

The tectonic evolution of the Omeo Zone, southeast Lachlan Fold Belt, Australia

Australian Earth Science Convention
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Senior Economic Geologist



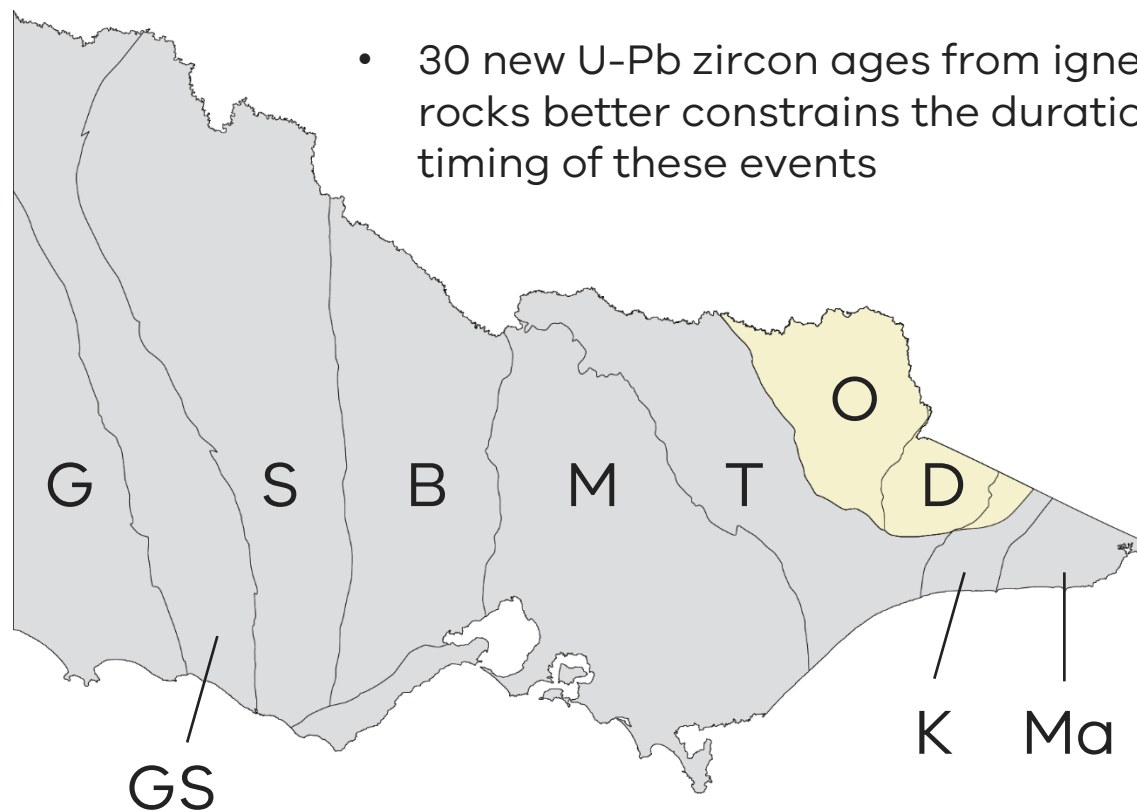
VICTORIA

VICTORIAN STRUCTURAL ZONES

G	=	Glenelg
GS	=	Grampians-Stavely
S	=	Stawell
B	=	Bendigo
M	=	Melbourne
T	=	Tabberabbera
O	=	Omeo
D	=	Deddick
K	=	Kuark
Ma	=	Mallacoota

OMEIO-DEDDICK-KUARK ZONES

- Unique history of voluminous Silurian magmatism and coeval sedimentation
- Two phases of more widespread and compositionally distinct Devonian magmatism
- 30 new U-Pb zircon ages from igneous rocks better constrains the duration and timing of these events





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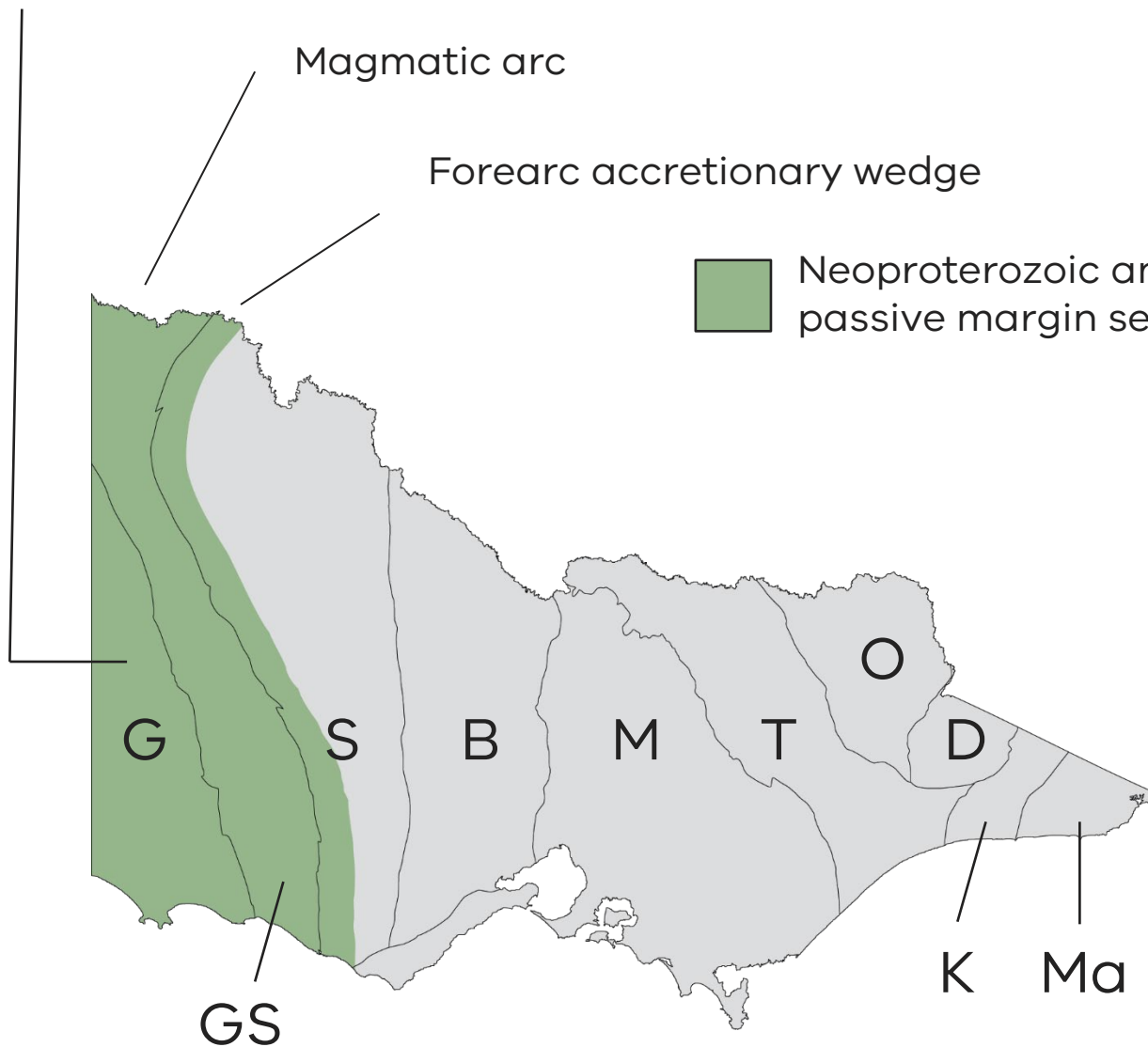
DELAMERIAN ARC (515-490 Ma)

Backarc

Magmatic arc

Forearc accretionary wedge

 Neoproterozoic and early Cambrian passive margin sediments





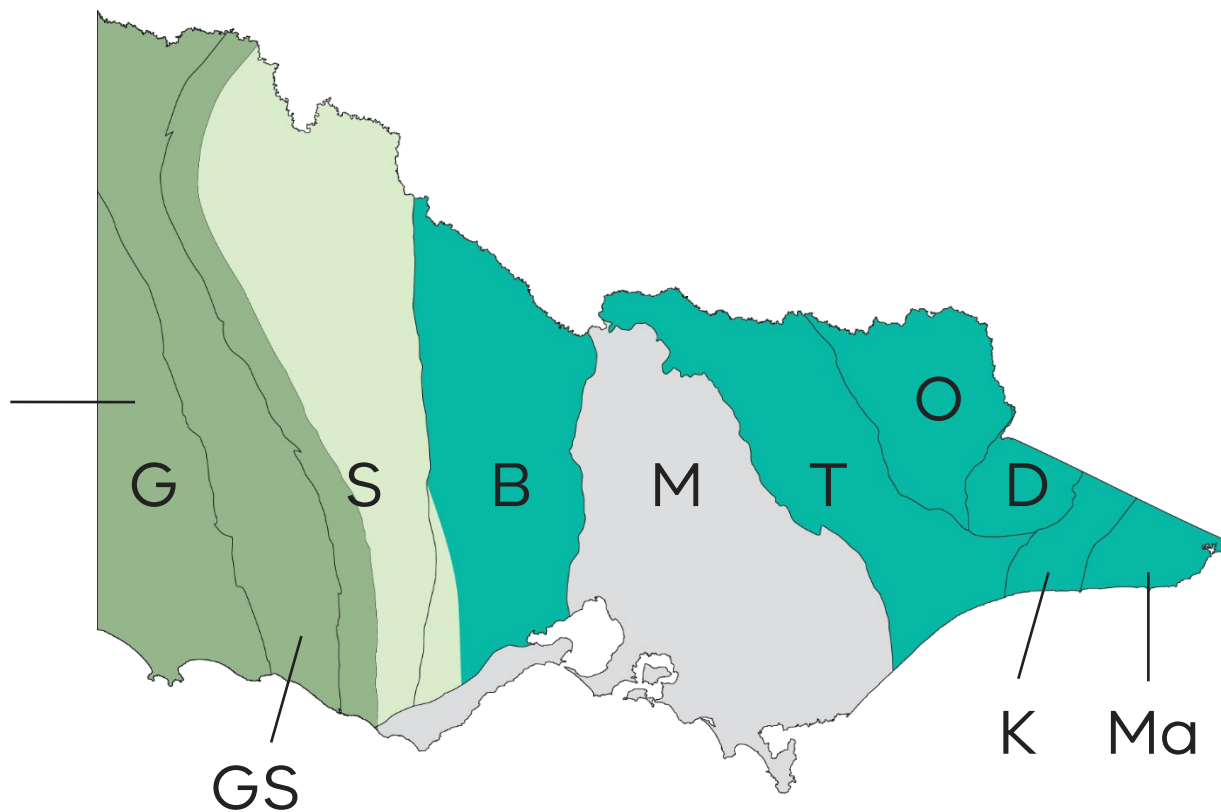
VICTORIA

PASSIVE MARGIN SEDIMENTATION (490-445 Ma)

-  Neoproterozoic and early Cambrian passive margin sediments
-  Late Cambrian passive margin sediments
-  Ordovician passive margin sediments

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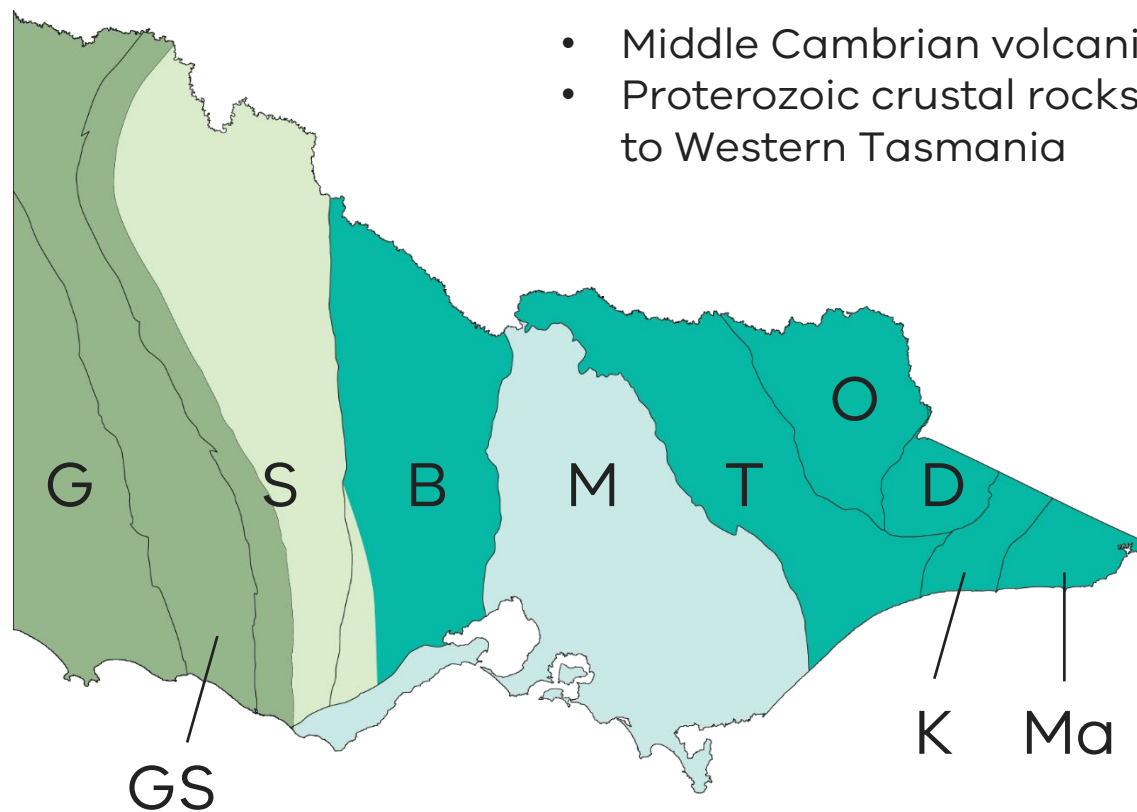
MELBOURNE ZONE

DOMINANT SURFACE LITHOLOGIES

 Siluro-Devonian sediments – dominantly mudstone, some conglomerate and sandstone, minor limestone

RARELY EXPOSED BASEMENT

- Middle Cambrian volcanics
- Proterozoic crustal rocks equivalent to Western Tasmania

