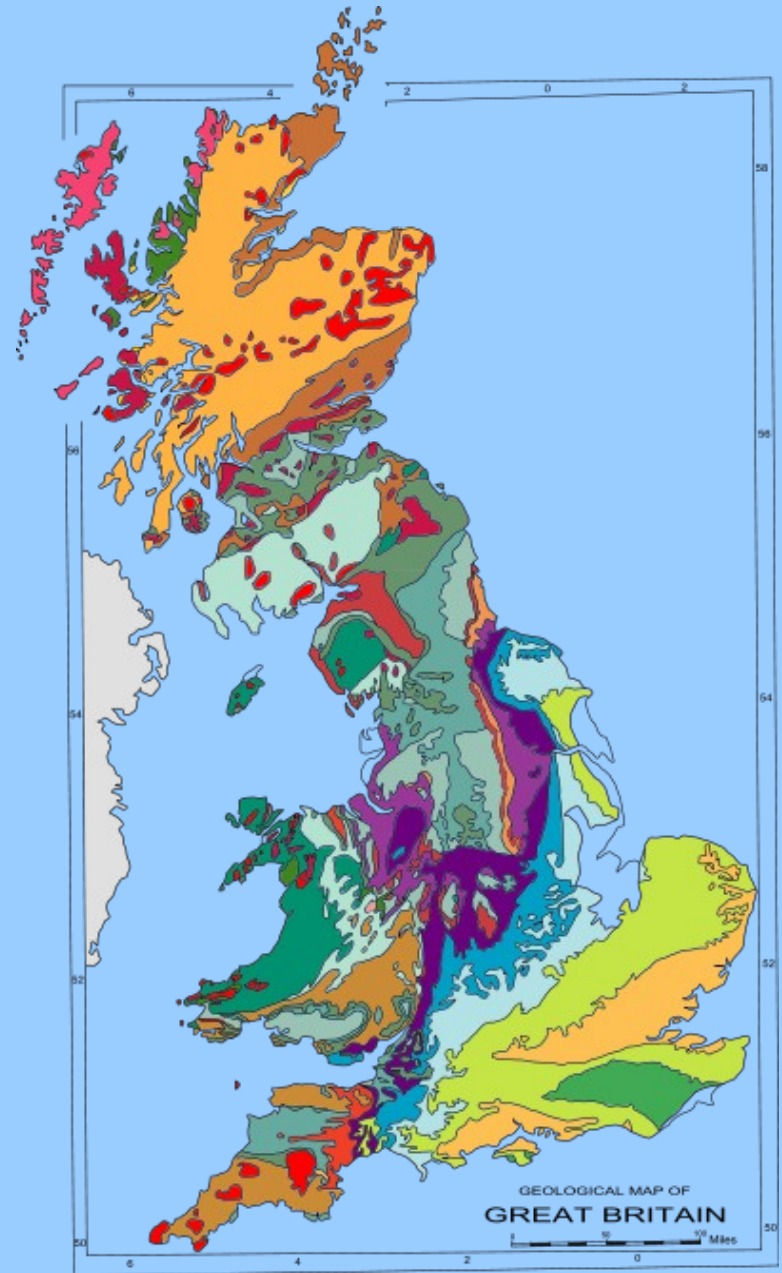


A Geological History of Britain

Dr Liam Herringshaw
lgh865@hotmail.com



Week 3

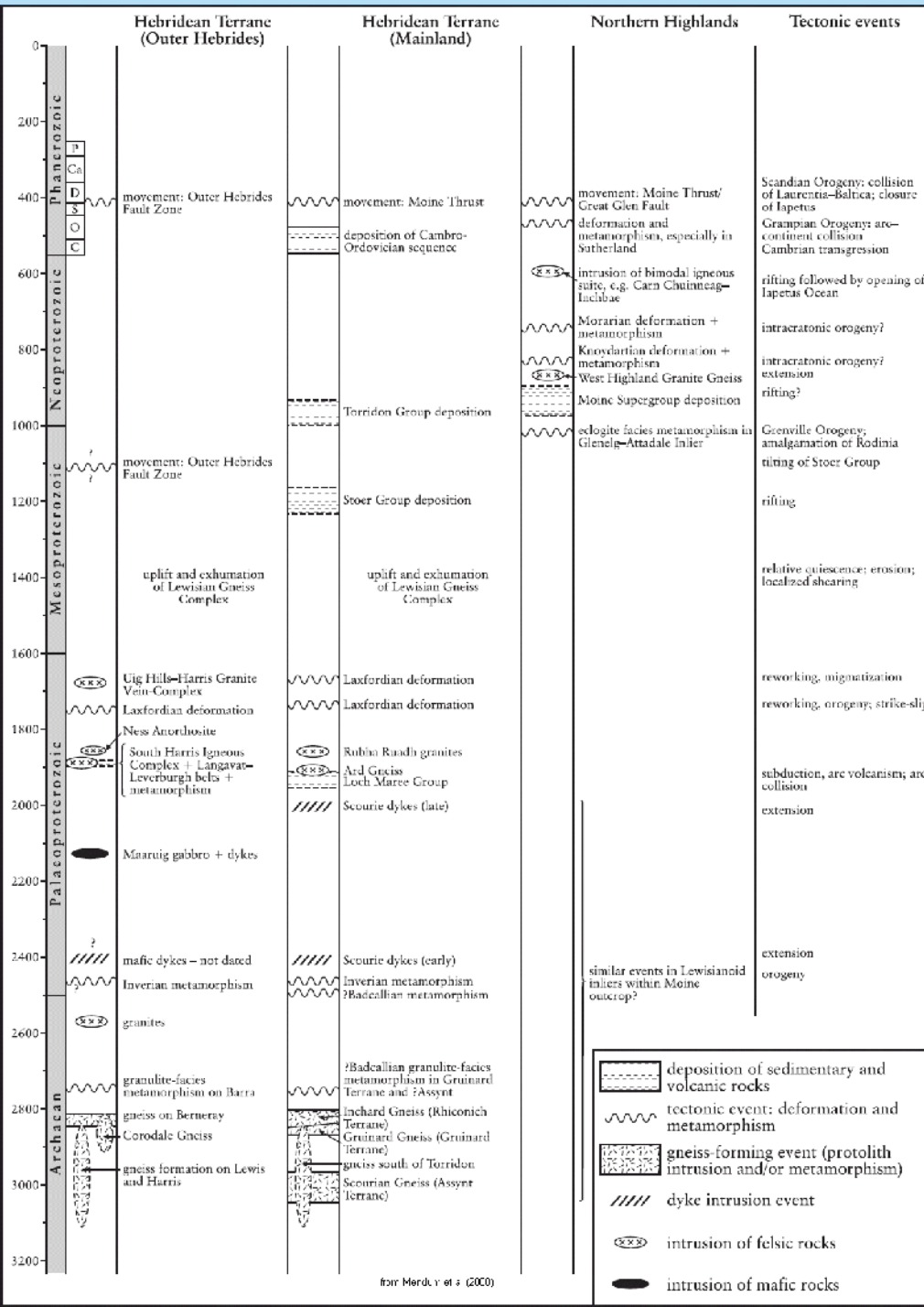
1. Review of last week
2. Geo-nealogy
3. The Precambrian of England & Wales
 - Charnwood case study







Last week

Precambrian-Cambrian geological history of Scotland

JNCC ref:

