

Florida: (Origins)

The Basement & Supercontinents

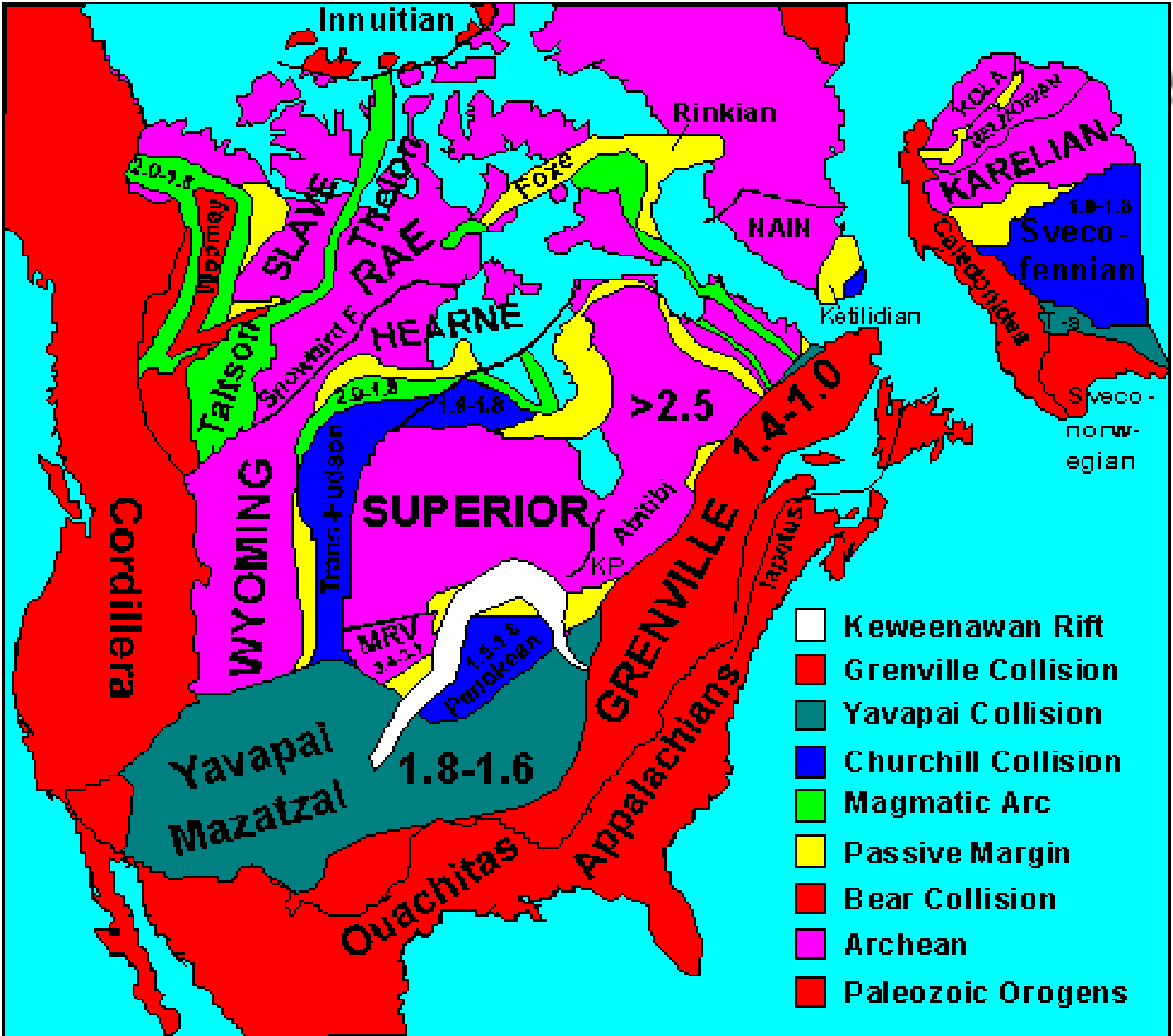
1. North America 1.1 Billion years ago.
2. Gondwana 530 Million years ago
3. Pangea 300 million years ago
4. Triassic-Jurassic breakup of Pangea
5. CAMP
6. Florida joins North America
7. Important: Our knowledge comes from boreholes.
No surface exposures of these rocks!

What is Basement?

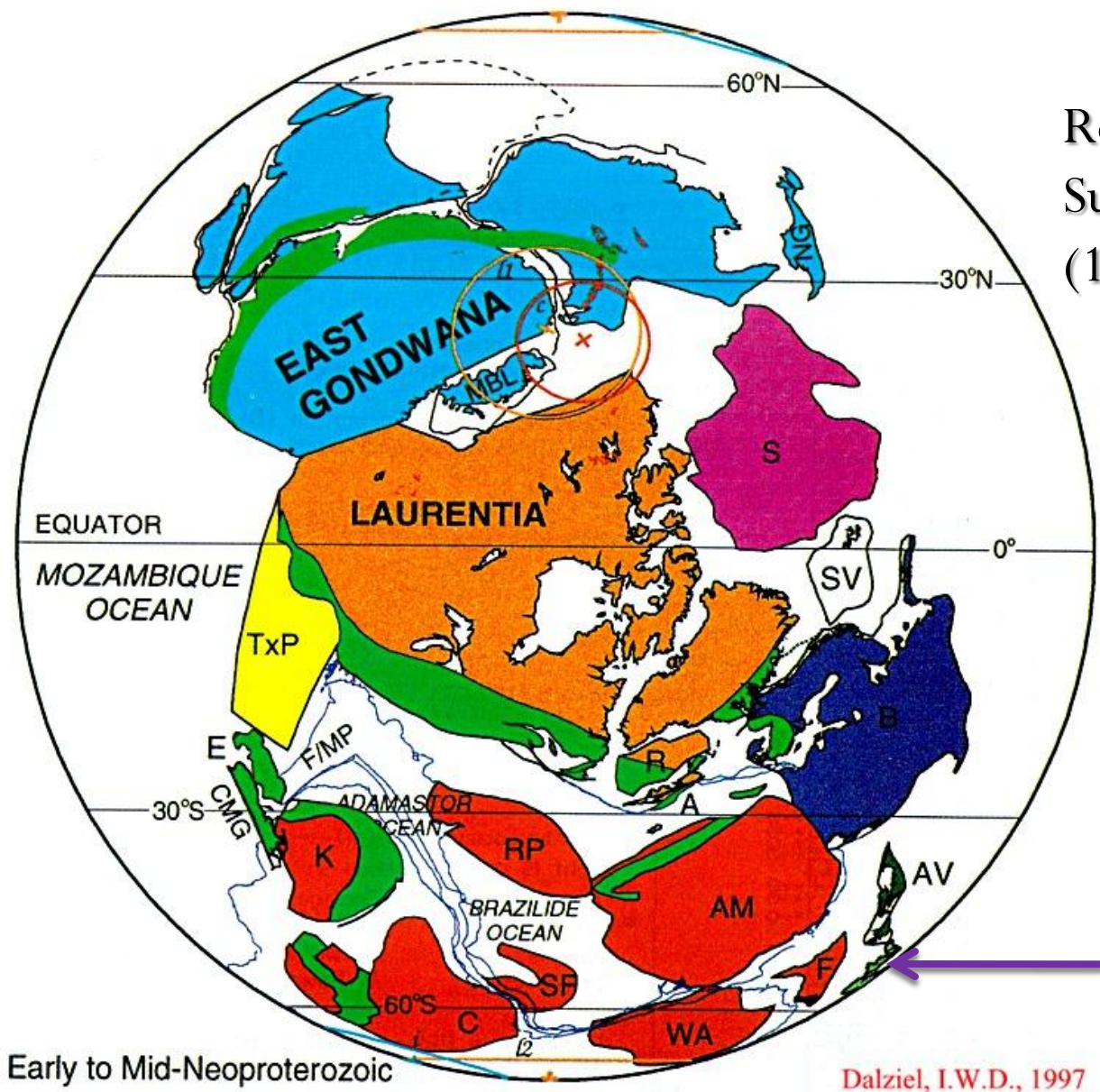
- (1) Precambrian rigid crust usually crystalline (igneous/metamorphic)
- (2) Usually underlies sedimentary sequences that make up the upper layers of the crust
- (3) Usually is deformed
- (4) In our case, it is the foundational material upon which Florida's sedimentary rocks rest.

