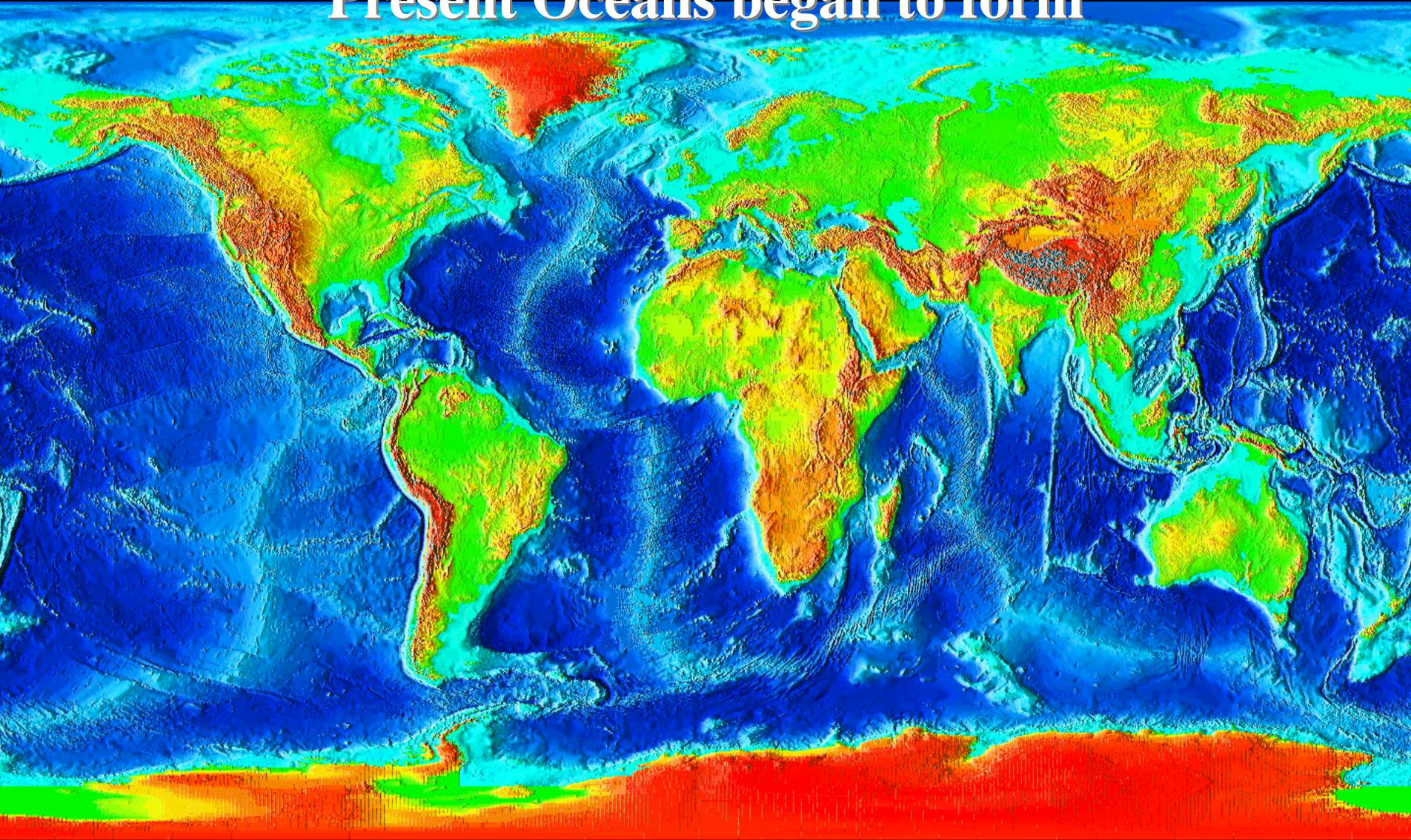


# The Wilson Cycle: Geology before the Present Oceans began to form