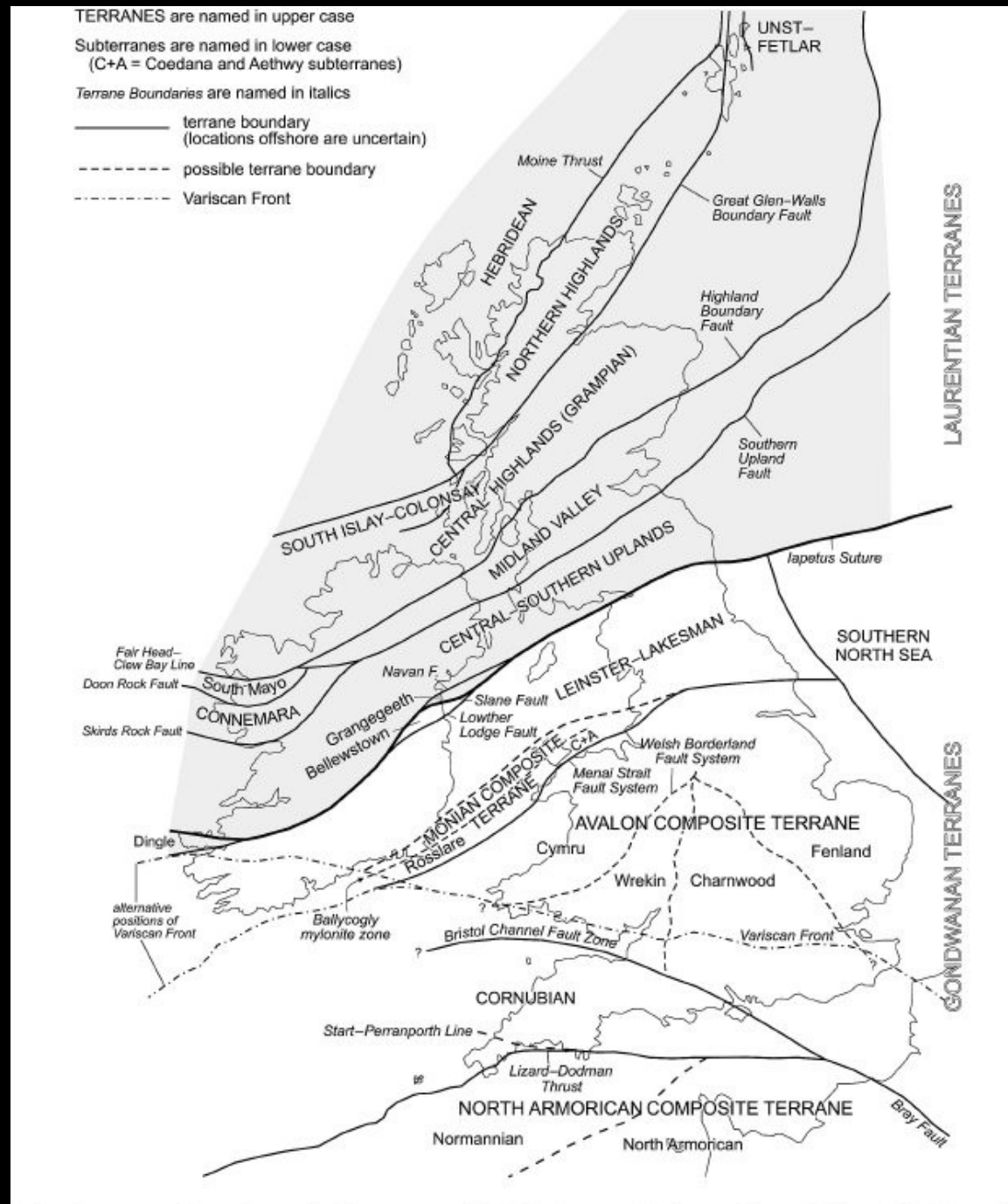
<http://jncc.defra.gov.uk/pdf/V34Chap1.pdf>



-  deposition of sedimentary and volcanic rocks
-  tectonic event: deformation and metamorphism
-  gneiss-forming event (protolith intrusion and/or metamorphism)
-  dyke intrusion event
-  intrusion of felsic rocks
-  intrusion of mafic rocks

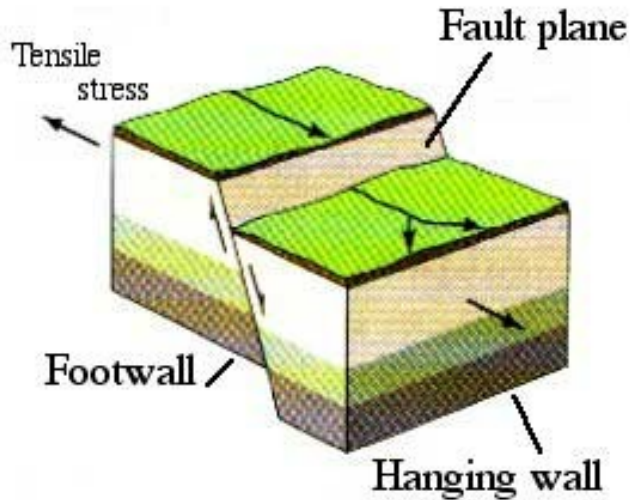
Terranes

crustal blocks or fragments preserving a geological history distinct from adjacent areas, and usually bounded by faults

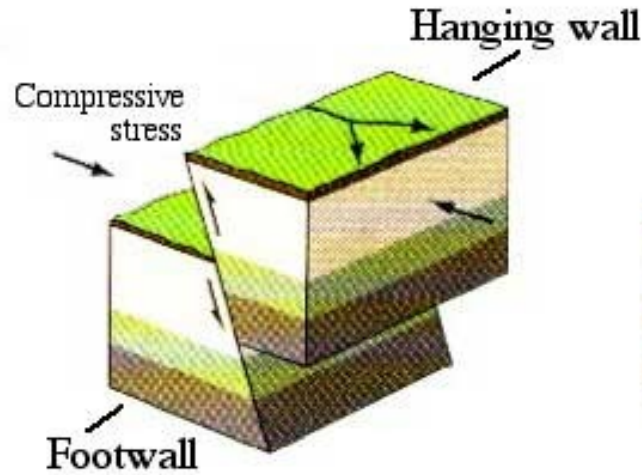


Fault types

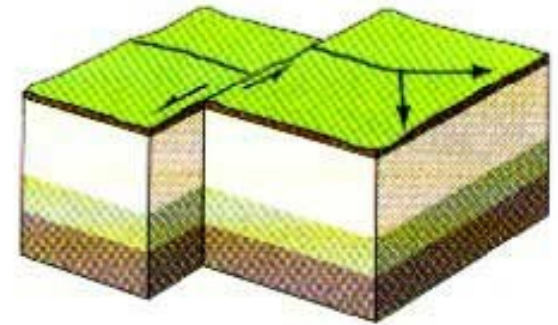
Normal fault



Reverse fault



Strike slip fault



e.g.
**HIGHLAND
BOUNDARY
FAULT**

e.g.
**MOINE
THRUST**

e.g.
**GREAT GLEN
FAULT**

Geo-nealogy

BBC

~~WHO~~

WHERE

DO YOU THINK YOU ARE?

