
Rostherne Mere

[SJ 745 842]

Highlights

Rostherne Mere lies in one of the finest and clearest examples of a subsidence basin formed over the Triassic salt beds of Cheshire. The meres of the Cheshire Plain are the most conspicuous feature of Britain's only area of salt karst.

Introduction

Rostherne Mere, north of Knutsford (Figure 1.2), is a lake within a roughly circular subsidence basin which was formed by solution of salt beds at depth. The buried salt is dissolved and removed where it is exposed to groundwater flow, causing regional and localized subsidence and collapse at the surface. Many depressions become lakes as they subside below the shallow water table of the plain. Lakes formed rapidly by accelerated subsidence in recent times are locally known as flashes — such as Moston Long Flash. The meres, including Rostherne, have a longer history of slow subsidence.

The subsidence features of the Cheshire salt karst have been described by Calvert (1915), Wallwork (1956), Reynolds (1979) and Waltham (1989), and the geology of the plain is outlined in Evans *et al.* (1968) and Earp and Taylor (1986). The bathymetry of Rostherne Mere was surveyed by Tattersall and Coward (1914) and redrawn by Pritchard (1961).

Description

Rostherne Mere is a lake with a surface area of 48.7 ha, and a maximum diameter of 1200 m (Figure 7.19). It lies in a shallow bowl which reaches about 35 m below the level of the surrounding terrain, and 27 m of this depth is now submerged. The sides of the depression slope gently down into the mere at about 5°, and there are no rock outcrops. The mere lies on a stream course which drains out to the east. The depression is an incidental part of the drainage system and is an isolated feature in the plain landscape of low relief, though other comparable meres occur nearby.

The mere depression is formed within the cover of Devensian glacial till and glaciofluvial sands. The drift overlies the Northwich Halite, a formation of 200 m of interbedded halite and mudstone within the Triassic Mercia Mudstone Group. On the halites the rockhead is covered by a breccia of mudstone left as a solution residue (Figure 7.18). The wet rockhead at the base of this breccia is generally over 100 m deep on the Northwich Halite (Oates, 1981). The depth to the breccia/drift interface at Rostherne Mere is unknown.

Interpretation

Both the halites and the mudstones are impermeable, and the only groundwater flow is in the permeable drift. Solution of the beds of halite therefore takes place where they meet the rockhead, causing collapse of the interbedded mudstones to create the residual breccia. The removal of the soluble salt by the groundwater flow, through both the drift and the breccia, caused the surface lowering and the formation of a subsidence basin, which subsequently flooded to form the mere. Continued solution of the rock-head halite relies on a supply of fresh water, but most of the rockhead on the halite is covered by a layer of dense, saturated brine, incapable of further solution. Both Rostherne and Tatton Meres overlie the Northwich Halite close to its buried edge, where groundwater flow off the adjacent rockhead of Mercia Mudstone first encounters the soluble salt (Figure 7.19).

The deep profile of the depressions containing Rostherne and some other meres is more than can be accounted for by differential solution and subsidence. The meres may be self-perpetuating in that, once formed in an incidental slight depression, they may gather surface water and act as supply points to the salt below. The same infiltration flow may