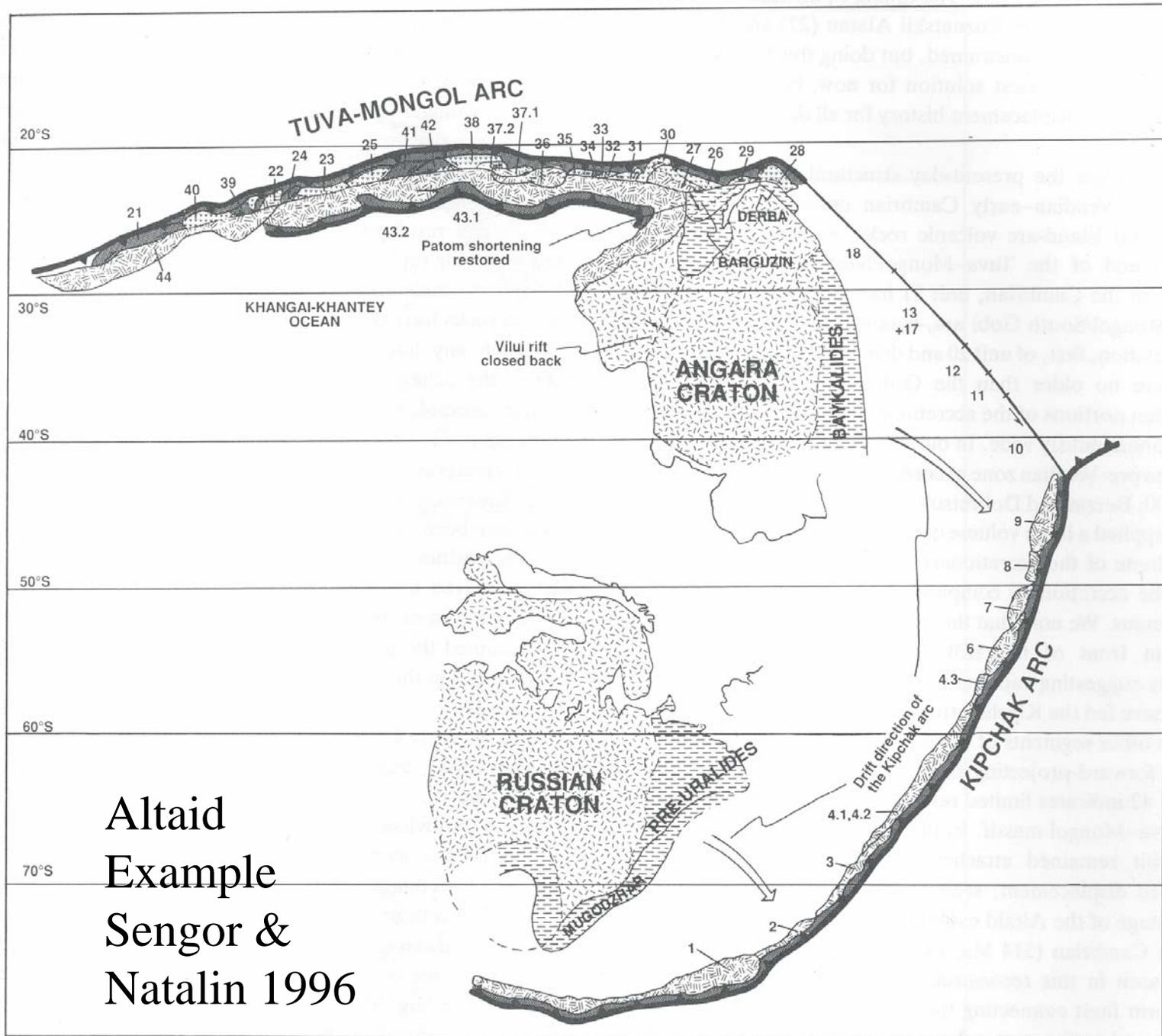
**Why does plate tectonics matter to Precambrian Geologists?**

Image courtesy of NOAA and USGS.

