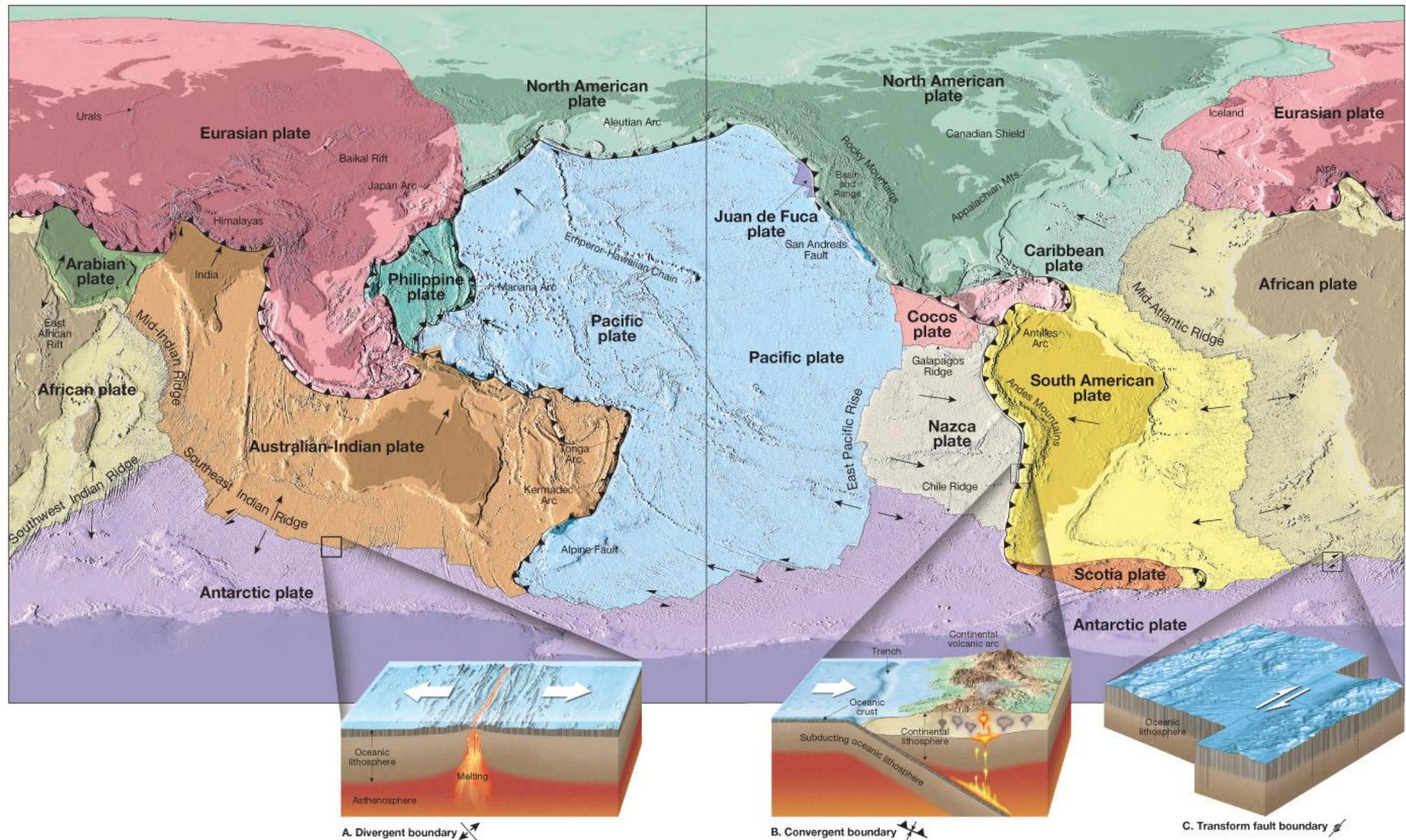




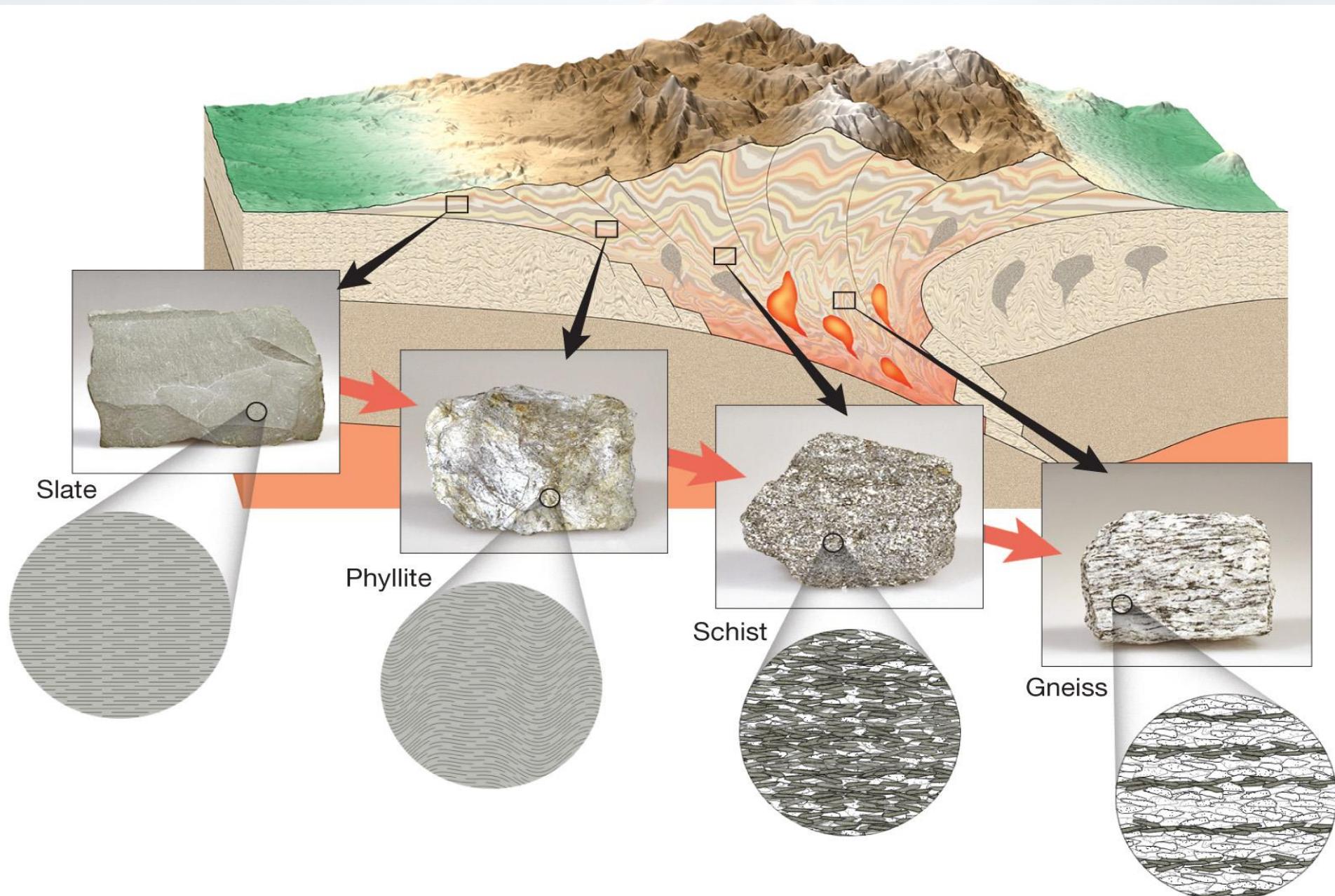
GY4051 Earth Science and Society

Tropical Ireland













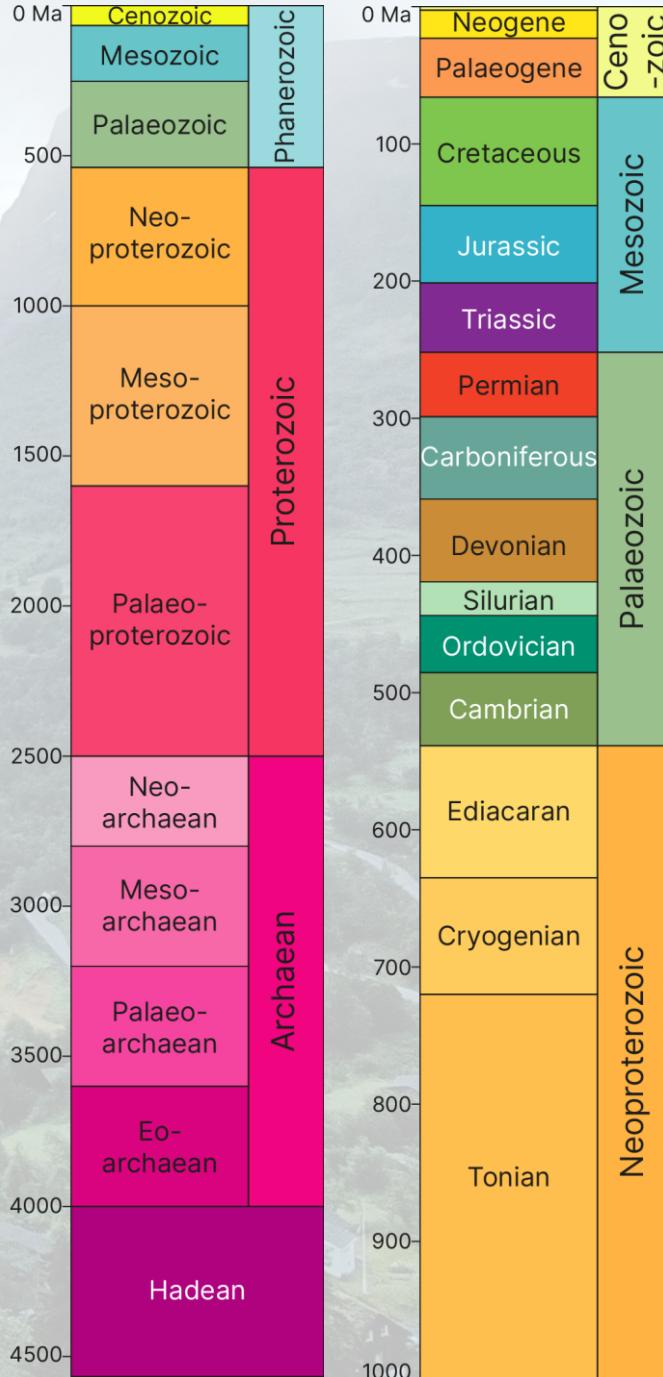
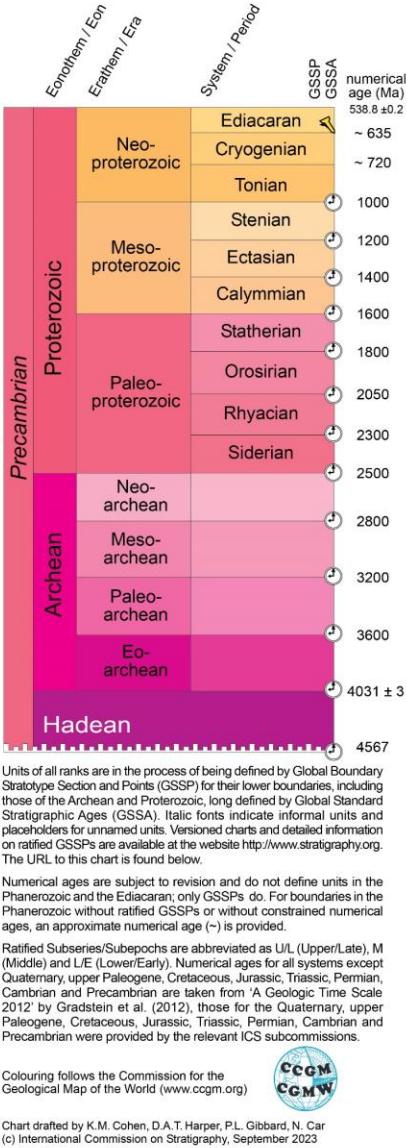
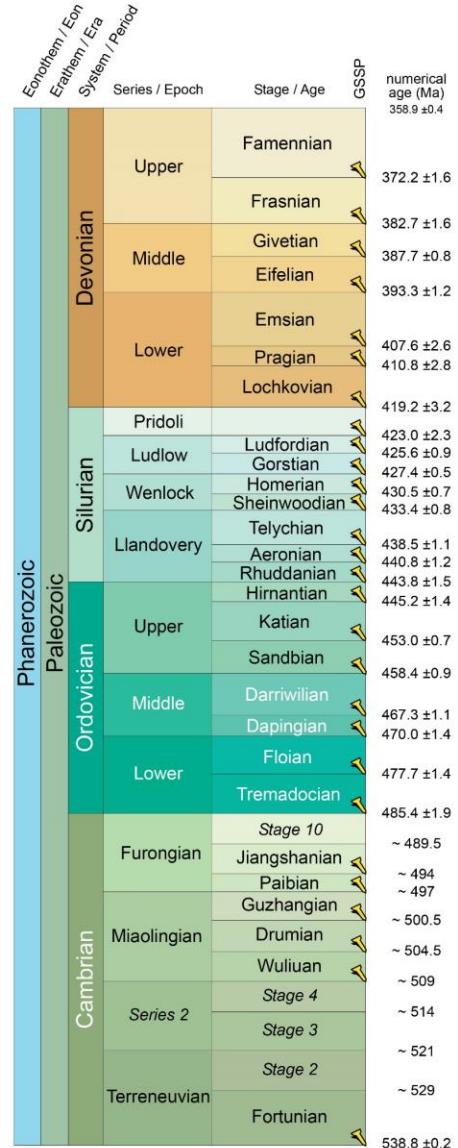
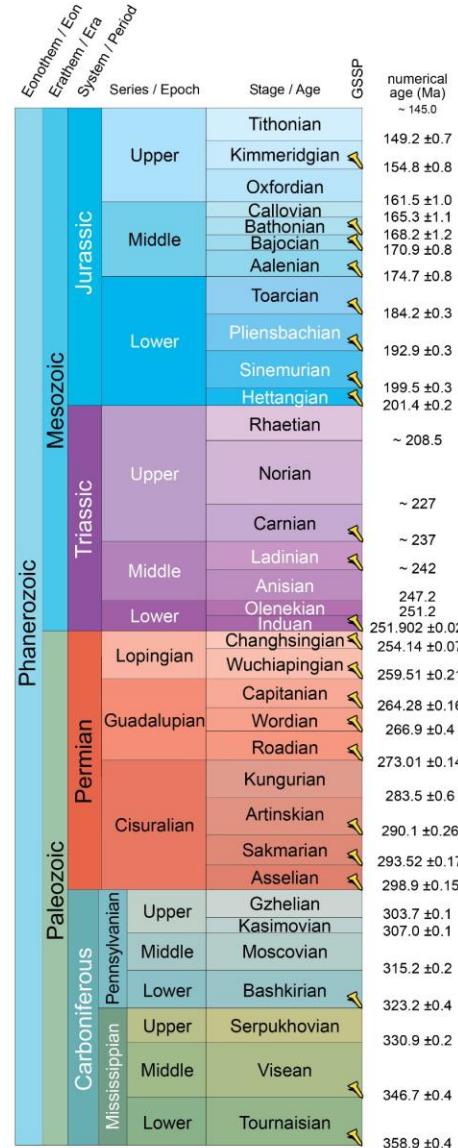
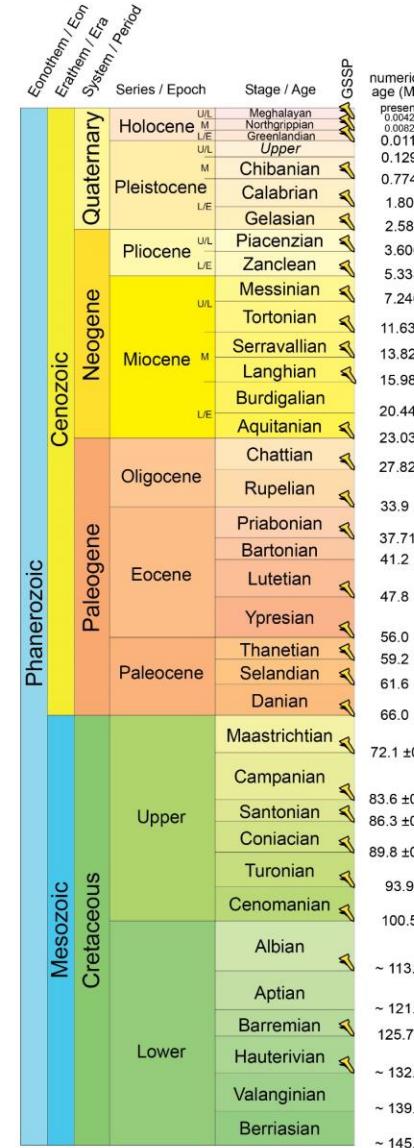


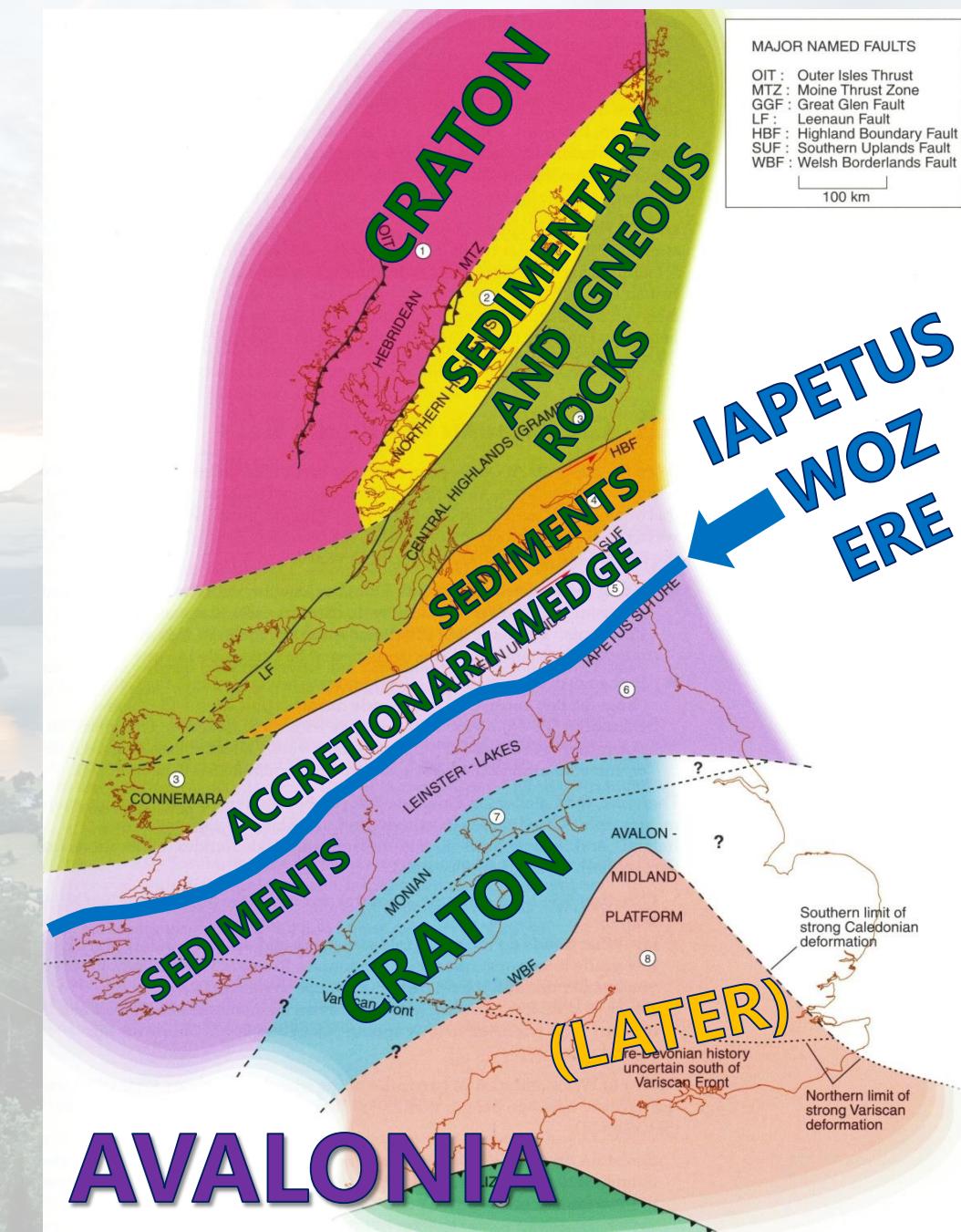
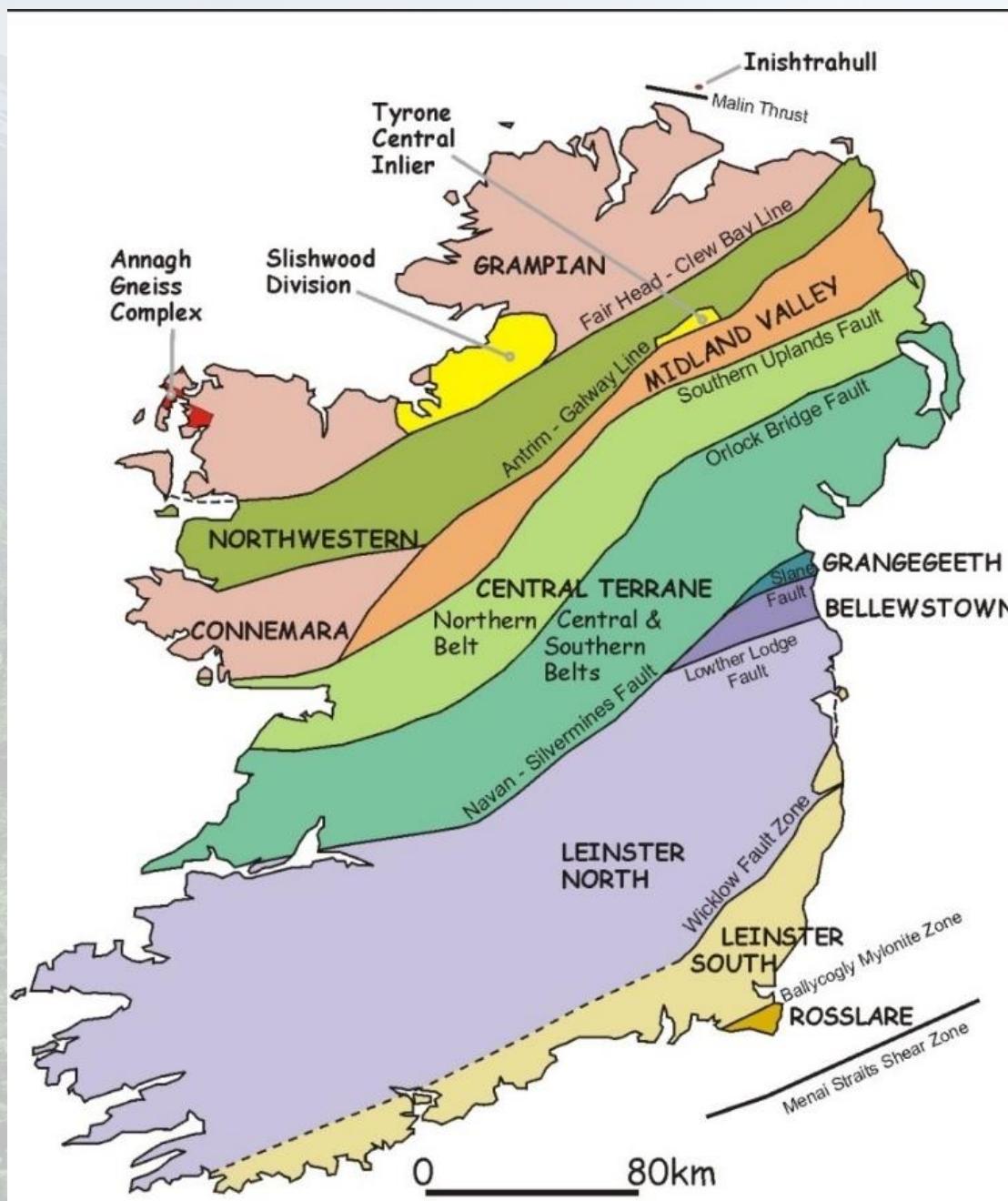
INTERNATIONAL CHRONOSTRATIGRAPHIC CHART

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International Commission on Stratigraphy

v 2023/09







AVALONIA

SUBDUCTION ZONE

VOLCANIC ISLAND ARC

HOT SPOT VOLCANO-SEAMOUNT

OCEANIC SPREADING RIDGE

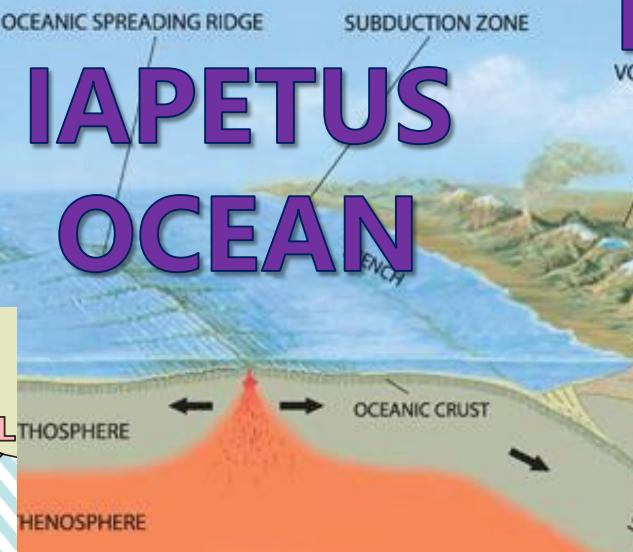
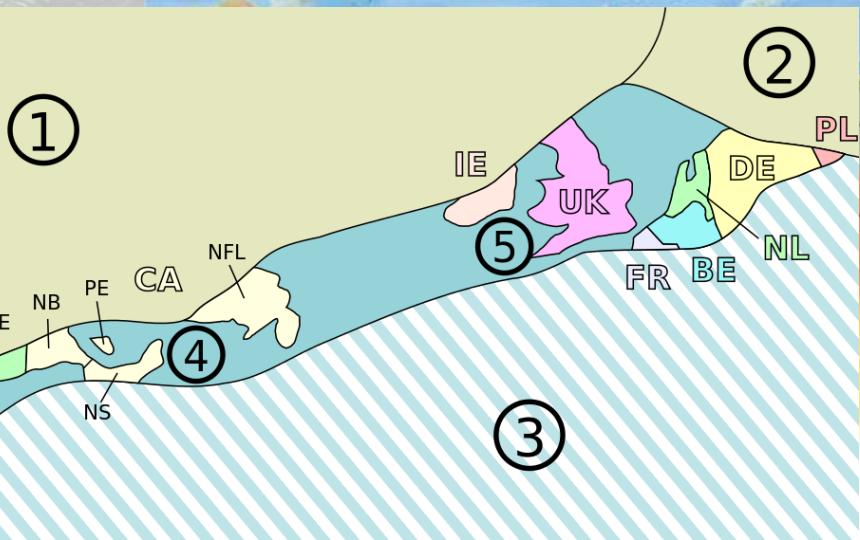
SUBDUCTION ZONE