WERE



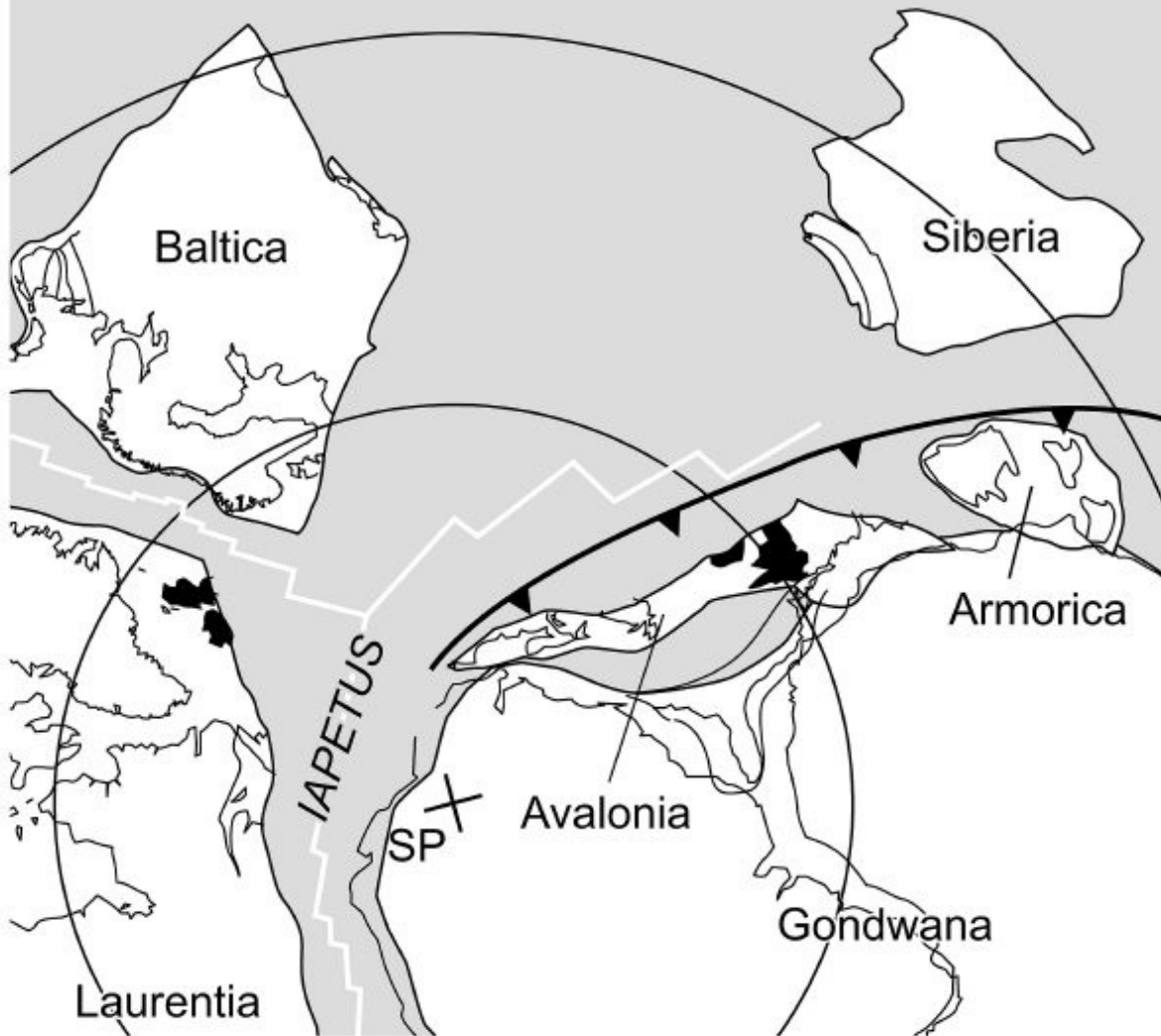
Precambrian of England & Wales

Alternating
Segmented
Lobes



Scotland – Archaean & Proterozoic;
Eng & Wales – Neoproterozoic only

Palaeogeography

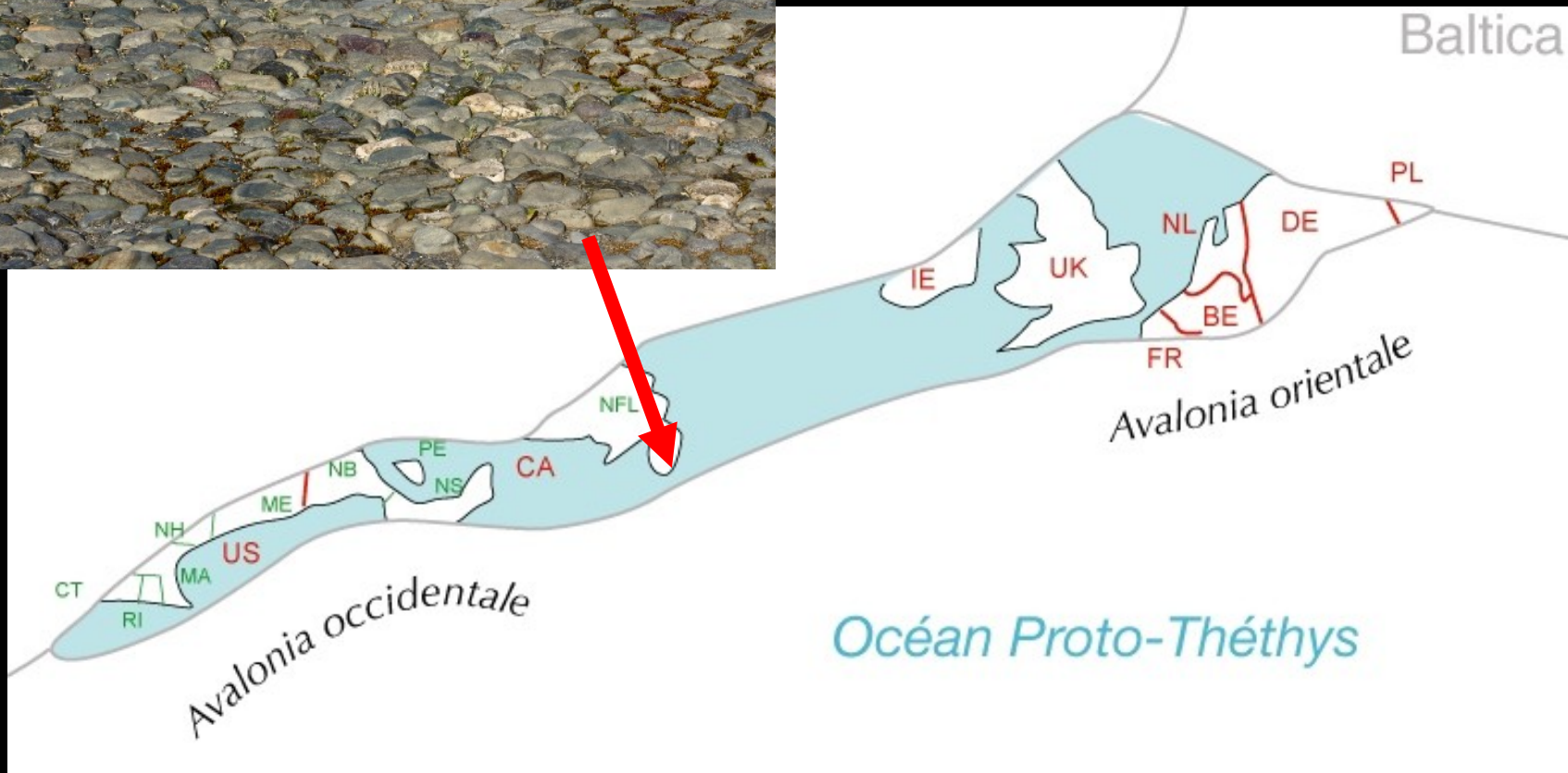