W

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Rodinia Supercontinent (1.1 Ga)

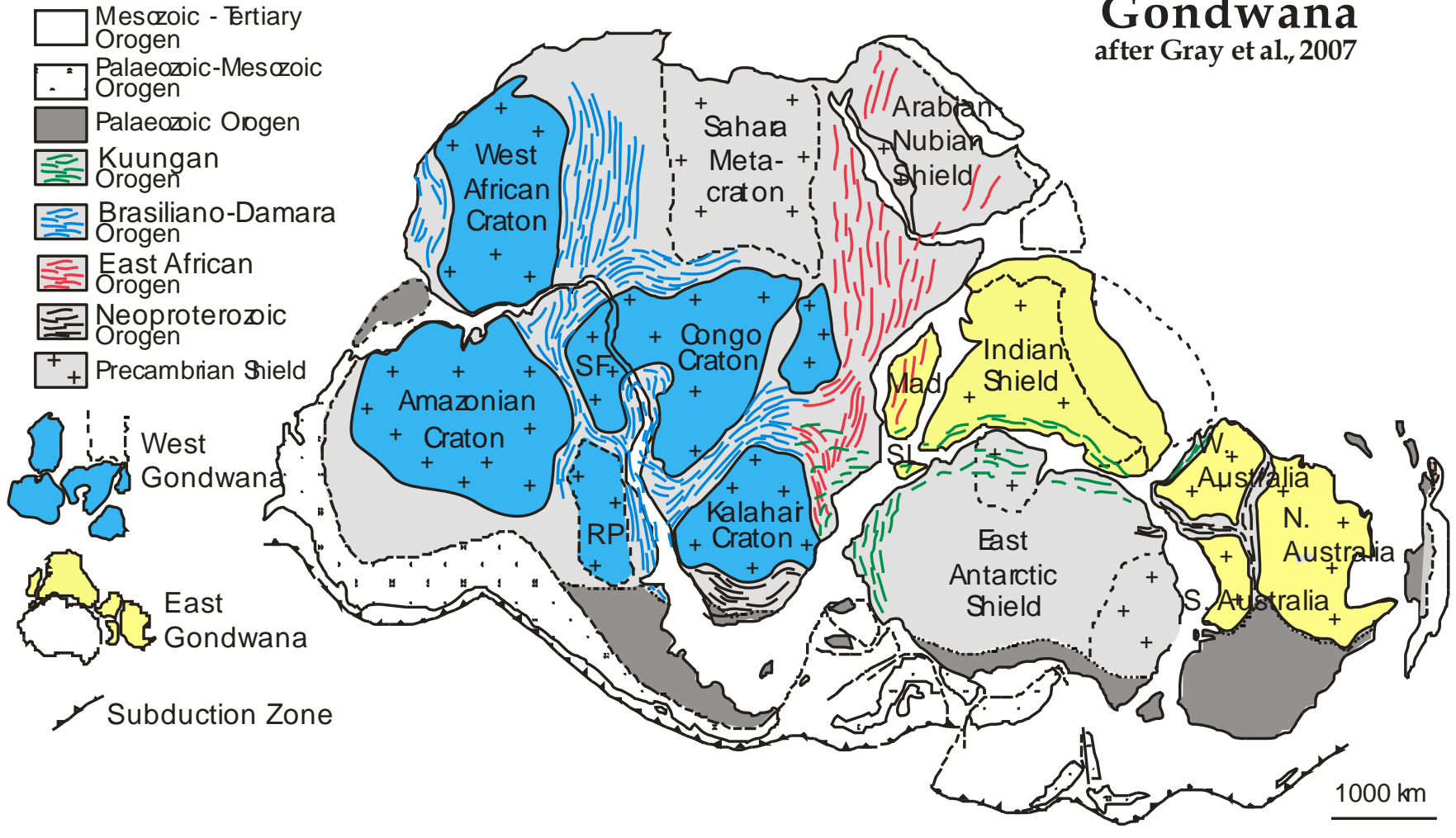


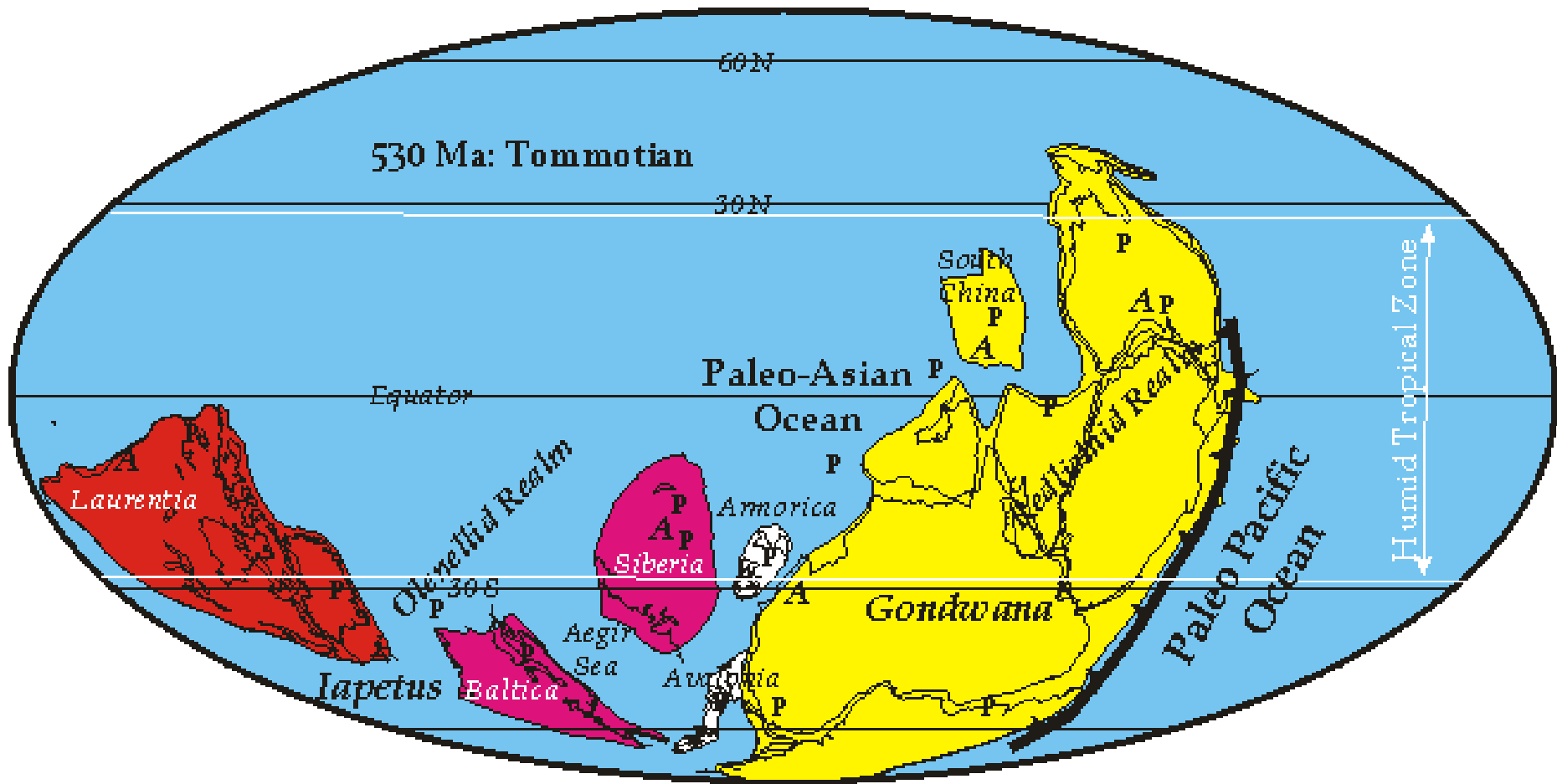
Early to Mid-Neoproterozoic

Dalziel, I.W.D., 1997

Gondwana

after Gray et al., 2007



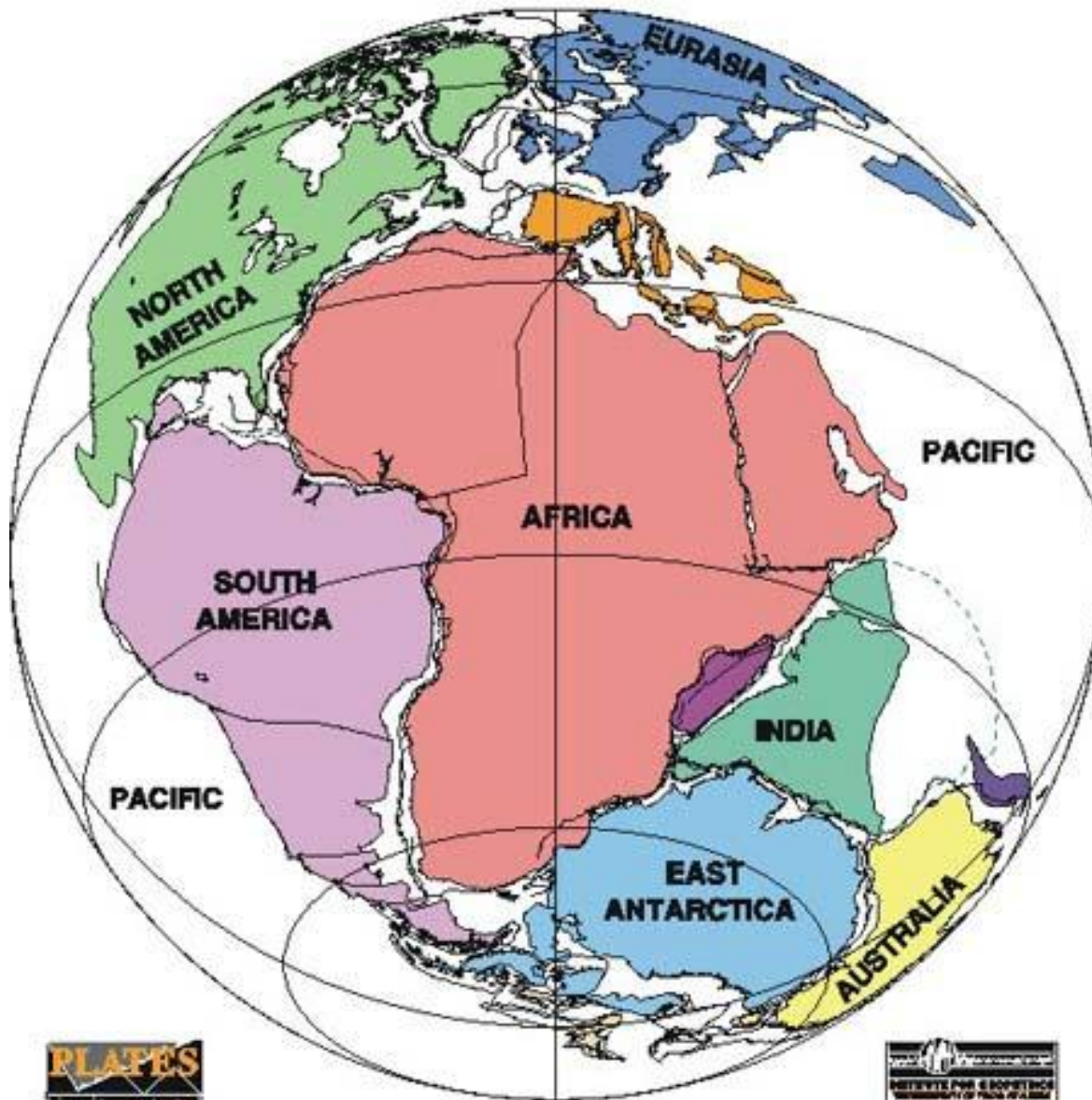


A=Archaeocyathids of Tommotian/Atdabanian age

▬▬▬ *Subduction Zone*

P=Phosphorite Occurrences (Parrish et al., 1986)

