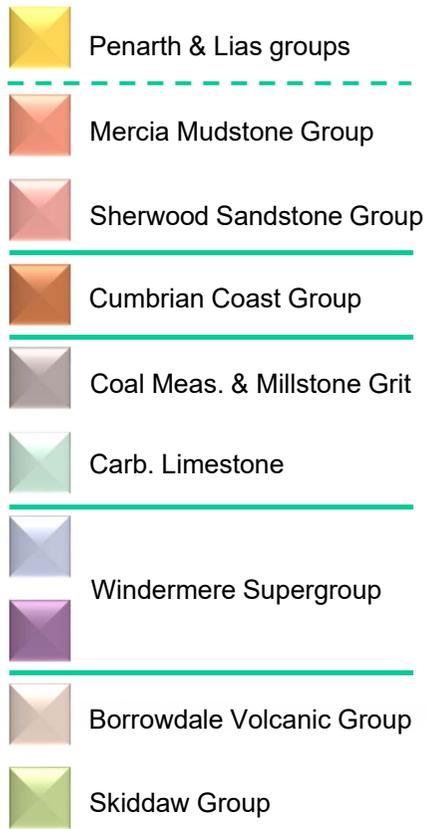




Geology of the North West

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Jurassic

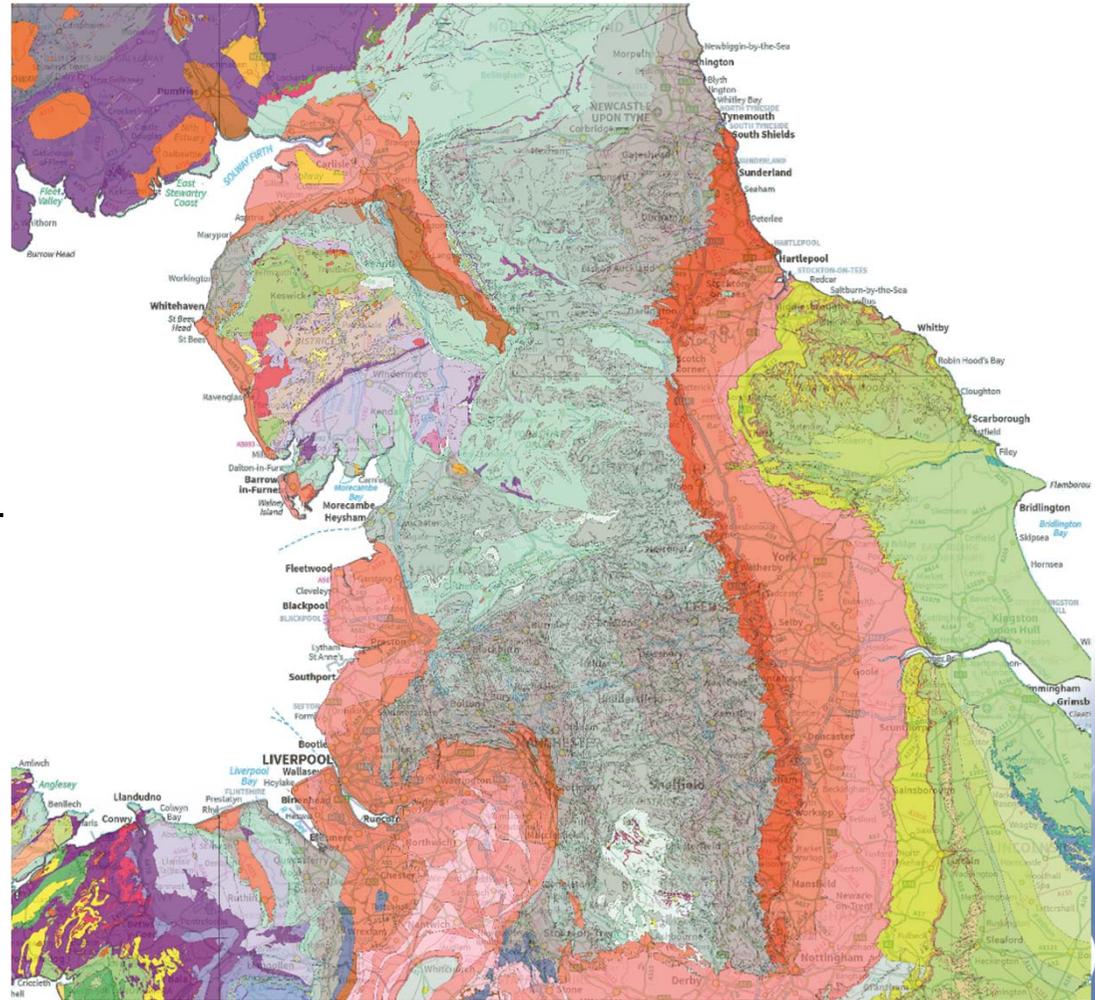
Triassic