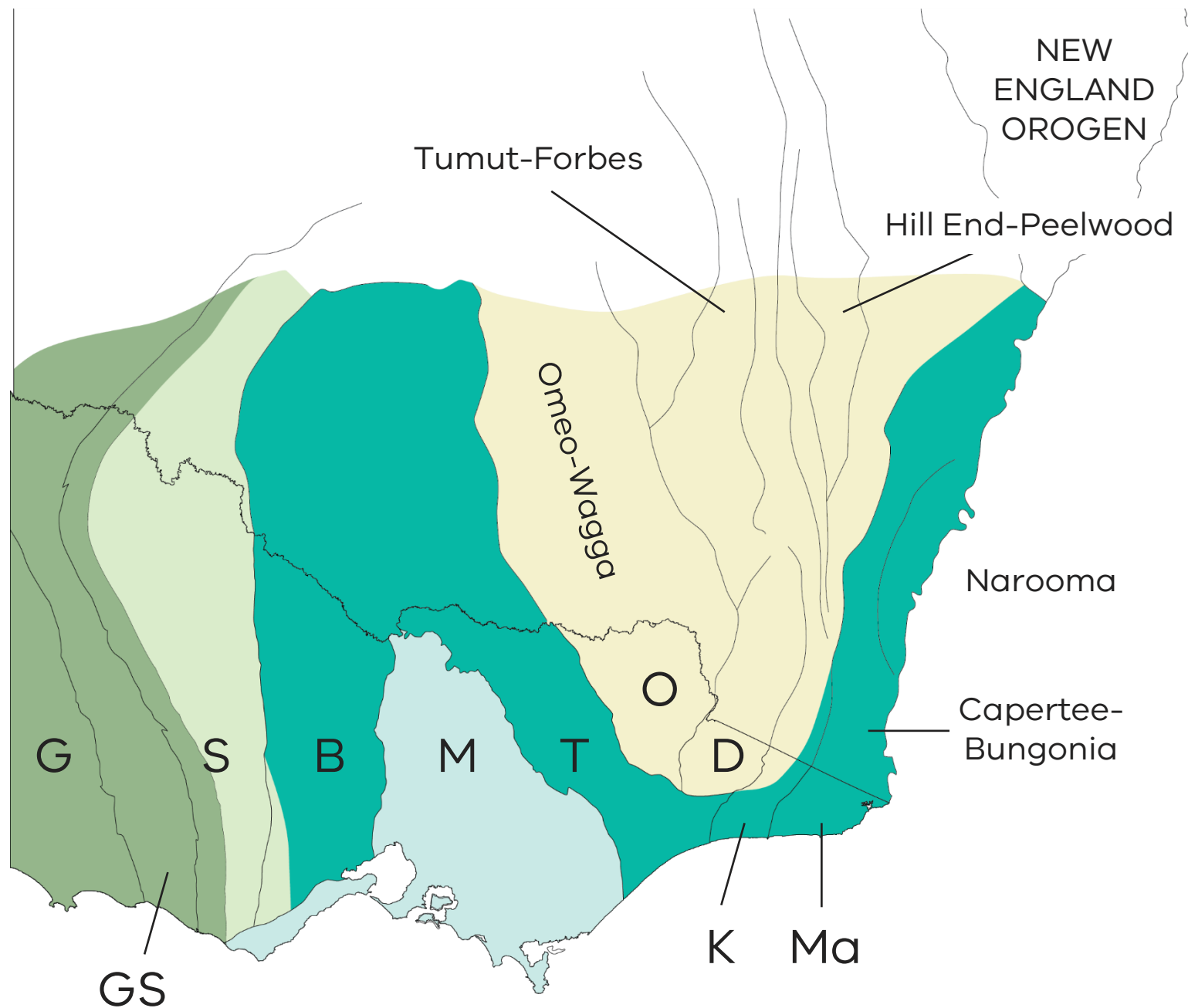


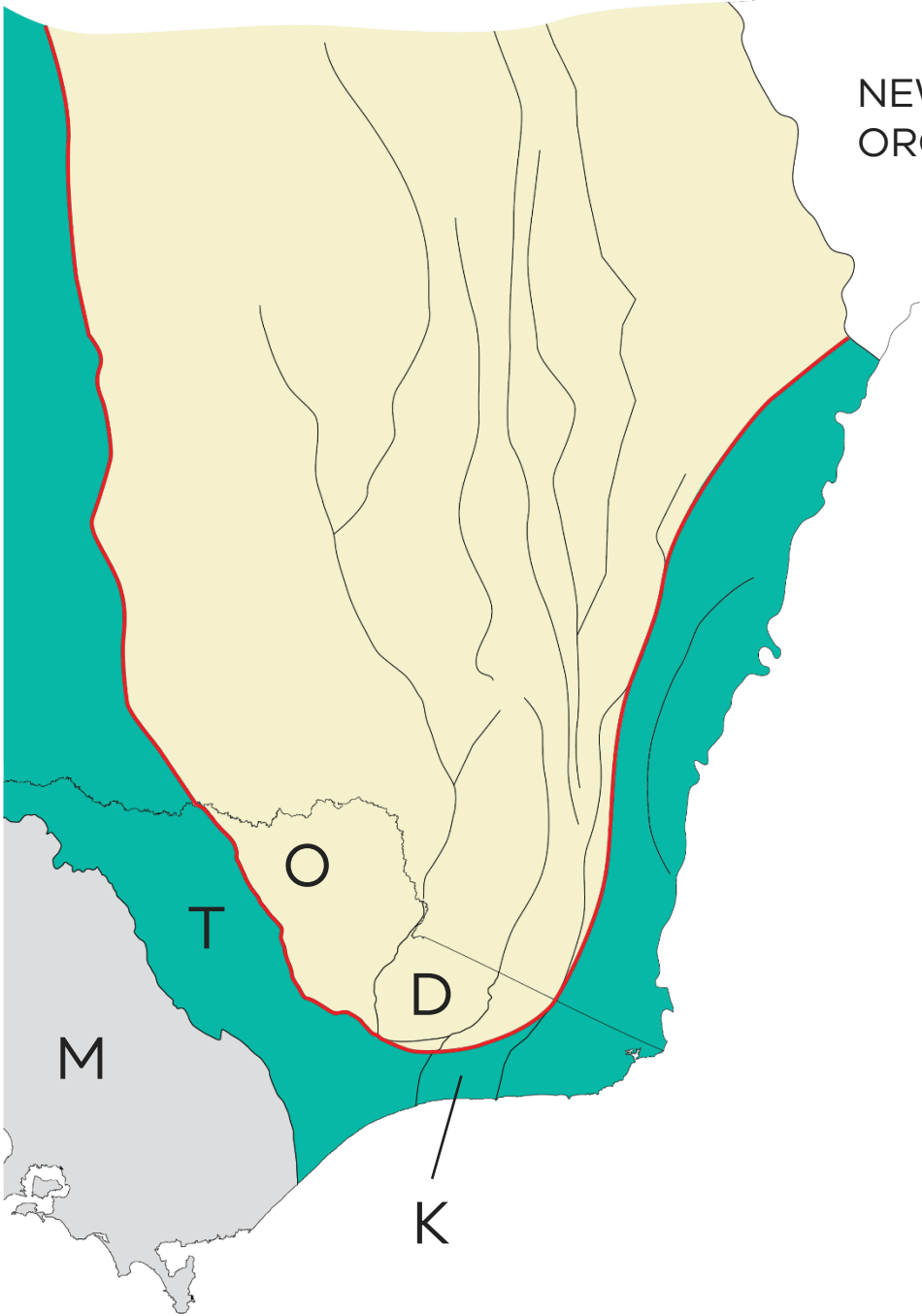


VICTORIA

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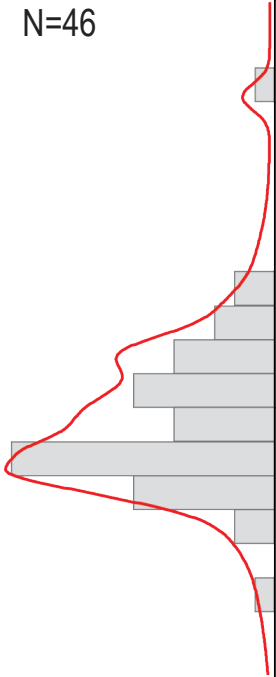
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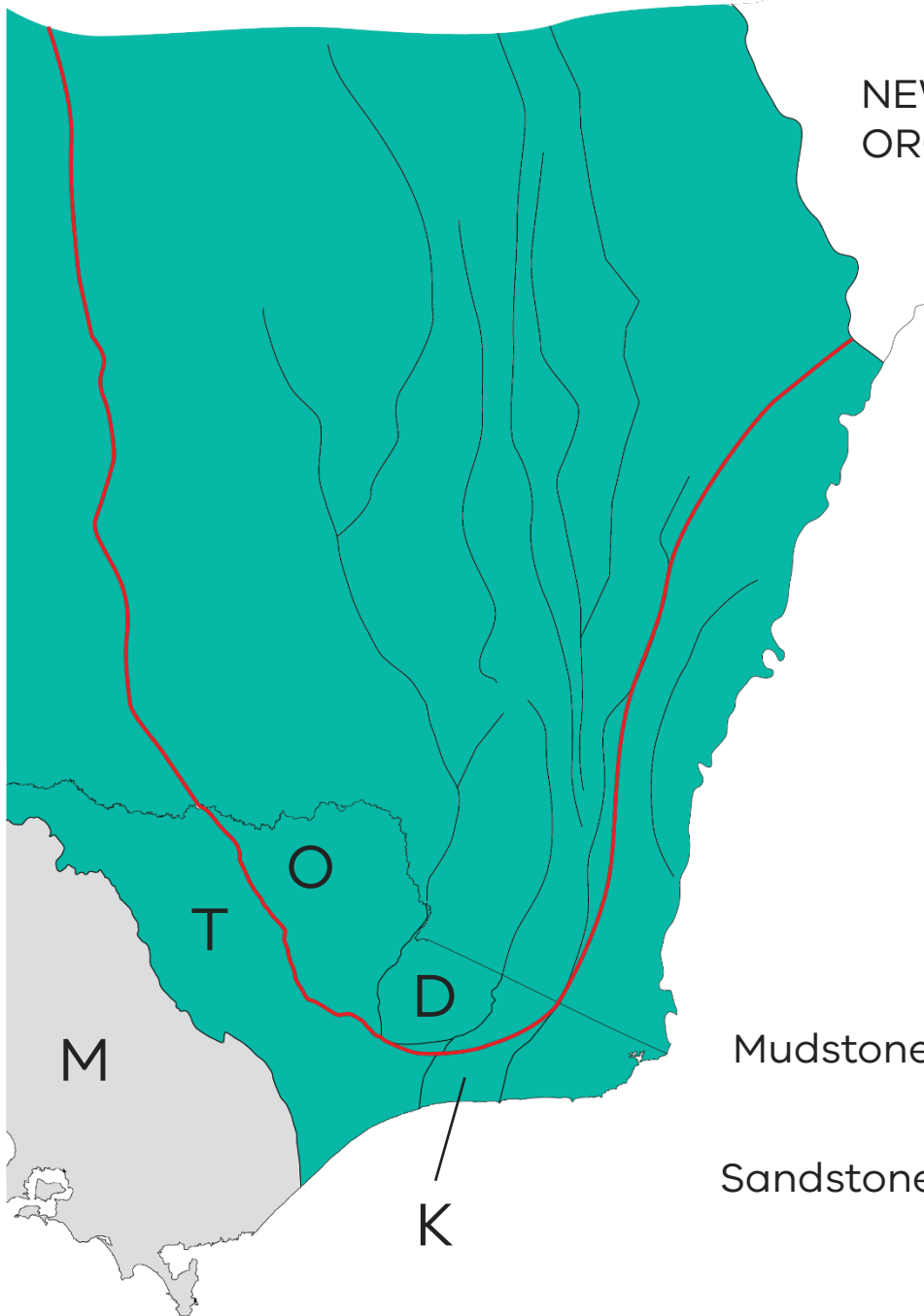


NEW ENGLAND
OROGEN

U-Pb zircon age data
N=46

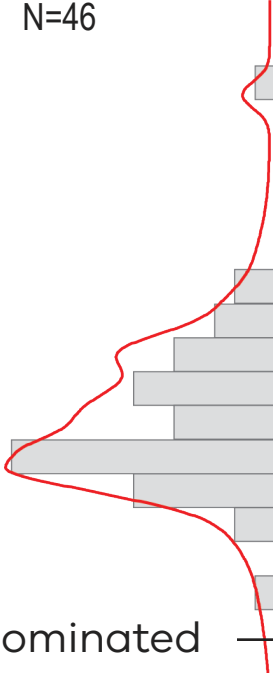


TAB.	OMEQ	DEDDICK	KUARK	NSW			
					L	DEVONIAN	359
					383 M		
					393 E		
					L	SILURIAN	419
					427 E		
					L	ORDOVICIAN	444
					458 M		
					470 E		
							485



NEW ENGLAND
OROGEN

U-Pb zircon age data
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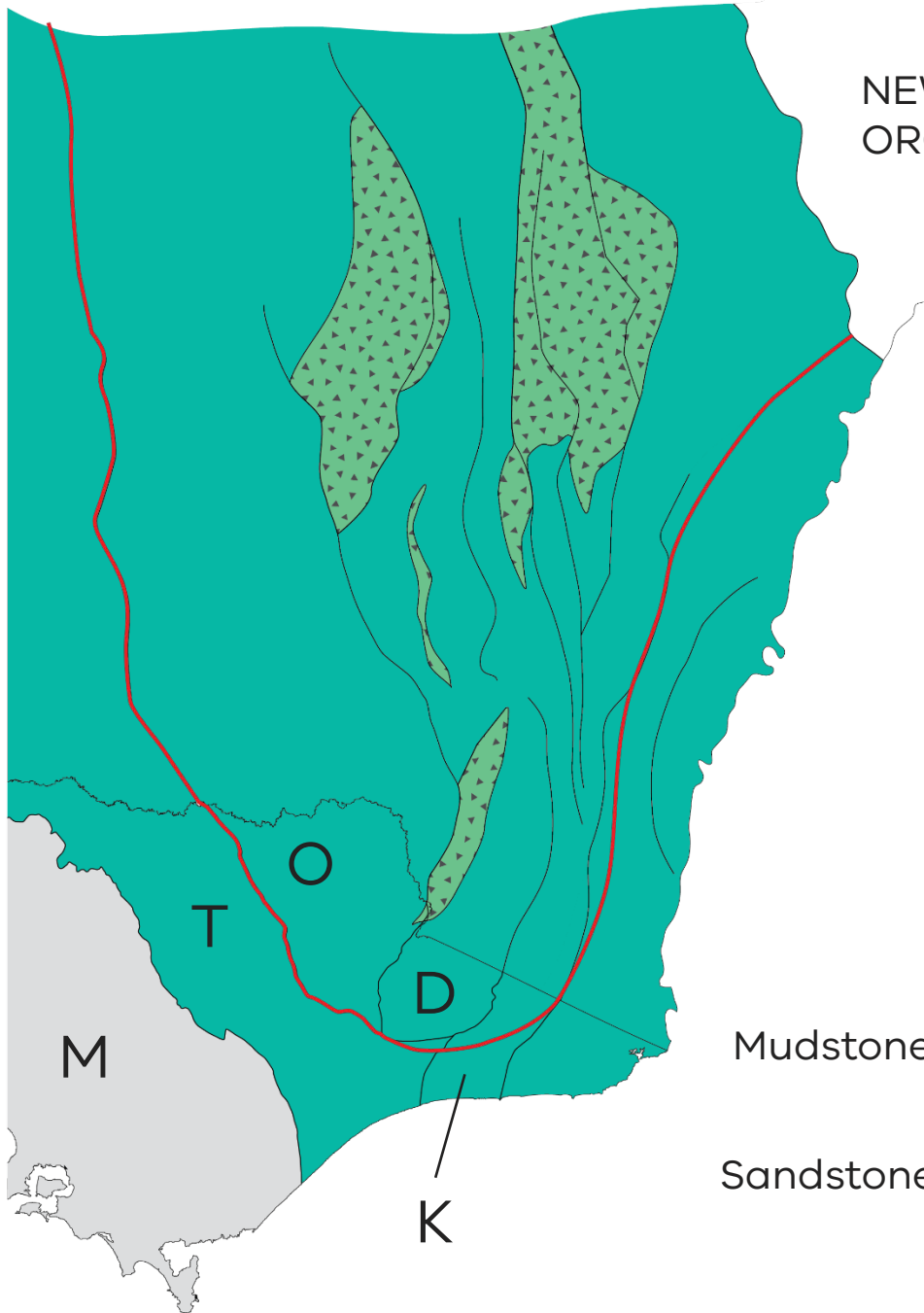
Mudstone dominated