PANGEA



Pangea= “All Lands”

Northern Pangea:

North America +
Eurasia

Southern Pangea:

Gondwana

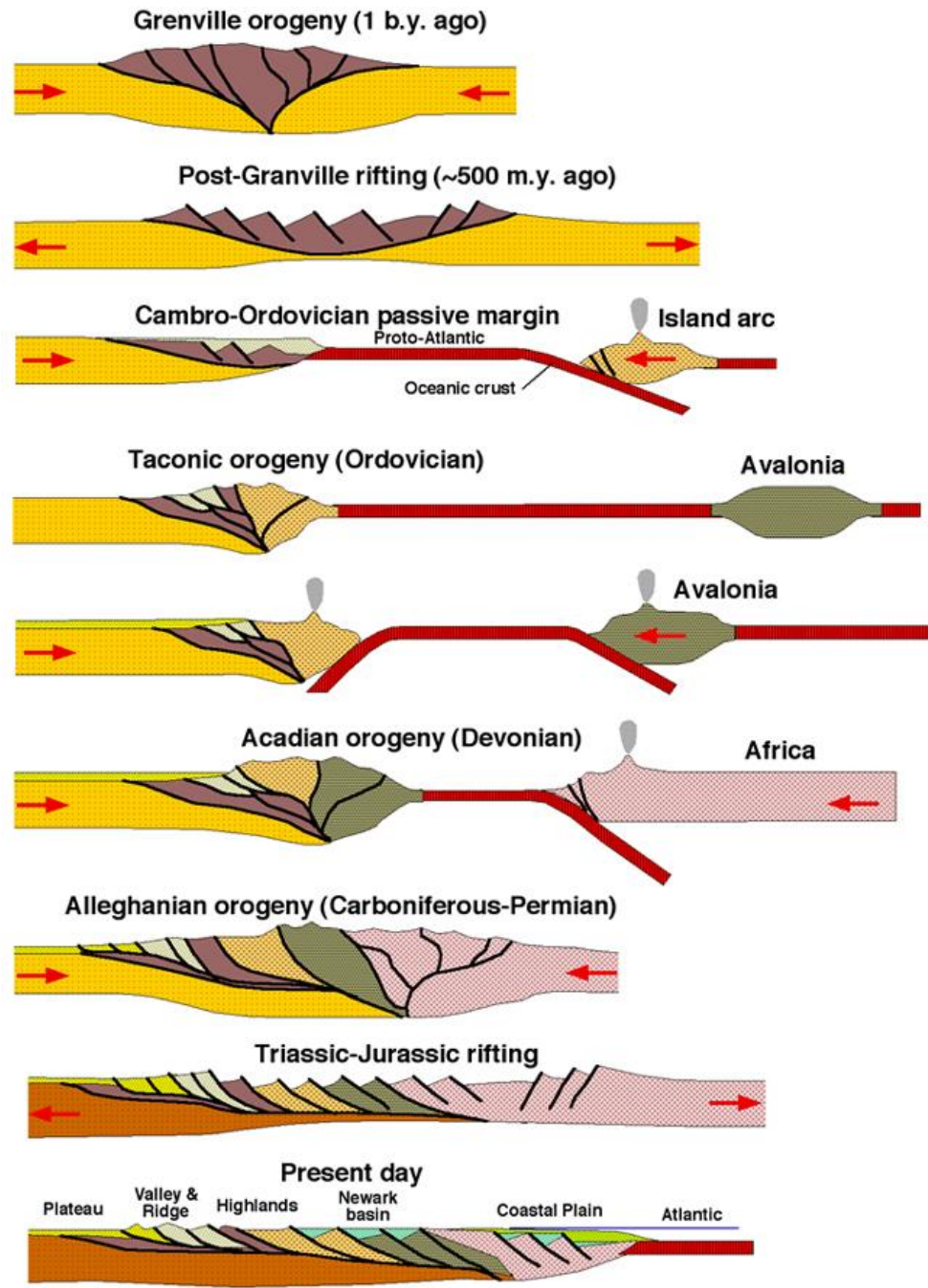
Gondwana= Africa, S.
America, India,
Madagascar, Sri Lanka,
Australia and Antarctica

Appalachian Orogenic Events

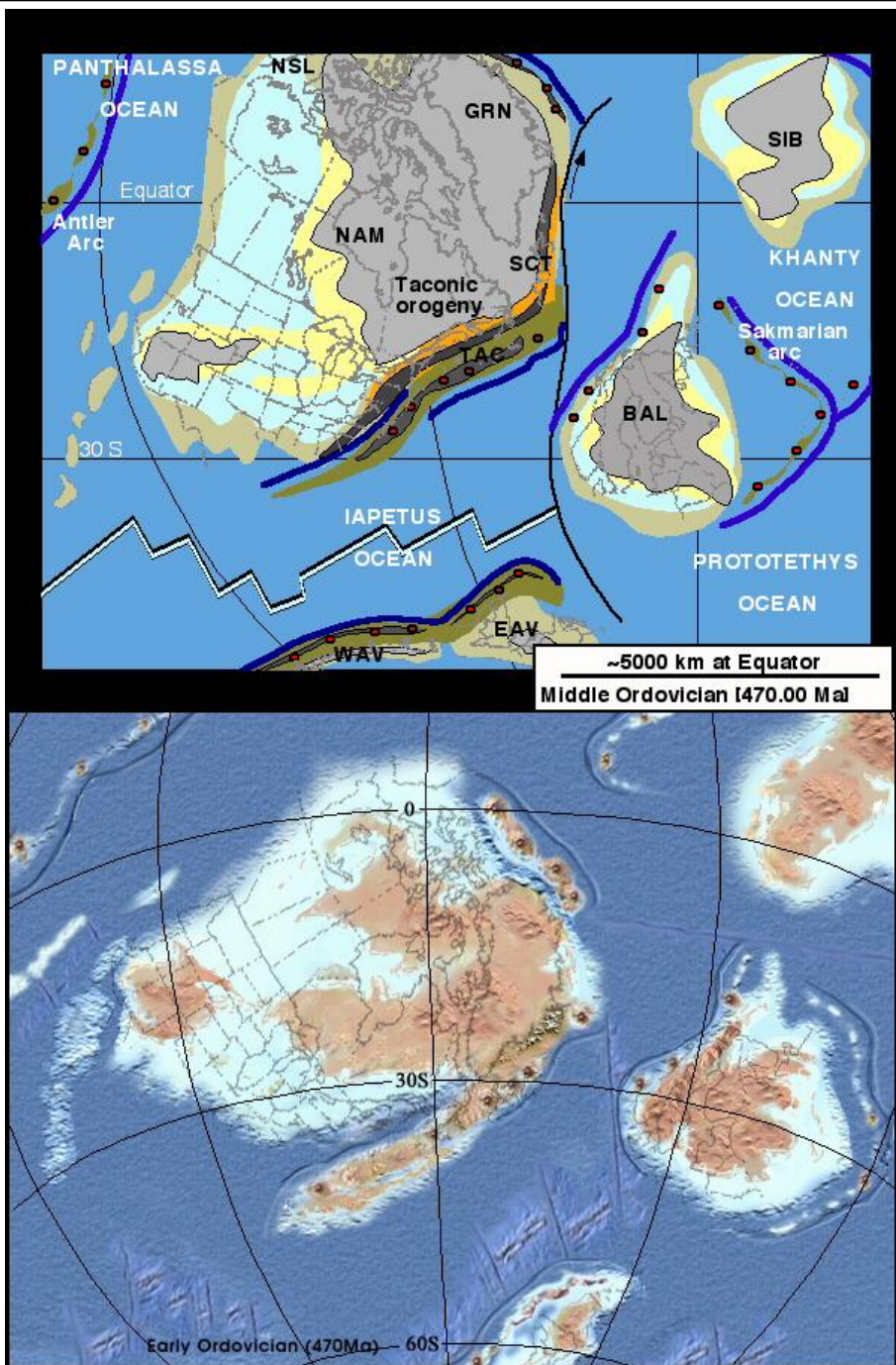
Taconic Orogeny- Ordovician Age (~450-490 Ma): Peri-Gondwana terranes collide with North America