# Life cycle of ocean basins

- Wilson, 1968

<u>Stage</u>	<u>Dominant motions</u>	<u>Characteristic features</u>	<u>Typical igneous rocks</u>	<u>Typical sediments</u>	<u>Metamorphism</u>	<u>Examples</u>
1. Embryonic	Uplifts	Rift valleys	Tholeiitic flood basalts, alkalic basalt centers	Sedimentation minor	Negligible	East African Rift Valleys
2. Young	Spreading	Narrow seas with parallel coasts and central	Tholeiitic flood basalts, alkalic basalt centers	Shelf and basin deposition; evaporites possible	Negligible	Red Sea, Gulf of Aden
3. Mature	Spreading	Ocean basin with active mid-ocean ridges	Tholeiitic flood basalts, alkalic basalt centers but activity concentrated at center	Abundant shelf deposits (miogeosynclinal)	Minor	Atlantic Ocean
4. Declining	Shrinking	Island arcs and adjacent trenches around margins	Andesites, granodiorites at margins	Abundant deposits derived from island arcs (eugeosynclines)	Locally extensive	Pacific Ocean
5. Terminal	Shrinking and uplifts	Young mountains	Volcanics, granodiorites at margins	Abundant deposits derived from island arcs (eugeosynclines) but evaporities possible	Locally extensive	Mediterranean Sea
6. Relic scar (geosuture)	Shrinking and uplifts	Young mountains	