Late
Neoprotero-
zoic
positions of
Avalonia
and
Laurentia

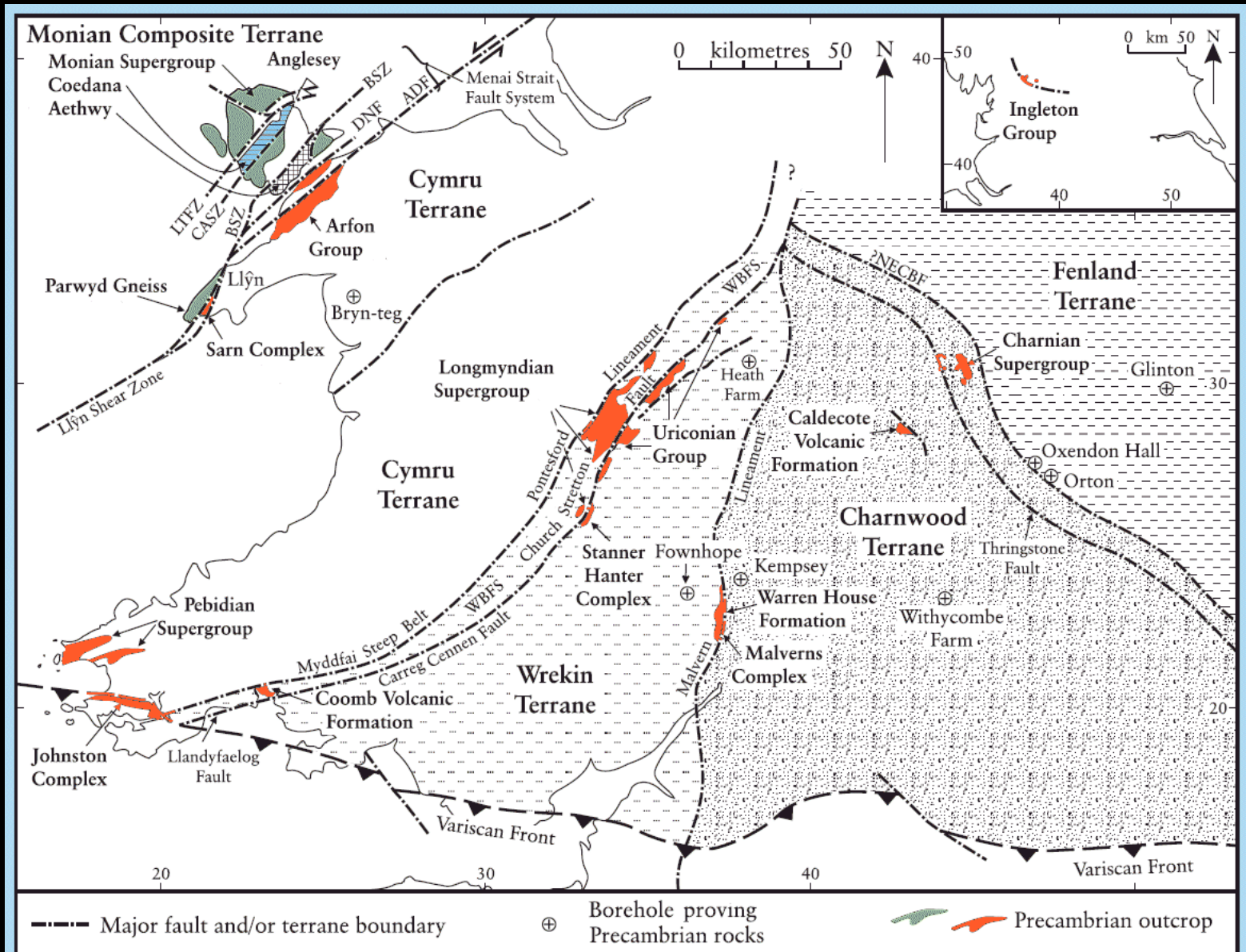
Avalonia



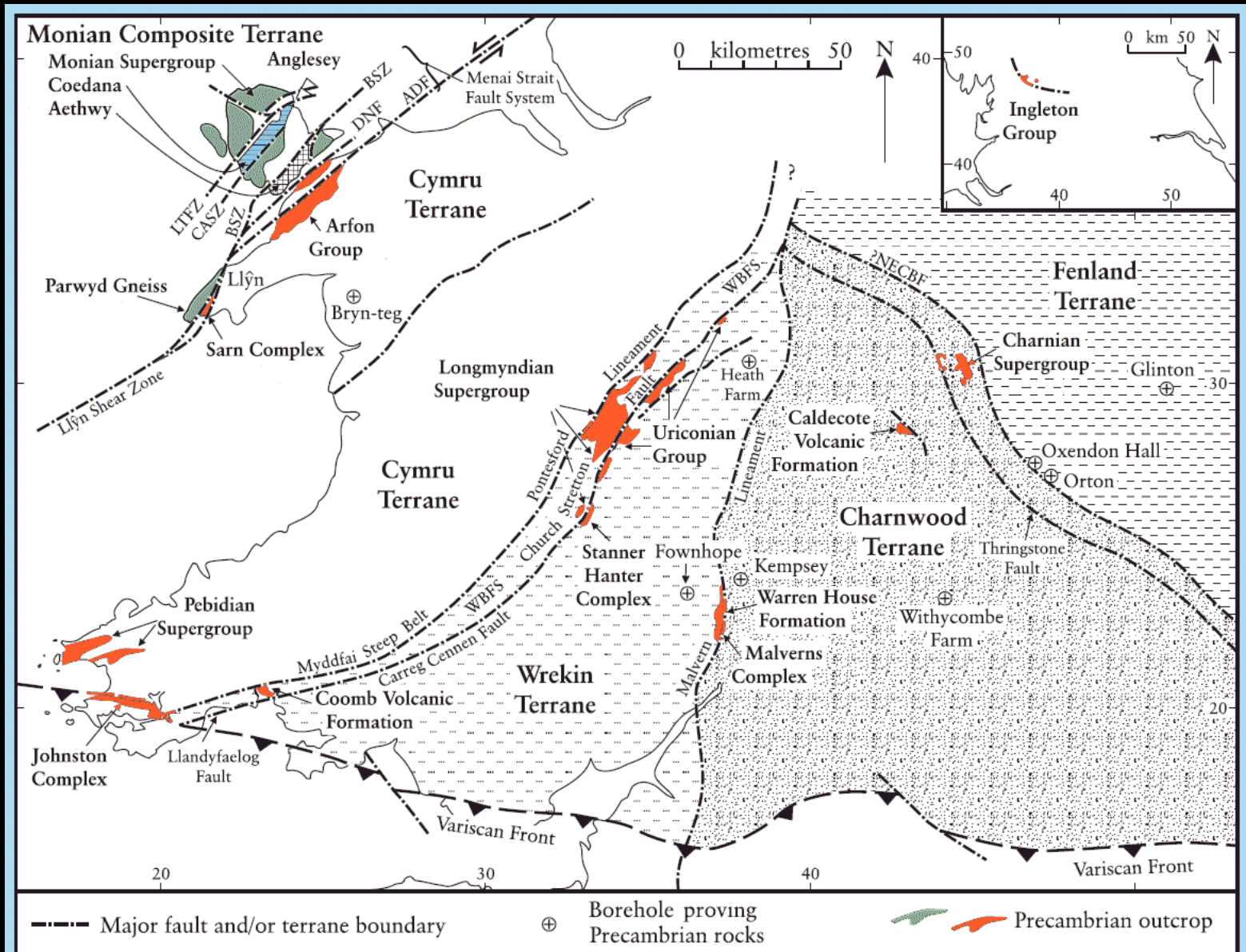
Colony of
Avalon, NL



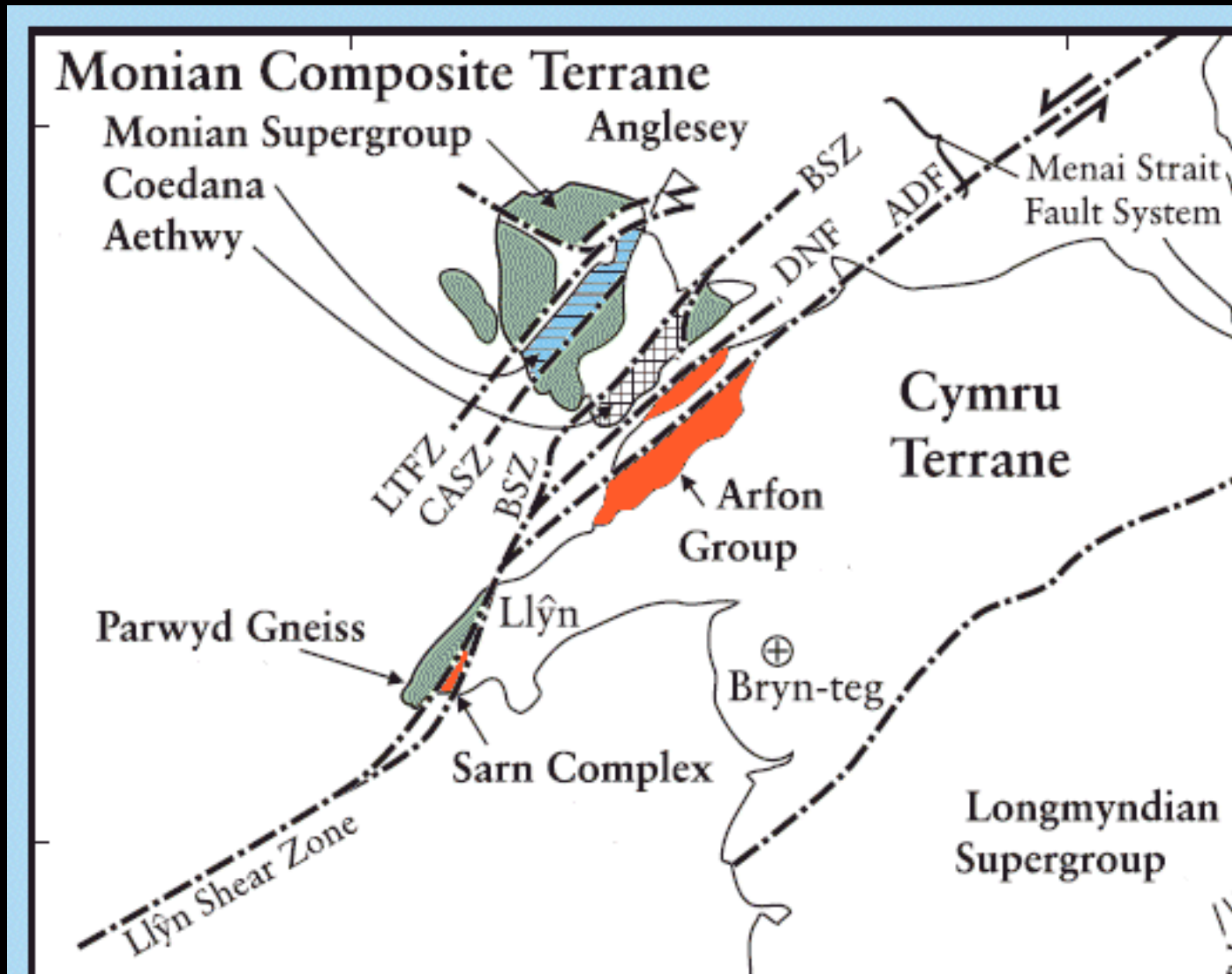