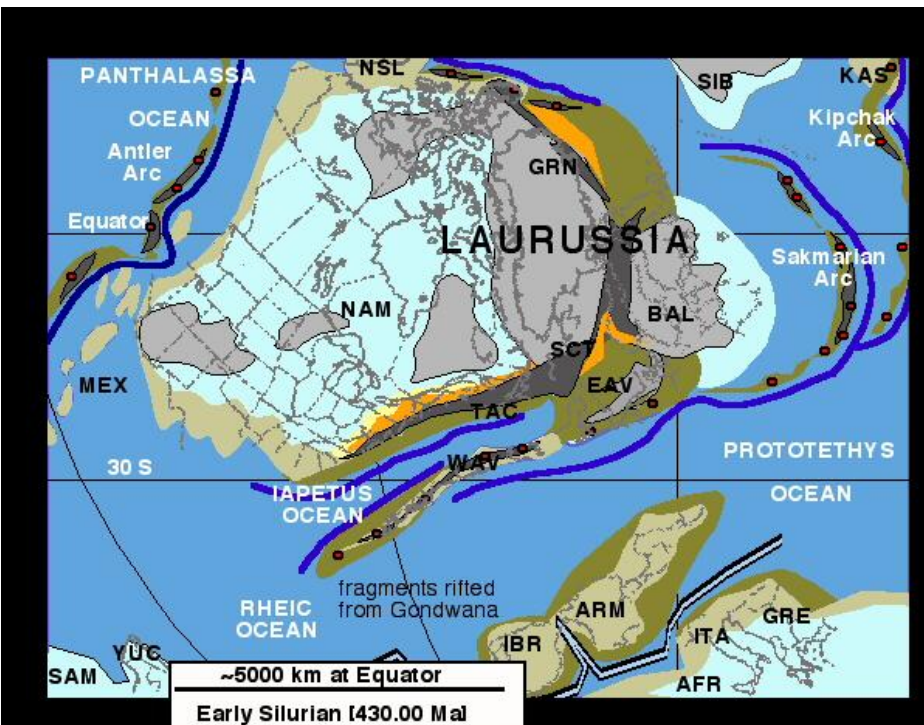
Acadian Orogeny- Silurian-Devonian Age (425-390 Ma): Avalonian-Armorican terranes collide formation of Balonia

Alleghenian Orogeny- Permo-Carboniferous (300-250 Ma): Collision of Africa+South America with Laurasia

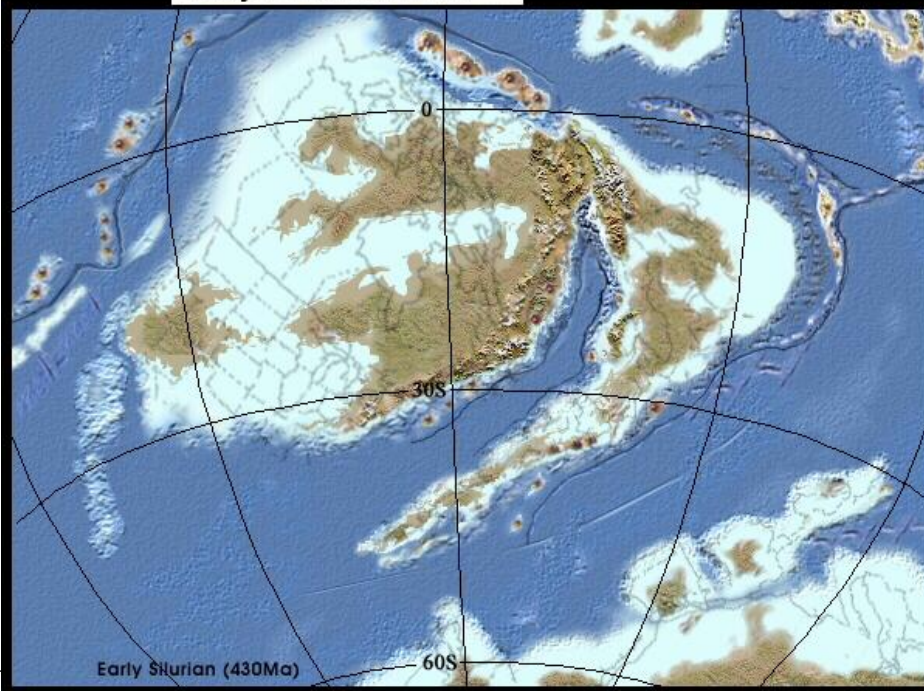


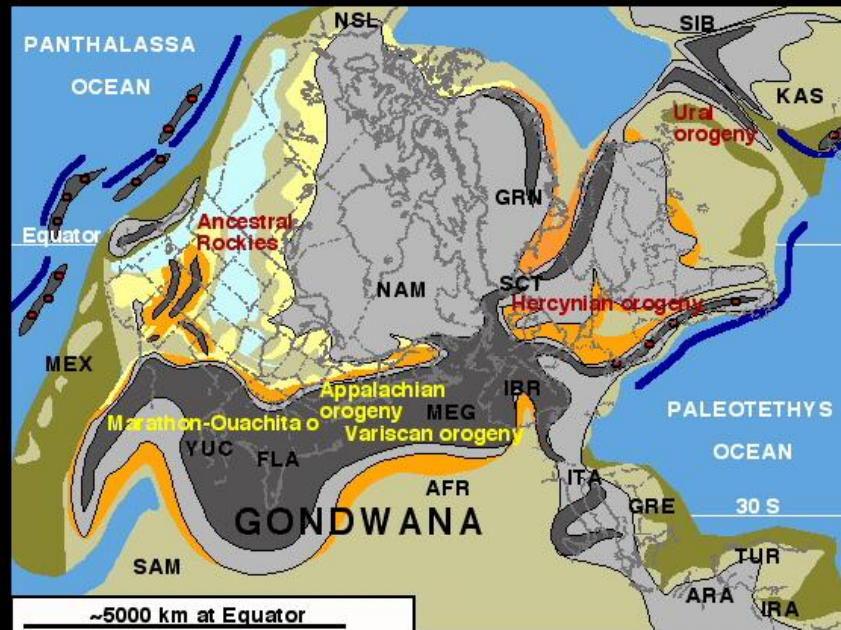
Taconic Orogeny





Acadian Orogeny





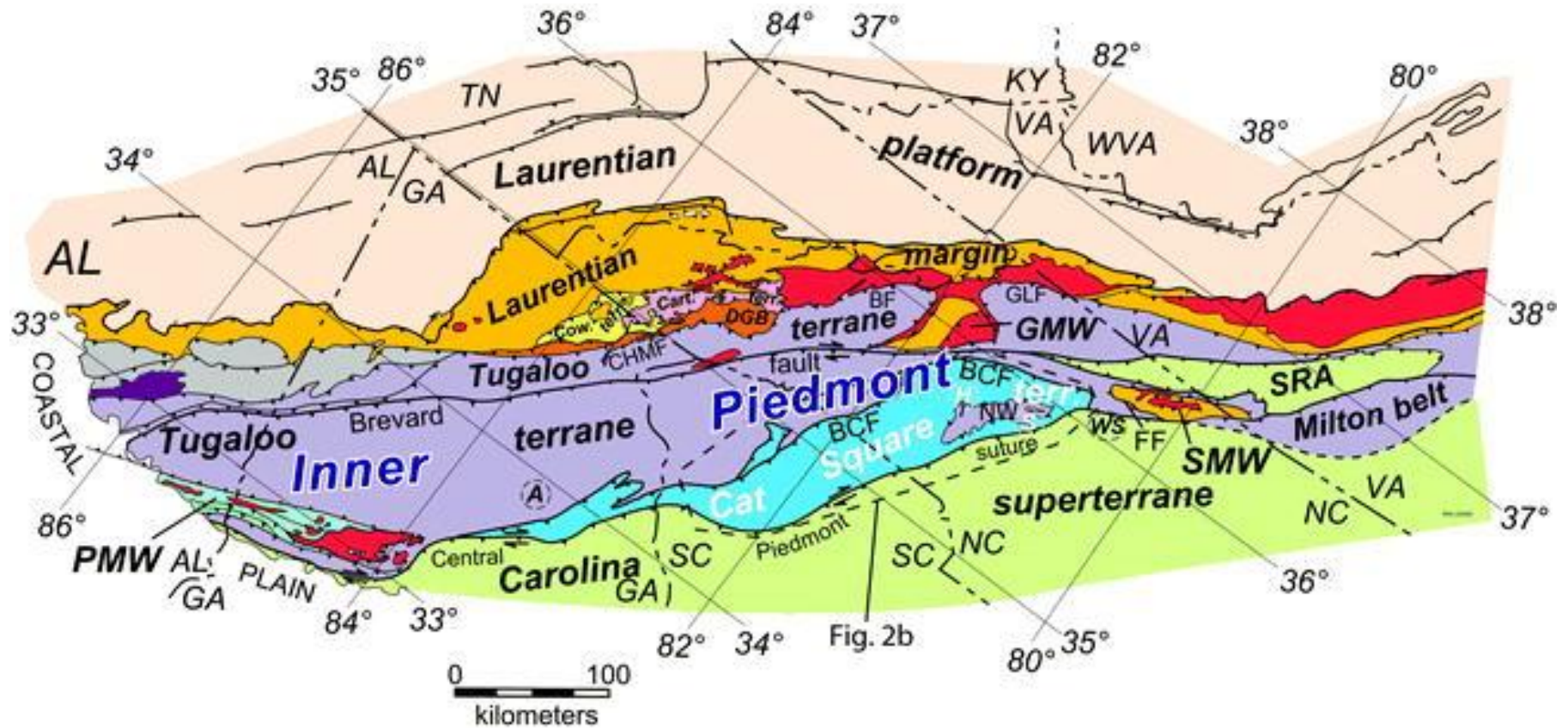
Upper Pennsylvanian (300.00 Ma)