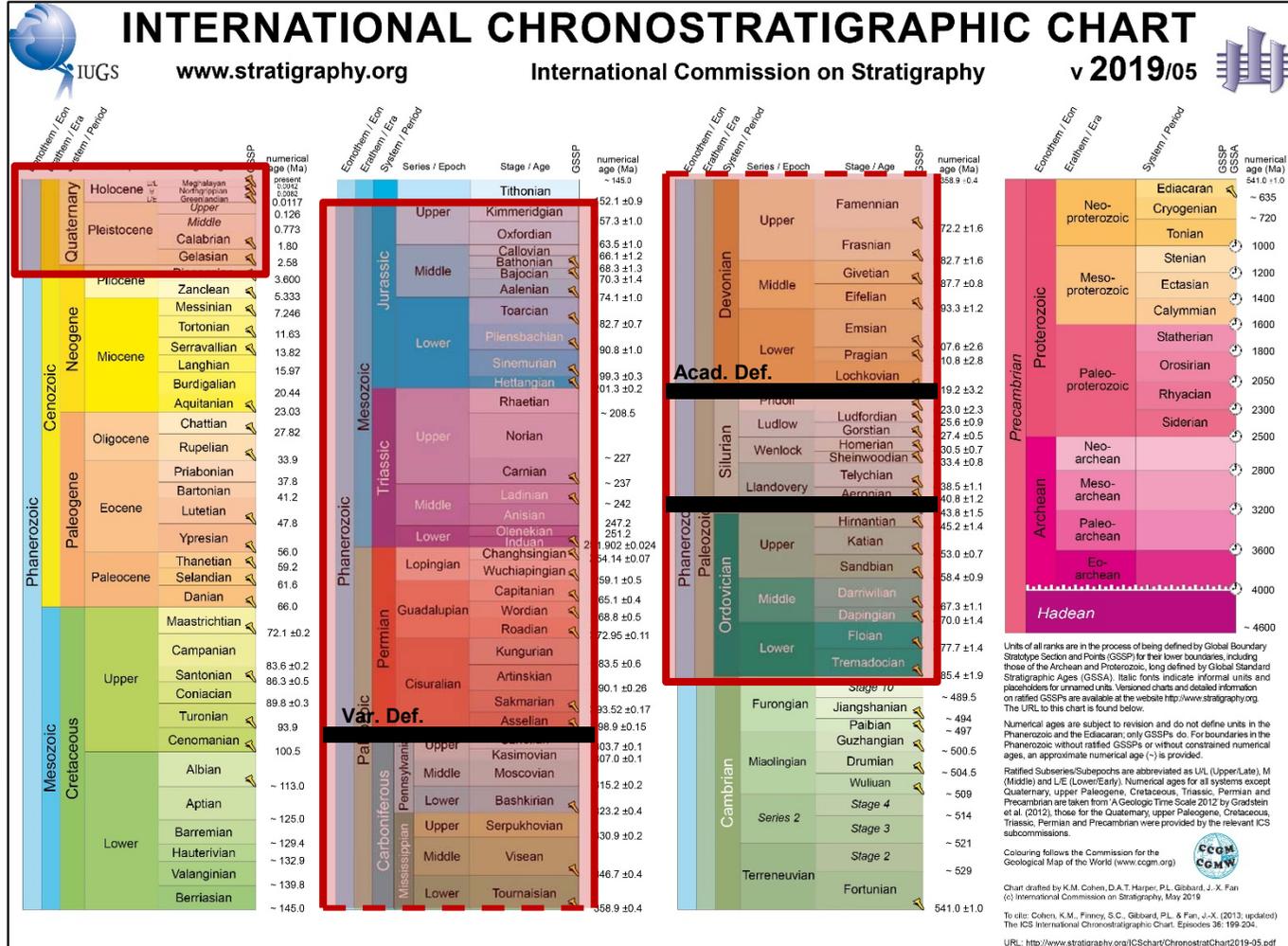
Permian

Carboniferous.

Silurian

Ordovician





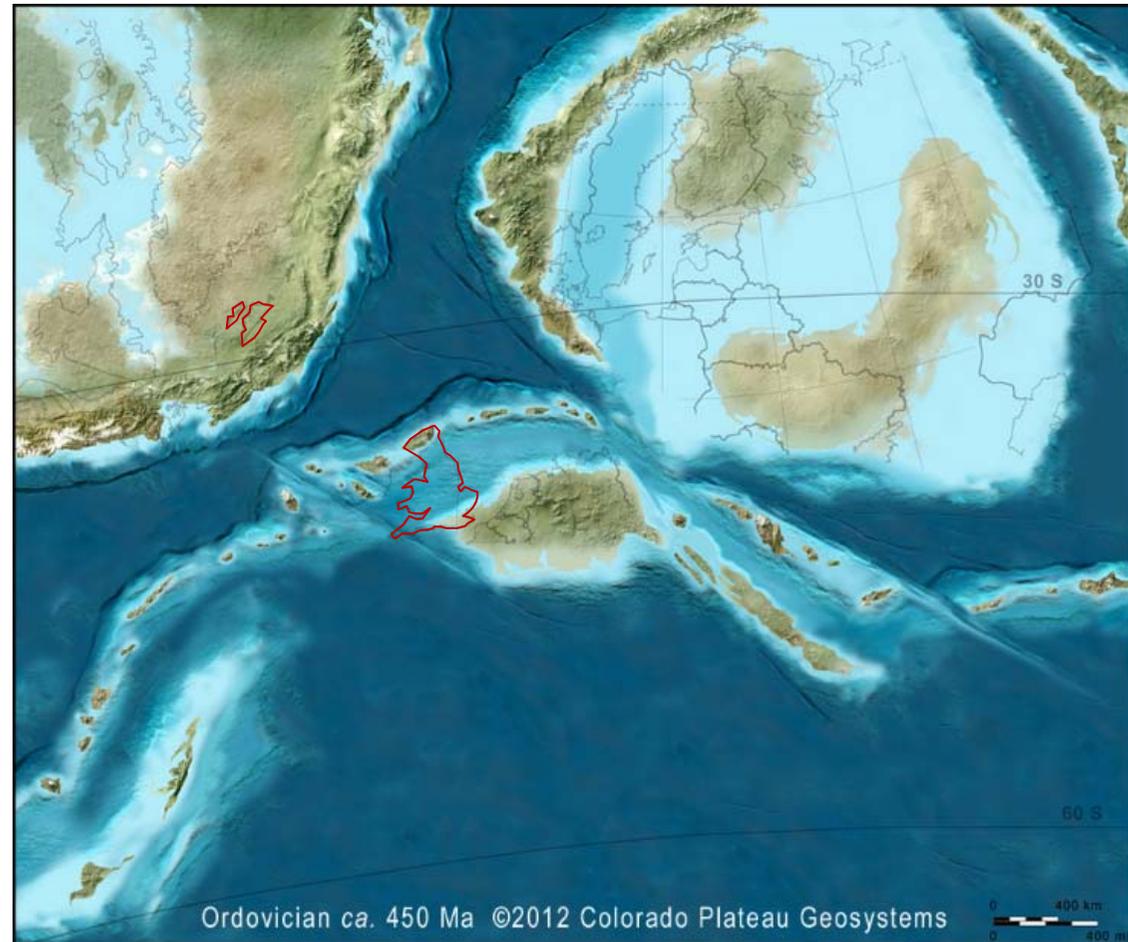
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Ordovician

