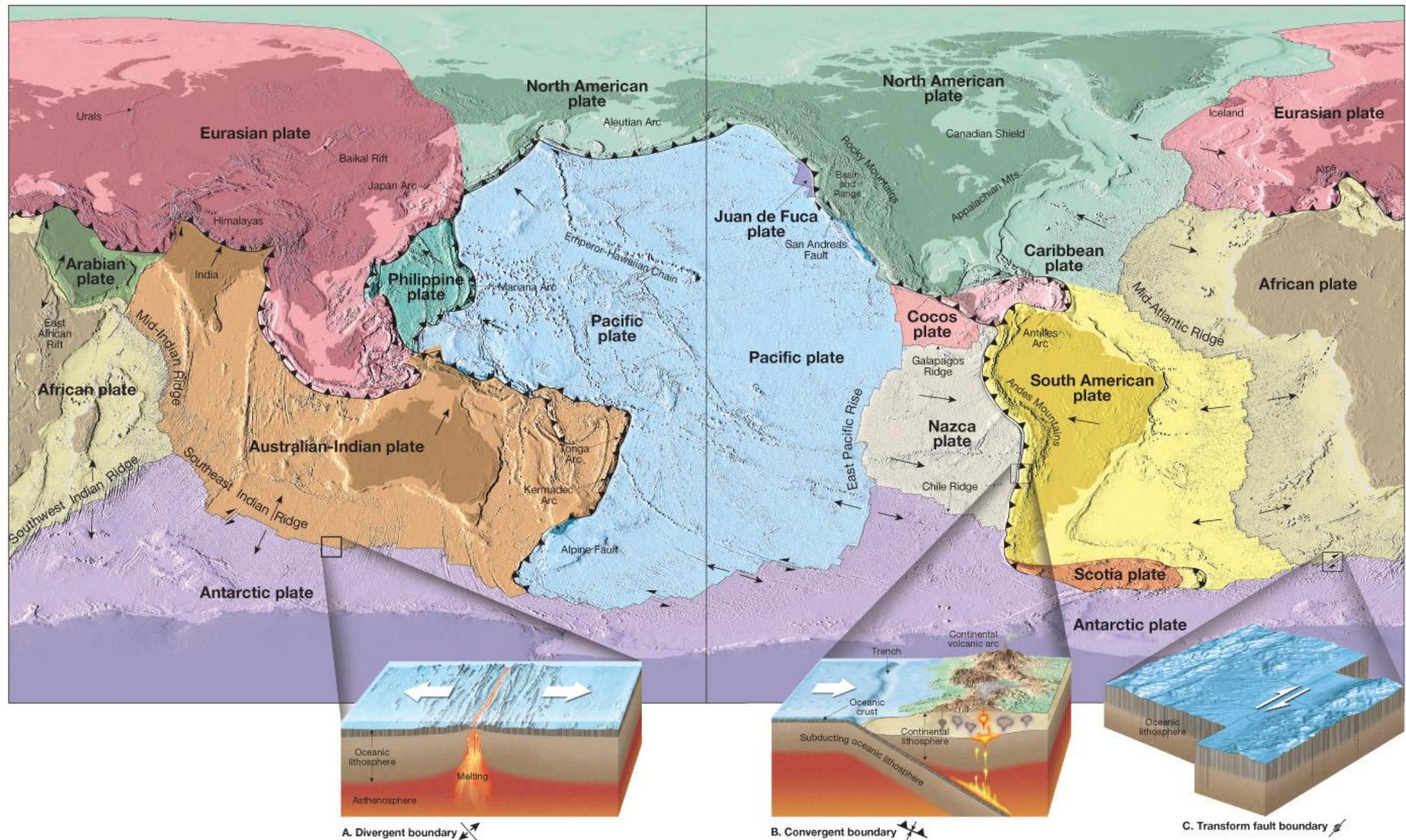


A wide-angle photograph of a fjord at sunset. The sky is filled with soft, warm orange and yellow hues, transitioning into cooler blues and purples. The fjord's water reflects these colors. On either side of the narrow inlet are steep, rugged mountains covered in dense green forests. In the foreground, a winding road cuts through the greenery, leading towards the town at the base of the fjord. The overall atmosphere is serene and majestic.

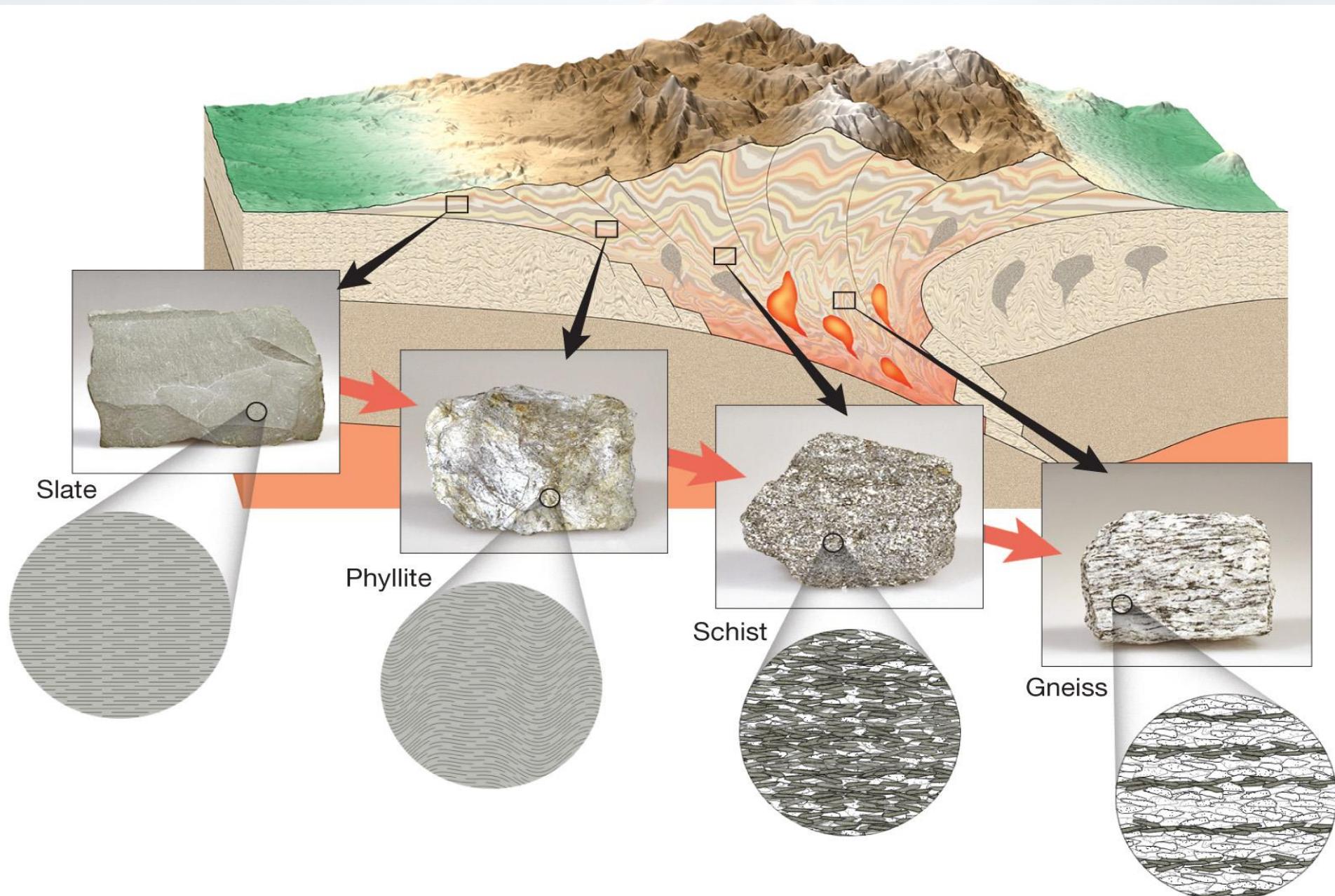
GY4051 Earth Science and Society

The Rise and Fall of the Caledonian Mountains













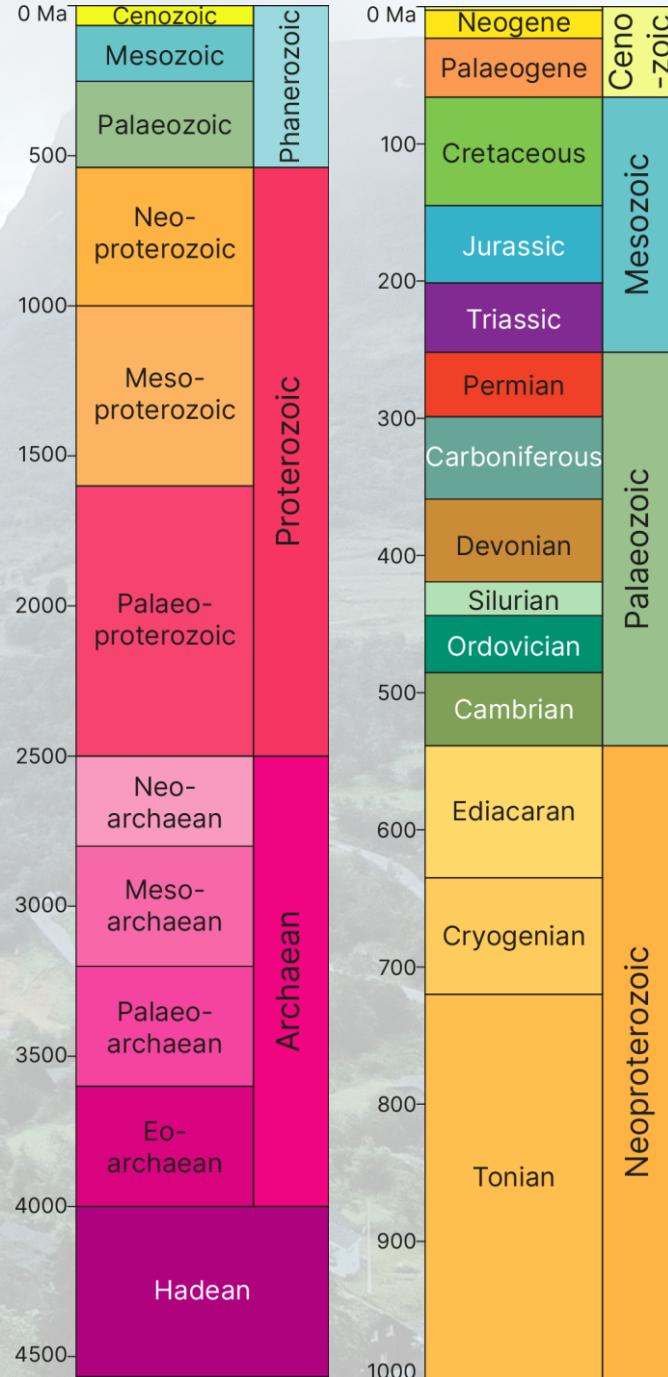
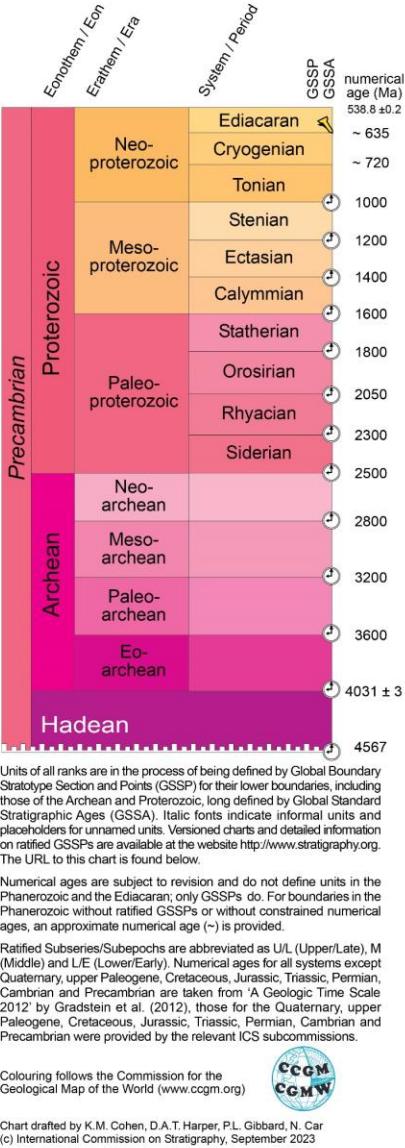
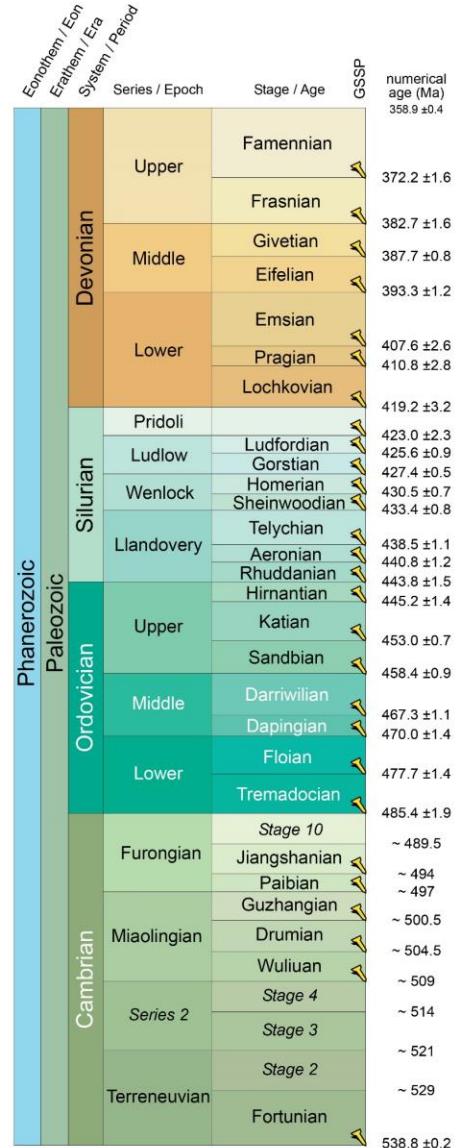
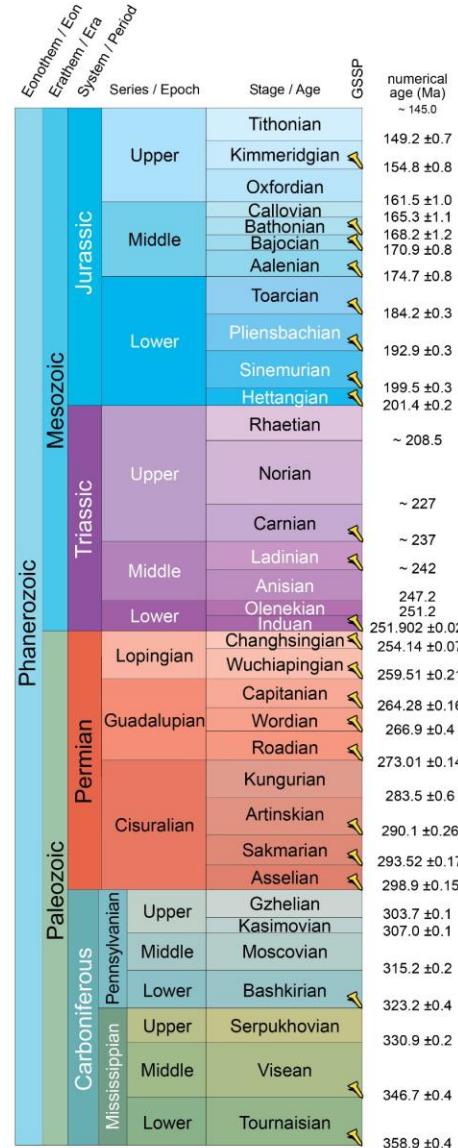
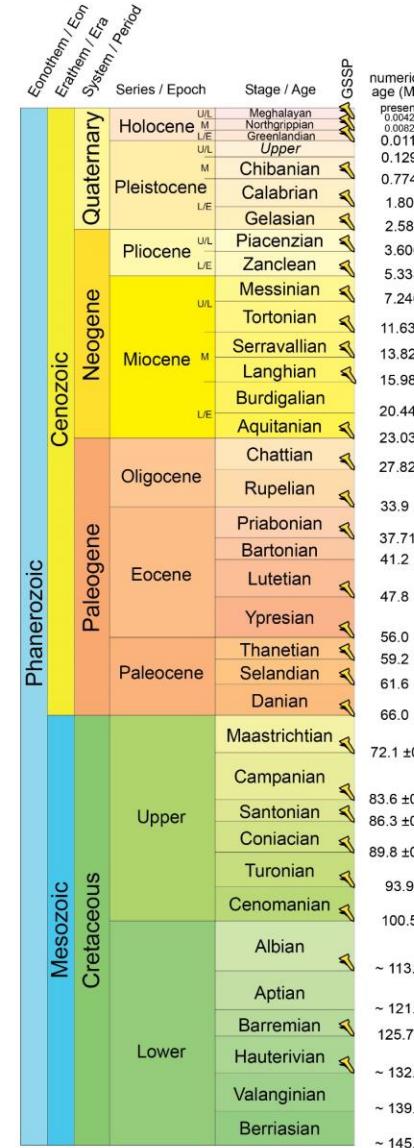


INTERNATIONAL CHRONOSTRATIGRAPHIC CHART

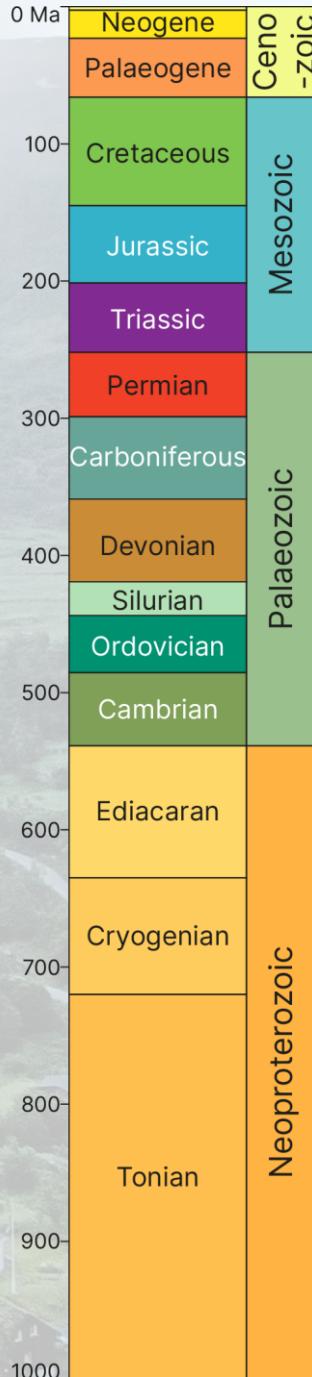
www.stratigraphy.org

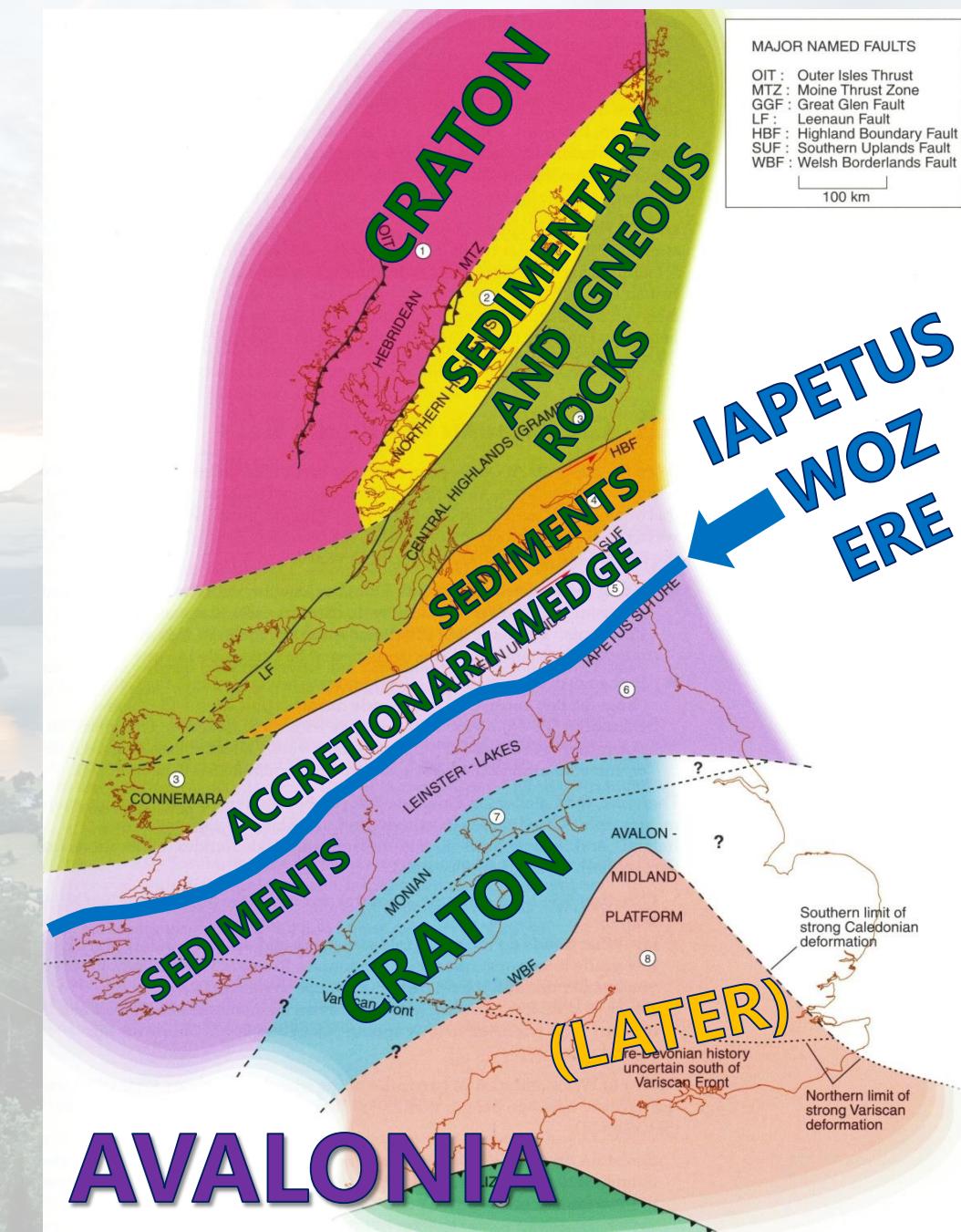
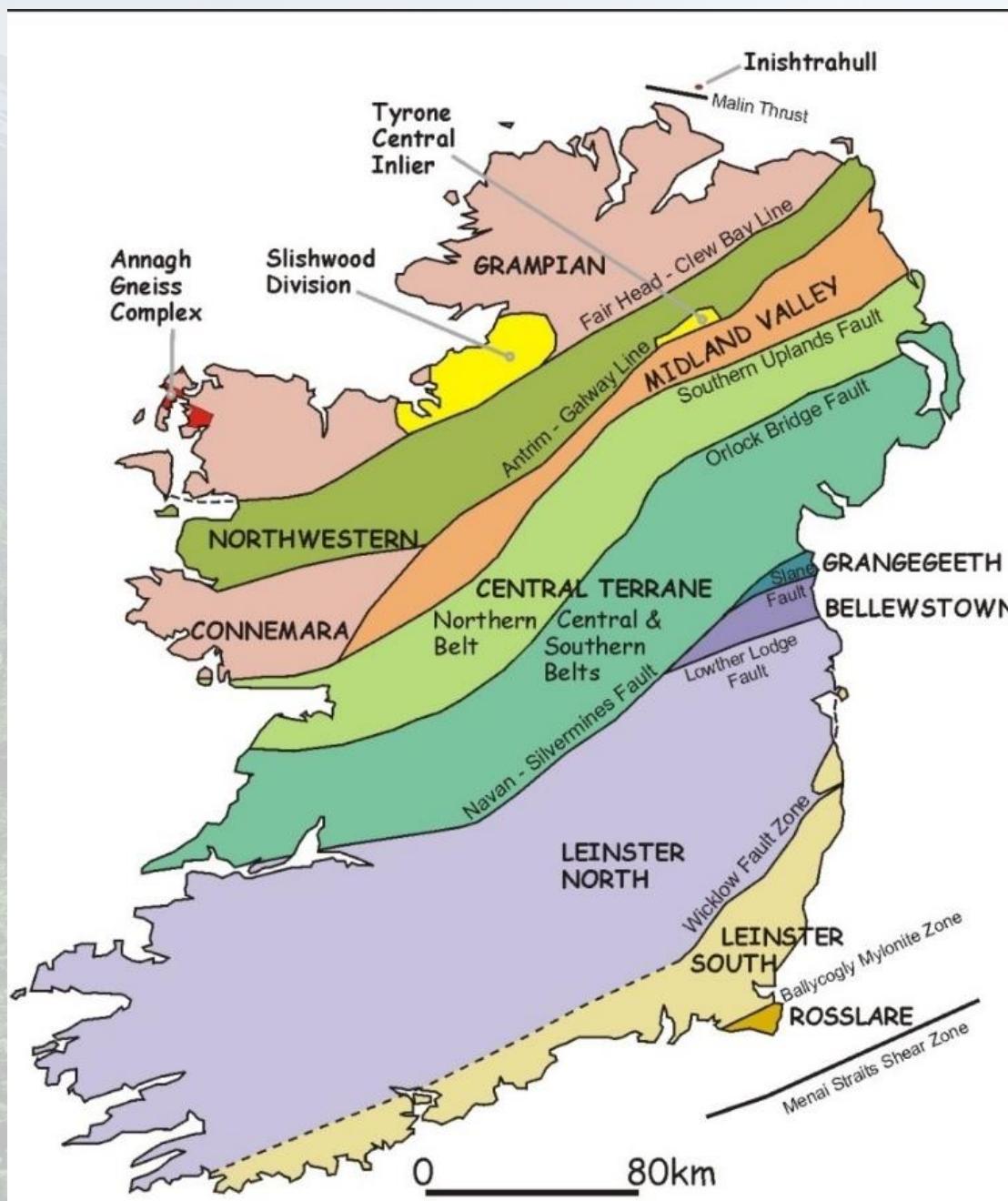
International Commission on Stratigraphy

v 2023/09



GY4051







AVALONIA

SUBDUCTION ZONE

VOLCANIC ISLAND ARC

OCEANIC SPREADING RIDGE

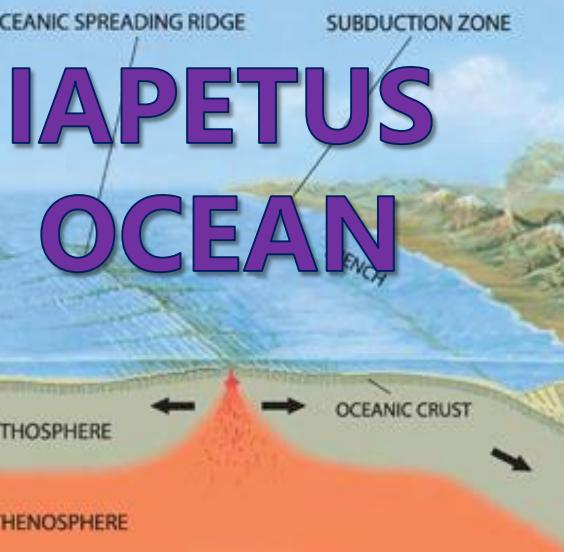
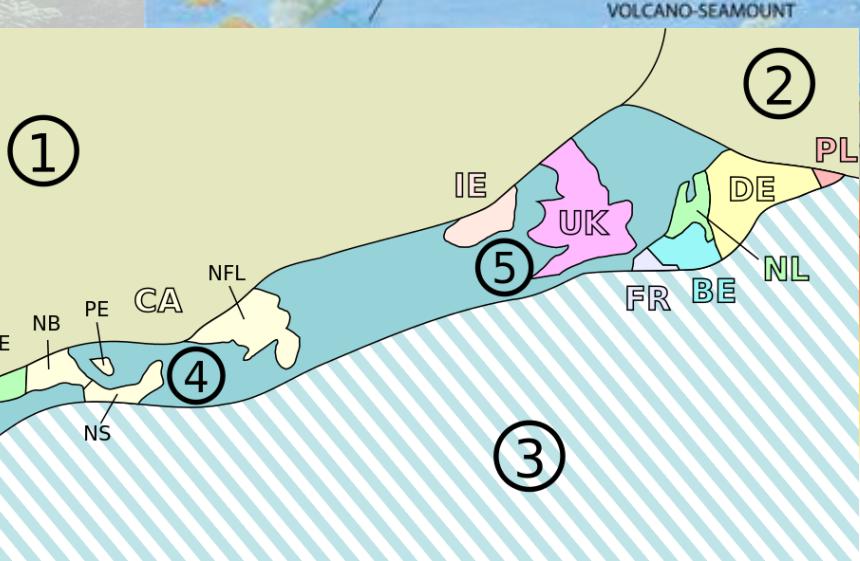
SUBDUCTION ZONE