Alleghenian Orogeny

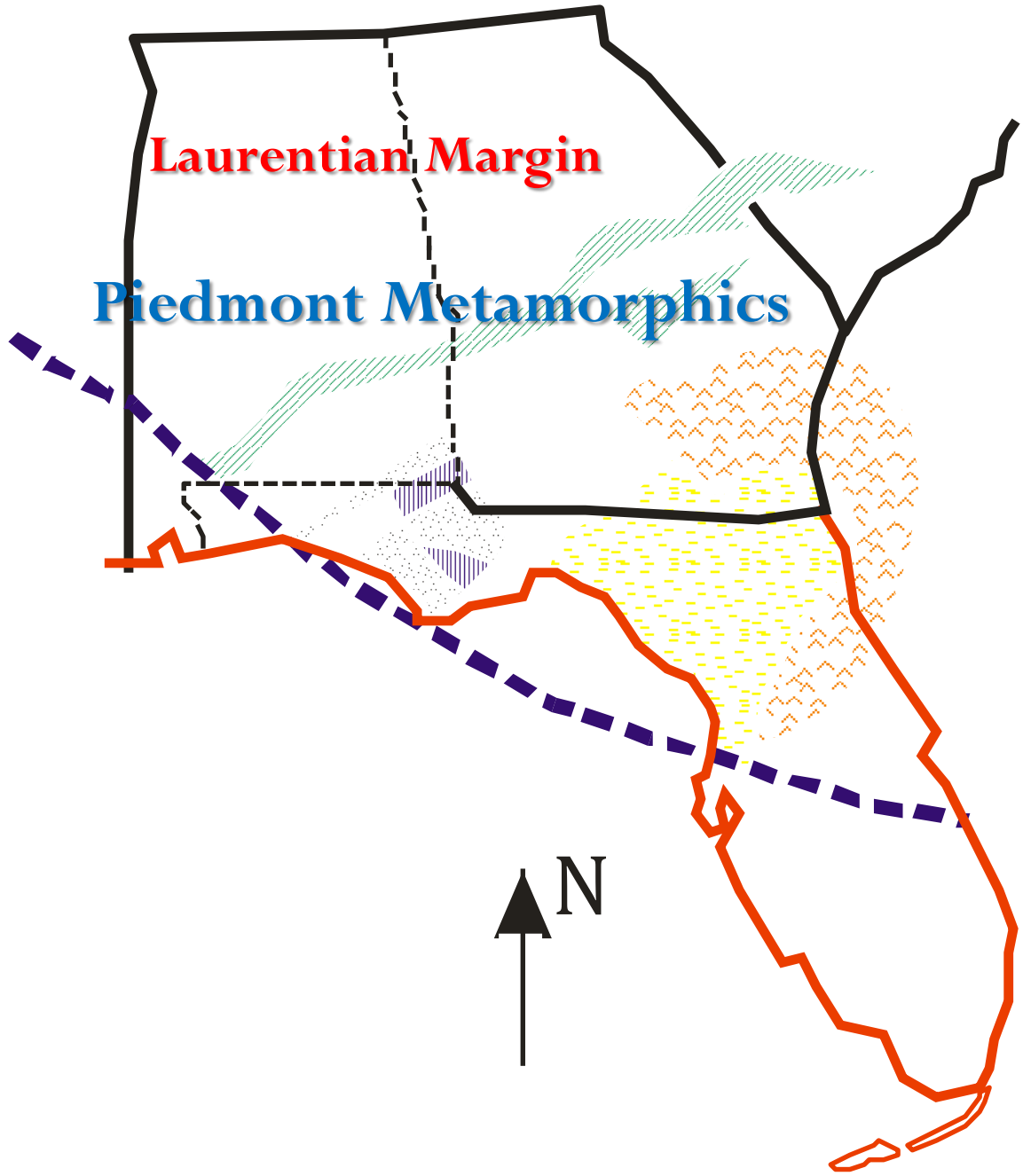


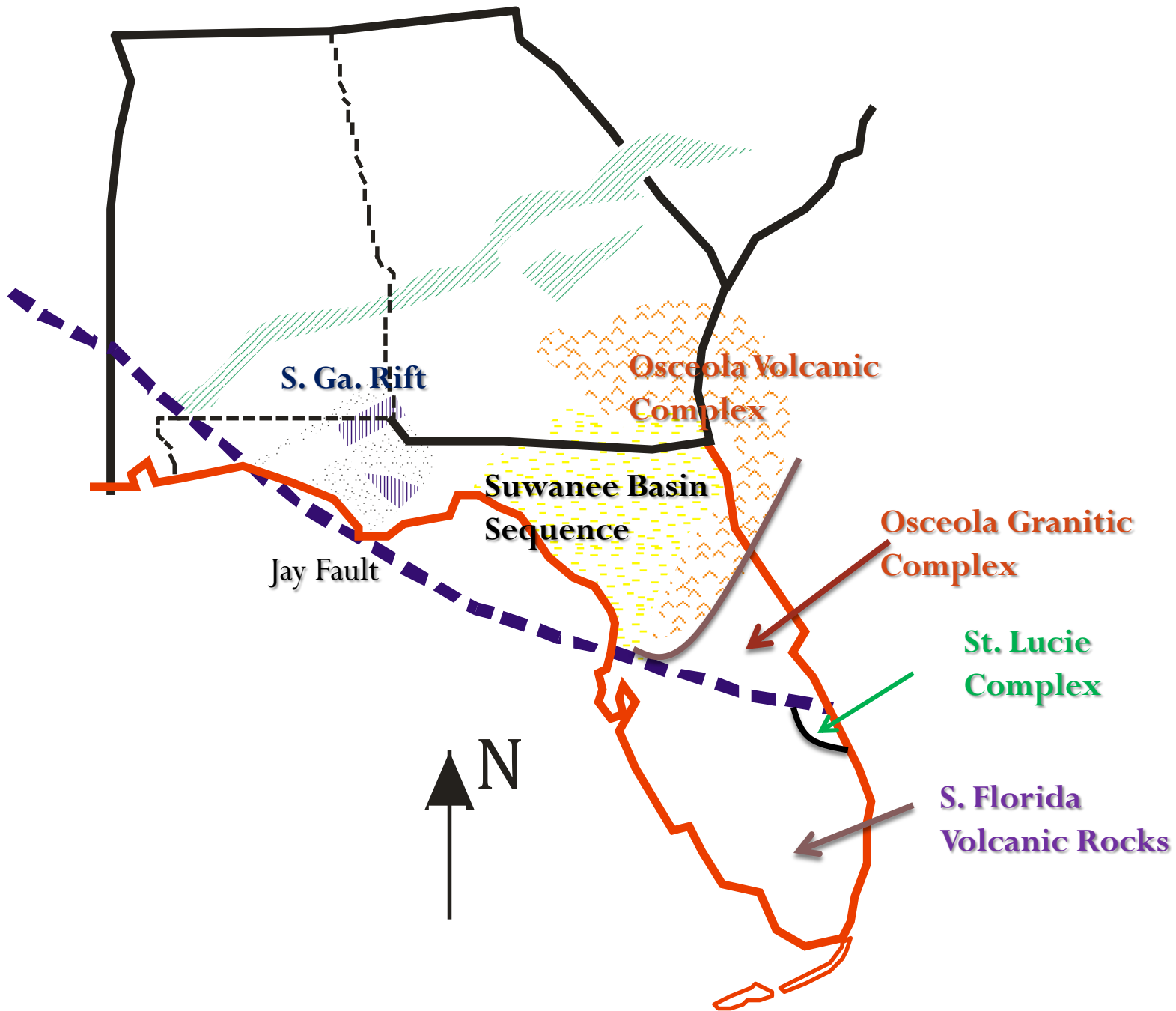
Late Pennsylvanian (300Ma)

Eastern US Geological Provinces



Laurentia=North America, Piedmont and Carolina are 'exotic' blocks to North America





Osceola Plutonic/Volcanic Rocks

Includes: Volcanic and Plutonic rocks of the Osceola proper sequence and the St. Lucie Metamorphic complex.