Sandstone dominated

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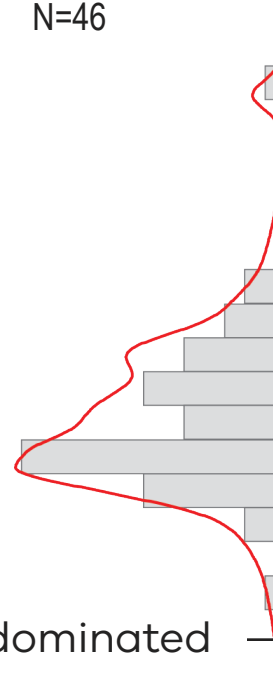
BENDOC GROUP

ADAMINABY GROUP



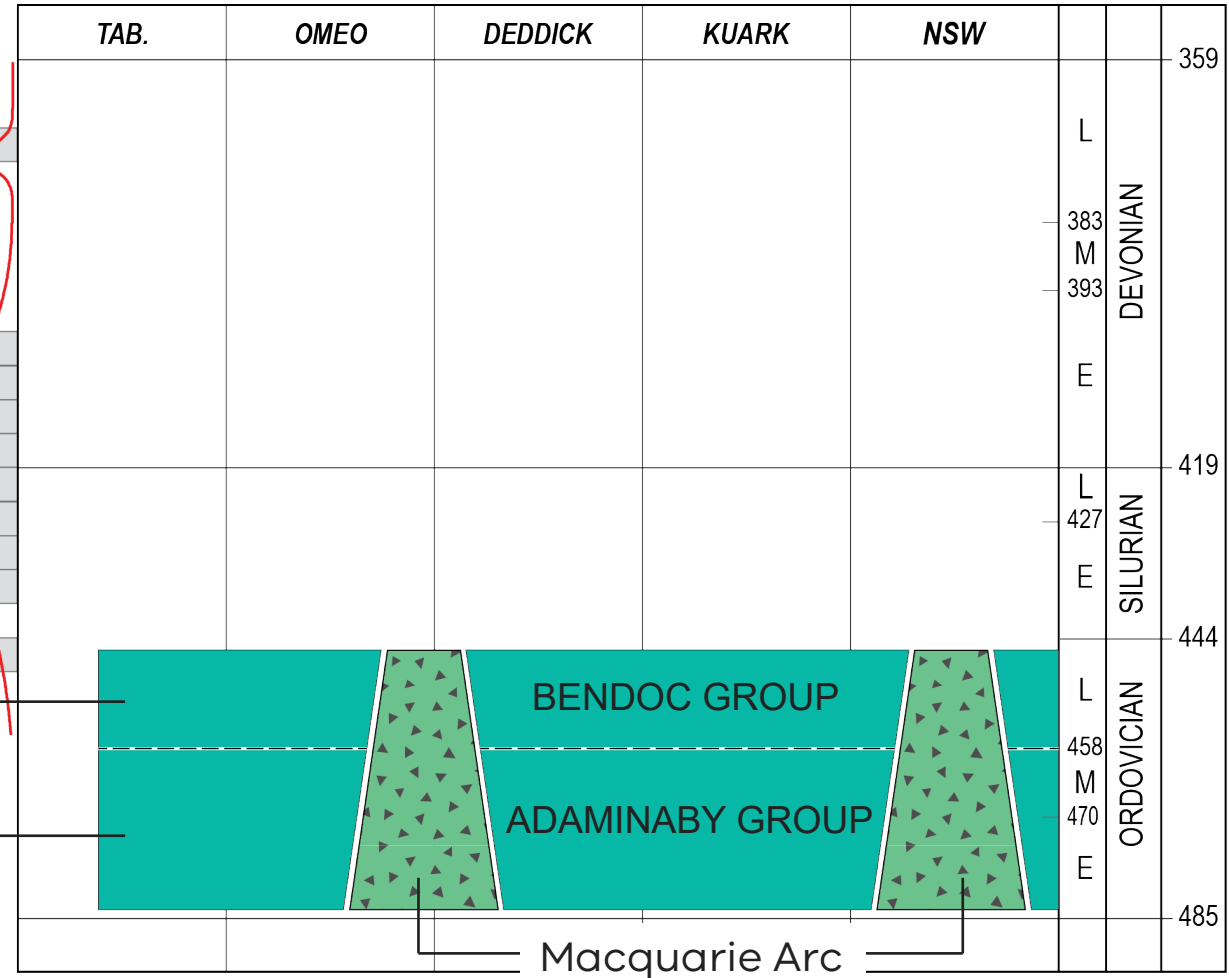
NEW ENGLAND OROGEN

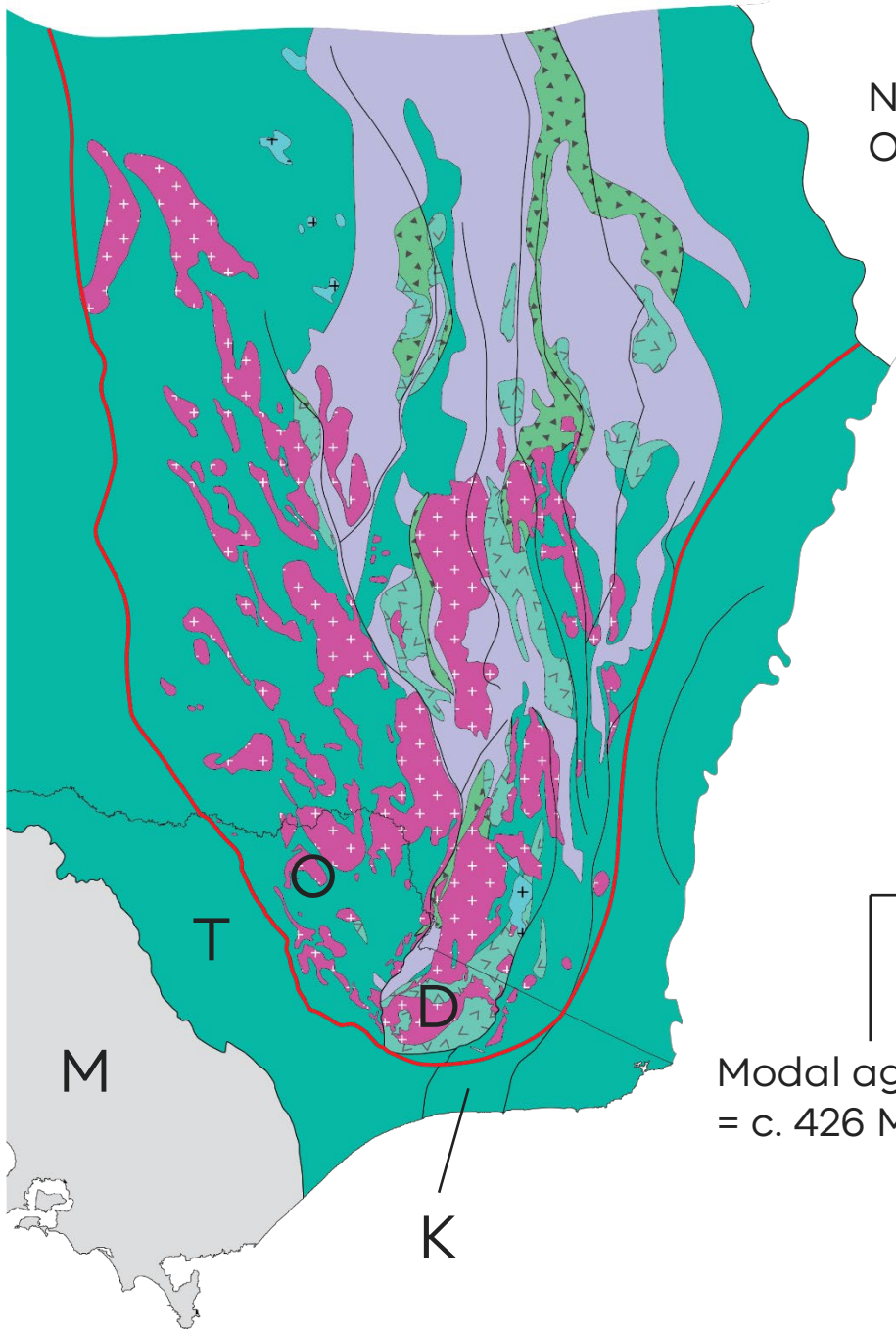
U-Pb zircon age data
N=46



Mudstone dominated

Sandstone dominated



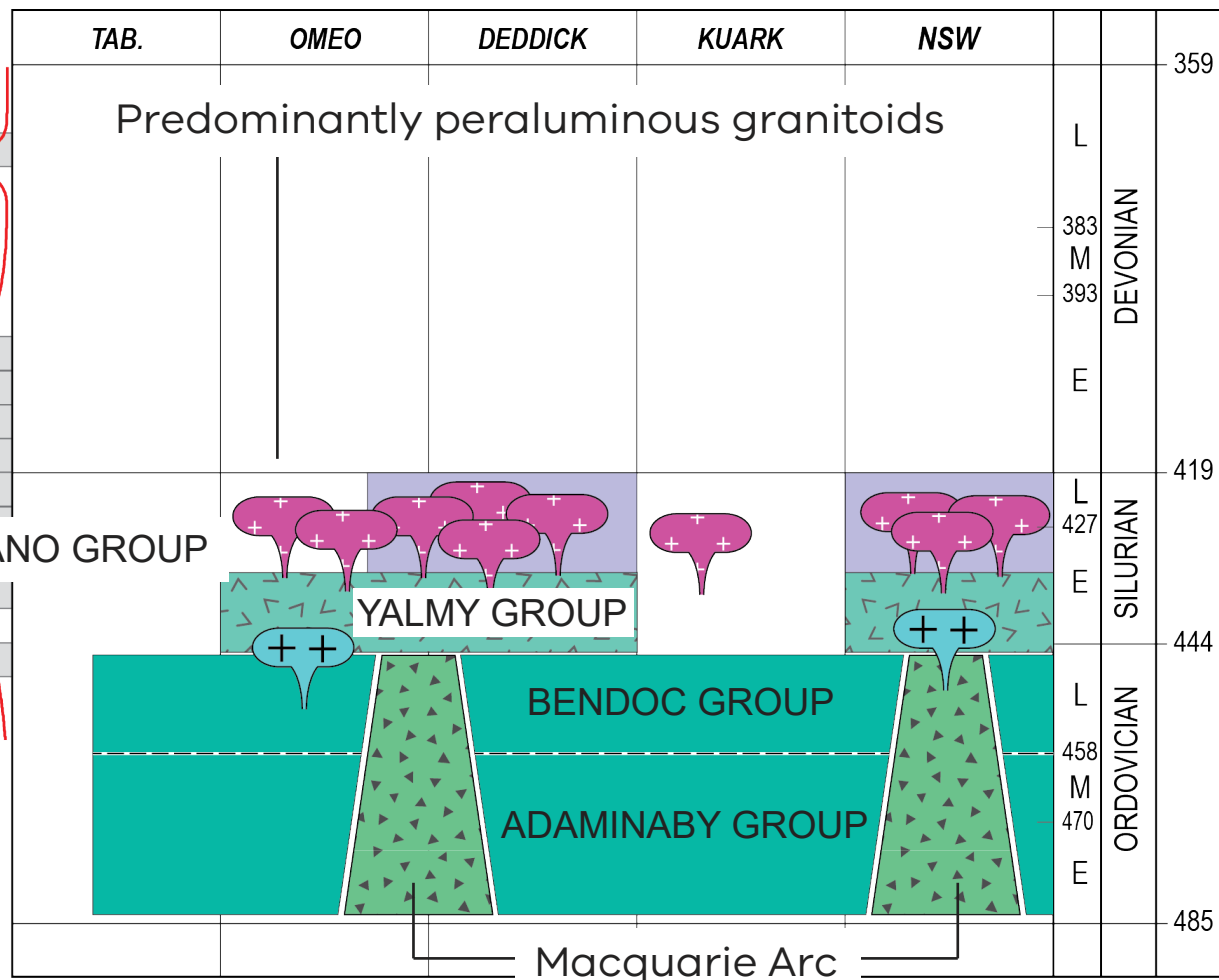


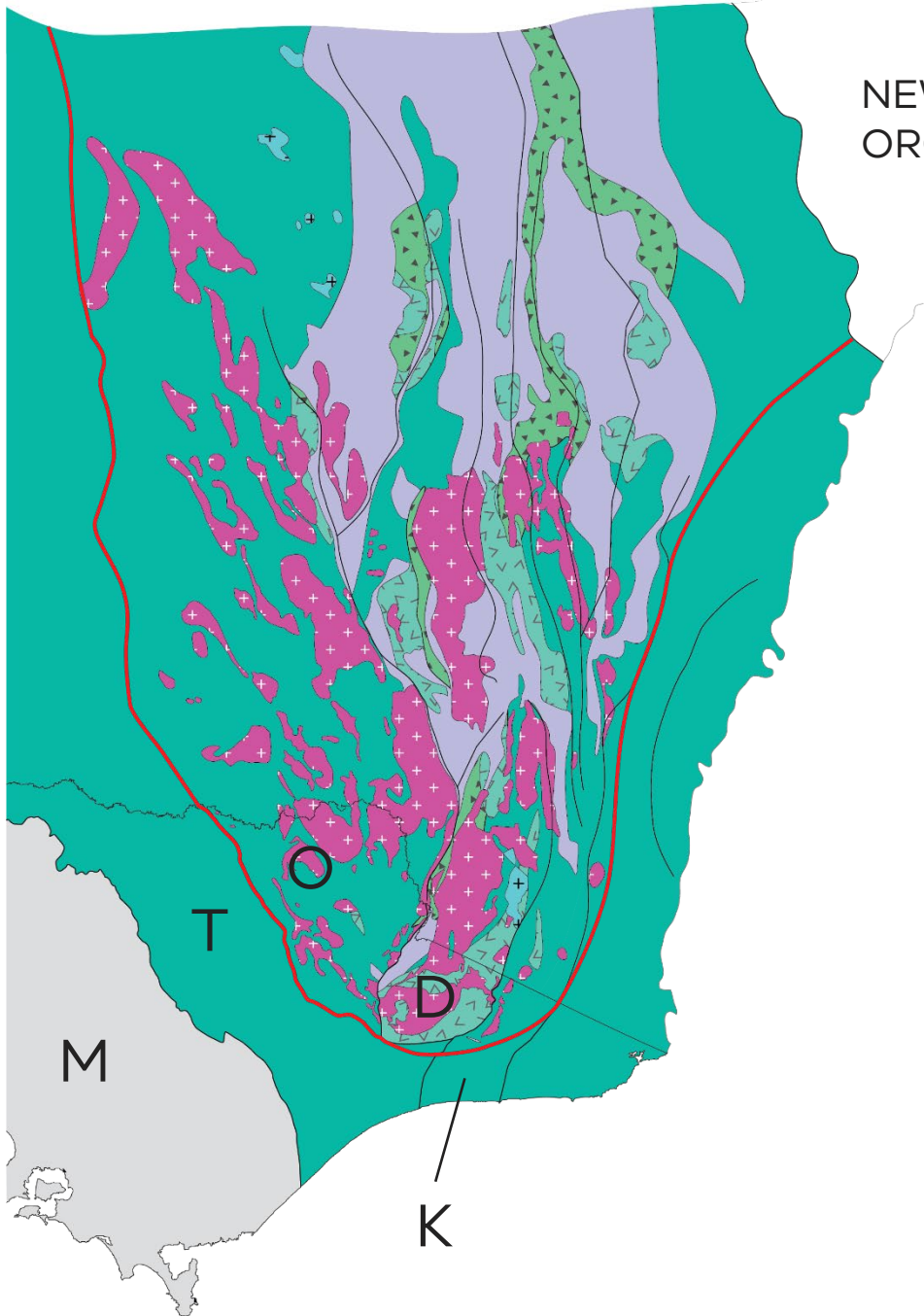