Precambrian of England & Wales



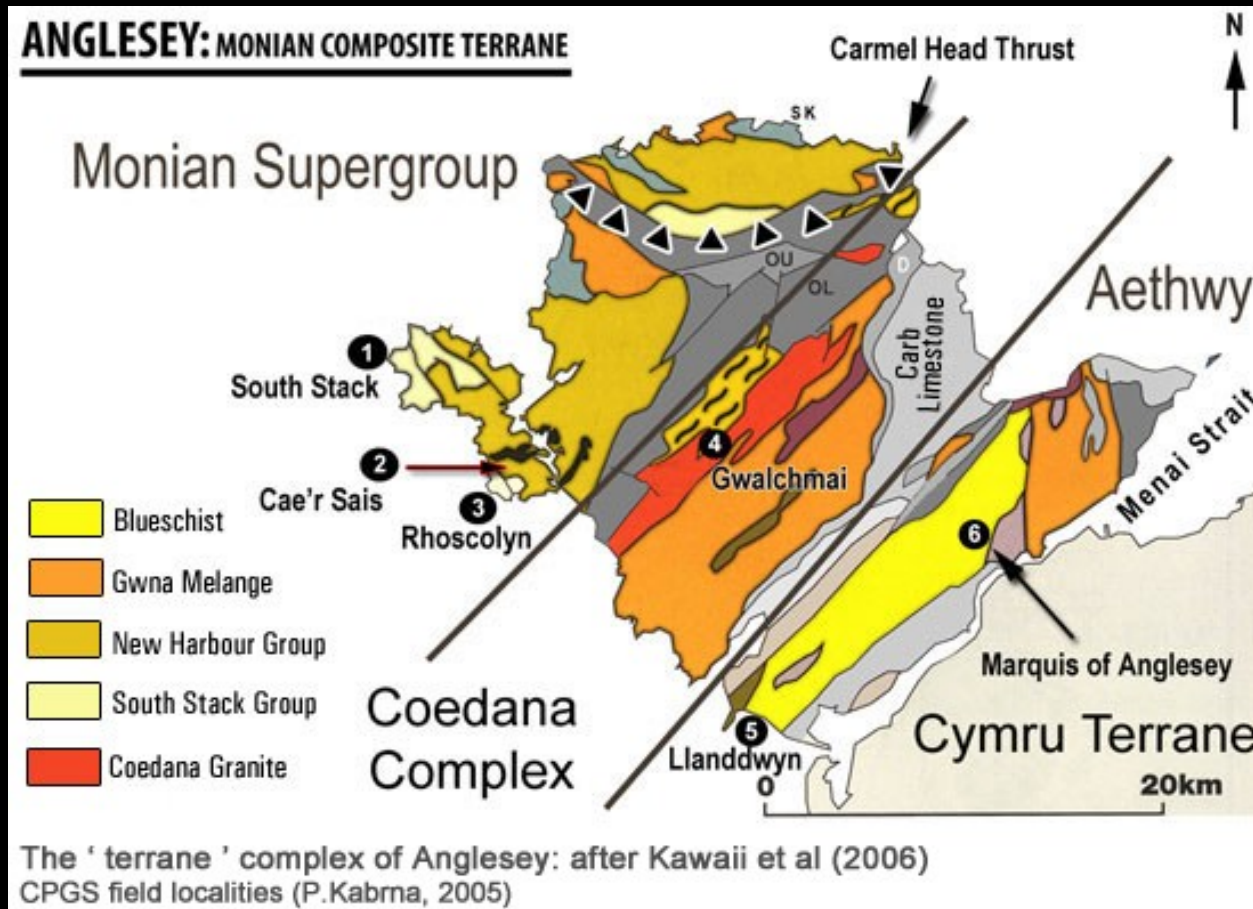
Two Major Terranes



1. Monian Terrane



A three-part terrane



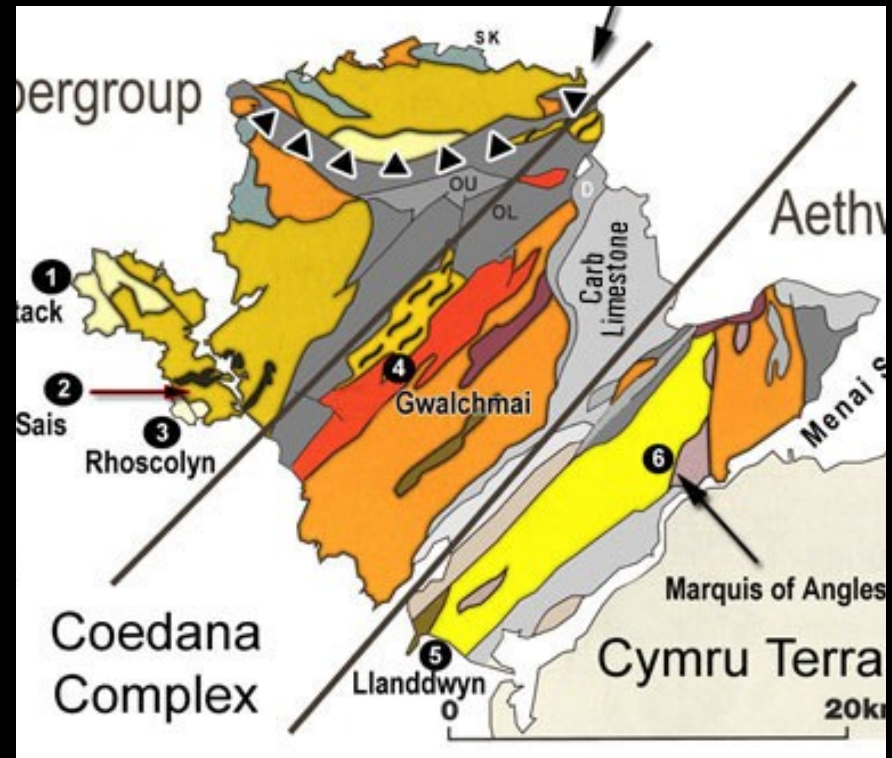
Coedana, Aethwy and Monian
(Ynys Môn = Monian)