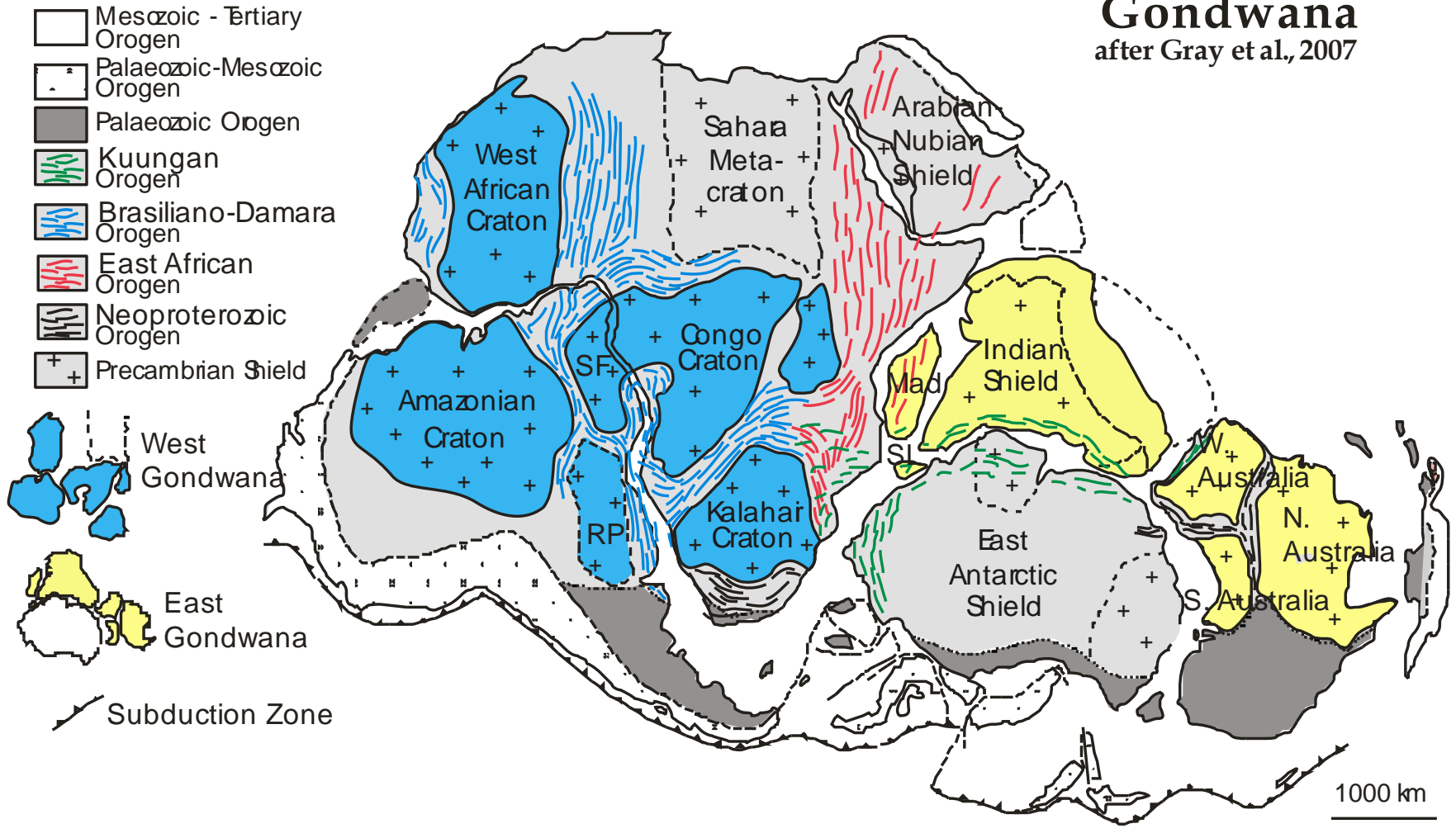
Likely continues into Georgia

Age is ~520-540 Ma and probably related to the assembly of the Gondwana Supercontinent during Brasiliano orogeny

Sometimes related to Avalonian blocks to the north. Maybe true....better to consider the material as peri-Gondwanan.

Gondwana

after Gray et al., 2007



Suwannee Basin

1. Early Ordovician Quartzite sandstones. (480 Ma)
2. Ordovician to Devonian Sandstones and Shales (475-375 Ma)

These have Gondwana affinities based on their fossil assemblages

Fossils of the Paleozoic



Skolithos- trace fossils of the Paleozoic.
Not diagnostic of any particular region.

Plaesiacomia exsul- only known trilobite
from Florida of Llandelo-Llanvirn
(Ordovician age-475 Ma)



Fossils of the Paleozoic II

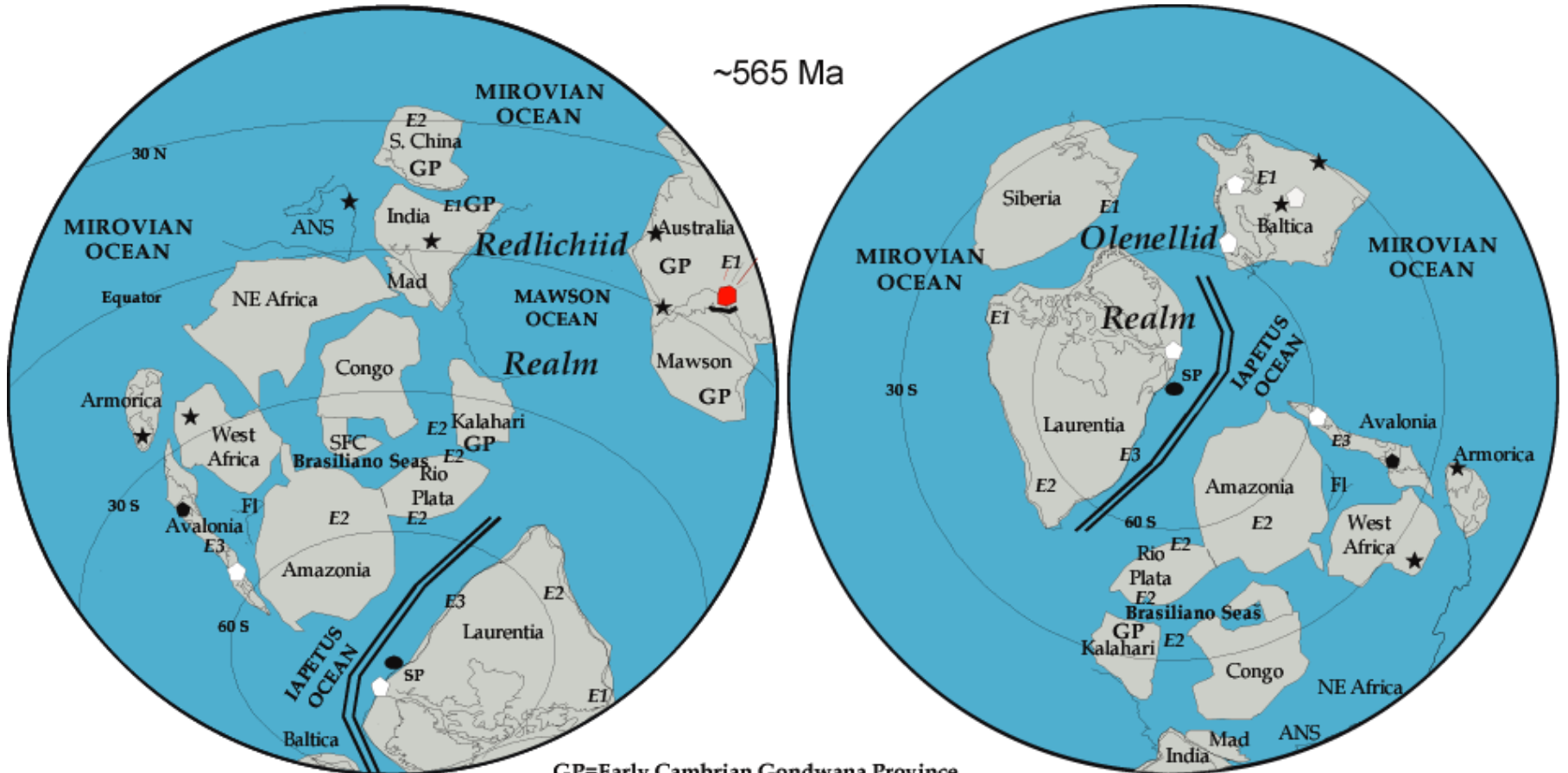
Plaesiacomia exsul- part of the Selenopeltis faunal province that is also found in northern Africa.

Why are trilobite fauna so useful?

Trilobitic spat (=young 'uns) have limited mobility and so they tend to have a restricted distribution in space and time.



~565 Ma



GP=Early Cambrian Gondwana Province

◻ Gaskiers Glacial deposits

☆ Ediacaran fossil locations not used by Waggoner (1999)

E1=Ediacaran province 1, E2=province 2, E3=province 3

🔴 Acraman Impact Site (580 Ma)

Fossils of the Paleozoic III

Other fossils from Florida basement rocks include *chitinozoans* that resemble similar fossils from western and northern Africa.

Other fossils include arthropods, eurypterids and ostracodes.



Fossils of the Paleozoic IV

A Late Silurian to Middle Devonian pelecypod assemblage is similar to fossils in *Poland, North Africa and Turkey*.