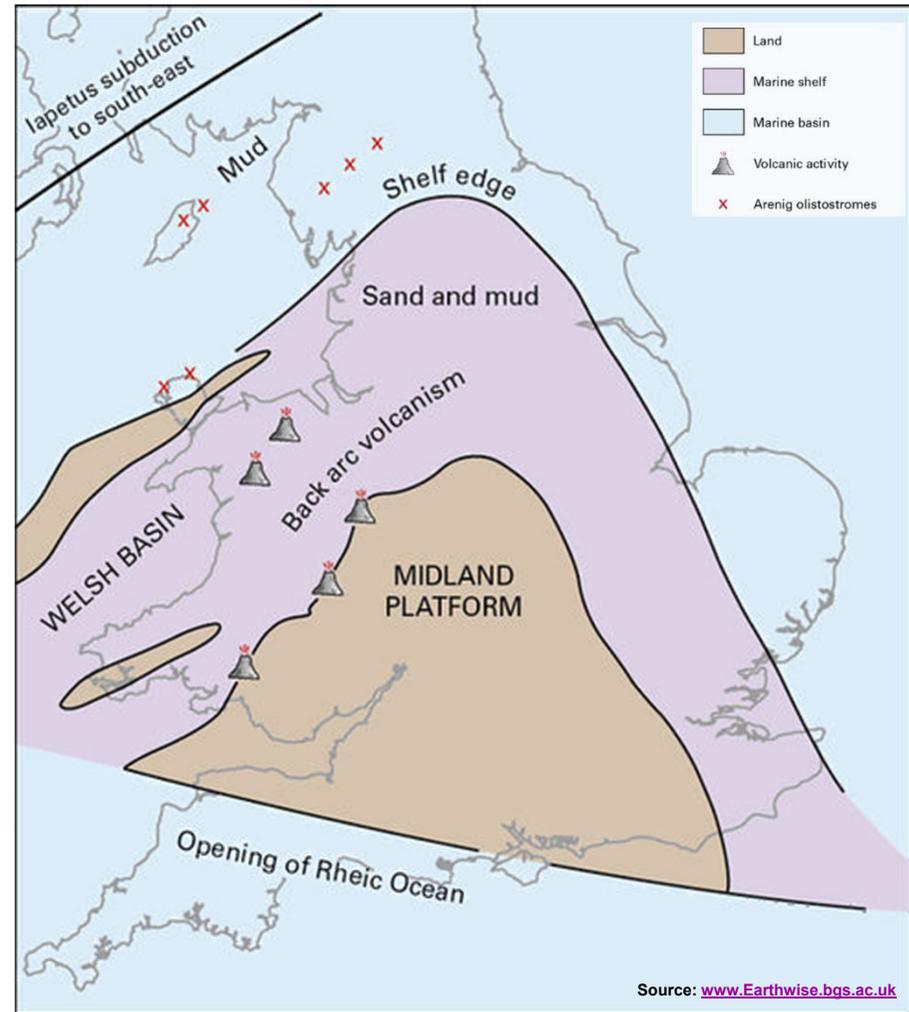
- The UK mainland landmass is separated by the Iapetus Ocean
- Situated at latitudes $\sim 60^\circ$ South
- Cold conditions led to low diversity of fauna (graptolites & sparse trilobites)
- Last traces of definitively local subduction related volcanism (Ashgill Dent Group)

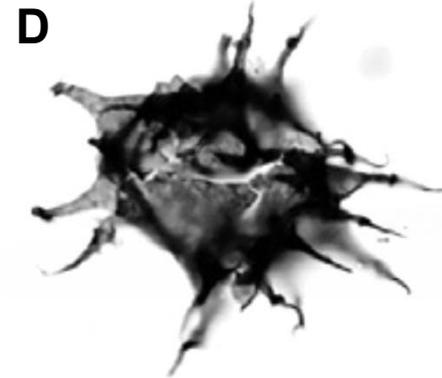
Source: www.deeptimemaps.com



Ordovician

- Skiddaw Group oldest rocks at rockhead in the region.
- Skiddaw Group was deposited in marine conditions (mudstones and sandstone turbidites)
- Sporadic turbidites in the Skiddaw show volcanic composition
- Basin uplift and mass-slumping prior to onsite of major volcanic events
- Borrowdale Volcanic Group present in some of the 'craggy' mountains in the Central parts of the Lake District





Examples of fossils from the Skiddaw Group:

- A) Trilobite, *Cyclopyge* sp.
- B) Pliomerid trilobite;
- C) Graptolite, *Didymograptus deflexus*;
- D) Acritarch, *Stallechinatum sicaforme sicaforme*