IAPETUS OCEAN

LAURENTIA

VOLCANIC ARC

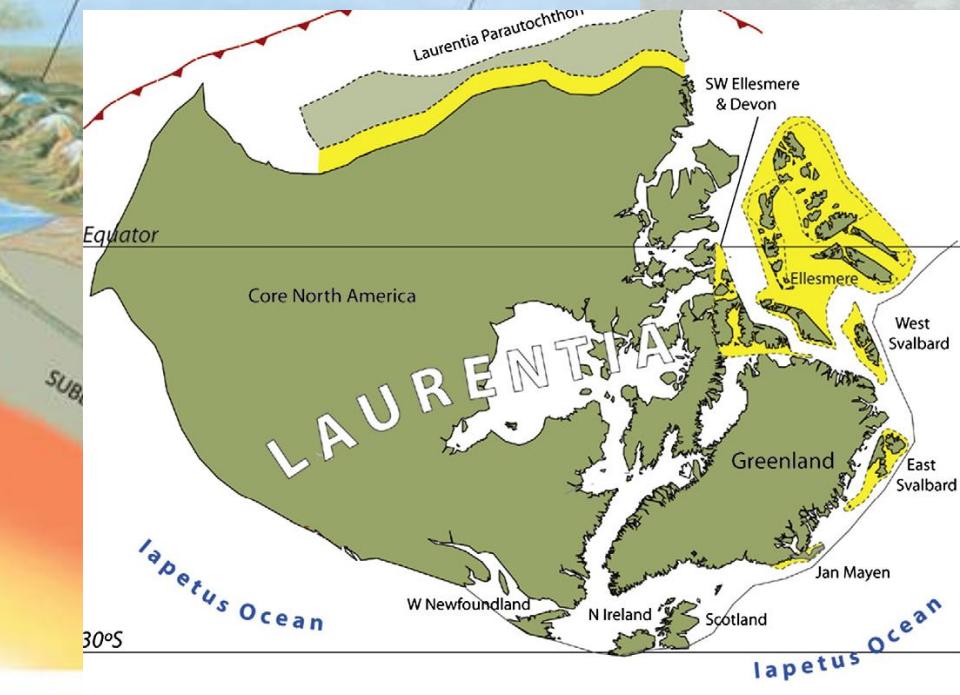
RIFT ZONE

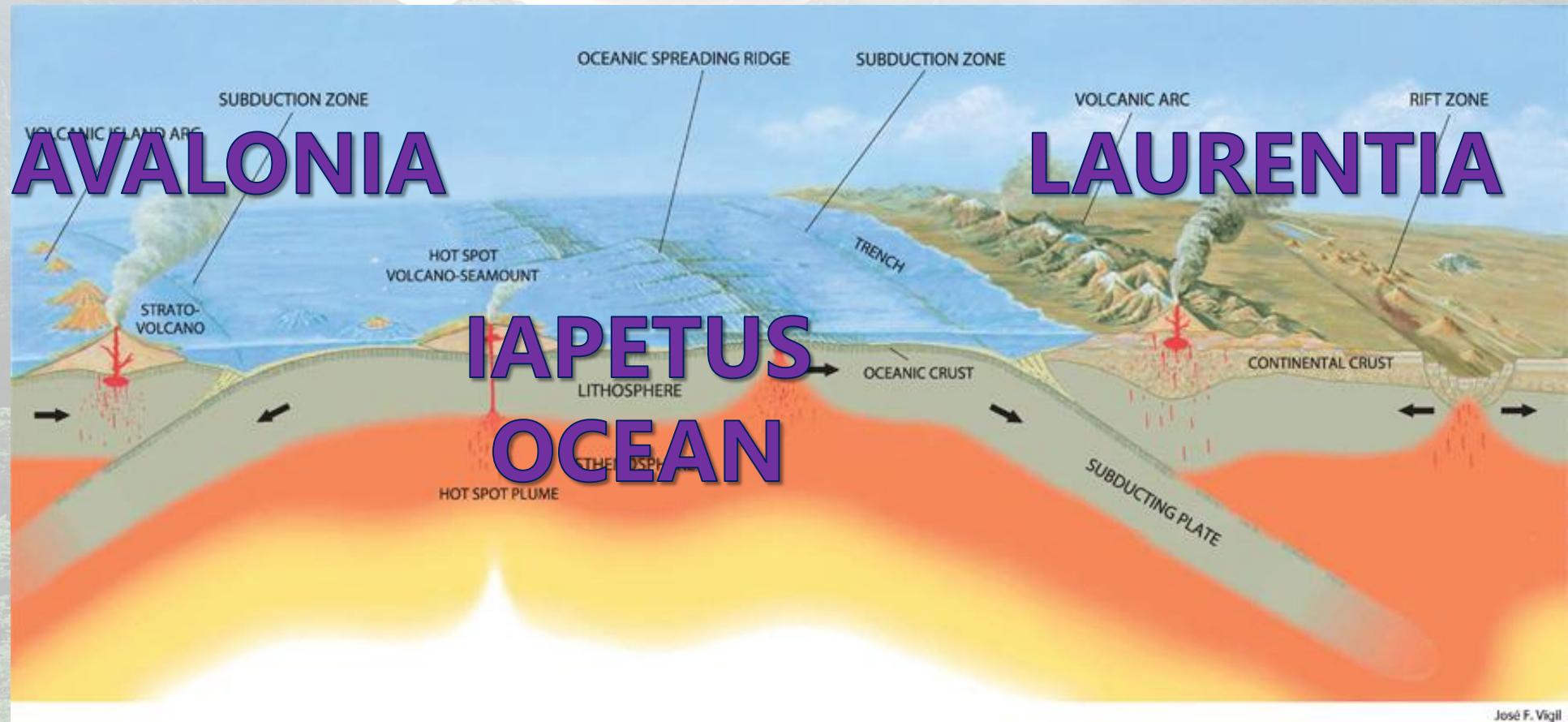


LAURENTIA

VOLCANIC ARC

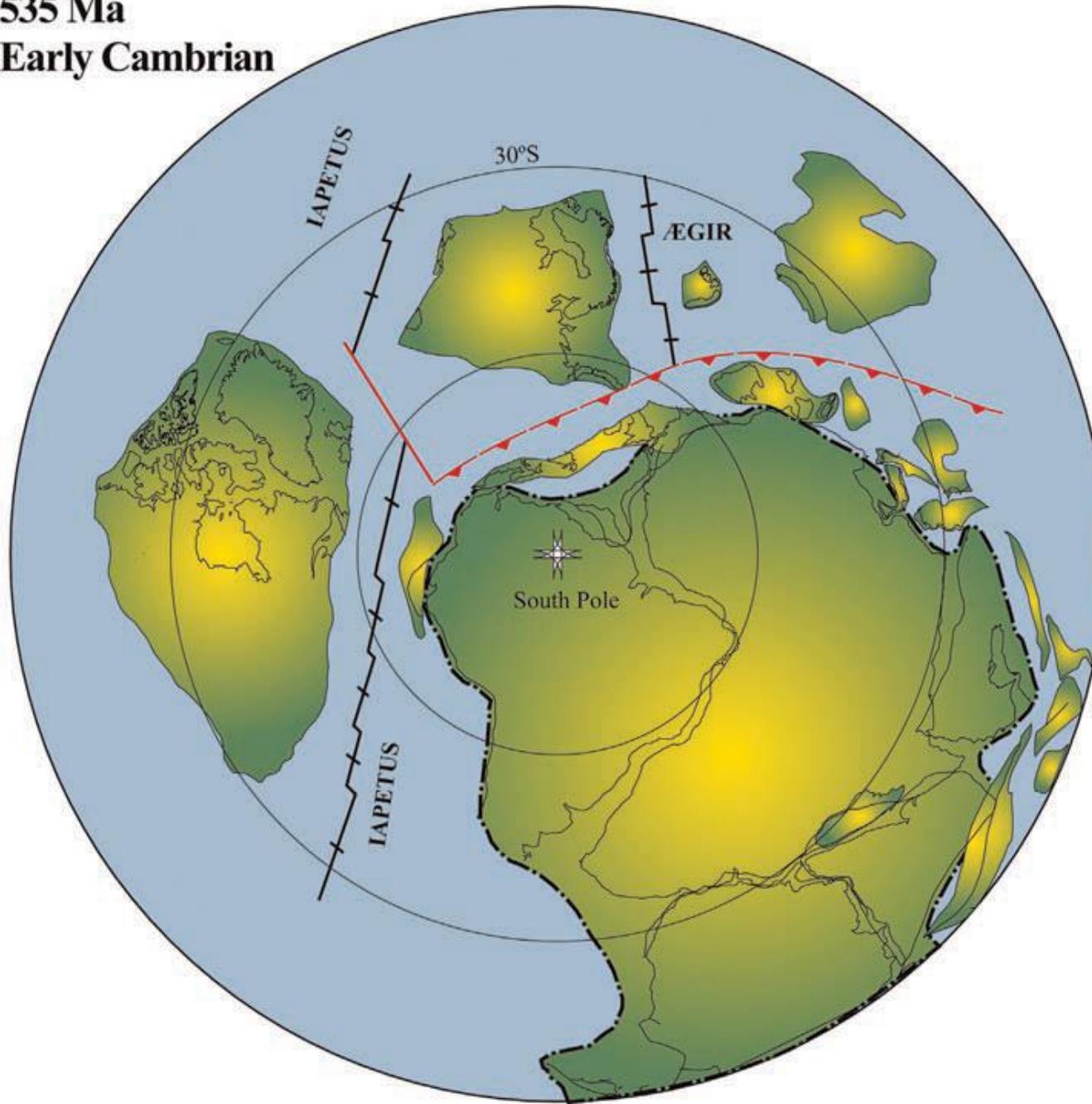
RIFT ZONE





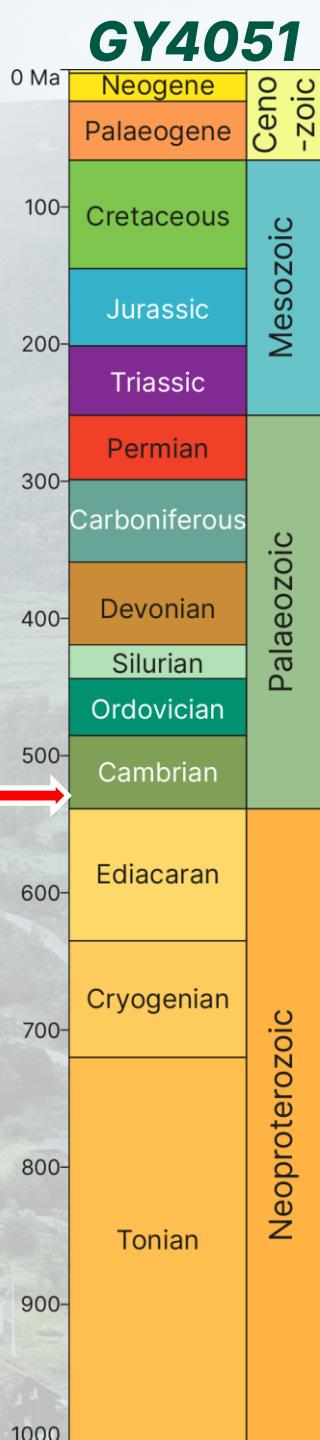
535 Ma

Early Cambrian



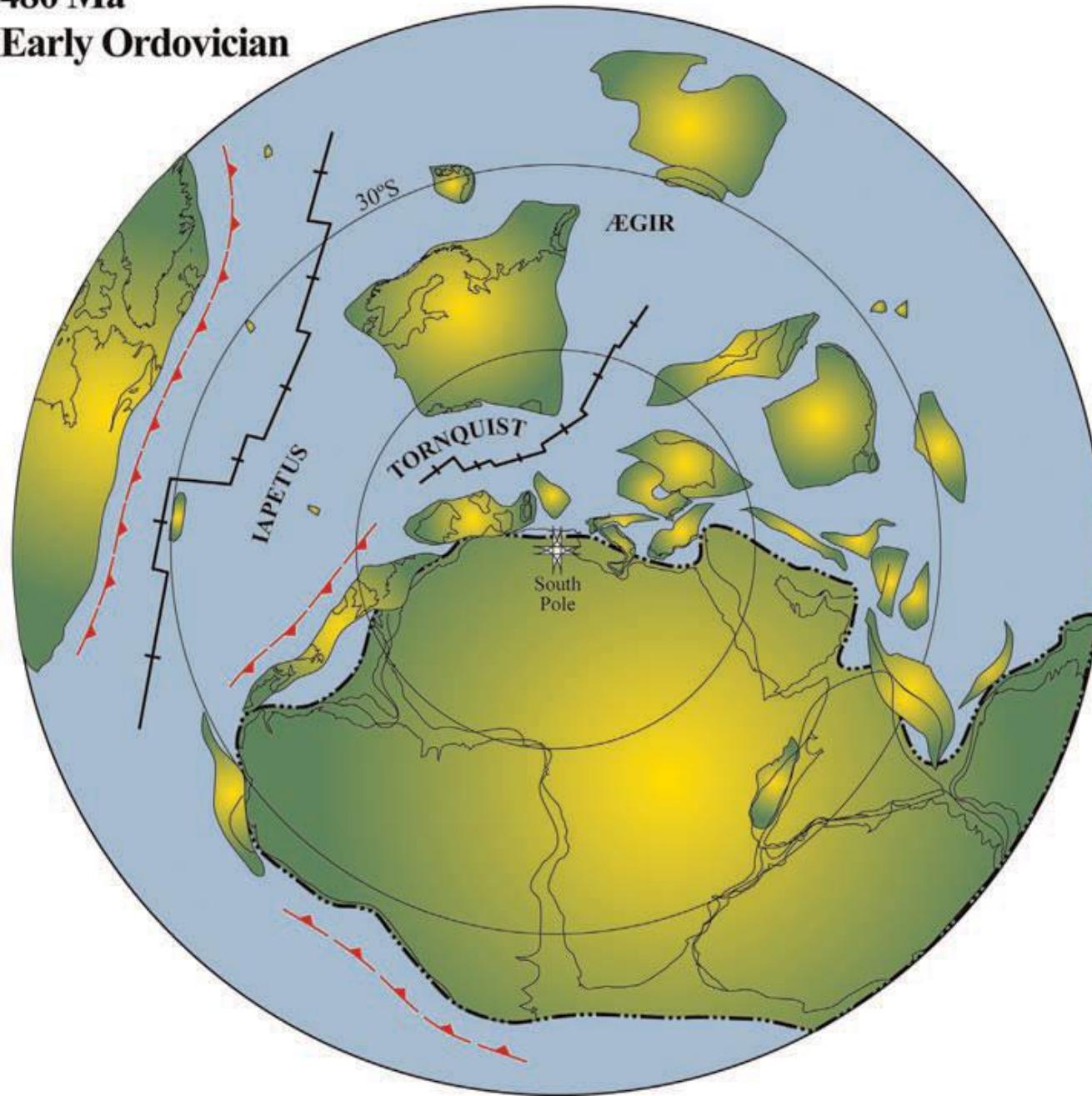
Rifting of Rodinia

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



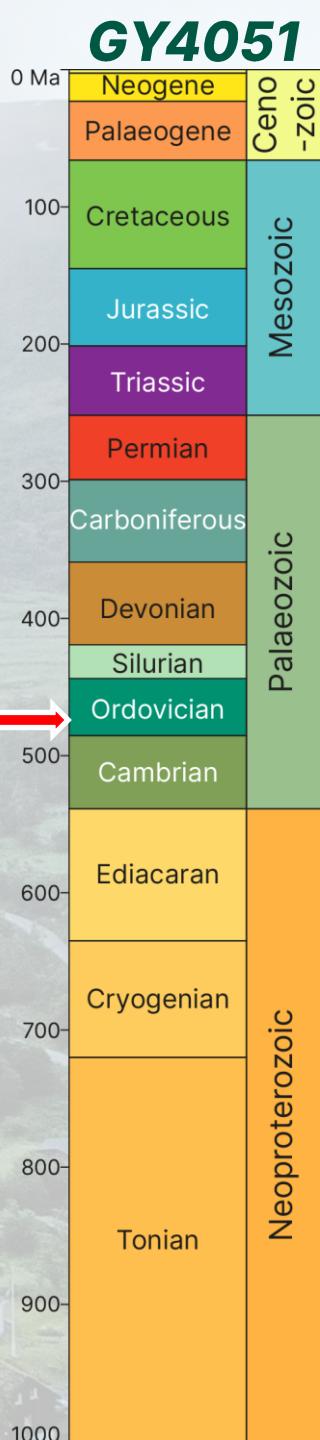
480 Ma

Early Ordovician



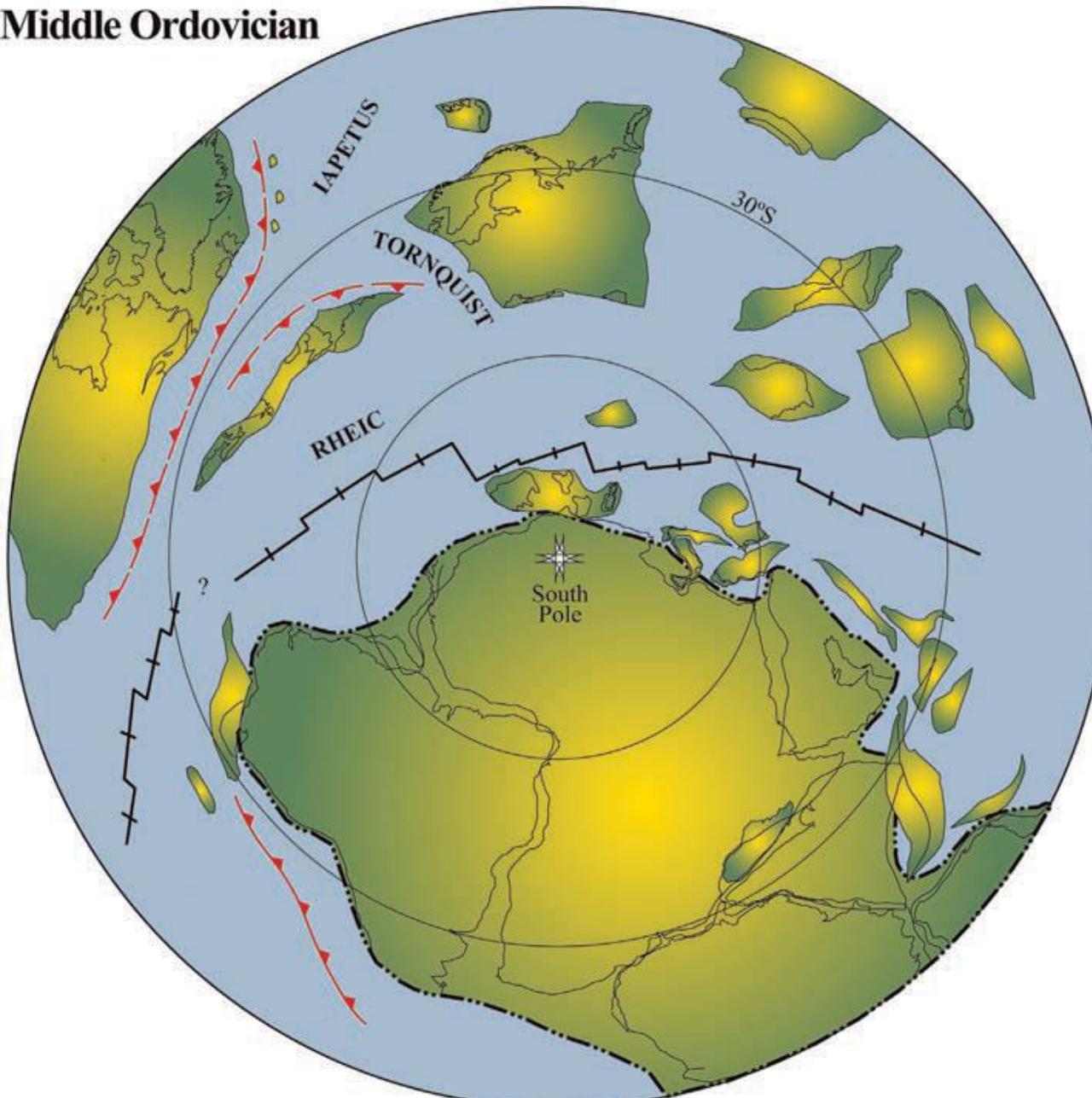
Iapetus Ocean starts to close

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



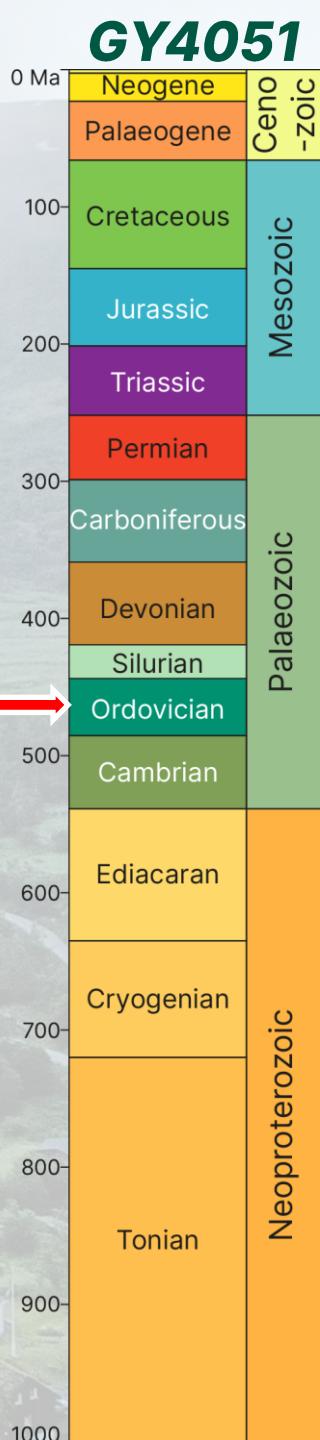
460 Ma

Middle Ordovician



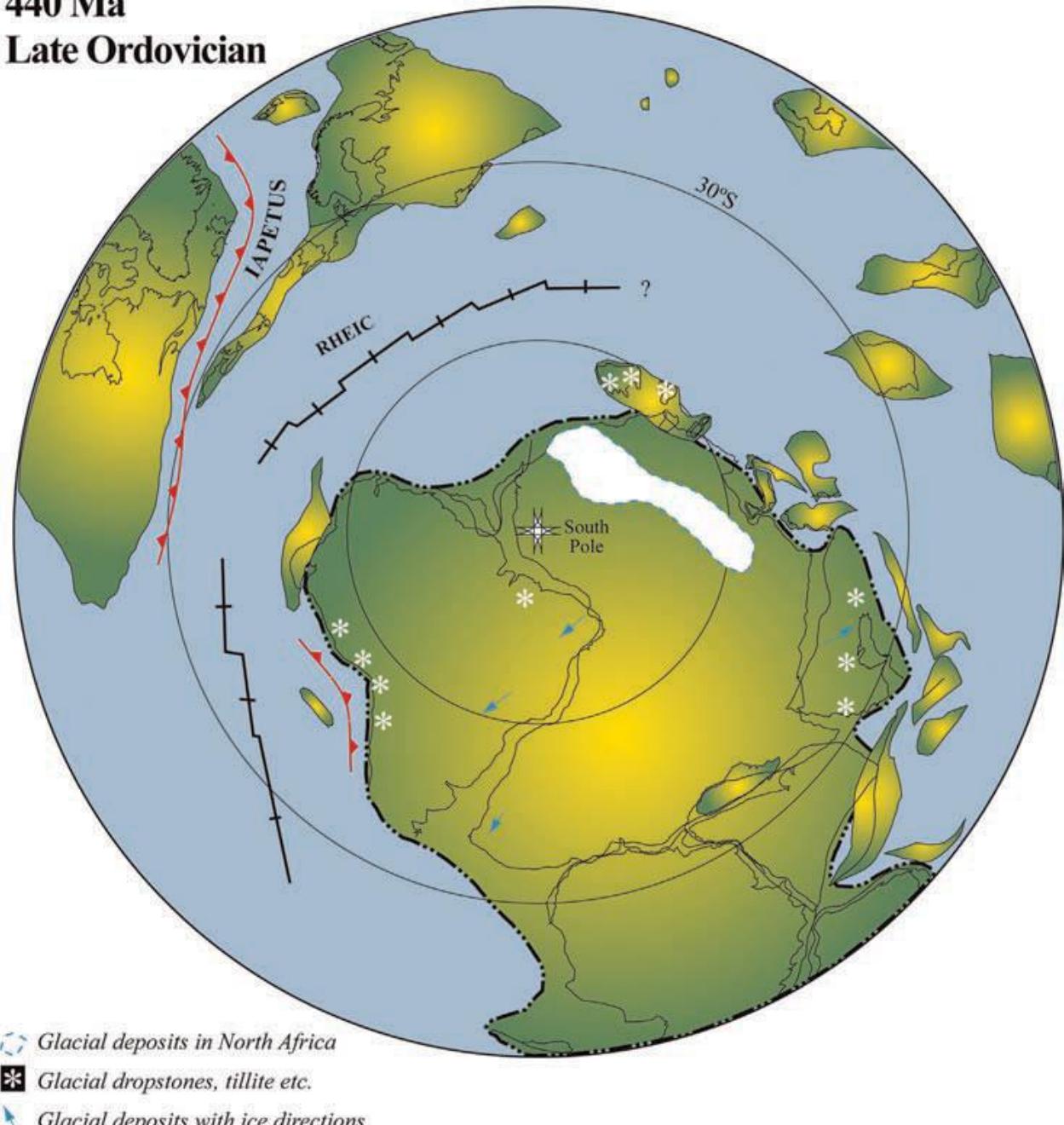
Lapetus Ocean continues to close

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



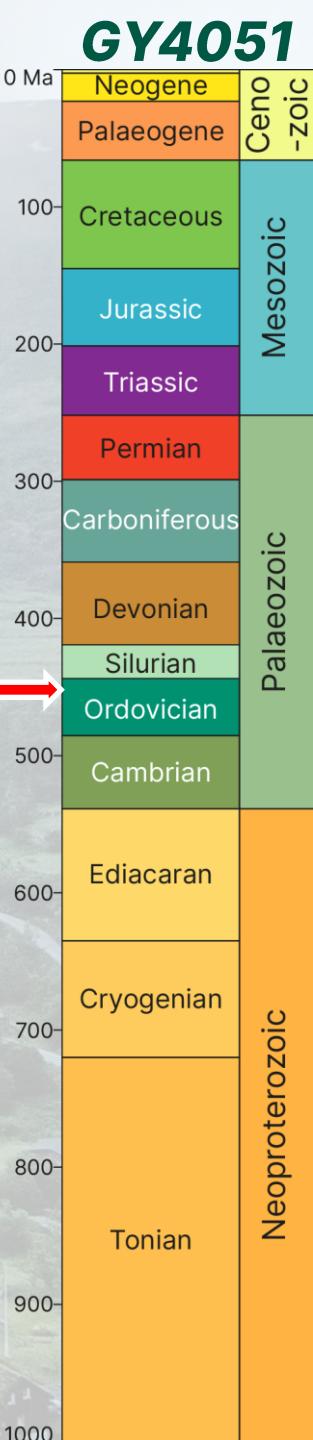
440 Ma

Late Ordovician



Iapetus Ocean nears the end

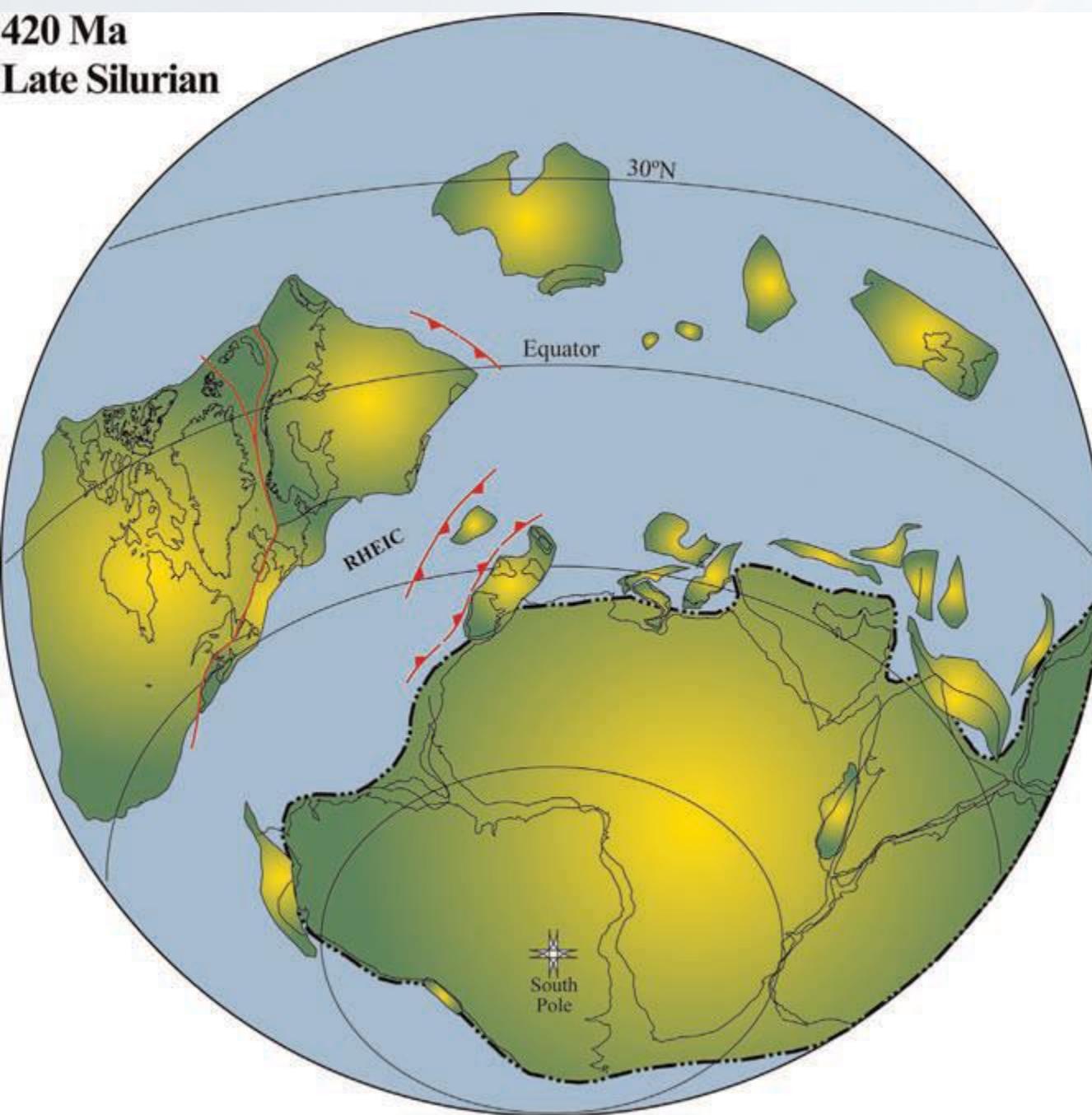
- Two halves of Britain and Ireland very close
- Baltica starts to collide with Eastern Avalonia
- Rheic Ocean widening