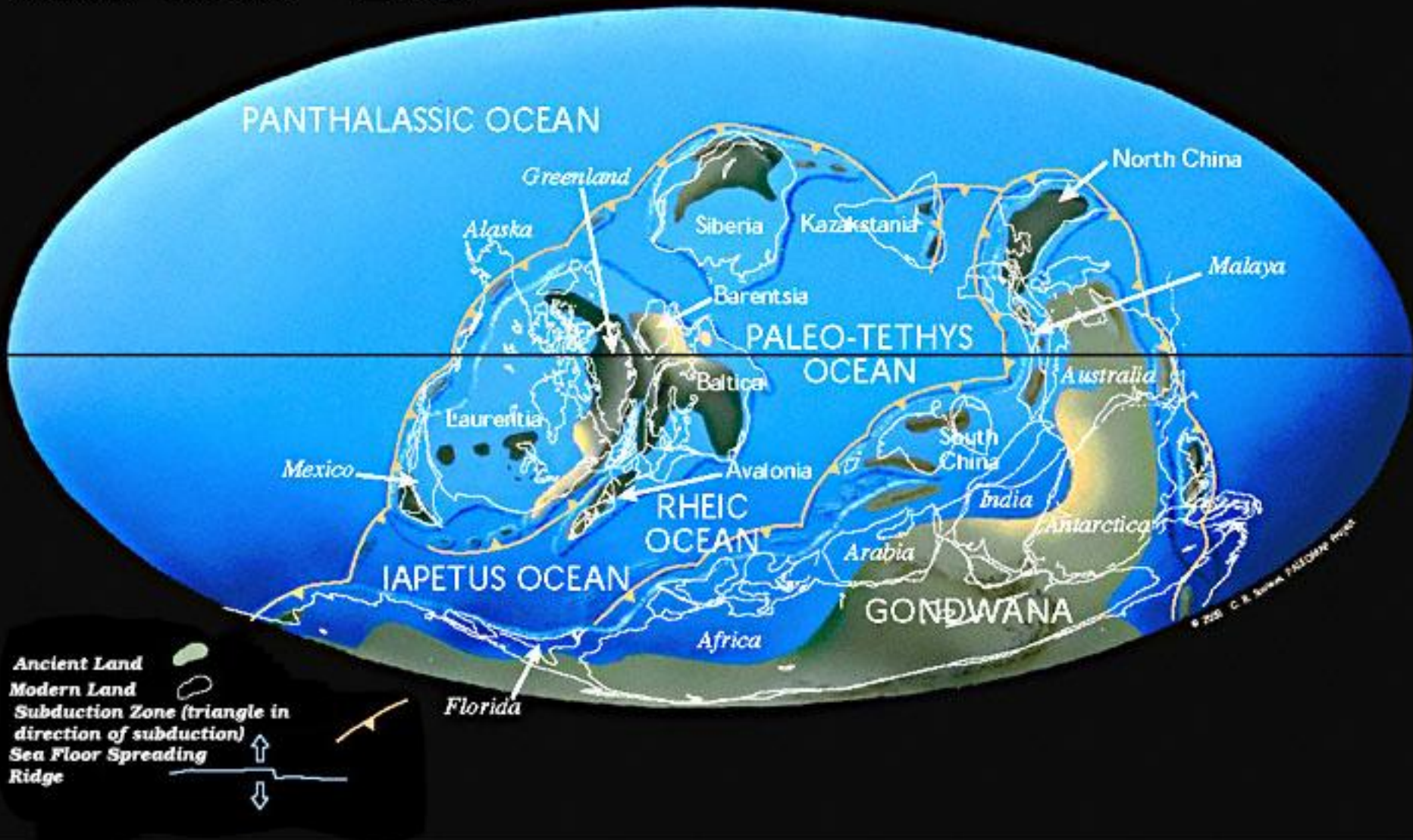
Other fossils include brachiopods, orthoconic cephalopods and Tentaculites (mollusk).



Fossil Connections to Gondwana

- (1) The collective fossil assemblages from Florida hinted that the basement of Florida was 'exotic' to North America.
- (2) Referred to as the Suwannee terrane, it was likely located at high latitudes during the early Paleozoic Ordovician-Silurian.
- (3) Supported by paleomagnetic data.

Middle Silurian 425 Ma



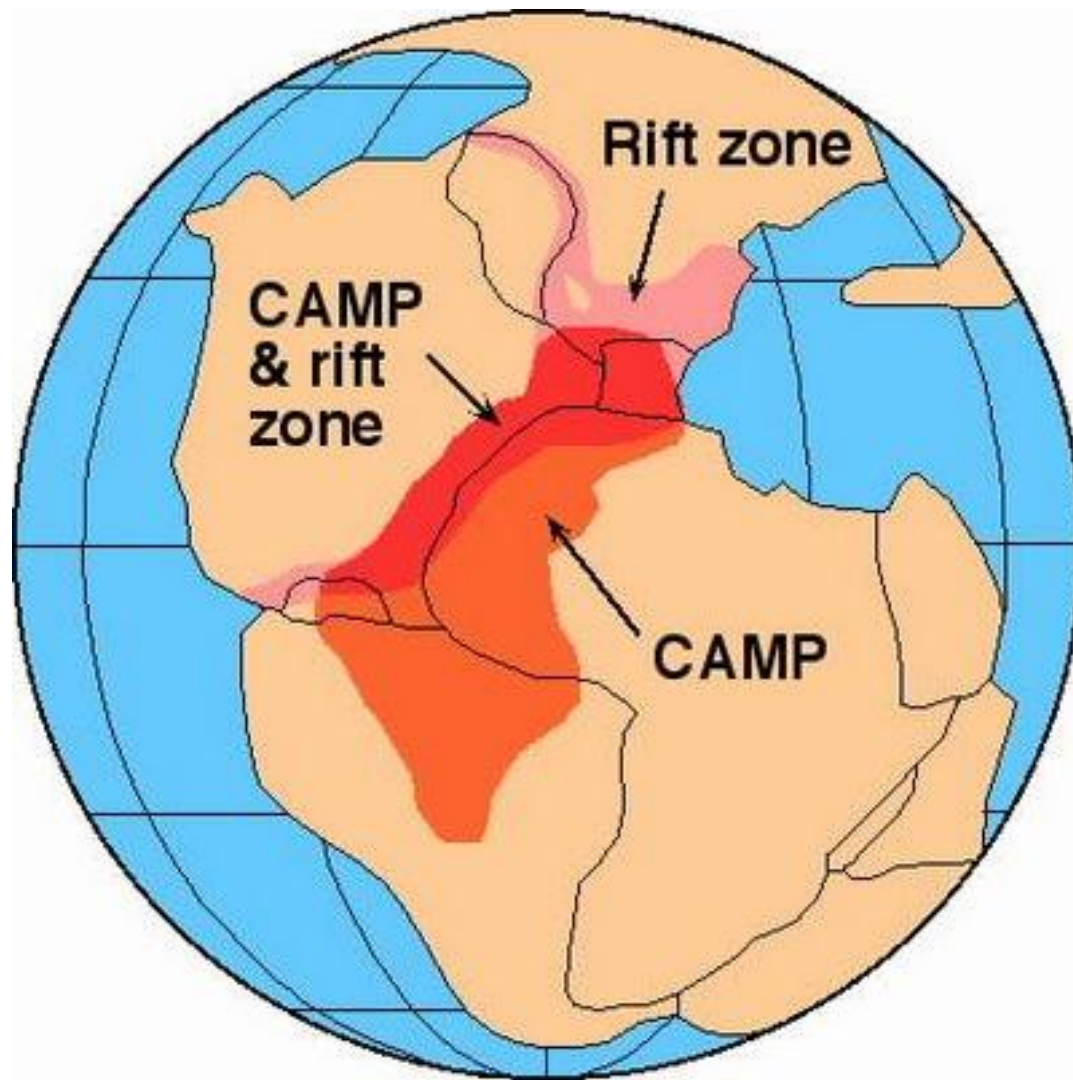
Terrane Transfer: How did Florida become attached to Laurentia?

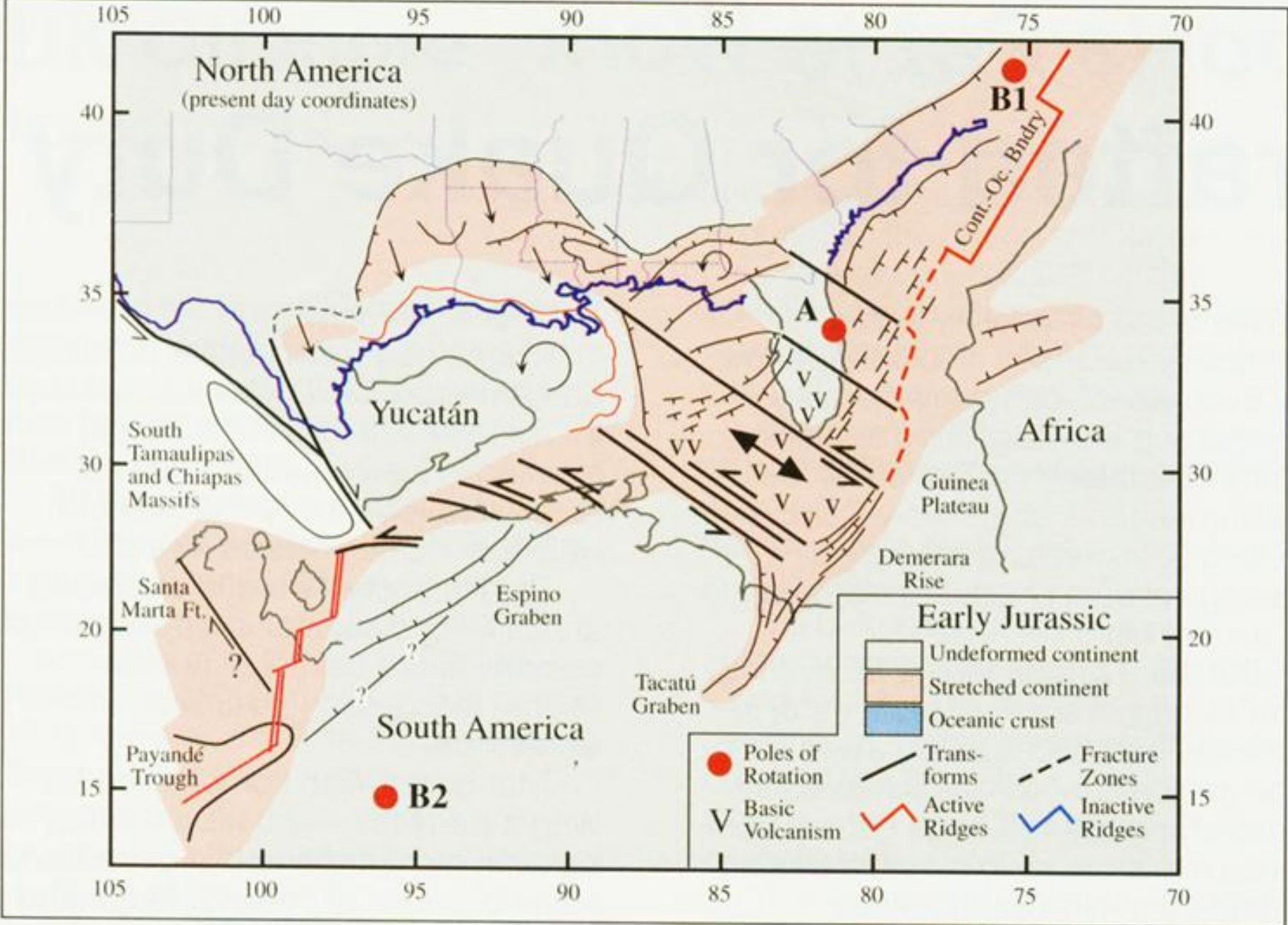
Pangea Assembly: Brings Gondwana and Laurentia together.

