of the Weald is a very difficult task:

> Reading accounts of the geomorphological evolution of a landscape, it is easy to forget just how difficult a topic we are tackling. We are attempting to use fragmentary and often obscure clues to reconstruct past landforms, most of which have subsequently vanished into thin air. … Nevertheless, at any time since the early nineteenth century, widely accepted models of landform development have been available, and they have been used with remarkable confidence to interpret the fragmentary evidence. When we

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[1] Embleton, C. (editor), 1984. *Geomorphology of Europe*, John Wiley & Sons, New York, NY.
[2] Clayton, K., 1980. The historical context of *Structure, Surface and Drainage in South-East England*. In, Jones, D.K.C. (editor), *The Shaping of Southern England*, Institute of British Geographers Special publication, No. 11, Academic Press, New York, NY, pp. 1–12.
[3] Jones, D.K.C., 1999. On the uplift and denudation of the Weald. In, Smith, B. J., W. B. Whalley, and P. A. Warke (editors), *Uplift, Erosion and Stability: Perspectives on Long-Term Landscape Development*, Geological Society of London Special Publication No. 162, The Geological Society, London, U. K., pp. 25–41.
[4] Jones, Ref. 3, p. 32.
[5] Oard, M.J. and Matthews, J.D., Erosion of the Weald, Southeastern England part I: uniformitarian mysteries. *Creation Research Society Quarterly* (in press).
[6] Matthews, J.D. and Oard, M.J., Erosion of the Weald, Southeastern England part I: the solution to its mystery and its implications. *Creation Research Society Quarterly* (in press).
[7] Jones, D.K.C., 1980. The Tertiary evolution of south-east England with particular reference to the Weald. In, Jones, D.K.C. (editor), *The Shaping of Southern England*, Institute of British Geographers Special publication, No. 11, Academic Press, New York, NY, p. 13.

> are not engaged in such reconstructions ourselves, we may contemplate the ease with which sparse evidence may be fitted to the fashionable model of the day.[8]

The same can be said for many landforms across the Earth. I wonder why this is the case after 200 years? Perhaps they should reevaluate their uniformitarian assumption.

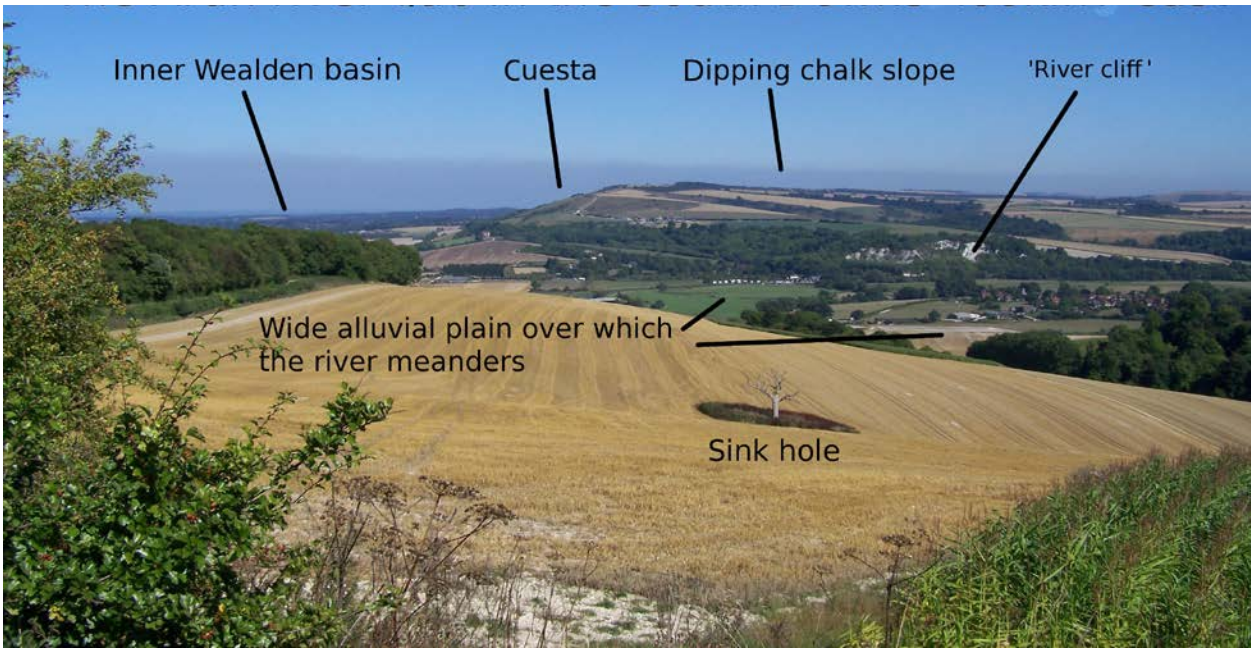

Figure 45.1. Planation surface on the top of the South Downs on the dipping chalk slope (view east across the Arun water gap).