Coedana Complex

1800-1200 Ma – continental protolith

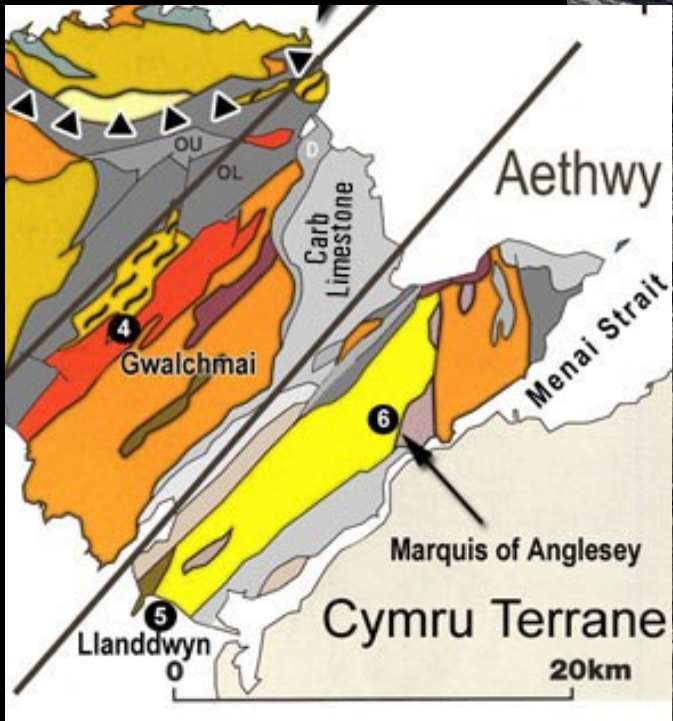
Metamorphism ~666 Ma = gneisses

615 Ma – intrusion of granite



Aethwy

625-570 Ma – oceanic protolith turned to schists



Monian Supergroup

600-500 Ma – deposition of sediments

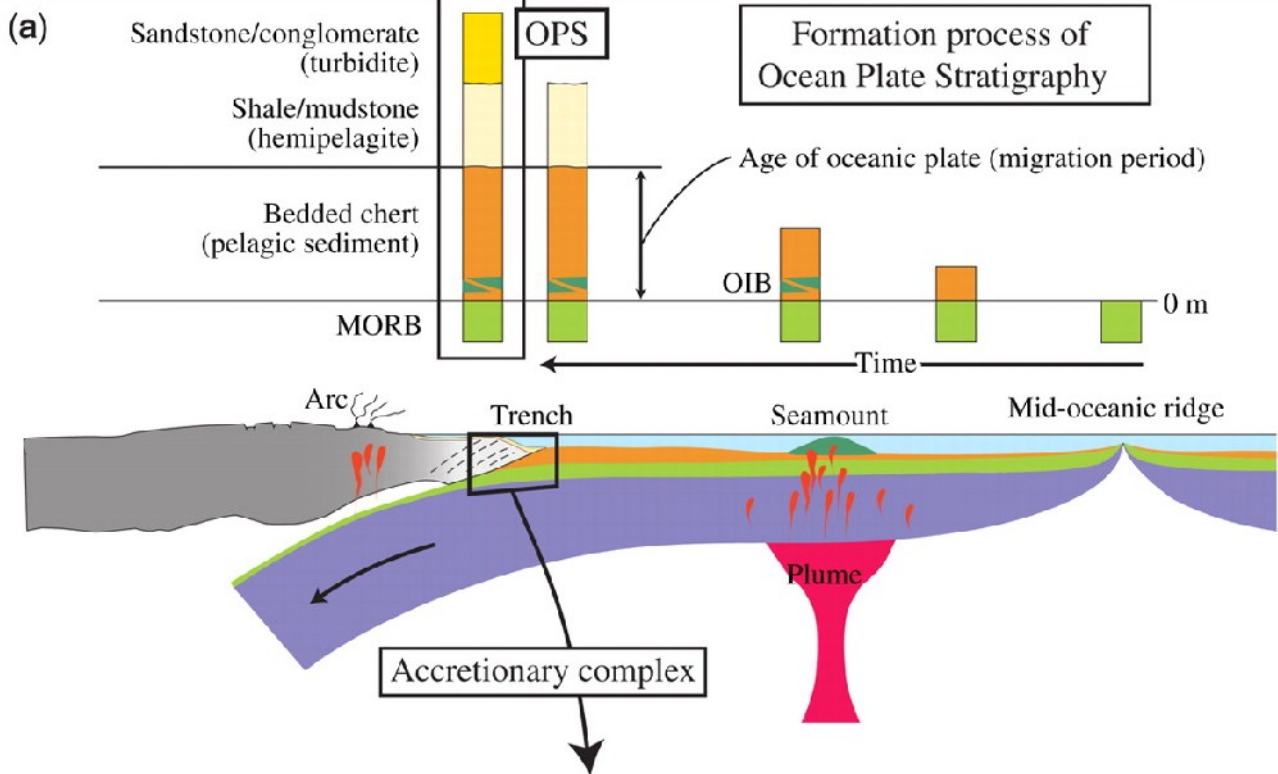
South Stack Group

New Harbour Group

Gwna Group

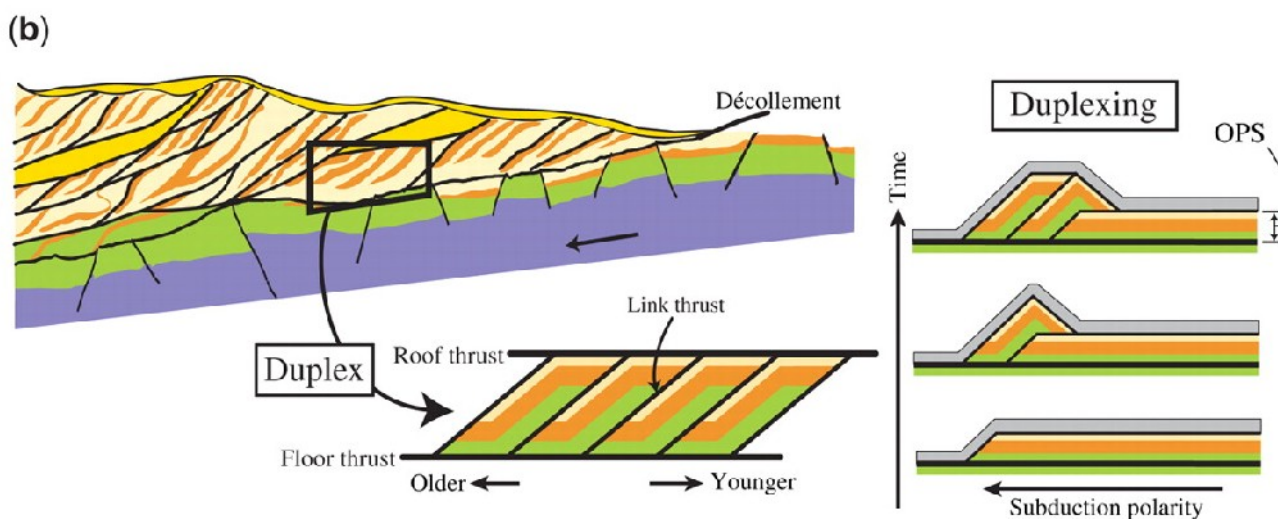
But in which order were they laid down?

Recent work (re-)overturns the layers!



A Pacific perspective

Anglesey as a Japan-type subduction complex



Where and what is the Gwna
Melange?

Gwna Melange



Olistostrome

New Harbour Group

Metamorph-
osed muddy
turbidites



Near Holyhead

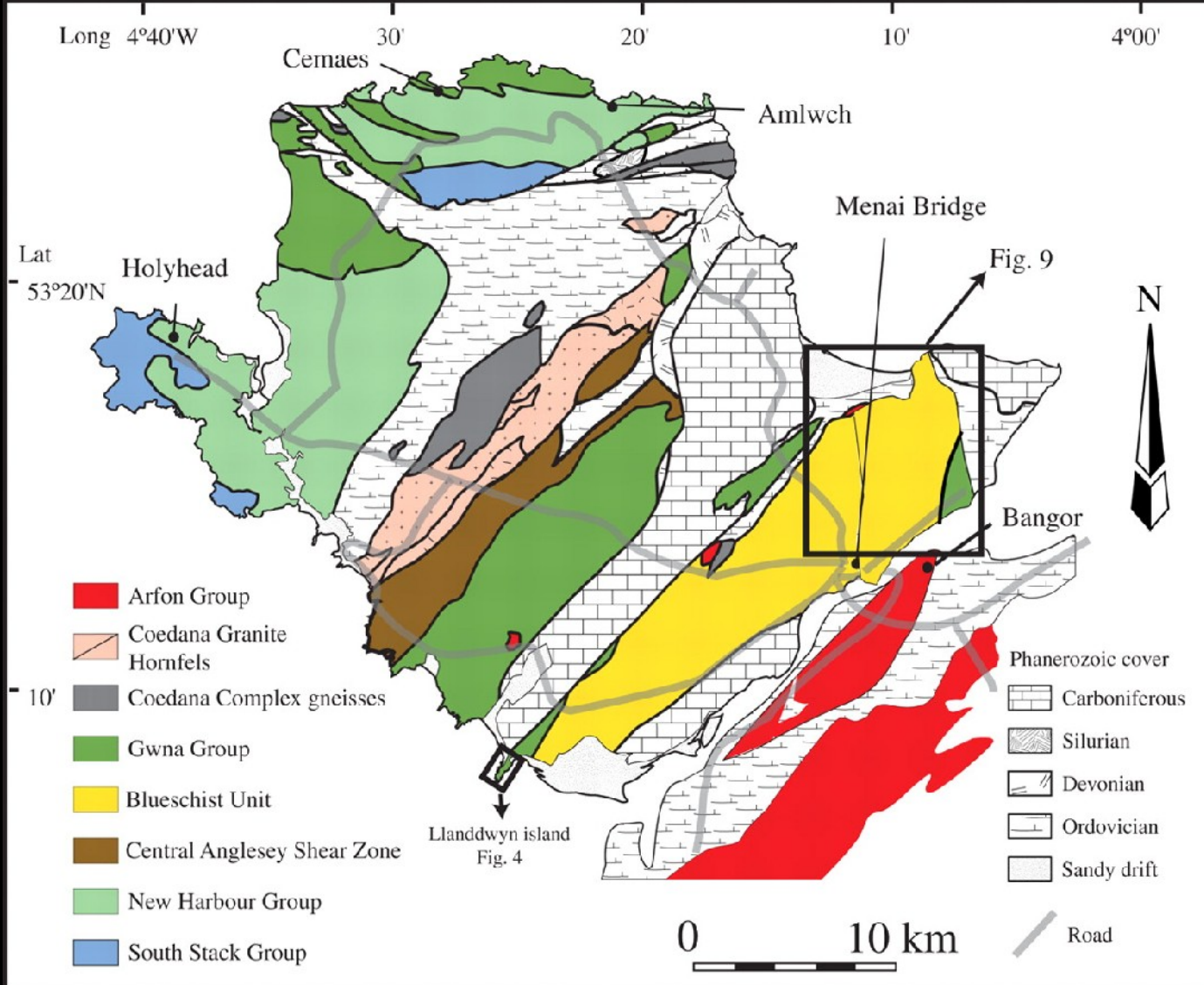
South Stack Group

Sandier turbidites

Now thought to be
Cambrian (~500
Ma)