IAPETUS OCEAN

LAURENTIA

VOLCANIC ARC

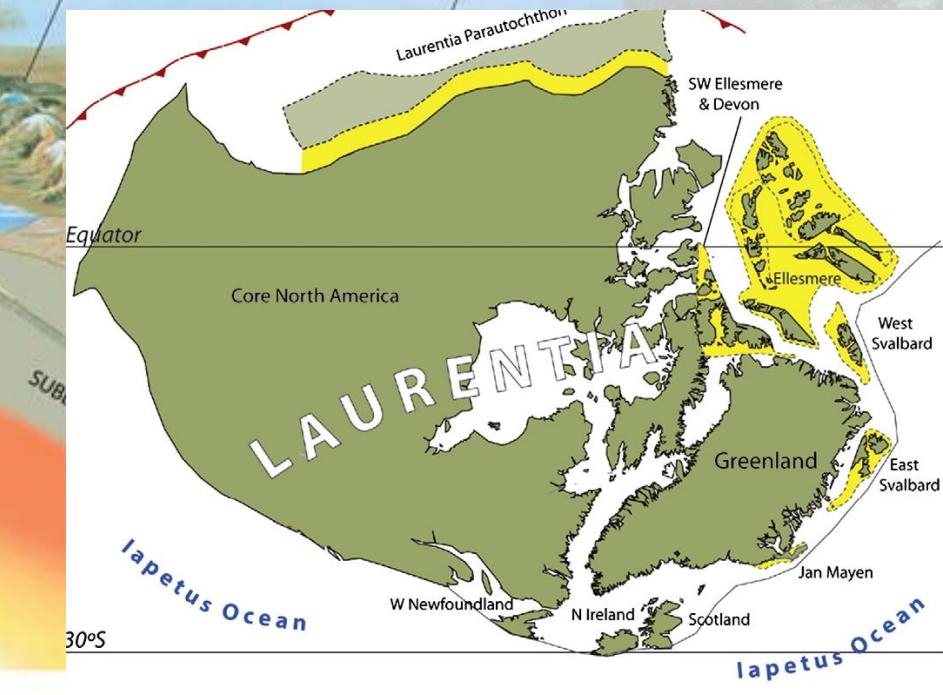
RIFT ZONE

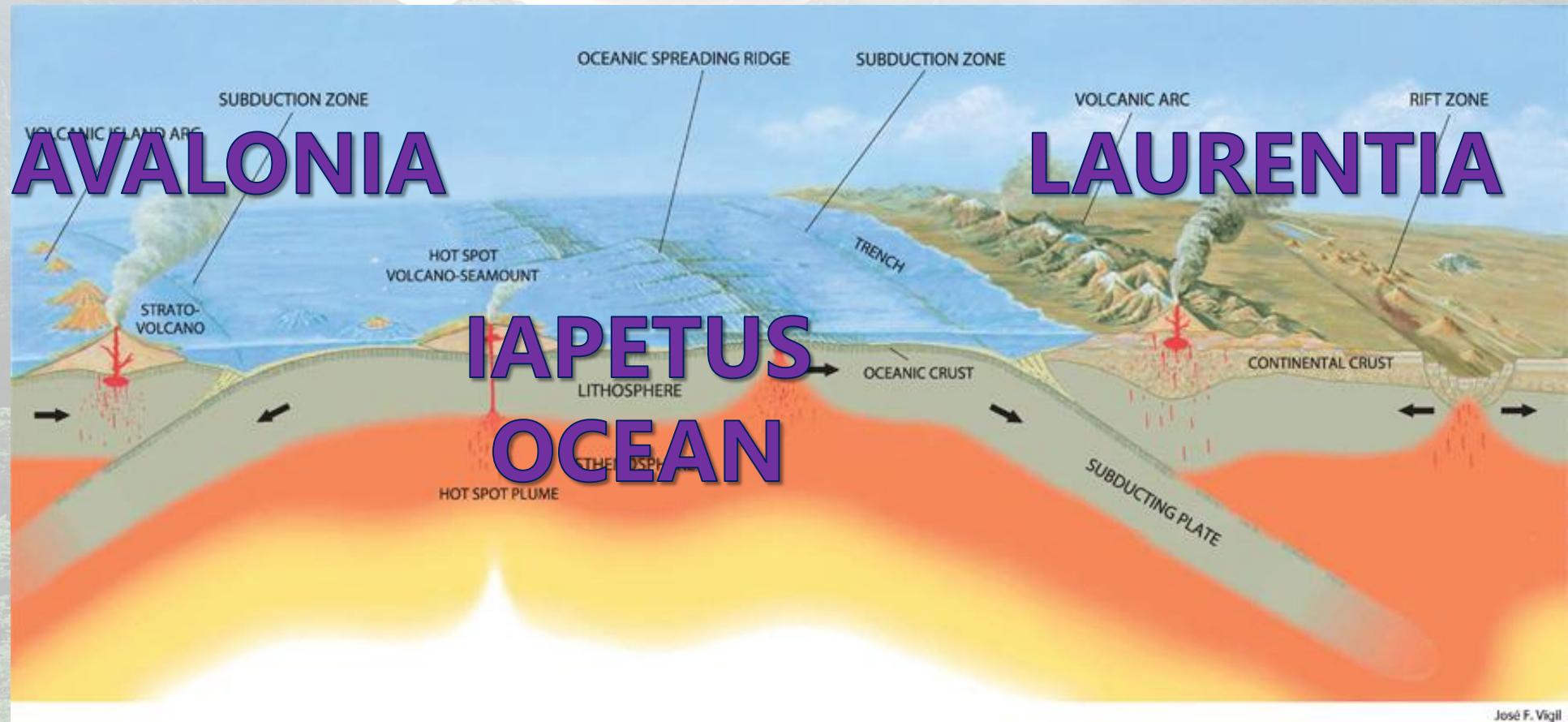


LAURENTIA

VOLCANIC ARC

RIFT ZONE





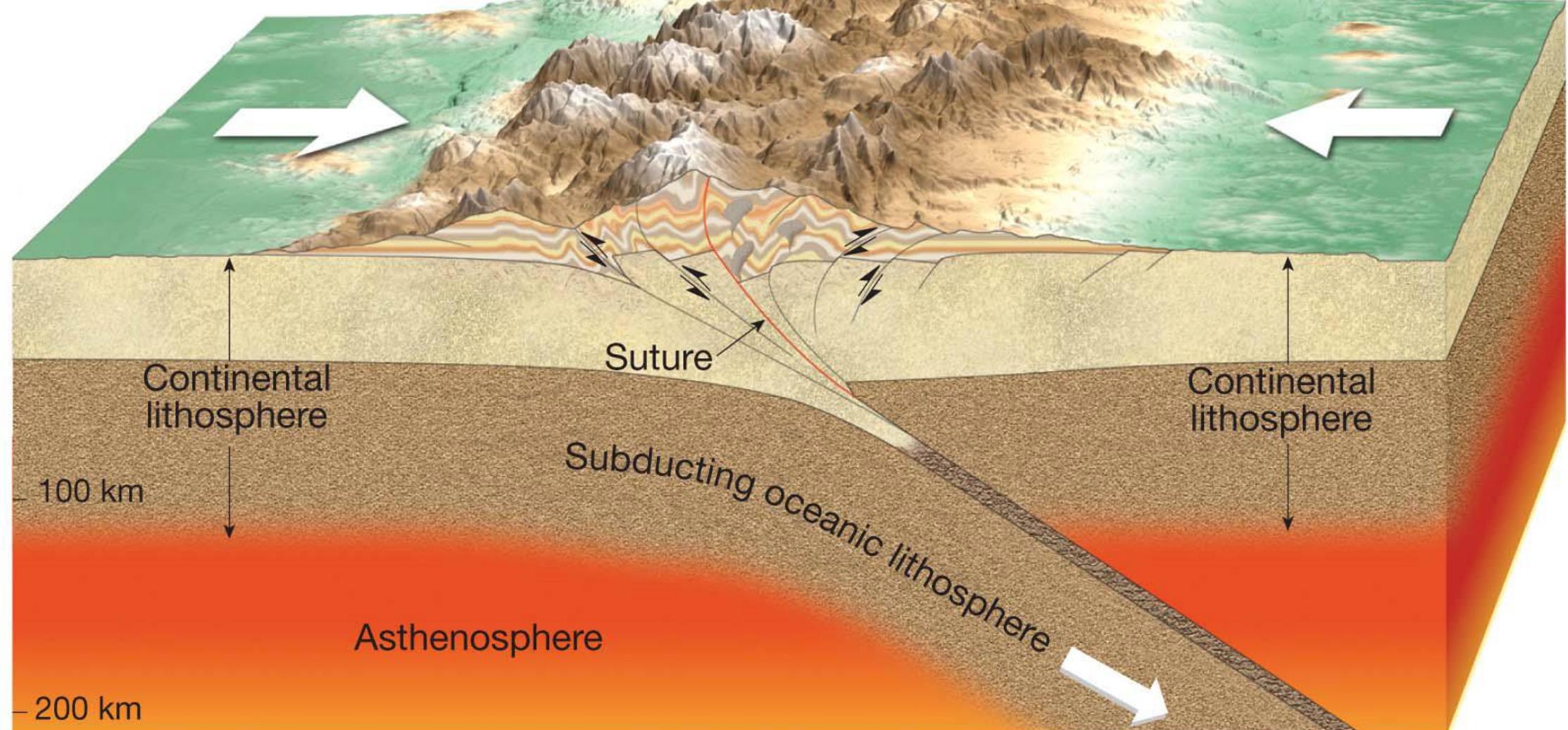
Rise and Fall of The Caledonian Mountains | The Caledonian Mountains

GY4051

AVALONIA

Collision mountains

LAURENTIA



C.

0 Ma
Neogene
Palaeogene

Ceno-zoic

100
Cretaceous

Mesozoic

200
Jurassic

300
Triassic

300
Permian

400
Carboniferous

500
Devonian

500
Silurian

500
Ordovician

600
Cambrian

600
Ediacaran

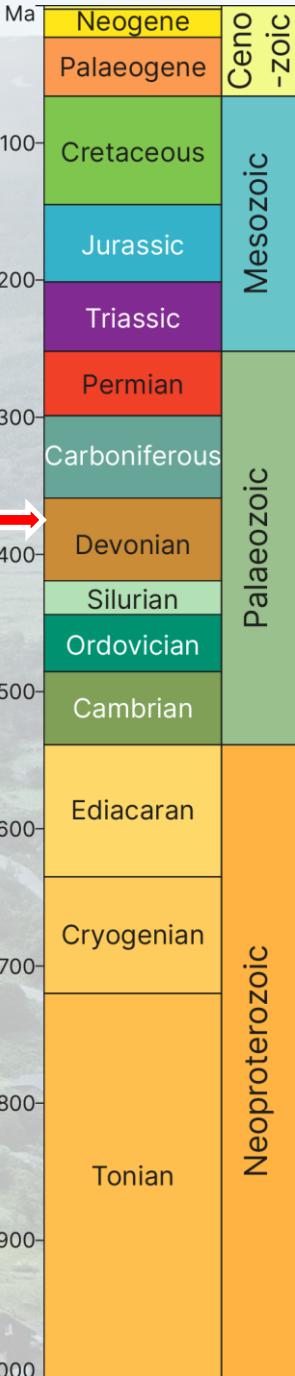
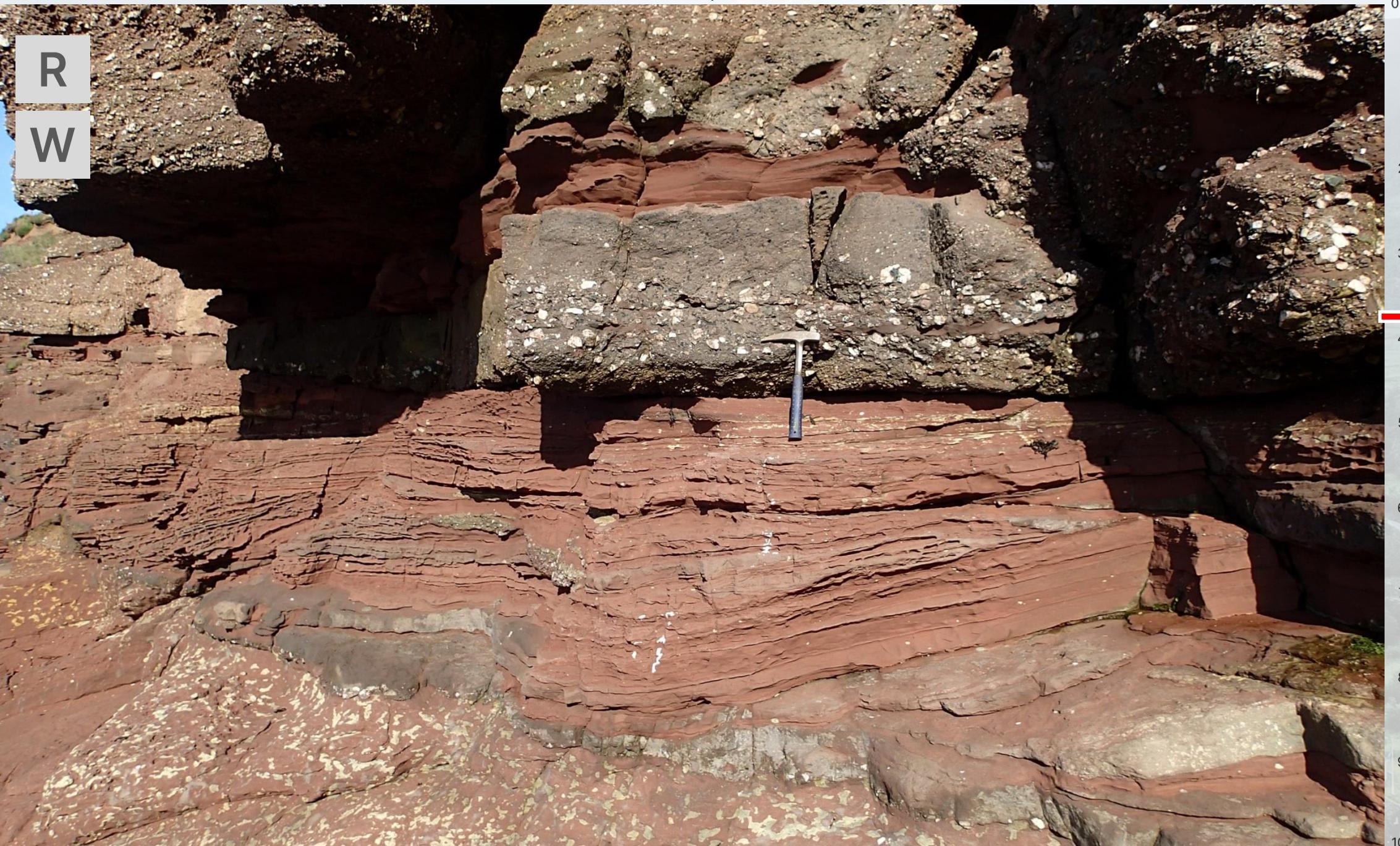
700
Cryogenian

800
Tonian



Rise and Fall of The Caledonian Mountains | Devonian of Ireland

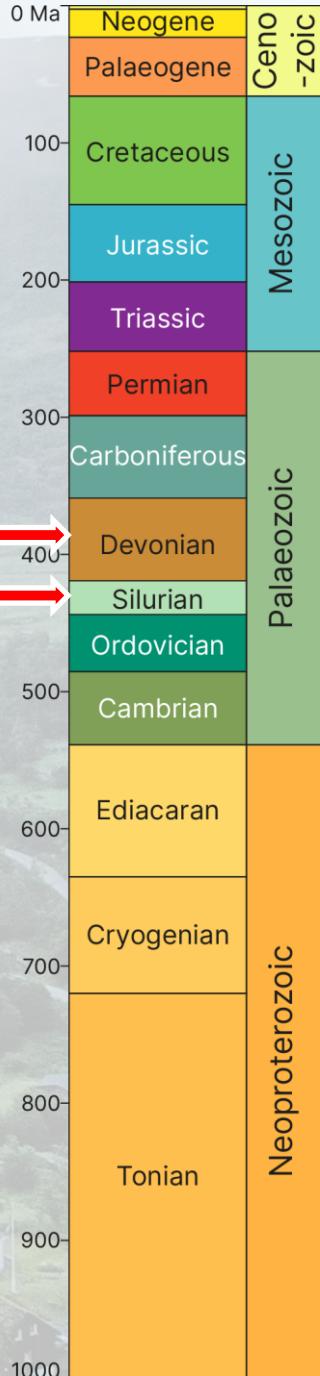
GY4051



Rise and Fall of The Caledonian Mountains | Caledonian Granites

GY4051

C



Rise and Fall of The Caledonian Mountains | Marine Transgression

GY4051



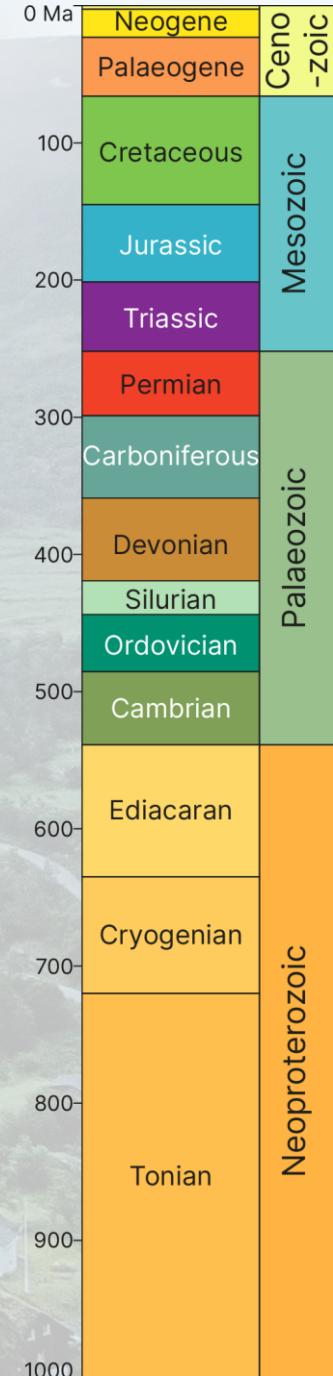
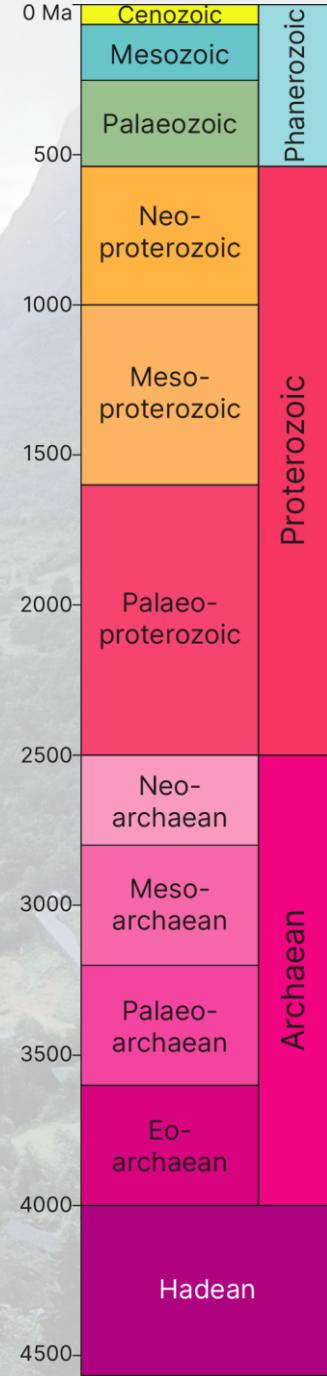
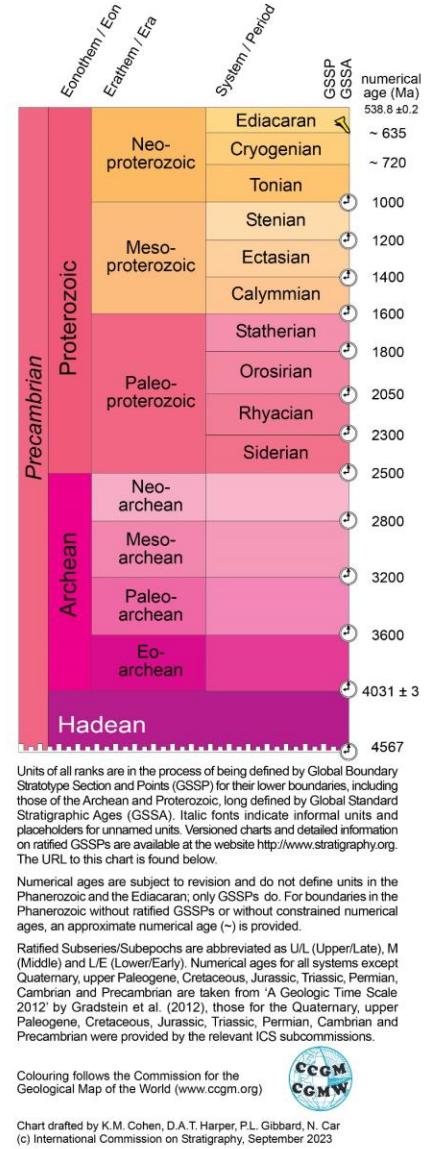
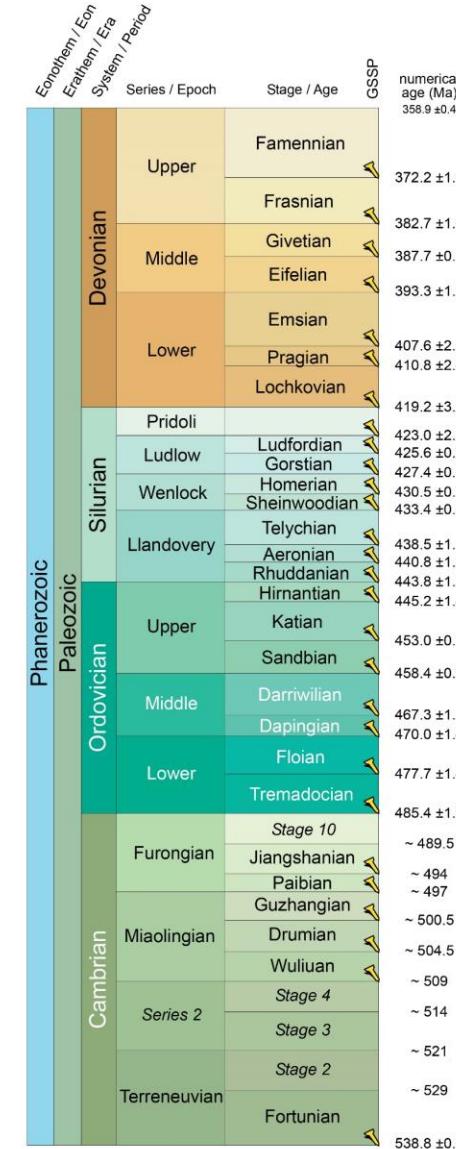
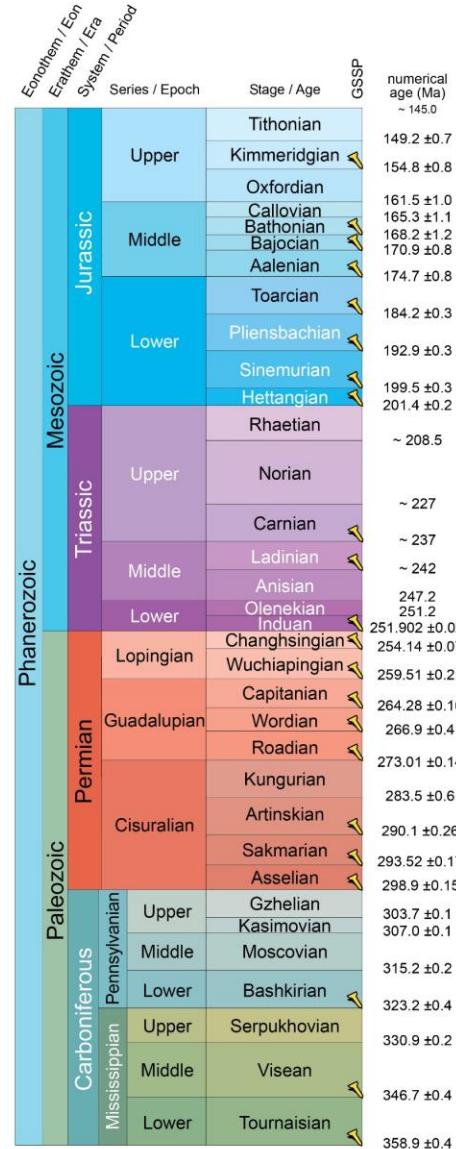
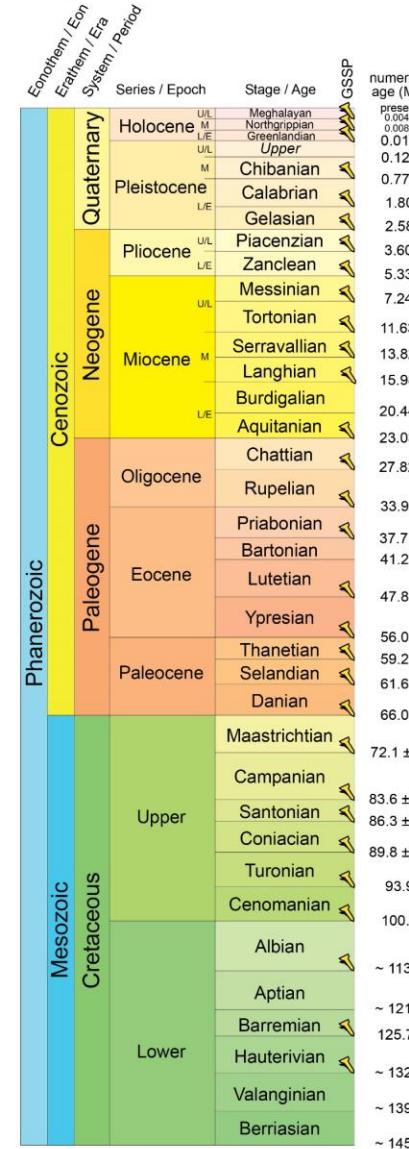


INTERNATIONAL CHRONOSTRATIGRAPHIC CHART

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International Commission on Stratigraphy

v 2023/09



GY4051

Units of all ranks are in the process of being defined by Global Boundary Stratotype Section and Points (GSSPs) for their lower boundaries, including those of the Archean and Proterozoic, long defined by Global Standard Stratigraphic Ages (GSSA). Italic fonts indicate informal units and placeholders for unnamed units. Versioned charts and detailed information on ratified GSSPs are available at the website <http://www.stratigraphy.org>. The URL to this chart is found below.

Numerical ages are subject to revision and do not define units in the Phanerozoic and the Ediacaran; only GSSPs do. For boundaries in the Phanerozoic without ratified GSSPs or without constrained numerical ages, an approximate numerical age (~) is provided.

Ratified Subseries/Subepochs are abbreviated as U/L (Upper/Late), M (Middle) and L/E (Lower/Early). Numerical ages for all systems except Quaternary, upper Paleogene, Cretaceous, Jurassic, Triassic, Permian, Cambrian and Precambrian are taken from 'A Geologic Time Scale 2012' by Gradstein et al. (2012), those for the Quaternary, upper Paleogene, Cretaceous, Jurassic, Triassic, Permian, Cambrian and Precambrian were provided by the relevant ICS subcommissions.

Colouring follows the Commission for the Geological Map of the World (www.cgm.org)

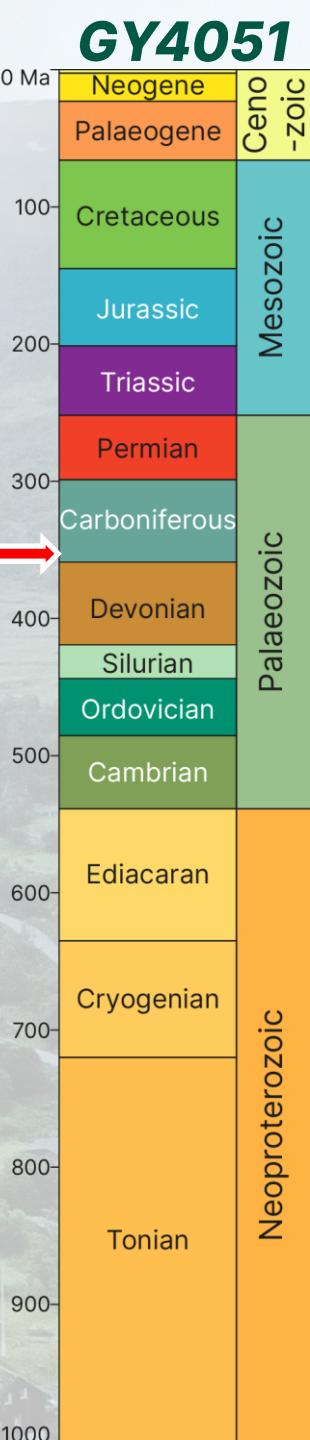
Chart drafted by K.M. Cohen, D.A.T. Harper, P.L. Gibbard, N. Car (c) International Commission on Stratigraphy, September 2023

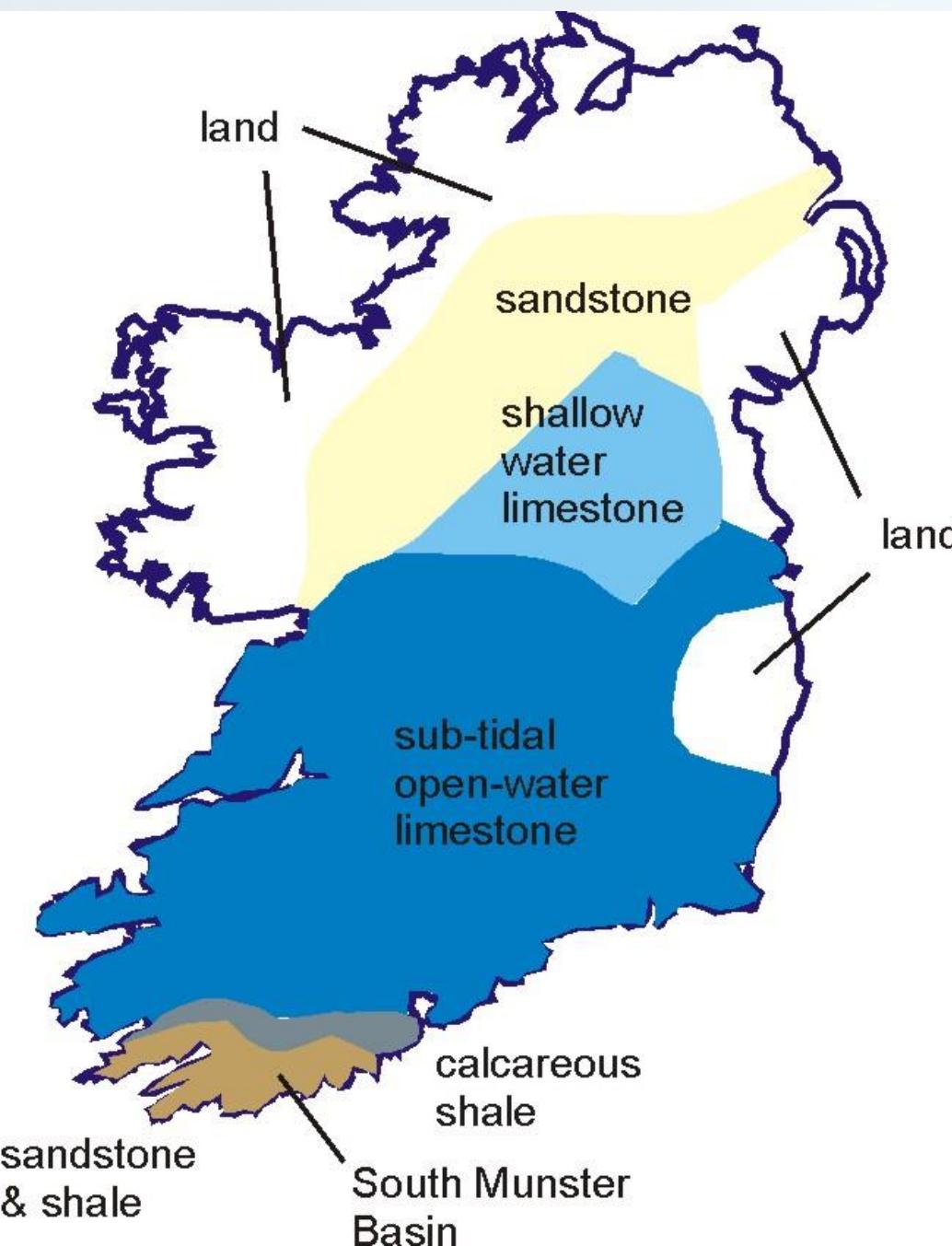
To cite: Cohen, K.M., Finney, S.C., Gibbard, P.L. & Fan, J.-X. (2013; updated) The ICS International Chronostratigraphic Chart. Episodes 36: 199–204.