Rise and Fall of The Caledonian Mountains | Late Silurian

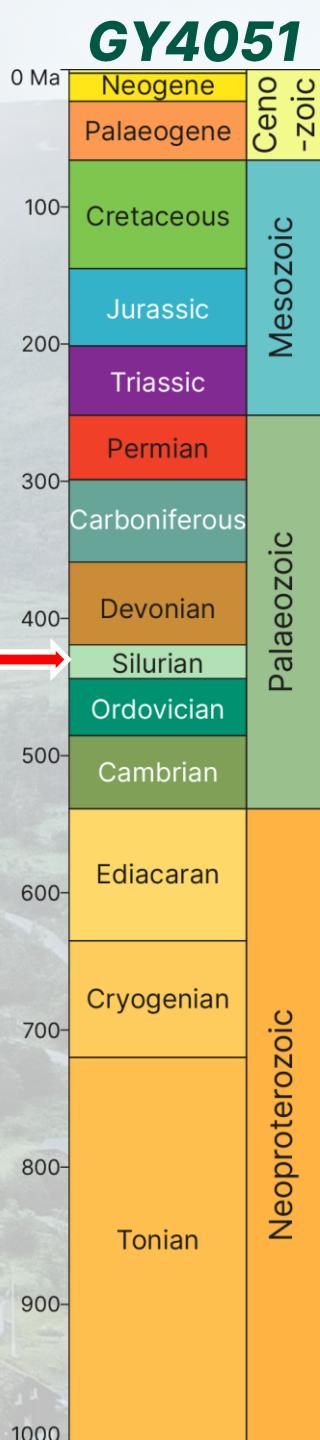
420 Ma

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



Rise and Fall of The Caledonian Mountains | Evolution of Ireland

GY4051

0 Ma
Neogene

Palaeogene

Ceno -zoic

100
Cretaceous

200
Jurassic

300
Triassic

400
Permian

500
Carboniferous

600
Devonian

700
Silurian

800
Ordovician

900
Cambrian

1000
Ediacaran

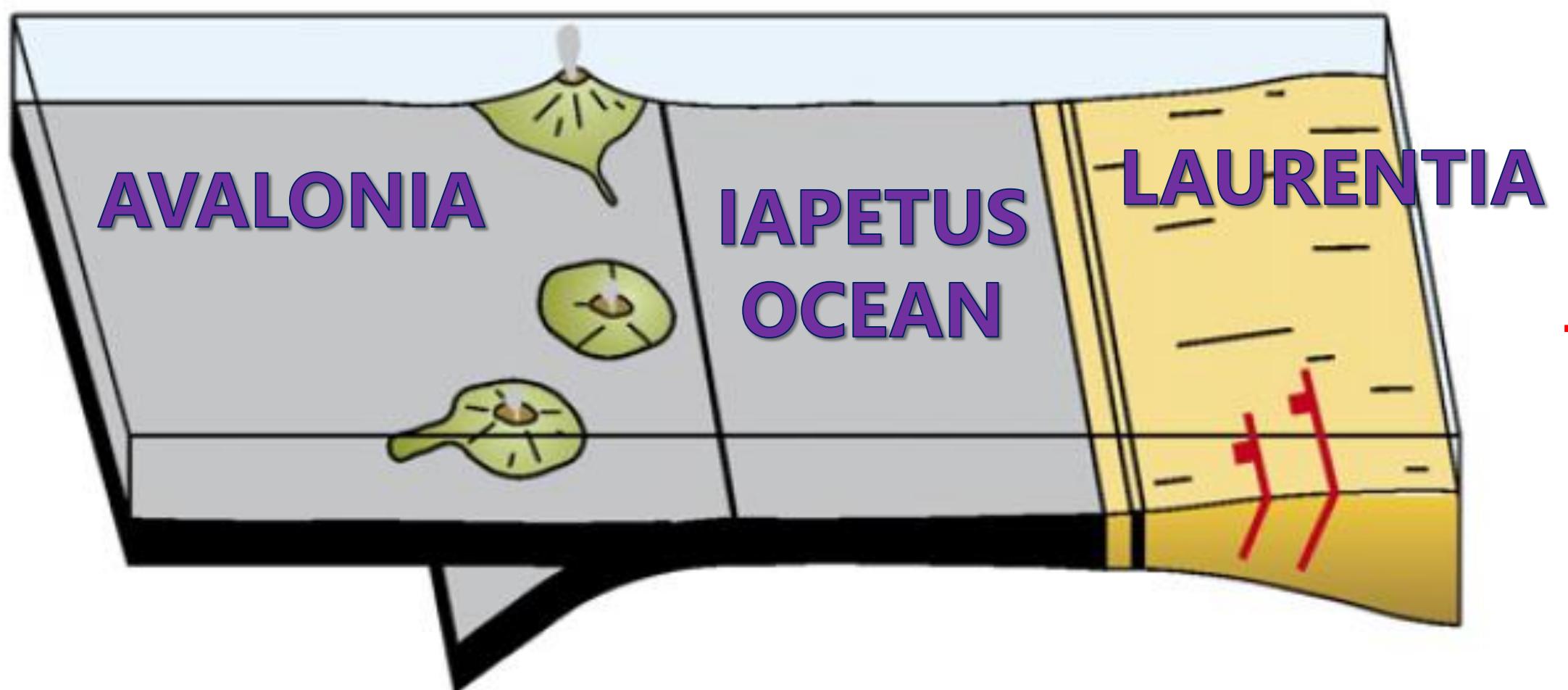
1100
Cryogenian

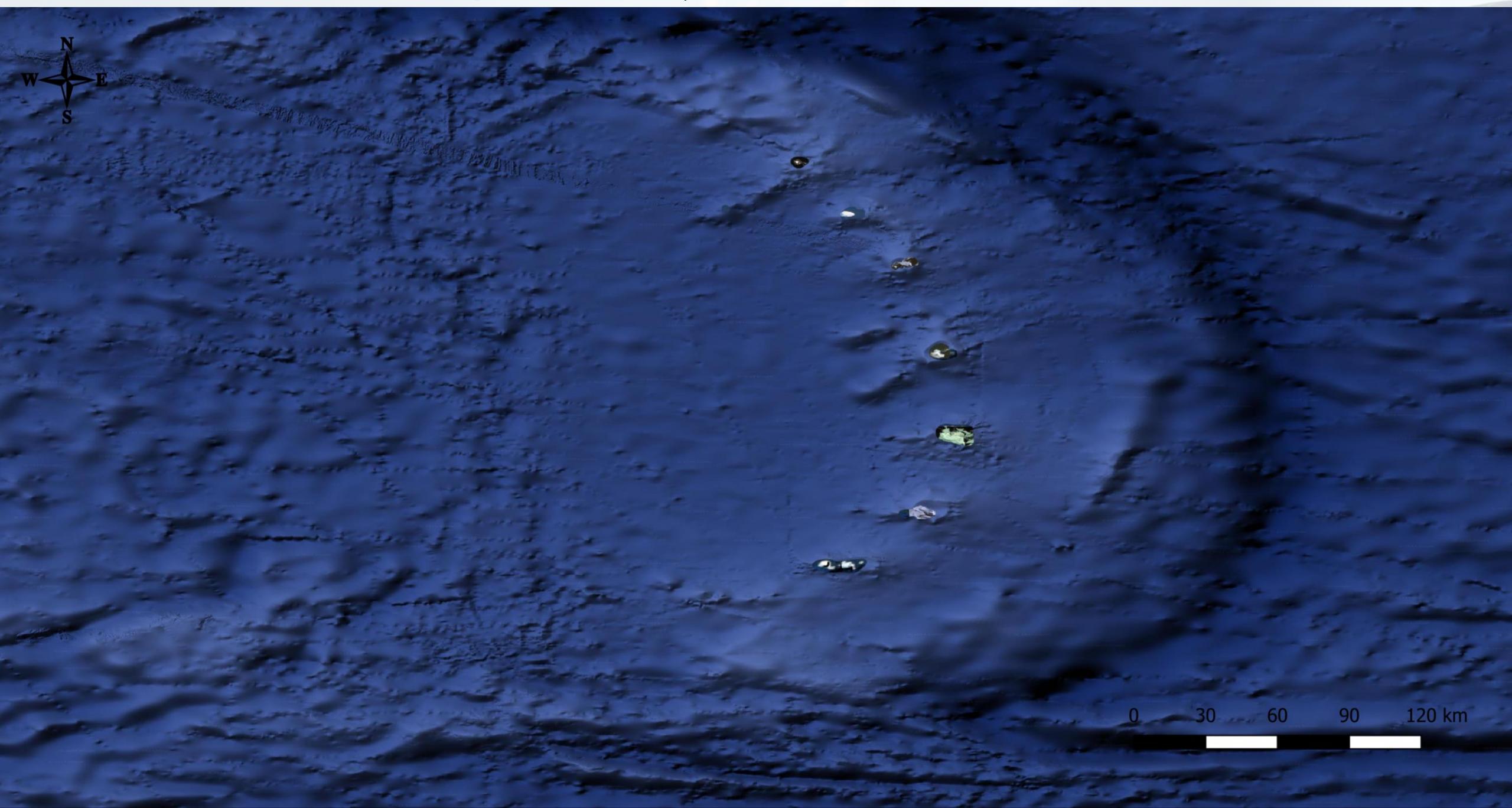
1200
Tonian

Mesozoic

Palaeozoic

Neoproterozoic





Rise and Fall of The Caledonian Mountains | Evolution of Ireland

GY4051

0 Ma
Neogene

Palaeogene

Ceno -zoic

100
Cretaceous

200
Jurassic

300
Triassic

400
Permian

500
Carboniferous

600
Devonian

700
Silurian

800
Ordovician

900
Cambrian

1000
Ediacaran

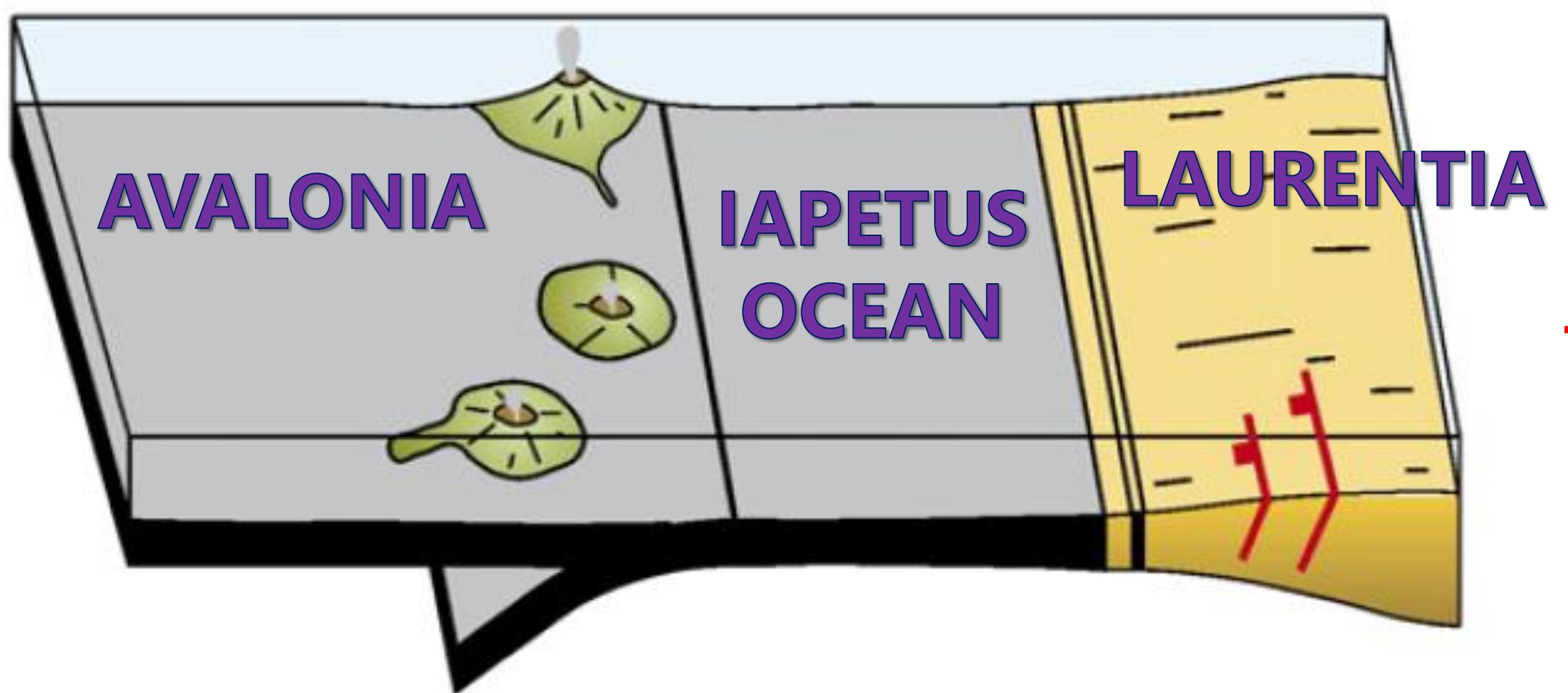
1100
Cryogenian

1200
Tonian

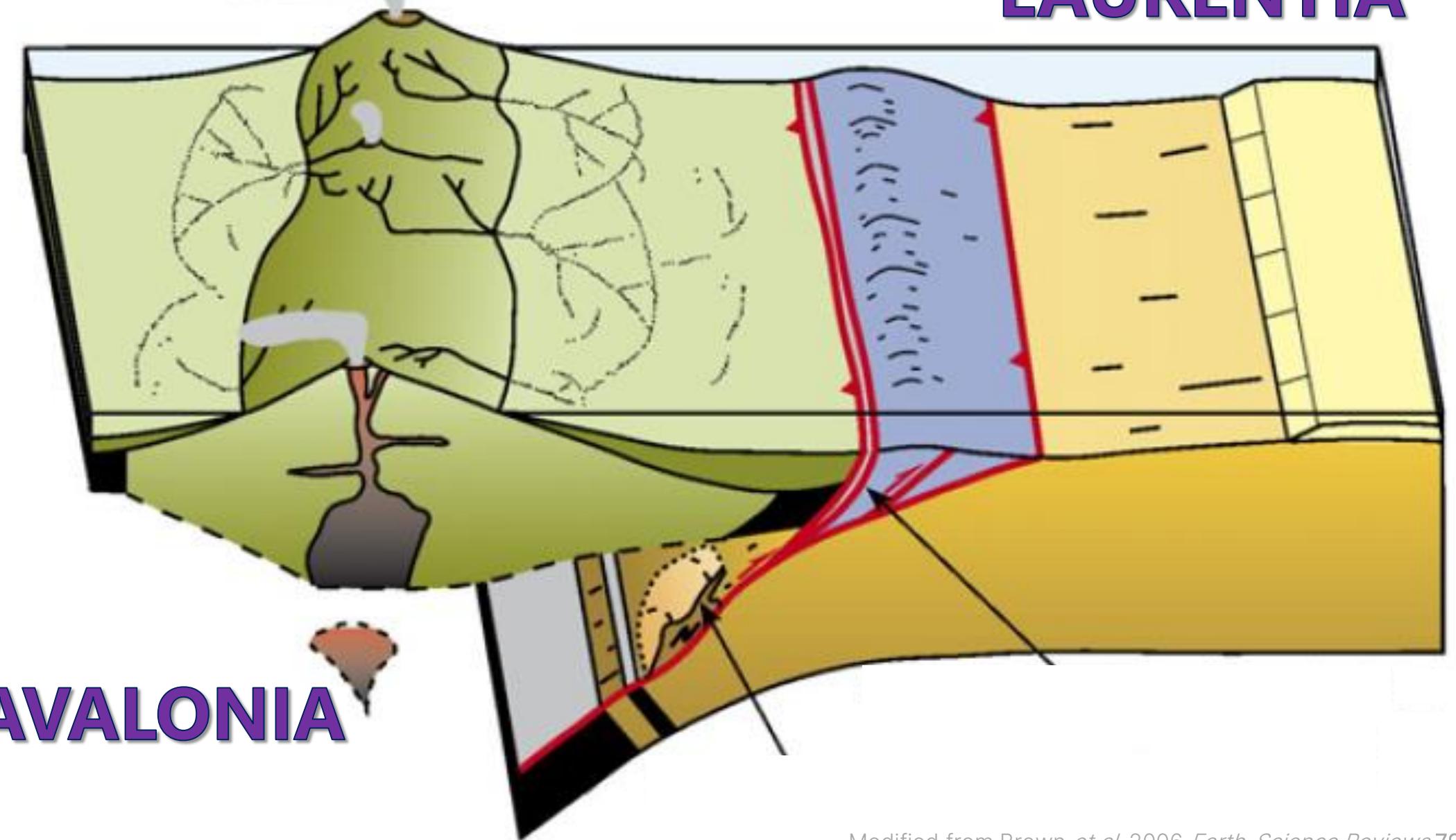
Mesozoic

Palaeozoic

Neoproterozoic



LAURENTIA



Rise and Fall of The Caledonian Mountains | The Dalradian Supergroup

GY4051

0 Ma
Neogene
Palaeogene
Cretaceous
Jurassic
Triassic
Permian
Carboniferous
Devonian
Silurian
Ordovician
Cambrian
Ediacaran
Cryogenian
Tonian

Ceno-zoic

100 Ma
Younger rocks
Dalradian Supergroup
Southern Highlands Group
Appin & Argyll Group
Grampian Group
Moine Supergroup
Basement (inc. Lewisian Gneiss)

200 Ma
Outer Isles Thrust
Moine Thrust Zone
Great Glen Fault
Leenaun Fault
Highland Boundary Fault
Southern Uplands Fault
Welsh Borderlands Fault

300 Ma
100 km

400 Ma
Hebridean
Northern Highlands
Central Highlands (Grampian)
Midland Valley
Southern Uplands
Tapetus Suture

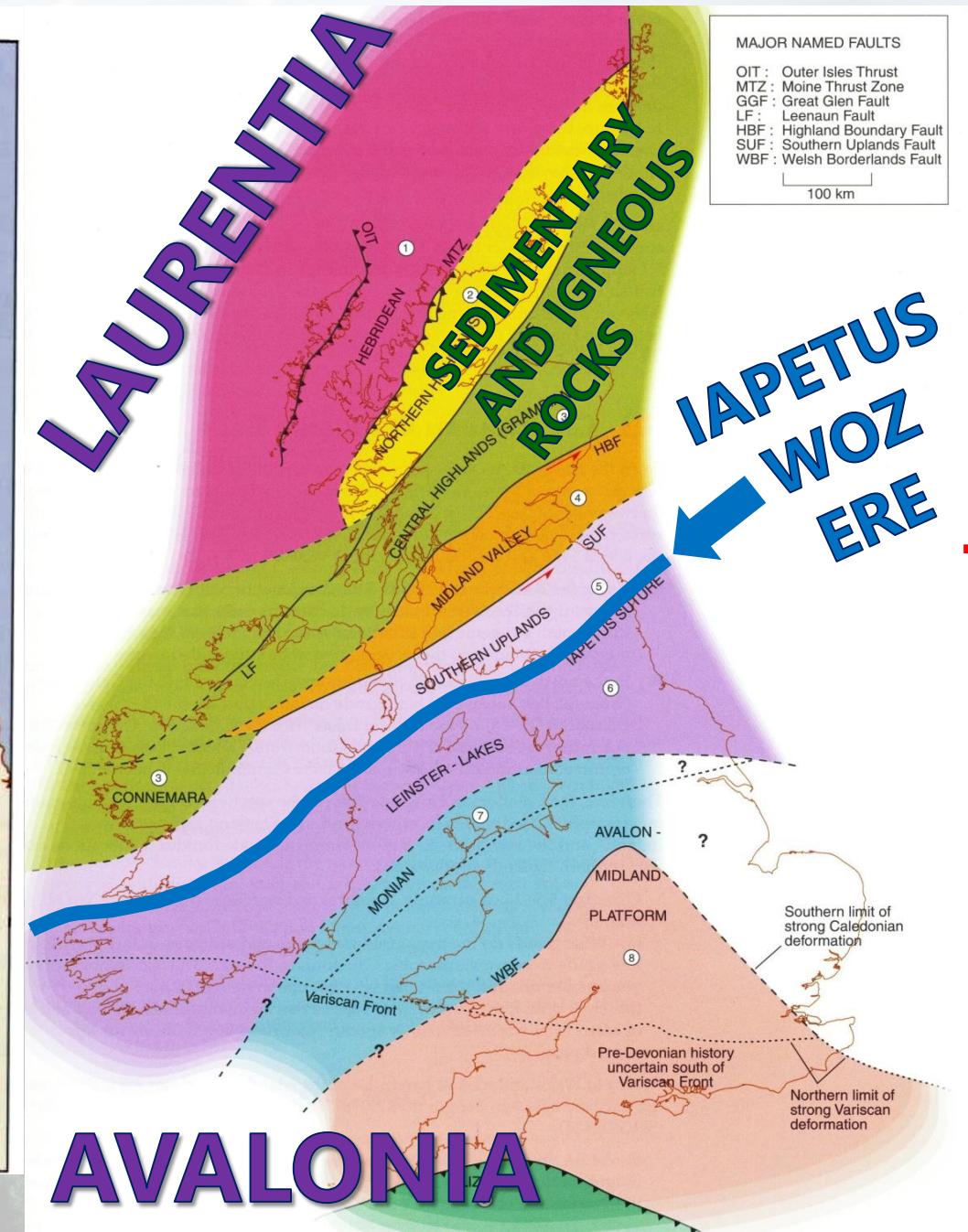
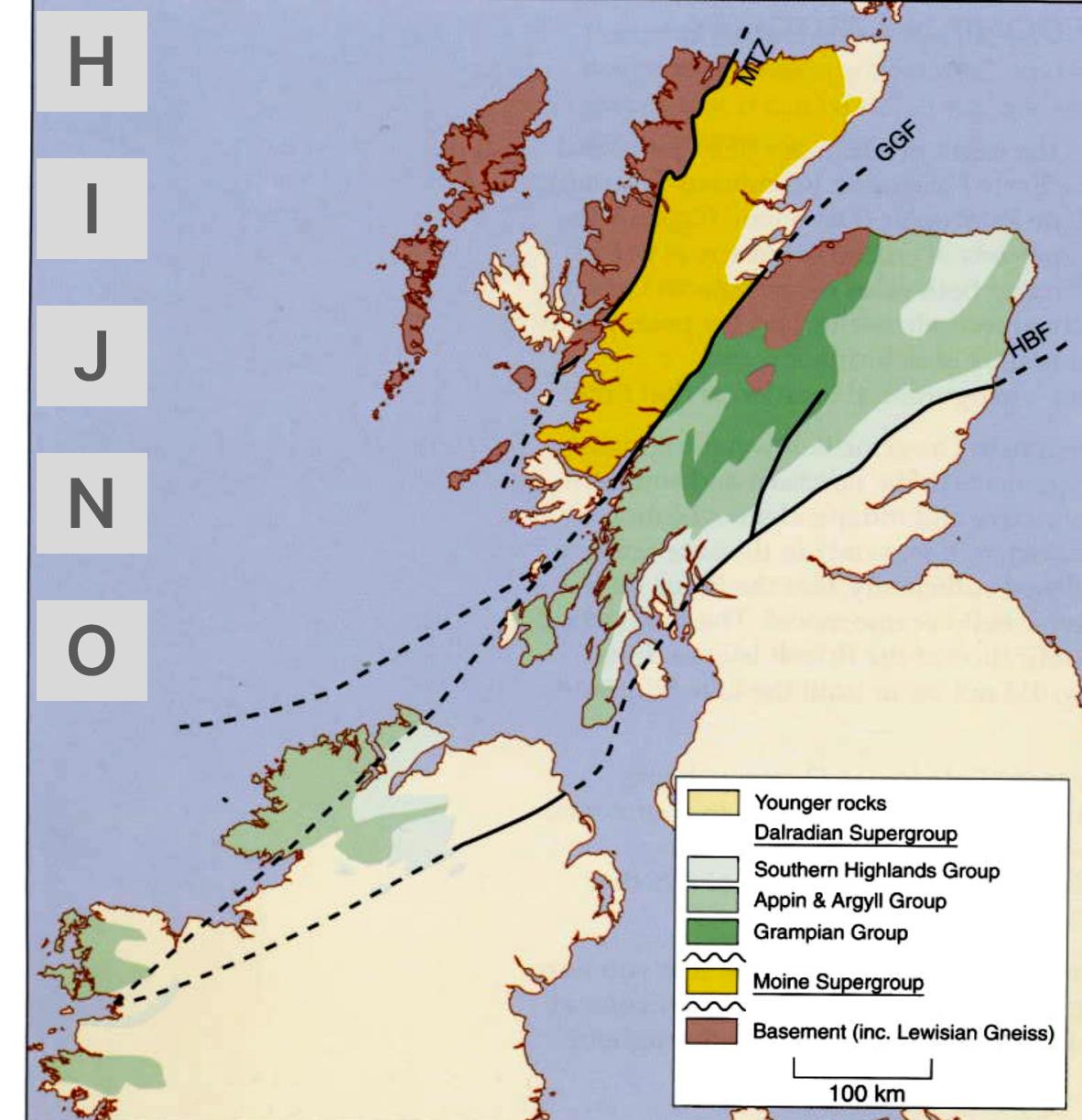
500 Ma
Connemara
Leinster - Lakes
Avalon -
Midland Platform
Variscan Front
Southern limit of strong Caledonian deformation
Pre-Devonian history uncertain south of Variscan Front
Northern limit of strong Variscan deformation

600 Ma
700 Ma
800 Ma
900 Ma
1000 Ma

Palaeozoic
Mesozoic

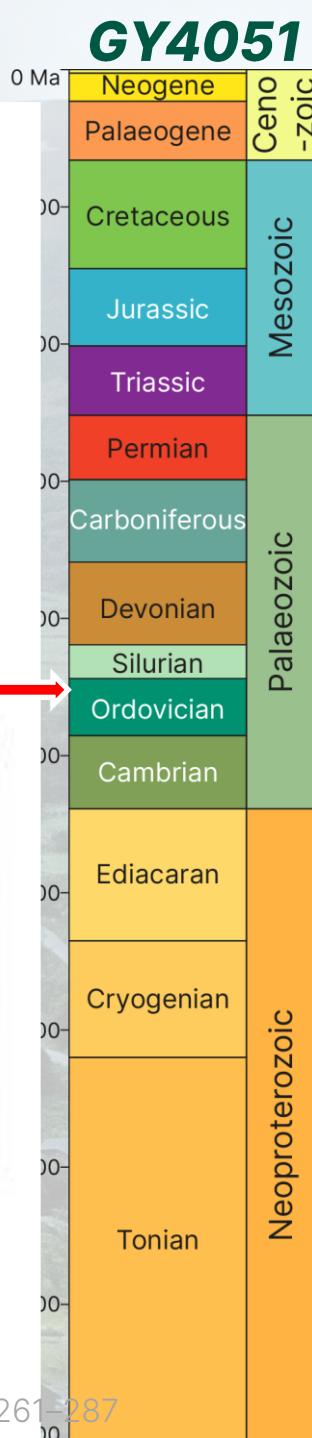
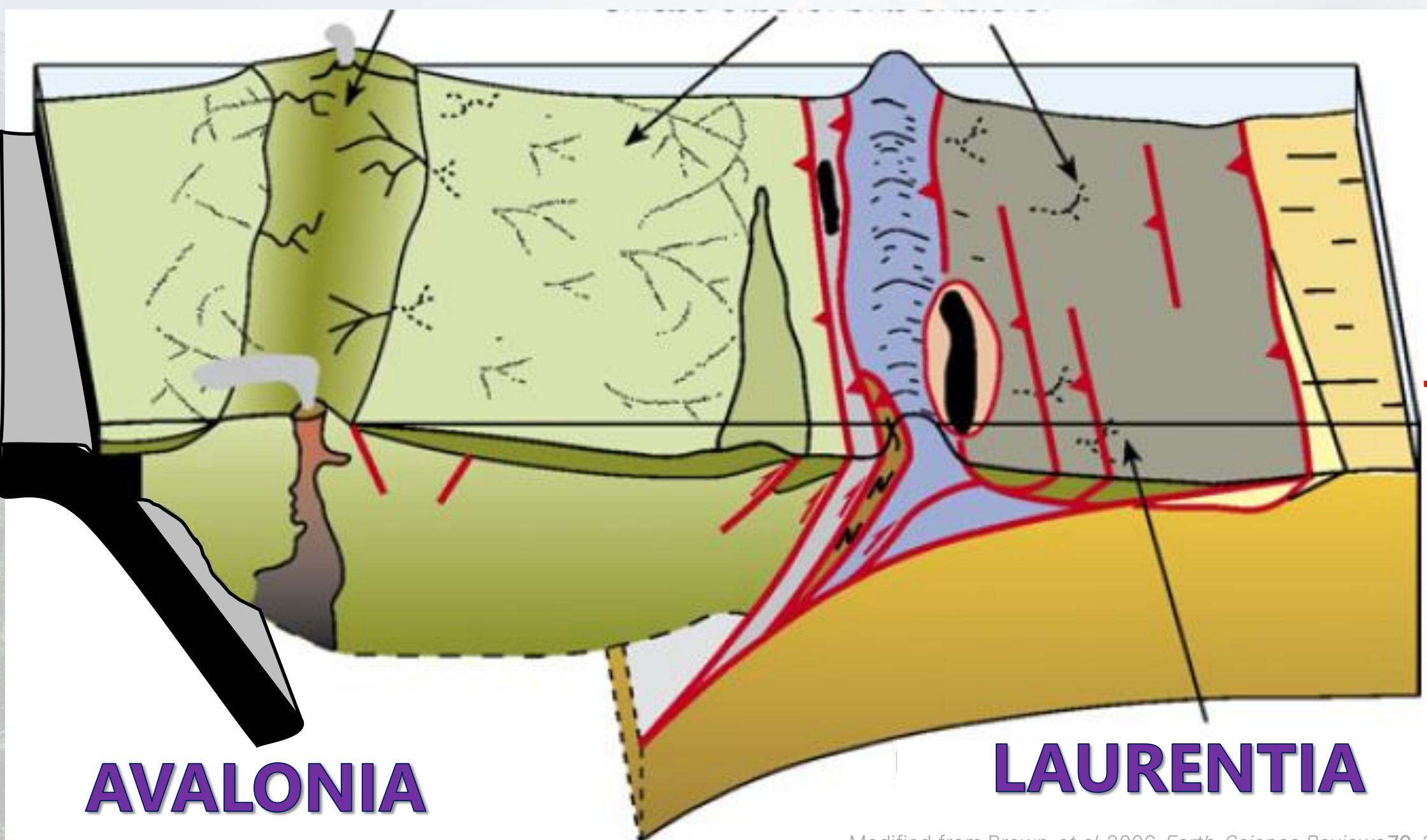
Palaeozoic

Neoproterozoic

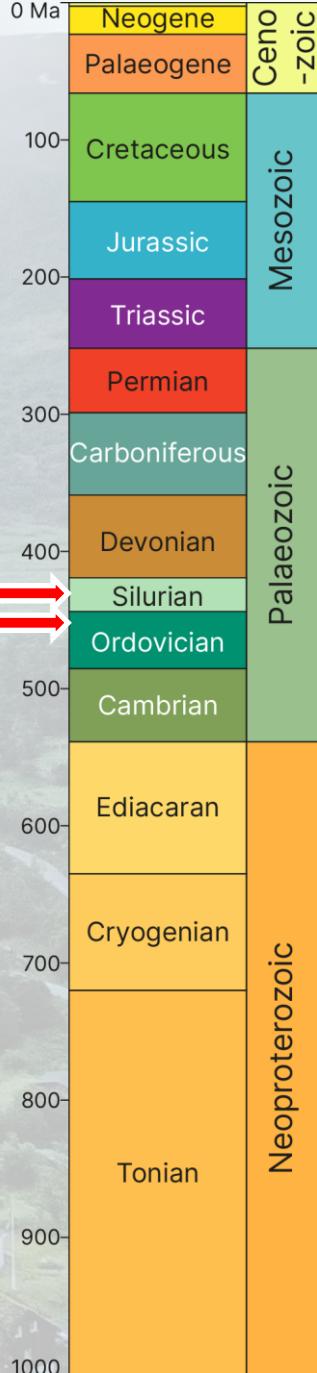
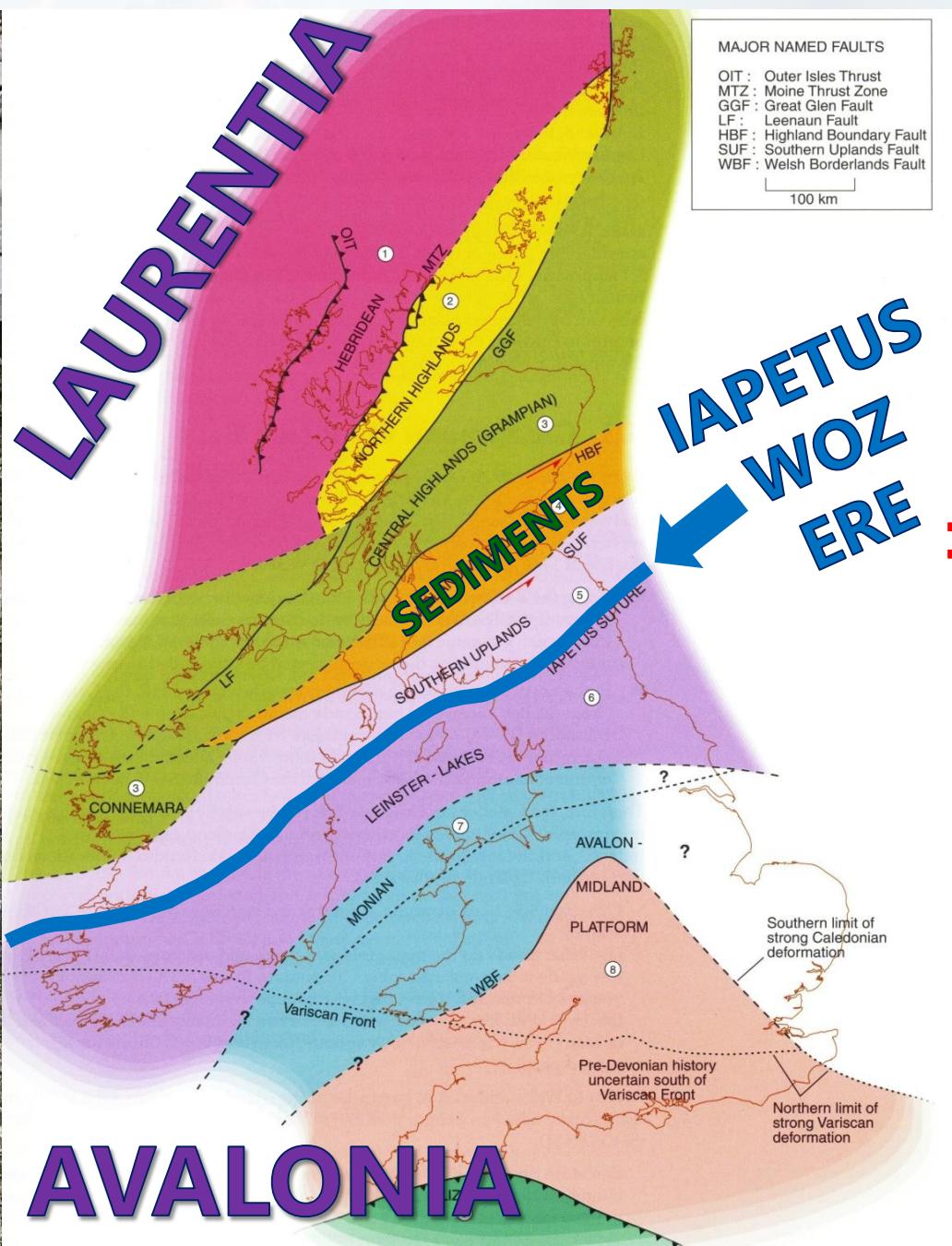


AVALONIA

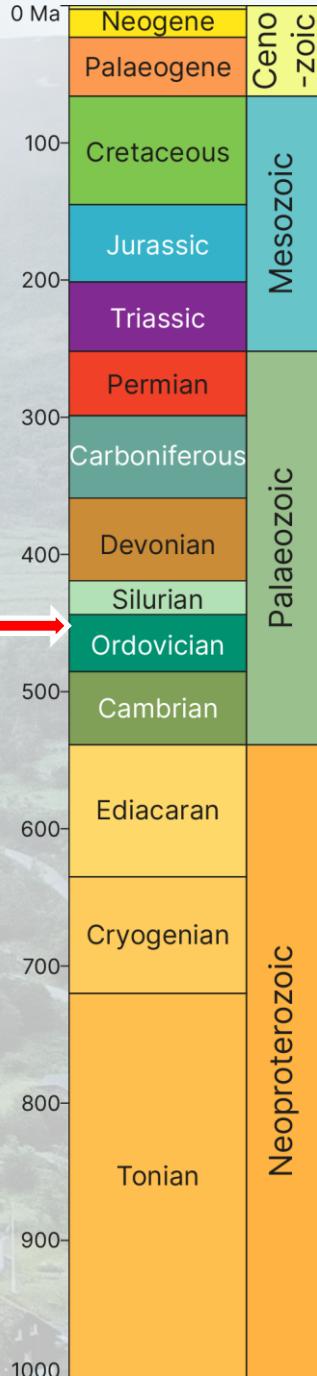
Rise and Fall of The Caledonian Mountains | Evolution of Ireland

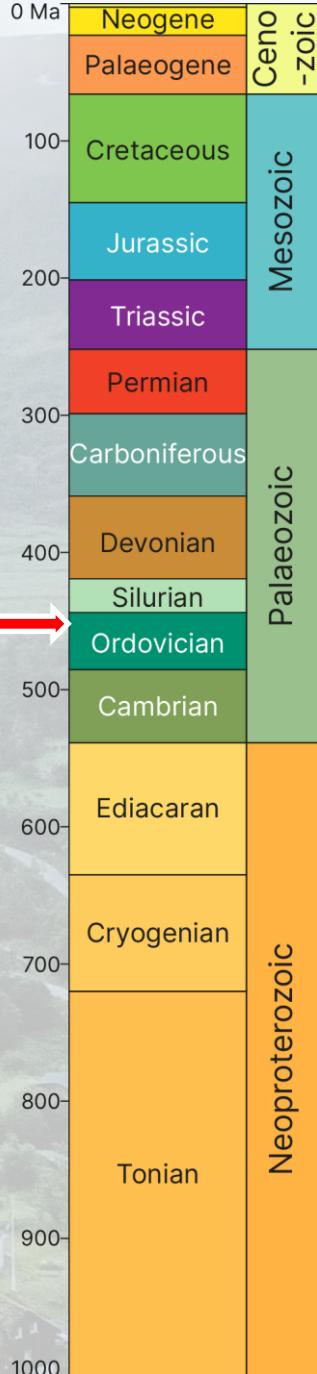


Modified from Brown *et al.* 2006 *Earth-Science Reviews* 79, 261–287

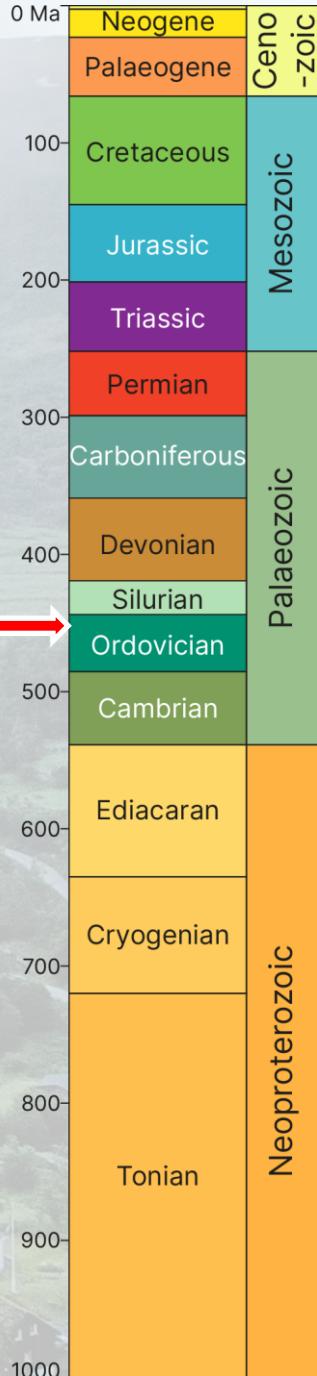


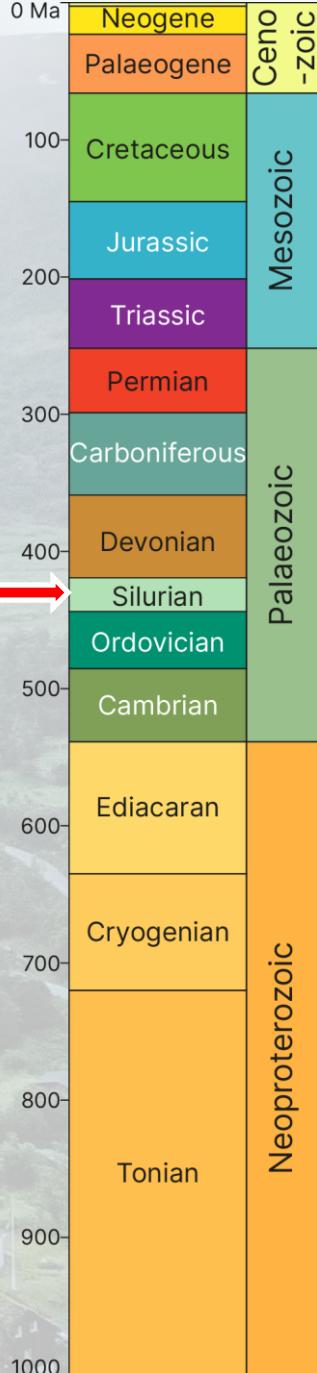
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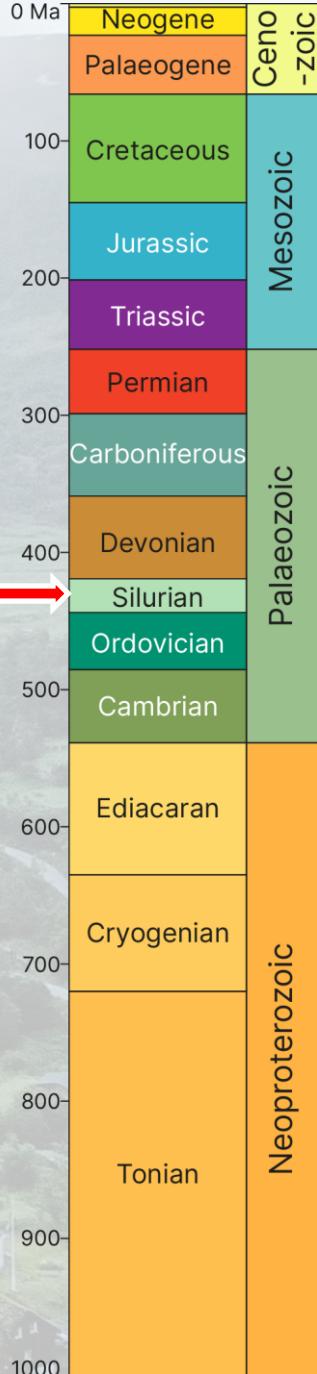


Rise and Fall of The Caledonian Mountains | Subduction volcanics and clastics in Laurentia GY4051

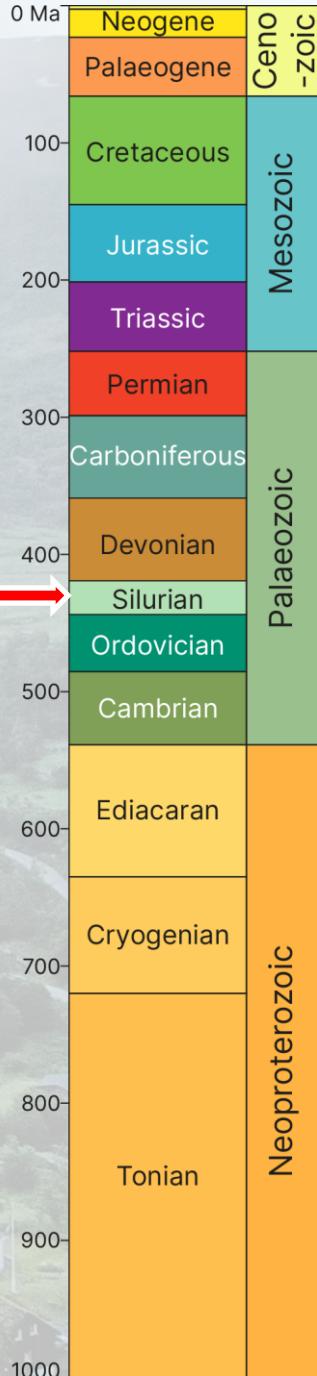




Rise and Fall of The Caledonian Mountains | Subduction volcanics and clastics in Laurentia GY4051