Triassic-Jurassic Opening of the Atlantic- The CAMP event.

CAMP=Central Atlantic Magmatic Province---Mantle Plume Event

CAMP

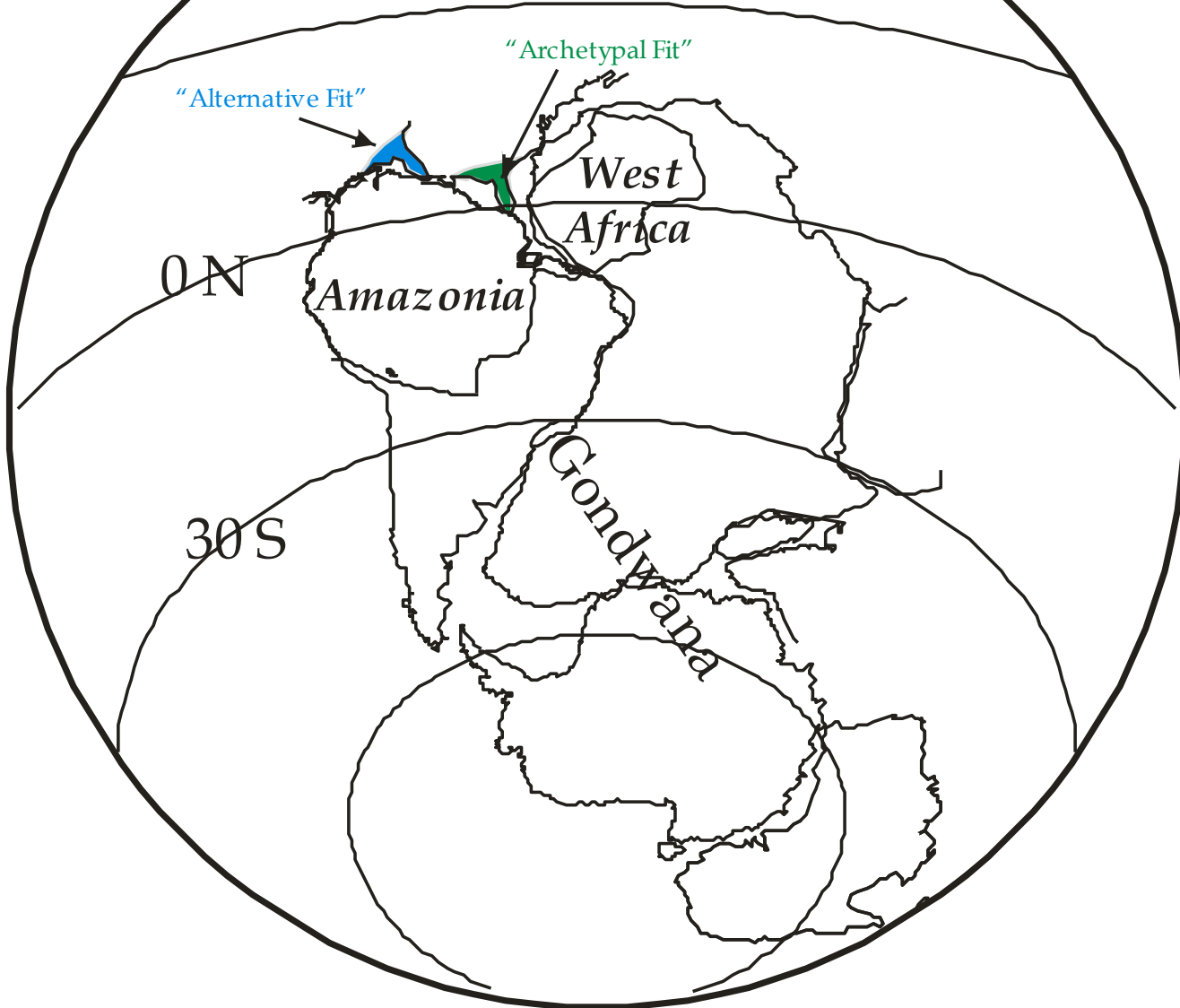




Evidence for CAMP in Florida

Heatherington and Mueller (2004) summarized geochronologic and geochemical evidence from Florida Boreholes for the CAMP event in Florida.

~175 Ma



"Alternative Fit"

"Archetypal Fit"

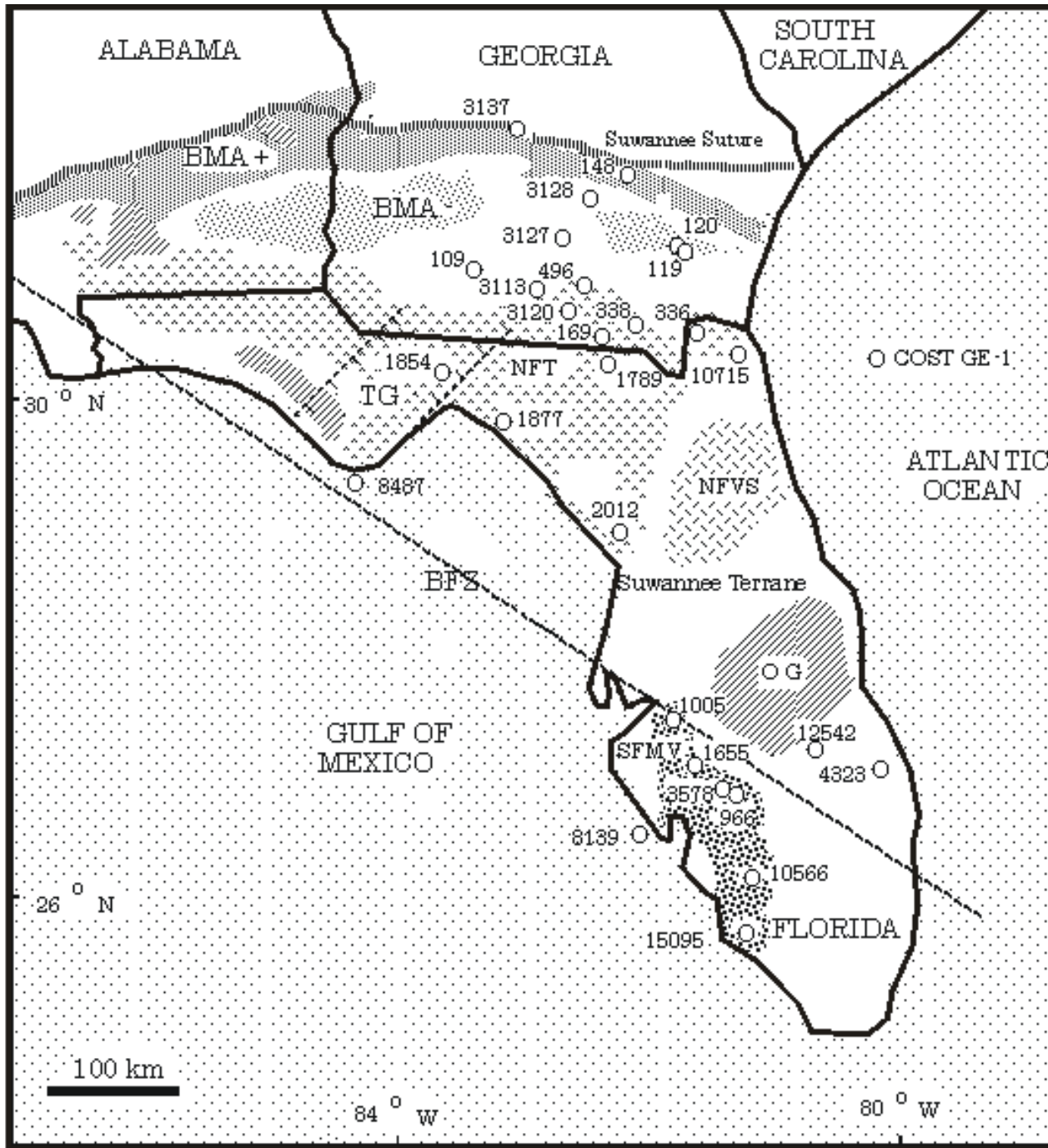
West
Africa

Amazonia

0°N

30°S

Gondwana



Geochemical/Geochronologic Support