URL: <http://www.stratigraphy.org/ICSChart/ChronostratChar2023-09.pdf>



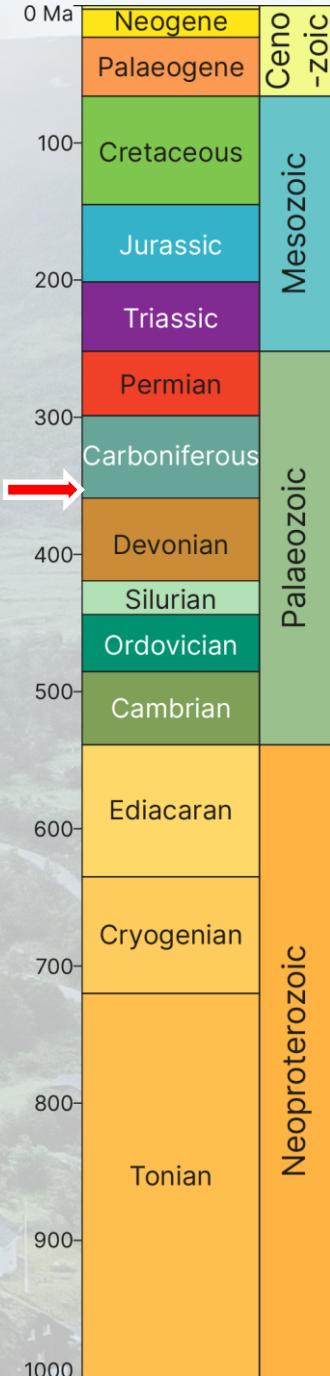
Tropical Ireland | Insert witty joke about the weather here



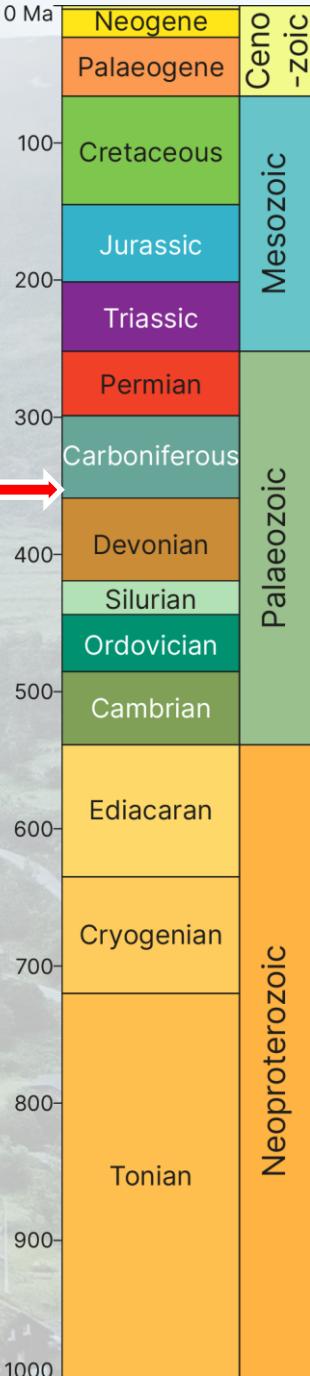


Marine transgression

- Some highland areas remain emergent
- Former alluvial plains gradually covered by shallow seas
- Mostly shallow marine carbonate sedimentation, with common fossils

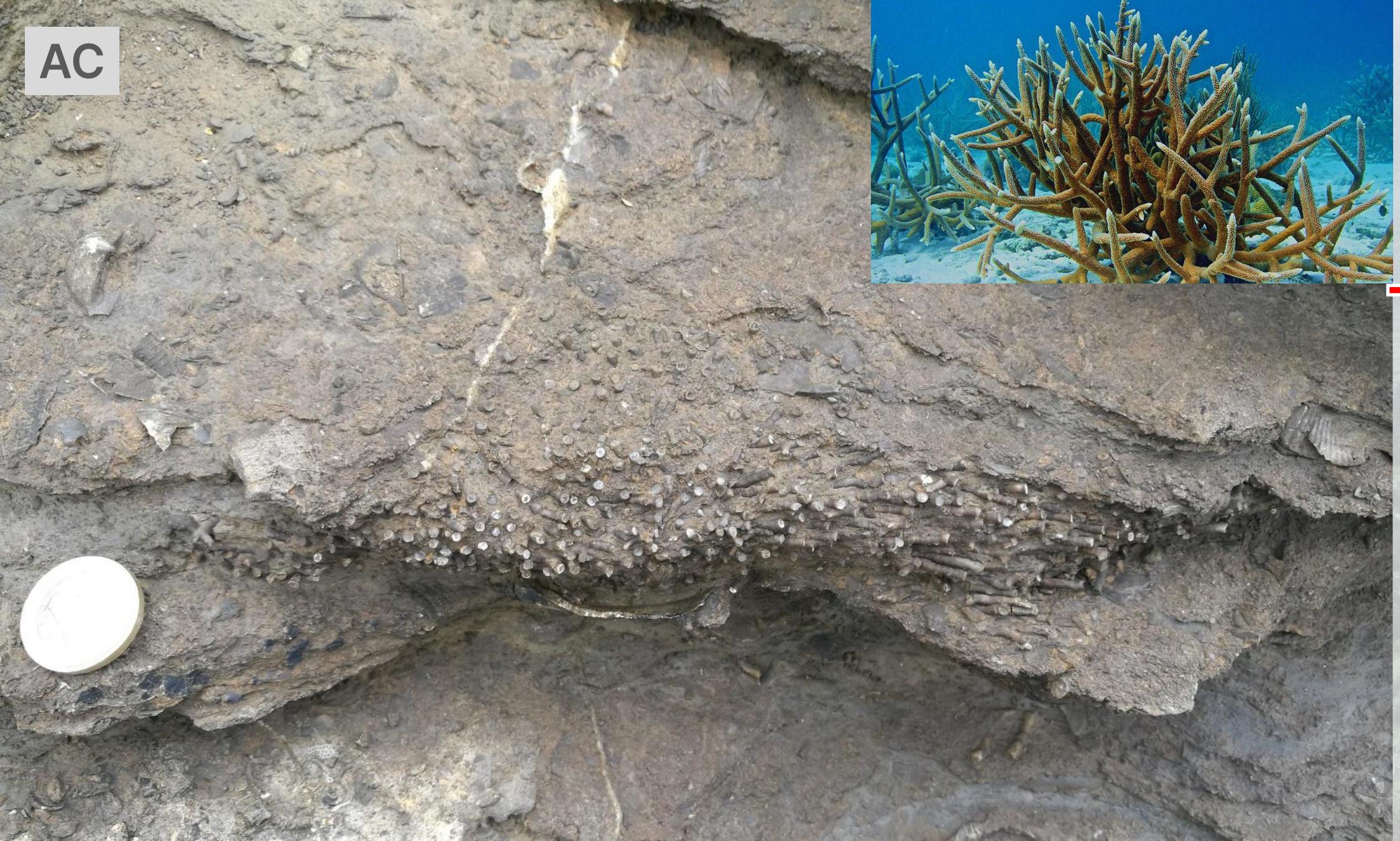


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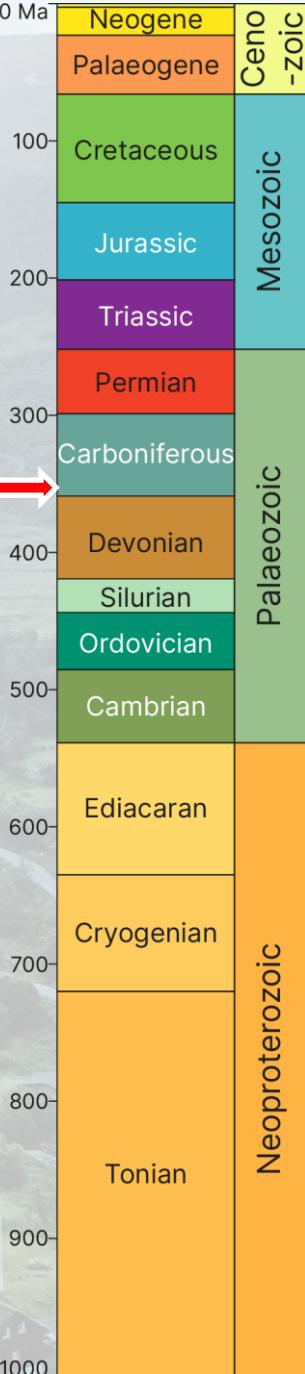


Tropical Ireland | Coral

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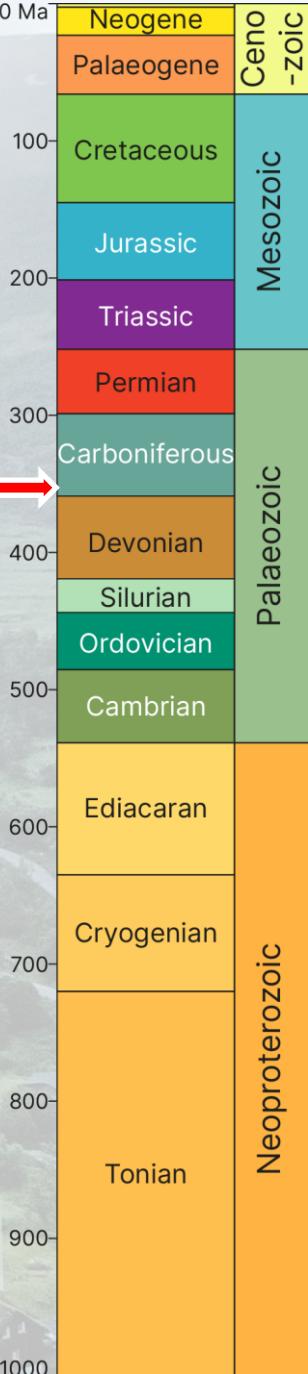
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Tropical Ireland | Coral

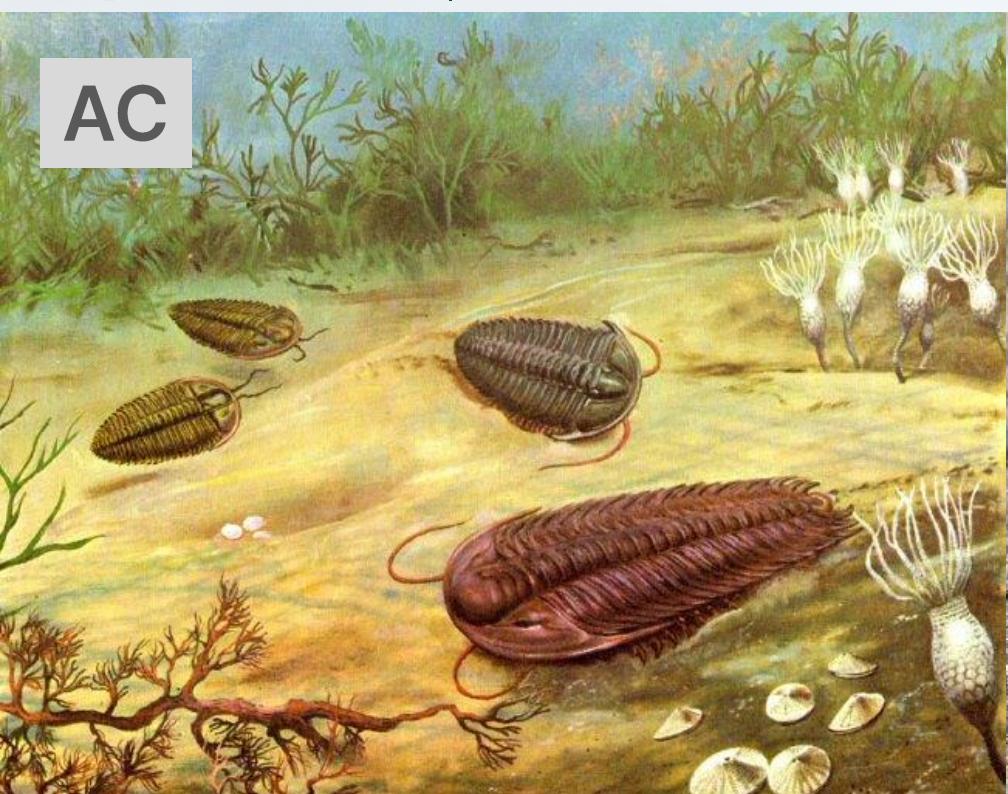
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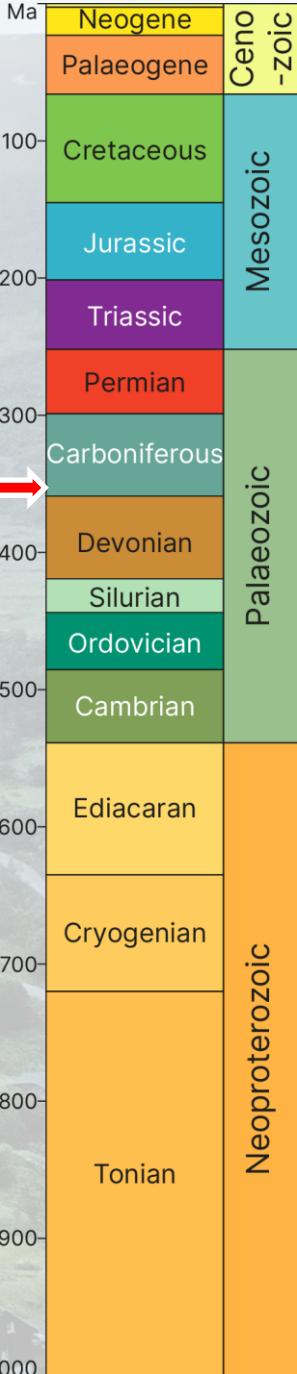


Tropical Ireland | Trilobites

GY4051



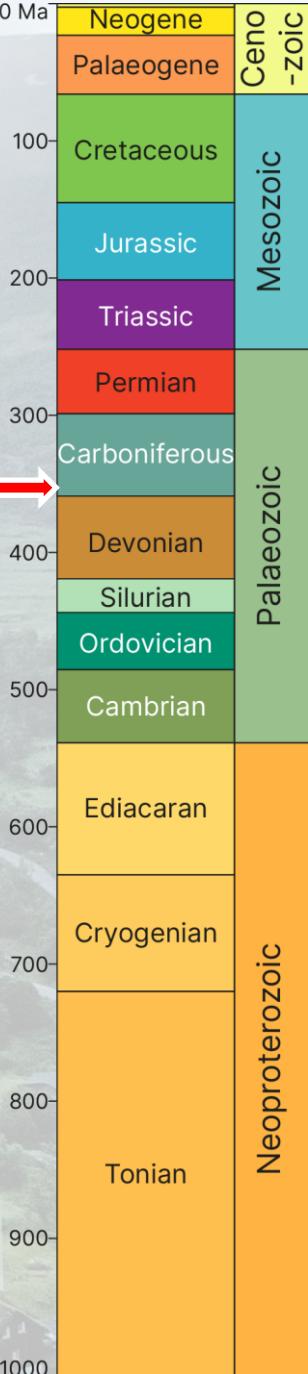
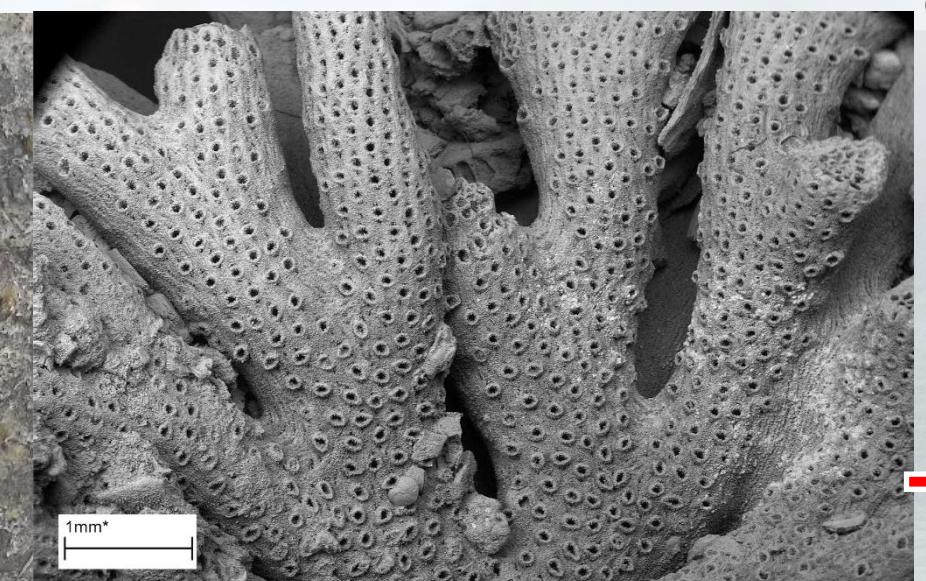
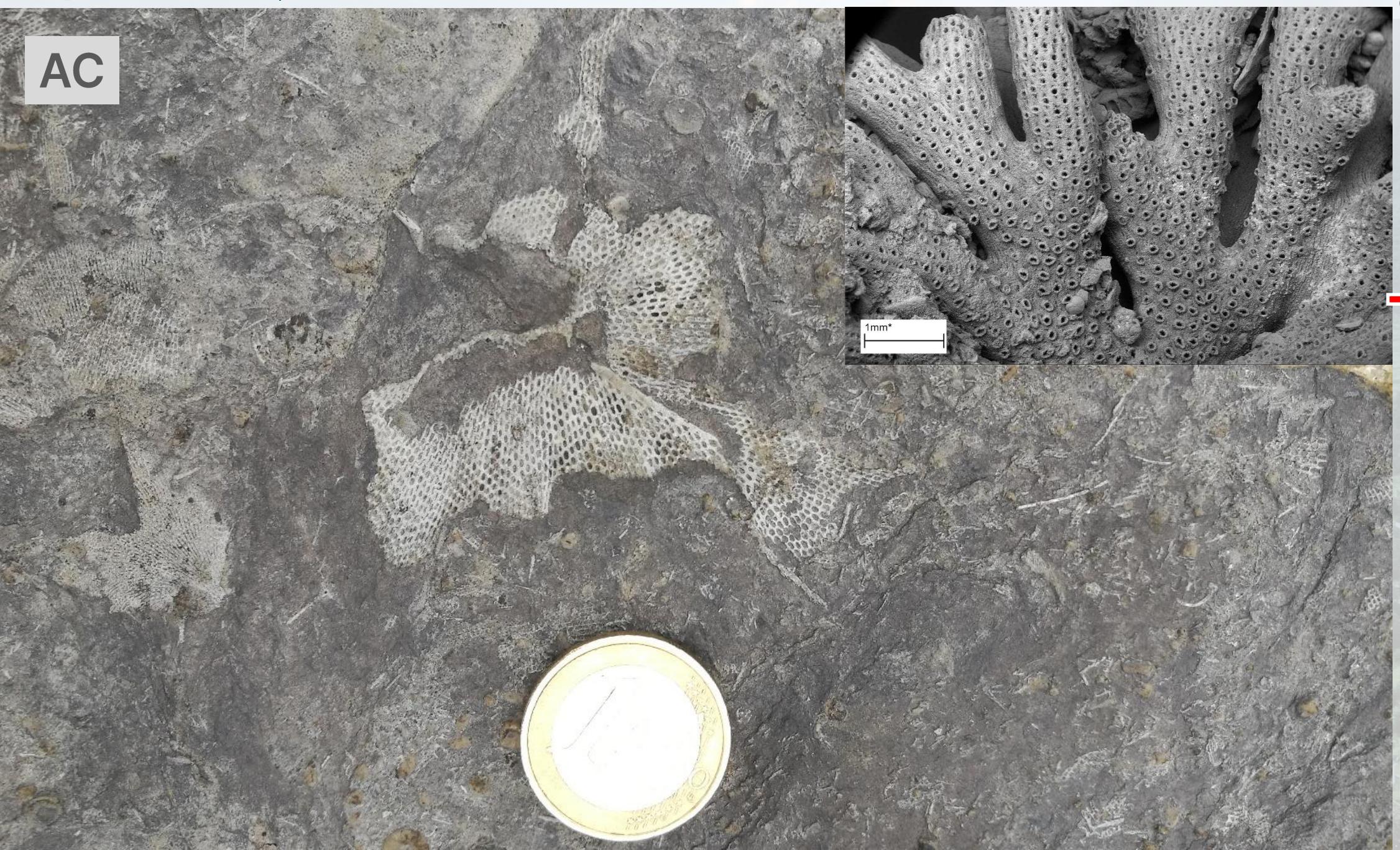
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Tropical Ireland | Bryozoan

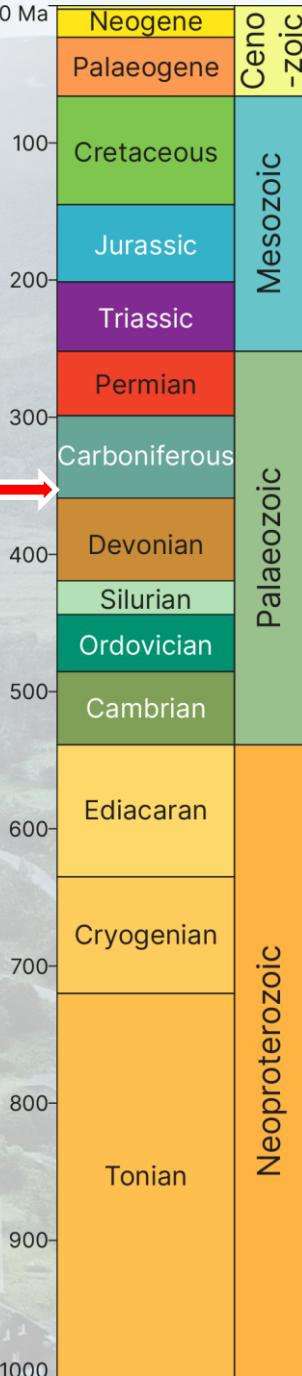
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Tropical Ireland | Bryozoan

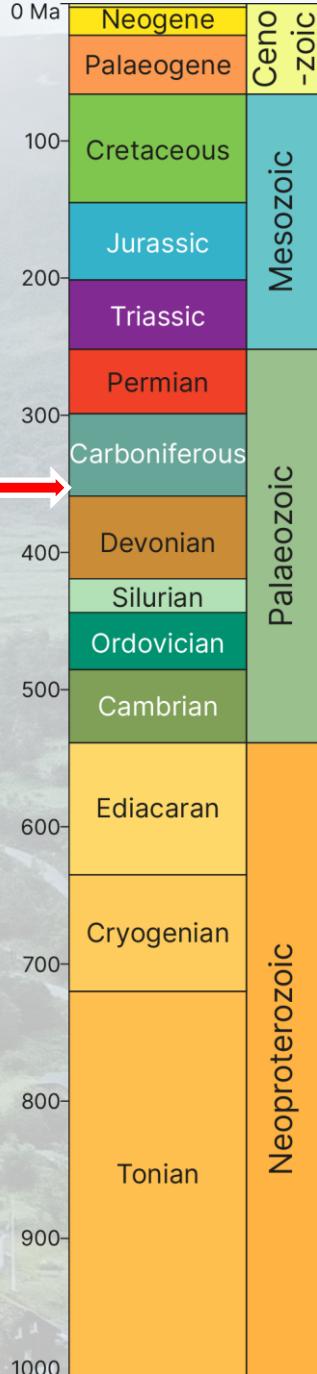
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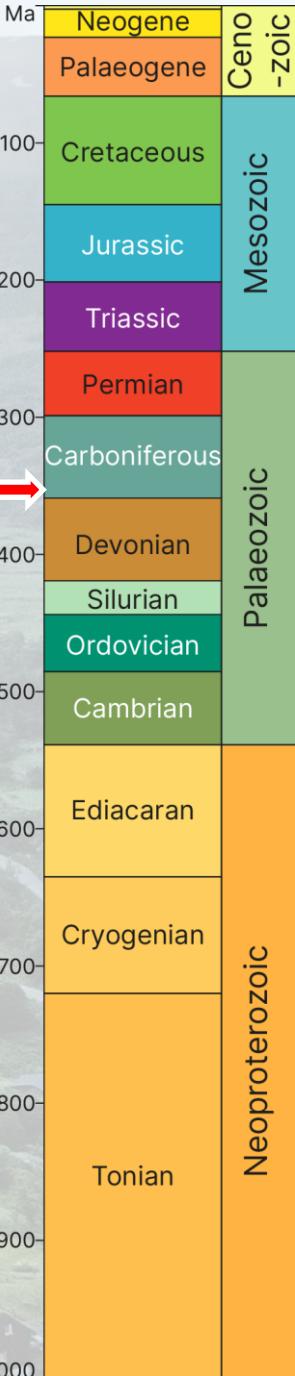
Tropical Ireland | Crinoid

GY4051

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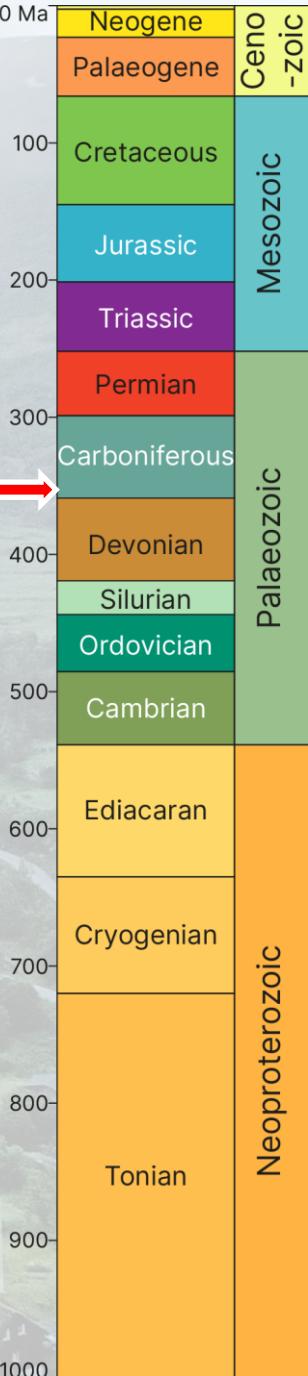
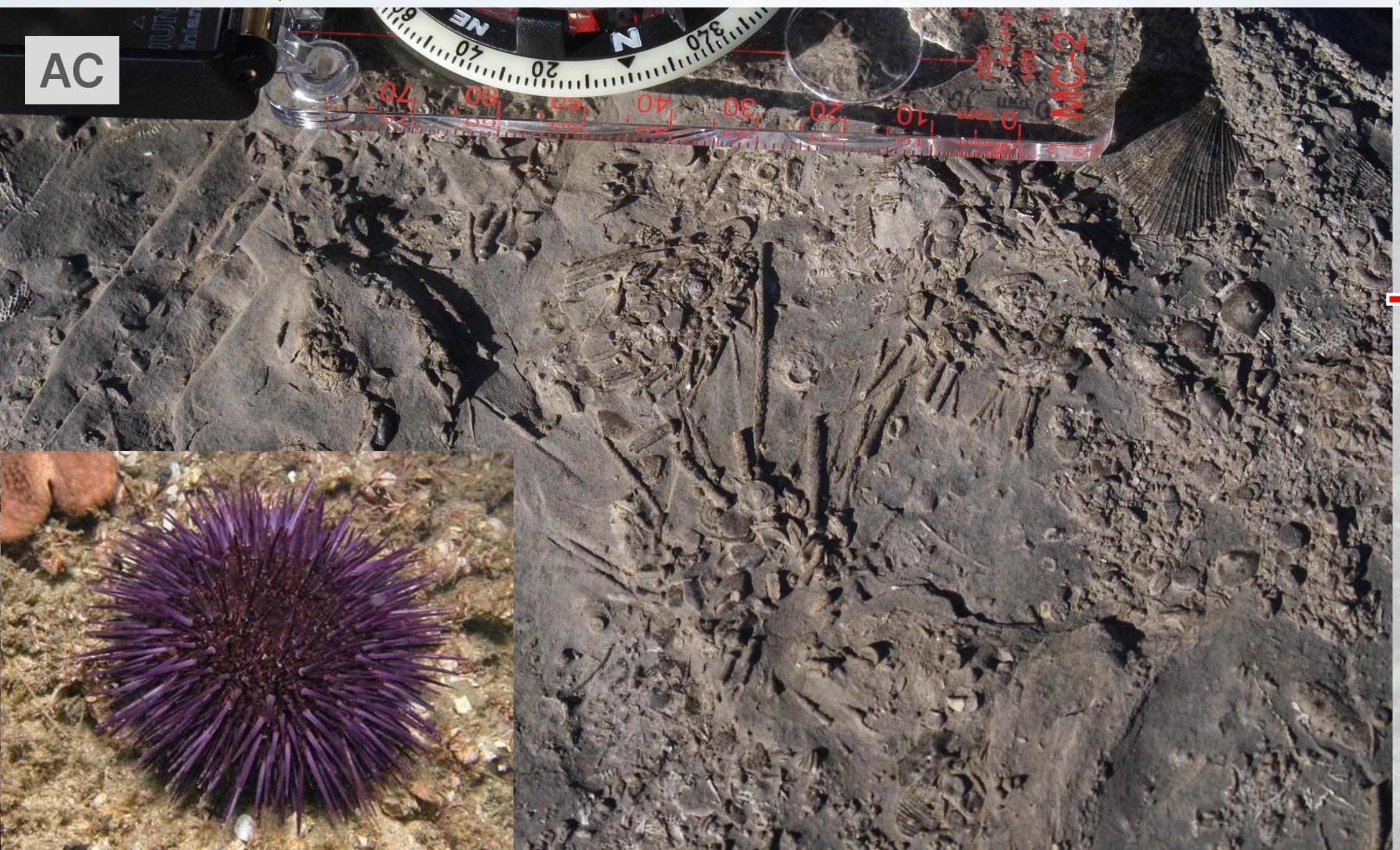


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Tropical Ireland | Echinoid

GY4051

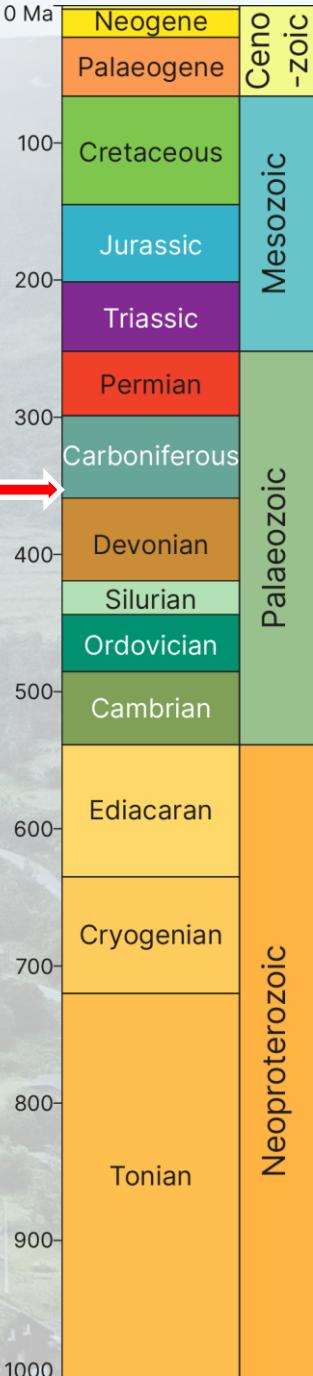


Tropical Ireland | Crinoid, gastropod, brachiopod

AC



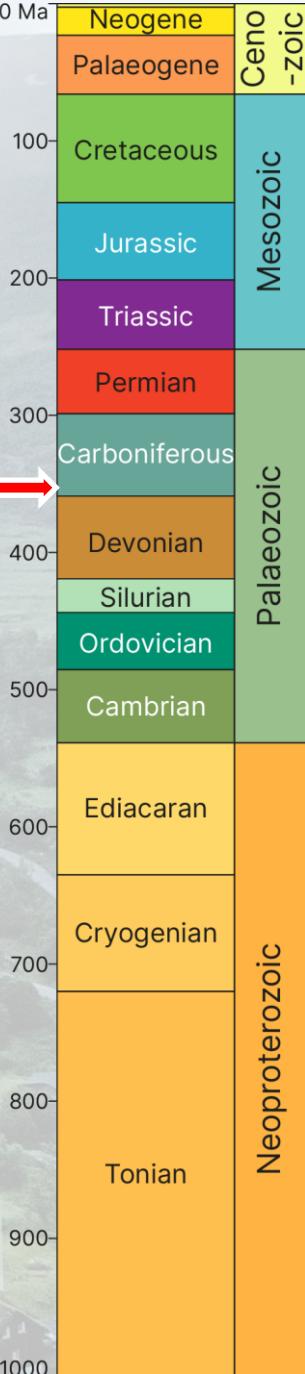
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Tropical Ireland | Shelf Limestones