Charles Lyell, considered one of the founders of the uniformitarian principle, used by geologists to interpret practically all geology, dogmatically thought that the chalk cliffs of the inner basin of the Weald were eroded by the ocean.[9] This idea has since been rejected. William Morris Davis attempted to explain the Weald within his cycle of erosion hypothesis (see Chapter 50), but this hypothesis also has been rejected. Other hypotheses fare no better.[5]

There are a few geomorphological features that are difficult to explain on the Weald, which will be discussed in later chapters, but one of them is that the top of the chalk cliffs retain a planation surface (Figure 45.1).[2,10] This planation surface probably westward and covers much of southern England (Figure 45.2). [11,12] However, there are questions on the nature of this planation surface, since it is mainly a beveled ridge that is accordant across the eroded Weald anticline.[13] But, it seems like most geomorphologists accept that the top of the North and South downs are

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[8] Clayton, Ref. 2, pp. 2–3.
[9] Clayton, Ref. 2, pp. 3–4.
[10] Jones, D.K.C., 1999. Evolving models of the Tertiary evolutionary geomorphology of southern England, with special reference to the Chalklands. In, Smith, B. J., W. B. Whalley, and P. A. Warke (editors), *Uplift, Erosion and Stability: Perspectives on Long-Term Landscape Development*, Geological Society of London Special Publication No. 162, The Geological Society, London, U. K., pp. 1–23.
[11] Jowsey, N.L., D.L. Parkin, I.J. Slipper, A.P.C. Smith, and P.T. Walsh, 1992. The geology and geomorphology of the Beacon Cottage Farm outlier, St Agnes, Cornwall. *Geological Magazine* 129(1):101–121.
[12] Balchin, W.G.V., 1952. The erosion surfaces of Exmoor and adjacent areas. *The Geographical Journal* 118:453–476.
[13] Chorley, R.J., S.A. Schumm, and D.E. Sugden, 1984. *Geomorphology*, Methuen, London, U.K., p. 25.

planation surfaces, so the major questions are related to its age and whether it is exhumed from below a layer of sedimentary rocks or not.[14] There is gravel partially capping the planation surface that are predominantly of broken flint (a form of silicon dioxide), which was eroded from within the chalk (the chalk has layers of flint within it) and called "Clay-with-Flints", although the matrix is commonly sand.[15]

Figure 45.2. Rolling planation surface about 240 m above msl (Hardy's Monument in the distance from the hill at Hell Stone) in south-central England.

Wales

Wales has distinctive planation surfaces at generally three altitude ranges resulting in a stepped landscape (Figure 45.3). [16] The planation surfaces cut across a great variety of rock

[14] Jones, D.K.C., 1980. The Tertiary evolution of south-east England with particular reference to the Weald. In, Jones, D.K.C. (editor), *The Shaping of Southern England*, Institute of British Geographers Special publication, No. 11, Academic Press, New York, NY, pp. 13–47.
[15] Small, R.J., 1980. The Tertiary geomorphological evolution of south-east England: an alternative interpretation. In, Jones, D.K.C. (editor), *The Shaping of Southern England*, Institute of British Geographers Special publication, No. 11, Academic Press, New York, NY, pp. 49–70..
[16] Small, R.J., 1978. *The Study of Landforms: A Textbook of Geomorphology*, second edition, Cambridge University Press, London, U.K.

types.[17] Embleton describes these planation surfaces, generally considered to be of Cenozoic age, within the uniformitarian timescale:

> But perhaps the most striking feature is the way in which, over large areas, the landform appears to lack any direct control by structure. Thus extensive plateaus bevel a range of strata and lithologies. … The flatness of the interfluves [ridges between drainage basins] and hill tops was commented on by Ramsay as long ago as 1866.[18]