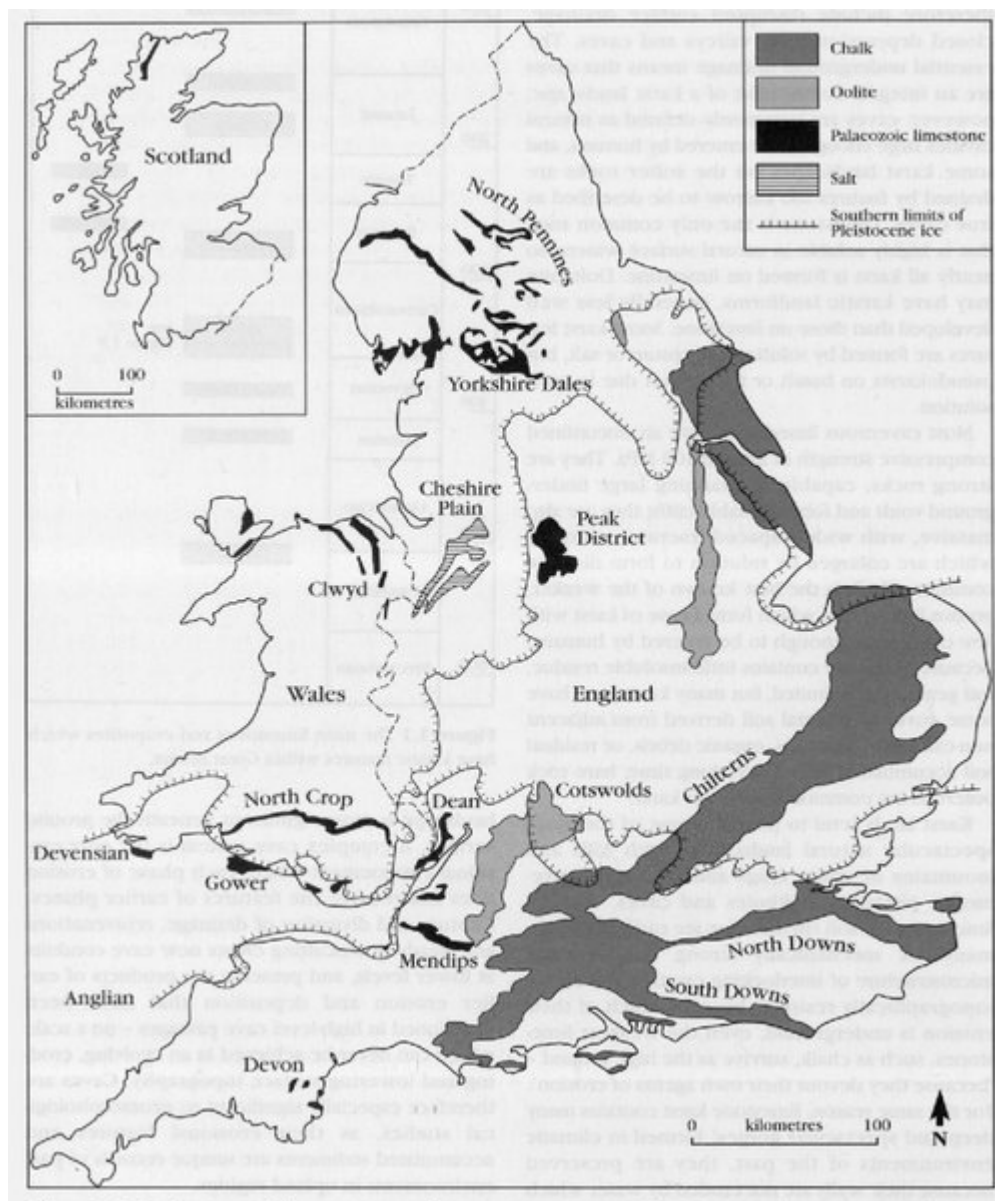
cause some ravelling of the cover sediments into solution cavities beneath and around the deepening mere; this process was suggested as a mechanism behind some crater subsidences (Evans *et al.*, 1968).

A large part of the surface depression containing Rostherne Mere was clearly formed by subsidence which postdates the Devensian drift. Pritchard (1961) suggested that the subsidence may have been localized over an ice-excavated hollow; the known morphology and bathymetry provide no positive evidence for this, and the profiles of both the surface and the rockhead will have been substantially modified by postglacial solution.