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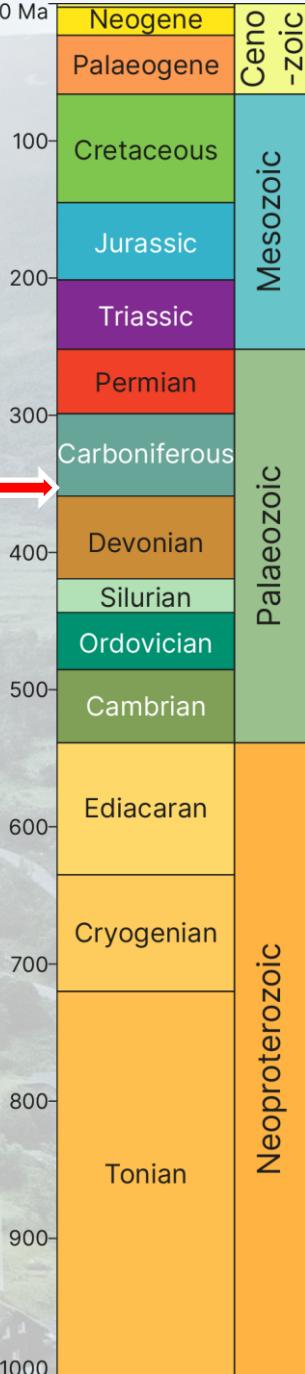
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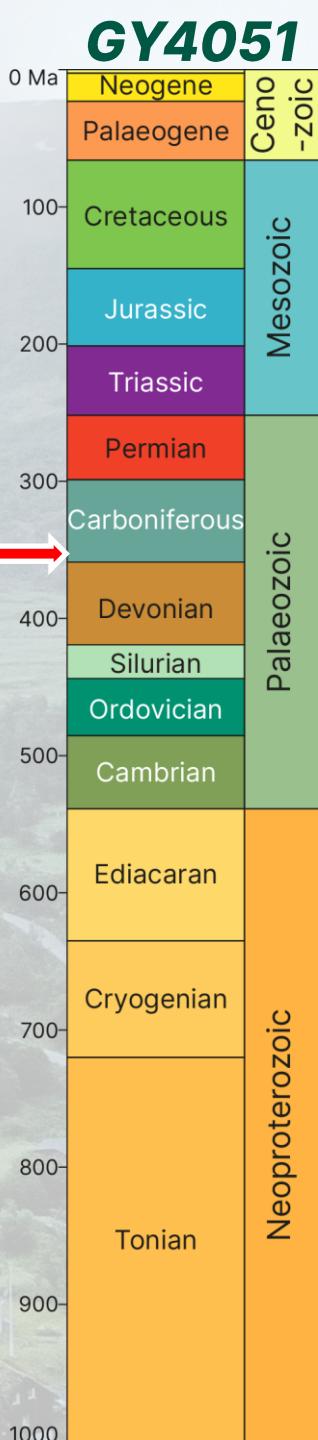
Tropical Ireland | Shelf Limestones

GY4051

AC

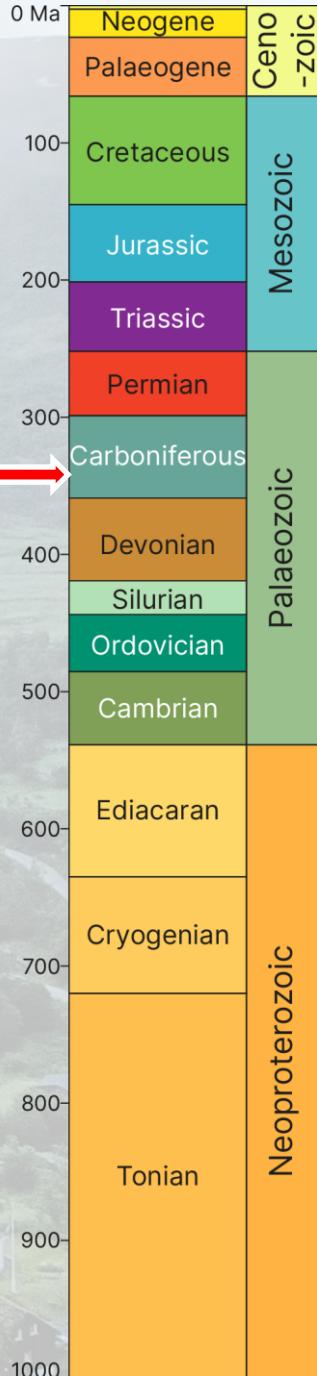
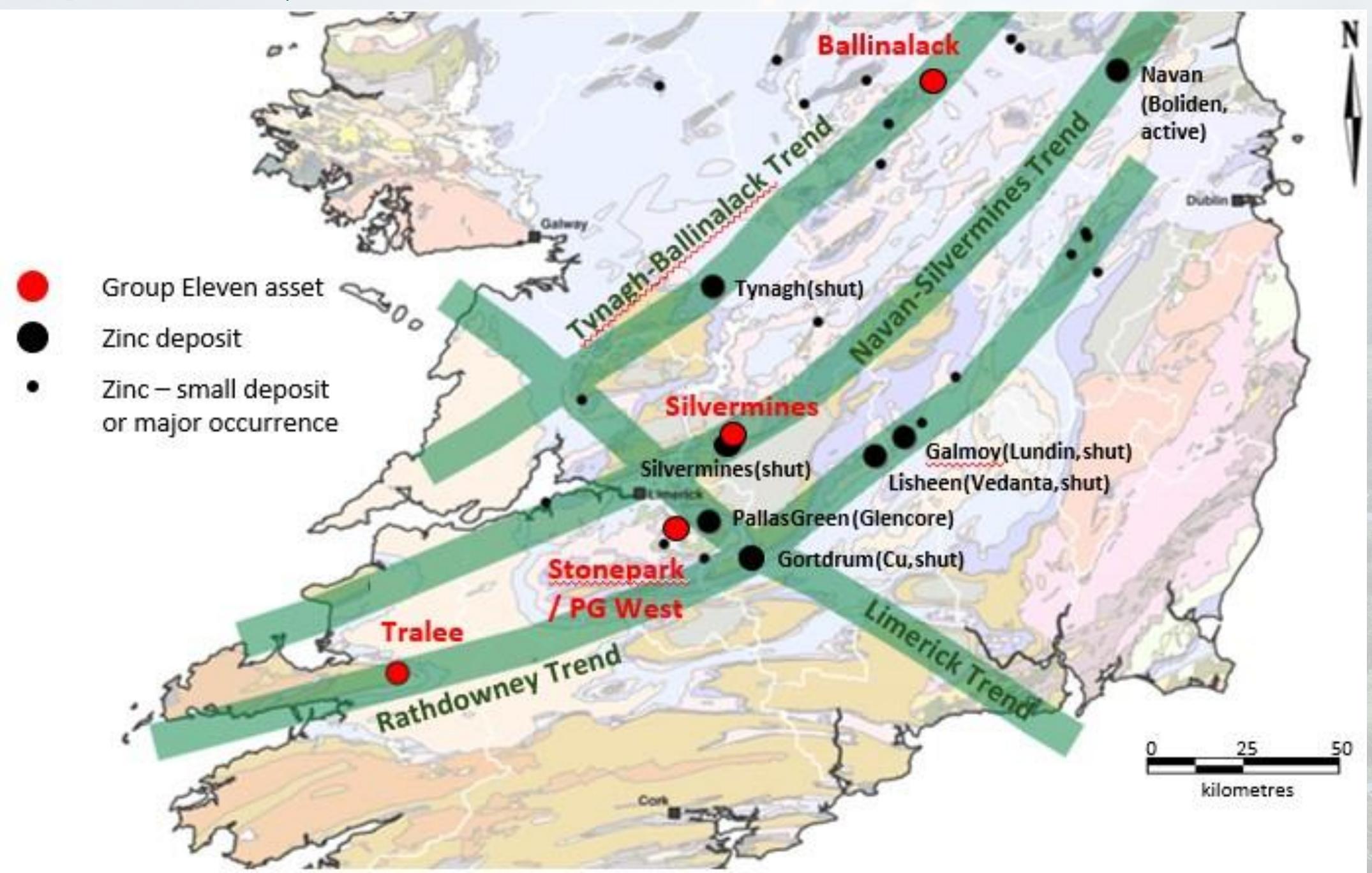


Tropical Ireland | Shelf Limestones – LEAD AND ZINC



Tropical Ireland | LEAD AND ZINC

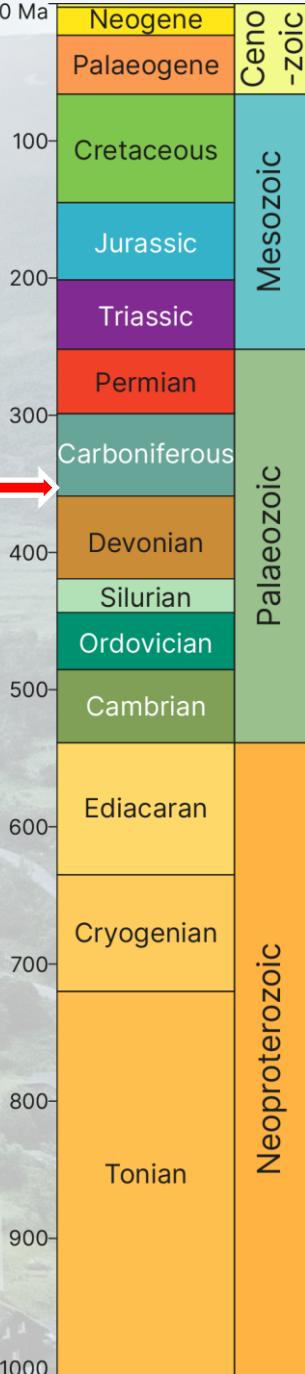
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Tropical Ireland | Shelf Limestones

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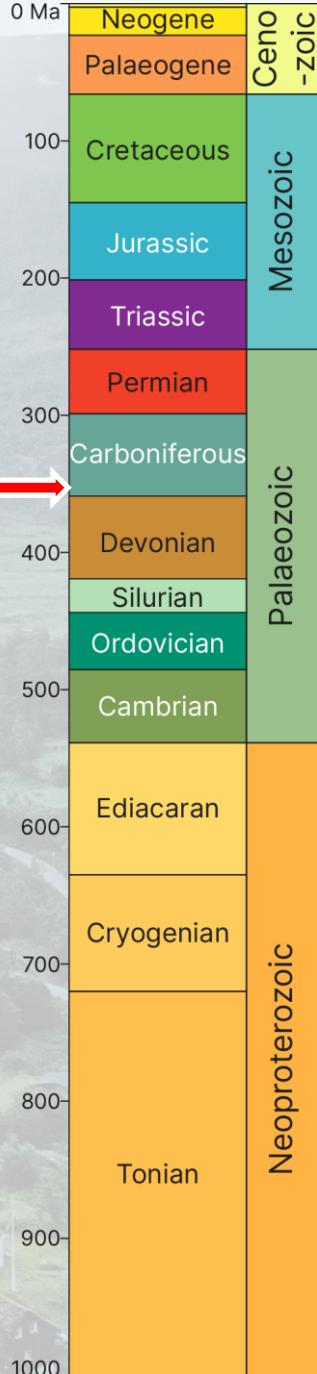
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Tropical Ireland | Shelf Limestones

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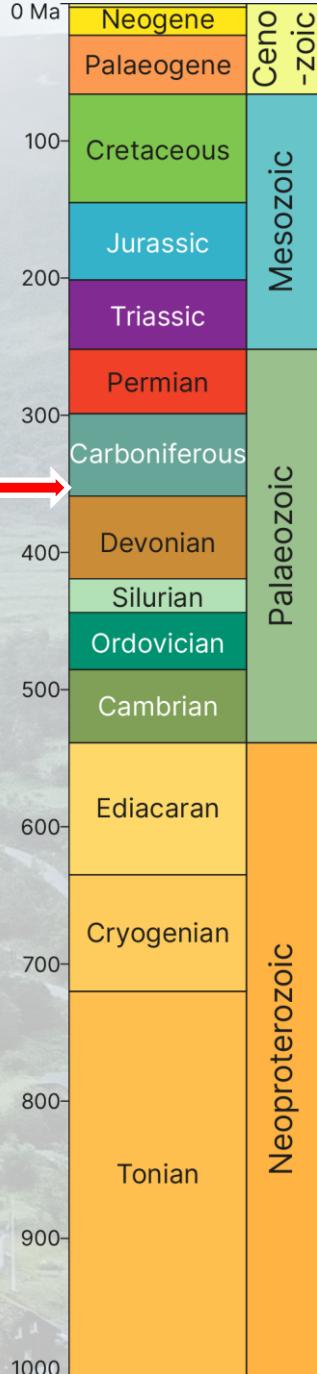
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Tropical Ireland | Shelf Limestones

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AA



Tropical Ireland | Shelf Limestones - The Burren

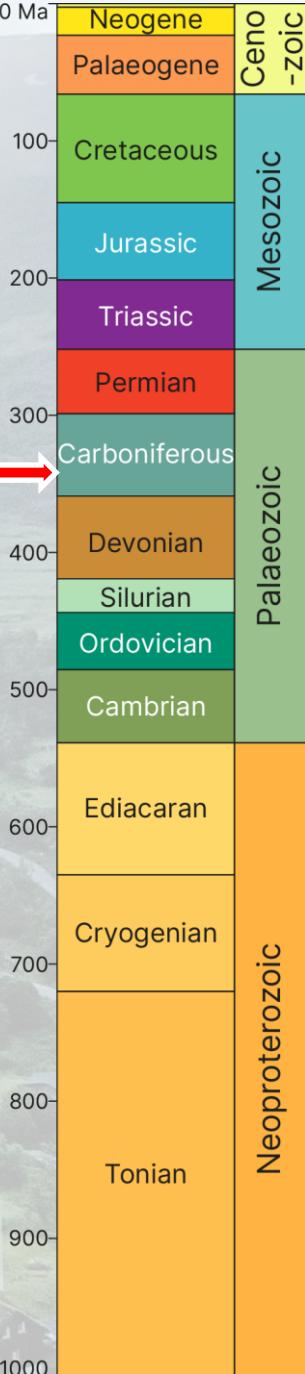


Tropical Ireland | Shelf Limestones - The Burren

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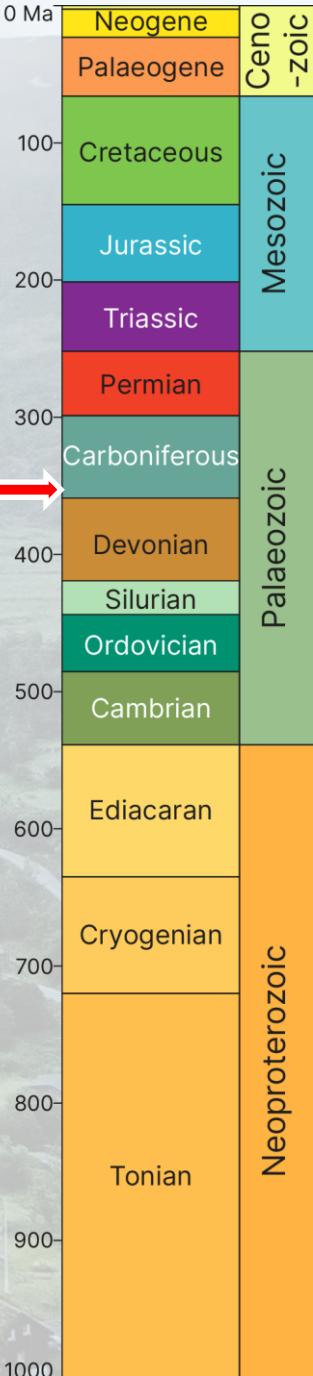


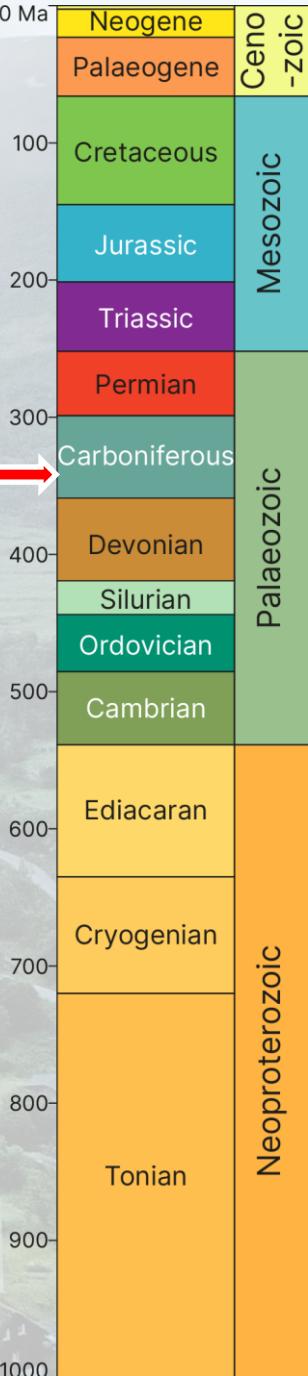
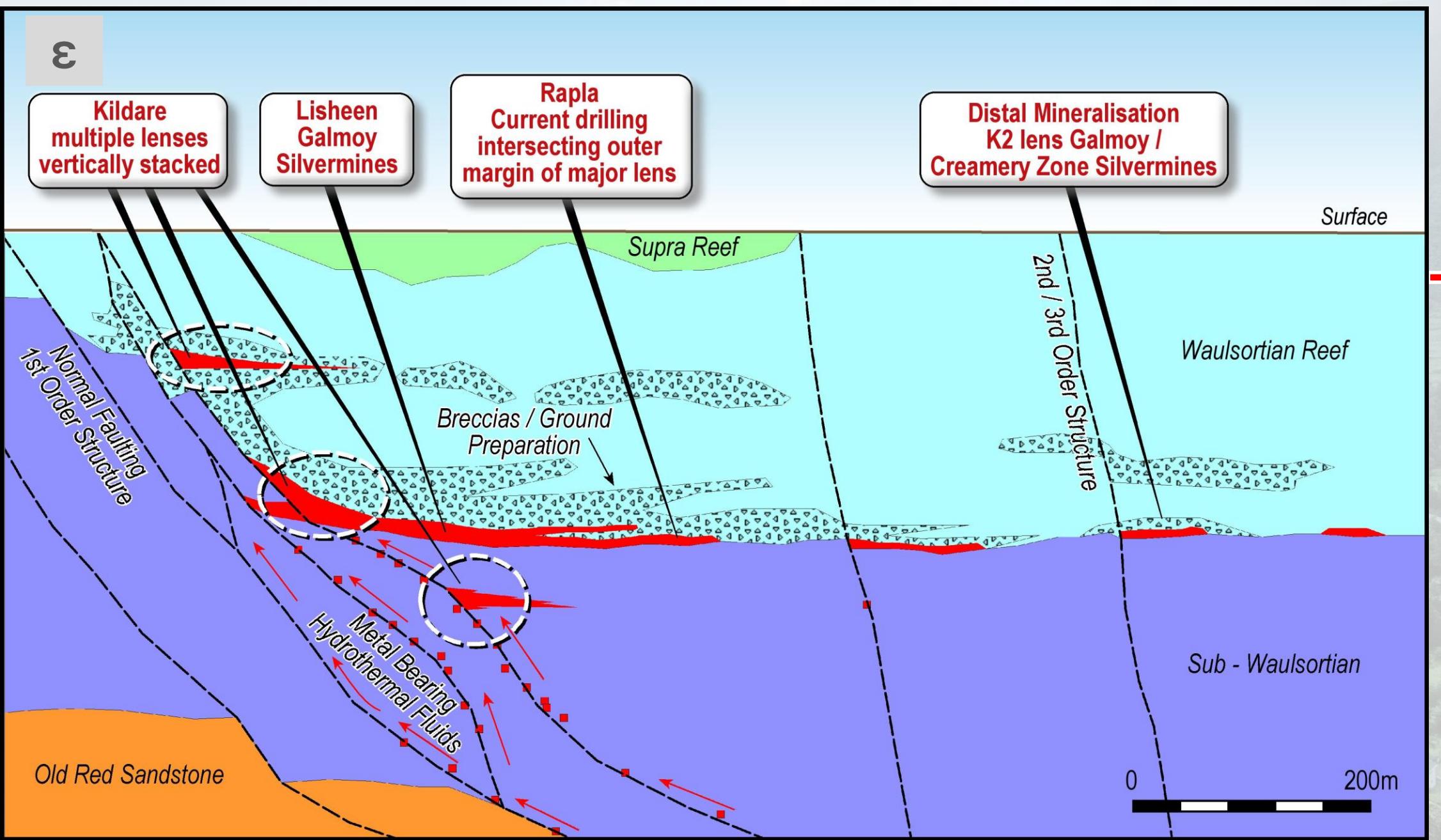
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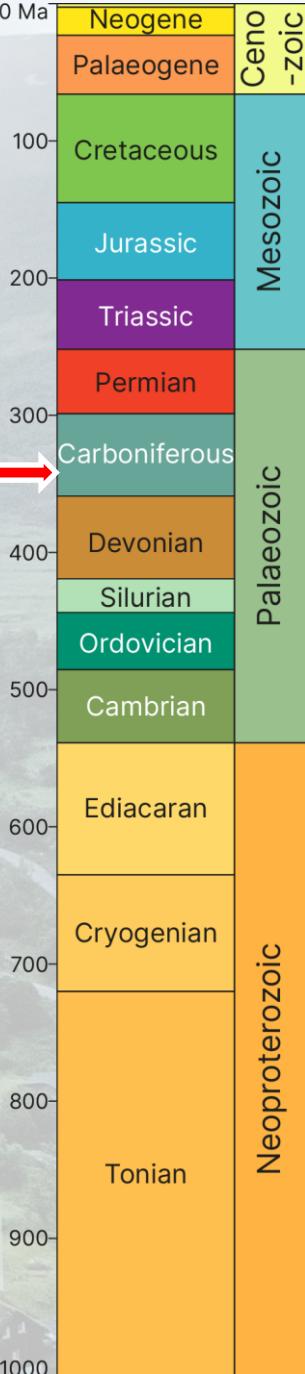
Tropical Ireland | Shelf Limestones – LEAD AND ZINC

GY4051

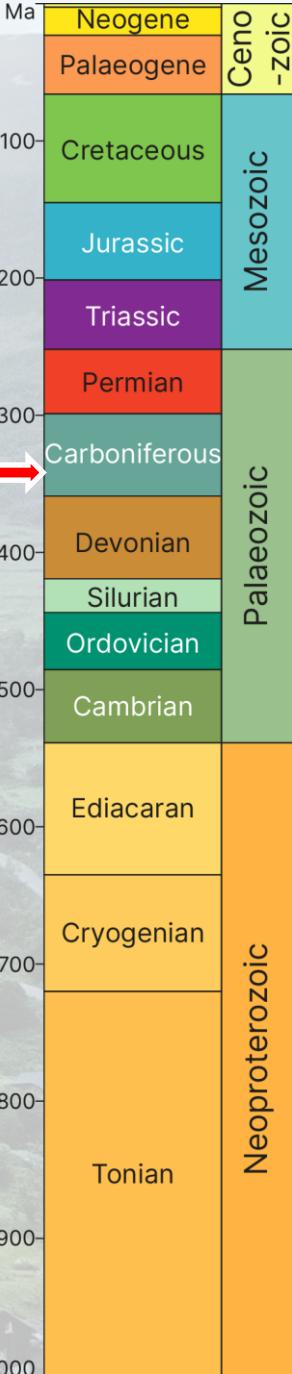




Y
AB



Y
AB

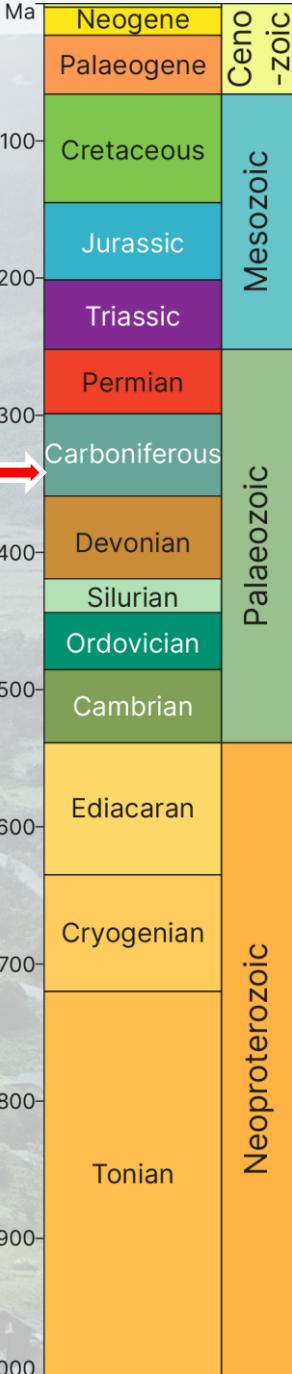


Tropical Ireland | Subduction volcanics and clastics in Laurentia

GY4051



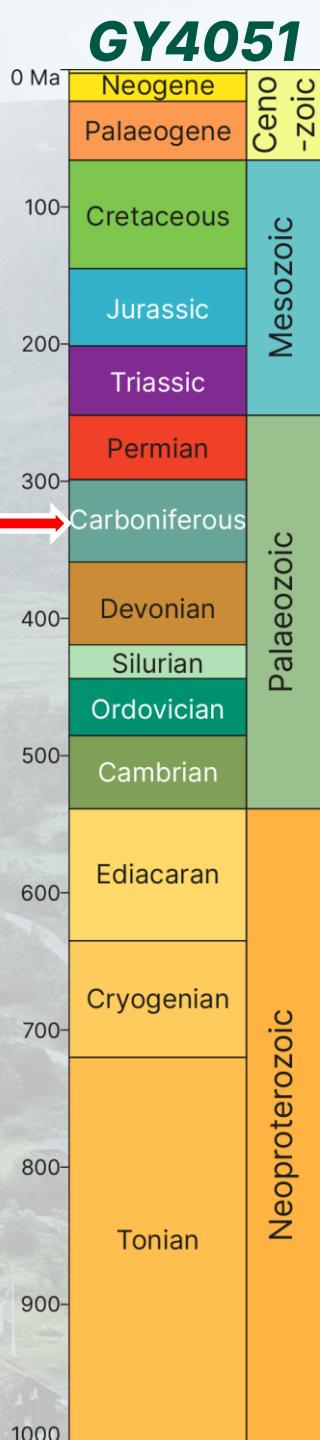
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AB



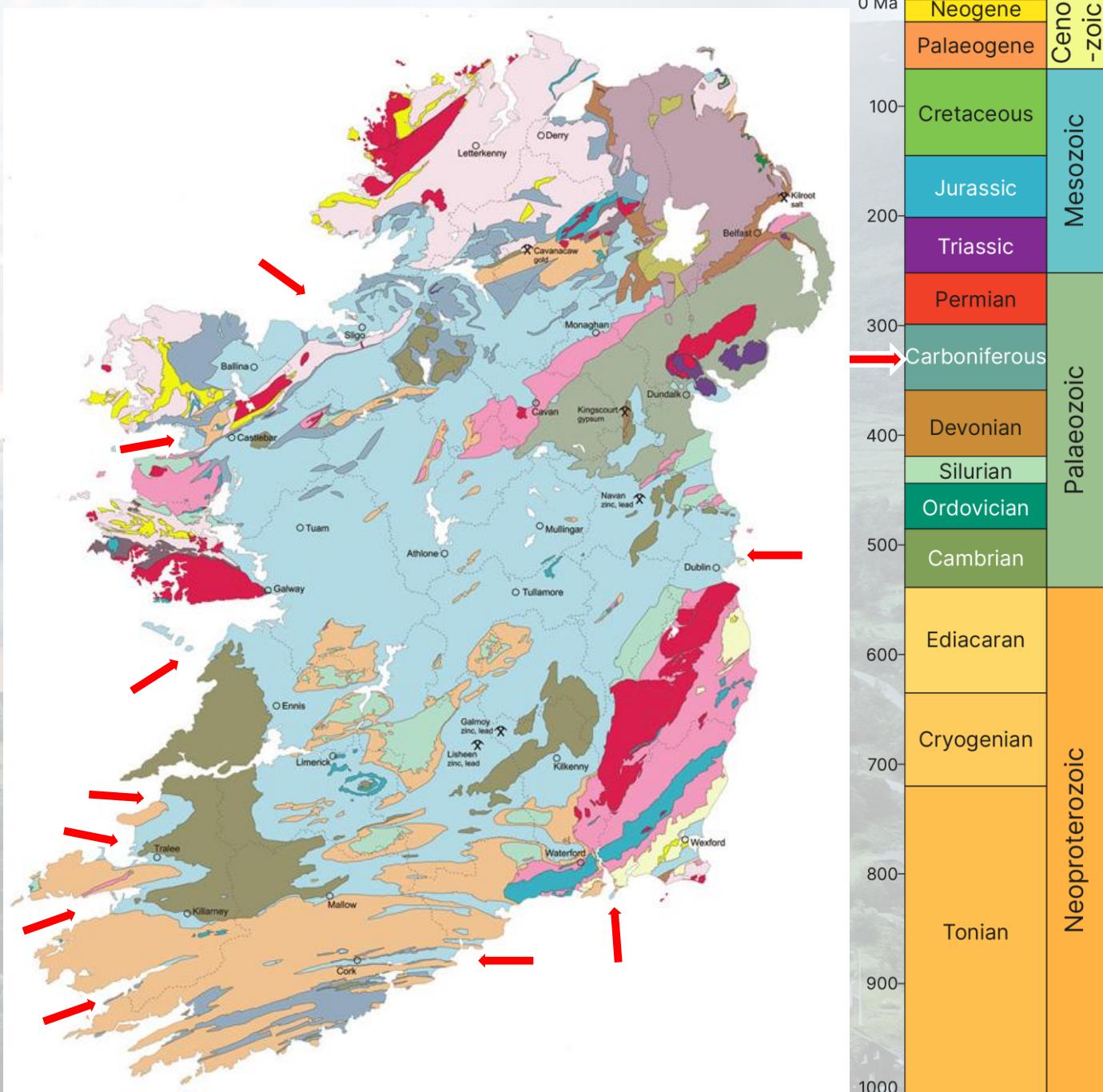


Marine transgression reaches maximum

- Some highland areas remain emergent, but much reduced
- Shallow seas have become quite deep in some places