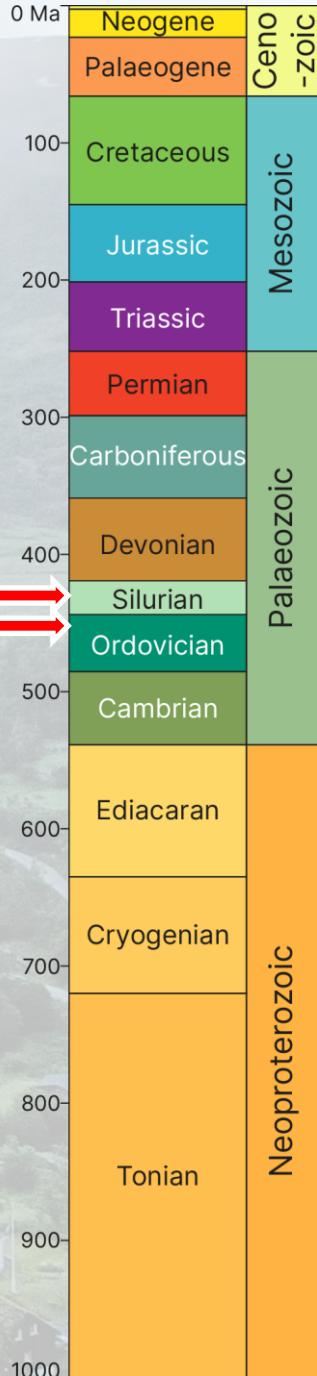


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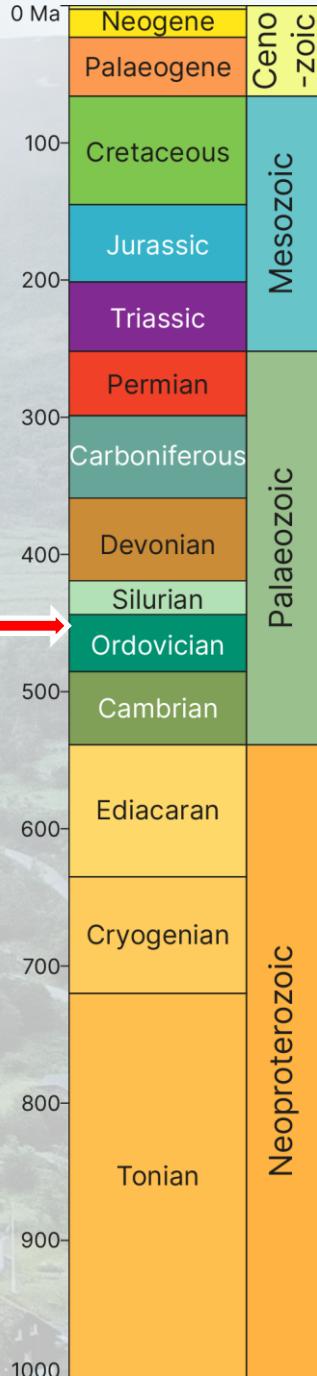
Rise and Fall of The Caledonian Mountains | Subduction volcanics and clastics in Laurentia GY4051

U
P

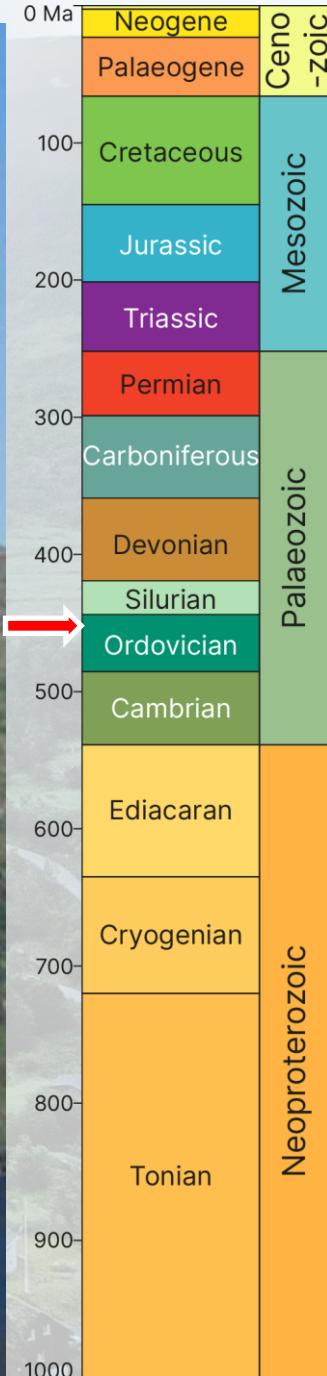
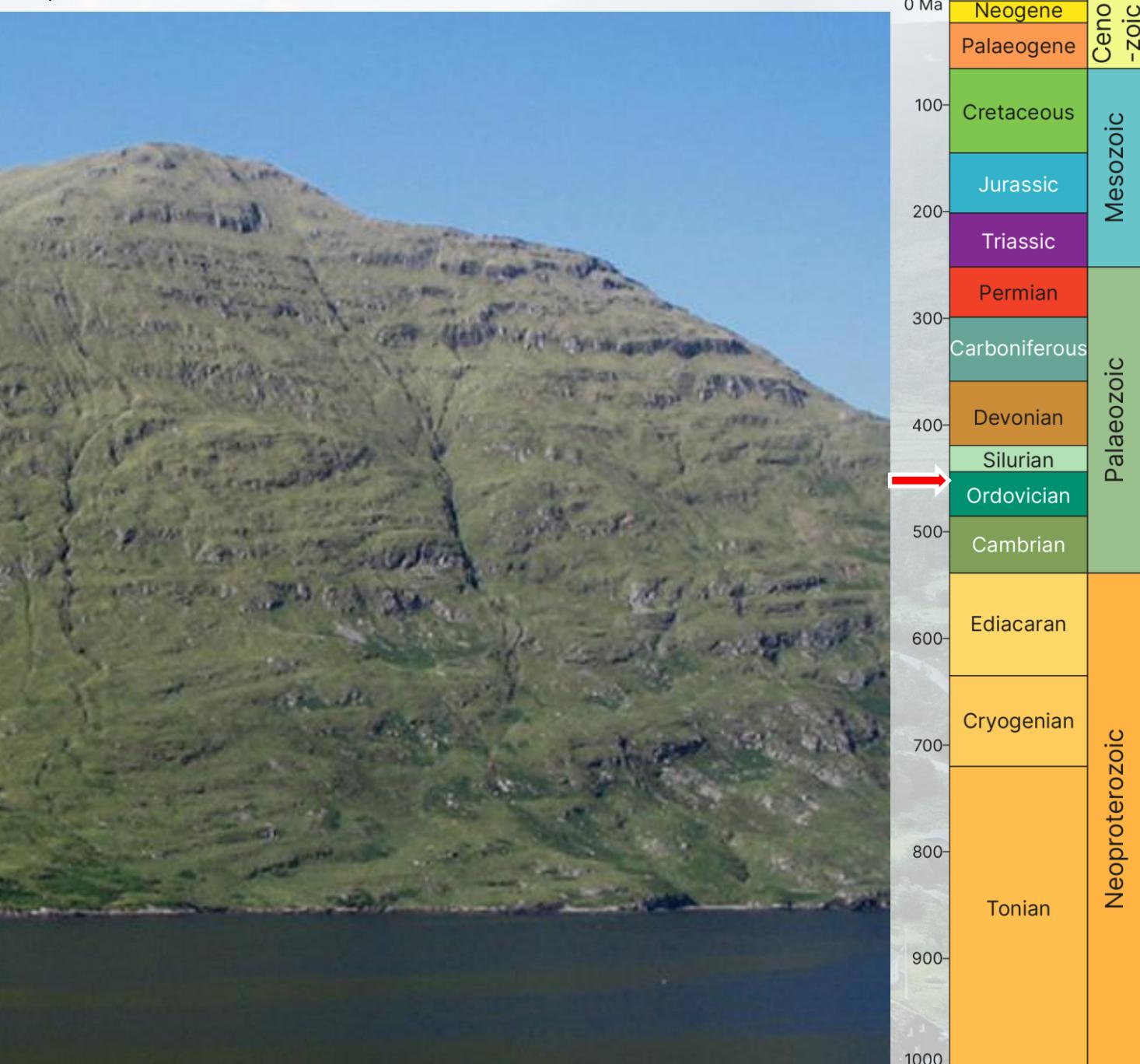
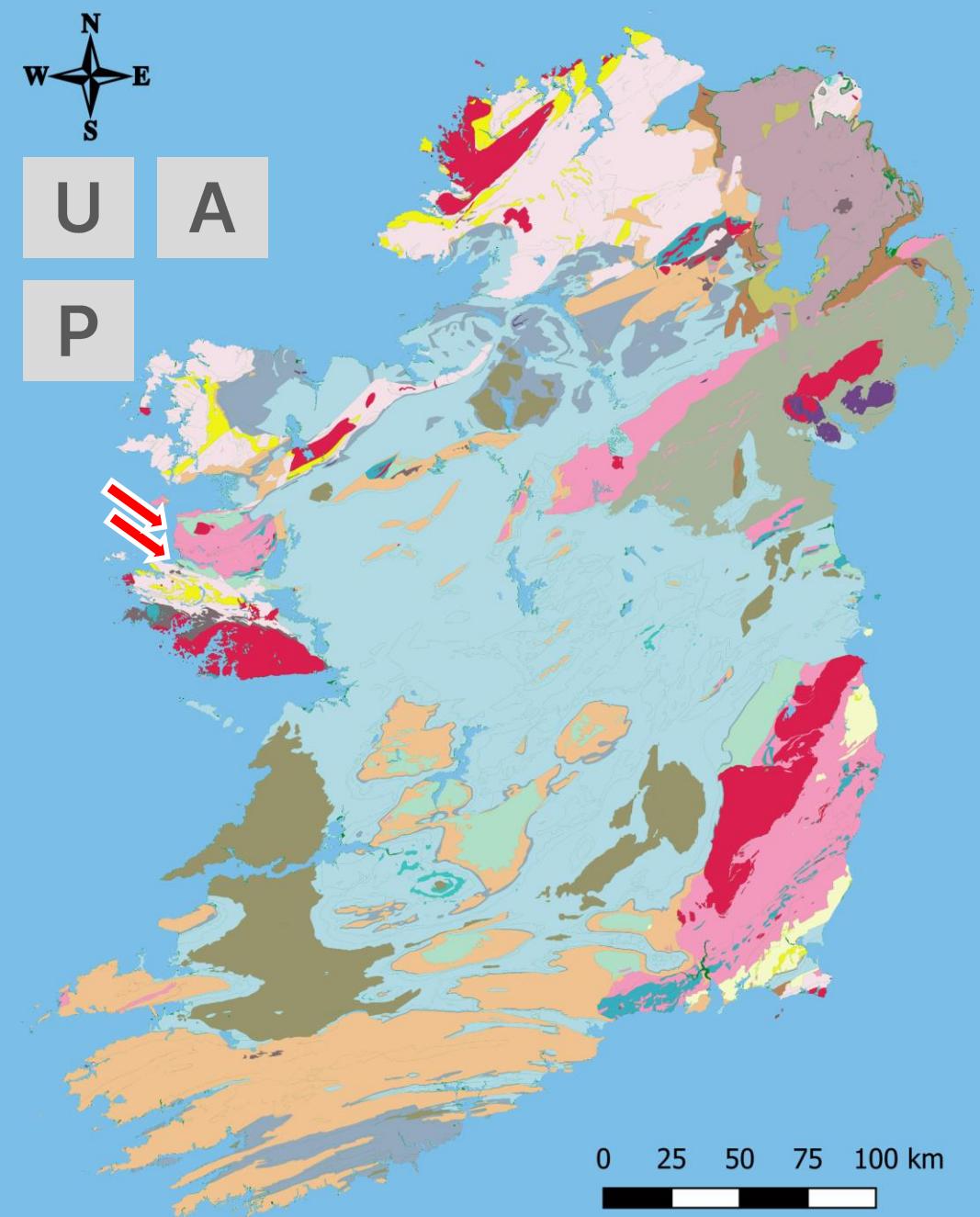


Rise and Fall of The Caledonian Mountains | Subduction volcanics and clastics in Laurentia GY4051

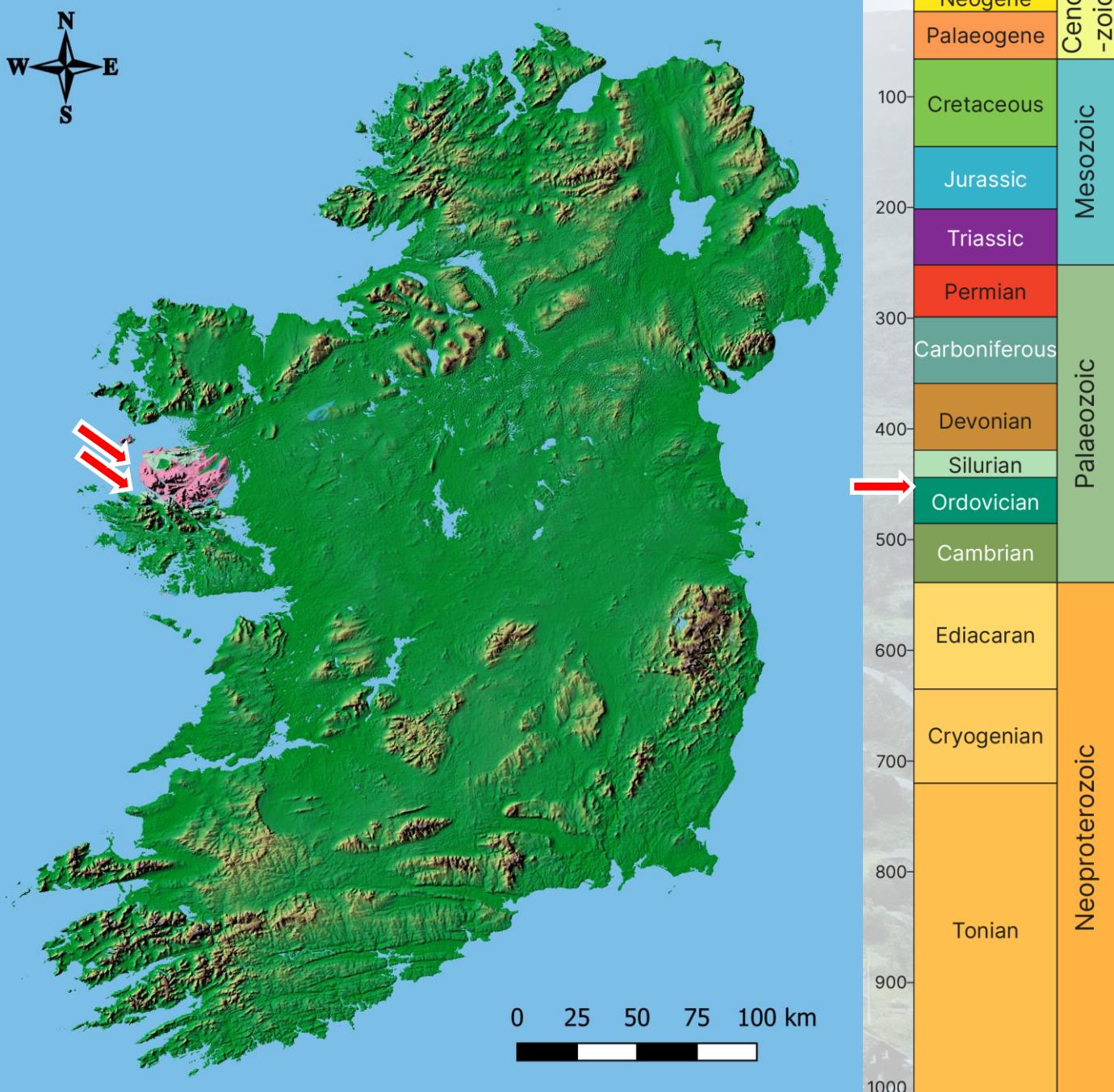
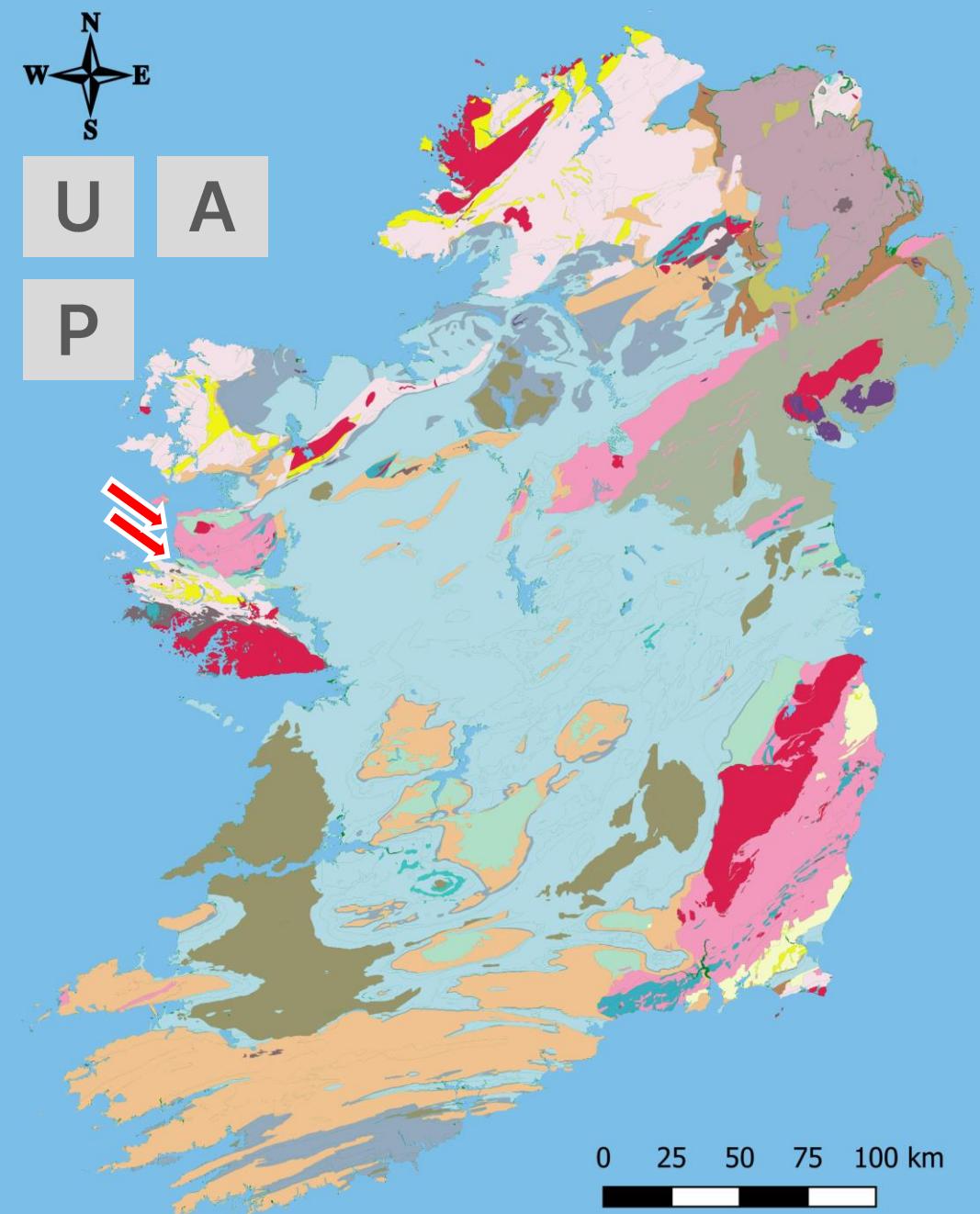
U
P



Rise and Fall of The Caledonian Mountains | Subduction volcanics and clastics in Laurentia GY4051

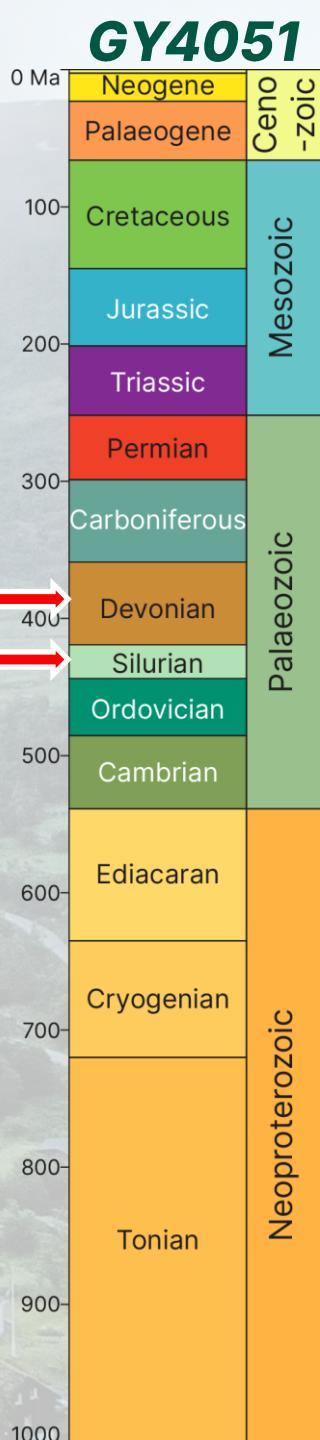


Rise and Fall of The Caledonian Mountains | Subduction volcanics and clastics in Laurentia GY4051



Rise and Fall of The Caledonian Mountains | Caledonian Granites

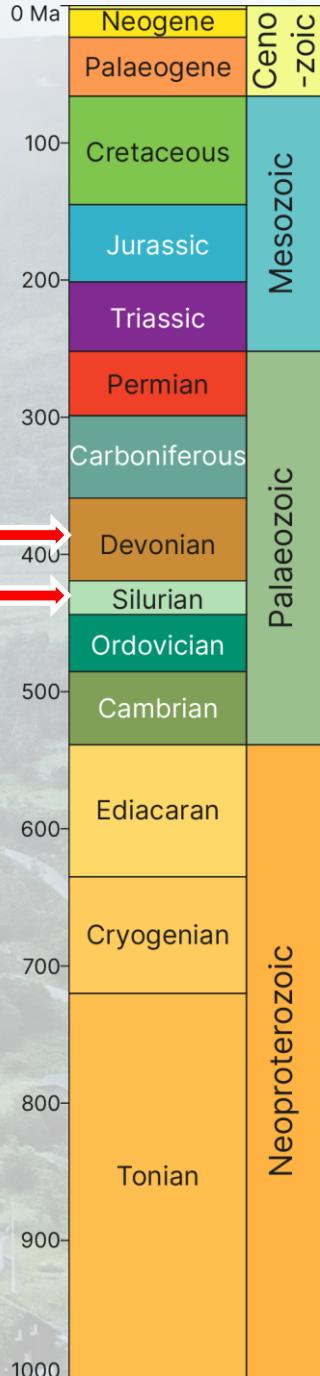
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Rise and Fall of The Caledonian Mountains | Caledonian Granites

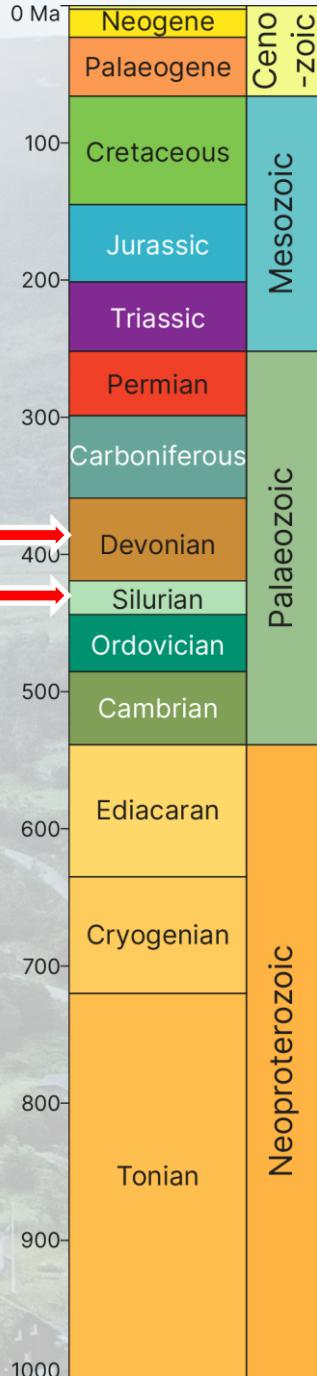
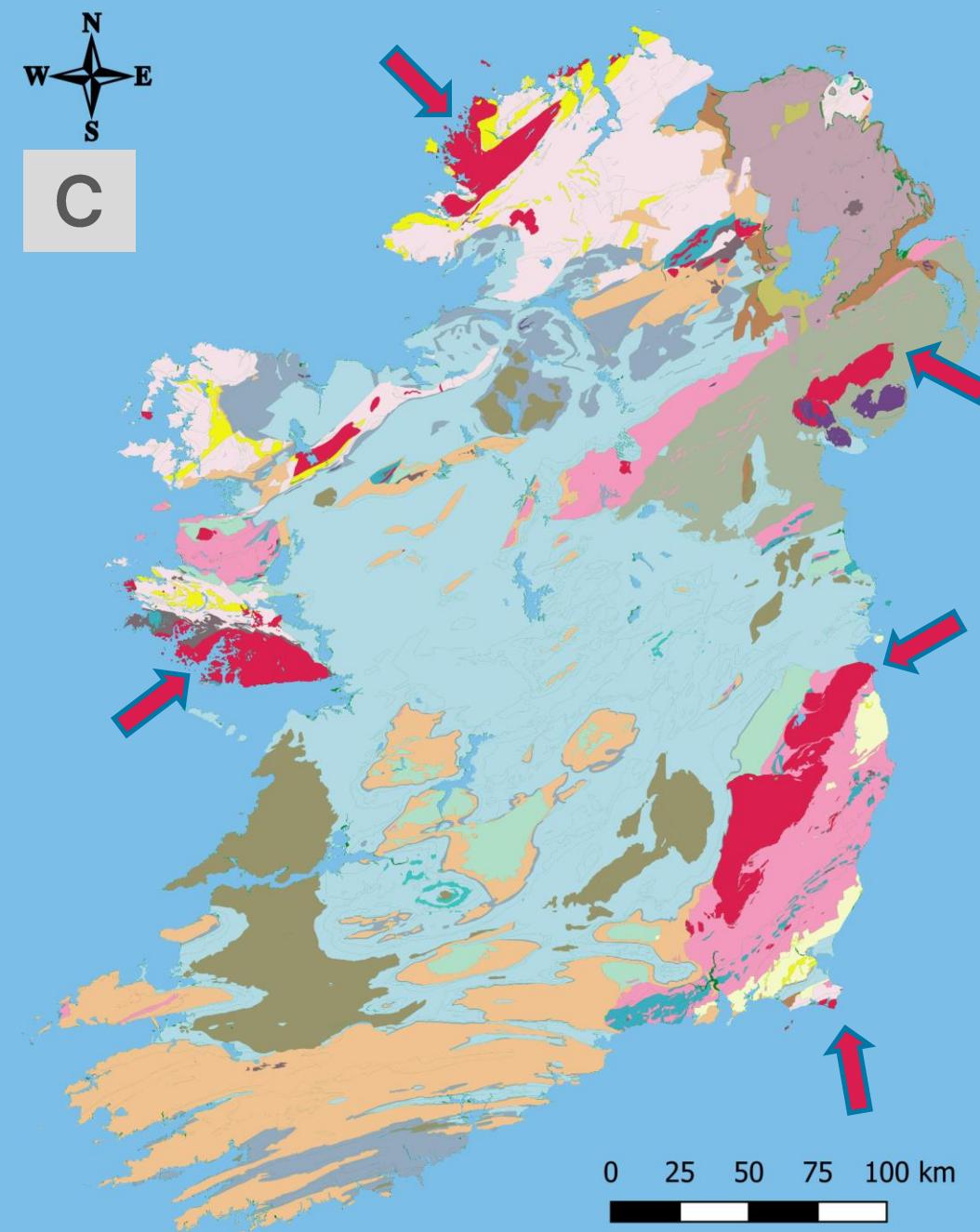
GY4051

C



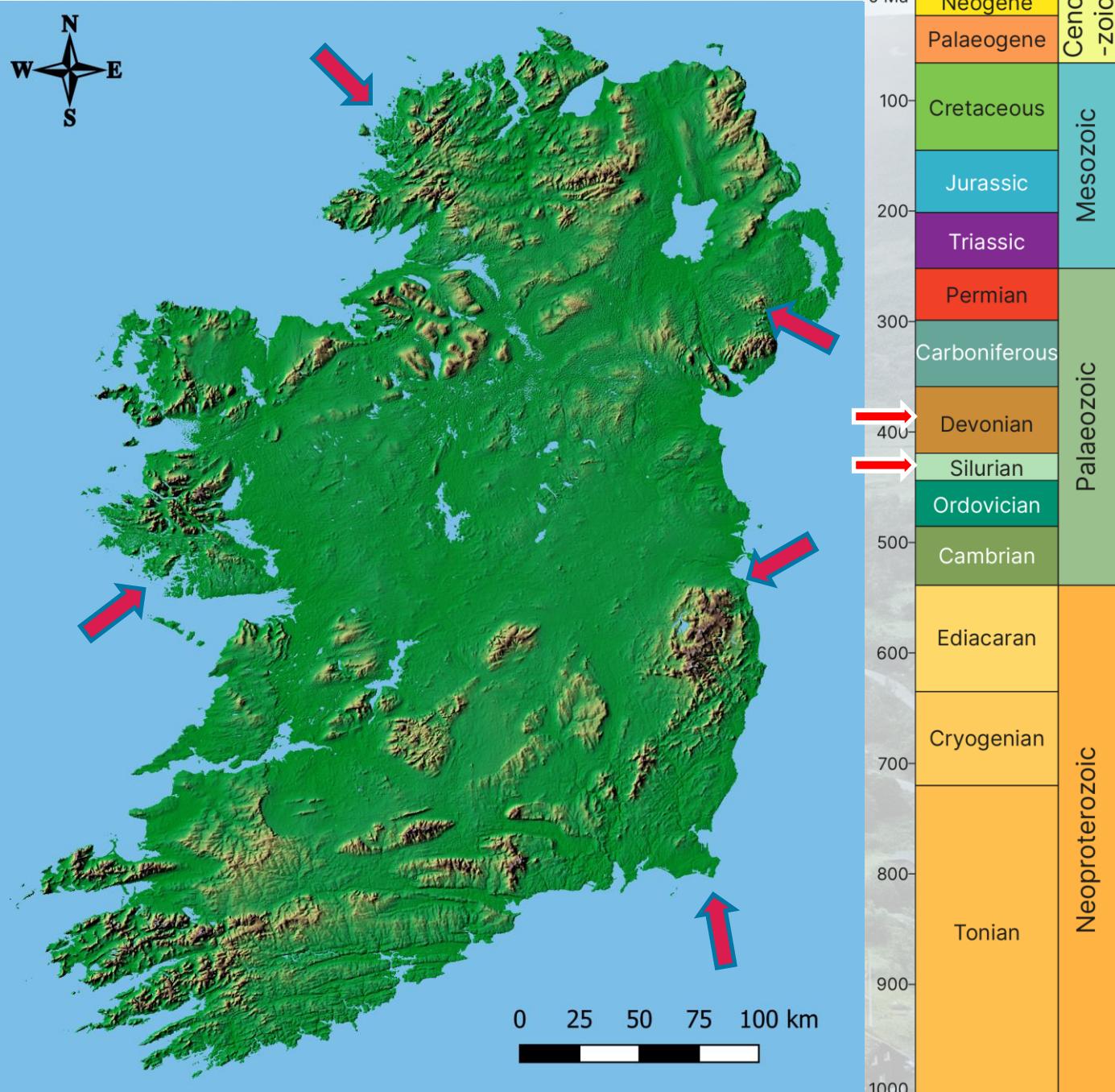
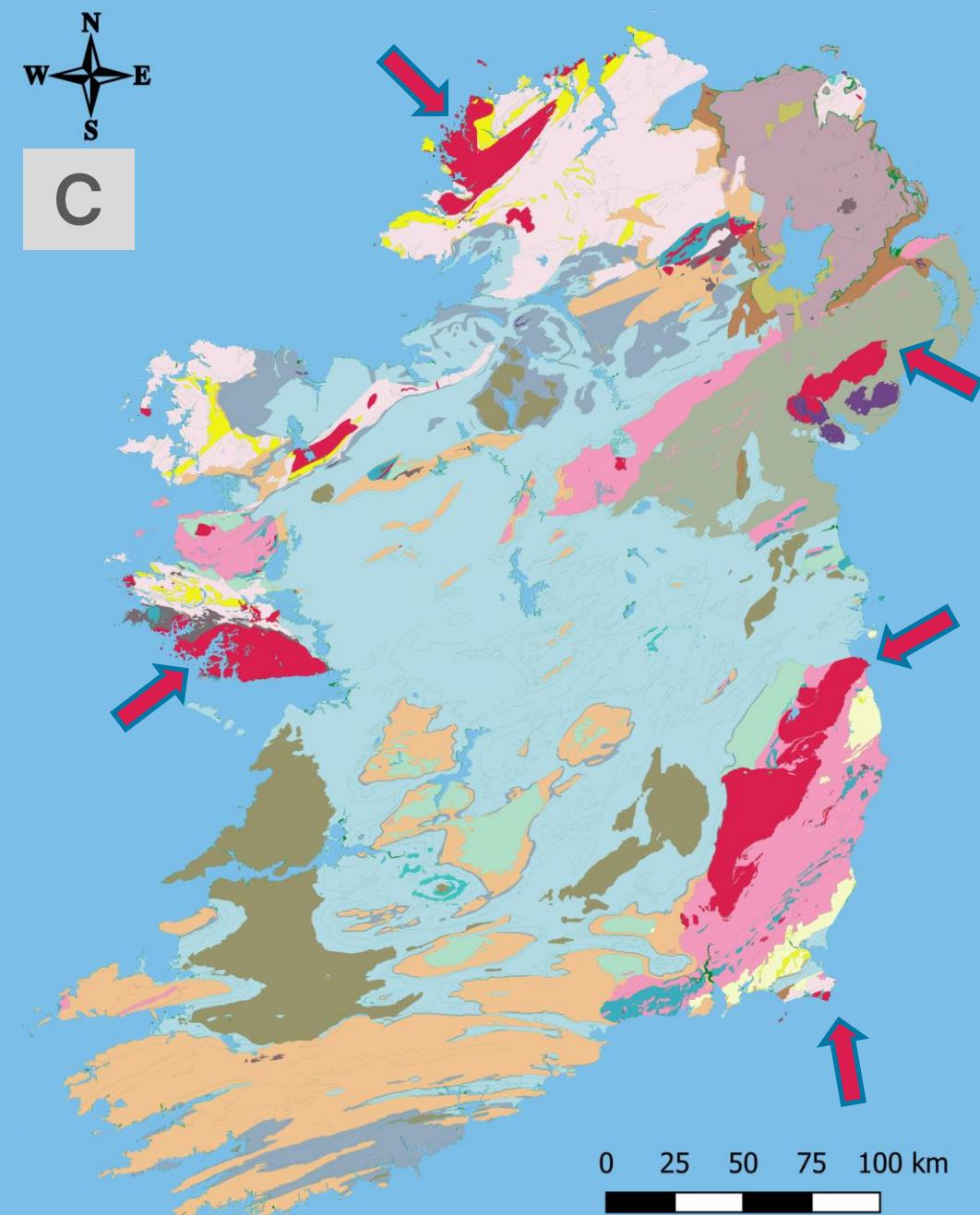
Rise and Fall of The Caledonian Mountains | Caledonian Granites

