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## 28 Hartside

**Theme:** Earthquakes and folded rocks

### Location

28 Hartside — Pennine Boundary Fault. Bike (or drive) from Penrith or Alston. It's uphill both ways [NY 646 418].

### Description

Hartside is a cyclist's nemesis. After meandering gently across the Vale of Eden, the A686 road out of Melmerby climbs abruptly to over 750 metres above sea level.

Why the dramatic change in slope? When you get to the top look north and south, you can see clearly for miles just how sharply the Pennine escarpment rises from the softly undulating plain. The journey from Melmerby took you across one of the most visible landscape-scale rock dislocations in England: the Pennine Fault System. Although the Fault and its history are complex, put simply it is a break in the Earth's crust which separates younger rocks in the Vale to the west from the older rocks of the Pennines to the east. Most of the Vale's rocks are 250-million-year-old red desert sandstones of the Permian and Triassic periods. The rocks of the Pennines are largely 330-million-year-old Carboniferous, (but east of Appleby there are even older Silurian and Ordovician strata).

This dramatic displacement (around 600 metres vertically) continues deep into the Earth and probably has its origins in the building of an ancient mountain chain more than 400 million years ago. But it experienced a major re-activation around 250 million years ago when the Fault was a strong influence on the deposition of the red sandstones of the Eden valley. It was active again around 65 million years ago, when the Alpine mountains began to form and there is evidence that it continues to be an area of weakness in the crust. On 9 August 1970 an earthquake with an unusually high magnitude for the UK (4.9 on the Richter Scale) had its epicentre near the southern end of the Pennine escarpment. The numerous twists on the ascent from Melmerby navigate through a series of glacial meltwater channels. As the last ice sheet was melting its surface slowly got lower and the meltwater coursing along the successive ice sheet margins, carved what are now mainly dry channels.

### Photographs

(Photo 28-1) 28 View of the Pennine escarpment from south of Melmerby.

(Photo 28-2) 28 Hartside.



*(Photo 28-1) View of the Pennine escarpment from south of Melmerby.*



*(Photo 28-2) Hartside.*