Tropical Ireland | Middle Carboniferous



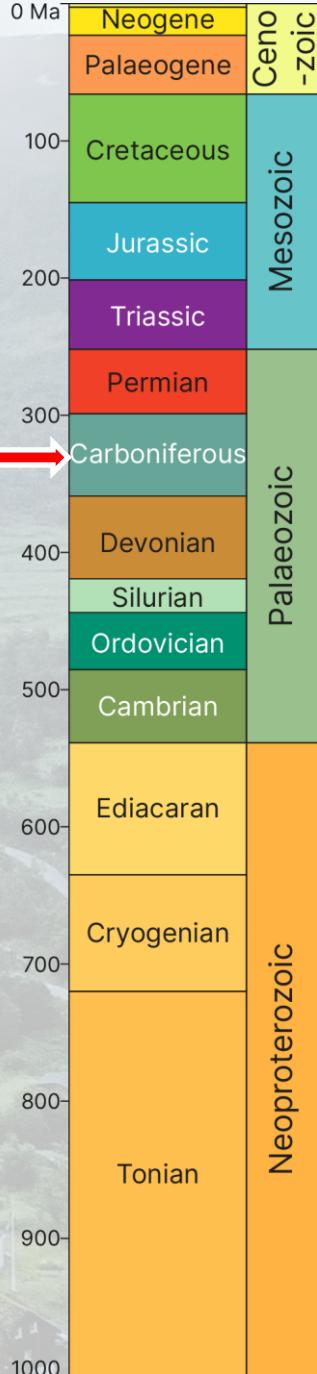
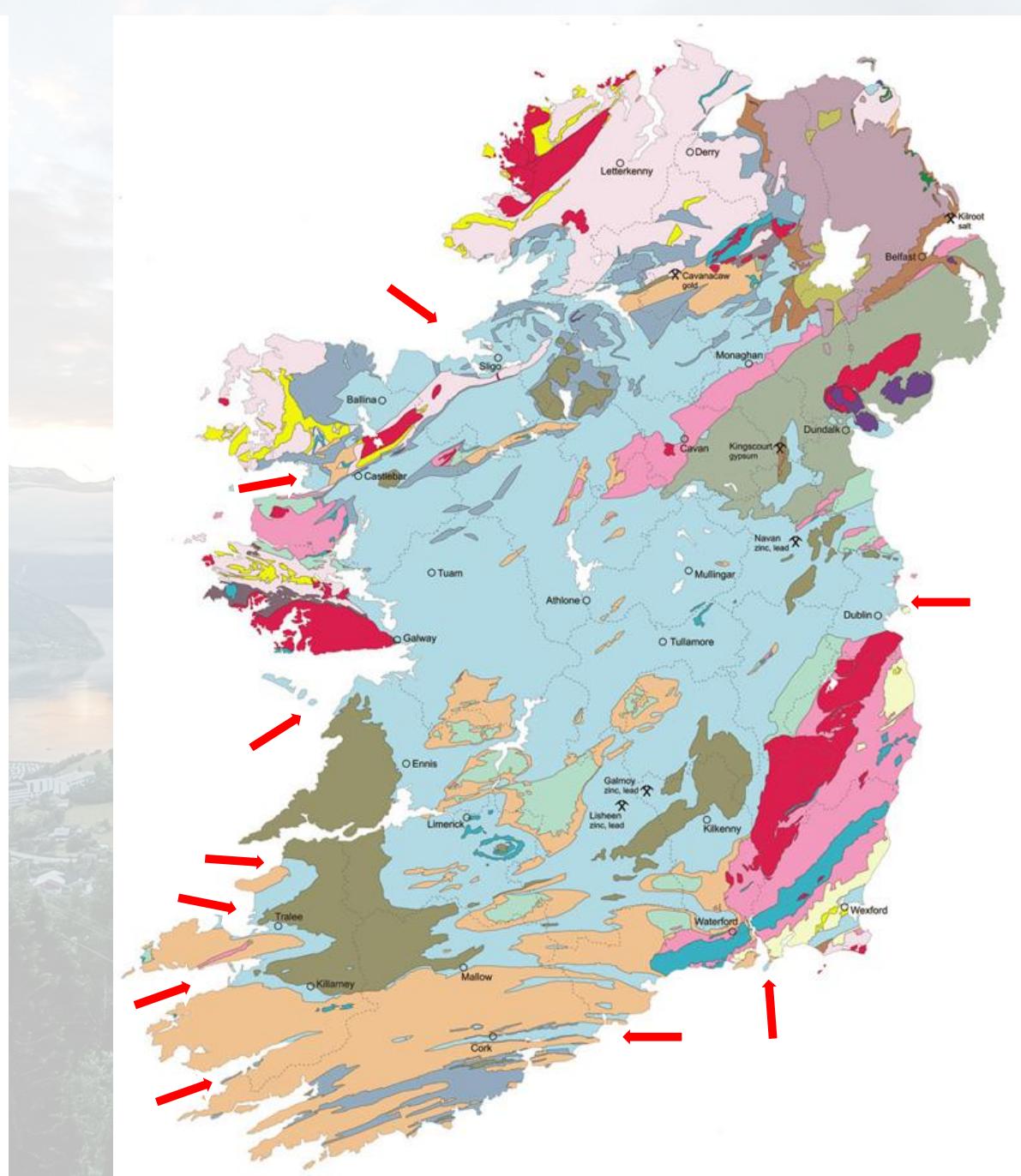
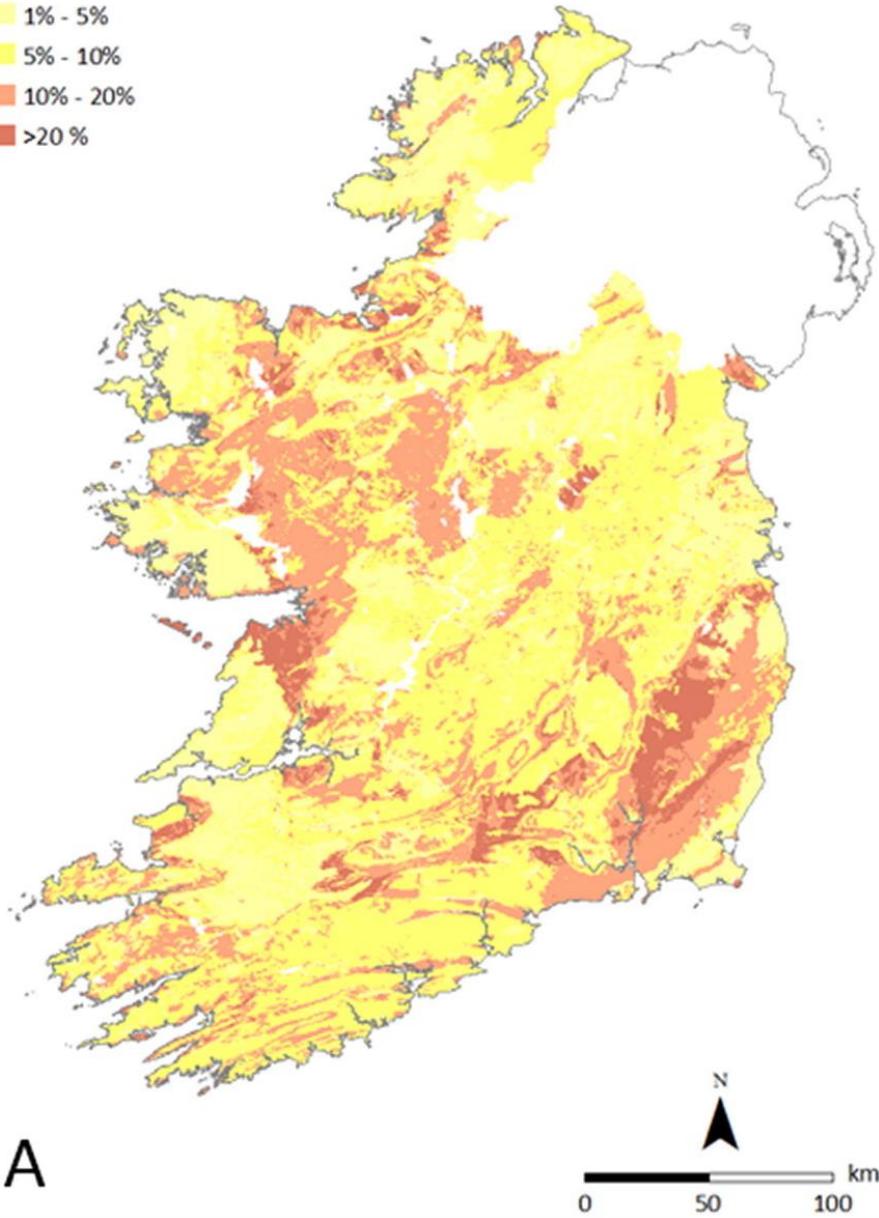
Tropical Ireland | Middle Carboniferous

GY4051

Indoor Radon Risk Map

Prob [InRn > 200 Bq/m³]

- < 1%
- 1% - 5%
- 5% - 10%
- 10% - 20%
- >20 %

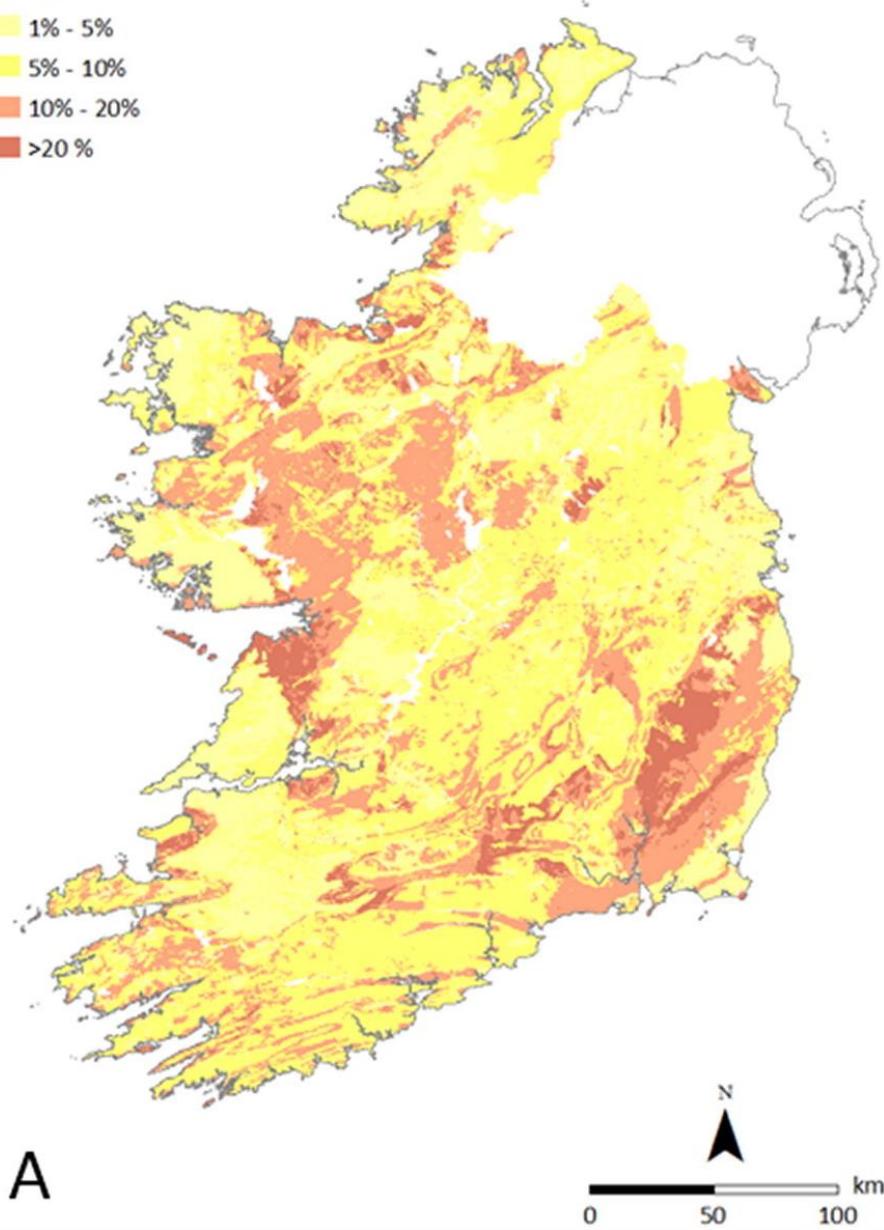


Tropical Ireland | Radon

Indoor Radon Risk Map

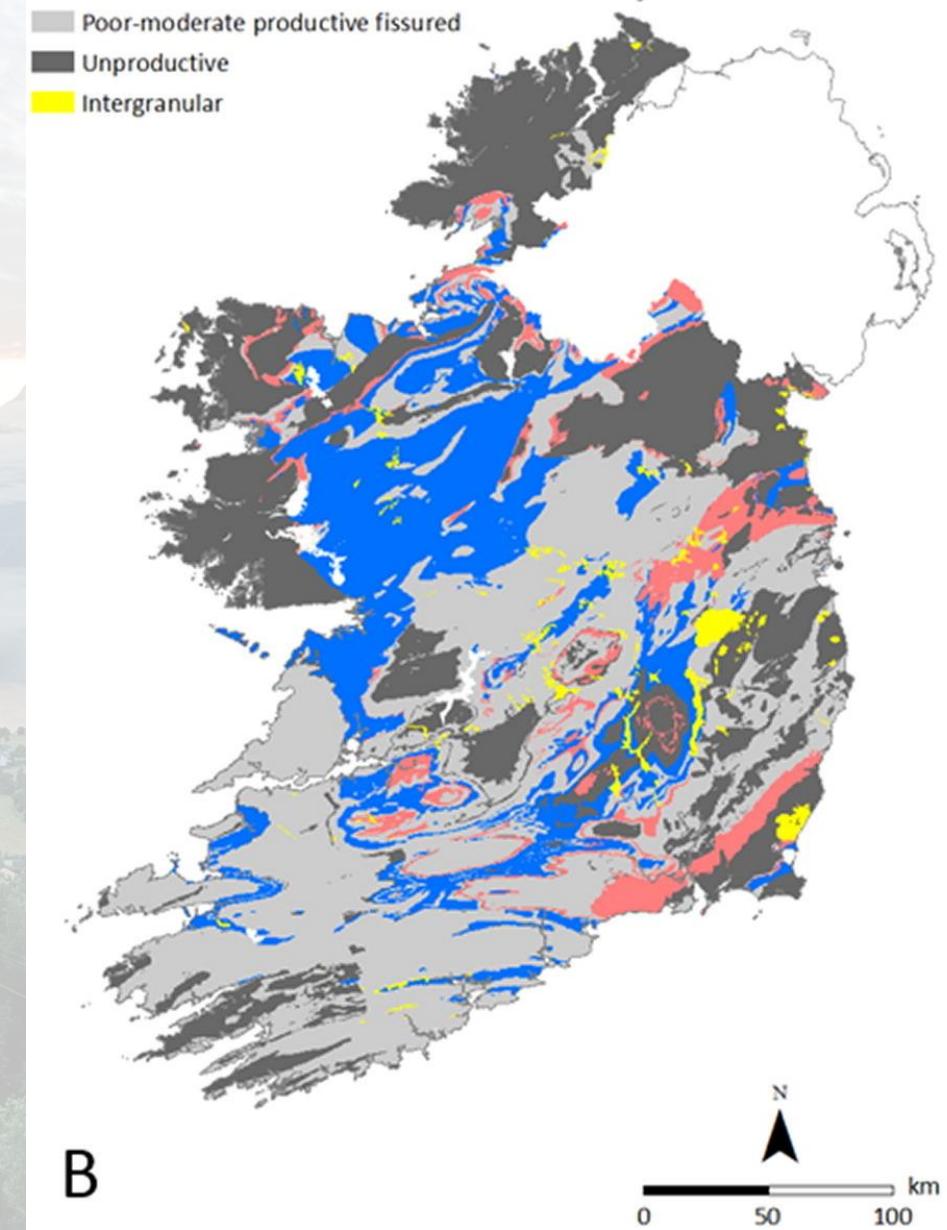
Prob [InRn > 200 Bq/m³]

- < 1%
- 1% - 5%
- 5% - 10%
- 10% - 20%
- >20 %



Simplified Aquifer Type

- Karst
- Productive fissured
- Poor-moderate productive fissured
- Unproductive
- Intergranular



GY4051

0 Ma
Neogene
Palaeogene

Ceno-zoic

100
Cretaceous

Mesozoic

200
Jurassic

Triassic

300
Permian

Carboniferous

400
Devonian

Palaeozoic

500
Silurian

Ordovician

600
Cambrian

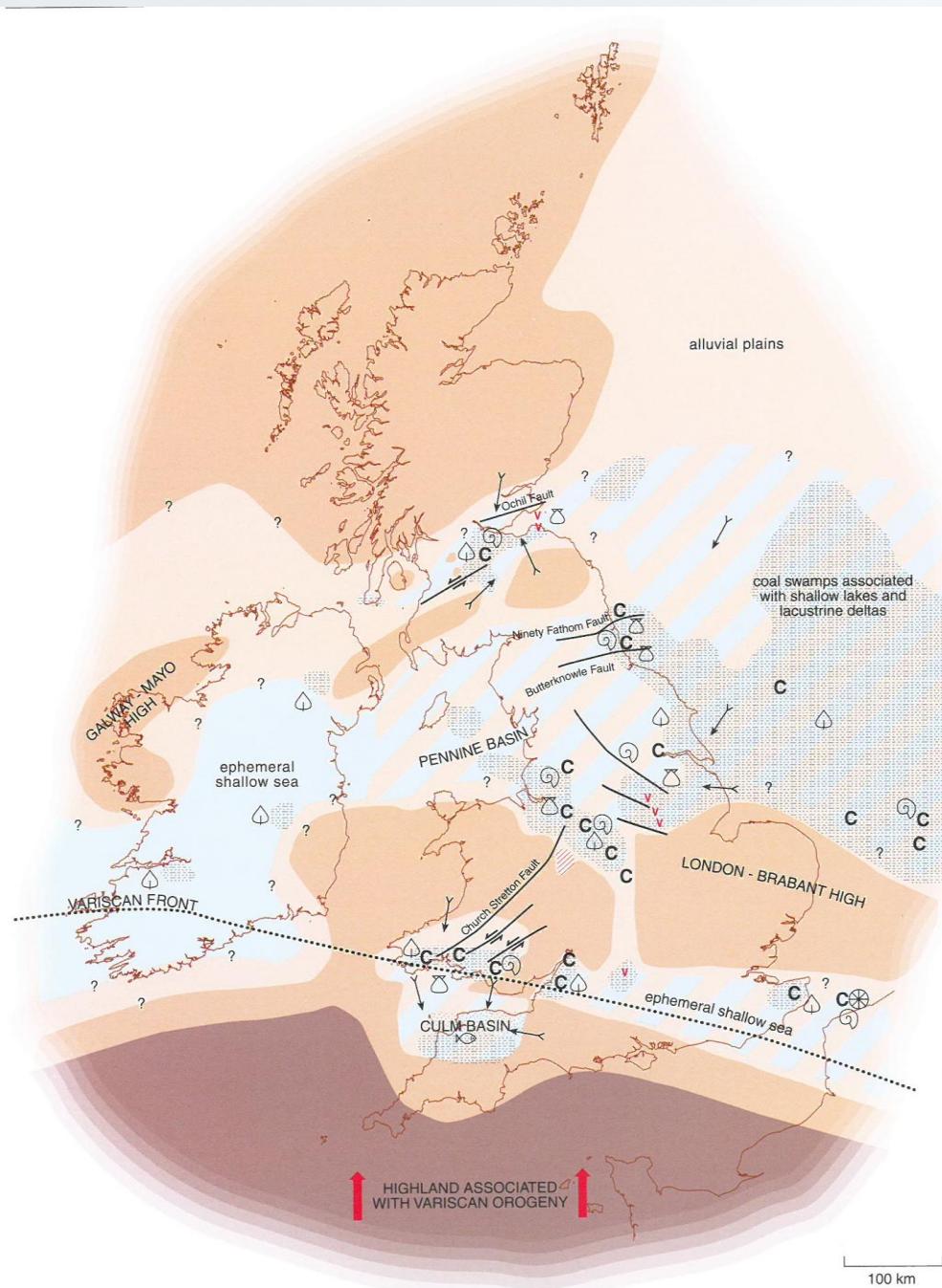
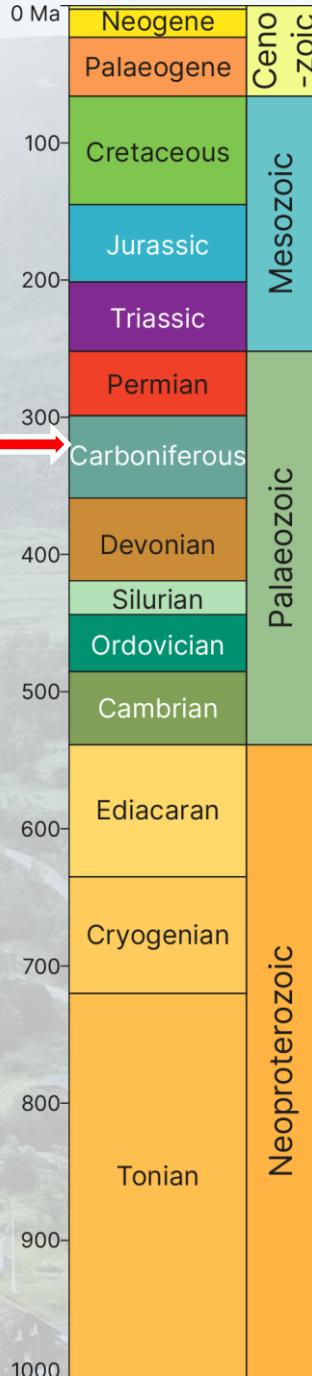
Ediacaran

700
Cryogenian

Neoproterozoic

800
Tonian

Cenozoic



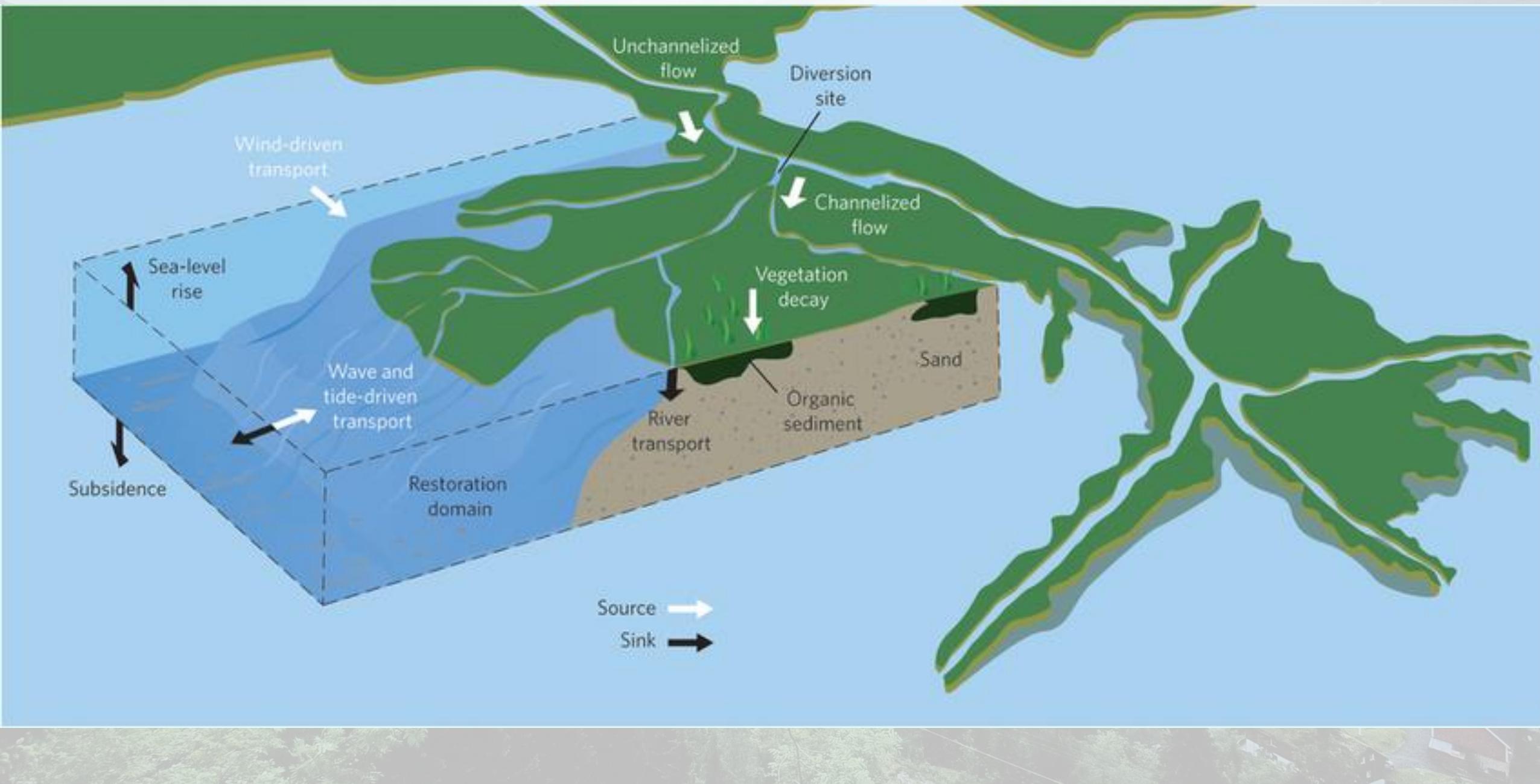
Marine transgression reverses

- Significant shallowing of sea levels
- N. England, S. Scotland, and Ireland covered in ephemeral shallow seas
- Marine deltas common
- Swamps widespread

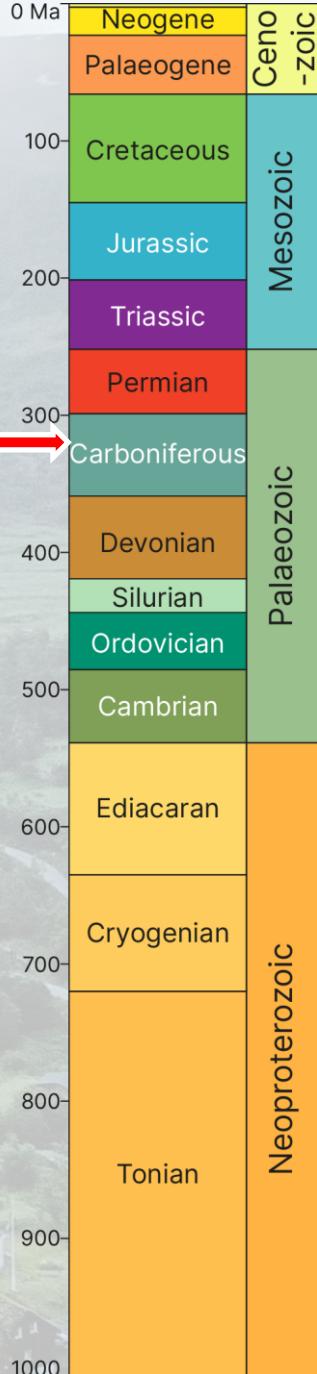
Tropical Ireland | Deltas – the Cliffs of Moher

GY4051









Sphenopsids

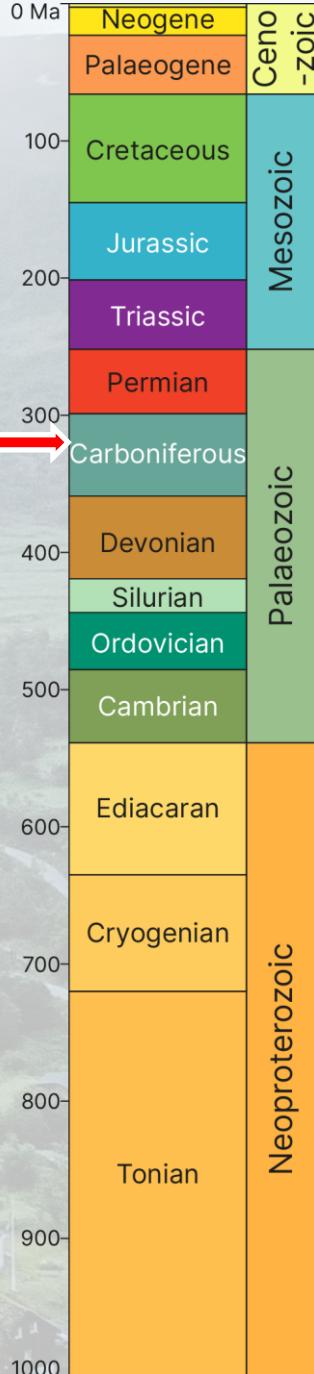
- Similar to living horsetails

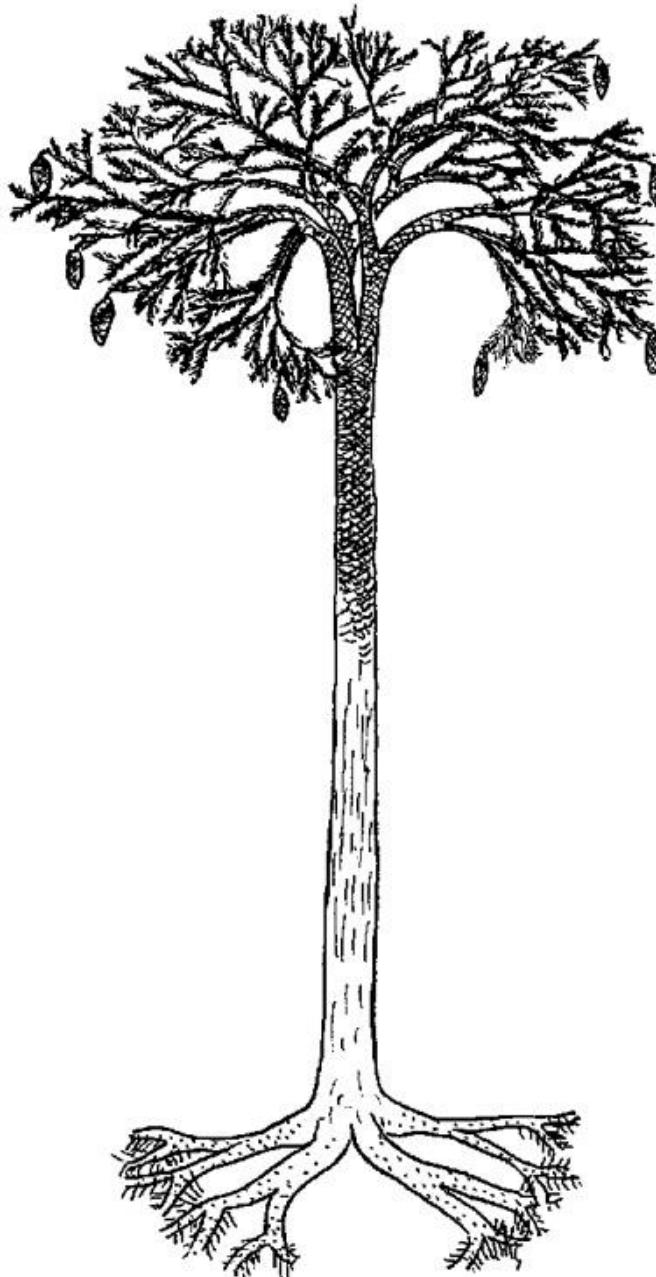




Cordaites

- Seed plant with straplike leaves, increasing in width towards tip, veins parallel to length
- Primitive trees: no modern descendants