Silurian

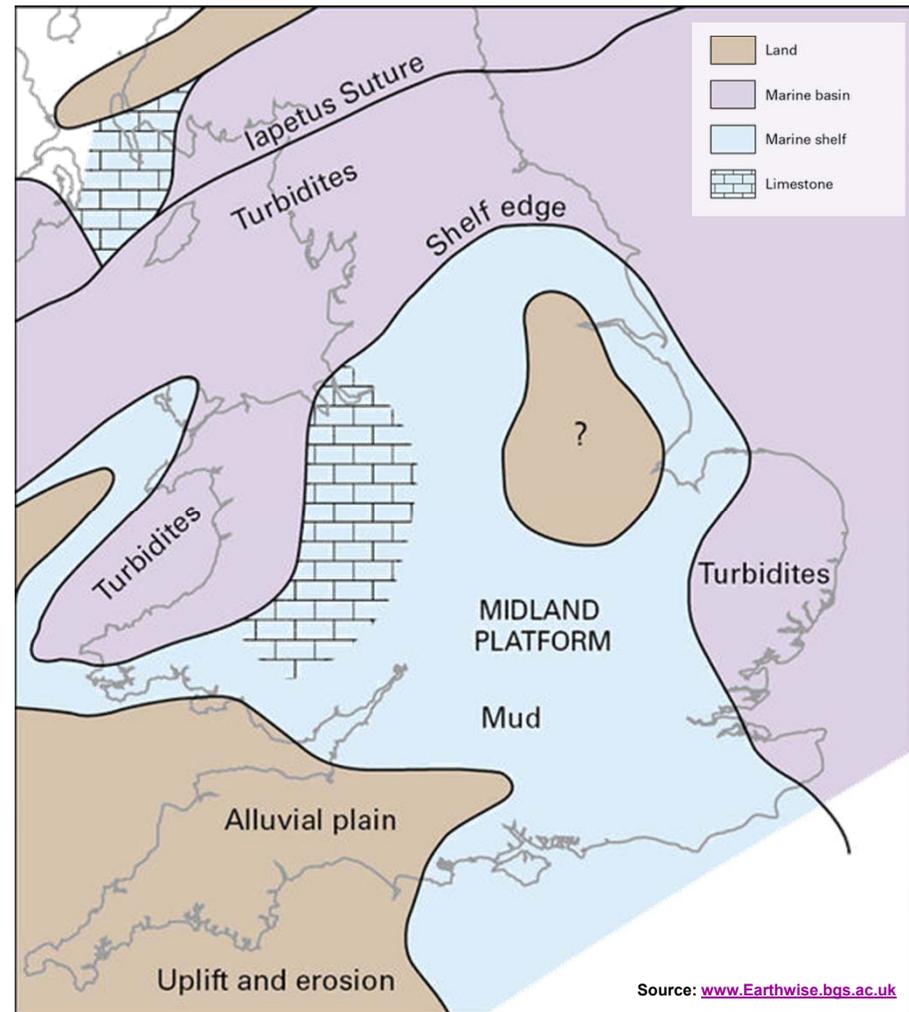
- The moving of the Laurentia, Avalonia and Baltica continents furthered the closing of the Iapetus Ocean
- Steady coalescing of these continents starts the gradual process of moving the constituent parts of the UK together
- Subsidence increased in the late Silurian as Laurentia & Avalonia collided, with the former over-riding the latter

Source: www.deeptimemaps.com



Silurian

- Marine transgression brought mostly marine conditions to England & Wales despite a Late Ordovician Glaciation (thermal subsidence related)
- Silurian dominated by marine conditions with hemiplegic and turbidite sedimentation.
- Windermere Supergroup deposited throughout most Silurian (and late Ordovician); siltstones & mudstones



Devonian

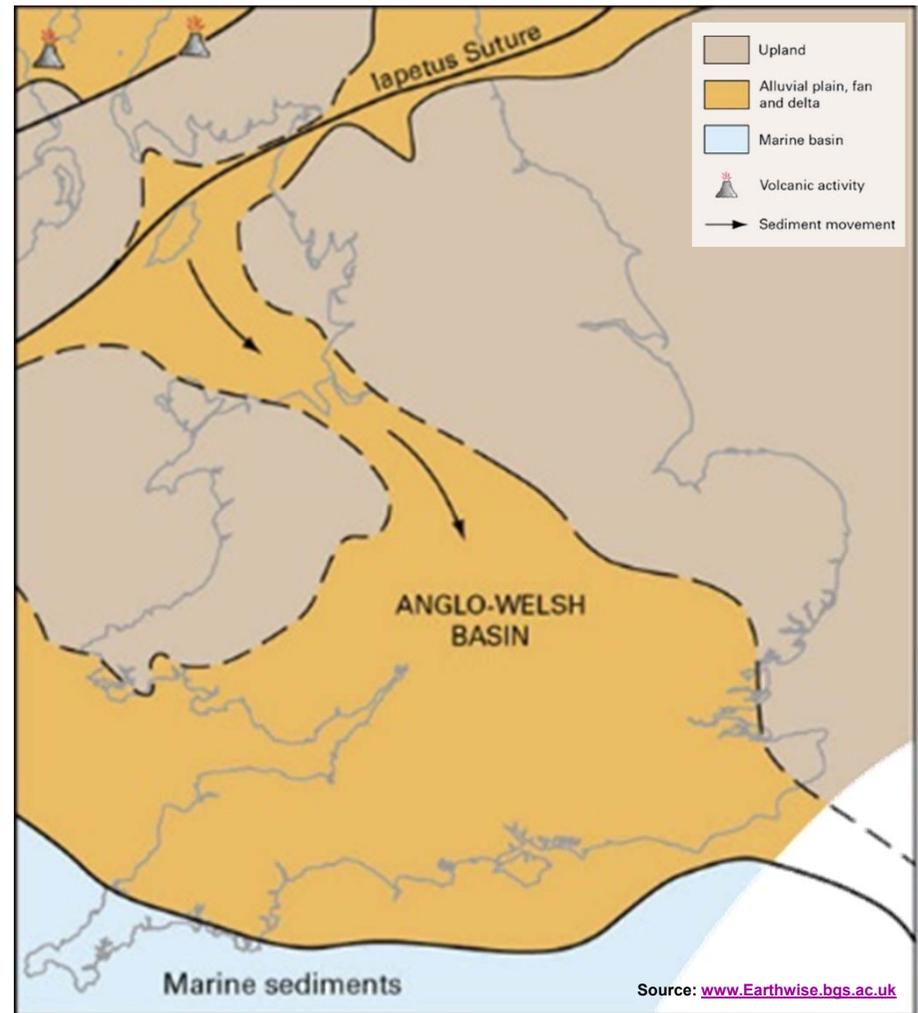
- Iapetus Ocean is closed and Scotland joins England
- First major non-marine deposits in most of England & Wales
- UK is situated at latitudes 15° to 30° south of the Equator
- Large uplands in the north shed detritus via large fluvial systems southwards into midland and southern England
- Tropical to semi-arid climate