GY4051



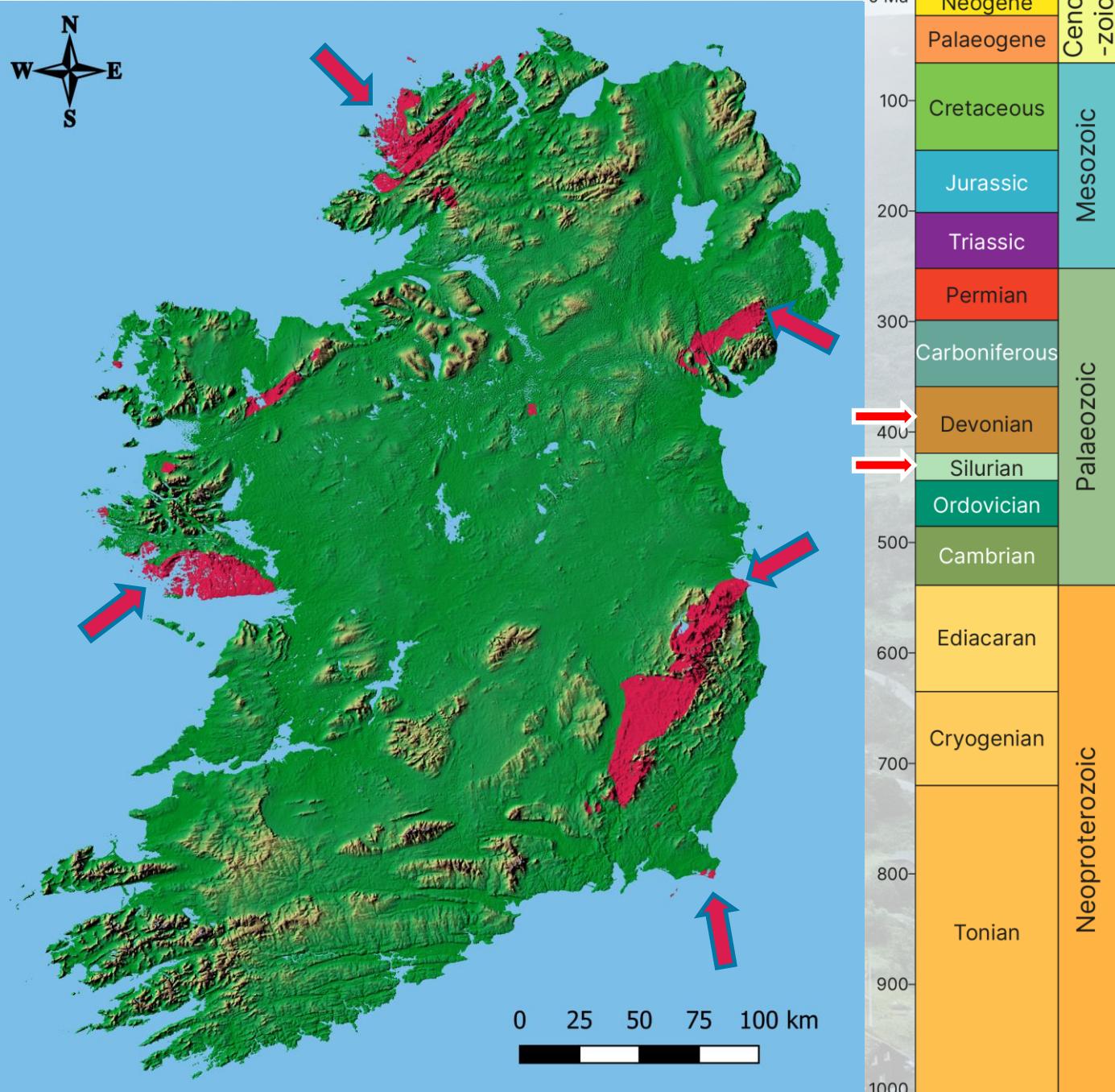
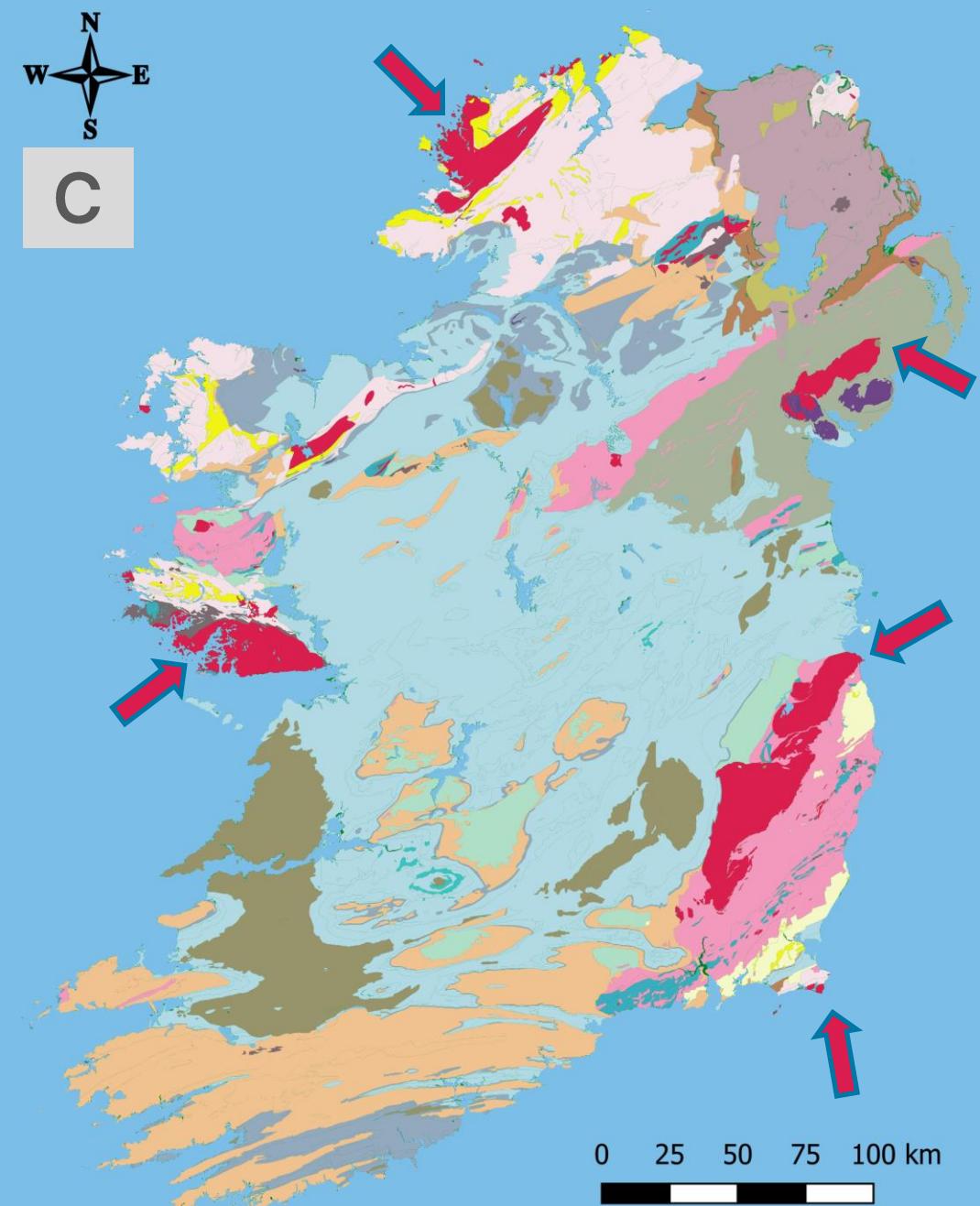
Rise and Fall of The Caledonian Mountains | Caledonian Granites

GY4051



Rise and Fall of The Caledonian Mountains | Caledonian Granites

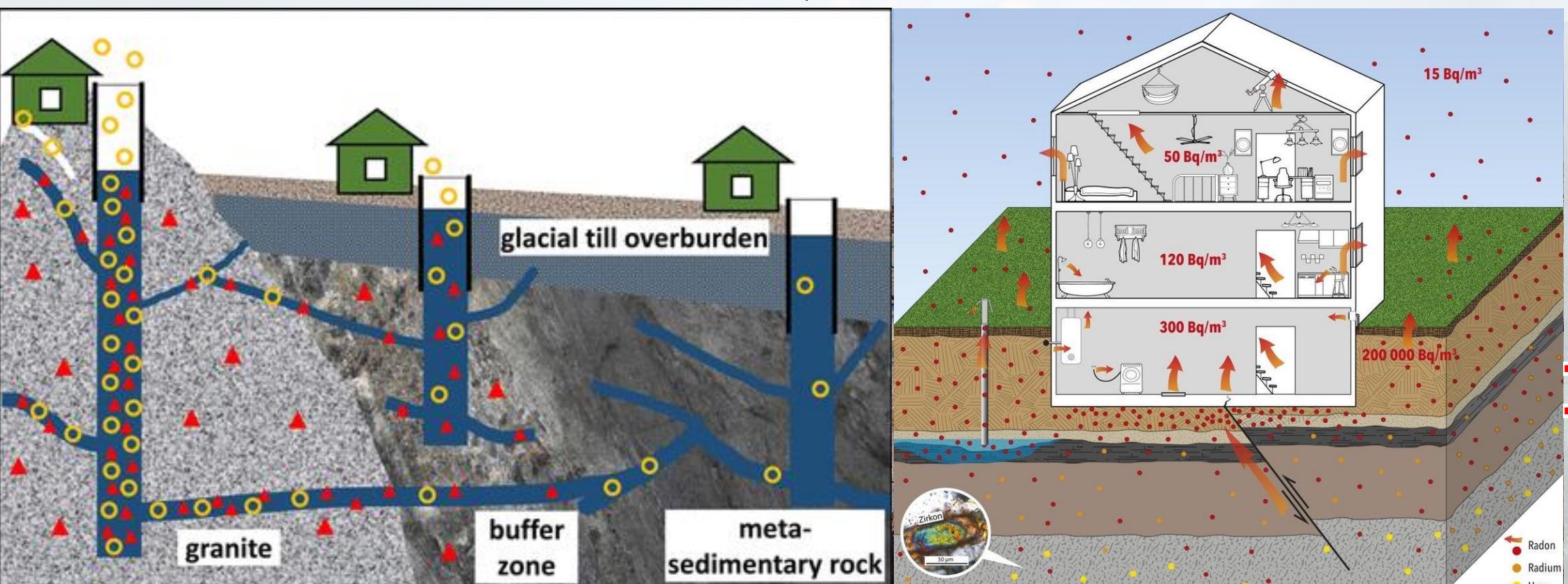
GY4051



	0 Ma	Neogene	Ceno-zoic
	100	Palaeogene	
	200	Cretaceous	Mesozoic
	300	Jurassic	
	400	Triassic	
	500	Permian	
	600	Carboniferous	
	700	Devonian	Palaeozoic
	800	Silurian	
	900	Ordovician	
	1000	Cambrian	
	1100	Ediacaran	
	1200	Cryogenian	
	1300	Tonian	Neoproterozoic

Rise and Fall of The Caledonian Mountains | Caledonian Granites - Radon

GY4051



0 Ma
Neogene
Palaeogene

Ceno-zoic

100
Cretaceous

Mesozoic

200
Jurassic

300
Triassic

300
Permian

400
Carboniferous

400
Devonian

500
Silurian

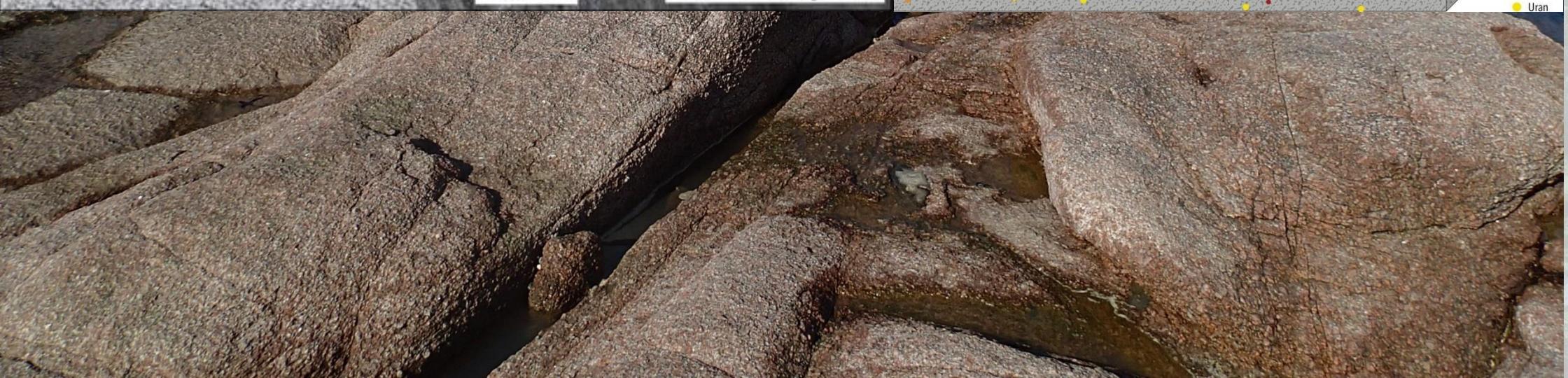
600
Ordovician

700
Cambrian

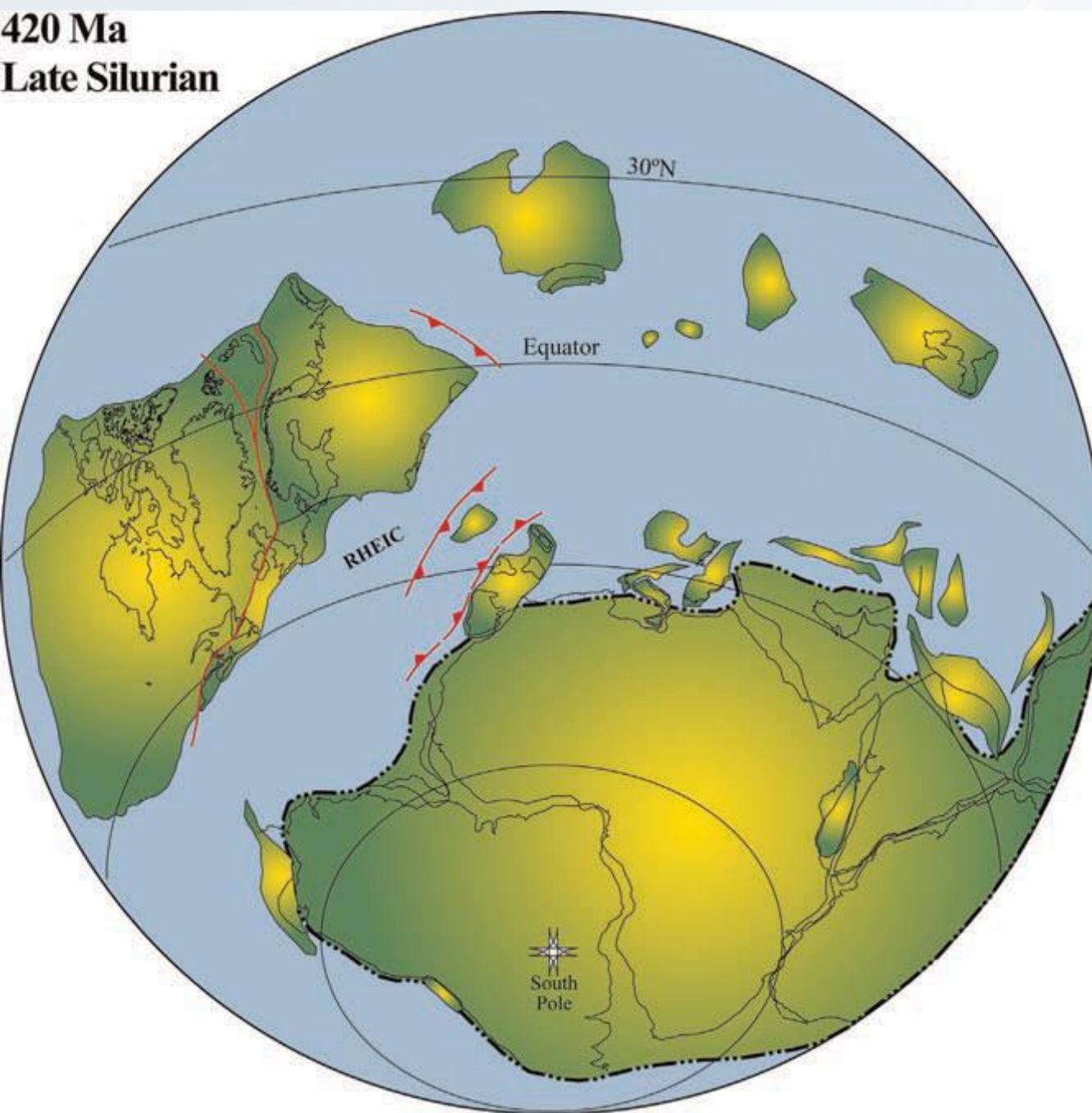
800
Ediacaran

900
Cryogenian

1000
Tonian

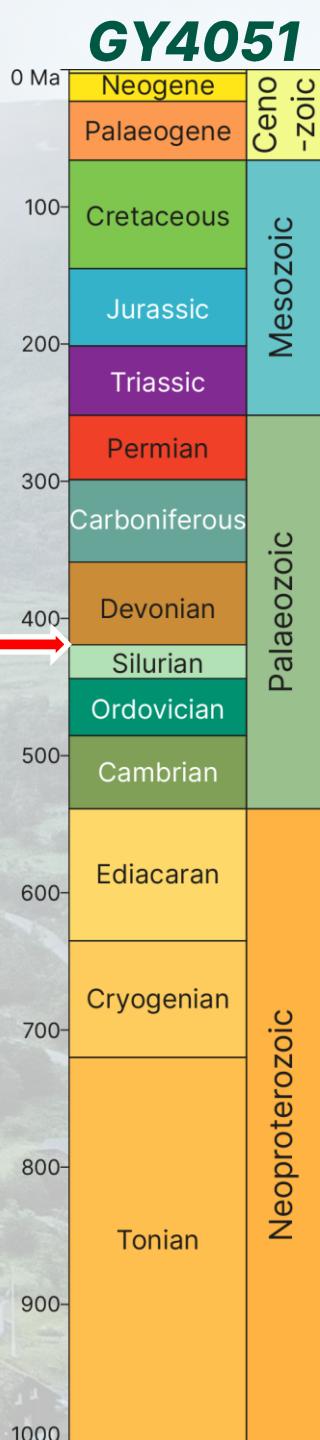


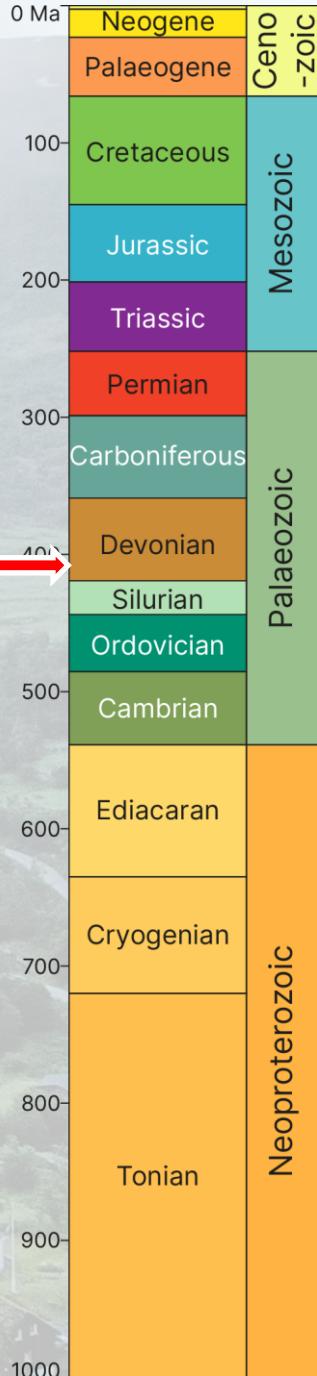
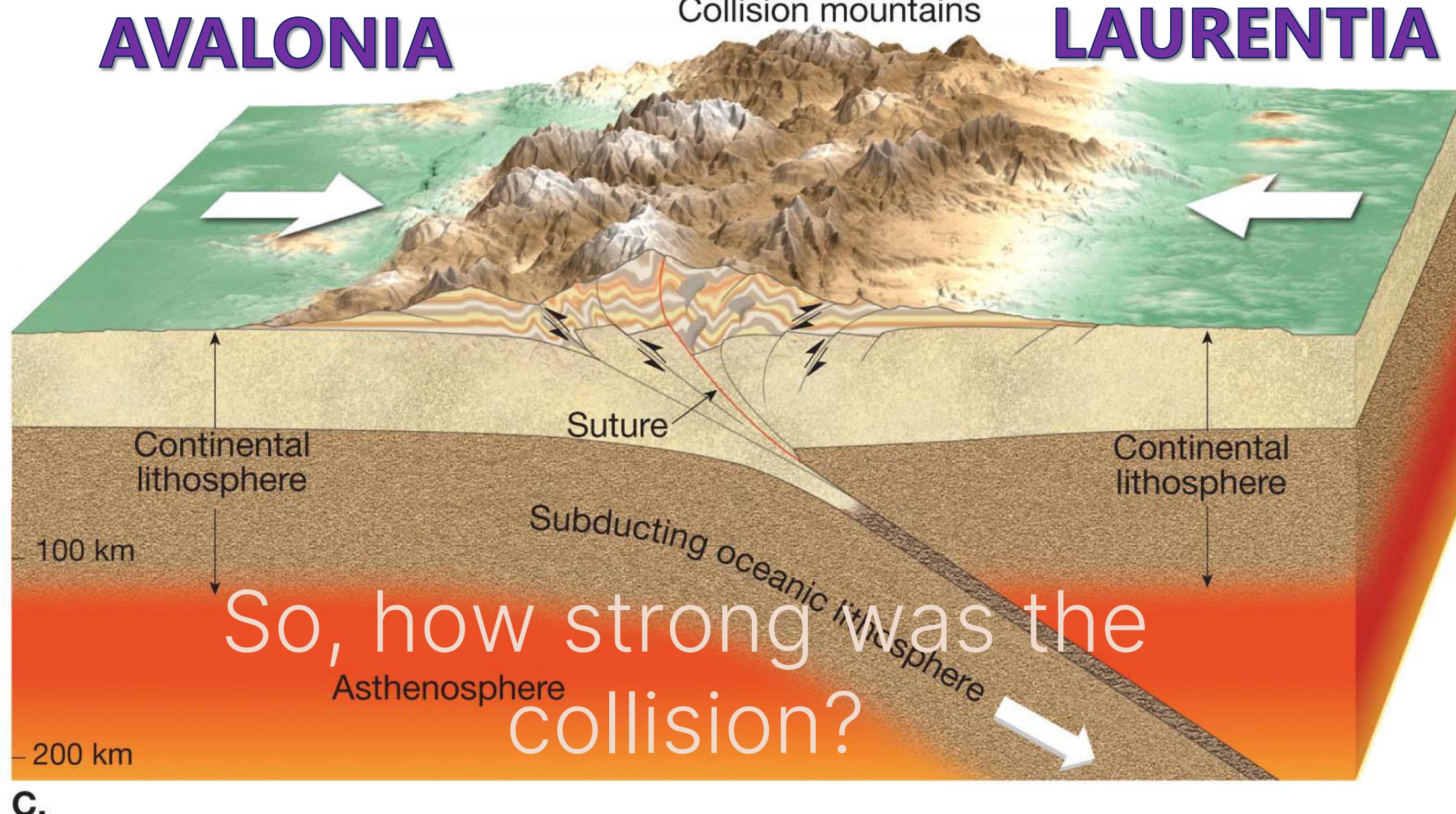
Rise and Fall of The Caledonian Mountains | Late Silurian



Iapetus Ocean is gone

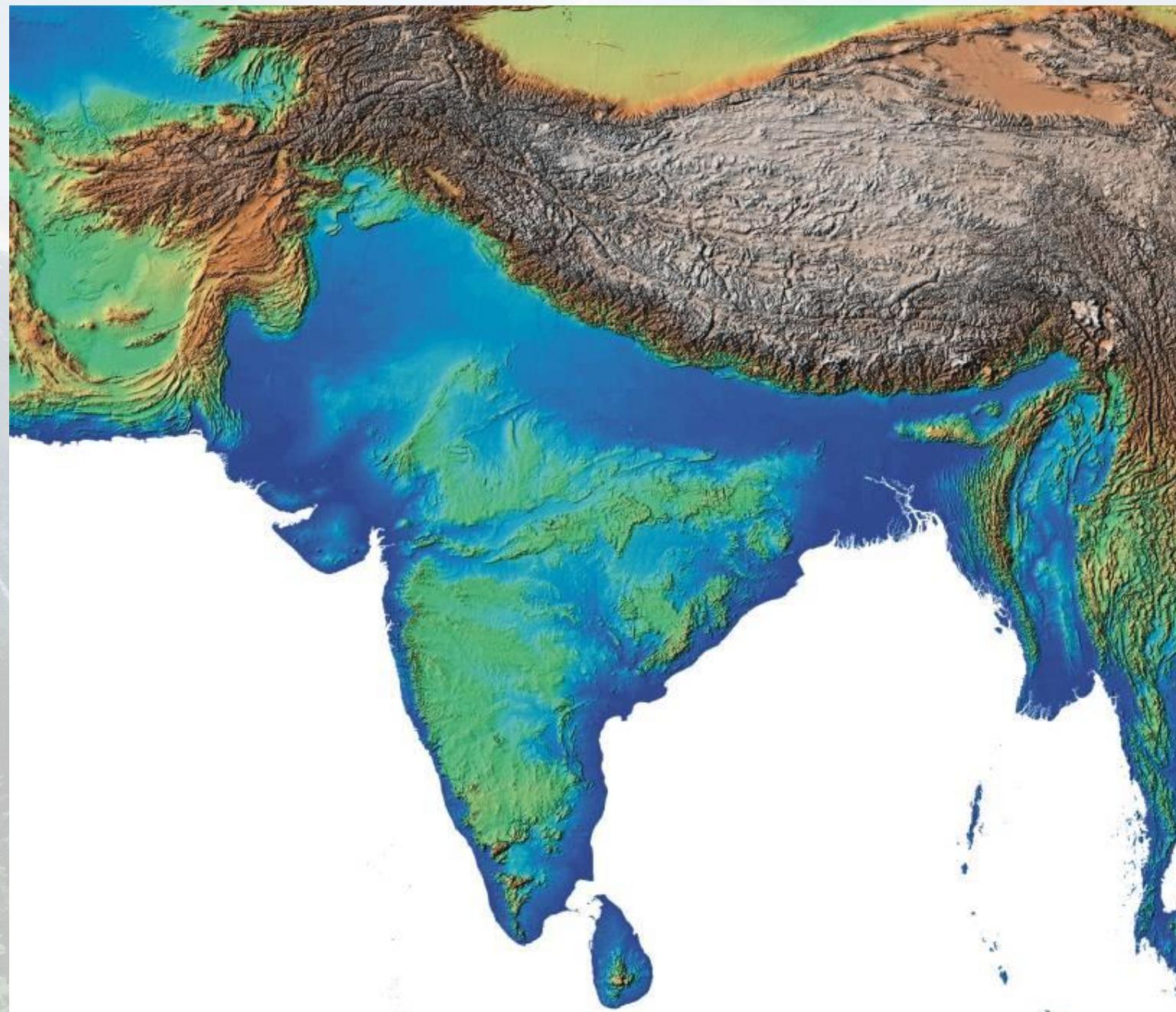
- Avalonia has collided with Laurentia and Baltica in the Caledonian Orogeny
- Continent of Laurussia
- UK and Ireland joined, separated from Gondwana by the Rheic Ocean



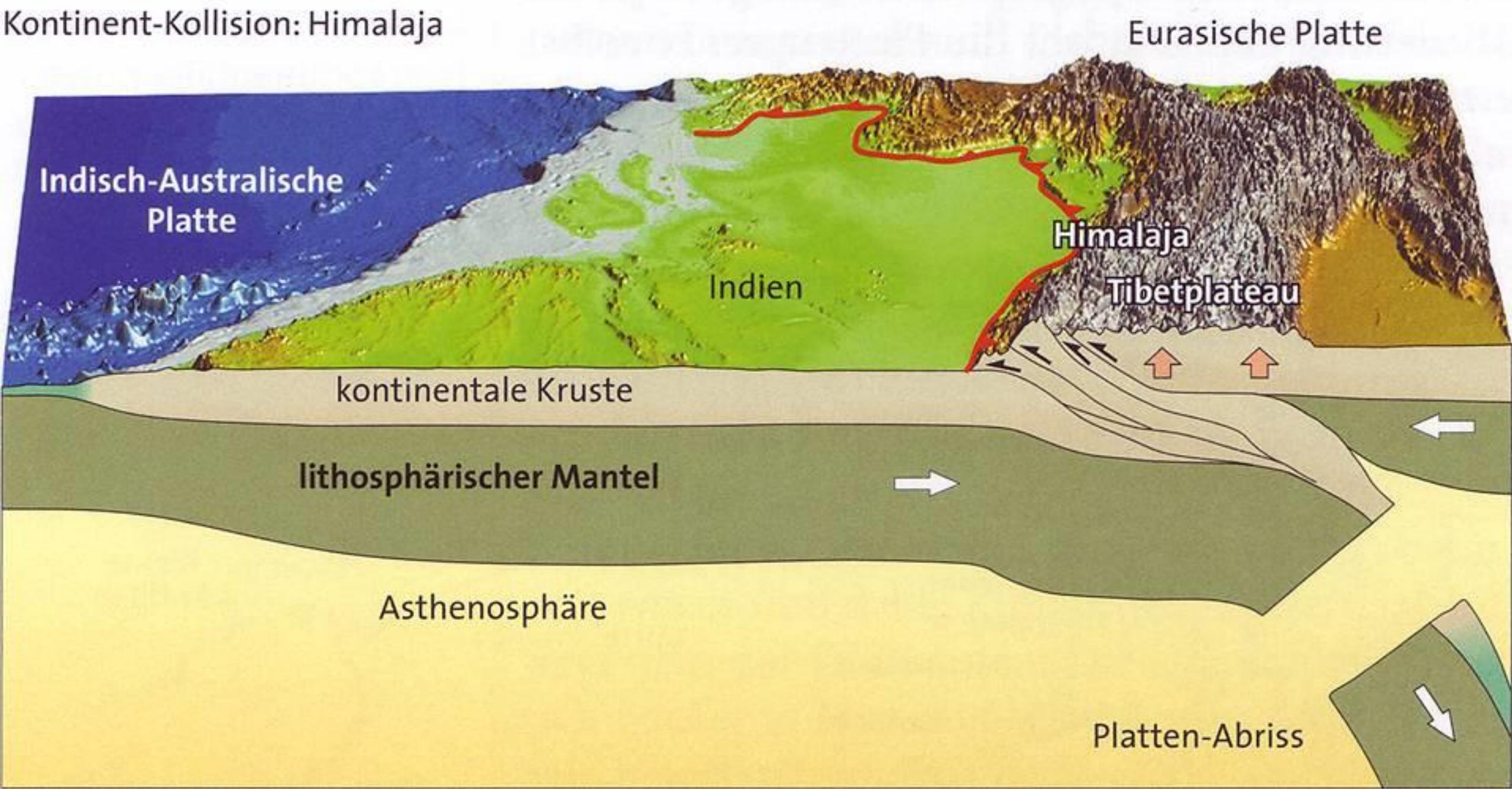


Rise and Fall of The Caledonian Mountains | Himalayas

GY4051



Kontinent-Kollision: Himalaja



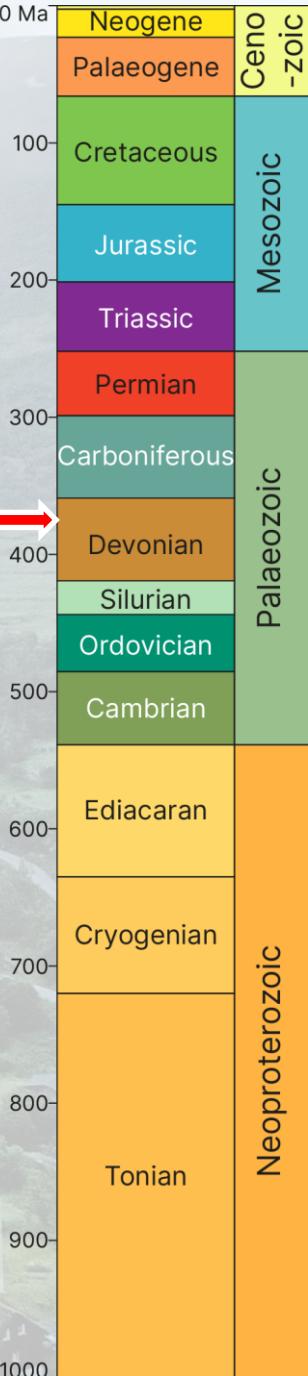




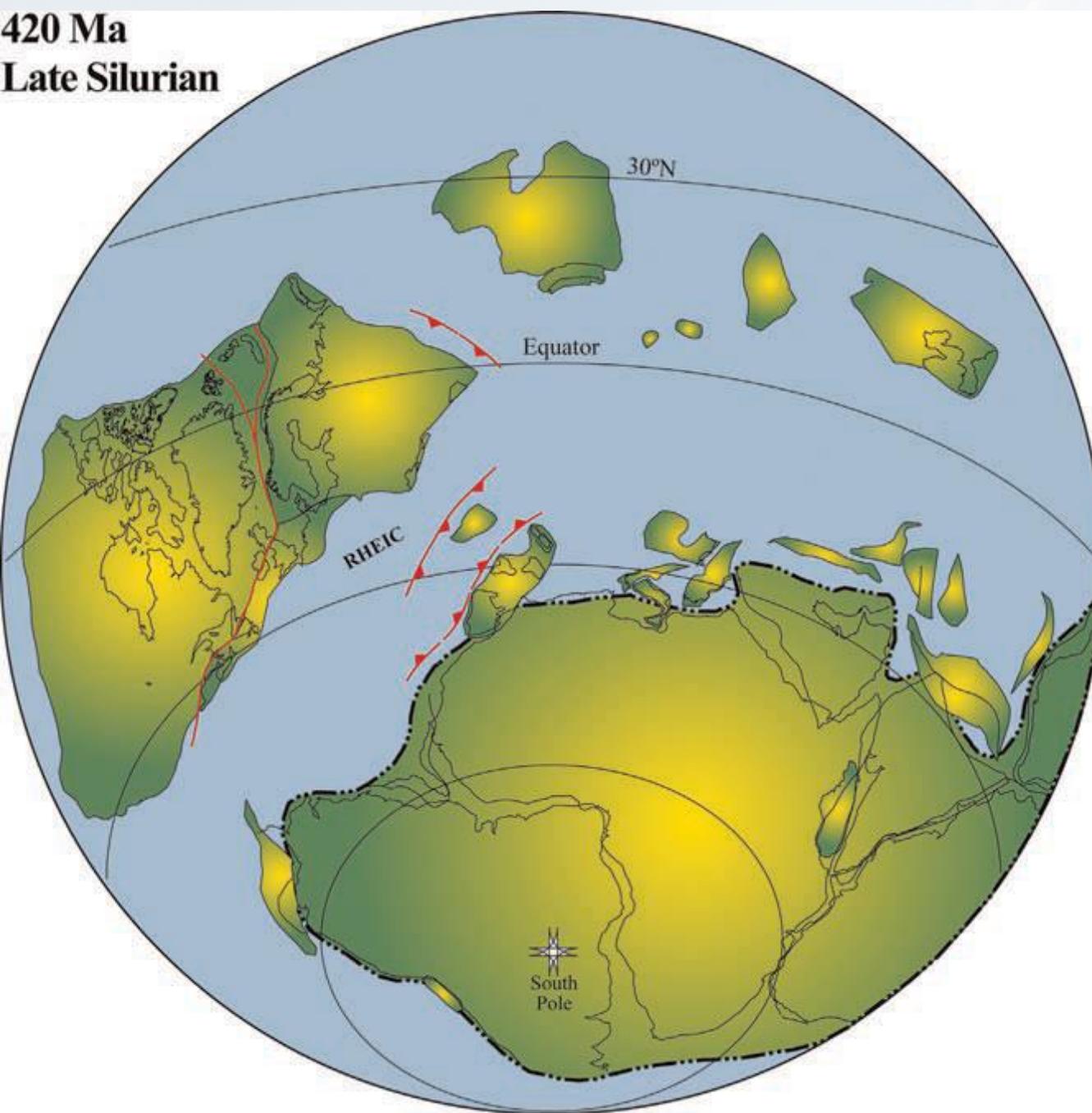


Rise and Fall of The Caledonian Mountains | Guess what didn't exist in the Devonian?