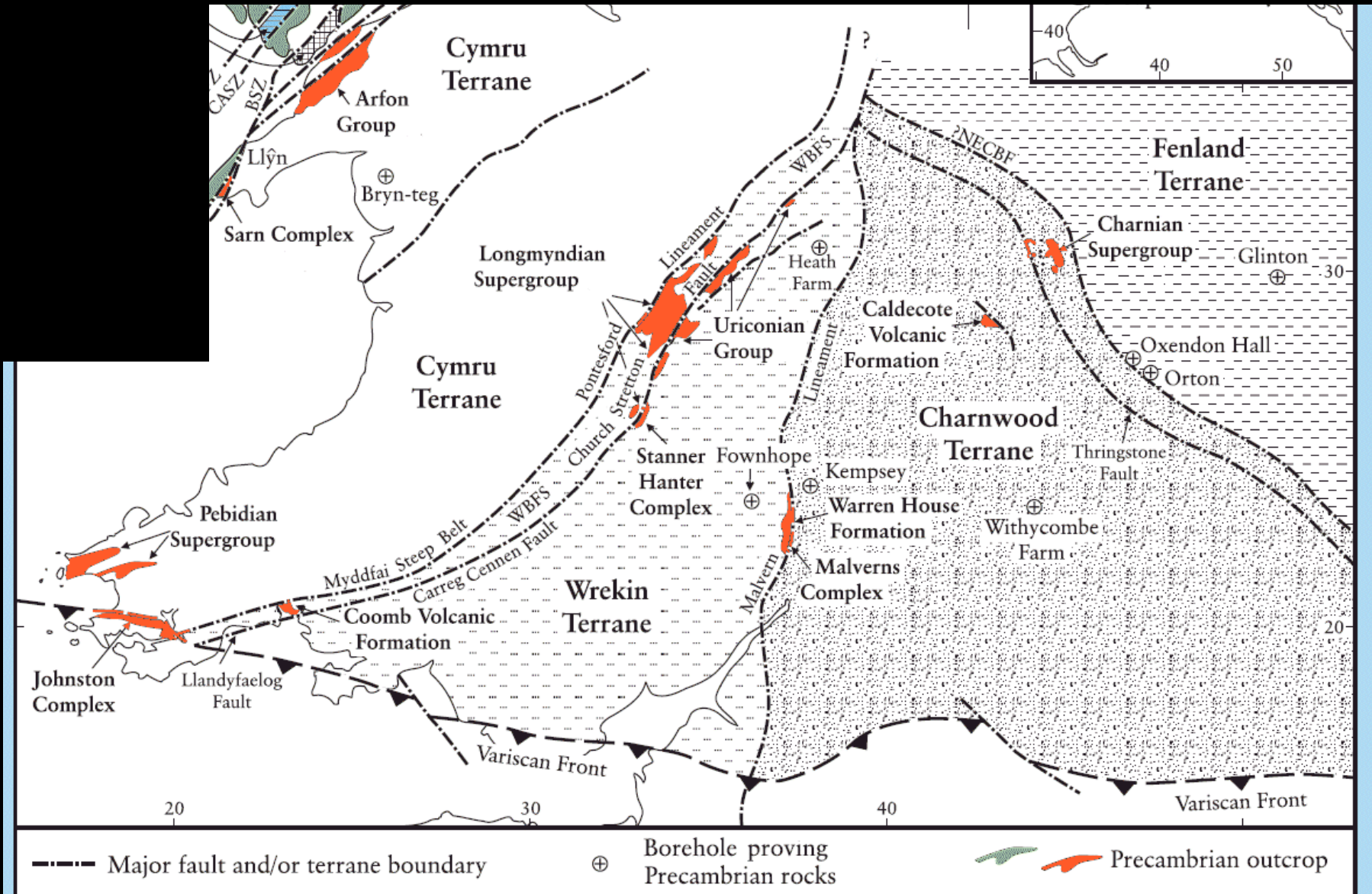


Find out more



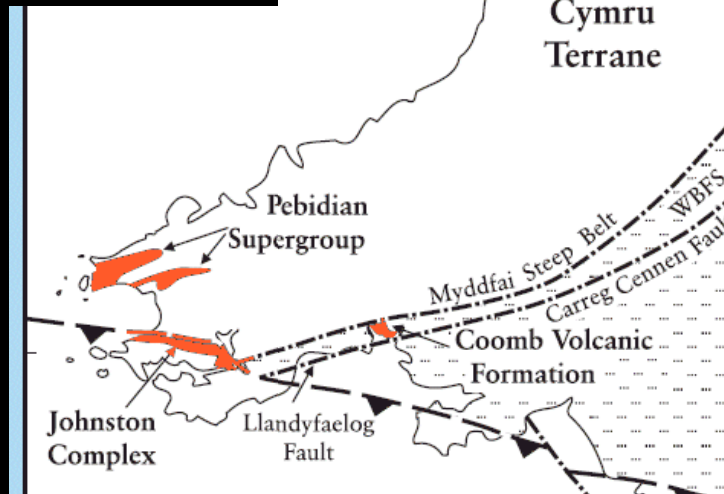
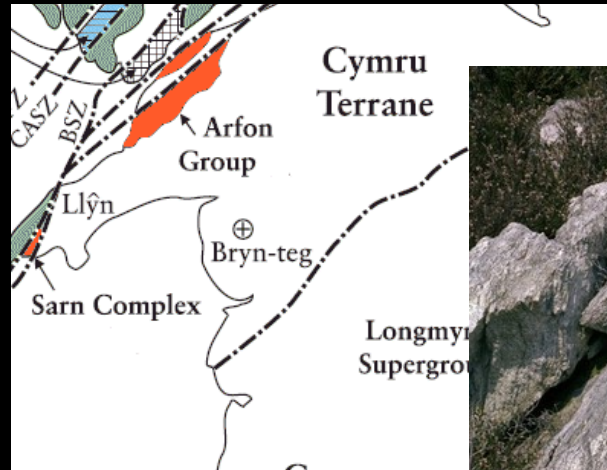
Anglesey UNESCO-assisted geopark = <http://geomon.co.uk/>

2. Avalon Terrane



Cymru

North:
Sarn plutonics
Arfon tuffs



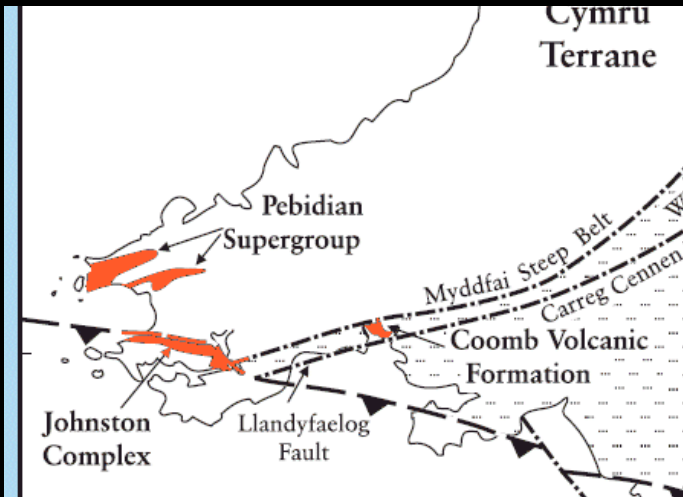
Ash flow tuffs with silica-rich nodules, Llyn Padarn

Cymru

South:

Pebidian volcanoclastics

Pembrokeshire



Vertically tilted volcanic ash beds, St Non's Bay

Wrekin

Malvern

1600 Ma protolith

1100 Ma plutons

700 Ma

metamorphism

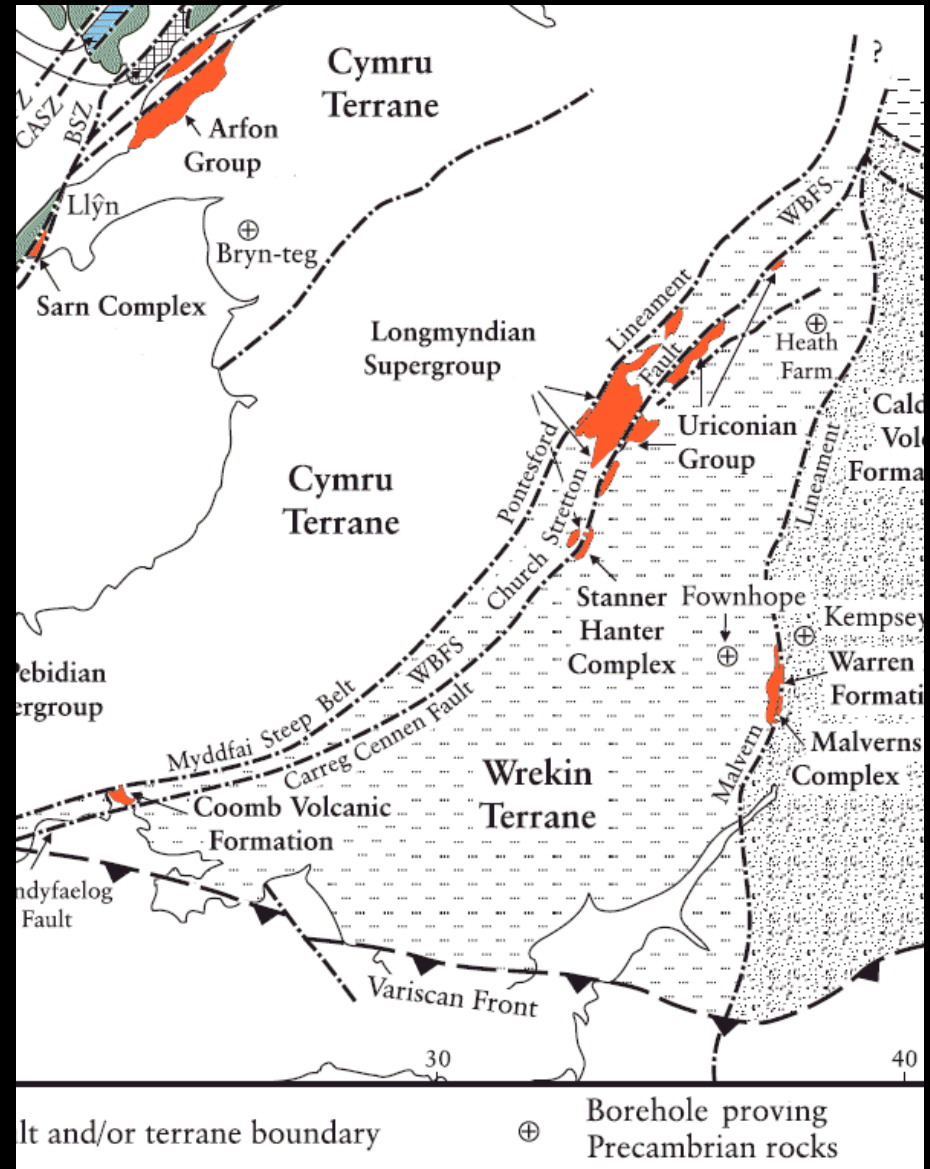
Uriconian

~570 Ma

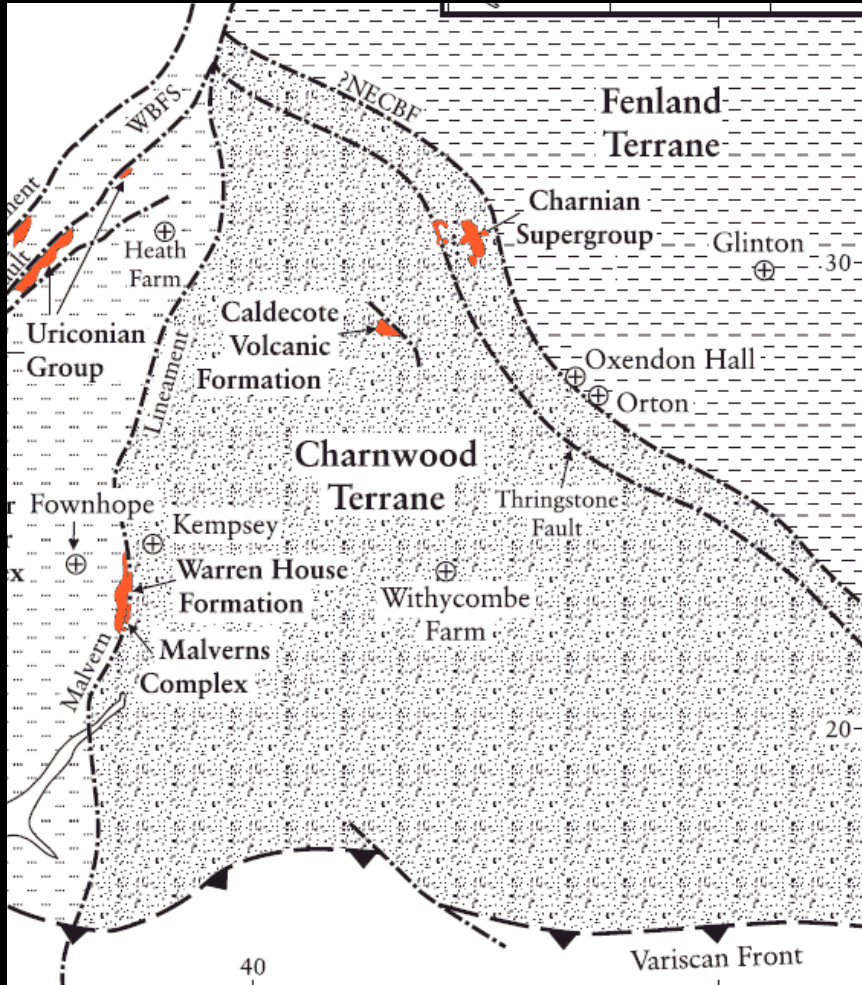
volcanics

Longmyndian

~570 Ma seds



Charnwood



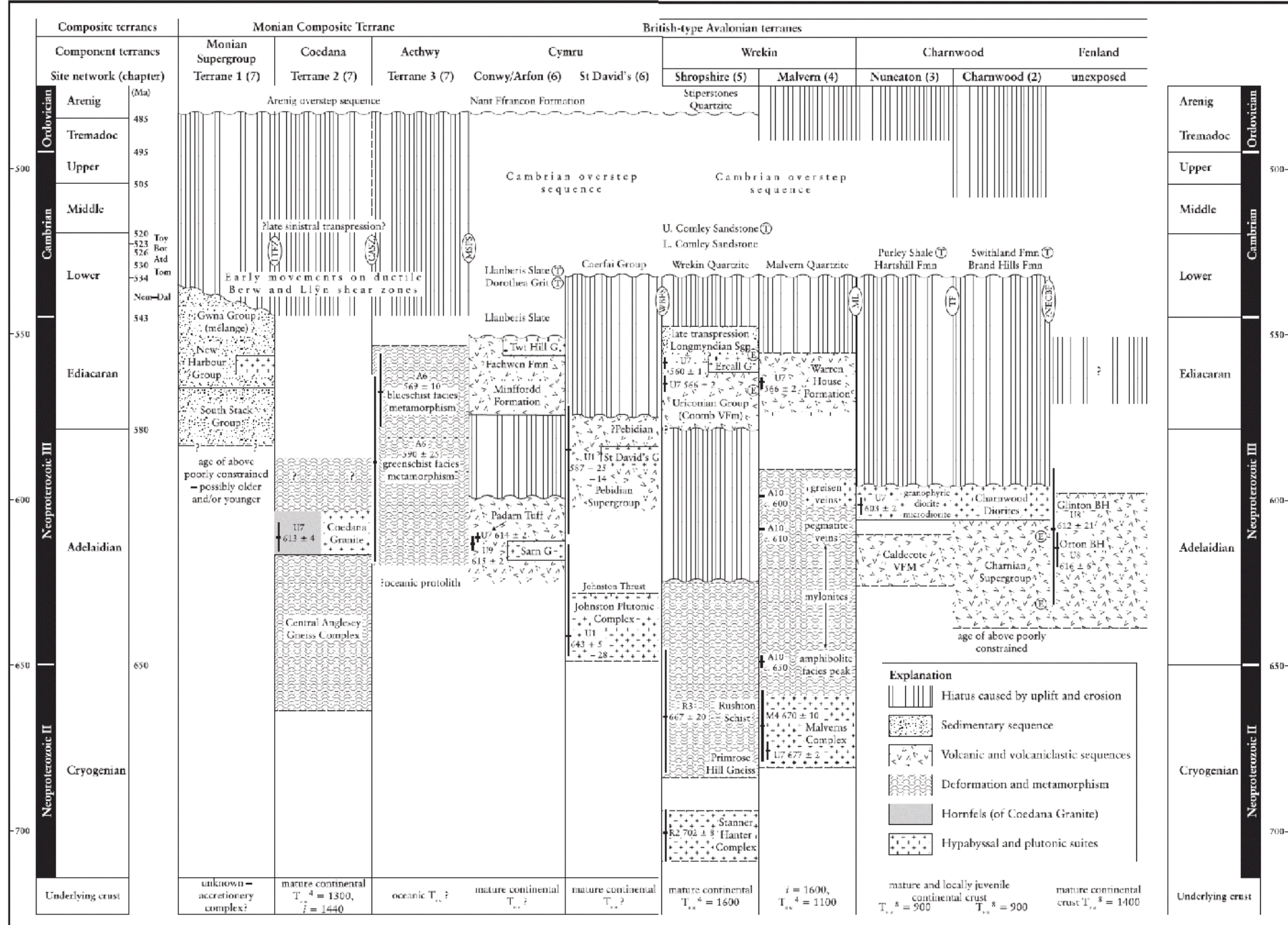
**Charnian
Supergroup:**

Lower:

**Pyroclastic flow-
dominated**

Upper:

**Marine-fluvial
sediments**



Correlation chart for the late Neoproterozoic history of southern Britain. Key: A, ⁴⁰Ar-³⁹Ar age; M, U-Pb monazite age; R, Rb-Sr whole-rock isochron age; II, U-Pb zircon age; T_{DM}, Depleted mantle Sm-Nd age; i, inherited zircons. Key to faunas: (E) Ediacaran fossils; (T) *Teichichnus* trace fossils. Key to horizontal boundaries: continuous line, conformable stratigraphy; wavy line, unconformity; dashed T line, tectonic contact; dashed line, nature of contact uncertain. Terrane boundaries: BSZ, Berw Shear Zone; CASZ, Central Anglesey Shear Zone; LTFZ, Llyn Trawfllw Fault Zone; ML, Malvern Lineament; MSFS, Menai Strait Fault System; ?NECFB, postulated NE Charnwood Boundary Fault; TF, Thringstone Fault; WFBS, Postestford Lineament of Welsh Borderland Fault System. Stratigraphical data for Lower Cambrian sequence, and fossil occurrences nem-Dal, Nemakit-Daldynian; Tom, Tommotian; Ard, Ardabanian; Bot, Boromian; Toy, Toyonian.

Charnwood in detail

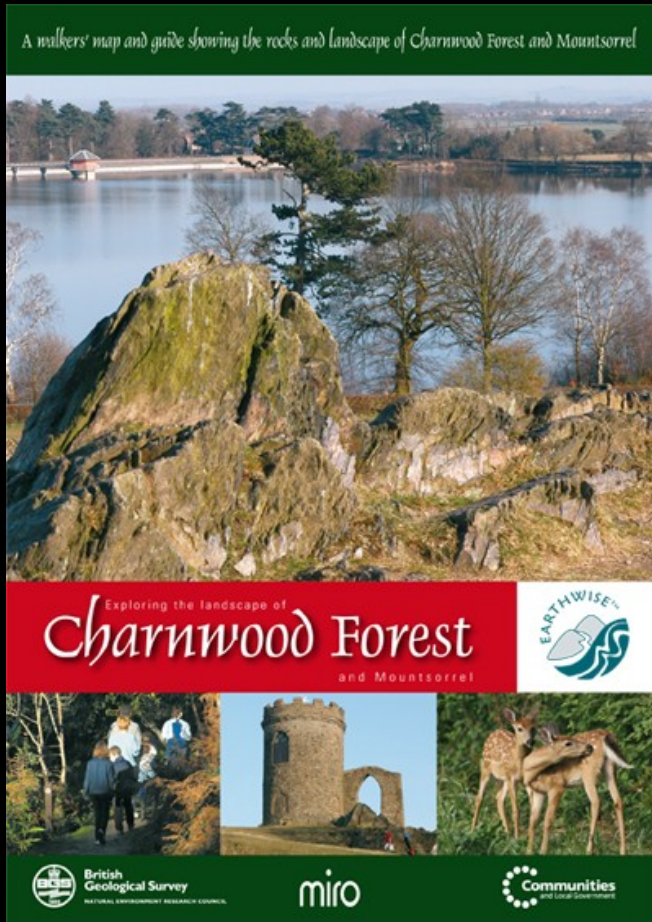


When
Leicestershire
was like
Montserrat

Alternating
Segmented
Lobes



Charnwood in detail



Guide to the geology of Bradgate Park:

nora.nerc.ac.uk/11705/1/Bradgate_Guide_JNC2010.pdf

Next week

Old Lost Sea: Tales from the Iapetus
Ocean

Q. What is a Wilson Cycle?

Links

The Neoproterozoic of England and Wales:

<http://www.geolsoc.org.uk/page10471.html>

Precambrian rocks of England and Wales:

<http://jncc.defra.gov.uk/page-2749>

Charnia @ 50:

<http://madliam.blogspot.co.uk/2007/03/charnia-50.html>