Source: www.deeptimemaps.com



Devonian

- The Devonian associated with stereotypical 'red-beds' for most of the England...
- ...But relatively few Devonian sediments present at Rockhead in the northwest region (Mell Fell SDST [UORS] west of Penrith), though very thick (>1.5km)
- Mell Fell polygenetic and is comprised of Borrowdale Vol. & Windermere Sup.)
- Important time for the evolution of vascular plants & likely the first 'forests' occurred during the Devonian



Carboniferous

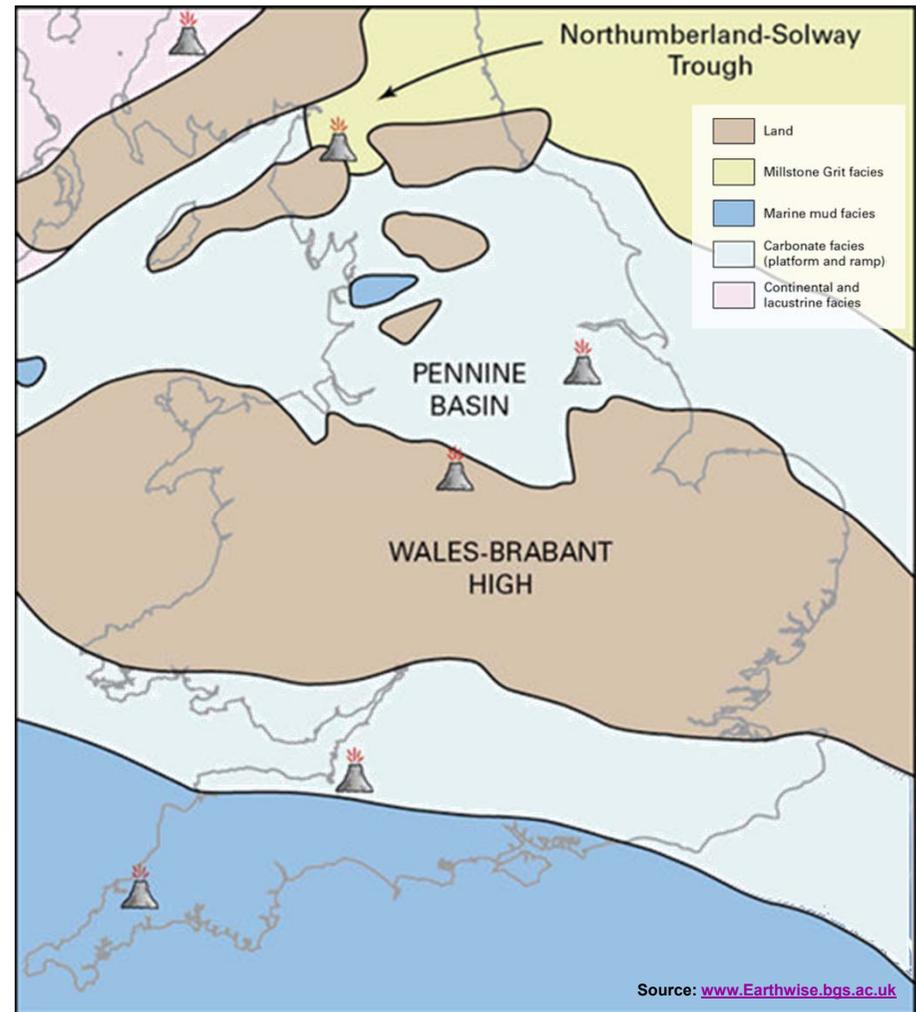
- UK occupied a broadly equatorial location (2° to 8° north) with tropical hot and wet conditions
- Cyclic climatic conditions with coeval syn-depositional faulting and folding
- Thermal relaxation helped drive subsidence and lead to eventual submergence of earlier structural highs