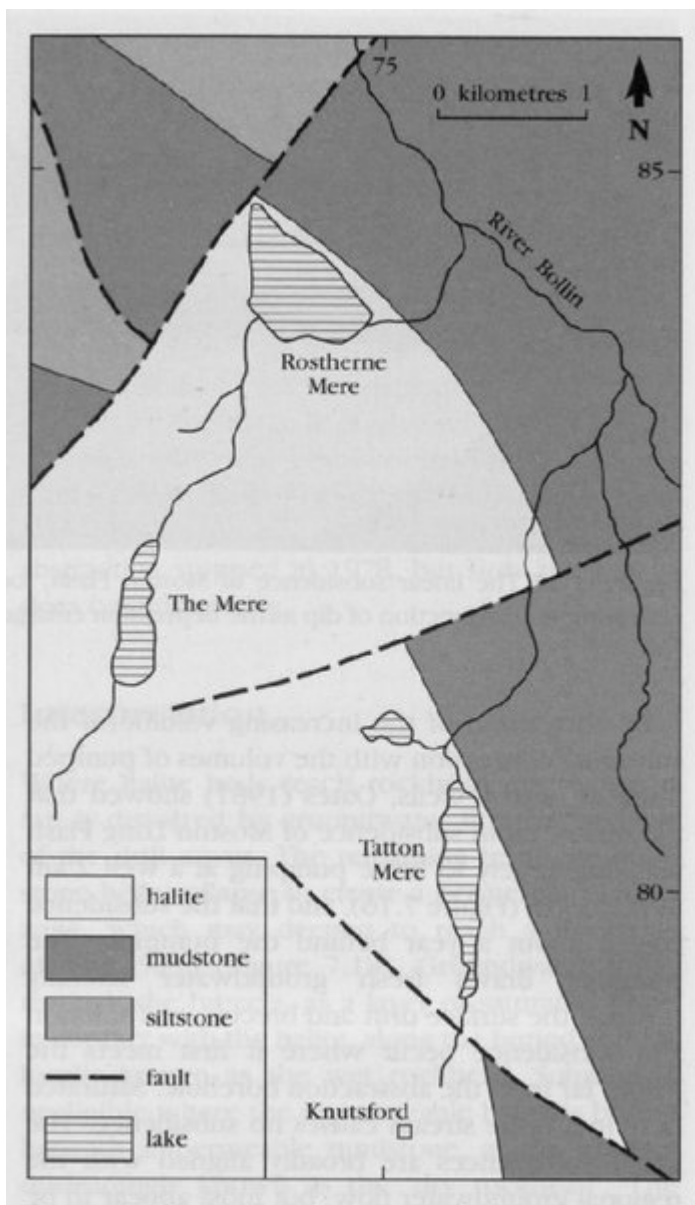
Conclusions

Rostherne Mere occupies one of the prime examples of a subsidence basin developed over the Triassic Halites of the Cheshire Plain. Solution of the underlying salt beds, by natural groundwater circulation, has caused the surface subsidence. Its clear morphology makes it representative of these diagnostic features of the Cheshire salt karst, and it provides an excellent contrast with the linear subsidences such as Moston Long Flash.

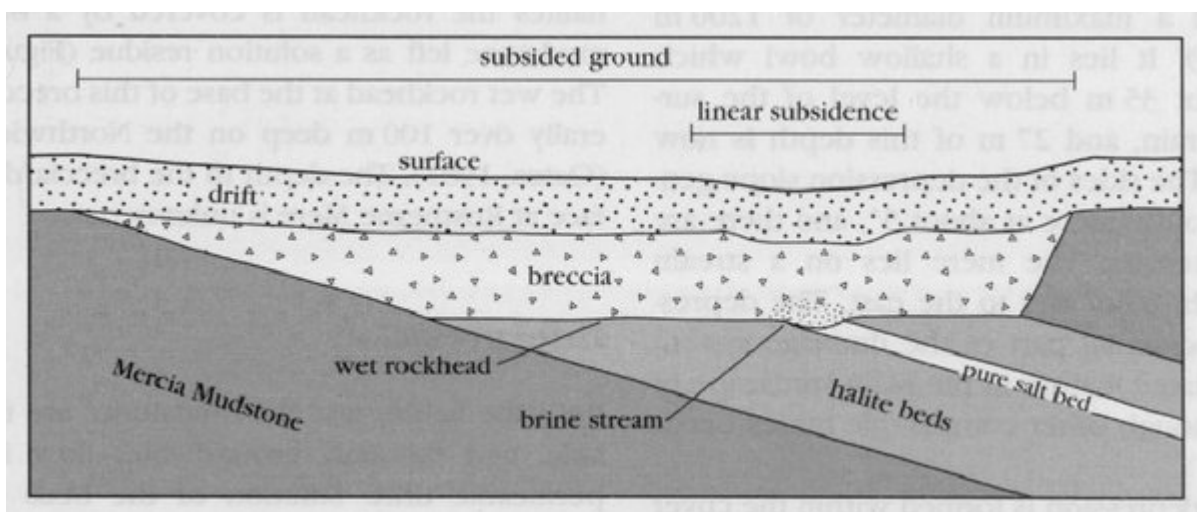
References



(Figure 1.2) Outline map of the main areas of karst in Great Britain. The Palaeozoic limestones are of Lower Carboniferous age, except for the Devonian limestone in Devon, and the Cambrian–Ordovician limestone in Scotland.



(Figure 7.19) Solid geology map of the area around Rostherne Mere and the other adjacent subsidence depressions over the Northwich Halite, buried by a complete cover of glacial and glaciofluvial drift.



(Figure 7.18) Diagrammatic section through the breccia of solutional residue at the rockhead in salt karst, with a brine stream flowing beneath an active linear subsidence like Moston Long Flash (from Waltham, 1989).