GY4051

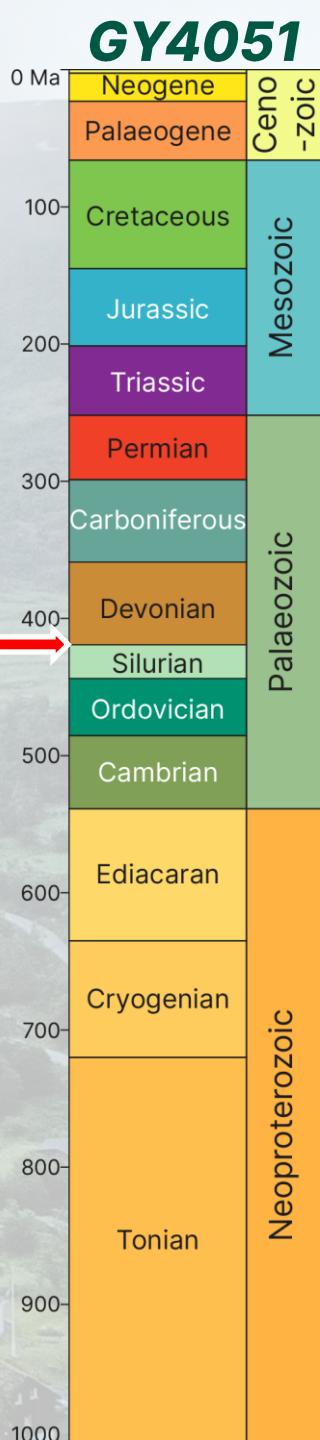


Rise and Fall of The Caledonian Mountains | Late Silurian



Iapetus Ocean is gone

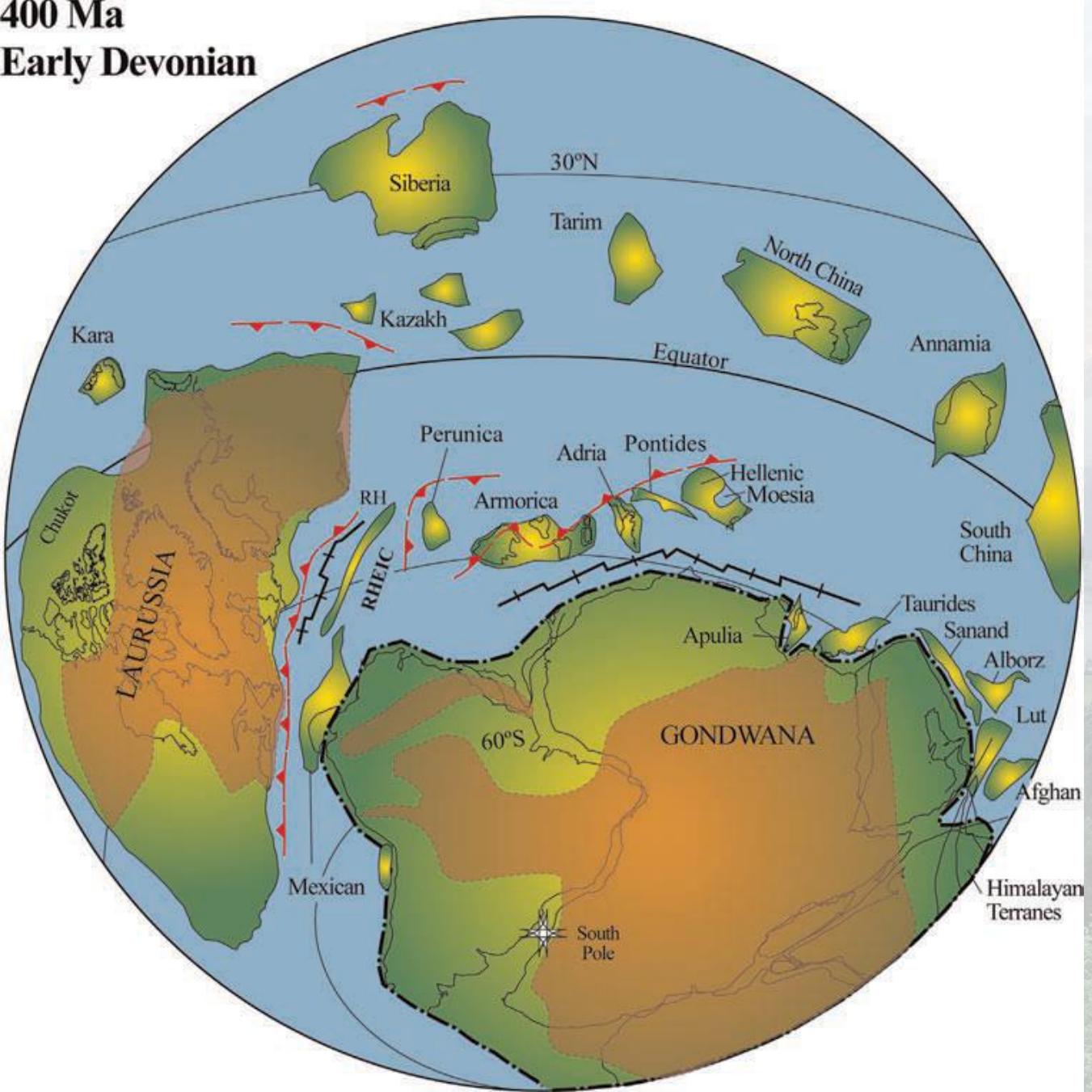
- Avalonia has collided with Laurentia and Baltica in the Caledonian Orogeny
- Continent of Laurussia
- UK and Ireland joined, separated from Gondwana by the Rheic Ocean



Rise and Fall of The Caledonian Mountains | Early Devonian

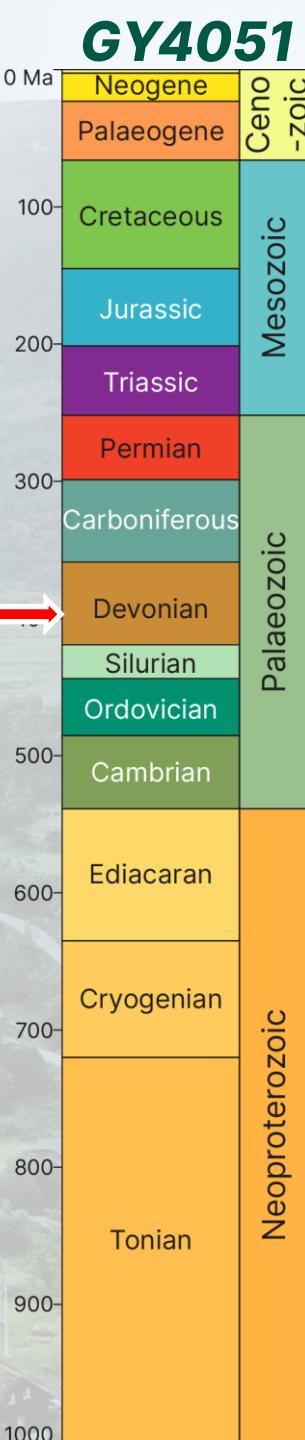
400 Ma

Early Devonian



Old Red Sandstone

- Laurussia – the Old Red Sandstone Continent – mostly emergent
- Southernmost Britain and Ireland on the continental margin





Arid Environments: Hammada | Rocky desert (Sahara)







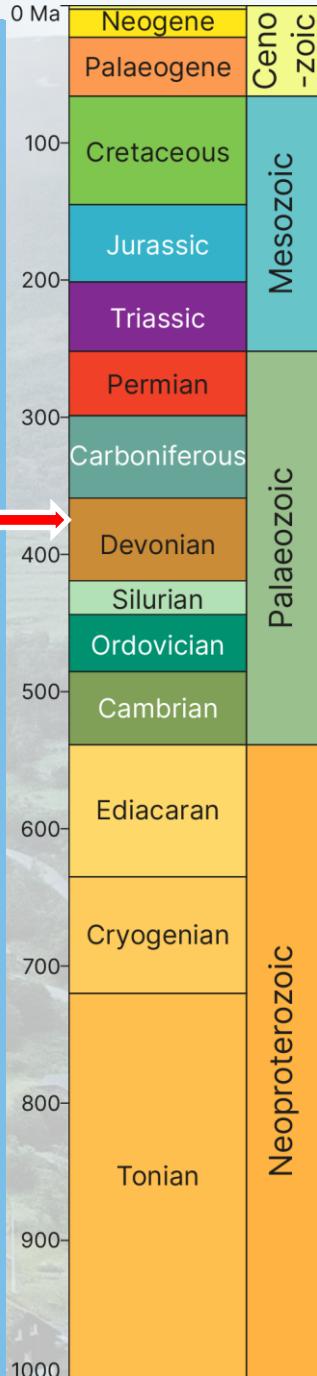






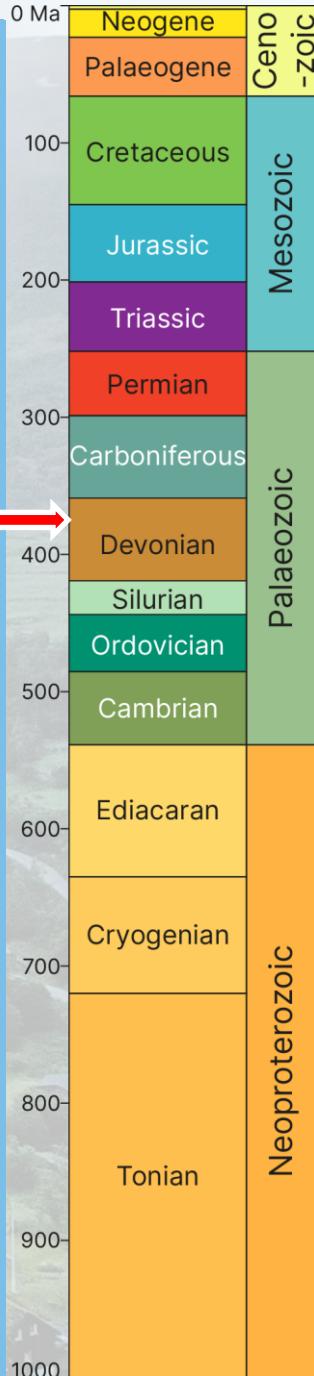
Rise and Fall of The Caledonian Mountains | Devonian River Sandstones of Ireland

GY4051



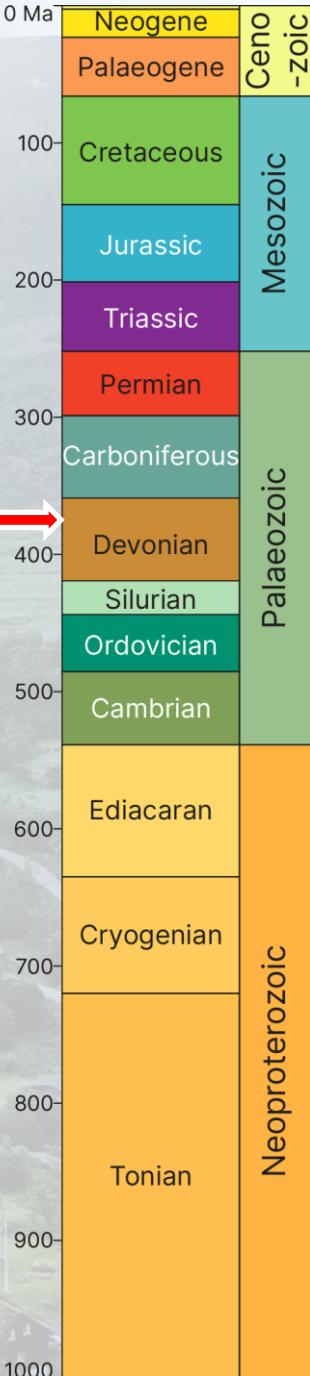
Rise and Fall of The Caledonian Mountains | Devonian River Sandstones of Ireland

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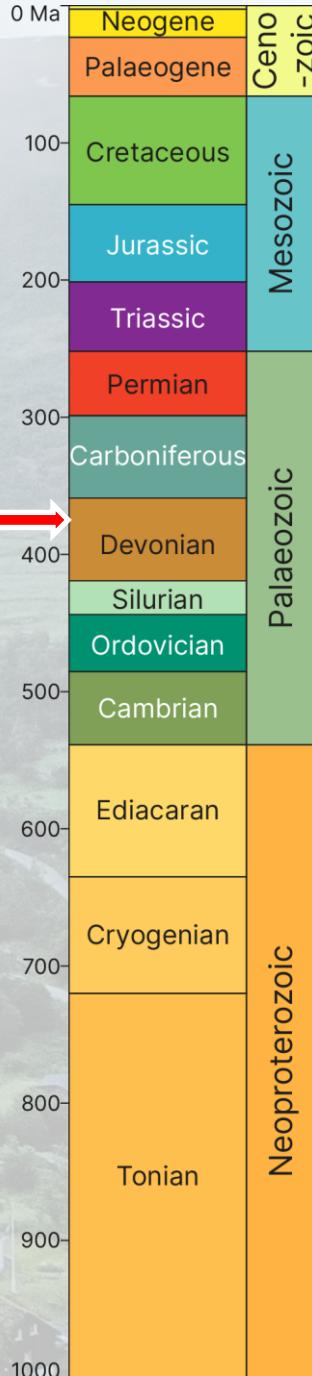
Rise and Fall of The Caledonian Mountains | Devonian River Sandstones of Ireland

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Rise and Fall of The Caledonian Mountains | Devonian River Sandstones of Ireland

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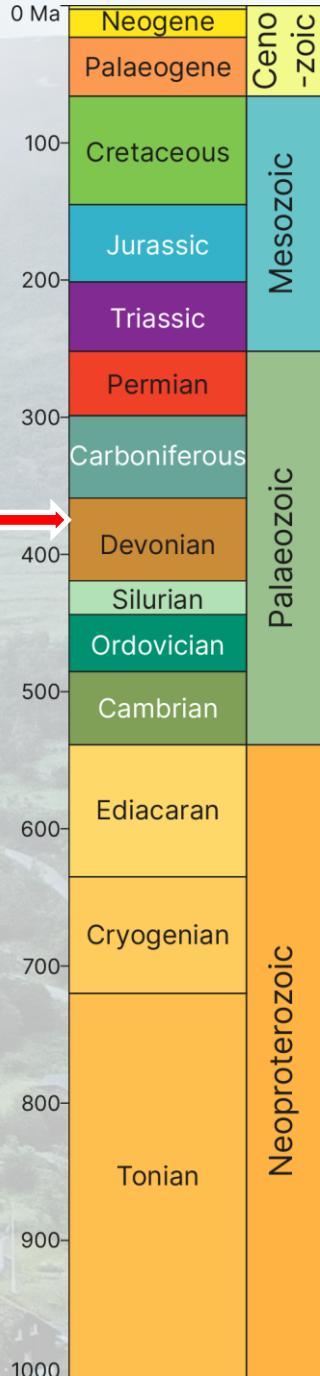
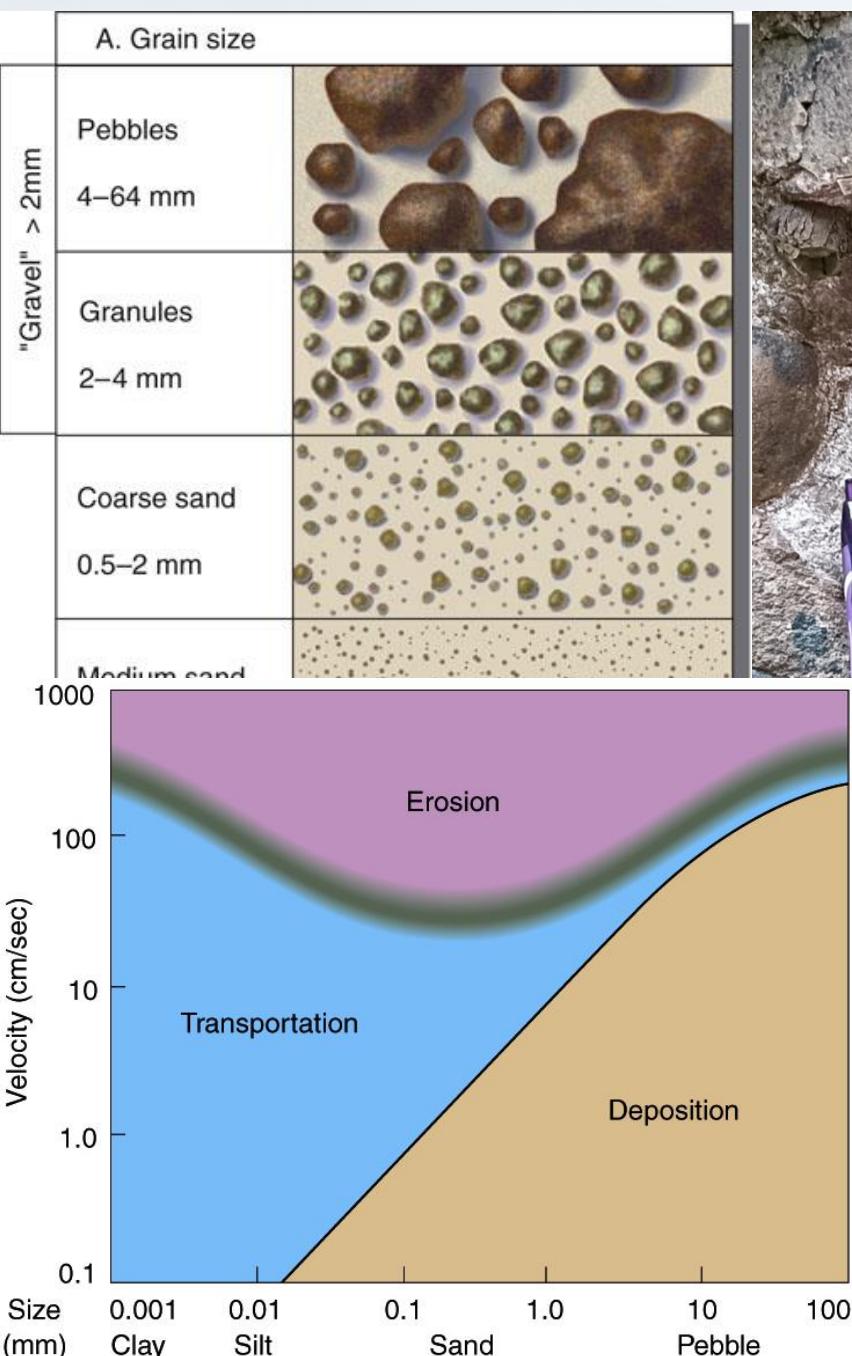


A. Grain size	
"Gravel" > 2mm	Pebbles 4–64 mm
	Granules 2–4 mm
	Coarse sand 0.5–2 mm
	Medium sand 0.25–0.5 mm
	Fine sand 0.06–0.25 mm
	Silt 0.004–0.06 mm
	Clay < 0.004 mm



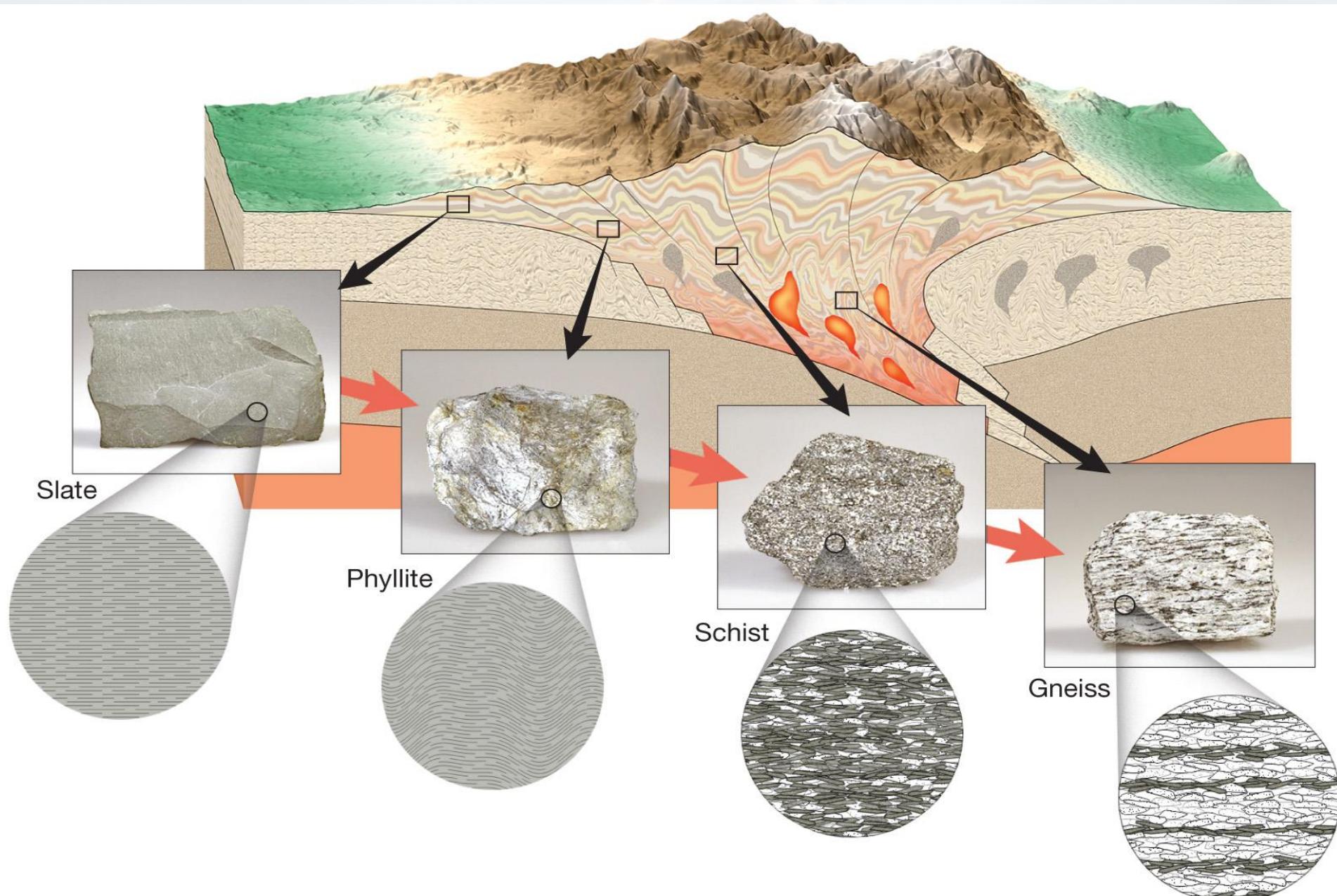
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Rise and Fall of The Caledonian Mountains | Metamorphic Rocks

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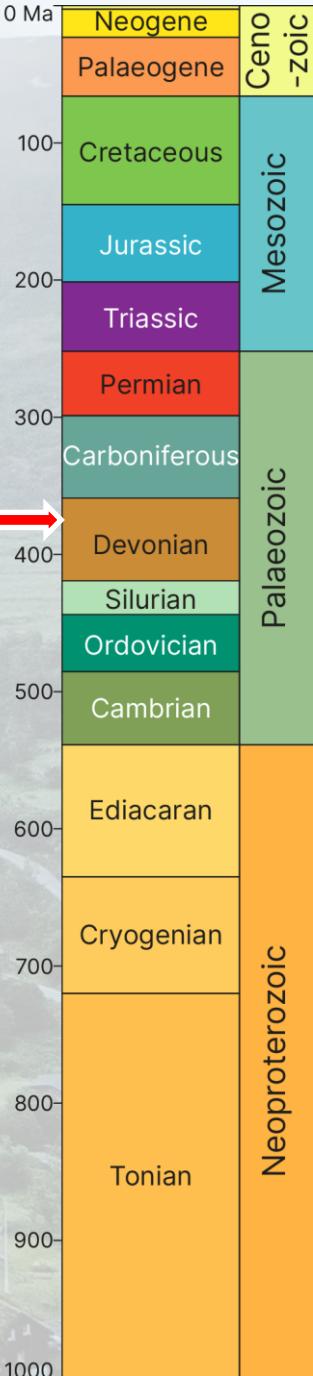
Rise and Fall of The Caledonian Mountains | Alps - Malbun, Liechtenstein

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Distance of transport

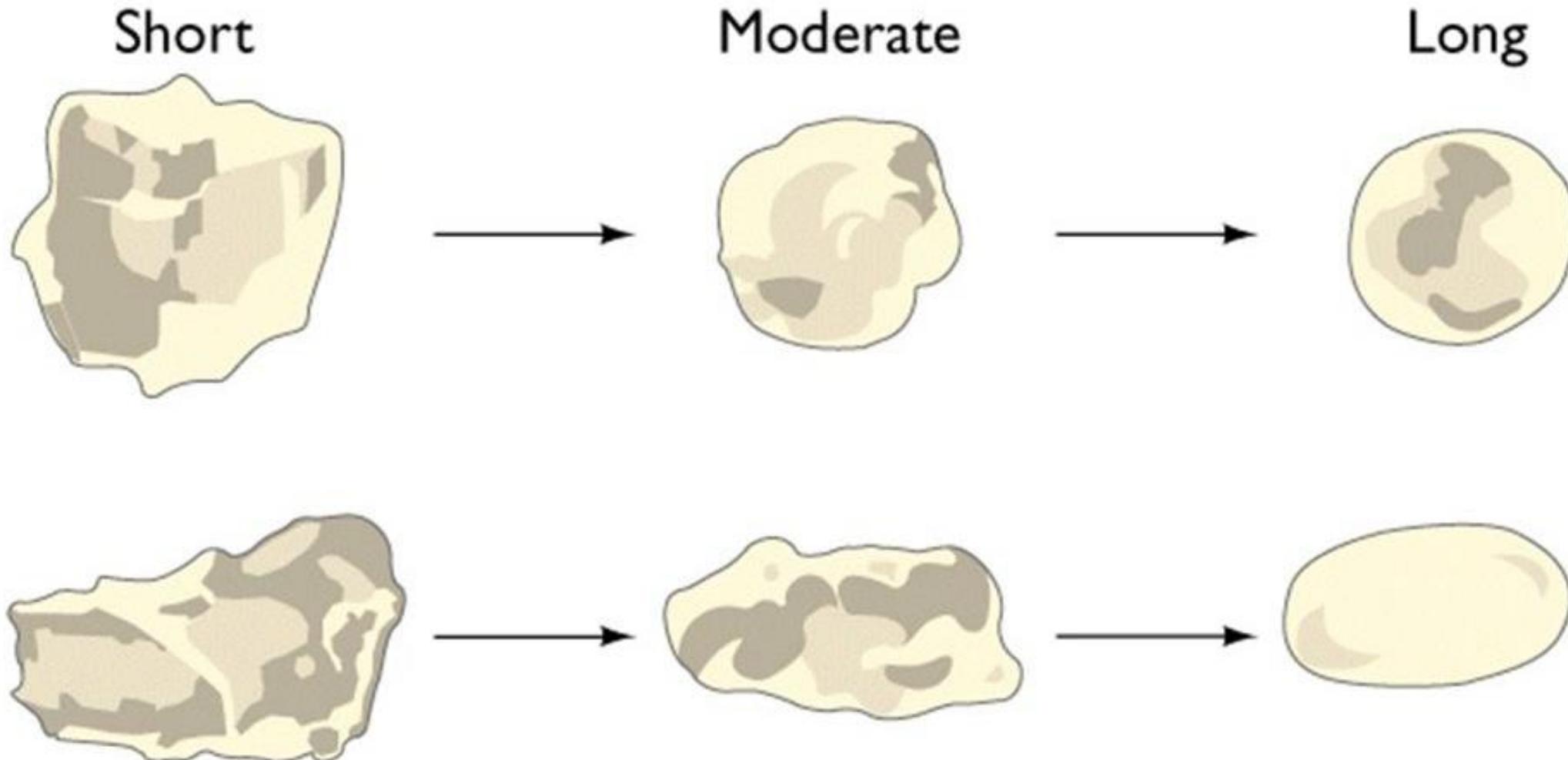
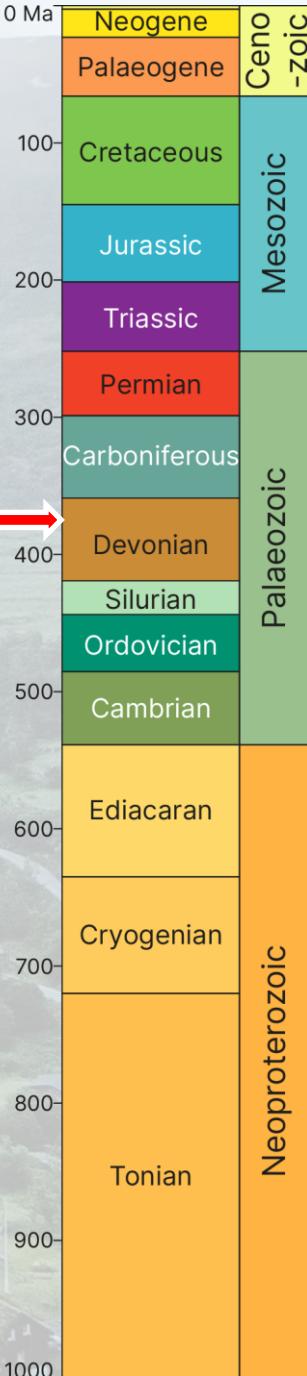


Fig. 7.3

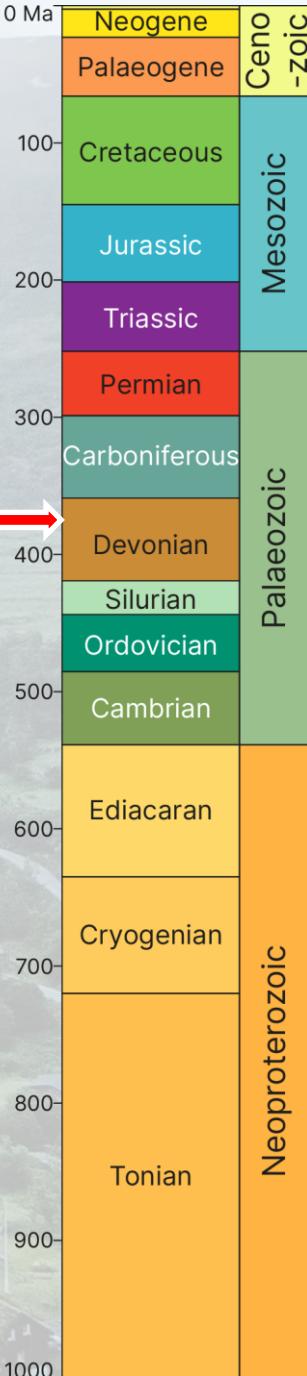
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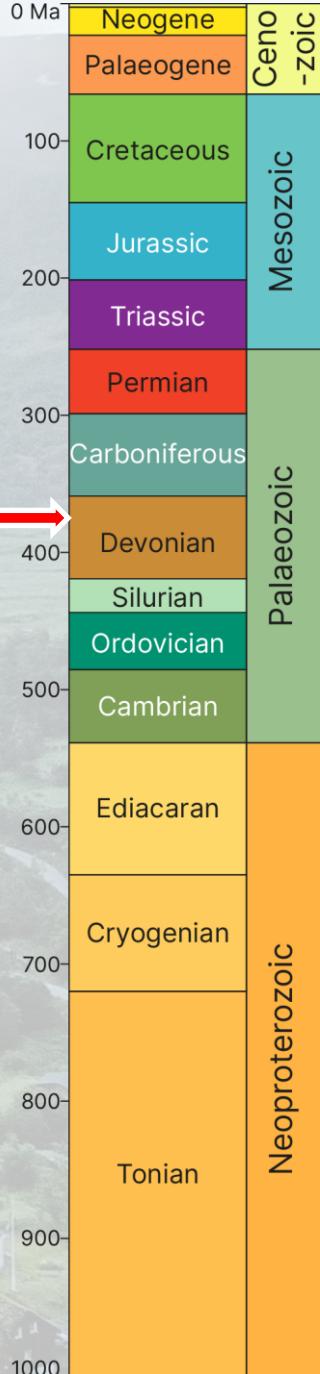
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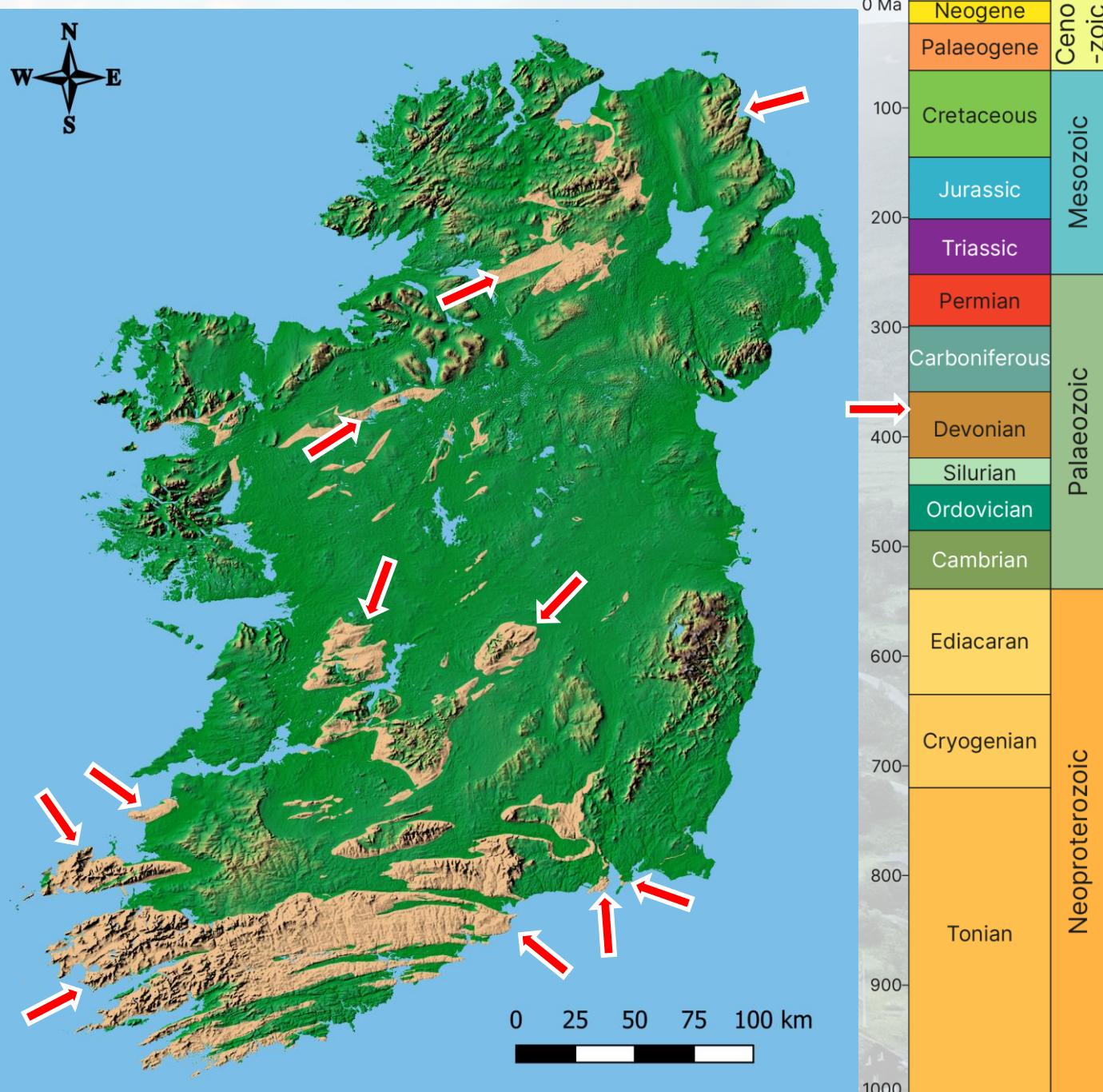
Rise and Fall of The Caledonian Mountains | Devonian River Sandstones of Ireland