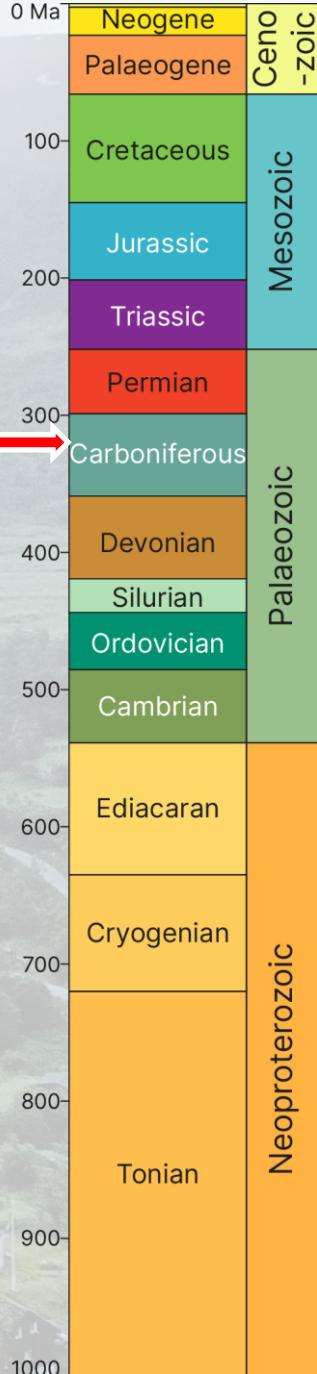


Lycopods

- 'Club mosses'
- Up to 40m tall
- Leaf scars on trunk

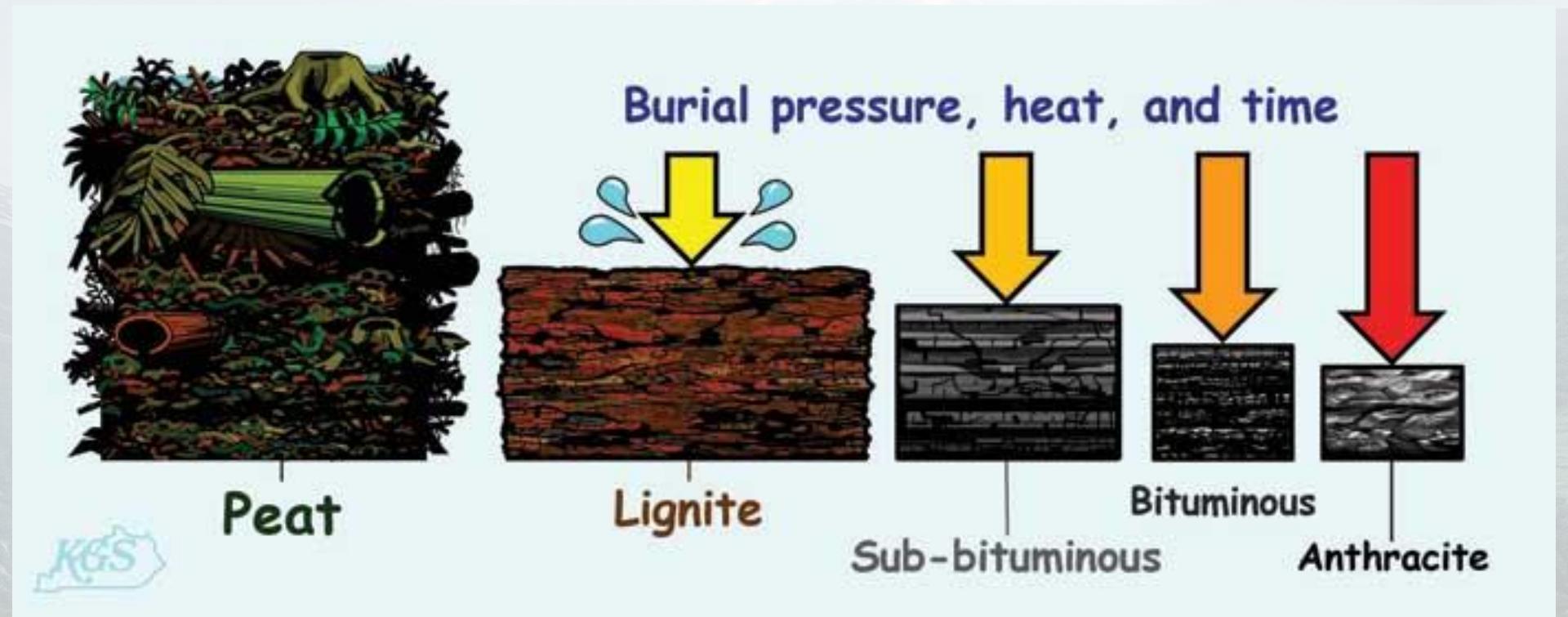


<https://samnoblemuseum.ou.edu/common-fossils-of-oklahoma/plant-fossils/fossils-by-plant-group/fossil-lycophytes/> 1 cm

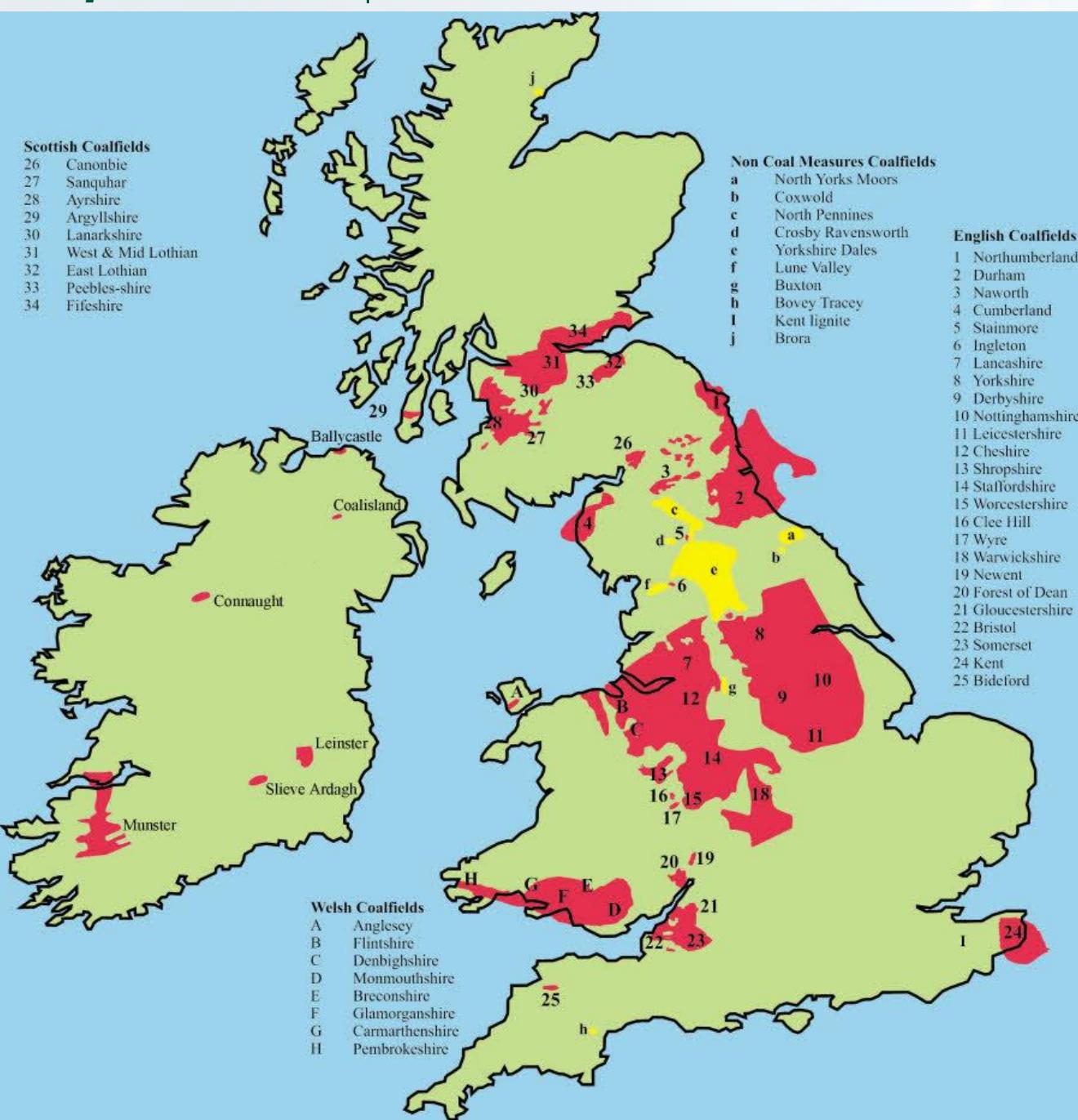




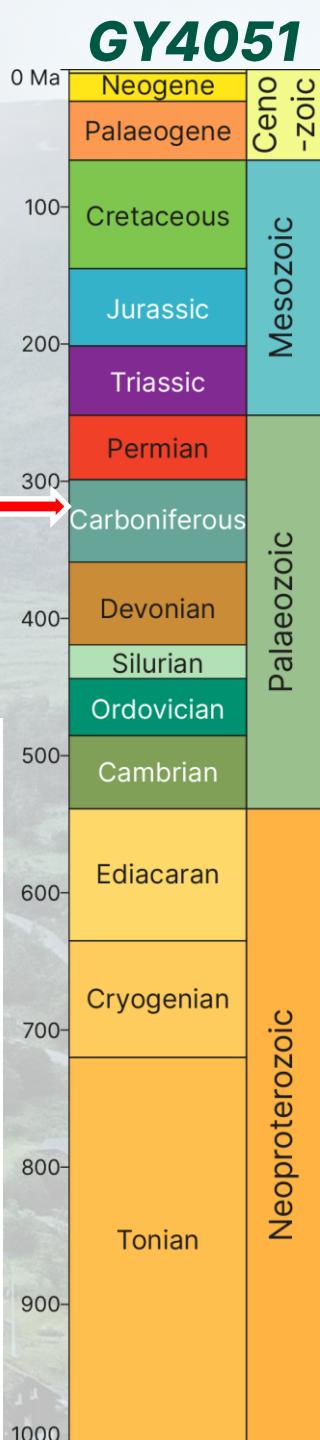




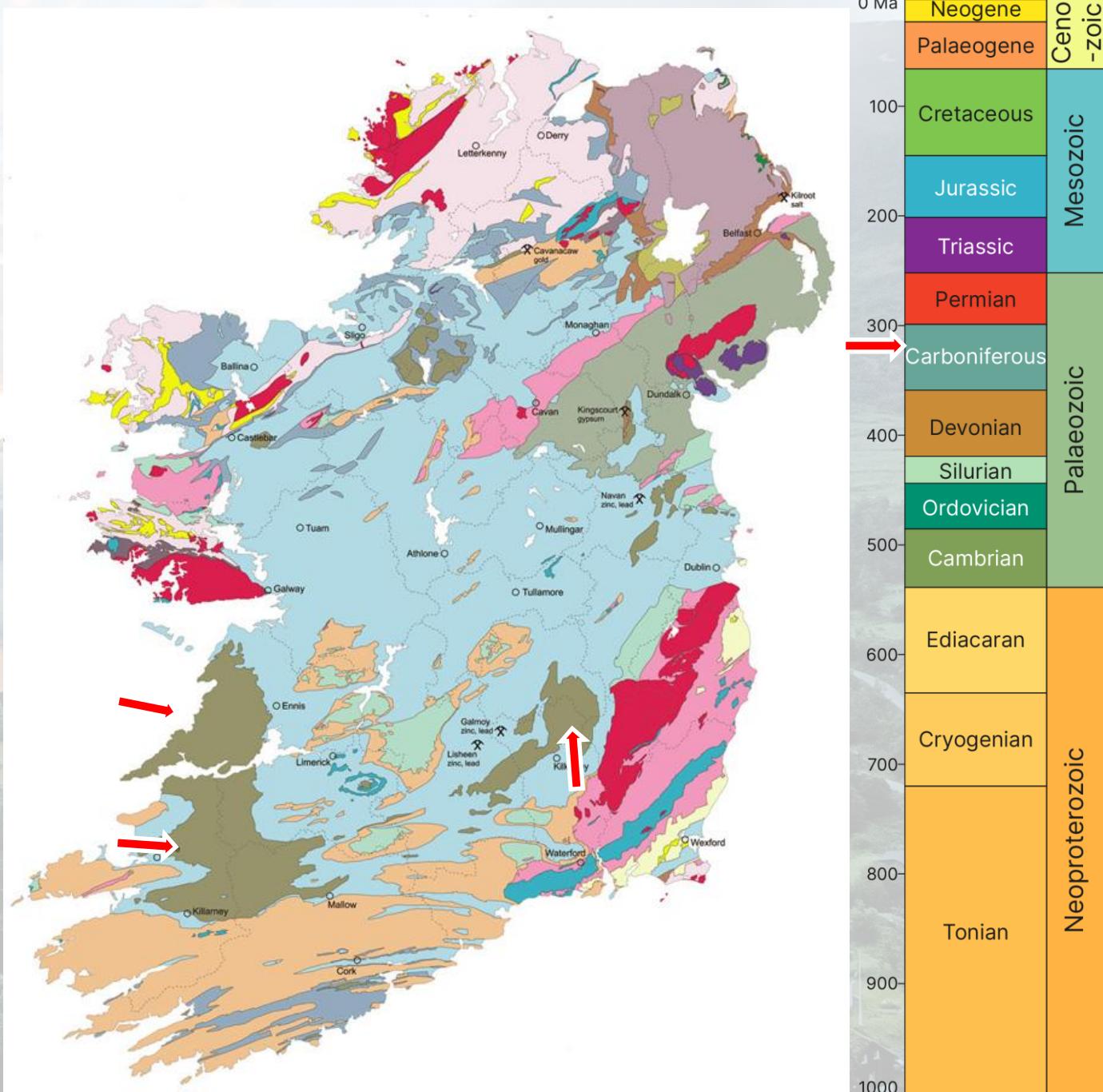
Tropical Ireland | Irish coalfields



Irish coalfields have thin coal seams, which are relatively uneconomic to work



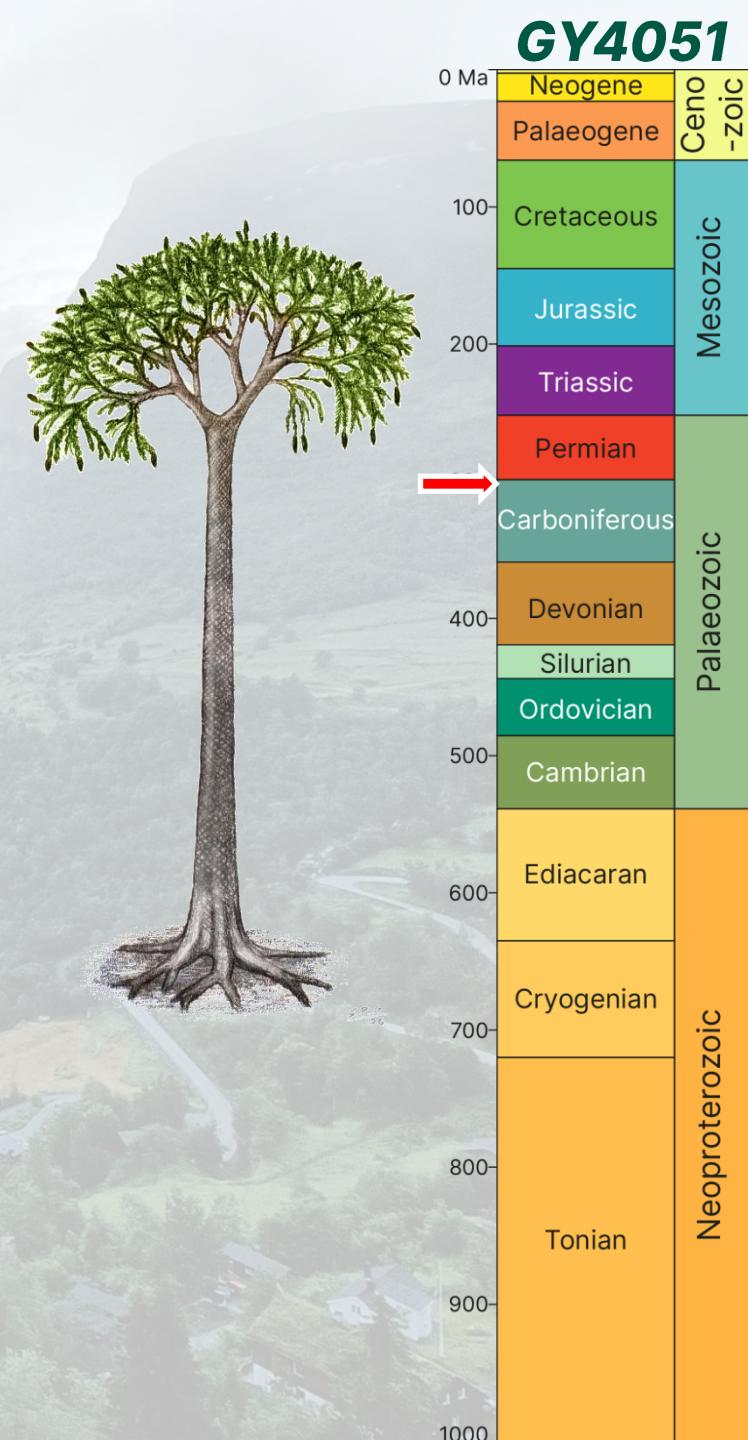
Tropical Ireland | Middle Carboniferous



Tropical Ireland | Carboniferous Rainforest Collapse

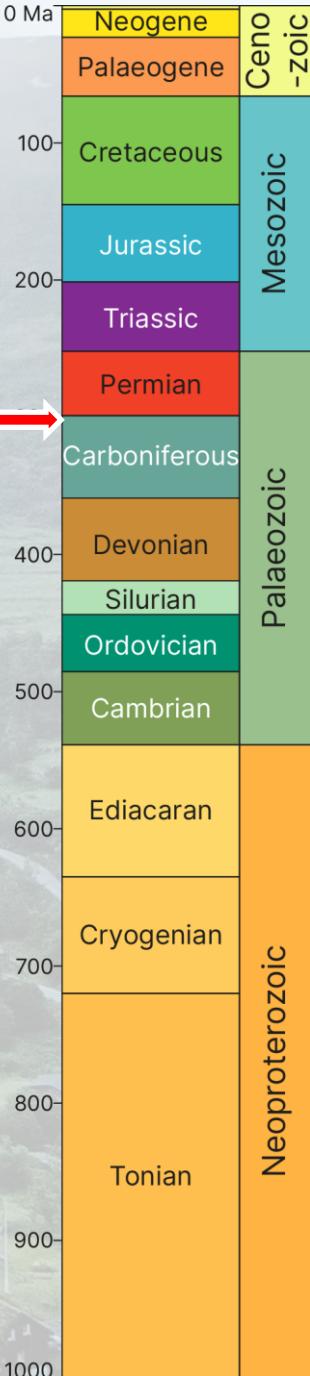
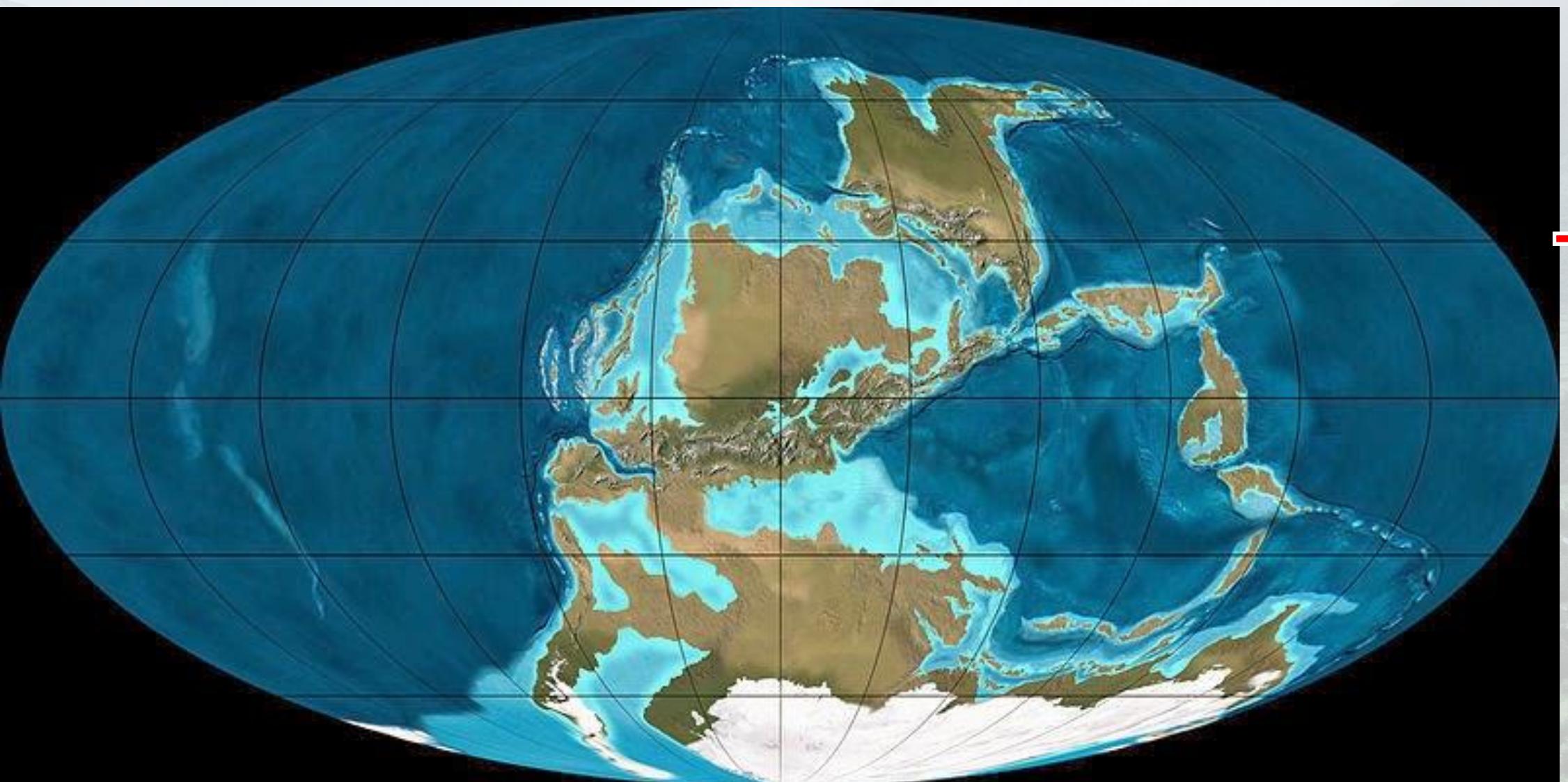


"Calamites & Asteroxylon"
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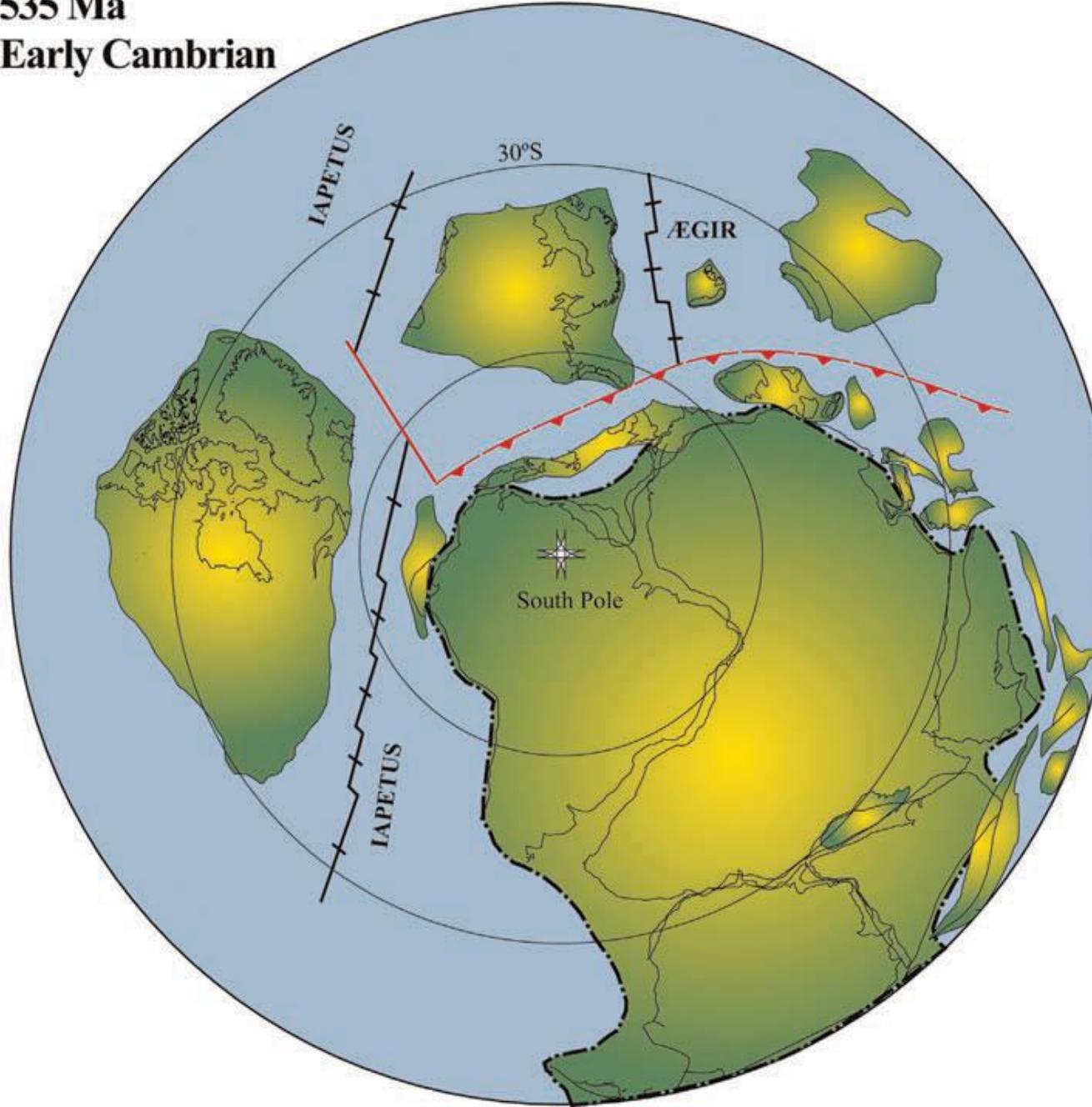
Tropical Ireland | Carboniferous Glaciation

GY4051



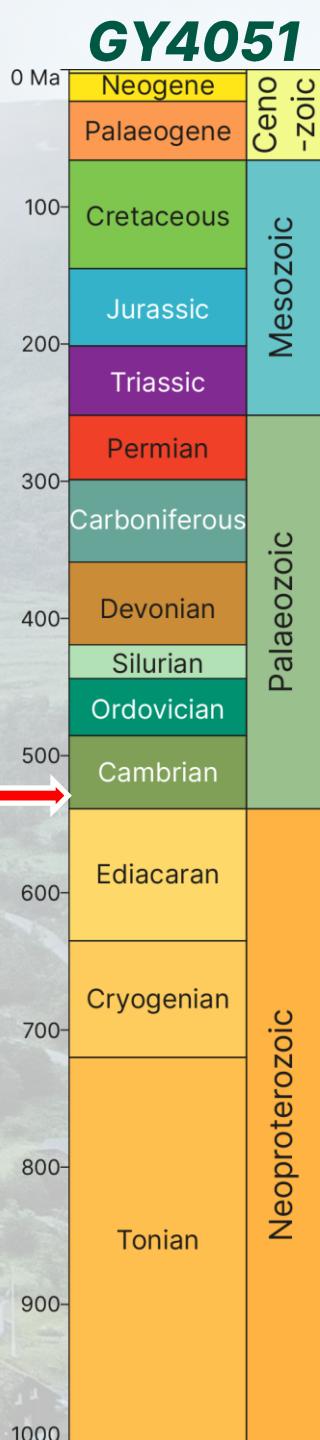
535 Ma

Early Cambrian



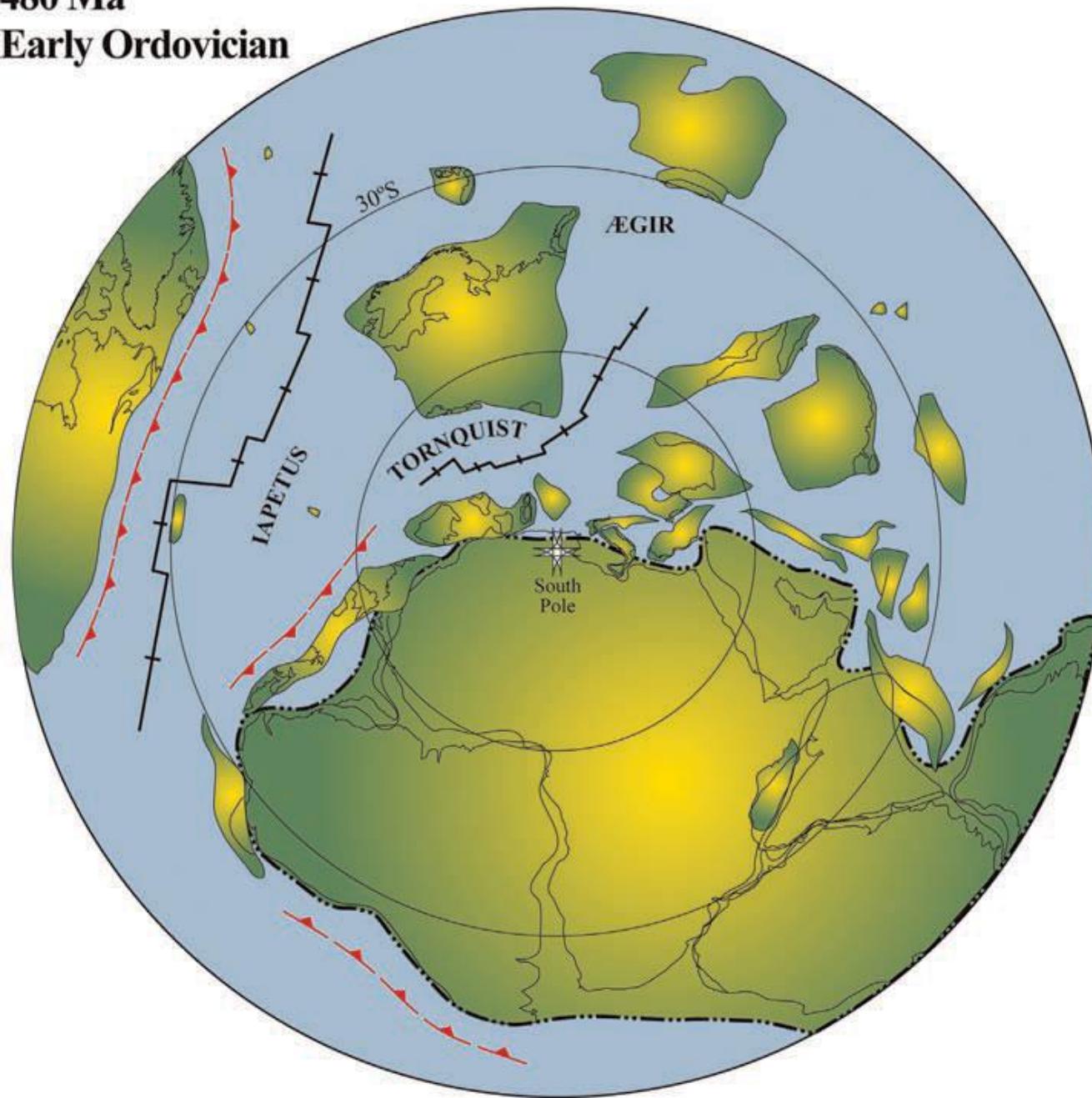
Rifting of Rodinia

- Iapetus Ocean opening
- Northern Britain and Ireland part of Laurentia
- Southern Britain and Ireland still part of Gondwana