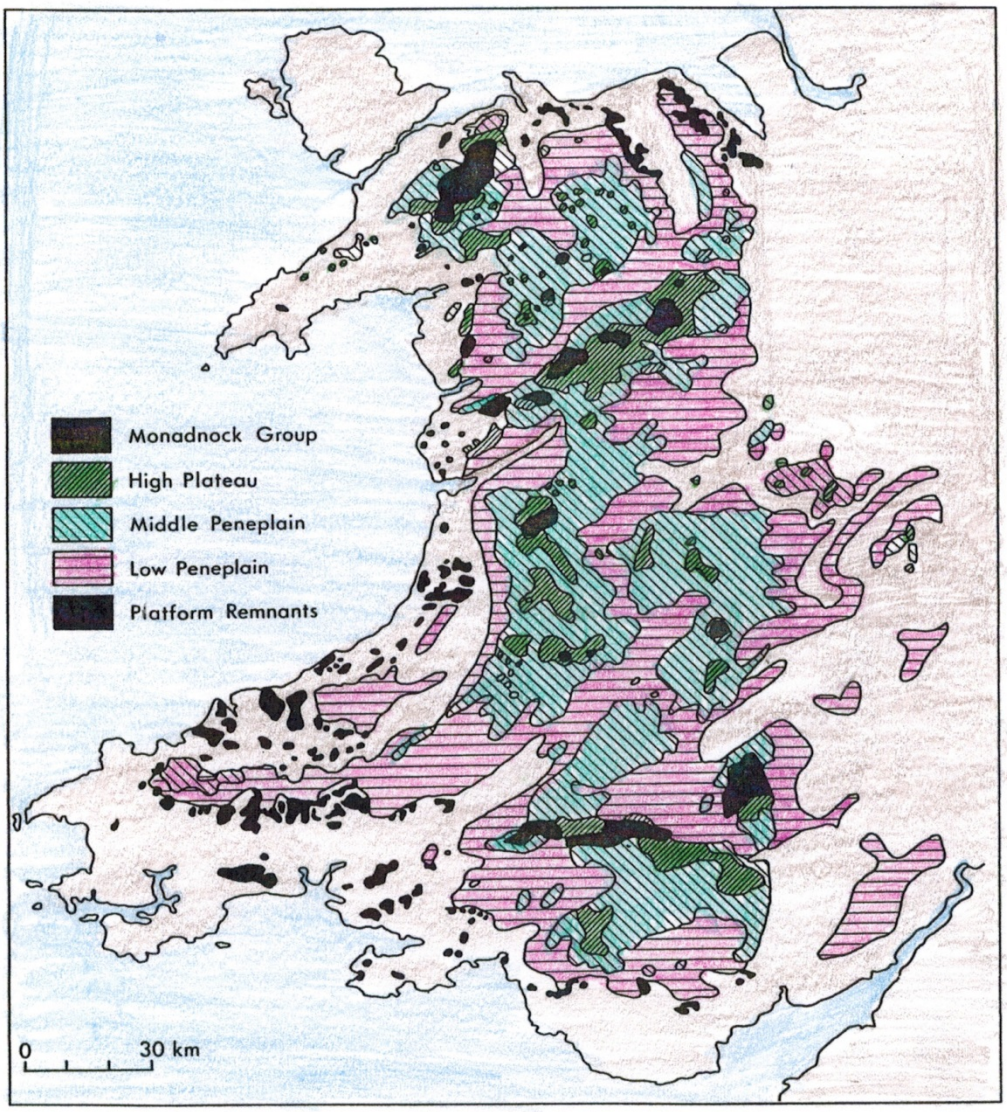

Figure 45.3. Map of Wales showing three levels of planation surfaces (Low Peneplain, Middle Peneplain, and High Plateau) with monadnocks (from Embleton, 1984, p. 121).

[17] Brown, E.H., 1960. *The Relief and Drainage of Wales: A Study in Geomorphological Development*, University of Wales Press, Cardiff, U.K.

[18] Embleton, C., 1984. Wales. In, Embleton, C. (editor), *Geomorphology of Europe*, John Wiley & Sons, New York, NY, p. 121.

Cliff Ollier states that, "In Wales planation surfaces have been recognized at a variety of heights, some of which are very clear."[19] The planation surfaces in the Welsh tableland are at heights of 1,475 to 1,970 feet (450 to 600 m) msl and bevel tilted sedimentary rocks.[20] At least 10,000 feet (3,000 m) of sedimentary rock has been eroded from the crest of folds to form the top planation surface, which places the formation of the planation surface during the Retreating Stage of the Flood because of the huge amount of surface erosion. There are also planation surfaces at lower altitudes. And similar to other planation surfaces, there is controversy over the uniformitarian ages, the number of surfaces, and the origin of the planation surfaces.[21,22]

Scotland

The top of the Scottish Highlands is considered a dissected planation surface.[23,24] Ringrose and Migon state:

> The occurrence of elevated surfaces of low relief and the alignment of summits in different parts of the Scottish Highlands have long been recognized… these features have been interpreted as remnants of planation surfaces, subsequently uplifted and dissected by fluvial and glacial erosion…[25]

A close analysis of the surface indicates that it is rather complicated. Sounds familiar, doesn't it?