NEW ENGLAND OROGEN

U-Pb zircon age data
N=46

Modal age maxima
= c. 426 Ma

ENANO GROUP

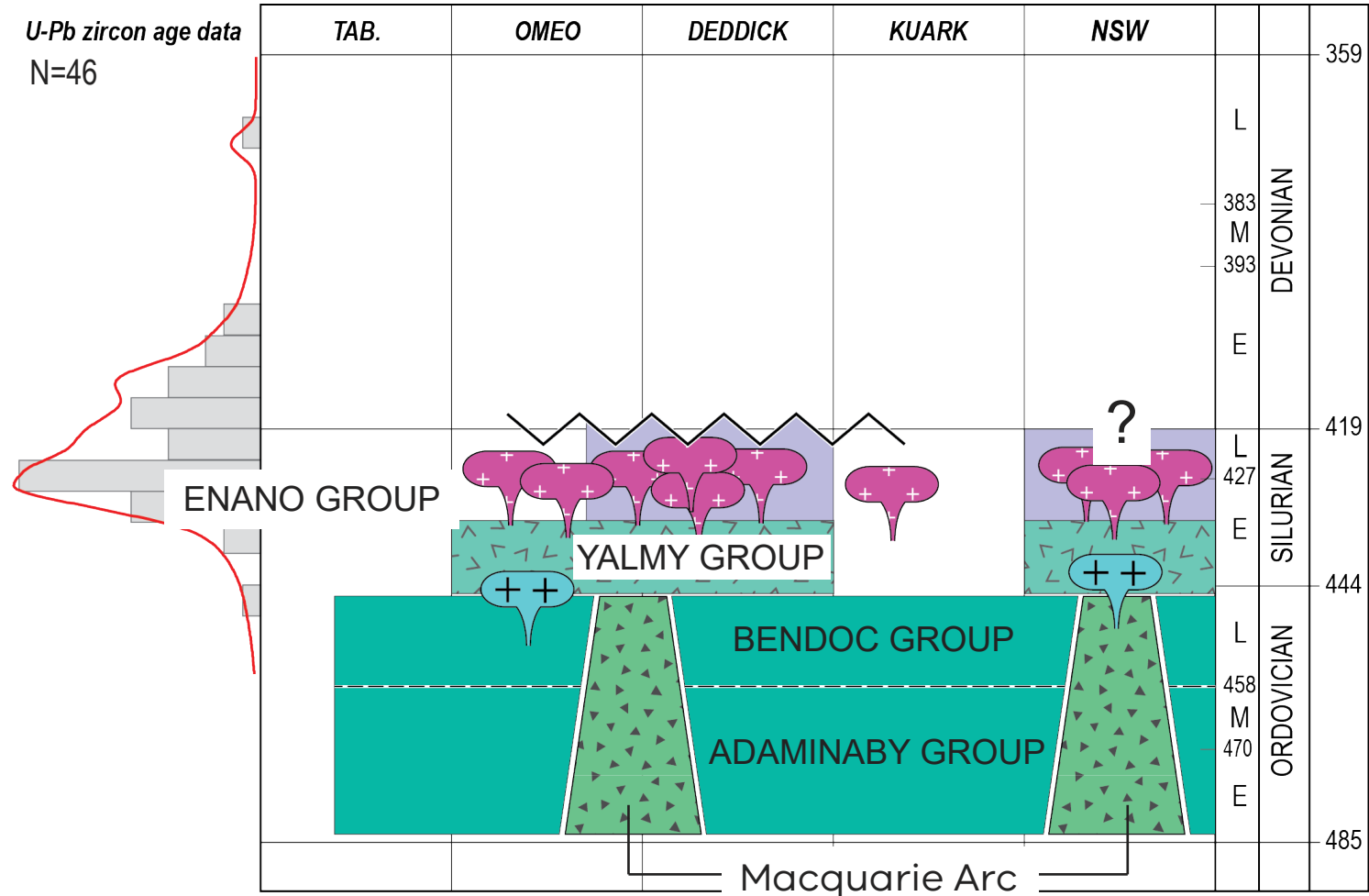


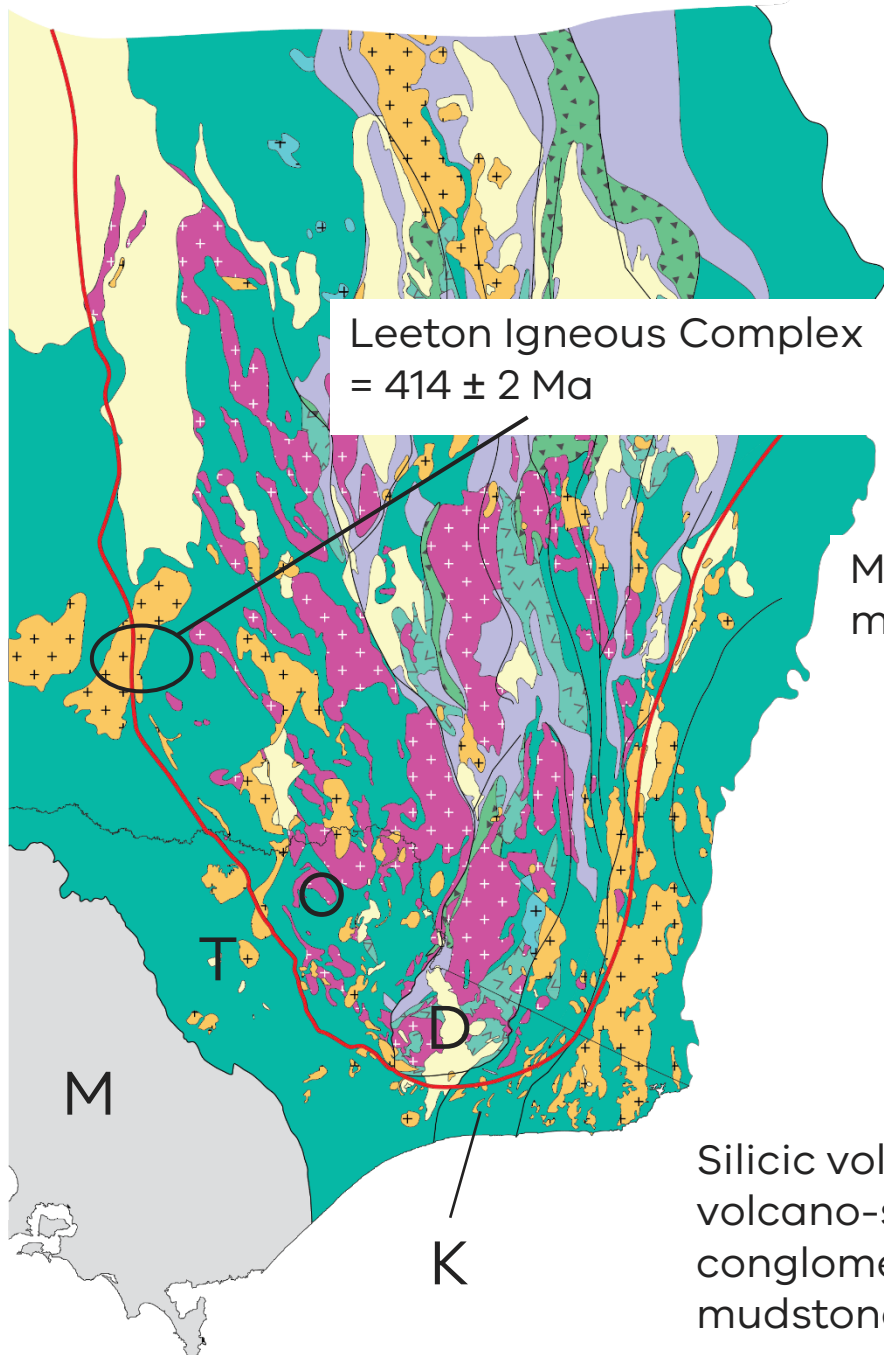


BINDIAN OROGENY

- Prodoli fossils (c. 423-419 Ma) in the Enano Group provide maximum age

U-Pb zircon age data
N=46





NEW ENGLAND OROGEN

Leeton Igneous Complex
= 414 ± 2 Ma

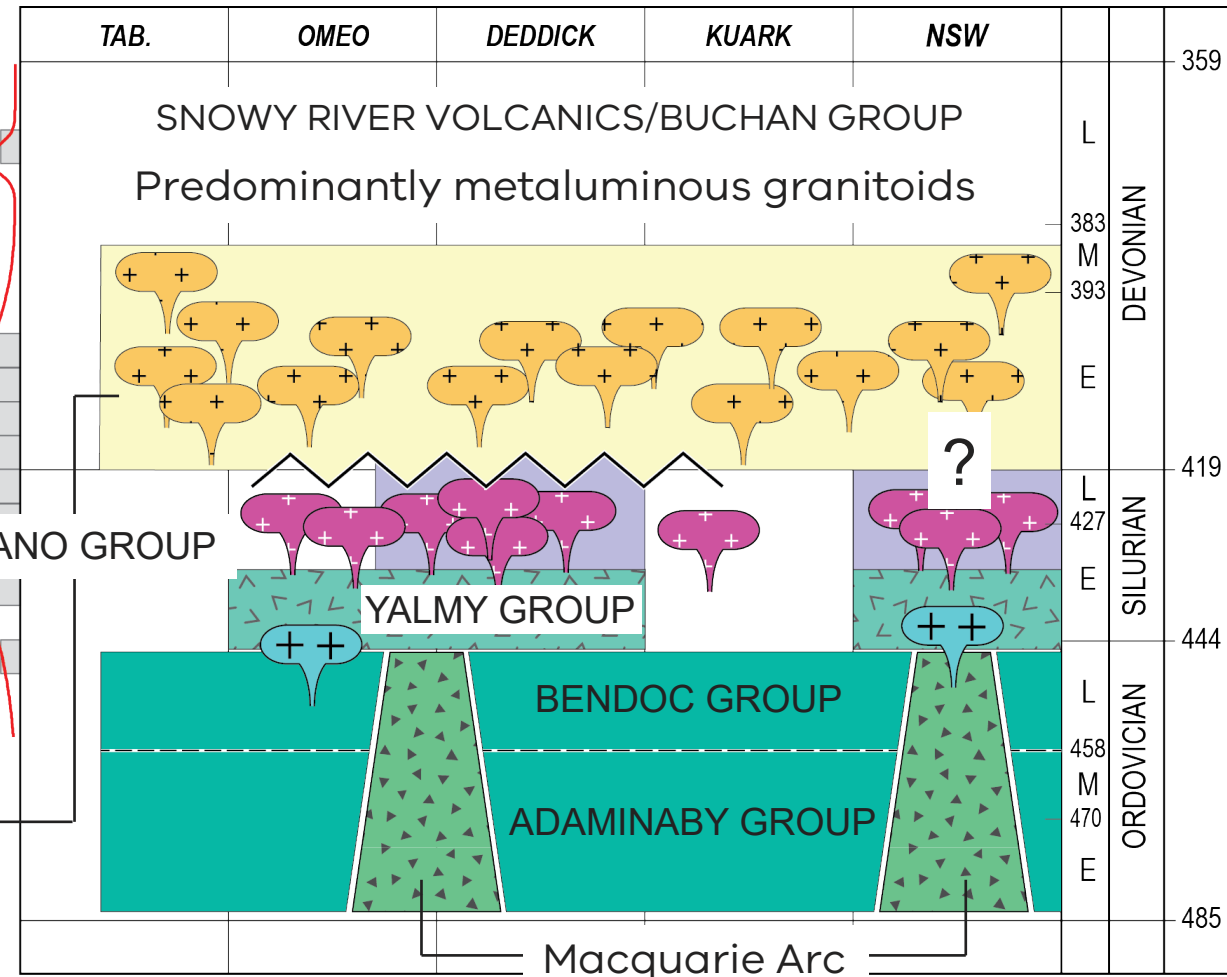