Source: www.deeptimemaps.com



Carboniferous

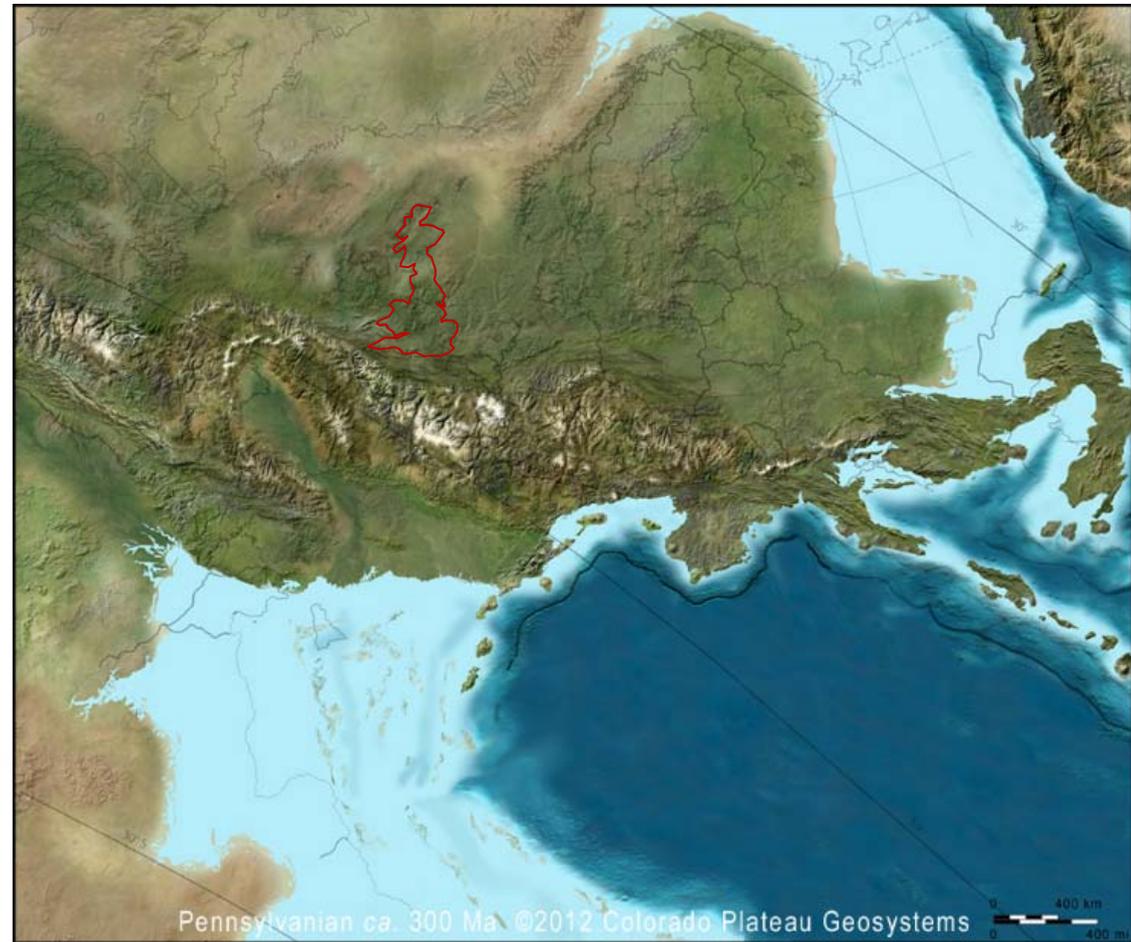
- Cyclic eustatic changes in global sea level generated repeated packages of limestones, mudstones, sandstones and coal (cyclotherms).
- Stratigraphical sub-division is largely based on biostratigraphy based on marine transgressions
- Geological age associated with important industrial deposits



Permian

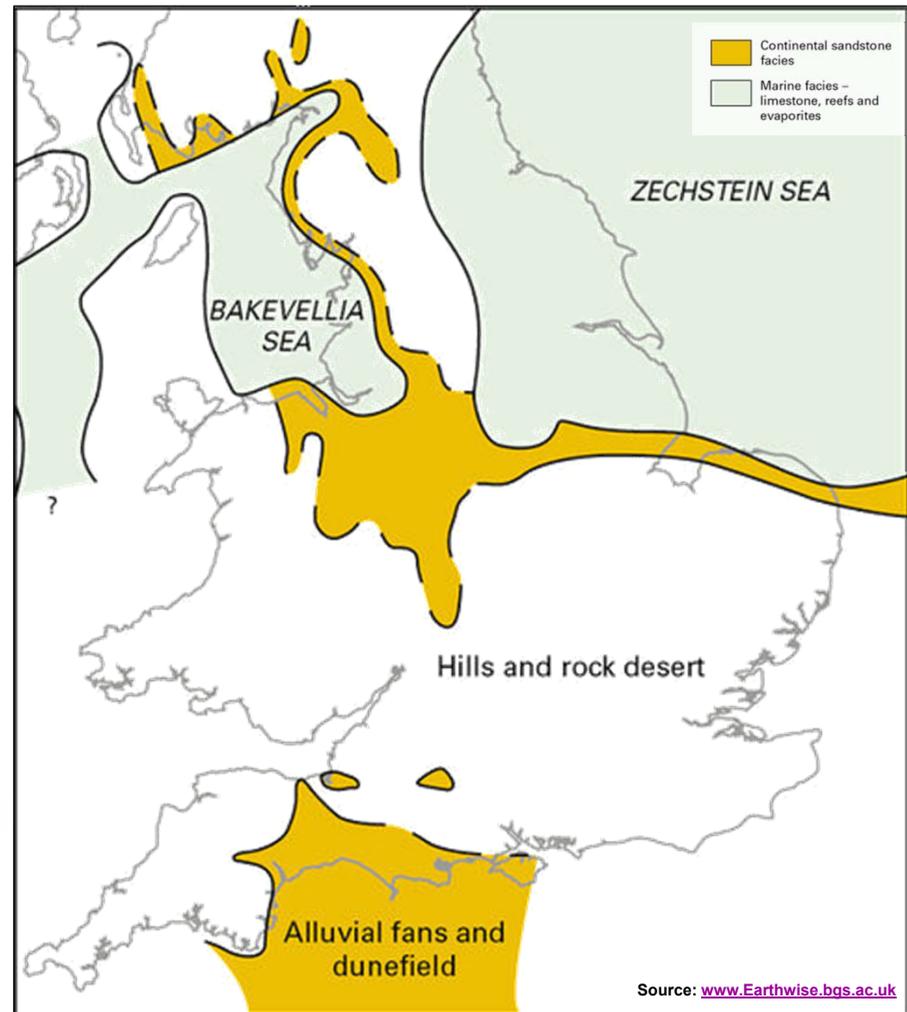
- The continental collision between Laurussia and Gondwana created the super continent Pangaea
- The collision generated the Variscan Orogeny with topography highs developed in northern mainland Europe
- Gradual movement of the UK northwards from 10° to ~30° north of the Equator
- Northern England lay in the foreland regions north of the deformation front