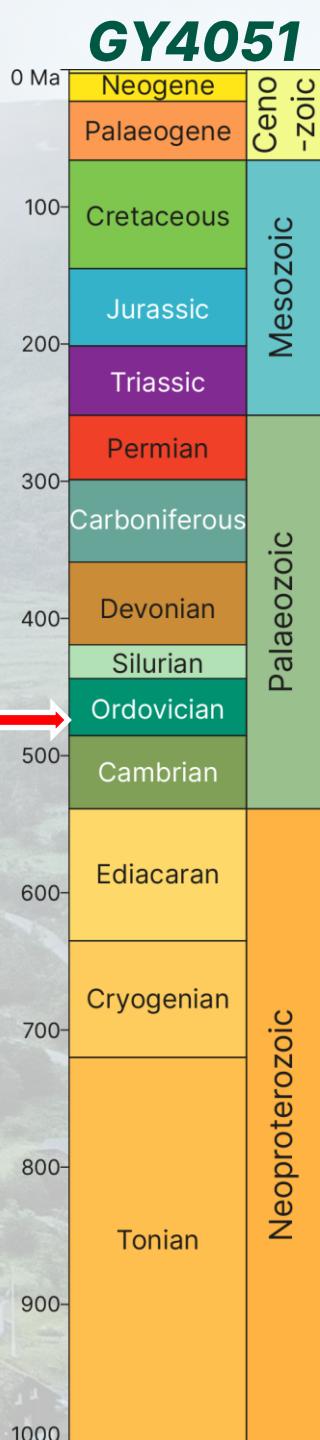
480 Ma

Early Ordovician



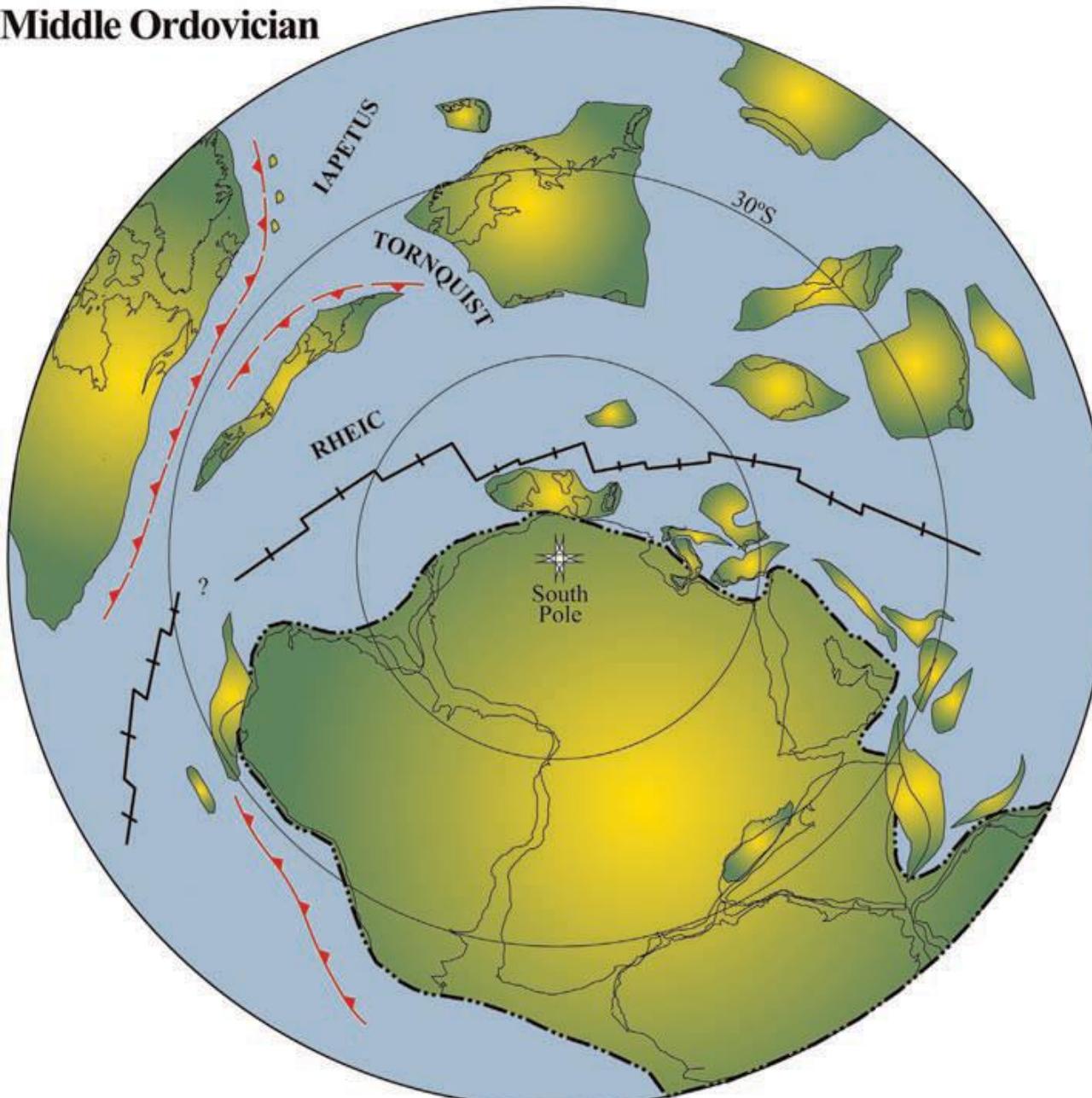
Iapetus Ocean starts to close

- Southern Britain and Ireland starts to rift from Gondwana
- Becomes microcontinent of Avalonia



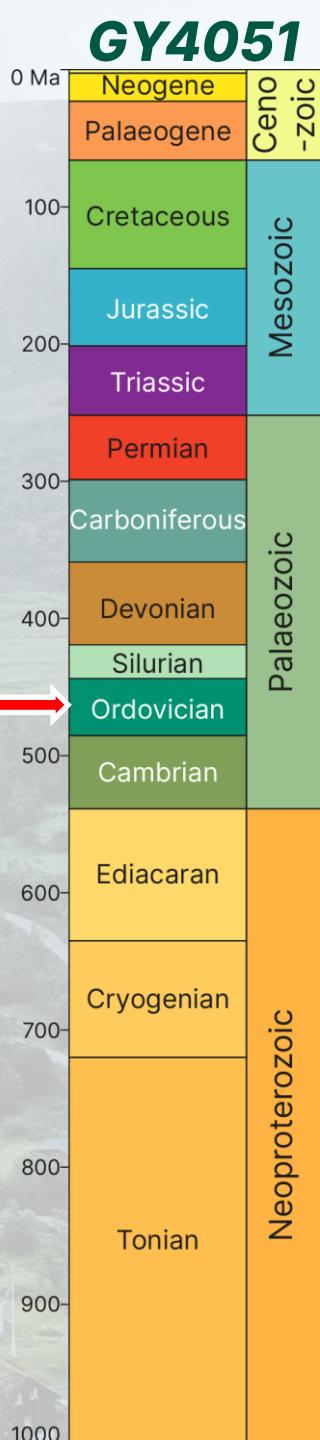
460 Ma

Middle Ordovician



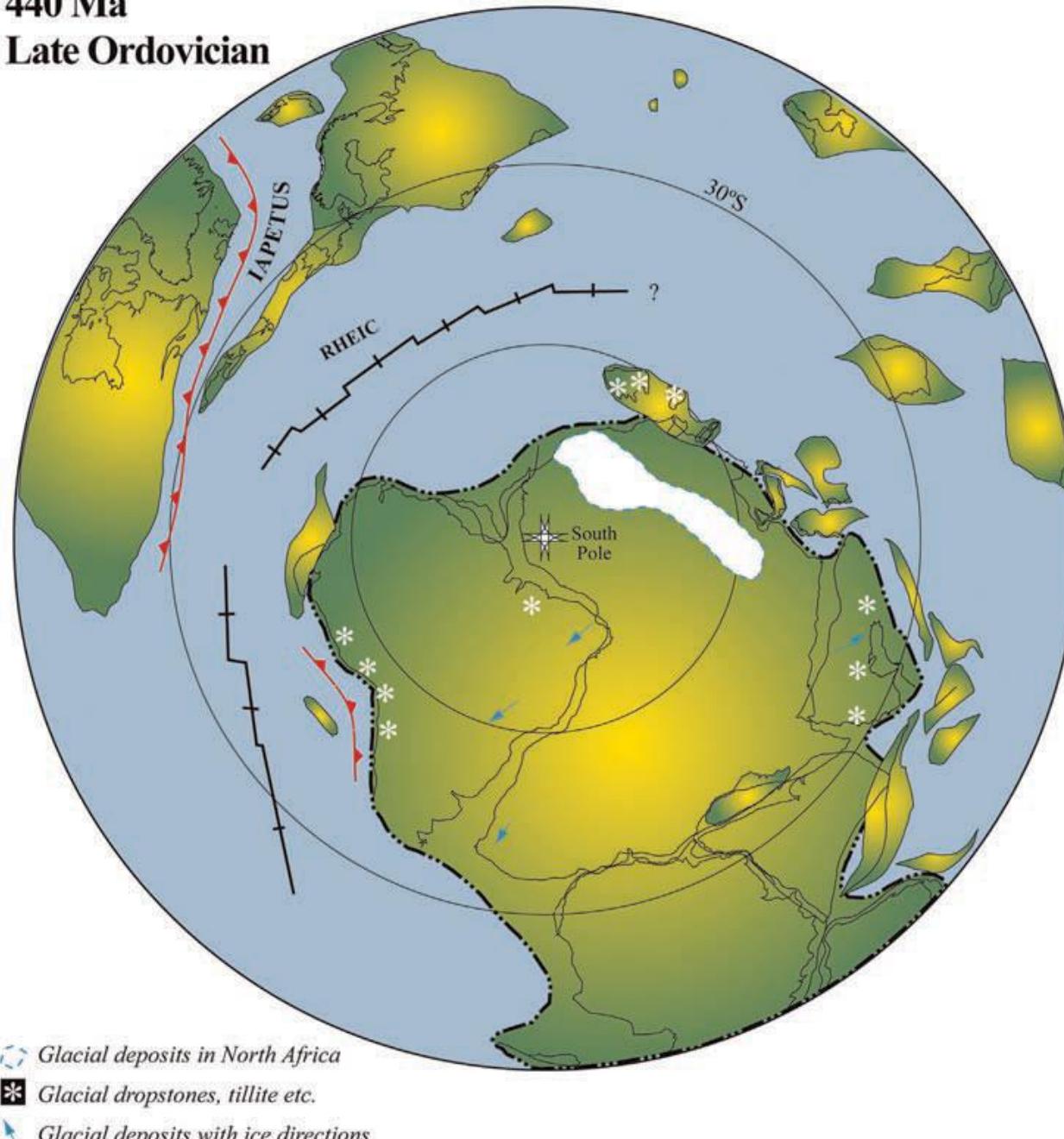
Iapetus Ocean continues to close

- Rheic Ocean opening between Avalonia and Gondwana
- Avalonia moving north towards Laurentia as Iapetus narrows



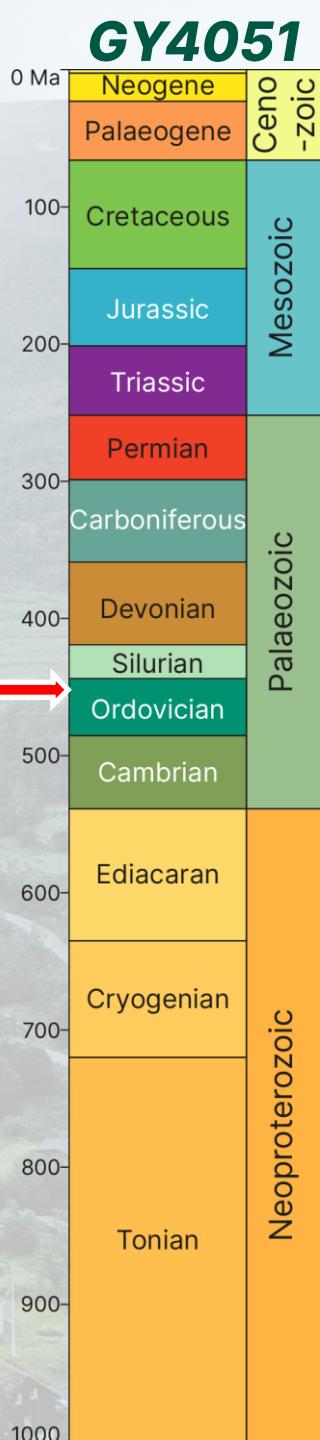
440 Ma

Late Ordovician



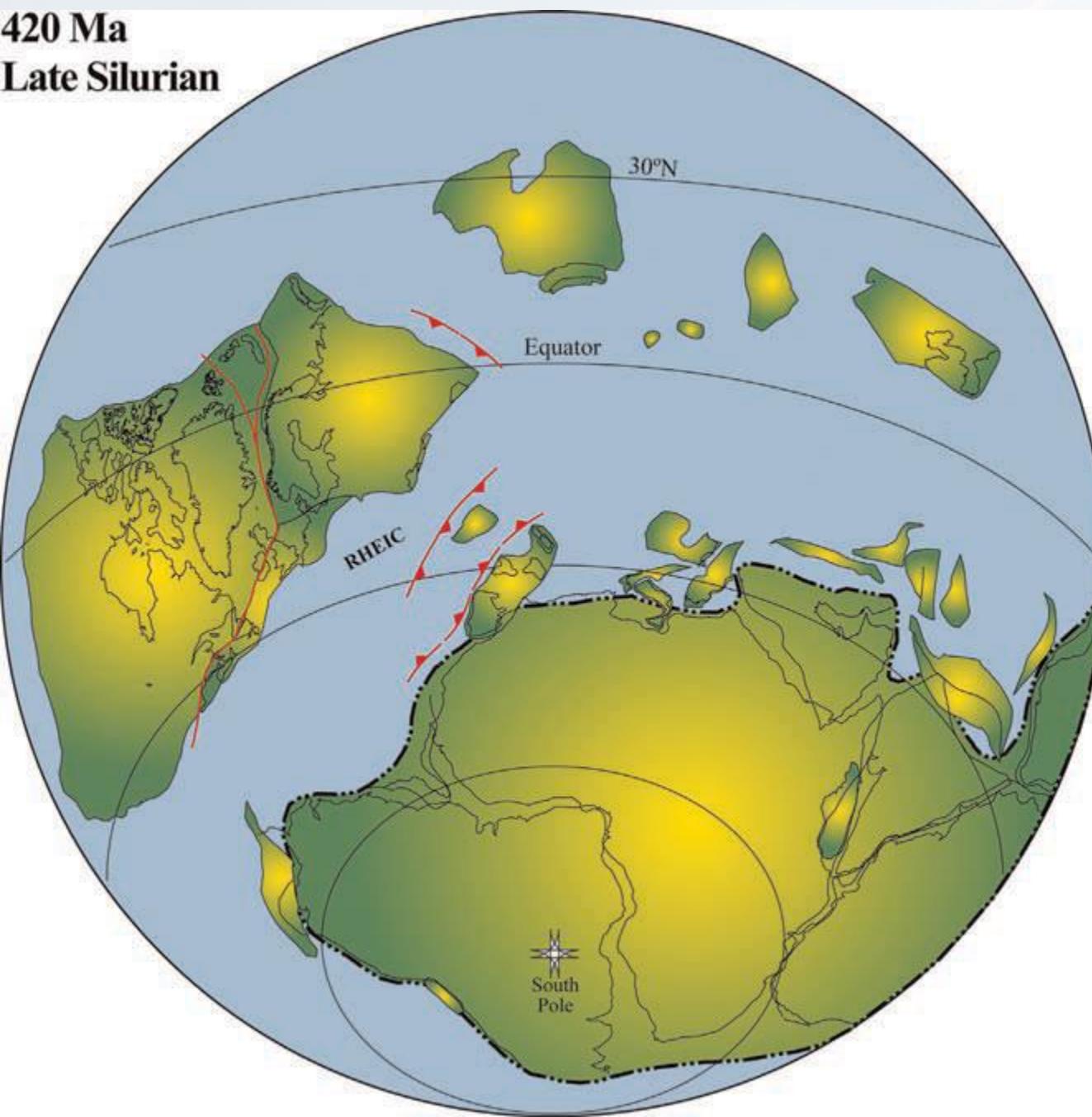
Iapetus Ocean nears the end

- Two halves of Britain and Ireland very close
- Baltica starts to collide with Eastern Avalonia
- Rheic Ocean widening



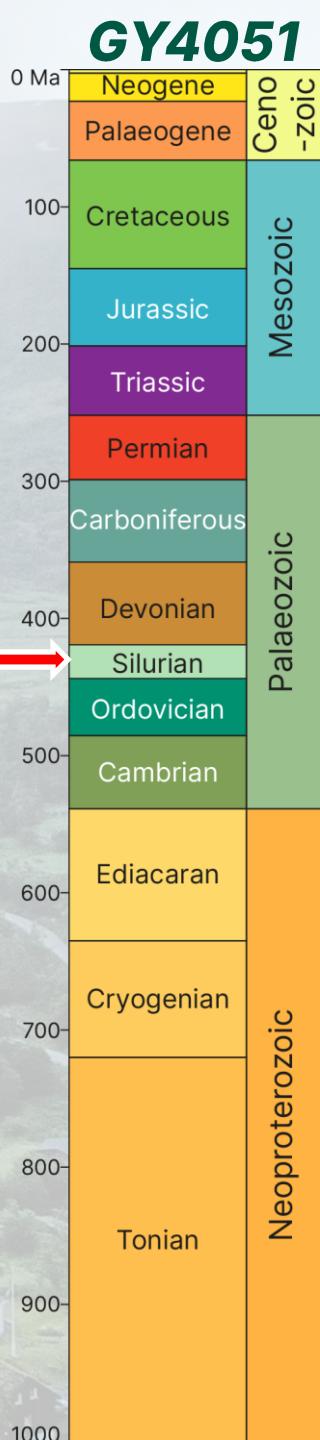
420 Ma

Late Silurian



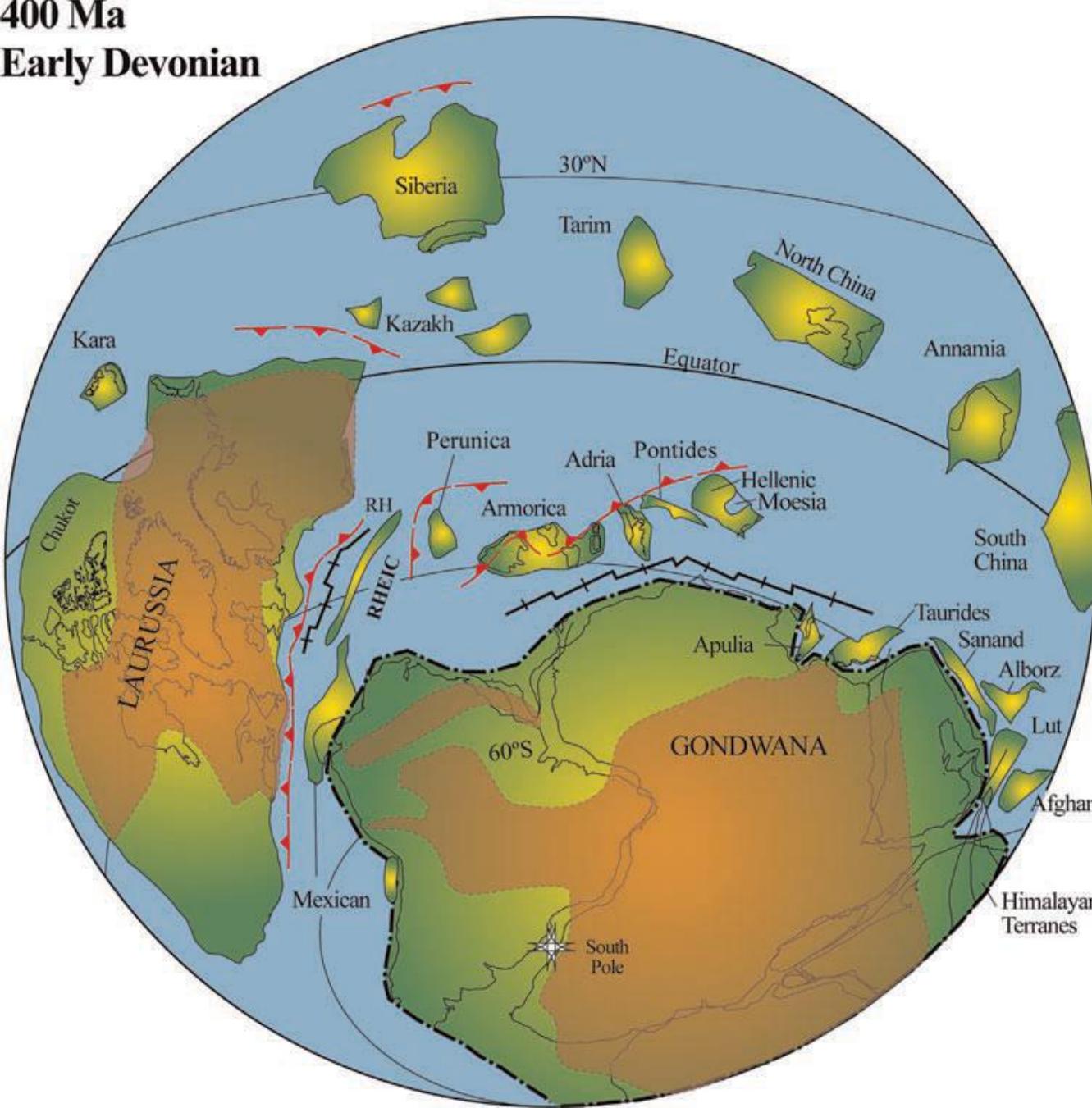
Iapetus Ocean is gone

- Avalonia has collided with Laurentia and Baltica in the Caledonian Orogeny
- Continent of Laurussia
- Britain and Ireland joined, separated from Gondwana by the Rheic Ocean



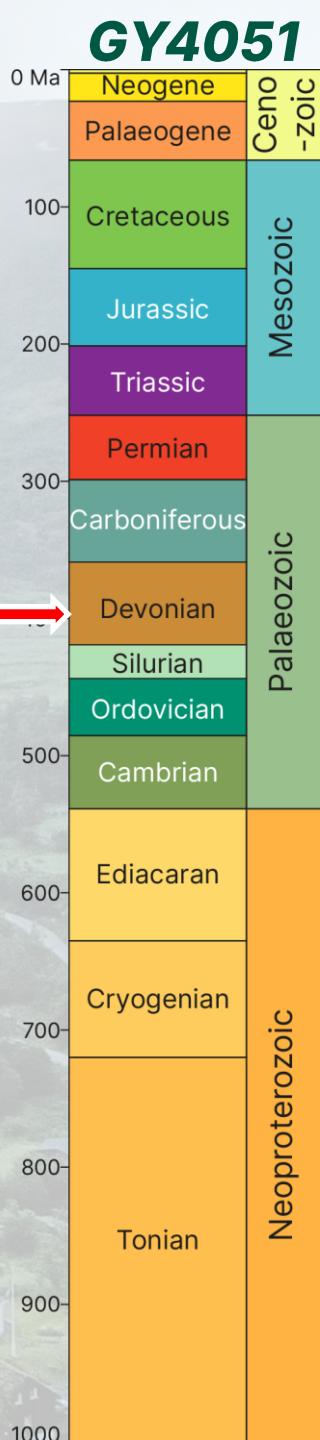
400 Ma

Early Devonian



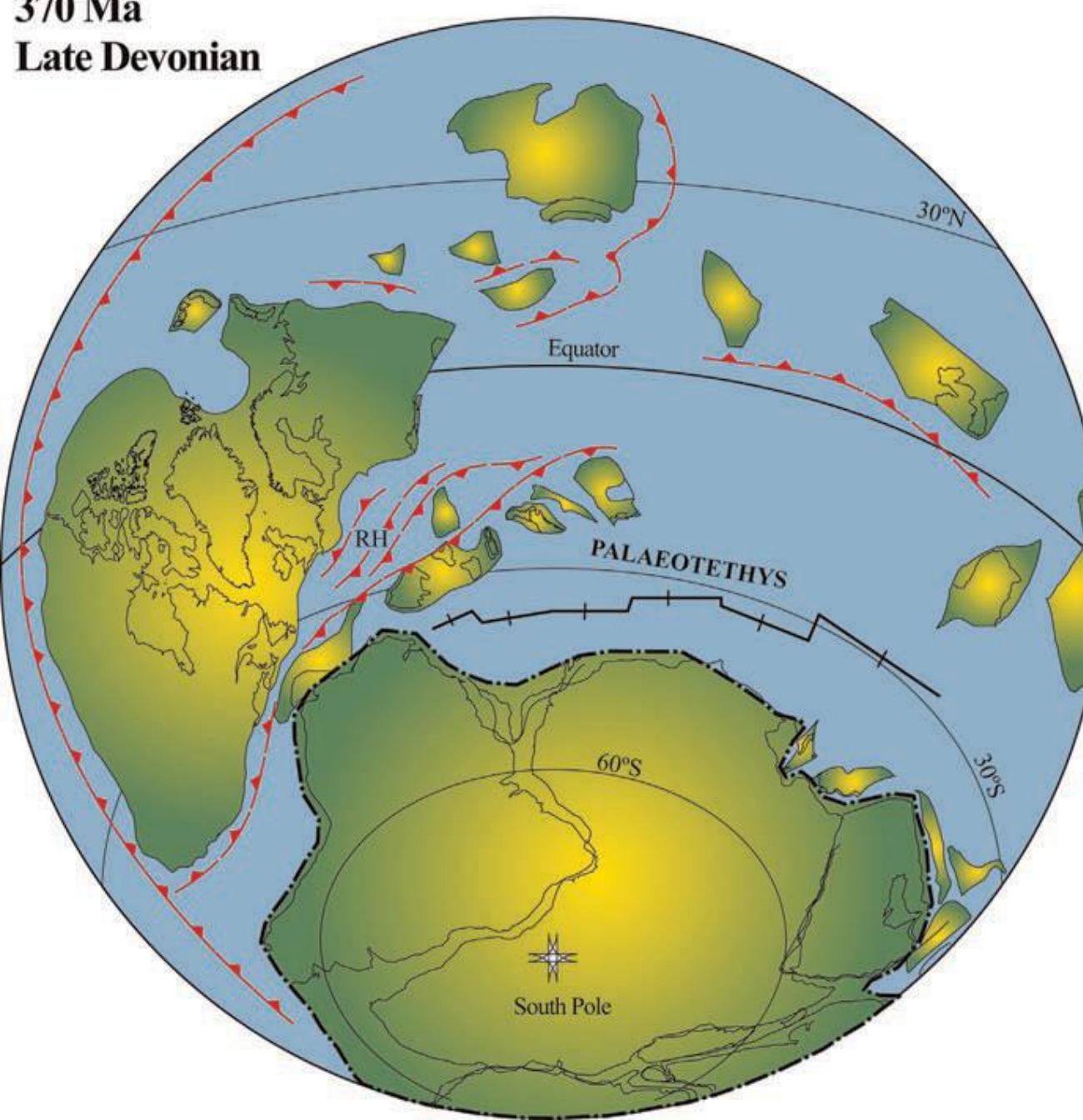
Rheic Ocean closing

- Laurussia – the Old Red Sandstone Continent – mostly emergent
- Southernmost Britain and Ireland on the continental margin
- European microcontinents rifting from Gondwana as the Tethys Ocean opens



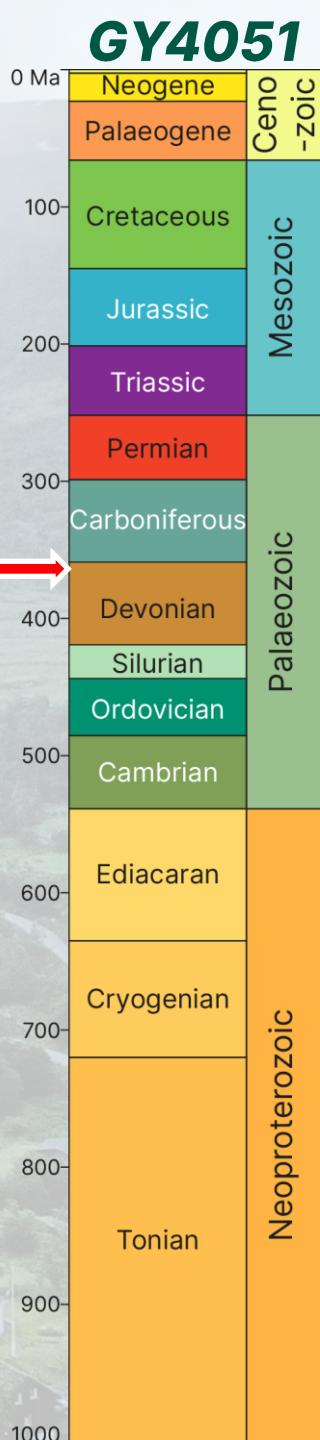
370 Ma

Late Devonian



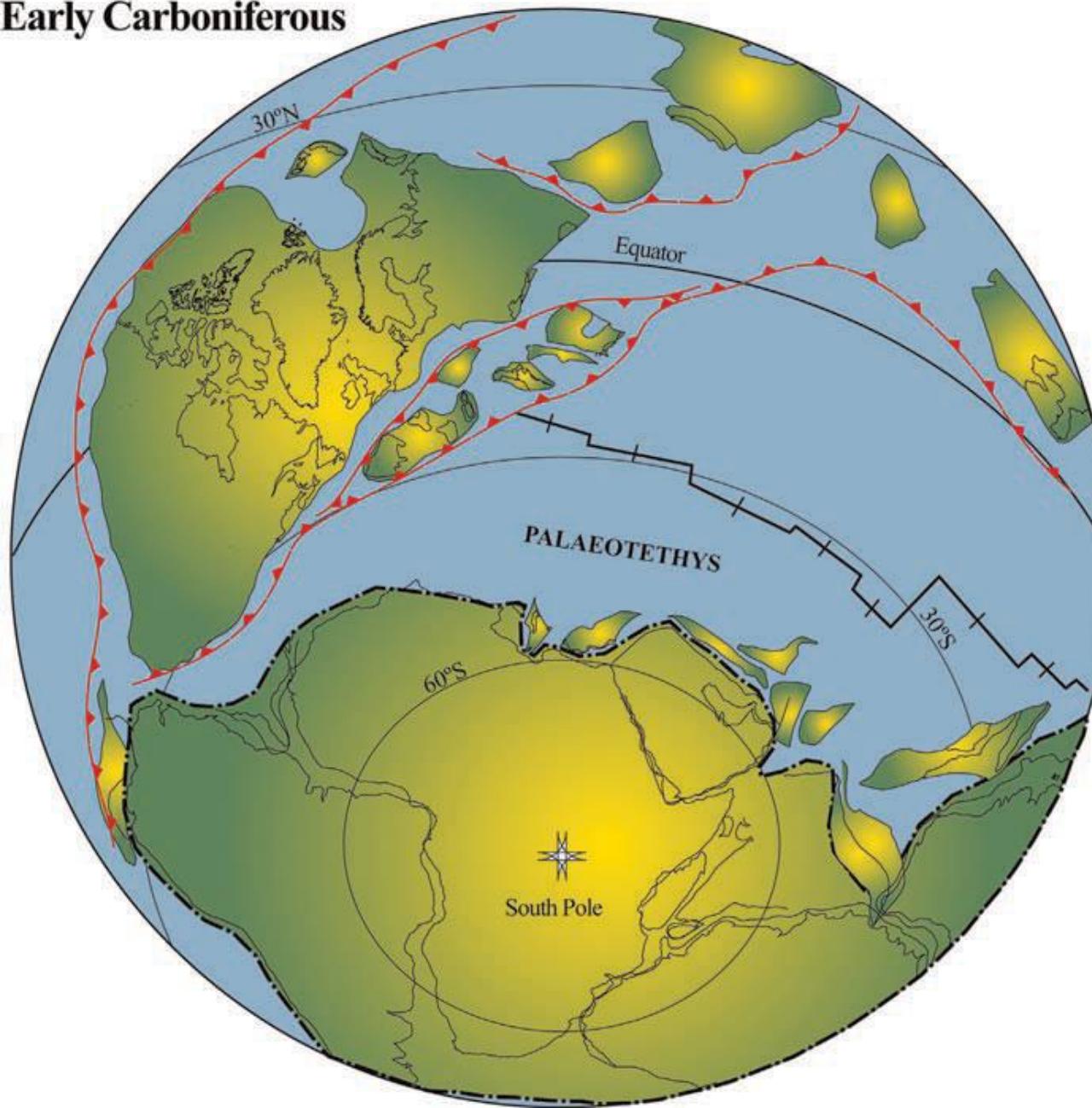
Tethys Ocean continues to open

- Rheic Ocean is nearly gone
- European microcontinents approaching Britain and Ireland