U-Pb zircon age data
N=46

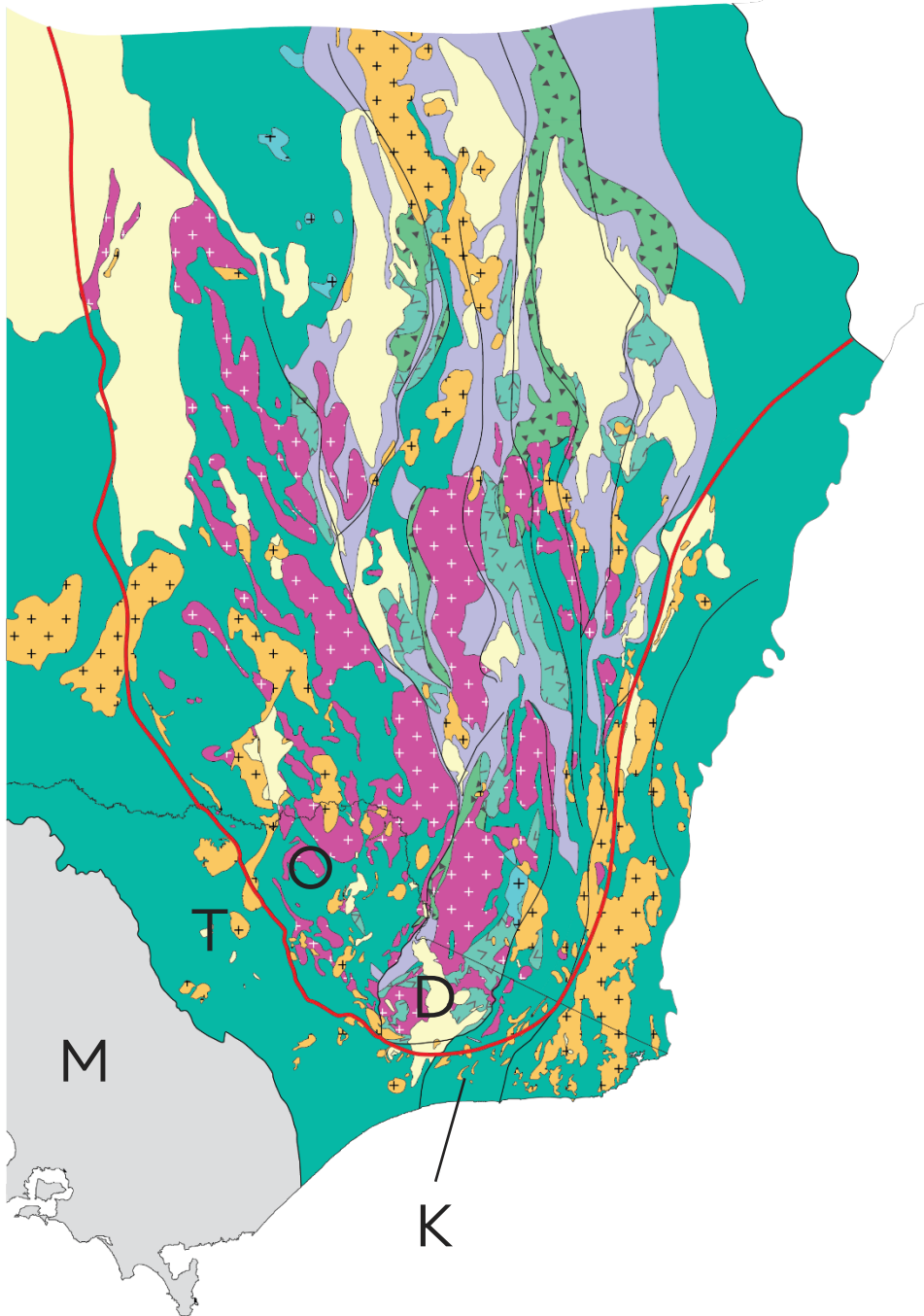
Modal age
maxima = 411 Ma

Silicic volcanic rocks,
volcano-sedimentary
conglomerate, sandstone,
mudstone, limestone

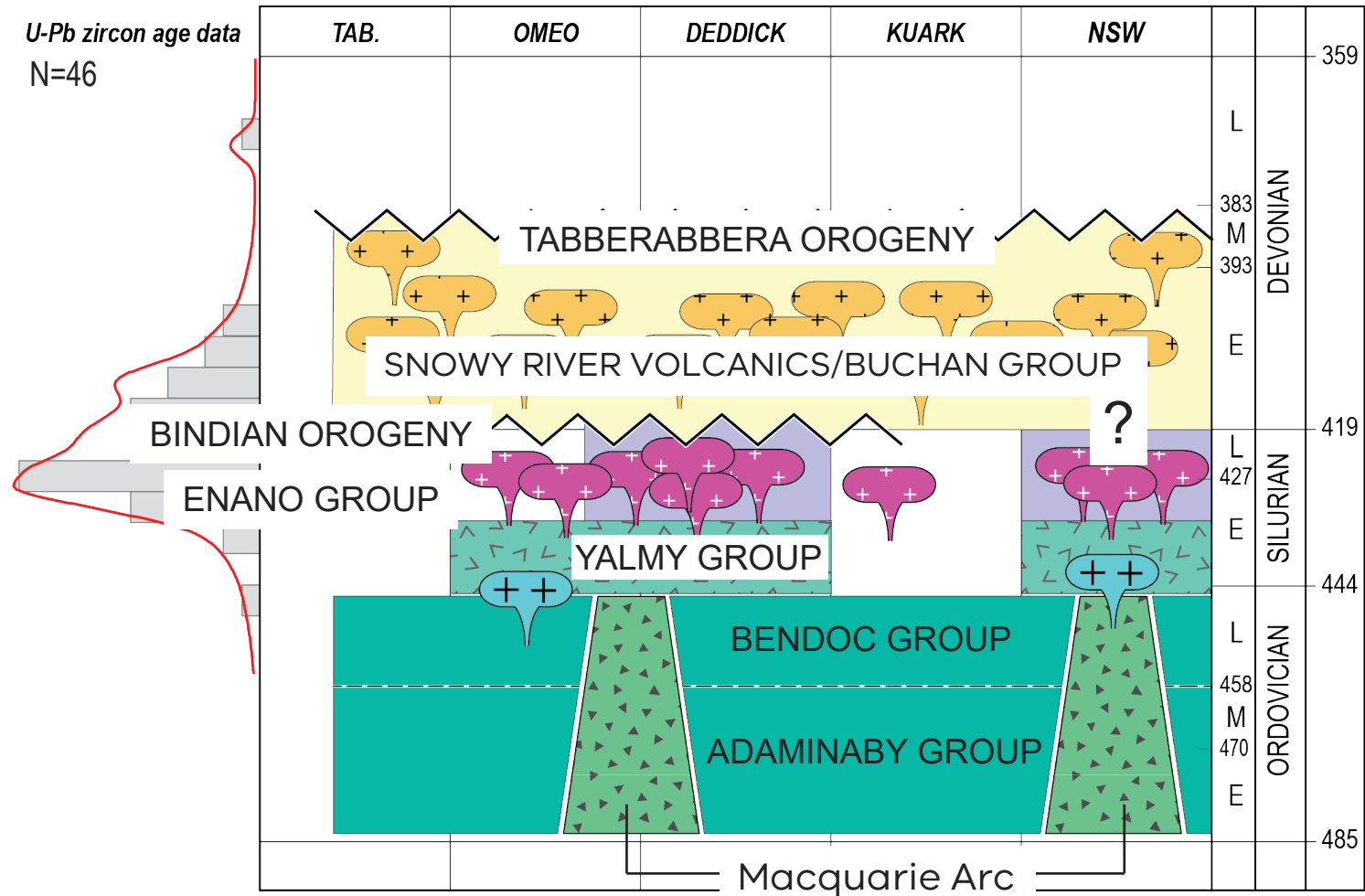
BINDIAN OROGENY

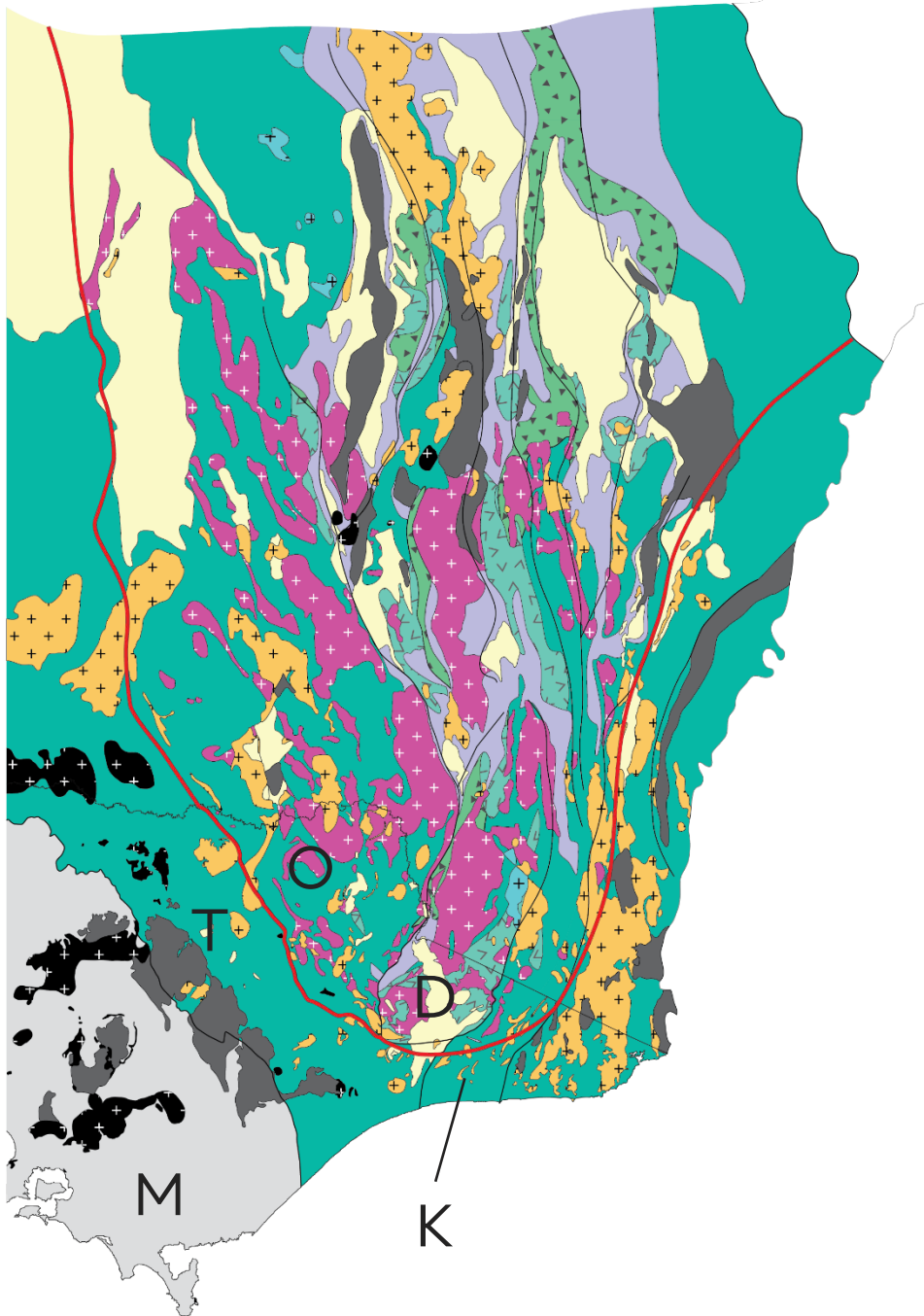
- Prodoli fossils (c. 423-419 Ma) in the Enano Group provide maximum age
- Oldest stitching intrusions = c. 414 Ma