Minor	Red beds	Extensive	Indus Line in the Himalayas



Altai  
 Example  
 Sengor &  
 Natalin 1996

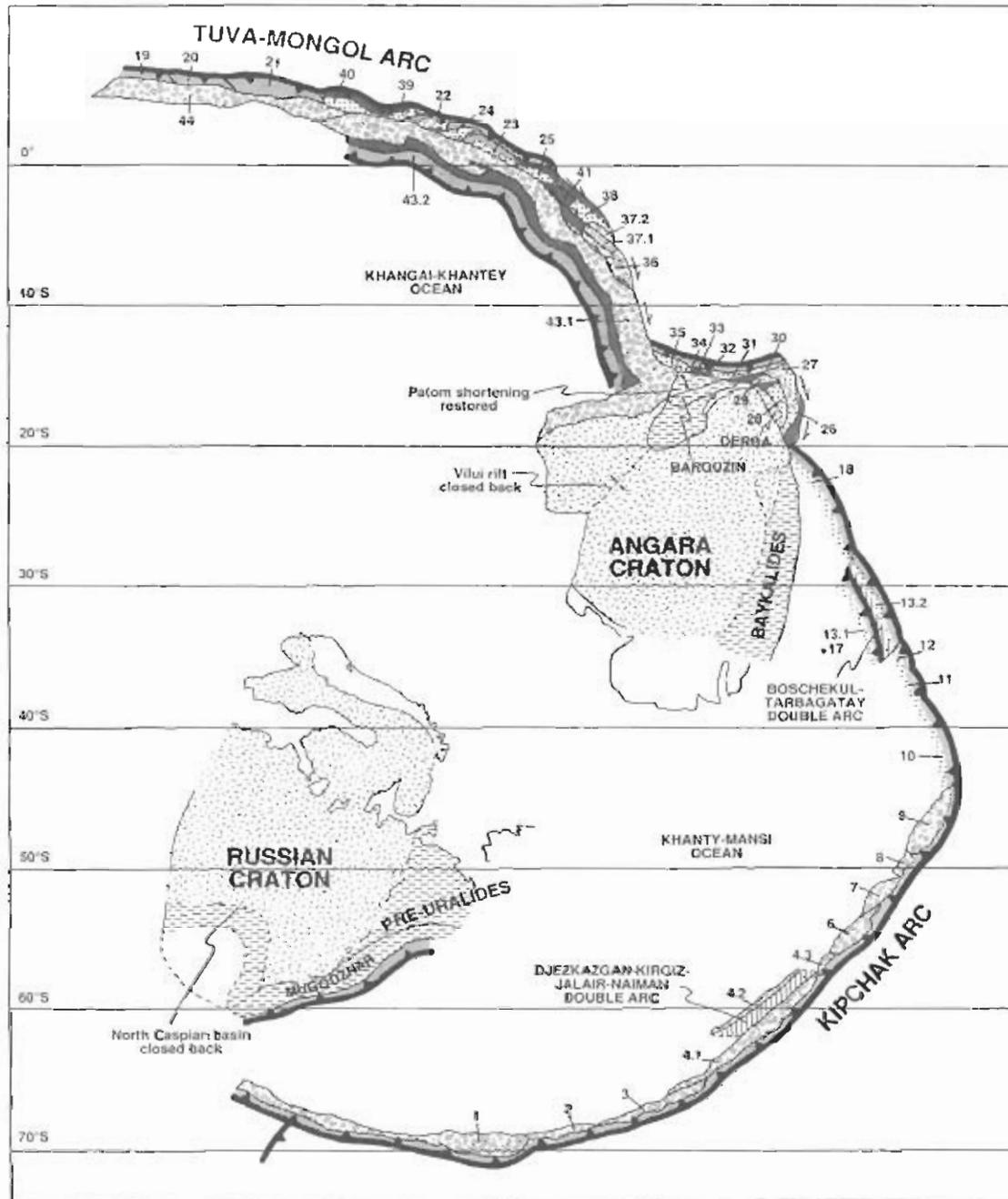
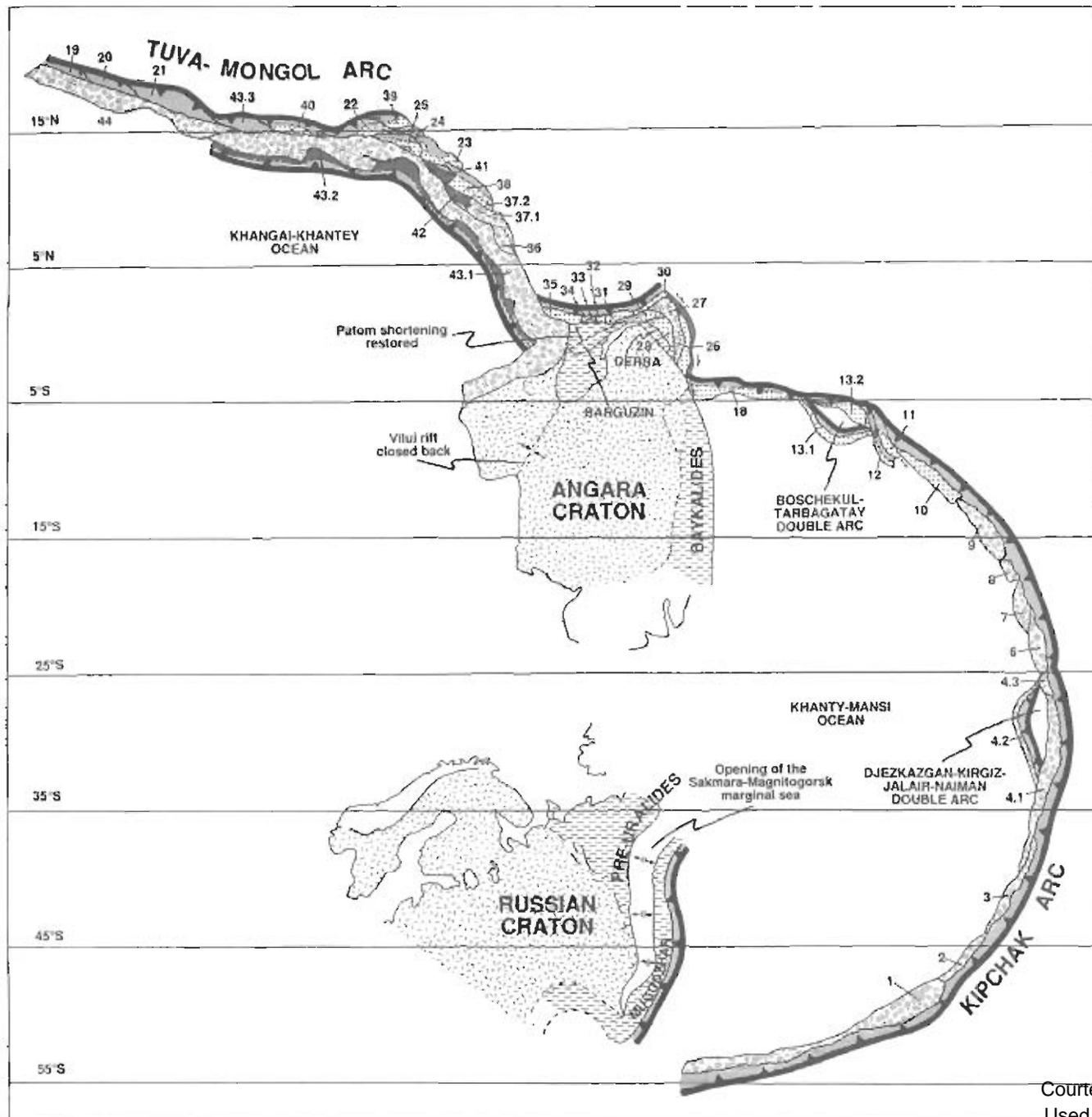
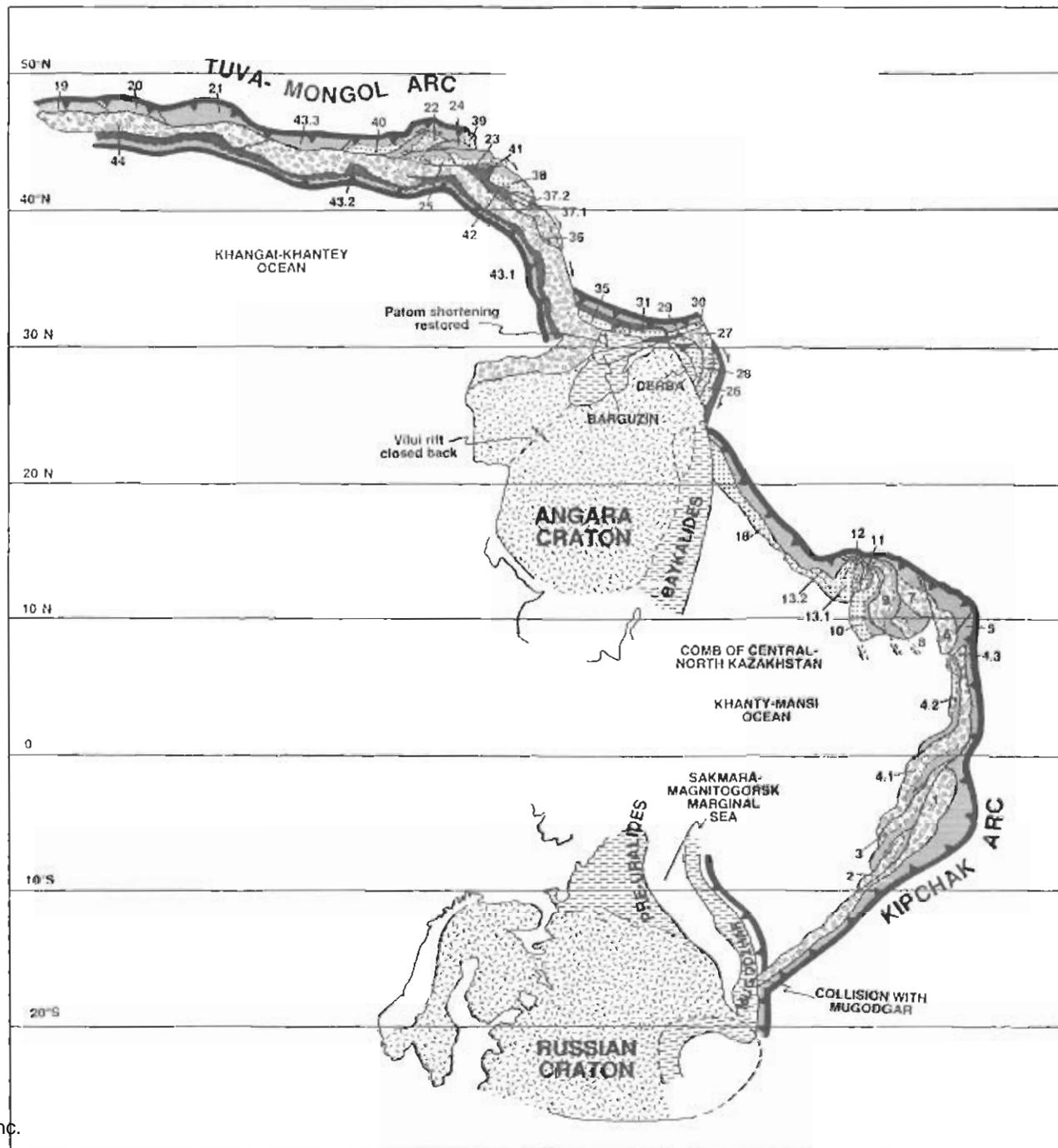


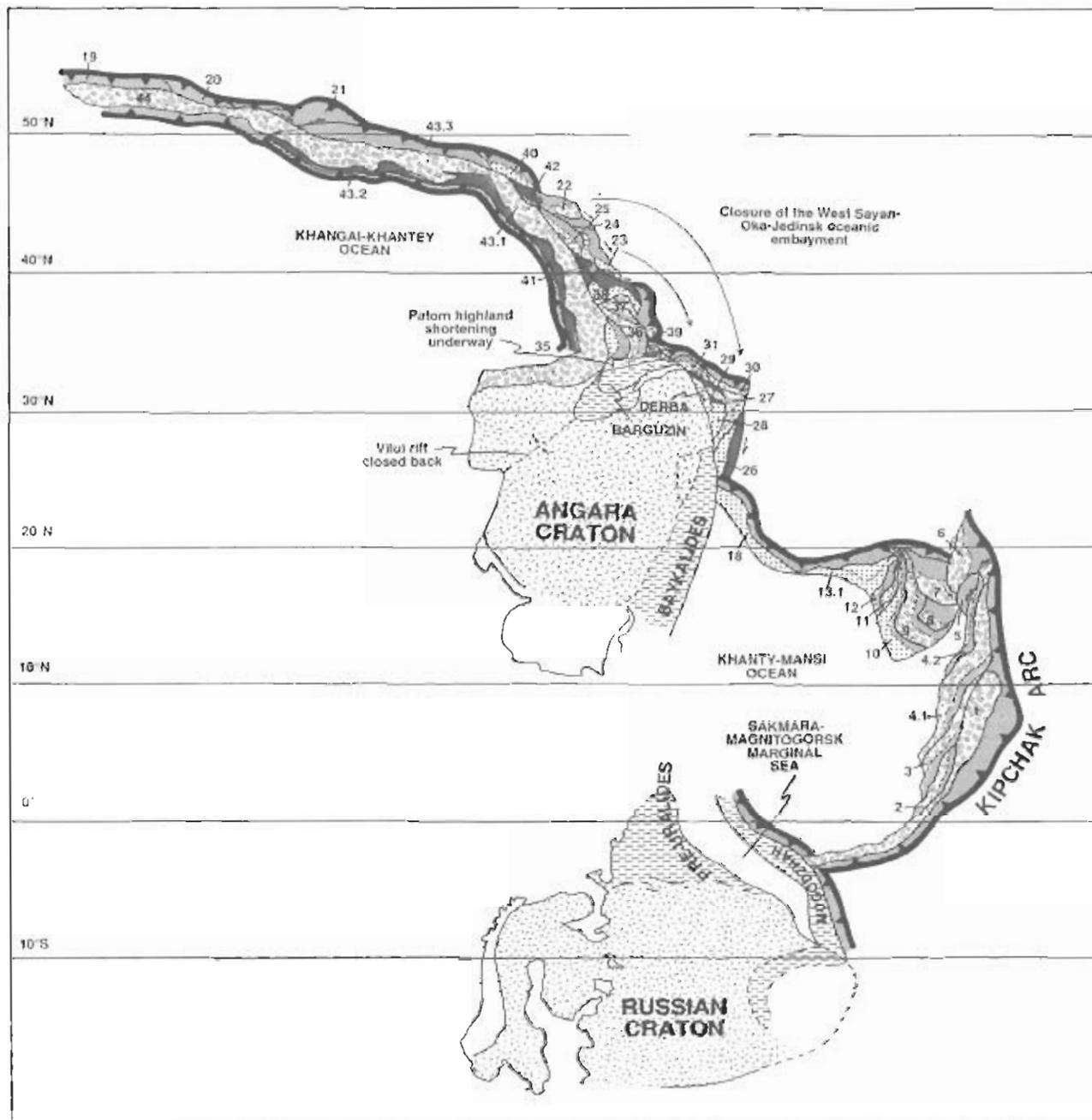