Source: www.deeptimemaps.com



Permian

- Erosion of folded and uplifted Carboniferous strata helped form more muted topography and led to non-deposition for the early Permian
- Creation of Pangaea led to catastrophic global energy circulation systems
- Prevailing hot, arid to semi-arid climatic conditions
- Late Permian extension opened seaways and flooded low-lying ground
- Aeolian and evaporitic environments dominate



Triassic

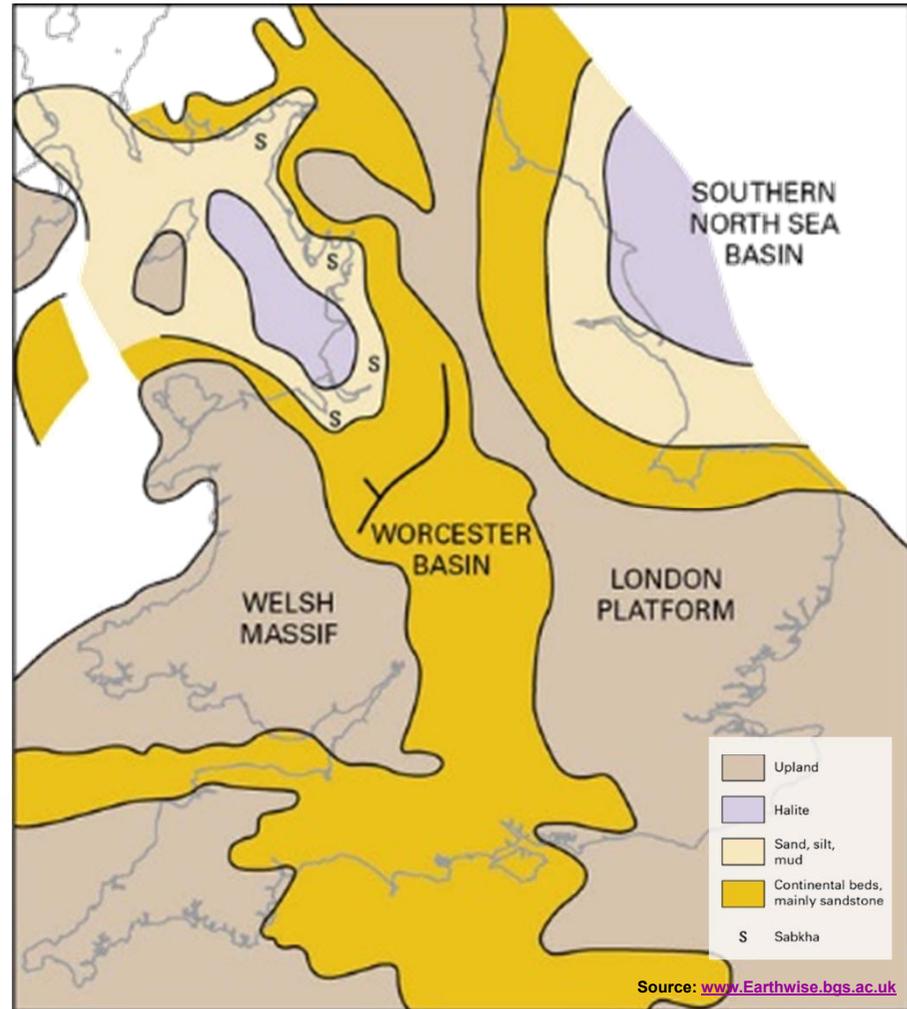
- The early phase of the break-up of Pangaea as the UK moves northward
- Prevailing hot and [semi-] arid conditions continue
- Continuation of the Permian climatic, though becoming more humid and cooler through the Triassic
- Significant drying of the current adjacent UK bodies of water