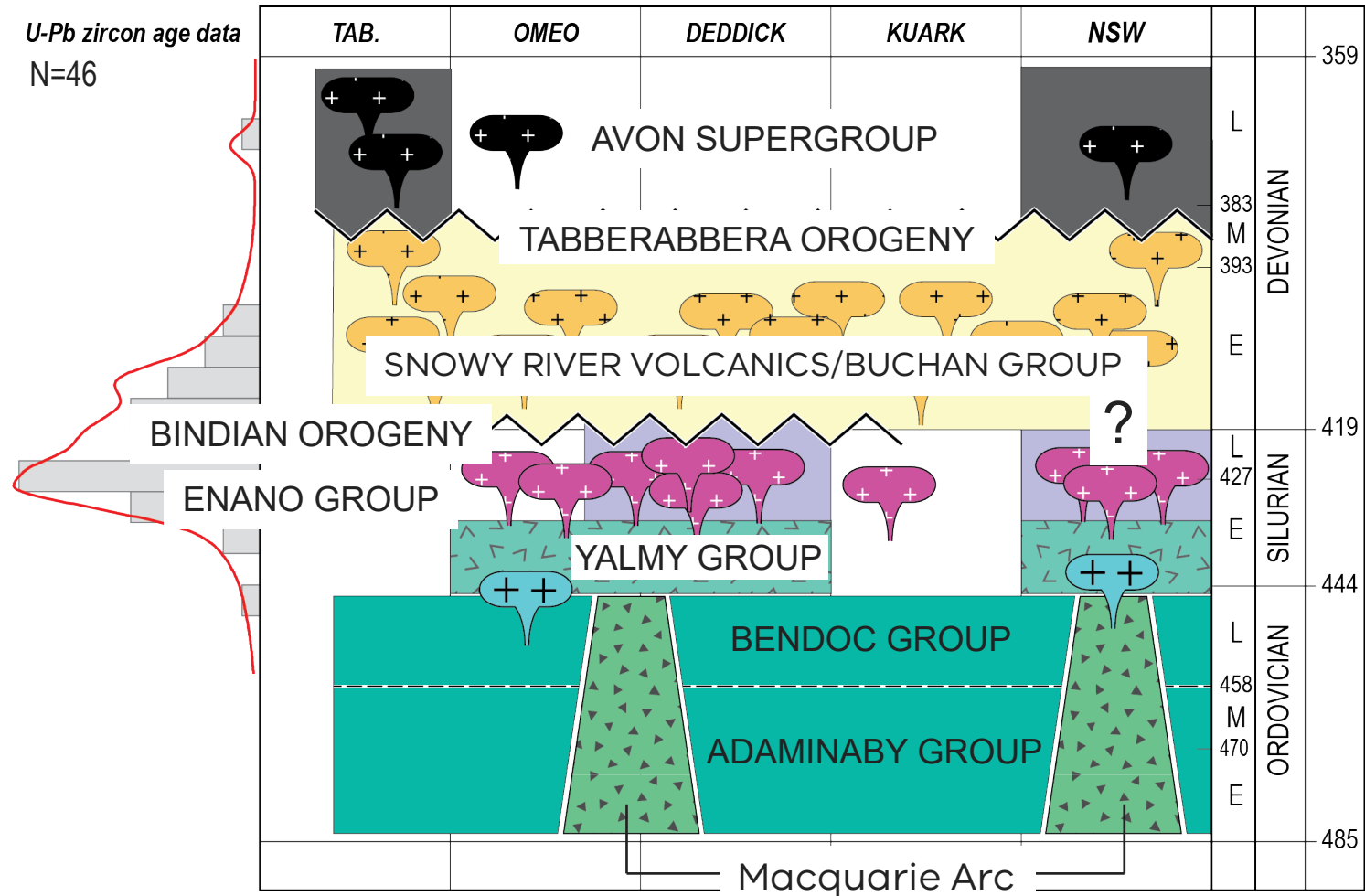


U-Pb zircon age data
N=46





U-Pb zircon age data
N=46



Tabberabbera Orogeny

Coeval sediment deposition and magmatism

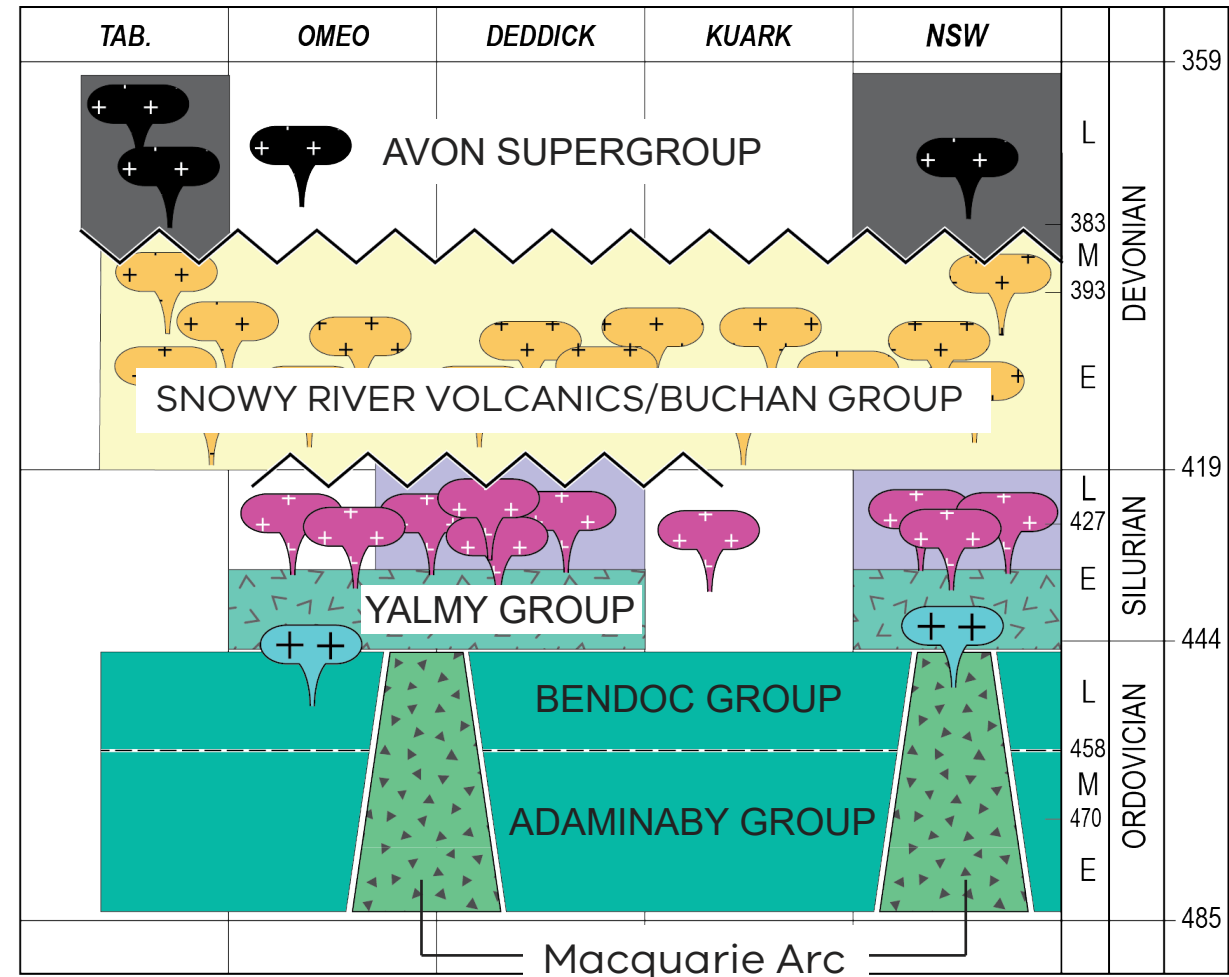
Bindian Orogeny
(stitching event)

Coeval sediment deposition and magmatism

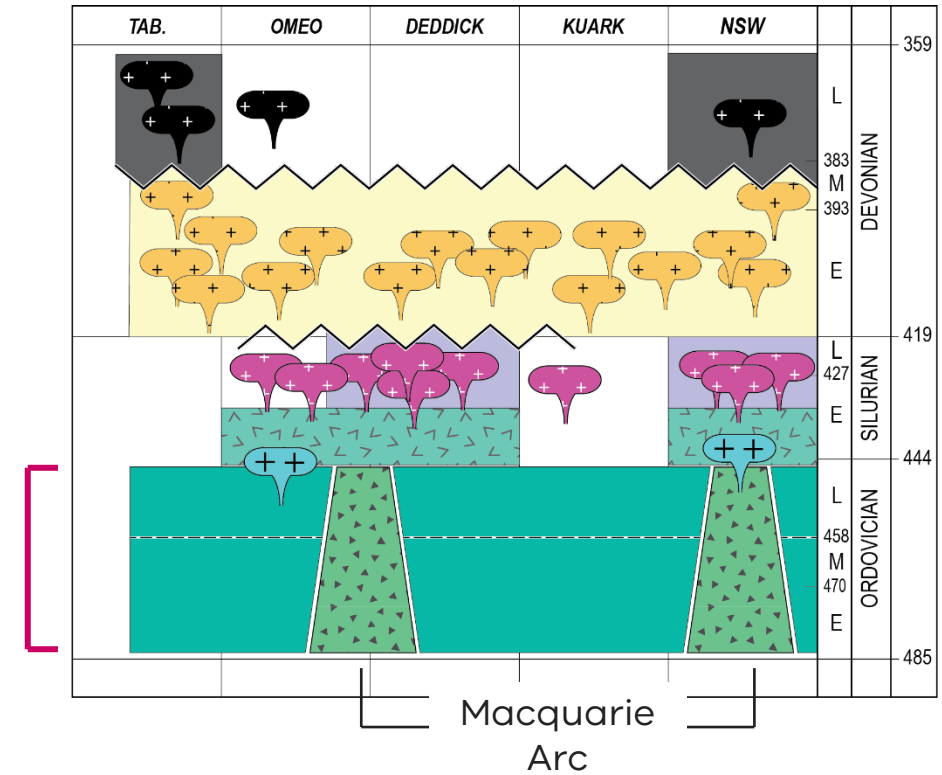
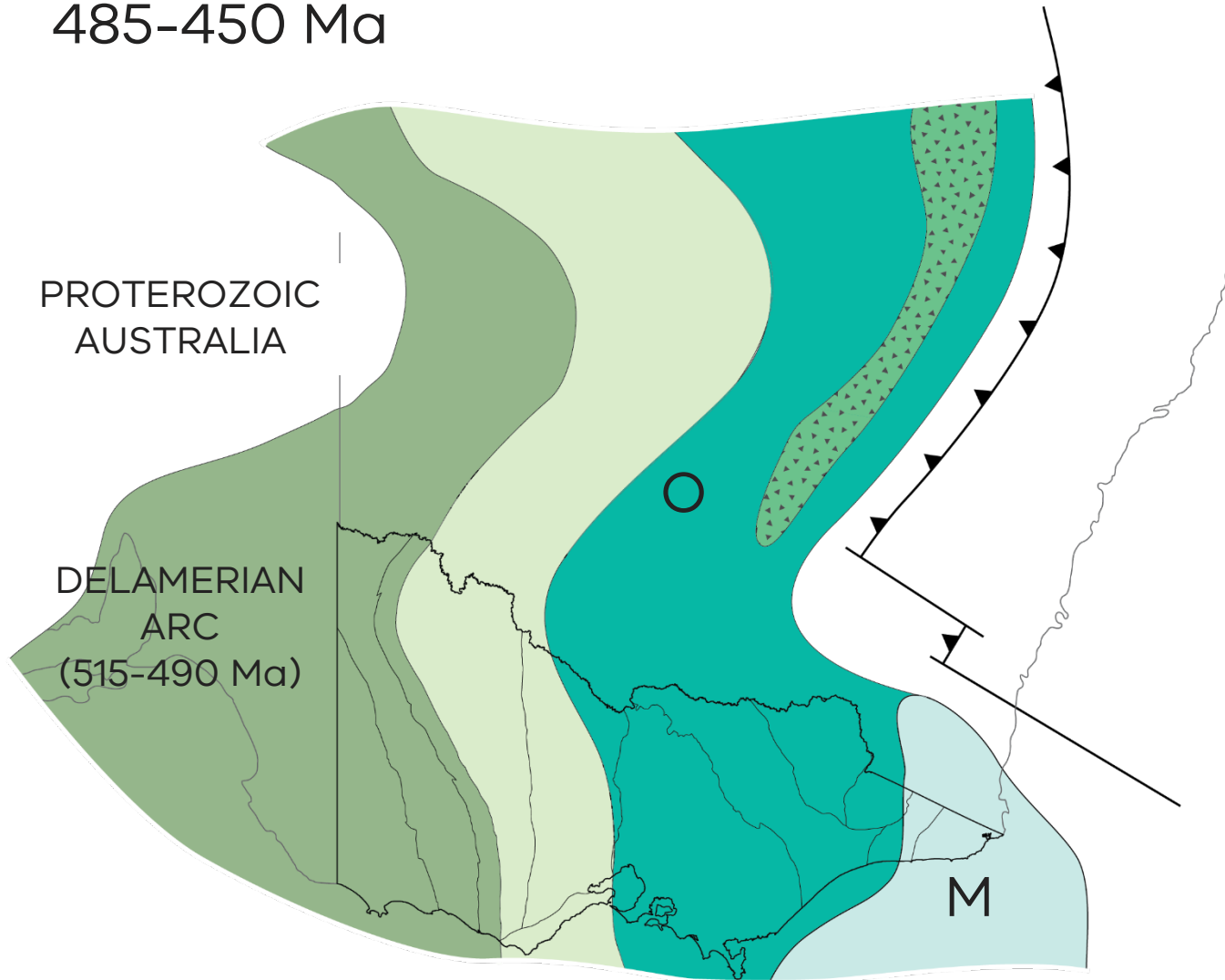
Benambran Orogeny ?