Some researchers in the mid1960s have thought that the mountaintop planation surfaces were formed by marine abrasion, but there is no evidence for this.[26] There are no marine deposits lying on the planation surface. Marine abrasion is a hypothesis that was suggested and mostly abandoned in the1900s (see Appendix 19).

Ireland

A remarkably flat, low altitude planation surface at 165 to 490 feet (50 to 150 m) above sea level is claimed for Ireland, as well as for western Britain.[27,28,29] Walsh and others state:

> Nearly flat, very nearly horizontal dissected planation surfaces, which truncate quite complex structural foundations of Palaeozoic and Precambrian rocks, form a widespread and distinctive element of the landscape of western Britain and Ireland (WB&I). Those

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[19] Ollier, C., 1991. *Ancient Landforms*, Belhaven Press, New York, NY, p. 84.
[20] Small, Ref. 15, pp. 266–272.
[21] Battiau-Queney, Y., 1984. The pre-glacial evolution of Wales. *Earth Surface Processes and Landforms* 9:229–252.
[22] Rodda, J.C., 1970. A trend-surface analysis trail for the planation surfaces of north Cardiganshire. *Transactions of the Institute of British Geographers* 50:107–114.
[23] George, T. N., 1966. Geomorphic evolution in Hebridean Scotland. *Scottish Journal of Geology* 2(1):1–34.
[24] Le Coeur, C., 1988. Late Tertiary warping and erosion in western Scotland. *Geografiska Annaler* 70A:361–367.
[25] Ringrose, P.S. and P. Migon, 1999. Analysis of digital elevation data for the Scottish Highlands and recognition of pre-Quaternary elevated surfaces. In, Widdowson, M. (editor), *Palaeosurfaces: Recognition, Reconstruction and Palaeoenvironmental Interpretation*, Geological Society of London Special Publication No. 120, The Geological Society of London, London, U.K., p. 25.
[26] Embleton, C., 1984. Scotland. In, Embleton, C. (editor), *Geomorphology of Europe*, John Wiley & Sons, New York, NY, pp. 104–115.
[27] Walsh, P., M. Boulter, and I. Morawiecka, 1999. Chattian and Miocene elements in the modern landscape of western Britain and Ireland. In, Smith, B.J., W.B. Whalley, and P.A. Warke (editors), *Uplift, Erosion and Stability: Perspectives on Long-Term Landscape Development*, Geological Society of Special Publication No. 162, The Geological Society, London, U.K., pp. 45–63.
[28] Orme, A.R., 1964. *Irish Geography* 5:48–72.
[29] Embleton, C., 1984. Northern and Central Ireland. In, Embleton, C. (editor), *Geomorphology of Europe*, John Wiley & Sons, New York, NY, pp. 125–130.

> surfaces at elevations of between 50 and 150 m a.s.l. [above sea level] are particularly sharply defined and studies of them have been carried out over the past 150 years … Despite the effort which has been expended in trying to establish the age and origin of these landforms, there is still very little agreement as to what they actually represent.[30]

Gravel, believed to be from a beach, probably because it is rounded, is found at some locations of the planation surface. Rounded gravel also forms by water flow.

The planation surface was once thought to be a young marine planation surface, but uniformitarian geologists now believe they were formed above the sea and are older. This presents the problem that this surface should have totally eroded by now (see Chapter 35). Researchers suggest that the surface may have been exhumed, protected until recently by a cover of sedimentary rocks. There is no evidence of this, and the weathering hypothesis (see Chapter 51) is invoked to rescue their contradiction:

> One solution to this apparent contradiction could be to imagine a recent exhumation, but in most cases there is no trace of overburden sediments, despite the presence, in some places, of karstic basins which could easily have trapped them. All these difficulties disappear if it is accepted that these low platforms have developed as true etchplains, in Palaeogene times [about 40 million years ago] or even before, and survived up to the present time on stable blocks.[31]

An etchplain is a hypothetical planation surface left after weathering of the surface. It is incredible that a weathering surface could cause a planation surface to survive for tens of millions of years (see Chapter 35).

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[30] Walsh *et al*., Ref. 27, p. 45.

[31] Battiau-Queney, Y., 1999. Crustal anisotropy and differential uplift: their role in long-term landform development. In, Smith, B.J., W.B. Whalley, and P.A. Warke (editors), *Uplift, Erosion and Stability: Perspectives on Long-Term Landscape Development*, Geological Society of London Special Publication No. 162, The Geological Society, London, U.K., p. 71.