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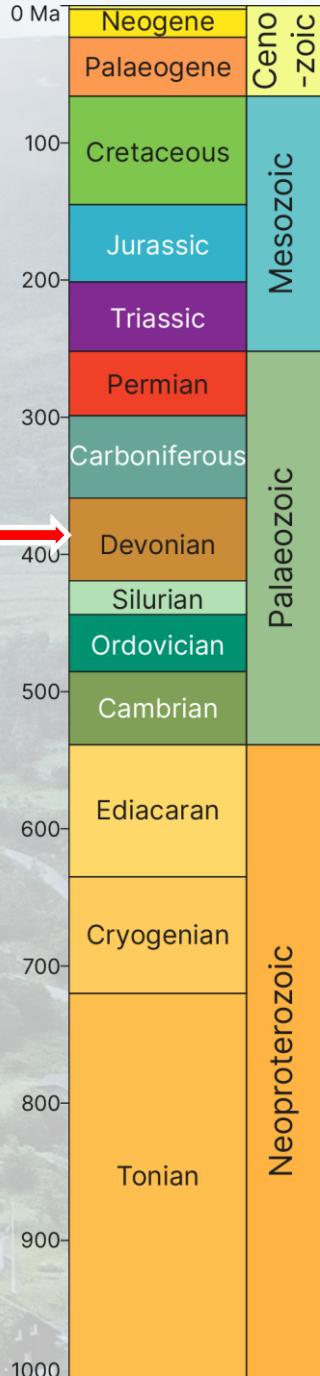
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0 Ma	Neogene	Ceno-zoic
100	Palaeogene	
200	Cretaceous	Mesozoic
300	Jurassic	
400	Triassic	
500	Permian	
600	Carboniferous	
700	Devonian	Palaeozoic
800	Silurian	
900	Ordovician	
1000	Cambrian	
1100	Ediacaran	
1200	Cryogenian	
1300	Tonian	Neoproterozoic

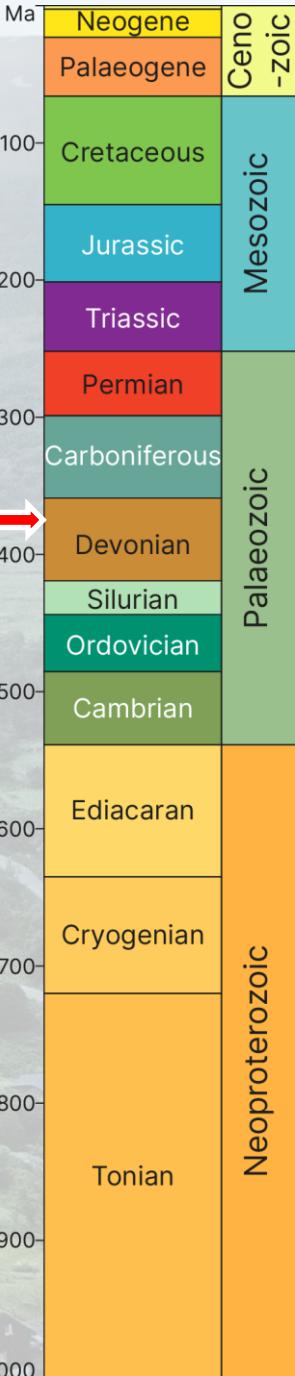
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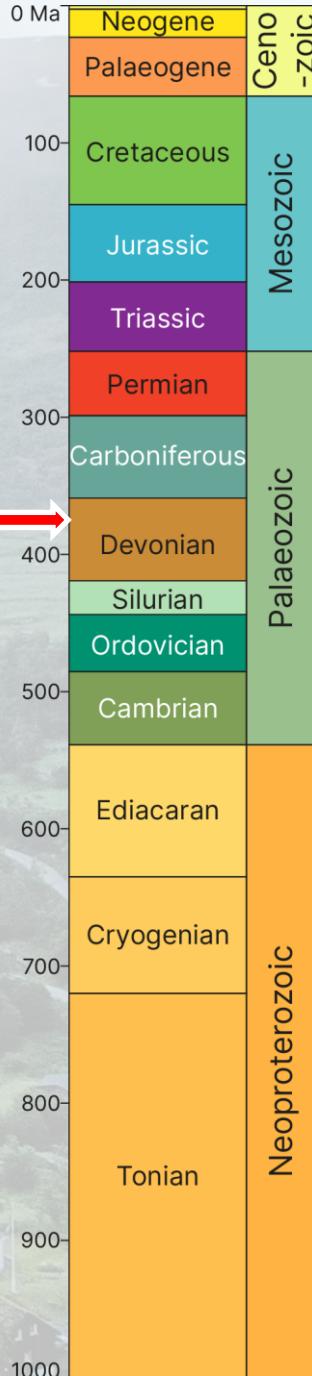
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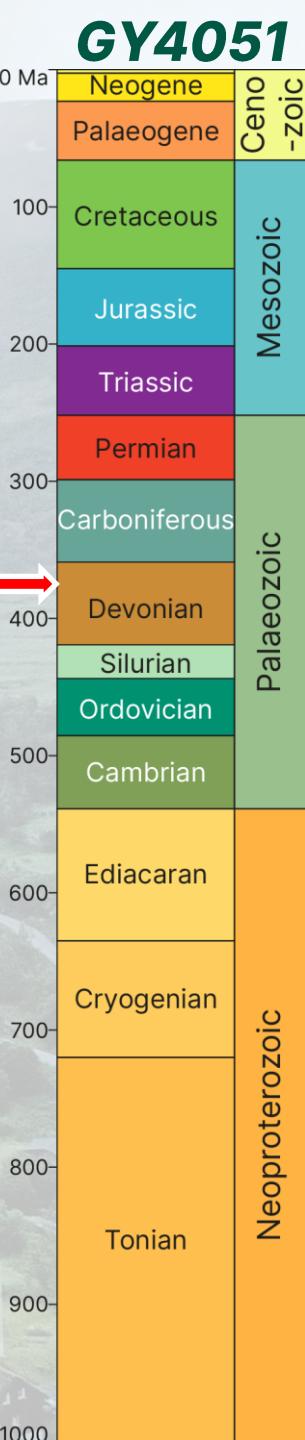


Rise and Fall of The Caledonian Mountains | Devonian Millstones of Ireland

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Rise and Fall of The Caledonian Mountains | Devonian Millstones of Ireland

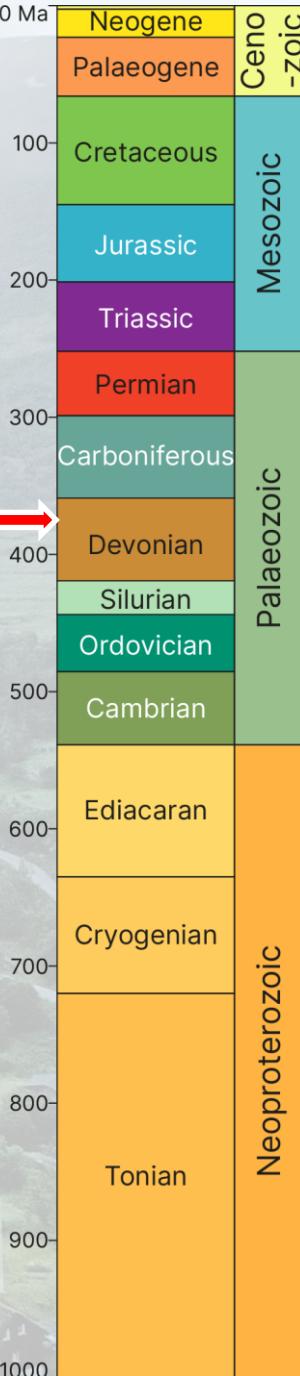


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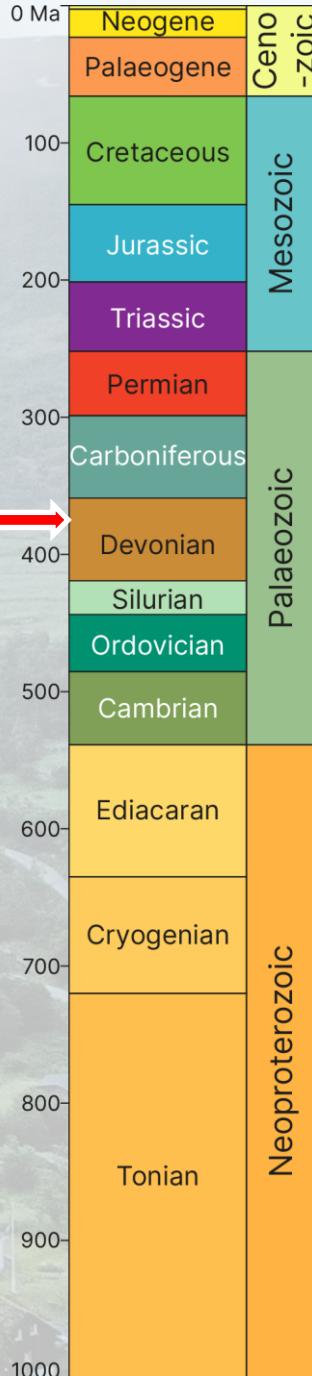


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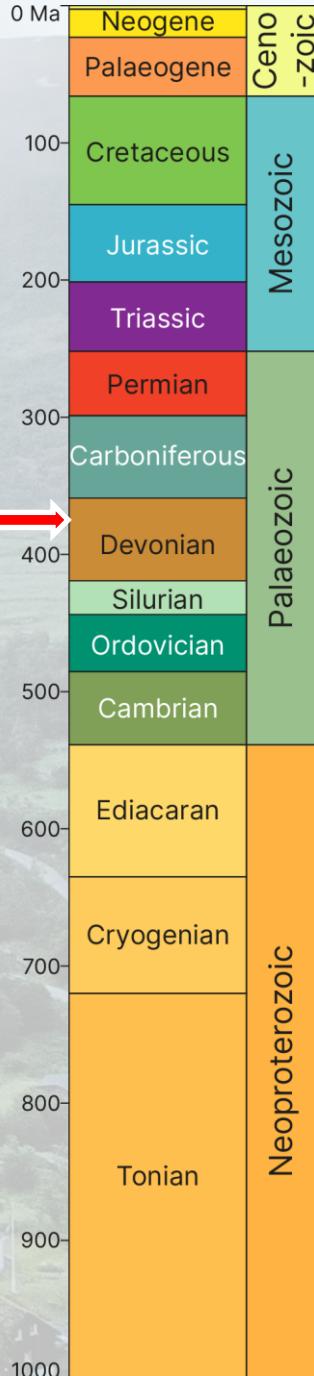


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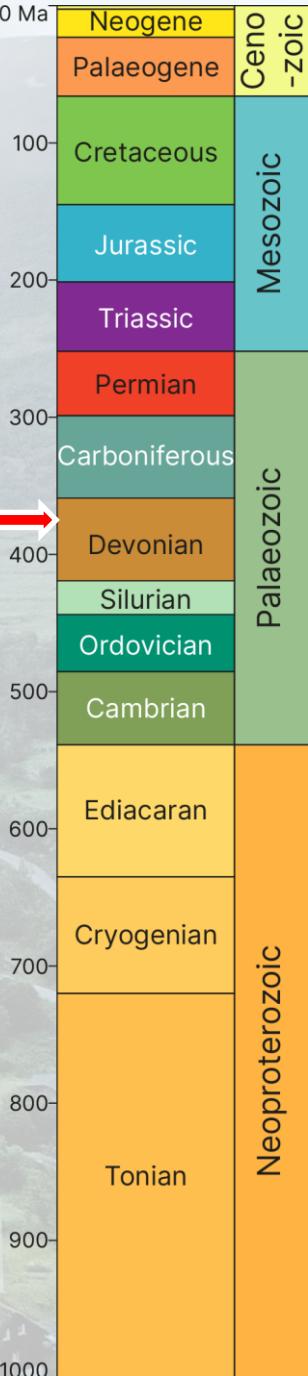
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Rise and Fall of The Caledonian Mountains | Devonian River Sandstones of Ireland

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Rise and Fall of The Caledonian Mountains | Devonian River Sandstones of Ireland

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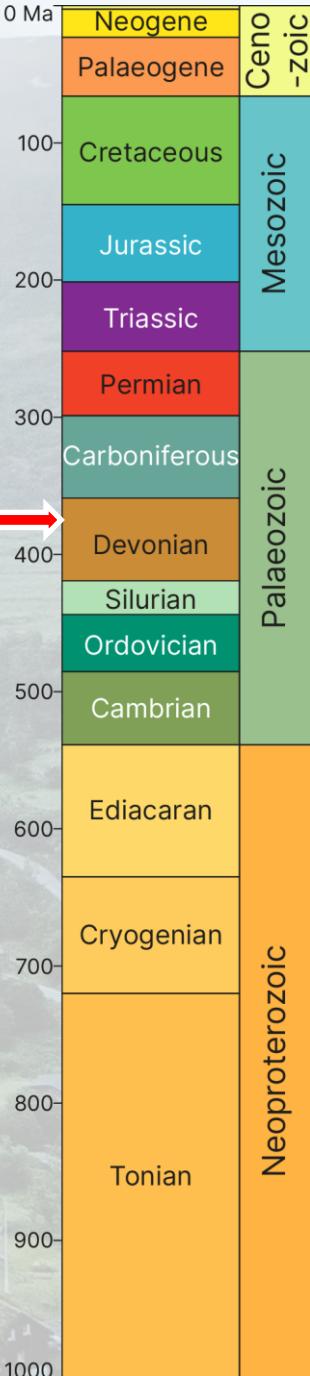






Rise and Fall of The Caledonian Mountains | Devonian River Sandstones of Ireland

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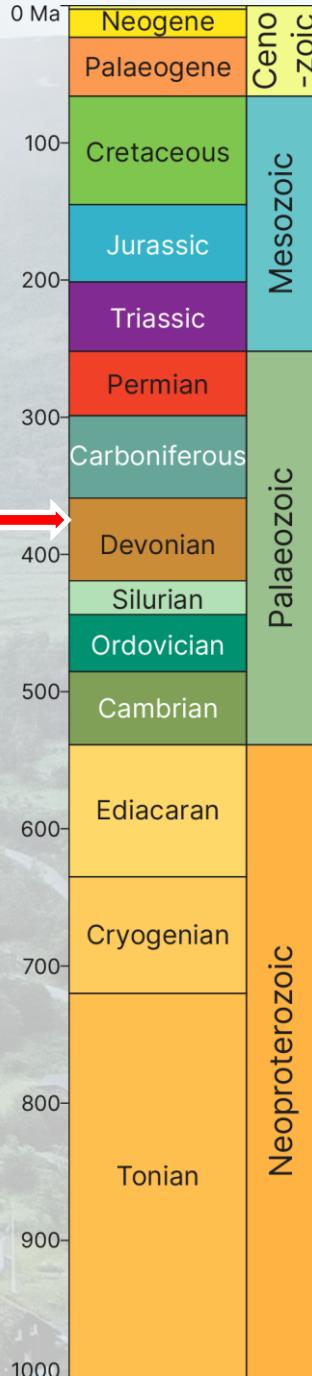


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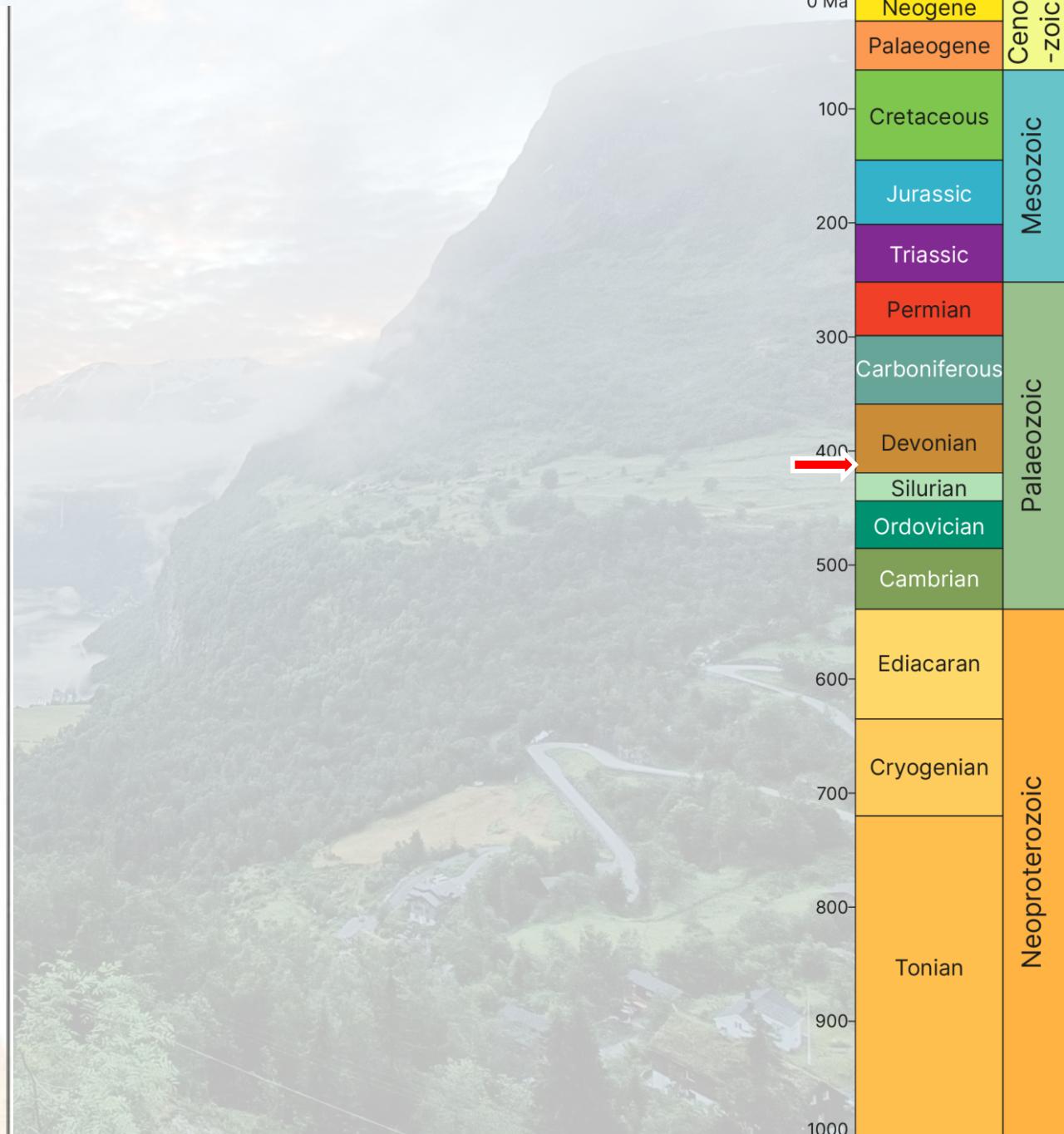
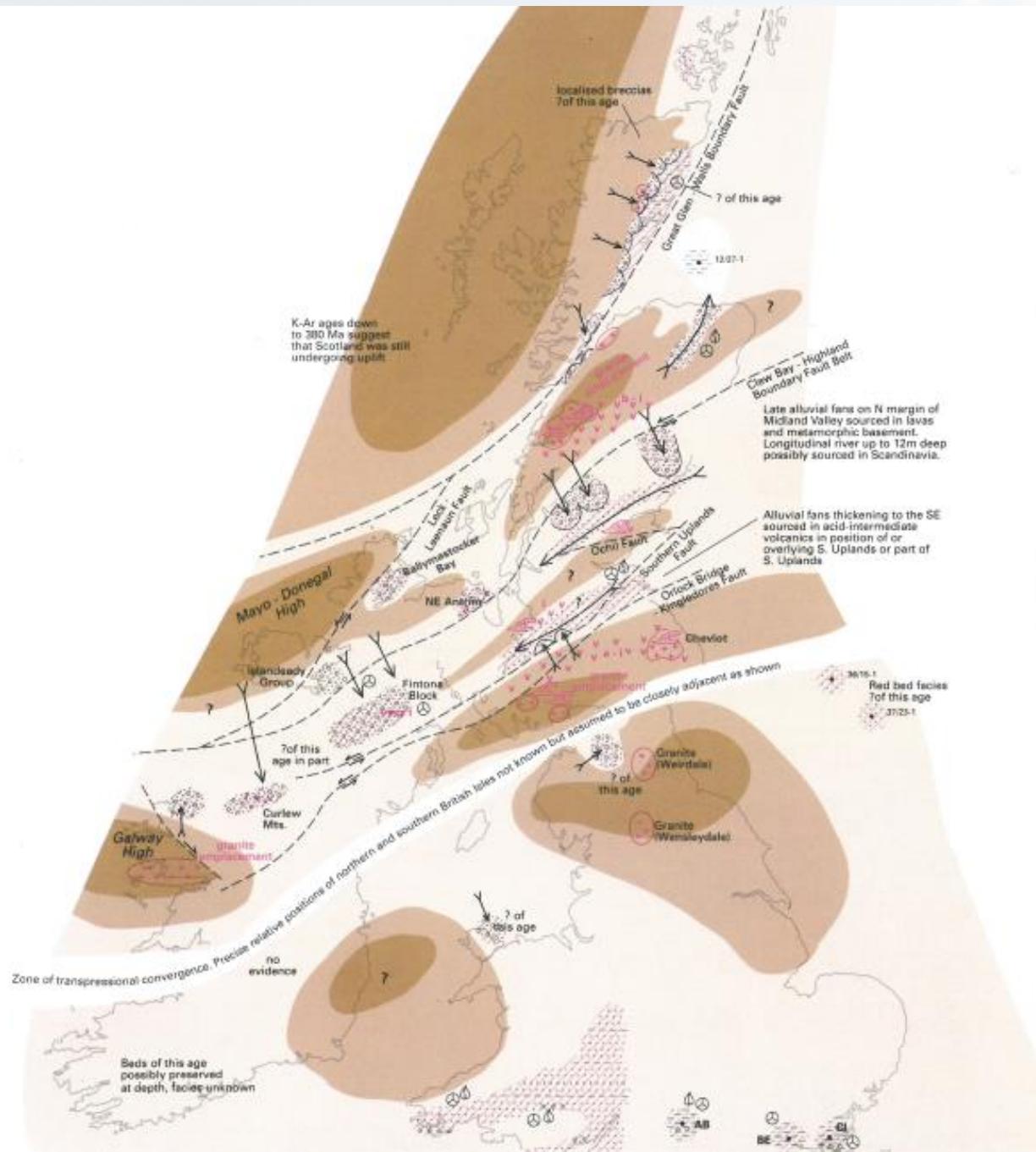
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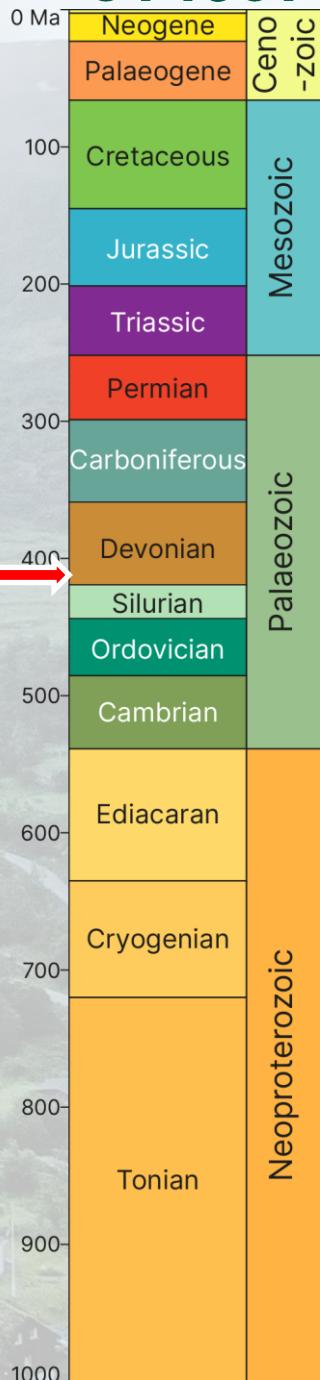




Fall of The Caledonian Mountains | Devonian of Ireland

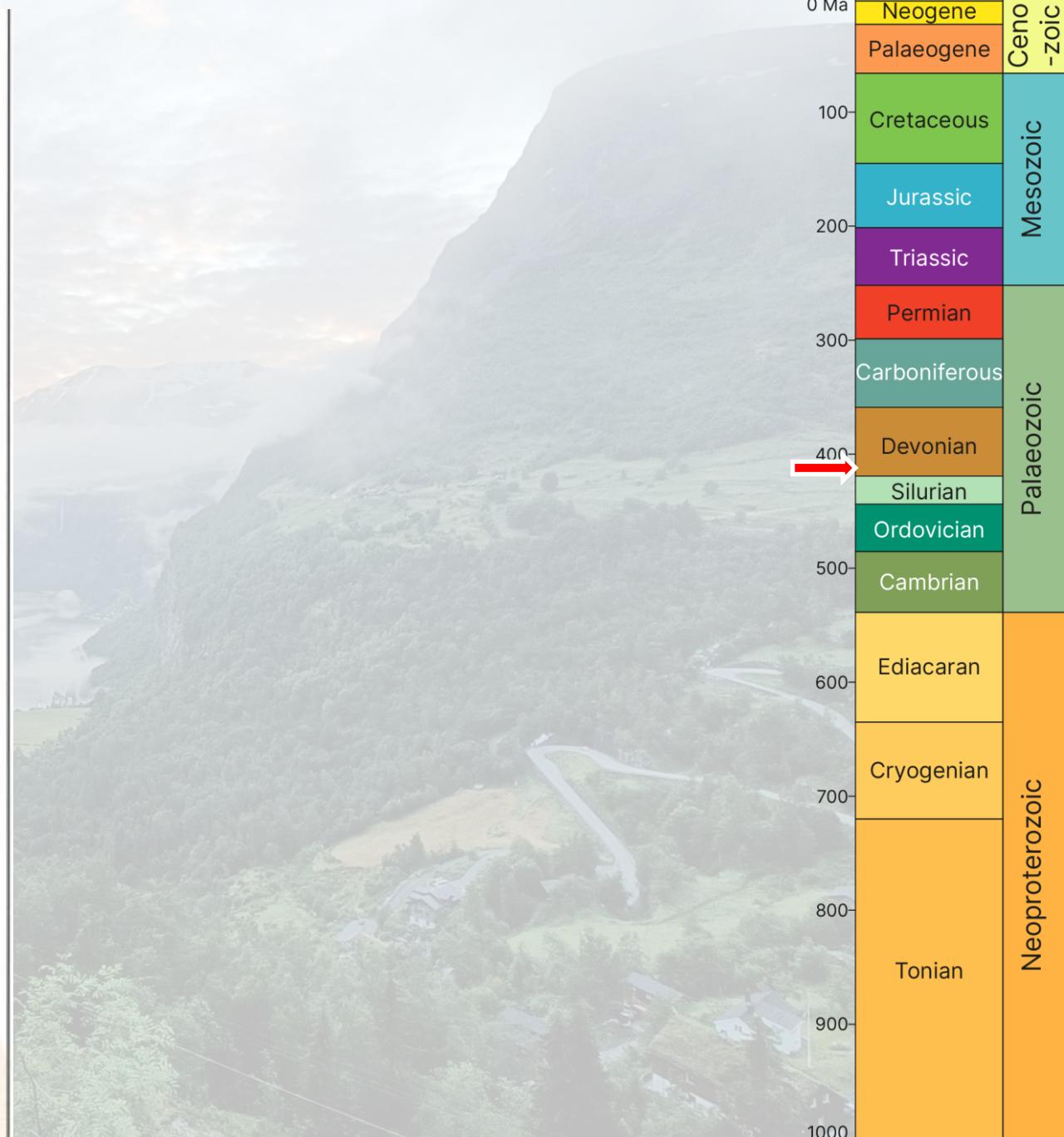
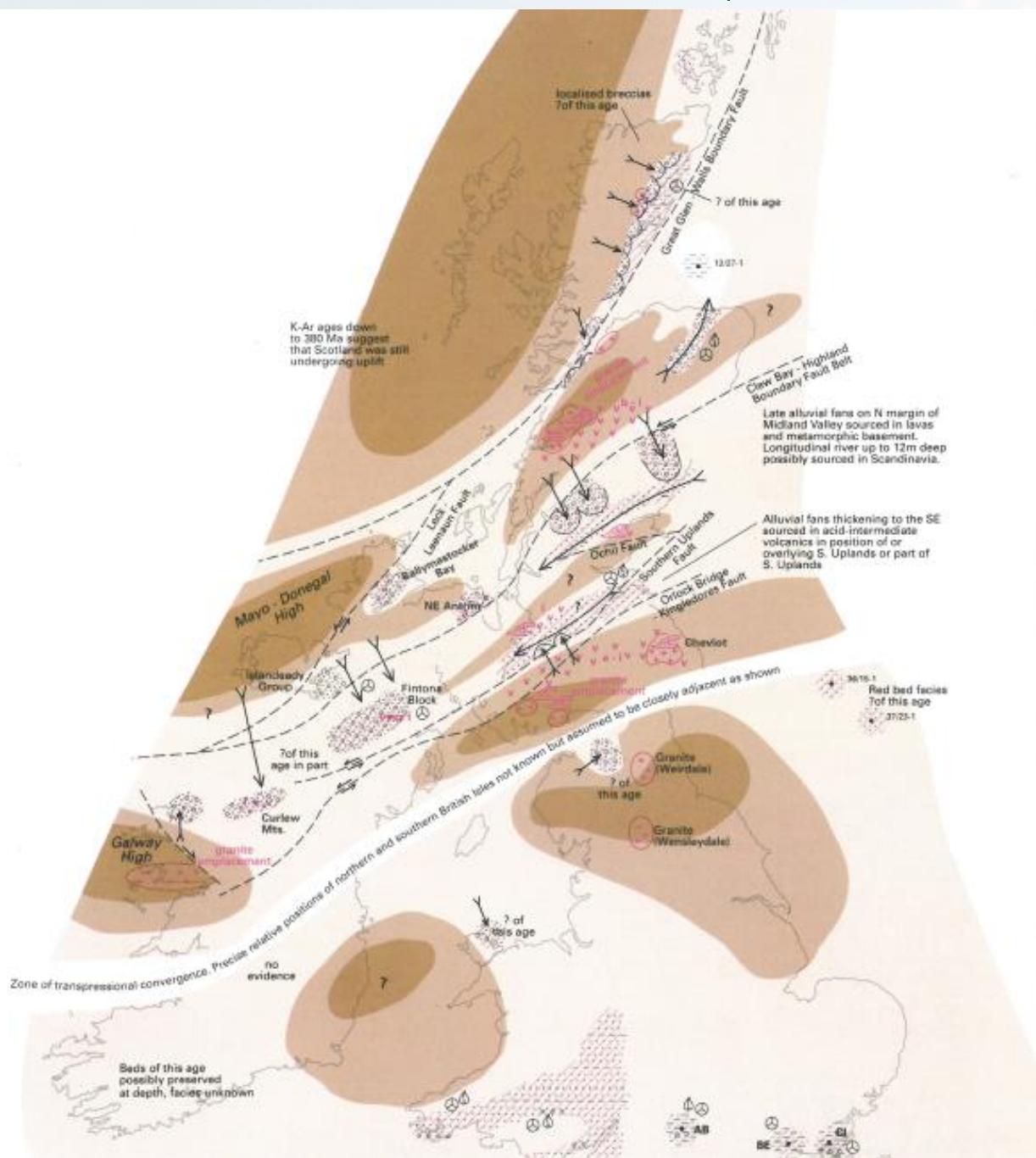