Coeval sediment deposition and magmatism

Coeval island arc magmatism and passive margin sedimentation



485-450 Ma

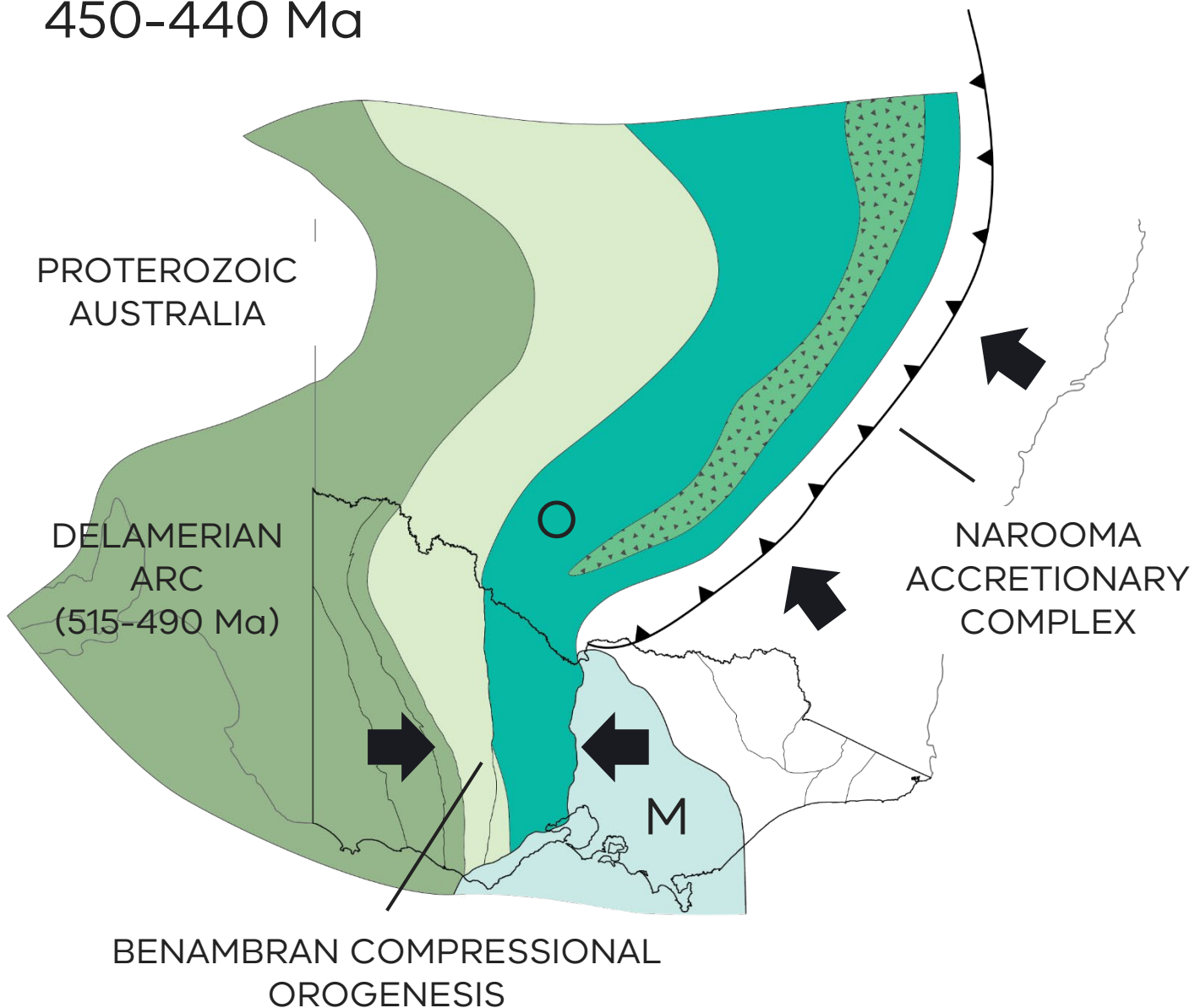


M = Melbourne Zone = Selywn Block

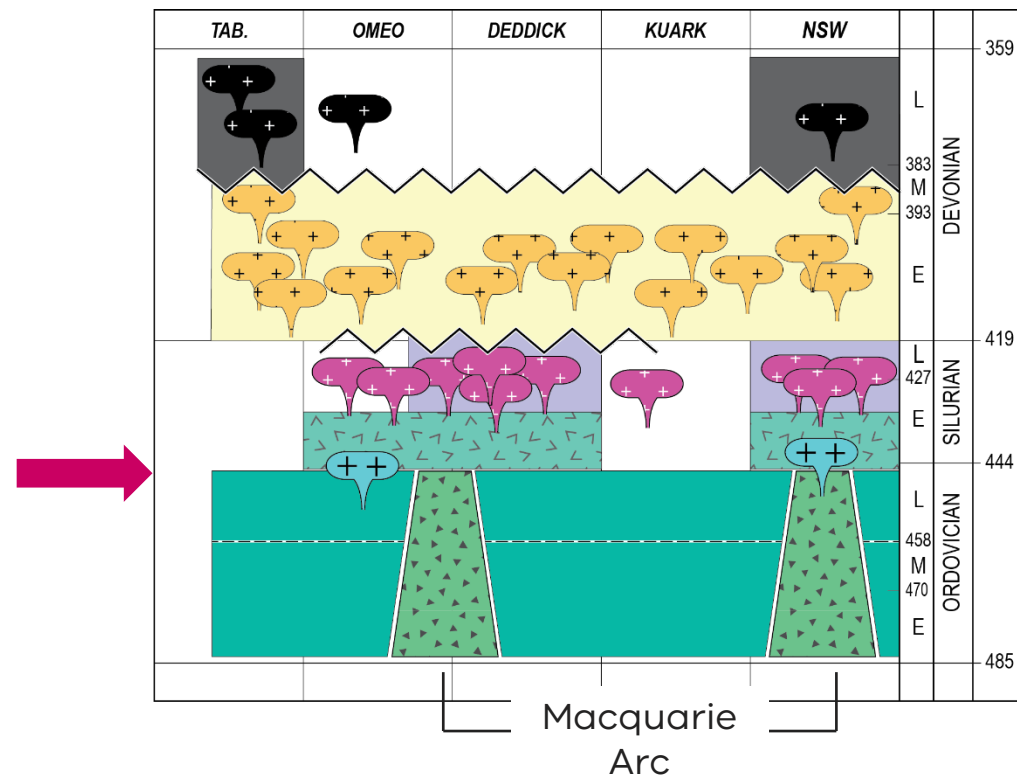
O = Omeo Zone

- Late Cambrian passive margin sediments
- Ordovician passive margin sediments

450-440 Ma

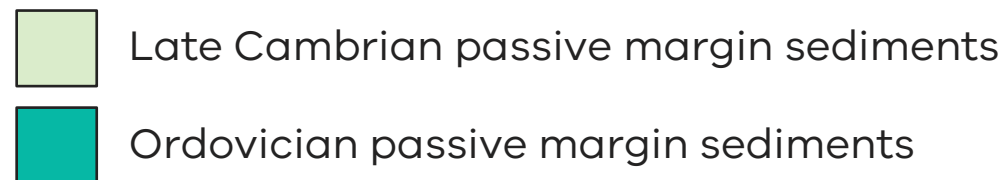


After: Moresi et al. 2014 (Nature, v. 508, p. 245-248)

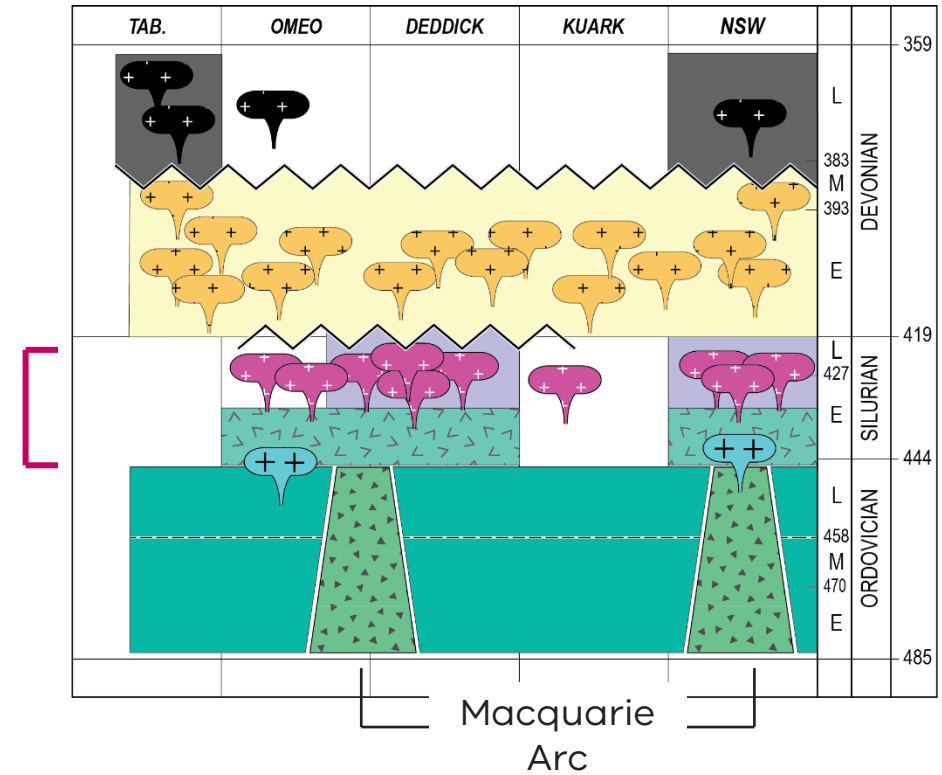
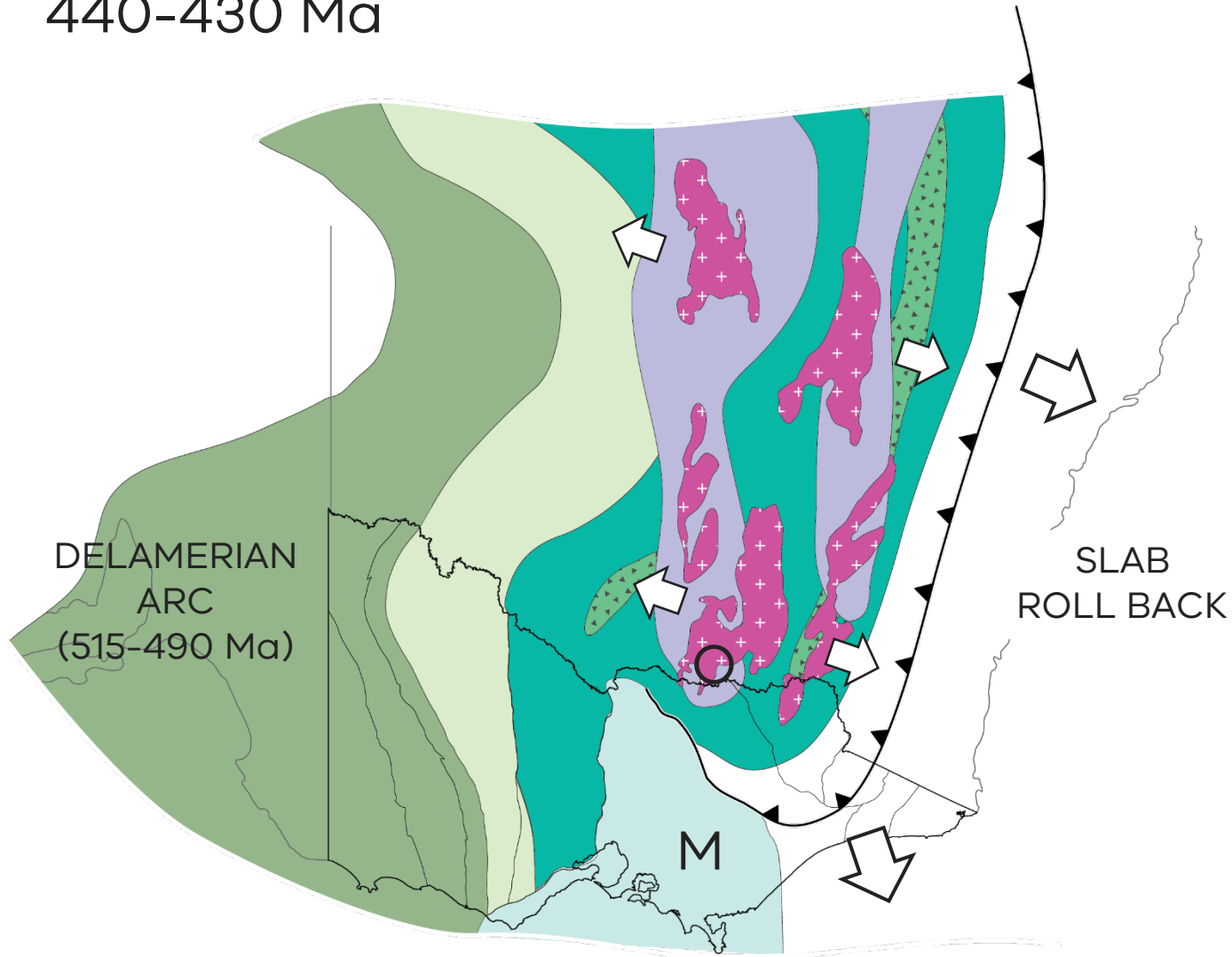


M = Melbourne Zone = Selywn Block

O = Omeo Zone



440-430 Ma

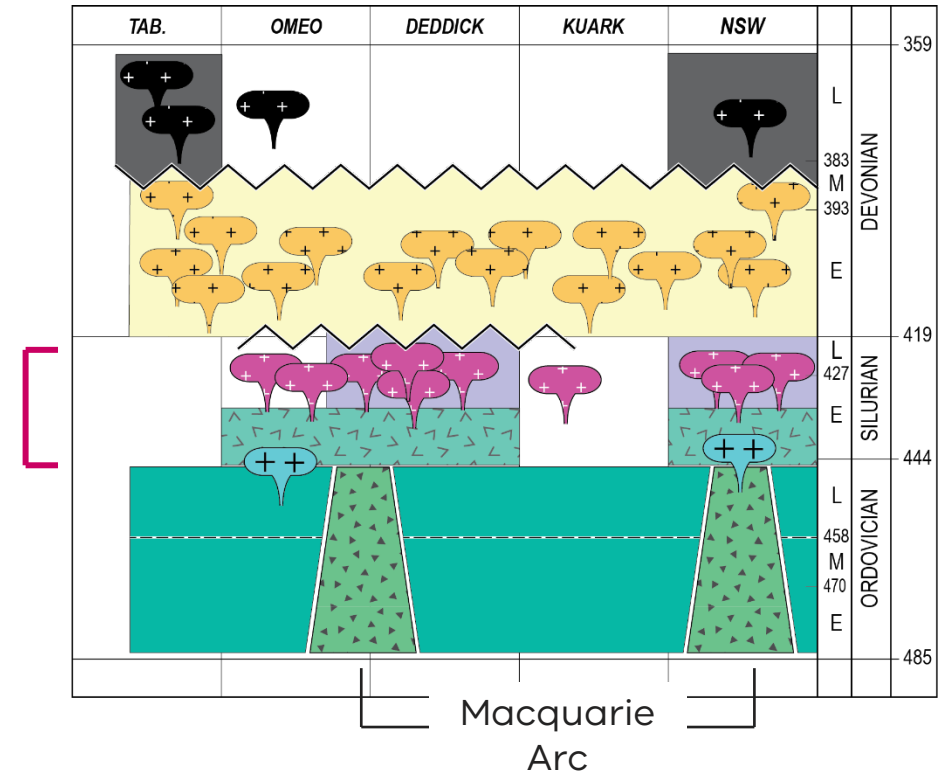
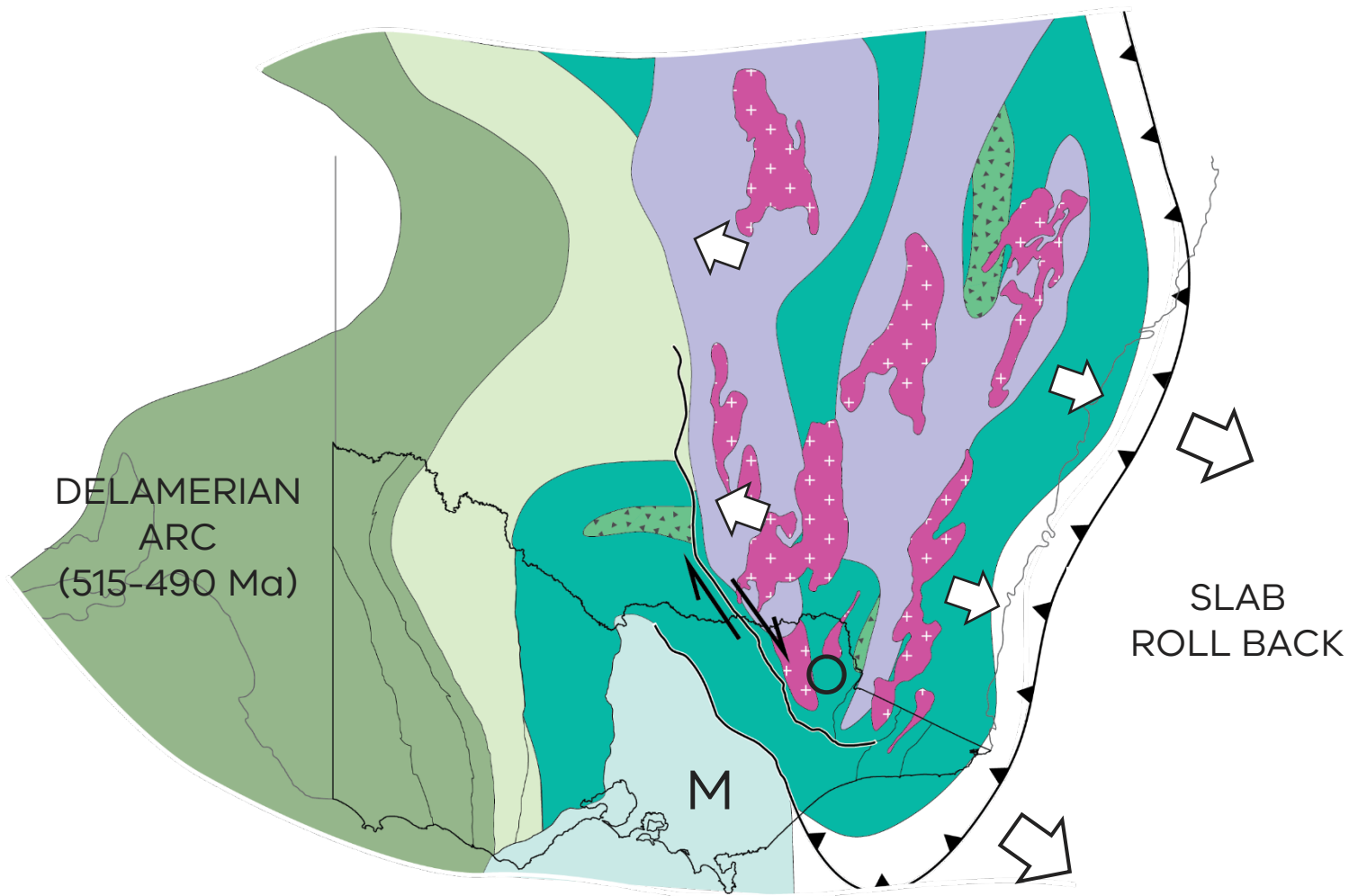