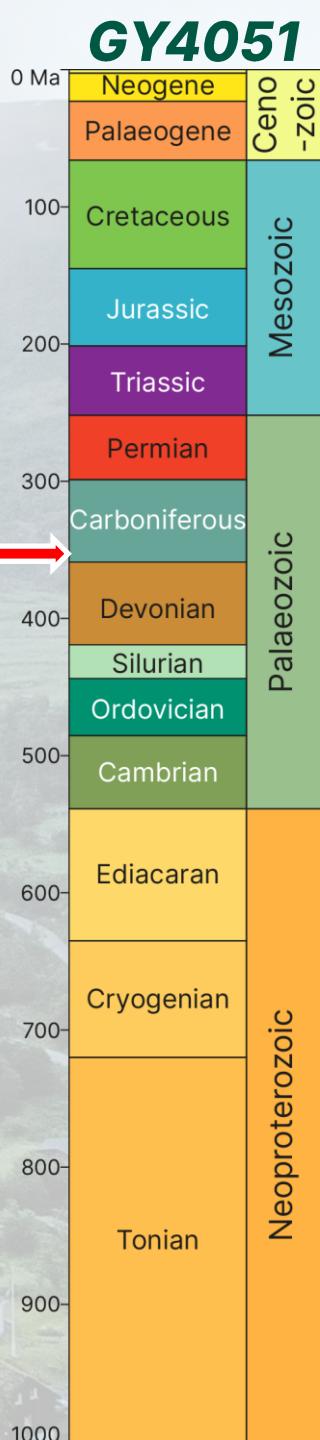
340 Ma

Early Carboniferous



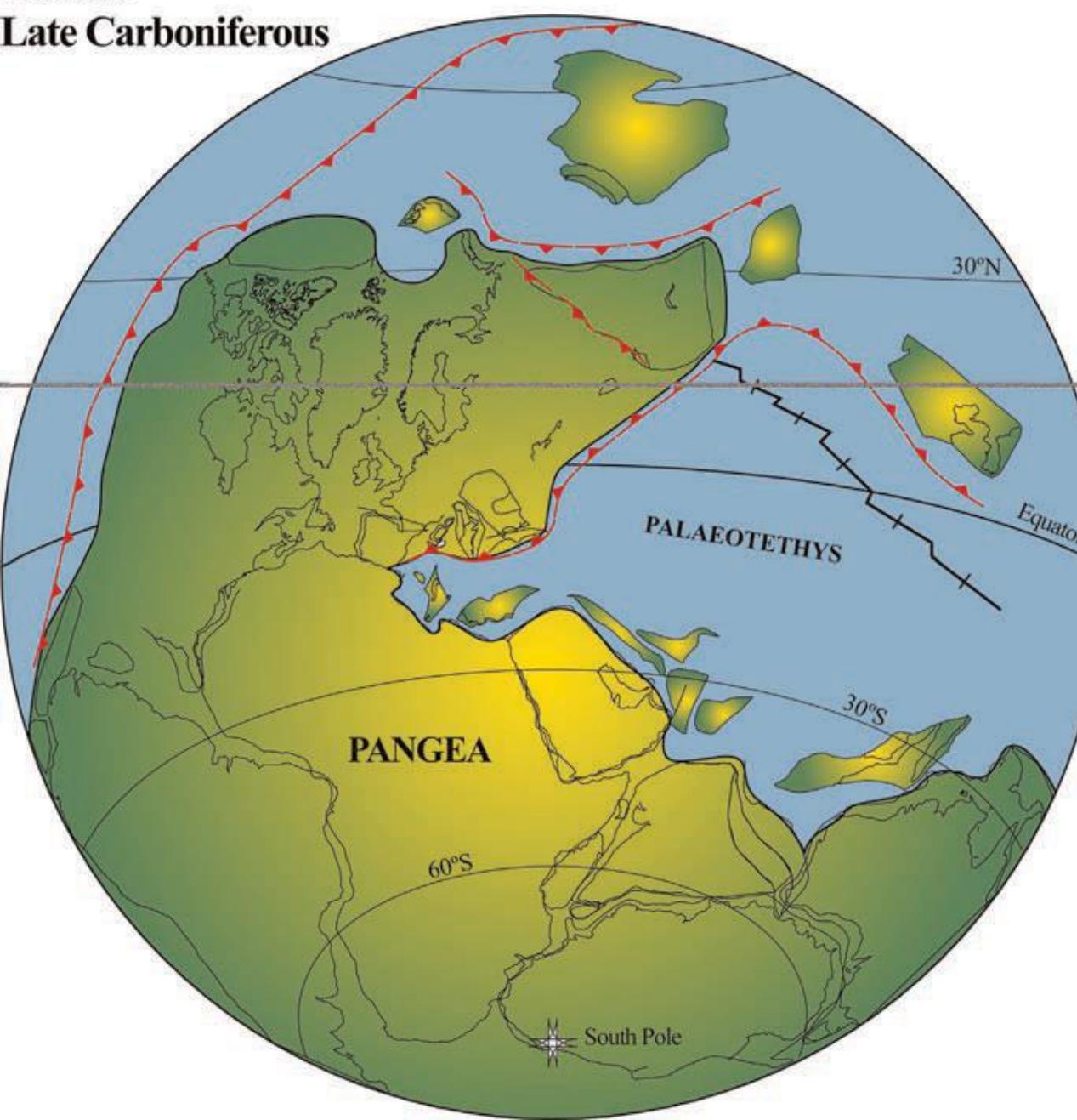
Rheic Ocean almost closed

- Tethys Ocean very wide
- Britain and Ireland tropical
- Gondwana closing on Laurussia



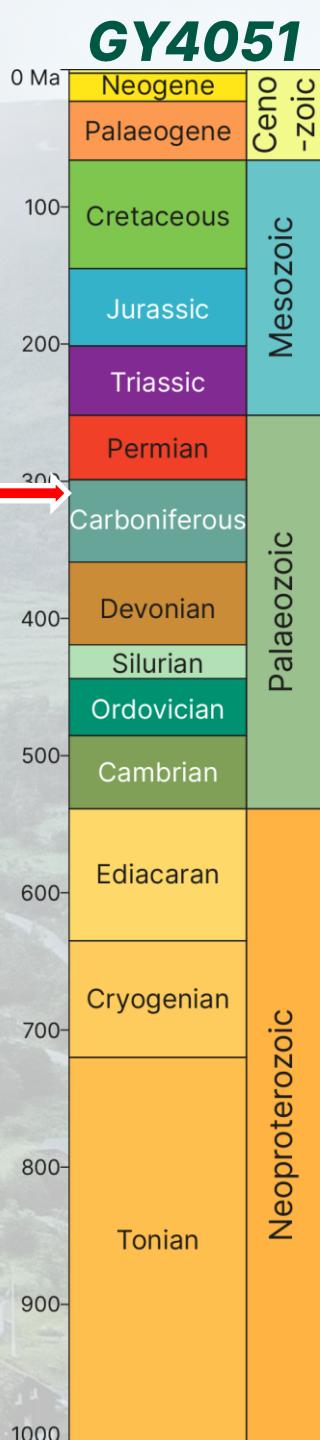
310 Ma

Late Carboniferous



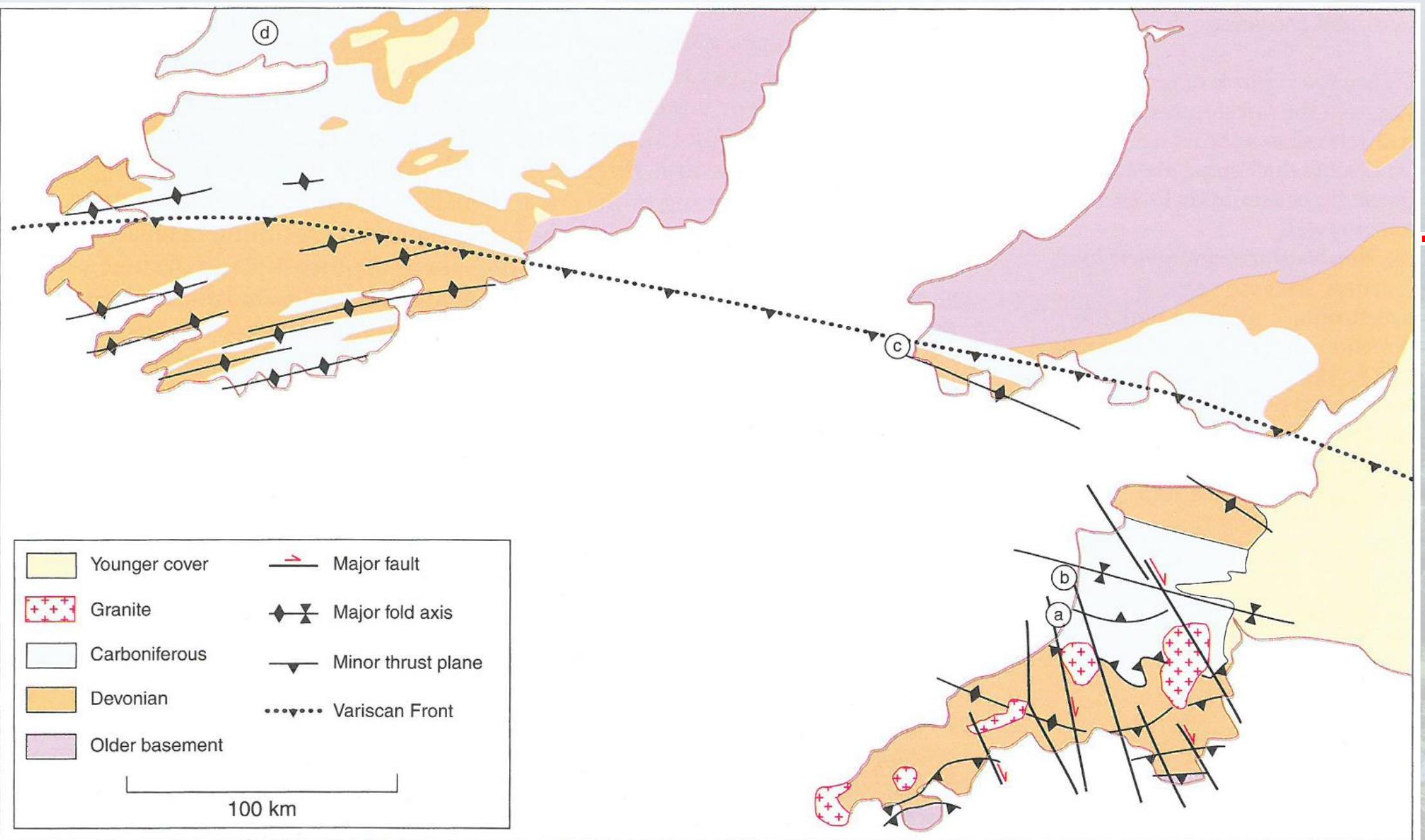
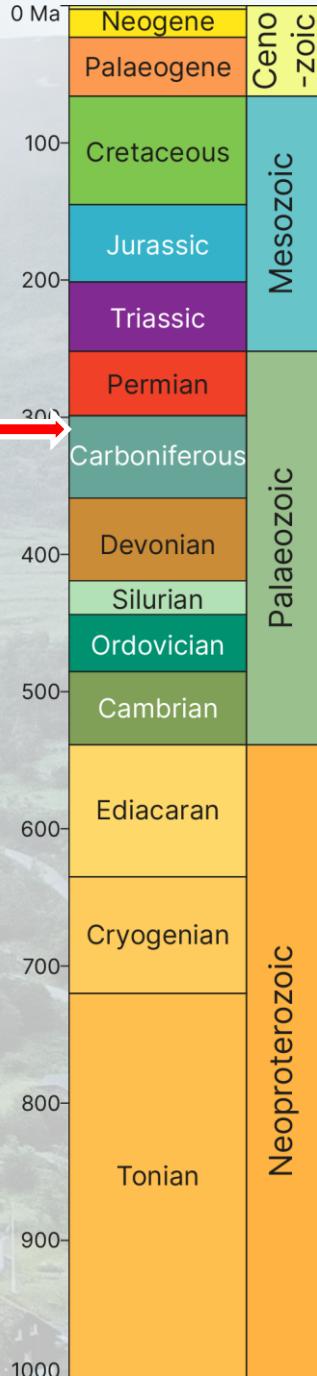
Variscan Orogeny

- Gondwana collided with Laurussia
- European microcontinents collided with Laurussia
- Supercontinent of Pangaea

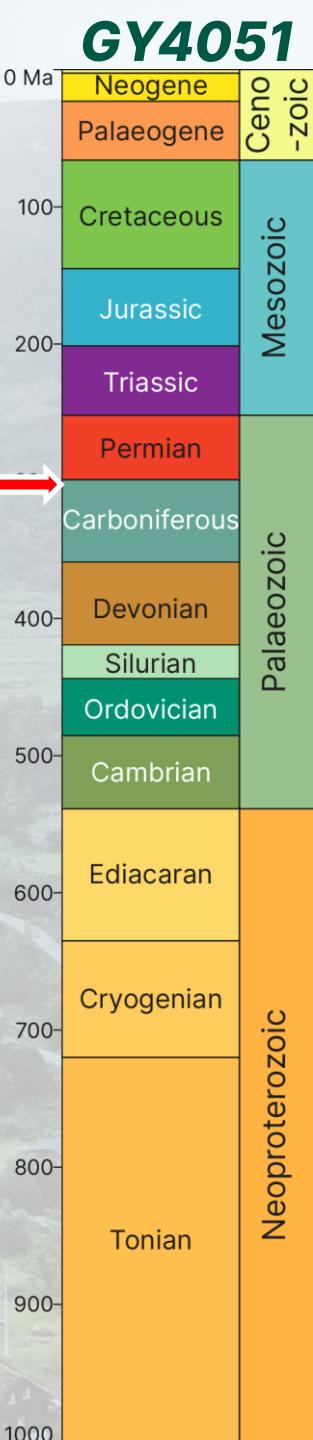


Tropical Ireland | The Variscan Front

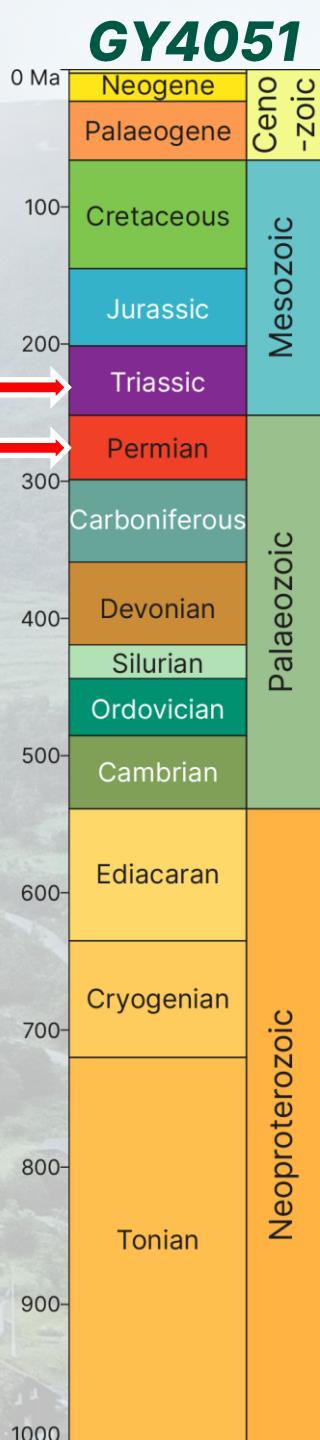
GY4051



Folded Limestones | Loughshinny, Co. Dublin



Desert sandstone | Belfast, Co. Antrim

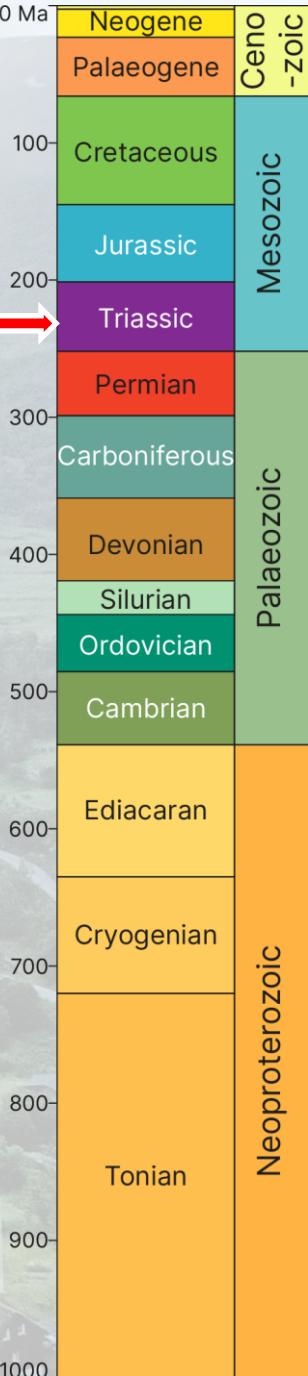




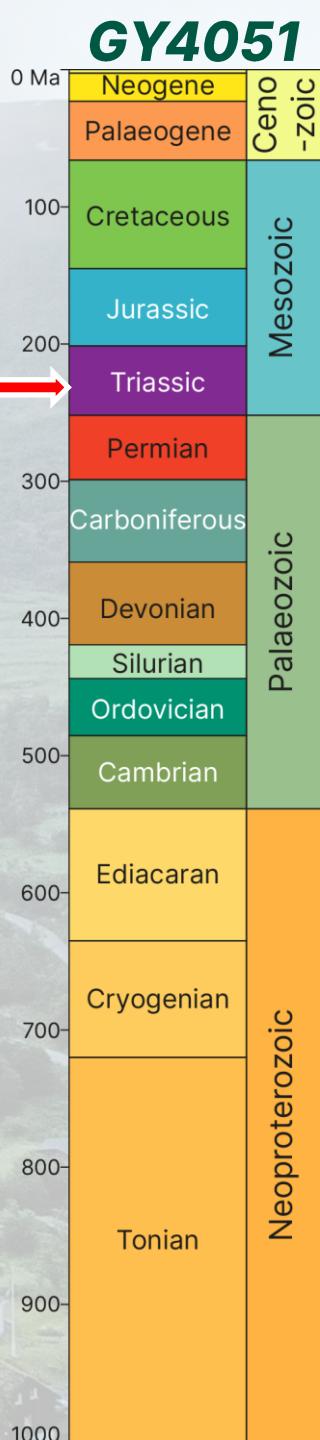
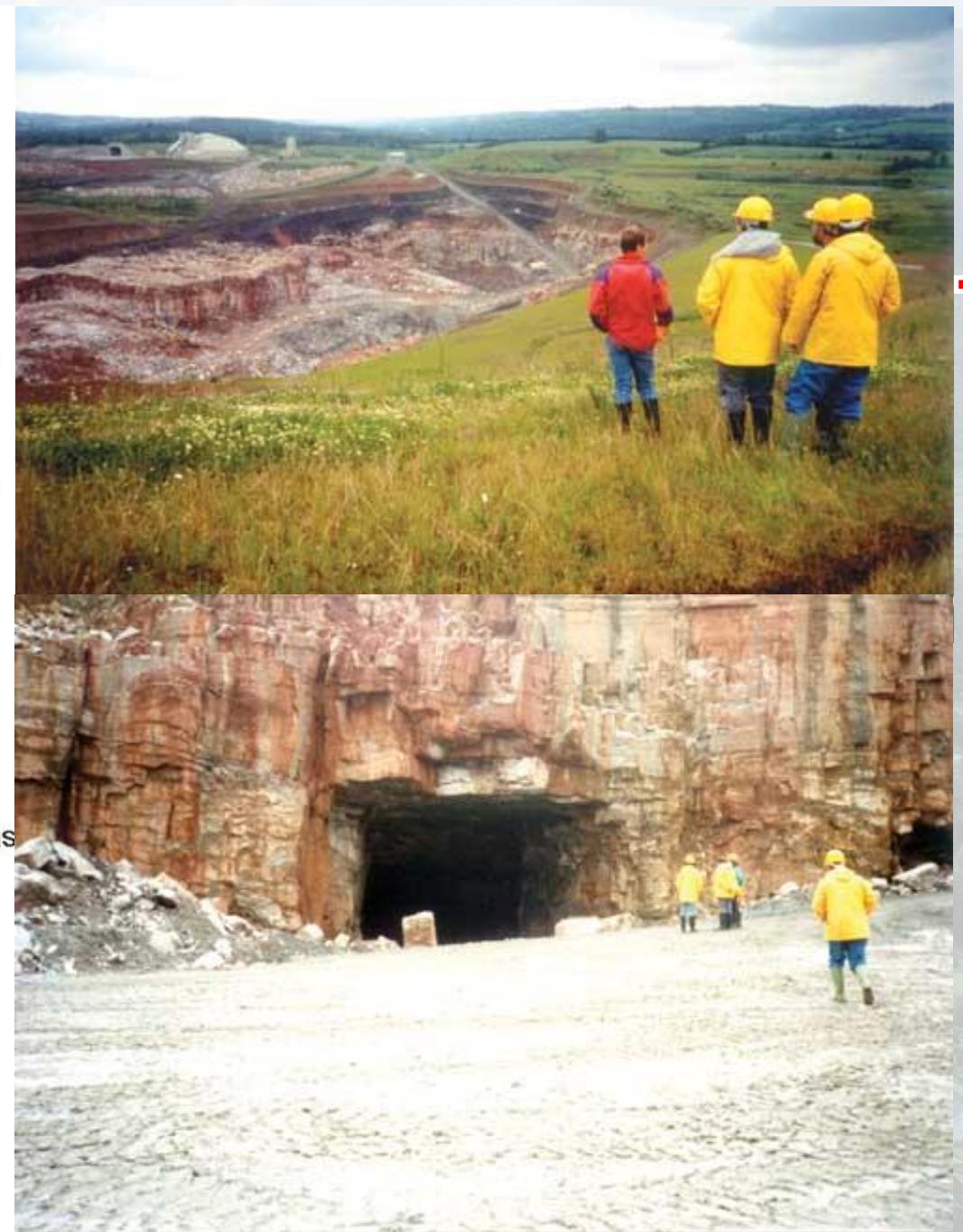
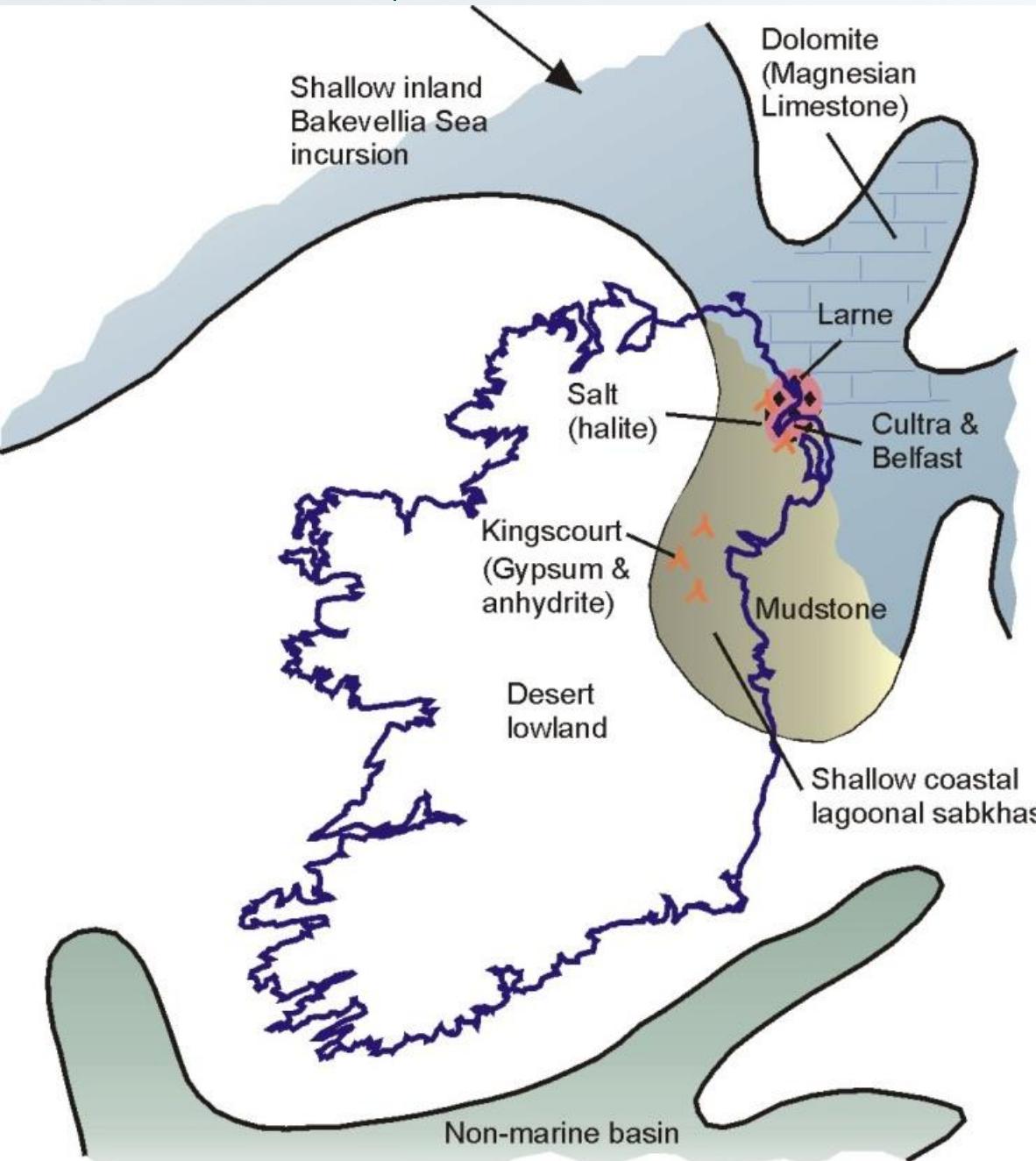


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Desert sandstone | Merseyside, England



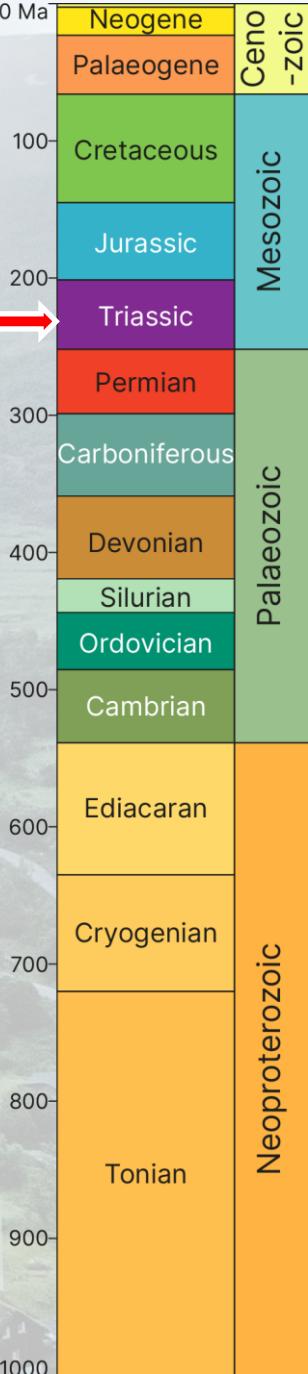
Tropical Ireland | Triassic evaporites



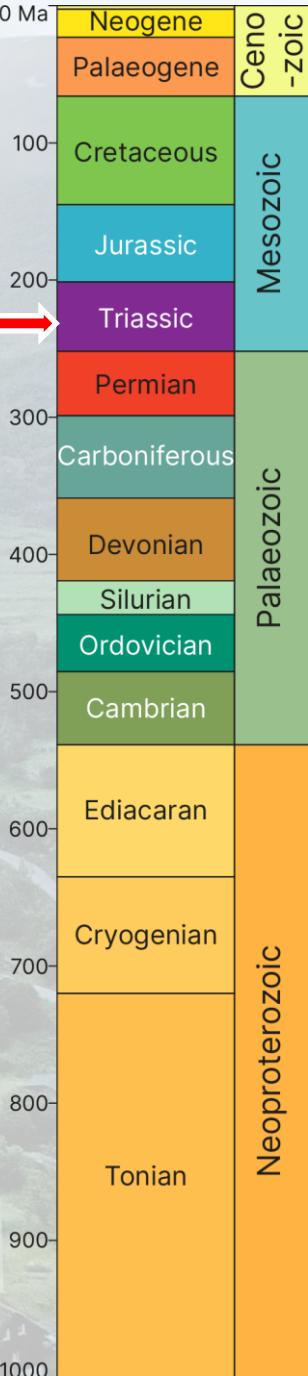




Desert sandstone | Bay of Fundy, Nova Scotia, Canada



Desert sandstone | Bay of Fundy, Nova Scotia, Canada



Desert sandstone | Scotland



Tropical Ireland | Triassic