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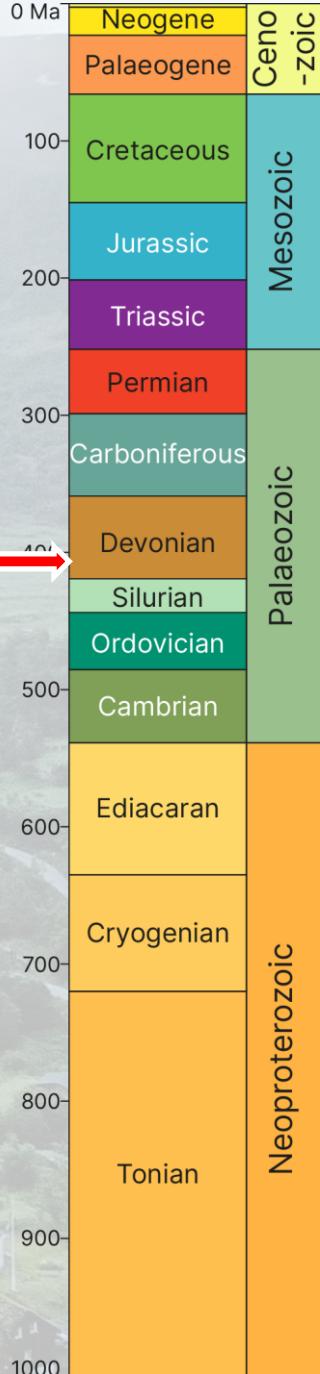
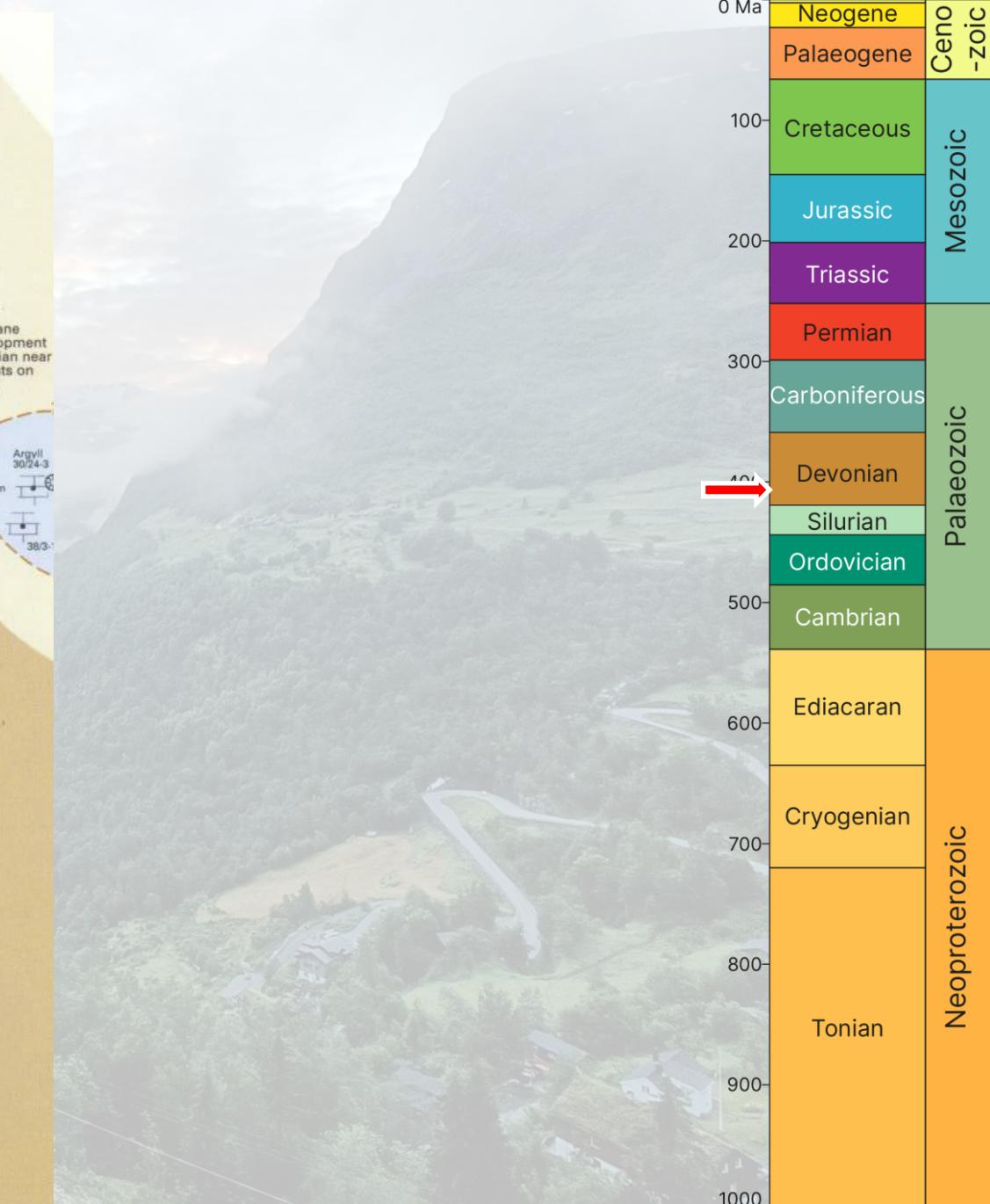
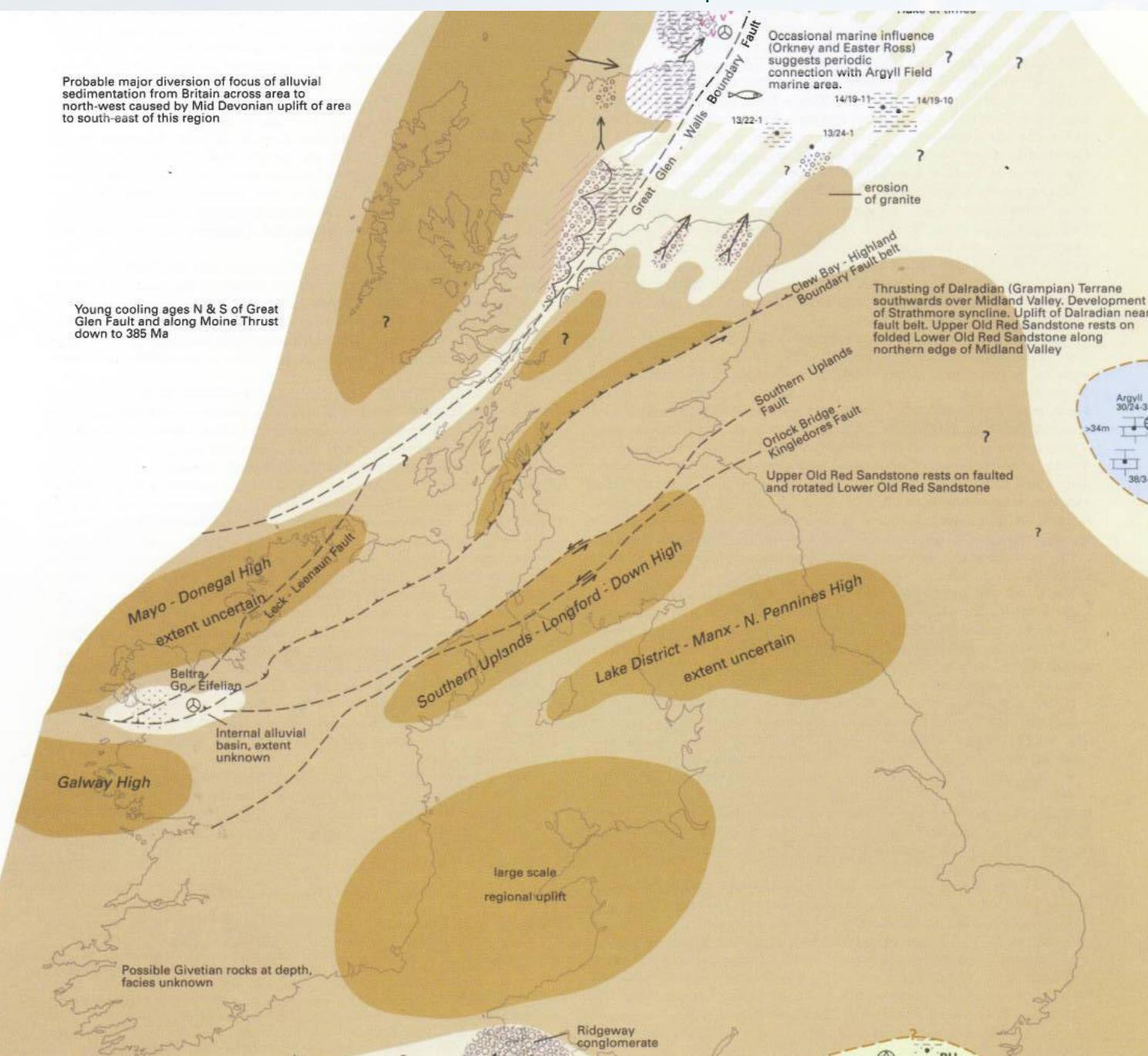
Fall of The Caledonian Mountains | Devonian of Ireland



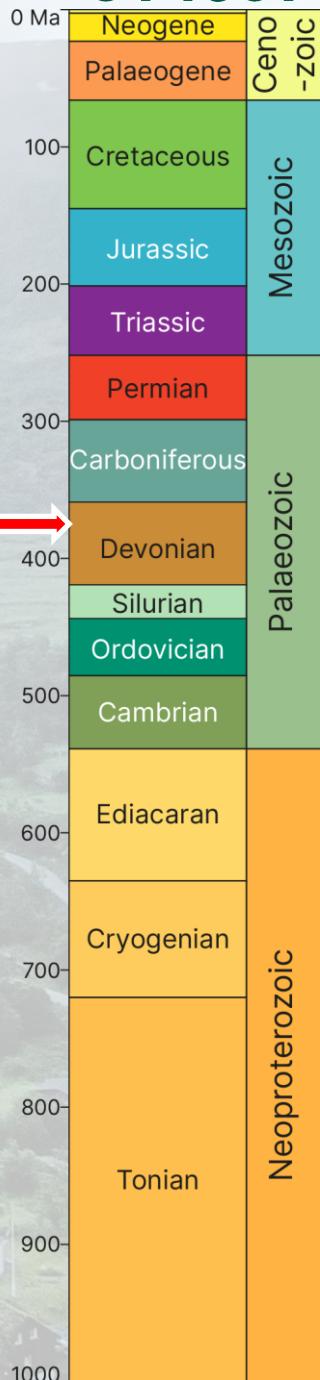
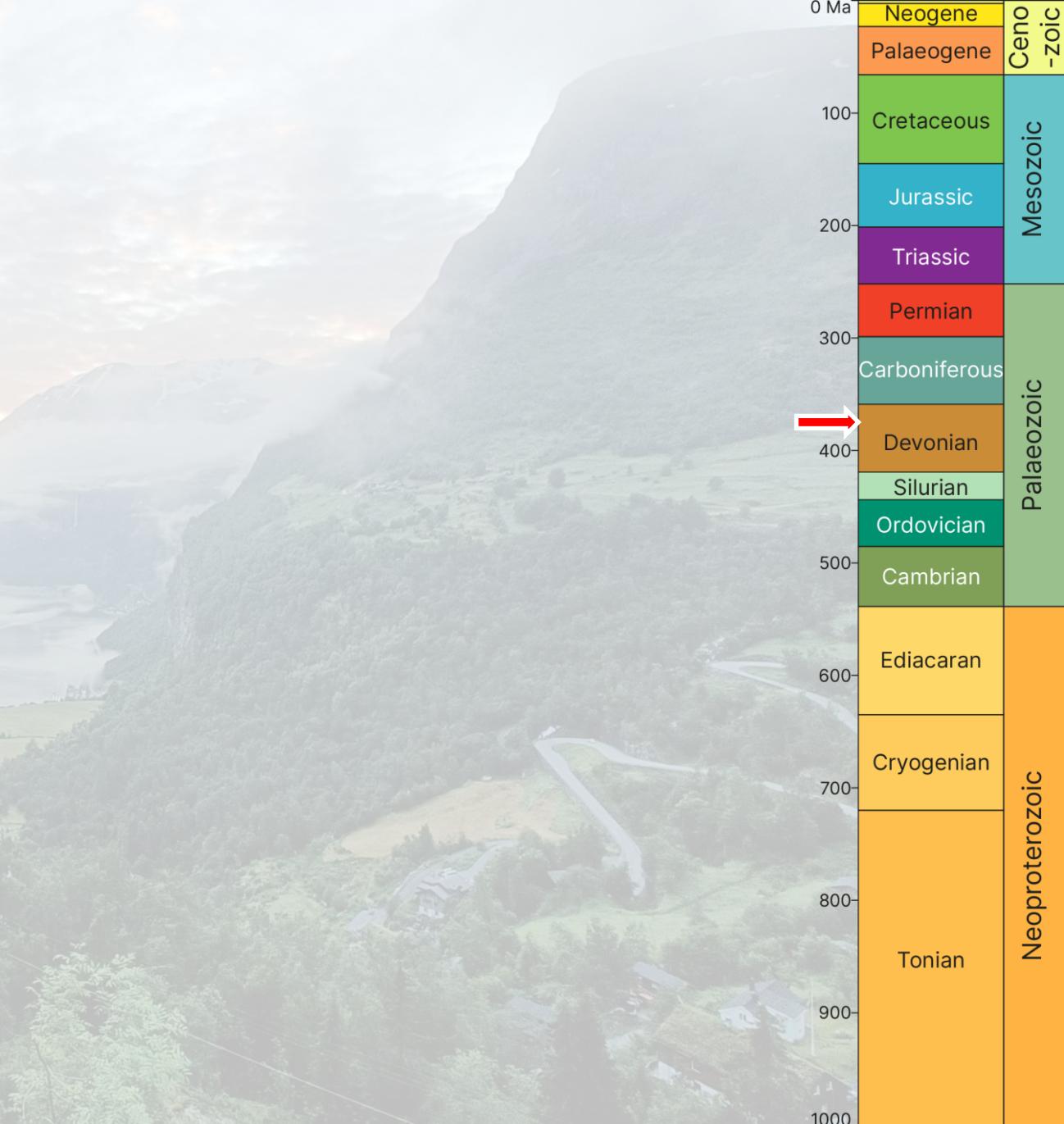
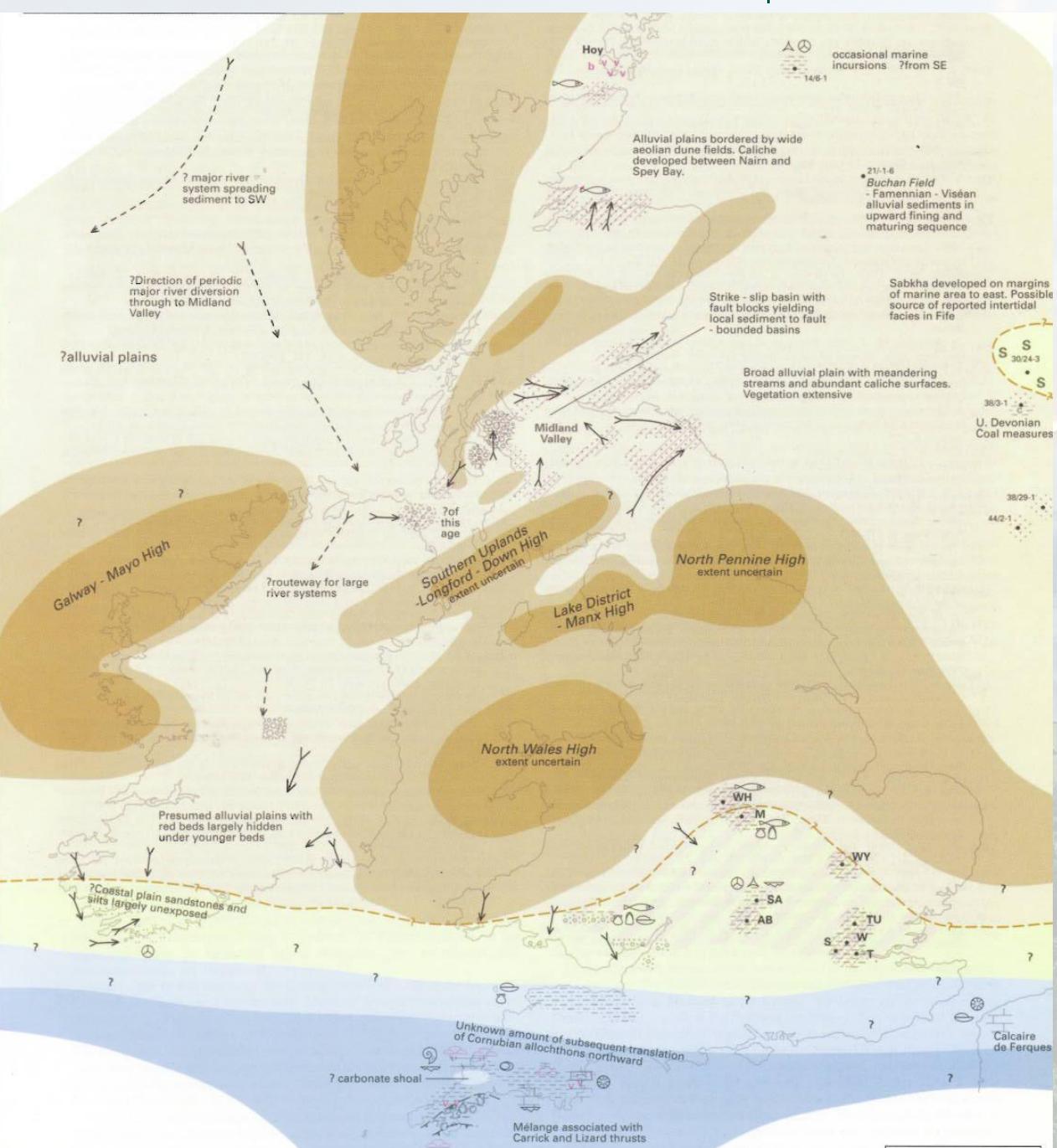
Fall of The Caledonian Mountains | Devonian of Ireland

Probable major diversion of focus of alluvial sedimentation from Britain across area to north-west caused by Mid Devonian uplift of area to south-east of this region

Young cooling ages N & S of Great Glen Fault and along Moine Thrust down to 385 Ma

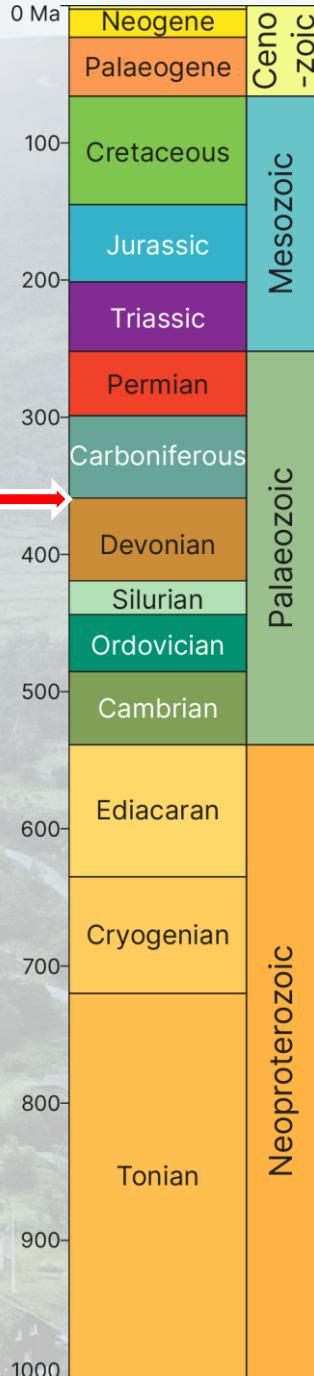


Fall of The Caledonian Mountains | Devonian of Ireland



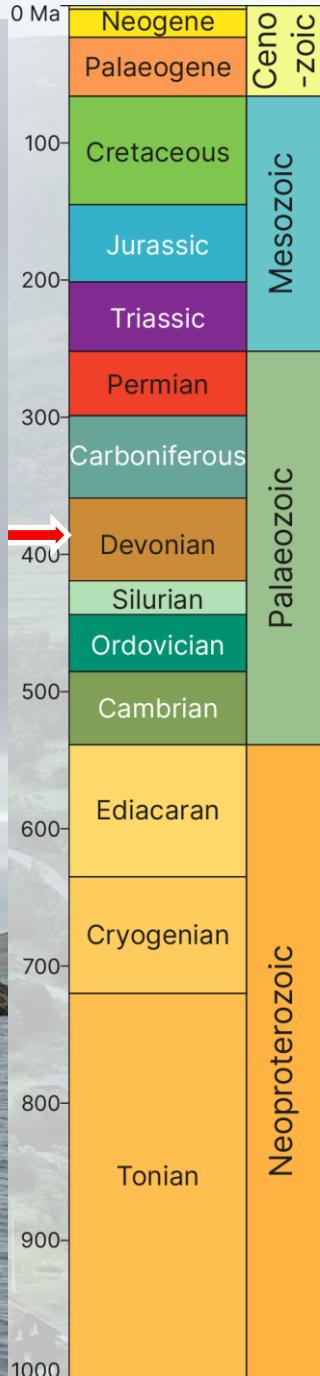
Rise and Fall of The Caledonian Mountains | Devonian of Ireland

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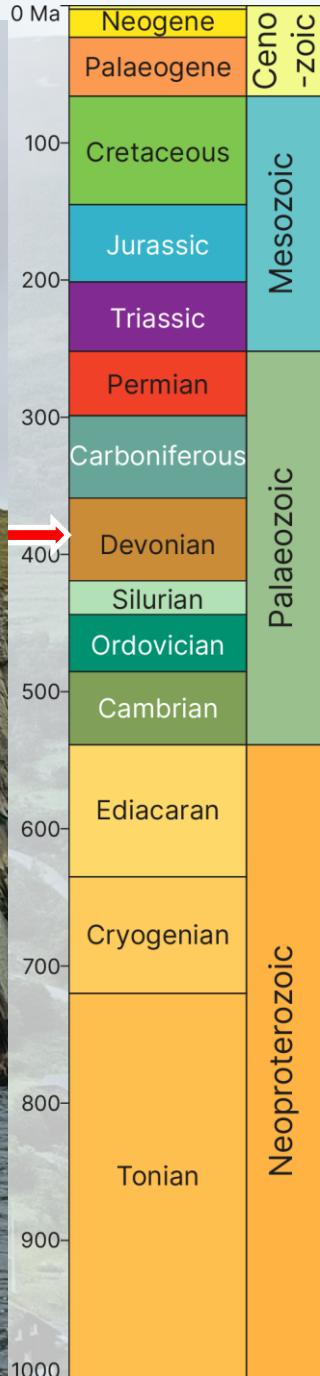
Rise and Fall of The Caledonian Mountains | Devonian River Sandstones of Ireland

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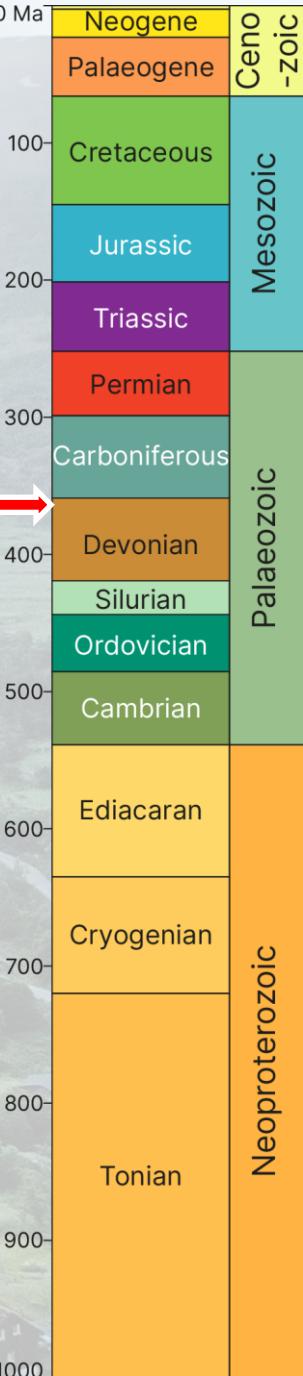
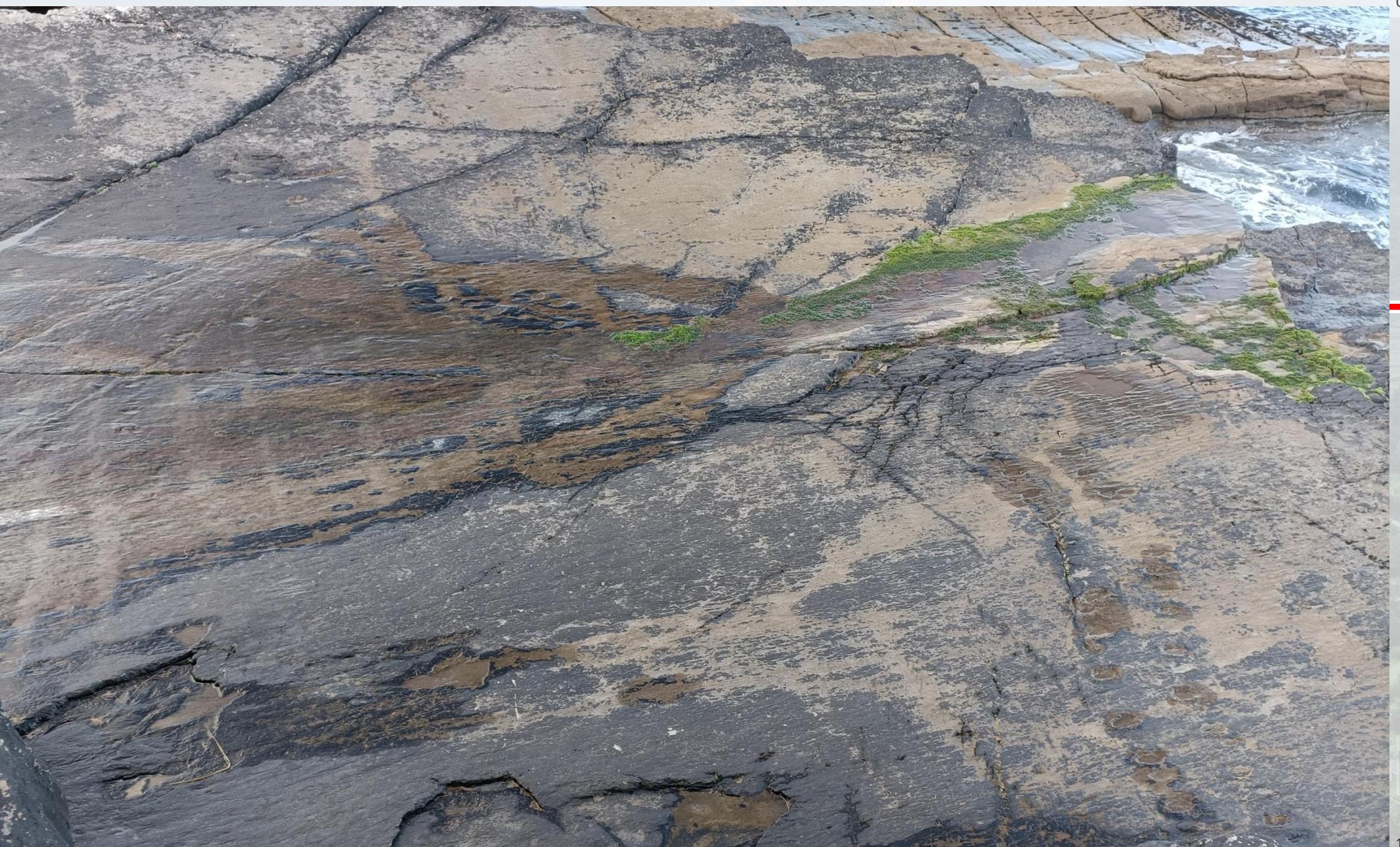
Rise and Fall of The Caledonian Mountains | Marine Transgression

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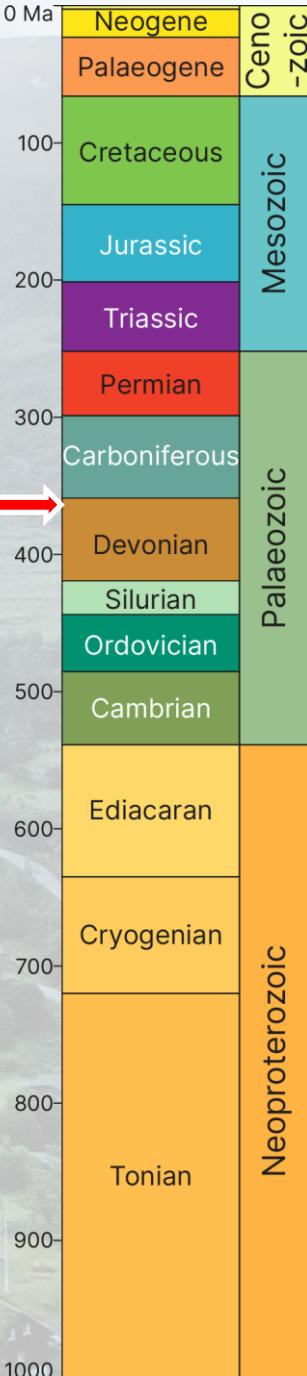
Rise and Fall of The Caledonian Mountains | Marine Transgression

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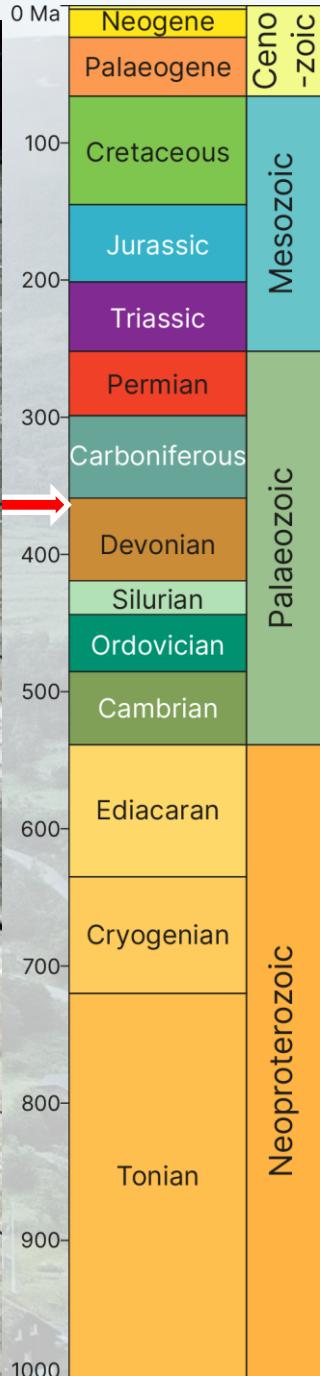
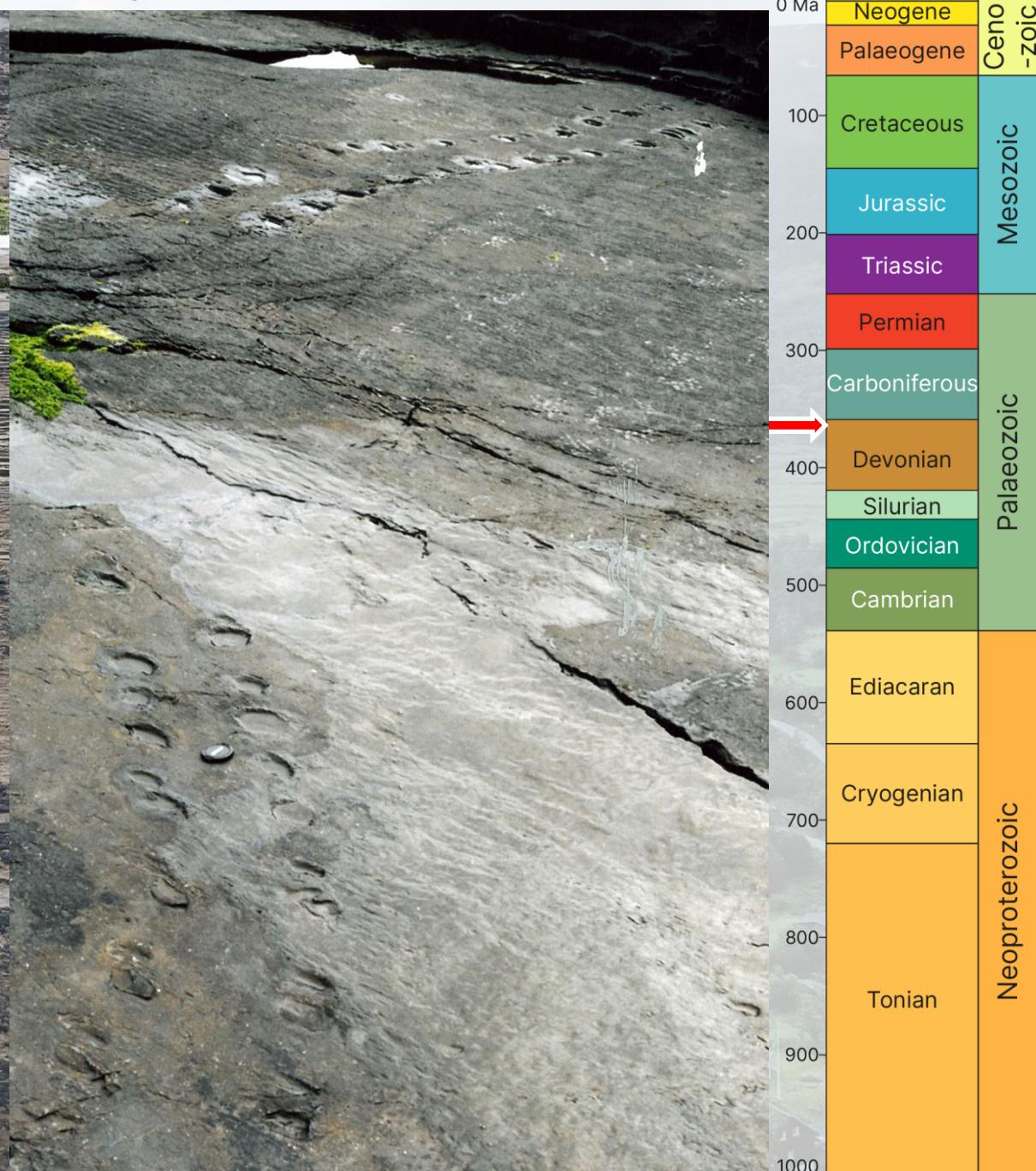
Rise and Fall of The Caledonian Mountains | *Marine Transgression*

GY4051



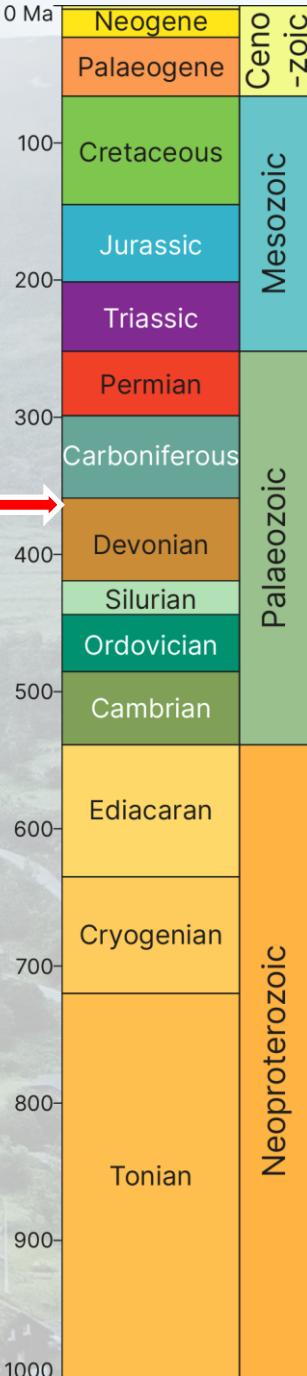
Rise and Fall of The Caledonian Mountains | Marine Transgression

GY4051



Rise and Fall of The Caledonian Mountains | *Marine Transgression*

GY4051



Rise and Fall of The Caledonian Mountains | Marine Transgression

GY4051