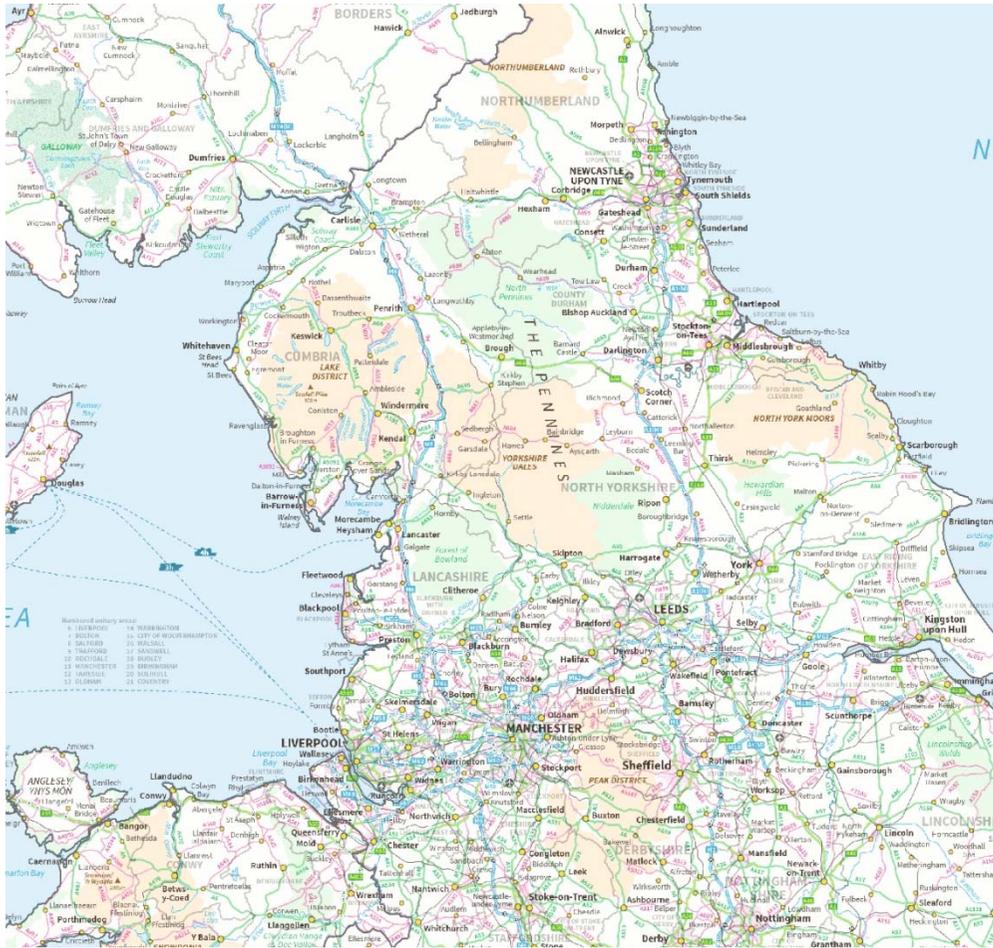
Source: www.deeptimemaps.com



Triassic

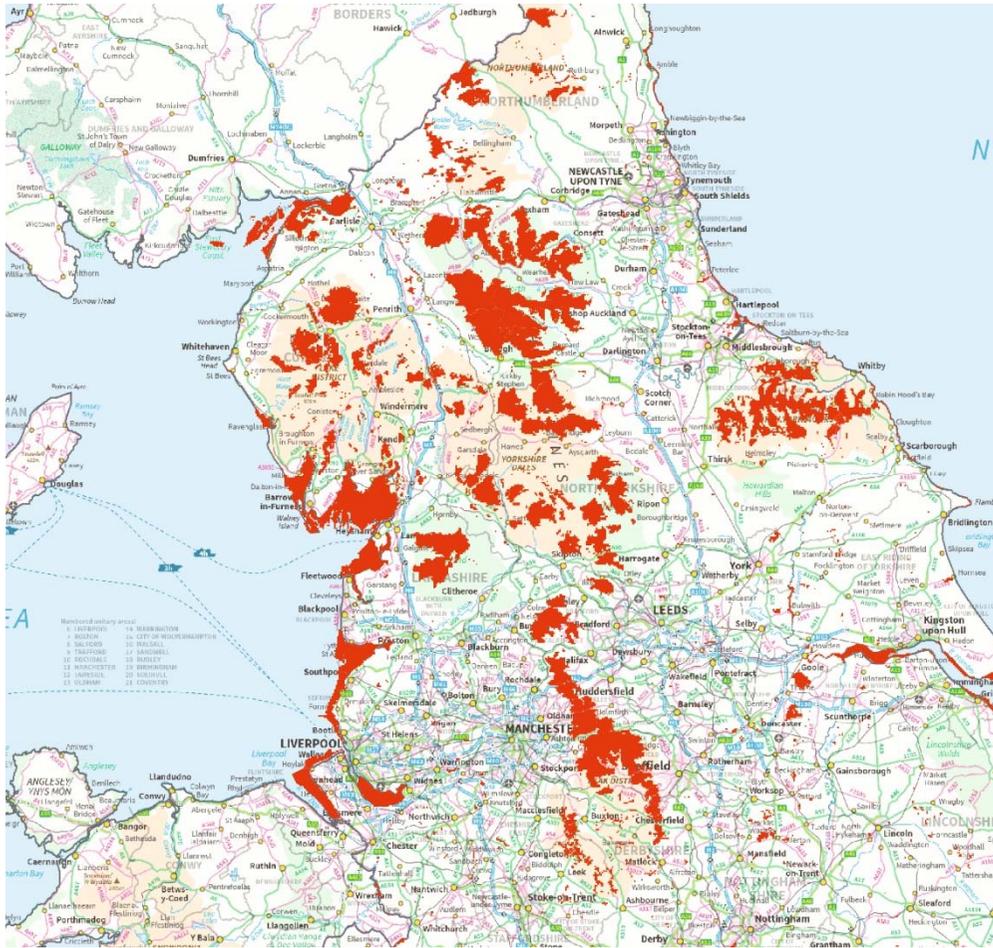
- Continental semi-arid conditions for most of the UK, though marine transgressions evident in the Northwest by mid & Late Triassic times
- Region subsidence rates led to thickness variations in the Triassic
- North western England experienced multiple Spectacular exposure of the of the Triassic at St Bees Head
- Littoral settings, playa lakes and mudflat environments deposited the Mercia Mudstone Group





A landscape 100's millions of years in the making...





A landscape 100's millions of years in the making...