M = Melbourne Zone = Selywn Block

O = Omeo Zone

- Light green: Late Cambrian passive margin sediments
- Teal: Ordovician passive margin sediments

430-420 Ma



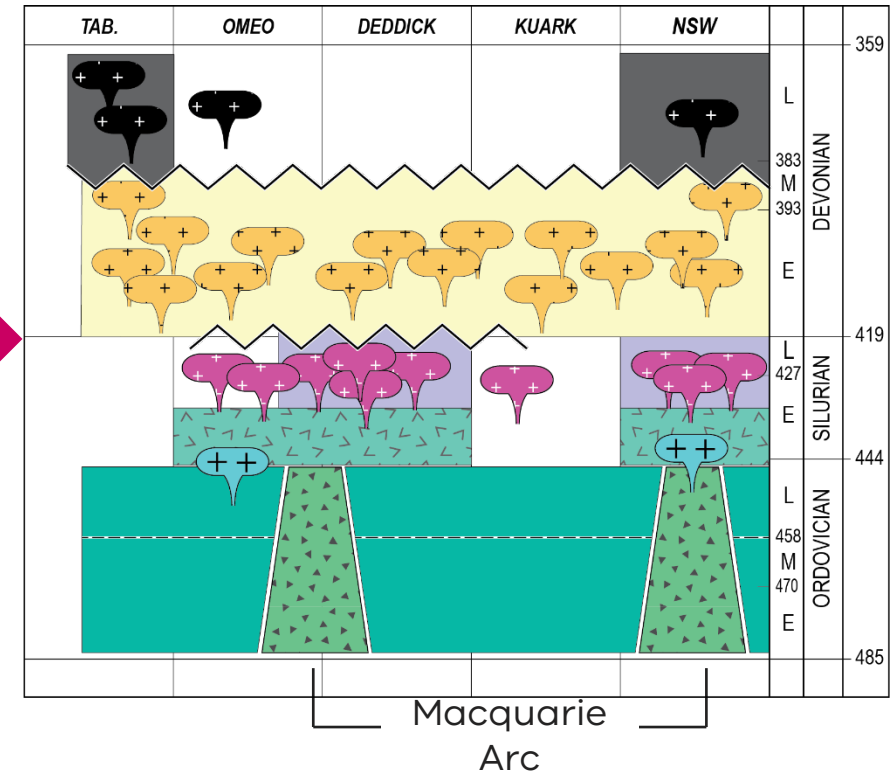
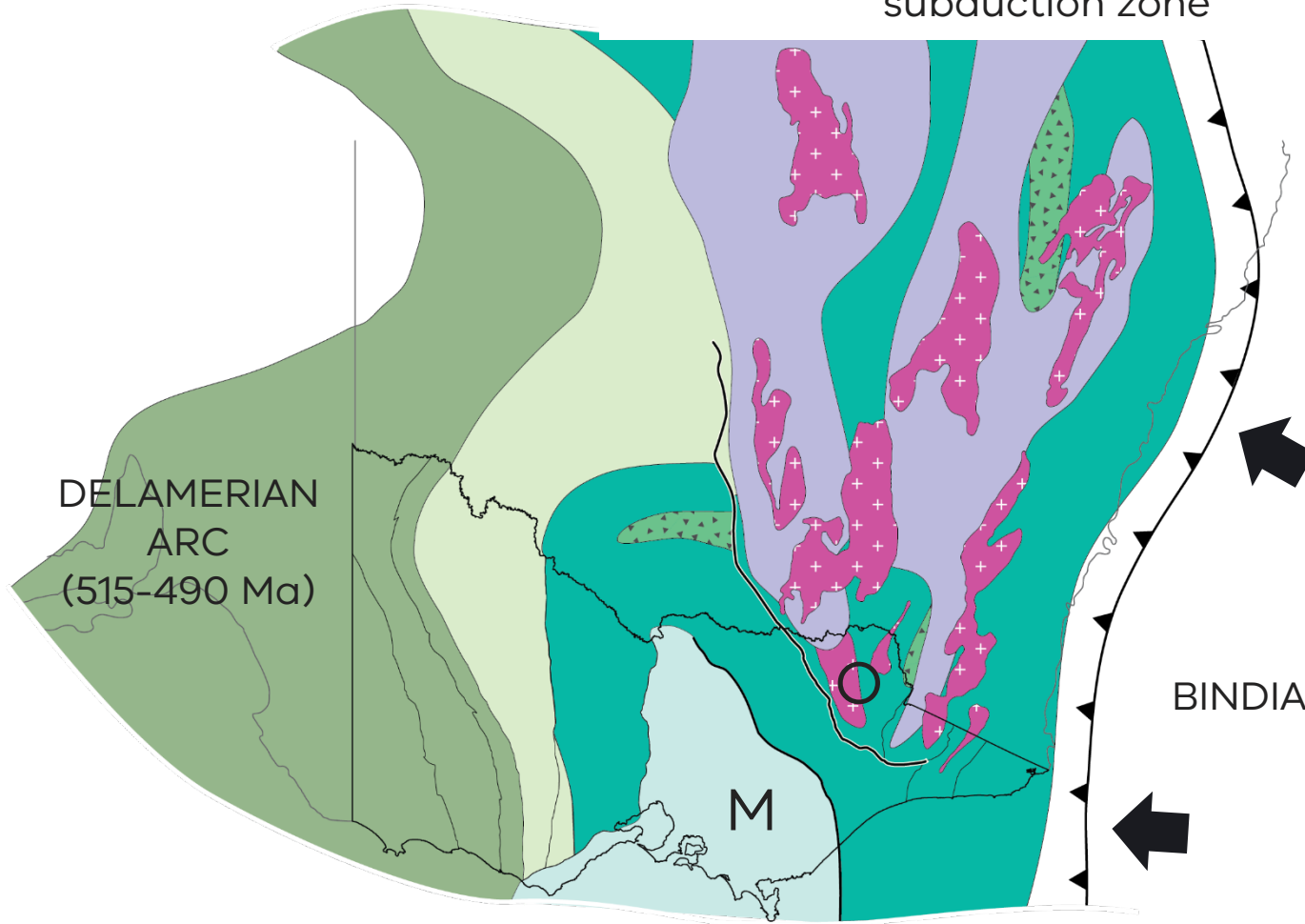
M = Melbourne Zone = Selywn Block

O = Omeo Zone

- Late Cambrian passive margin sediments
- Ordovician passive margin sediments

419-415 Ma

Compressional deformation associated with the re-establishment of a linear subduction zone



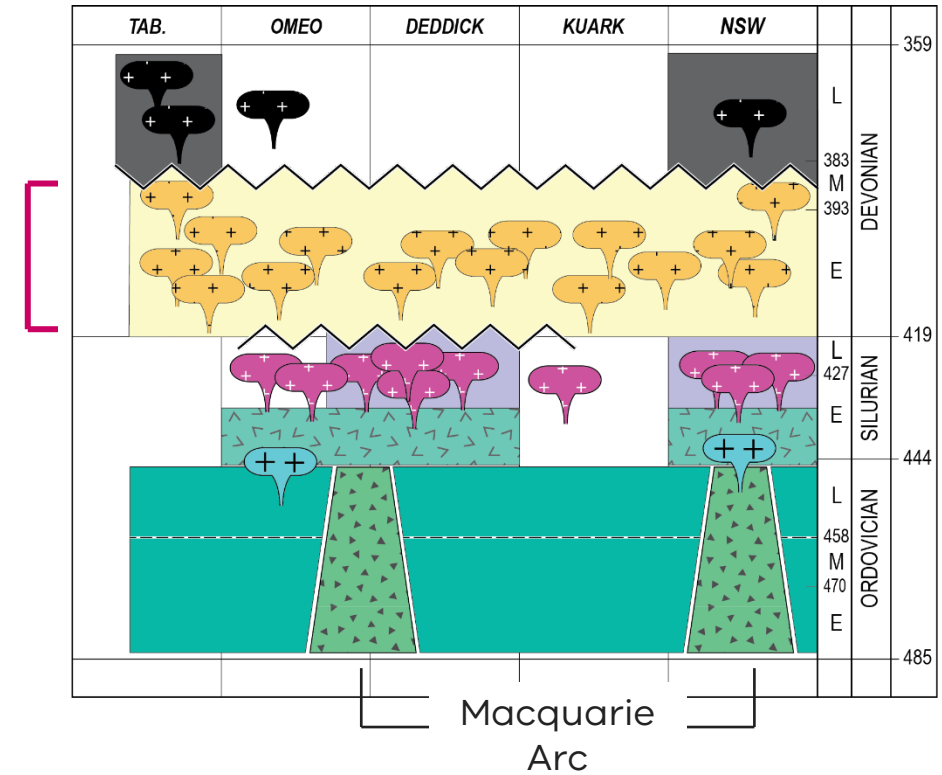
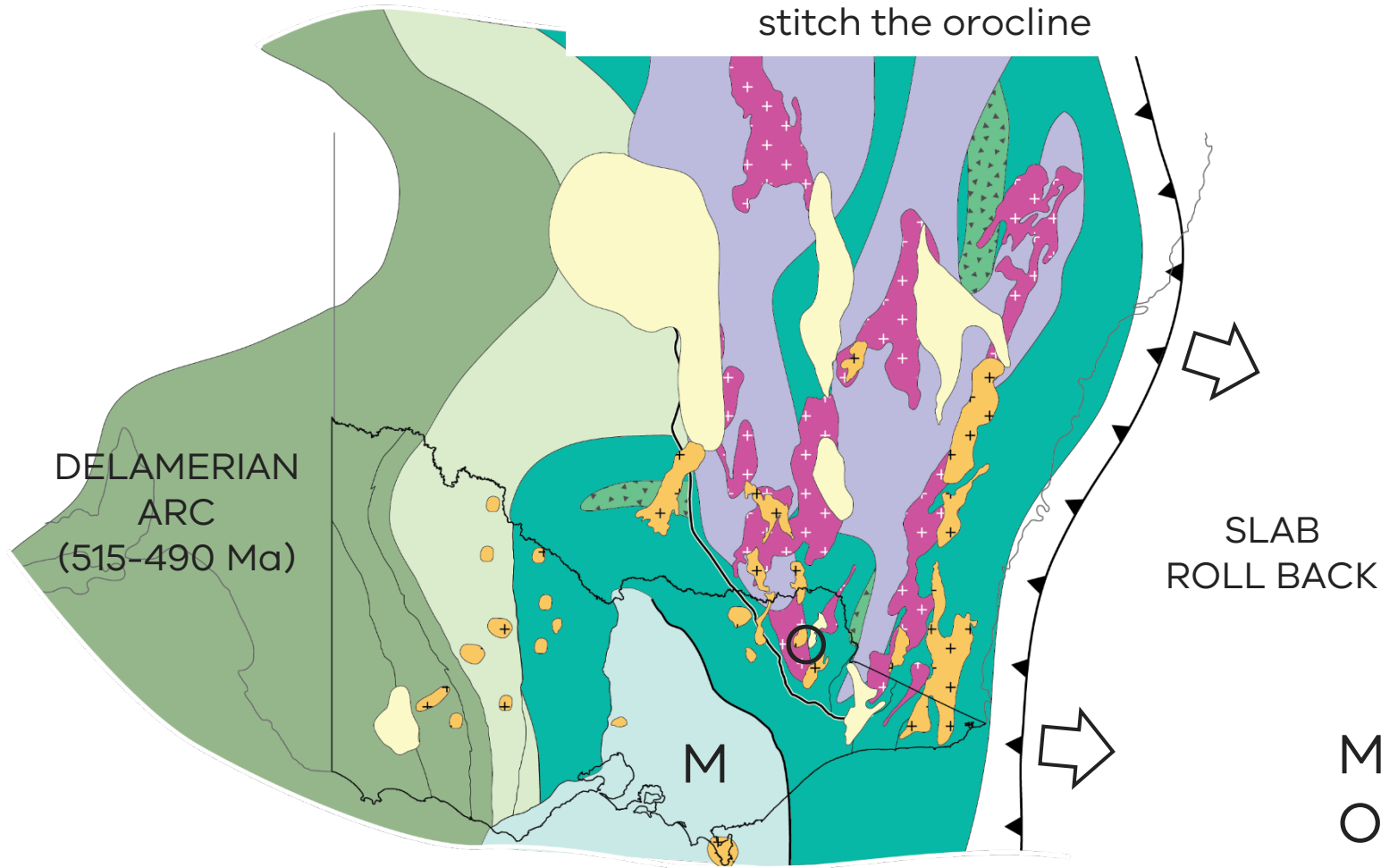
M = Melbourne Zone = Selywn Block

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-  Late Cambrian passive margin sediments
-  Ordovician passive margin sediments

> 415 Ma

Early Devonian volcano-sedimentary basins and intrusions stitch the orocline



M = Melbourne Zone = Selywn Block

O = Omeo Zone

- Late Cambrian passive margin sediments
- Ordovician passive margin sediments

THANK-YOU

Post-emplacement extension
and basin formation

Short-lived deformation

Post-emplacement extension
and basin formation

Short-lived deformation
and structural emplacement

Extension and southward
migration of Omeo Zone

Deposition of Omeo
Zone sedimentary protoliths
north of present position

Coeval sediment deposition and
magmatism

Coeval sediment deposition and
magmatism

Coeval sediment deposition and
magmatism

Coeval island arc magmatism and
passive margin sedimentation