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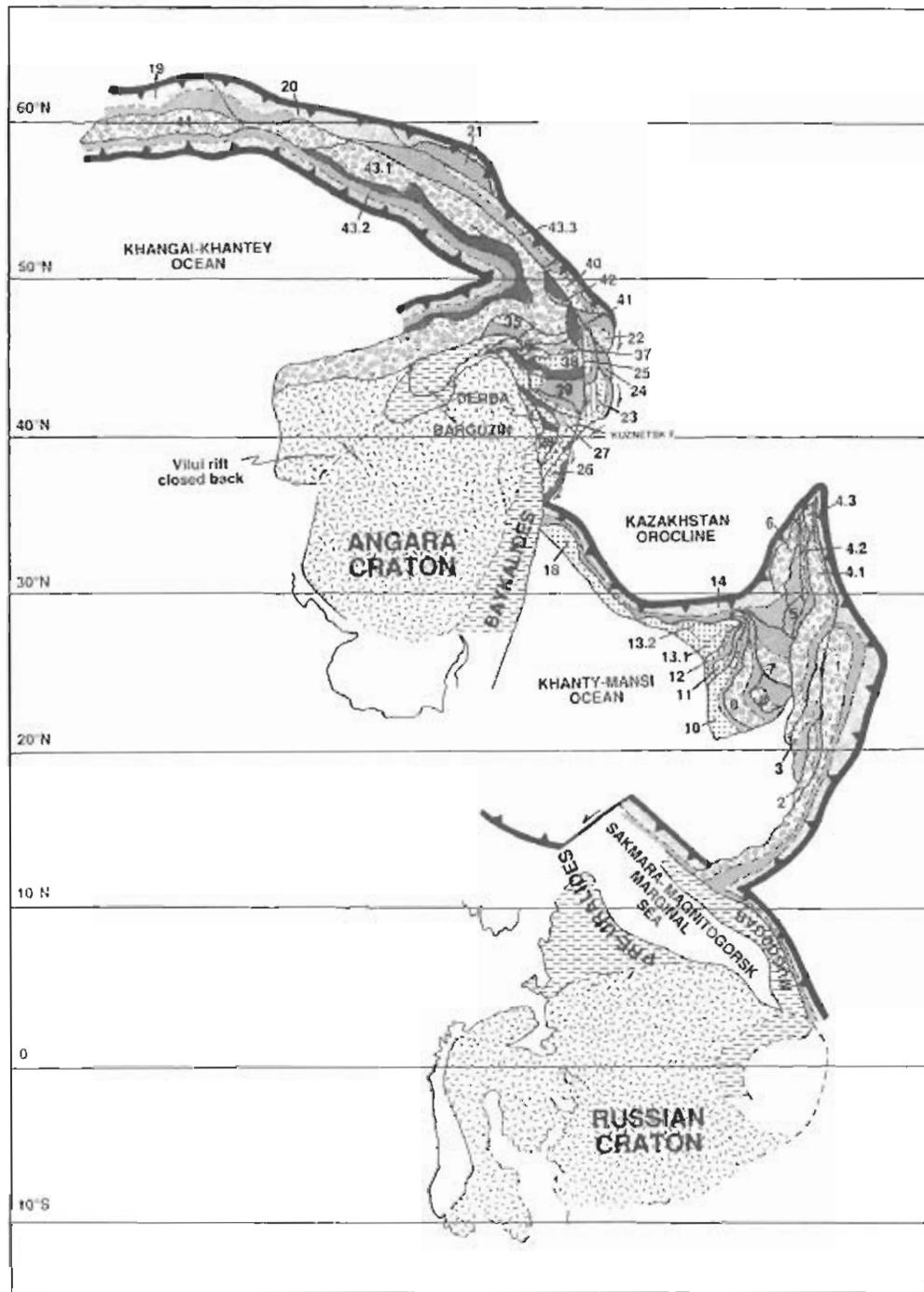


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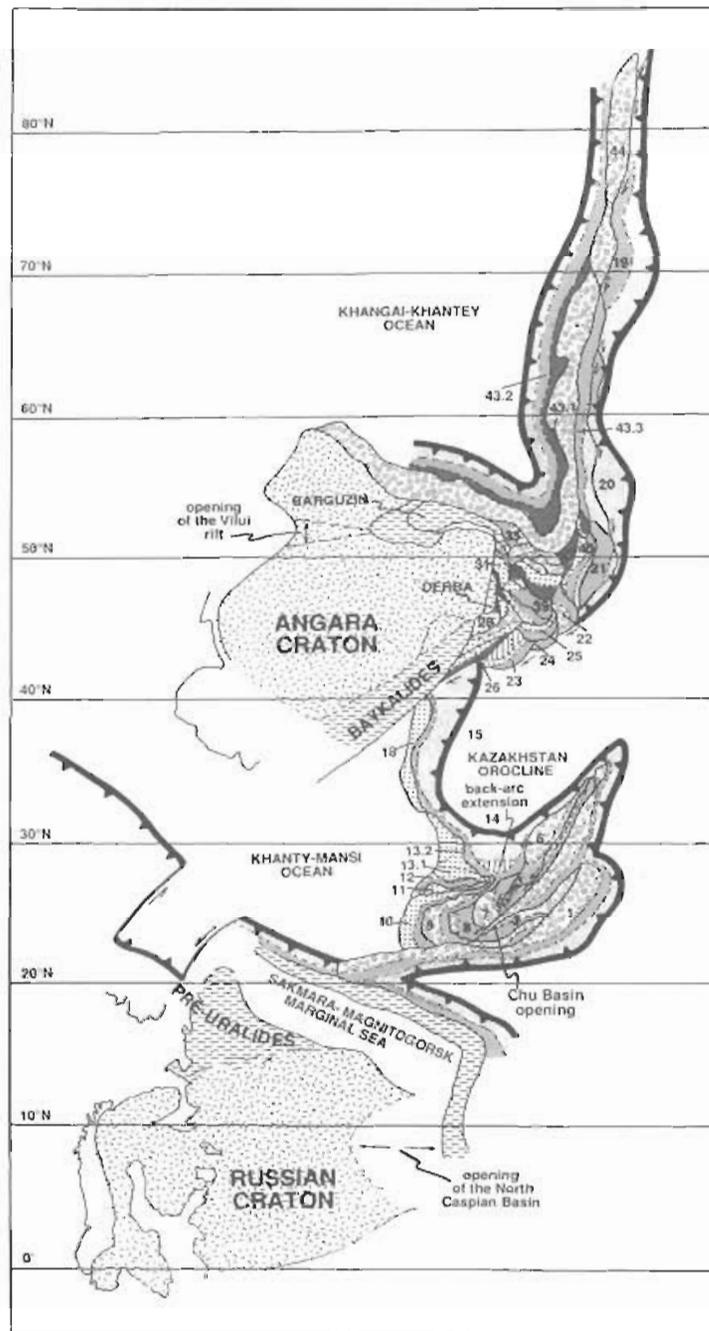




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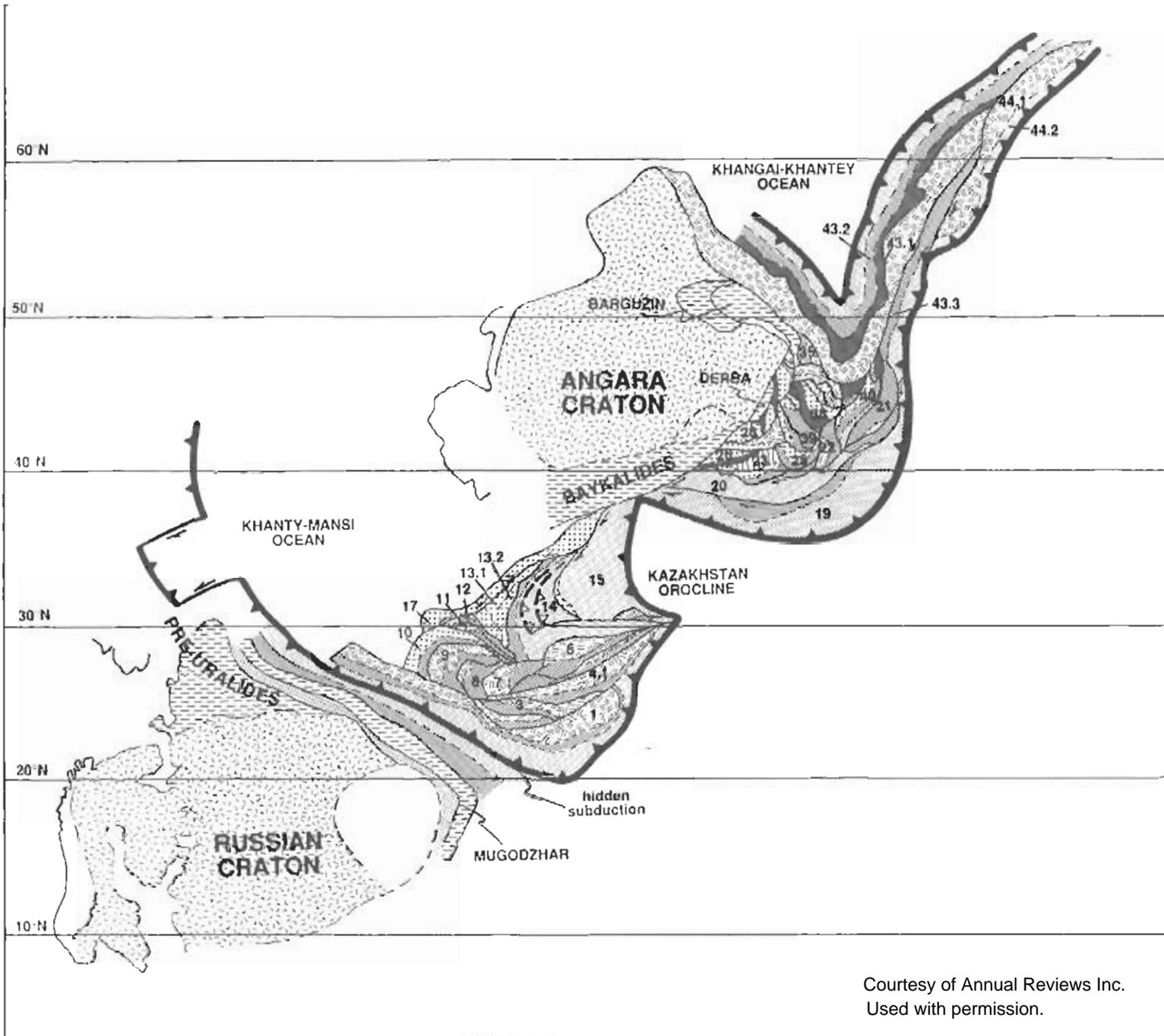


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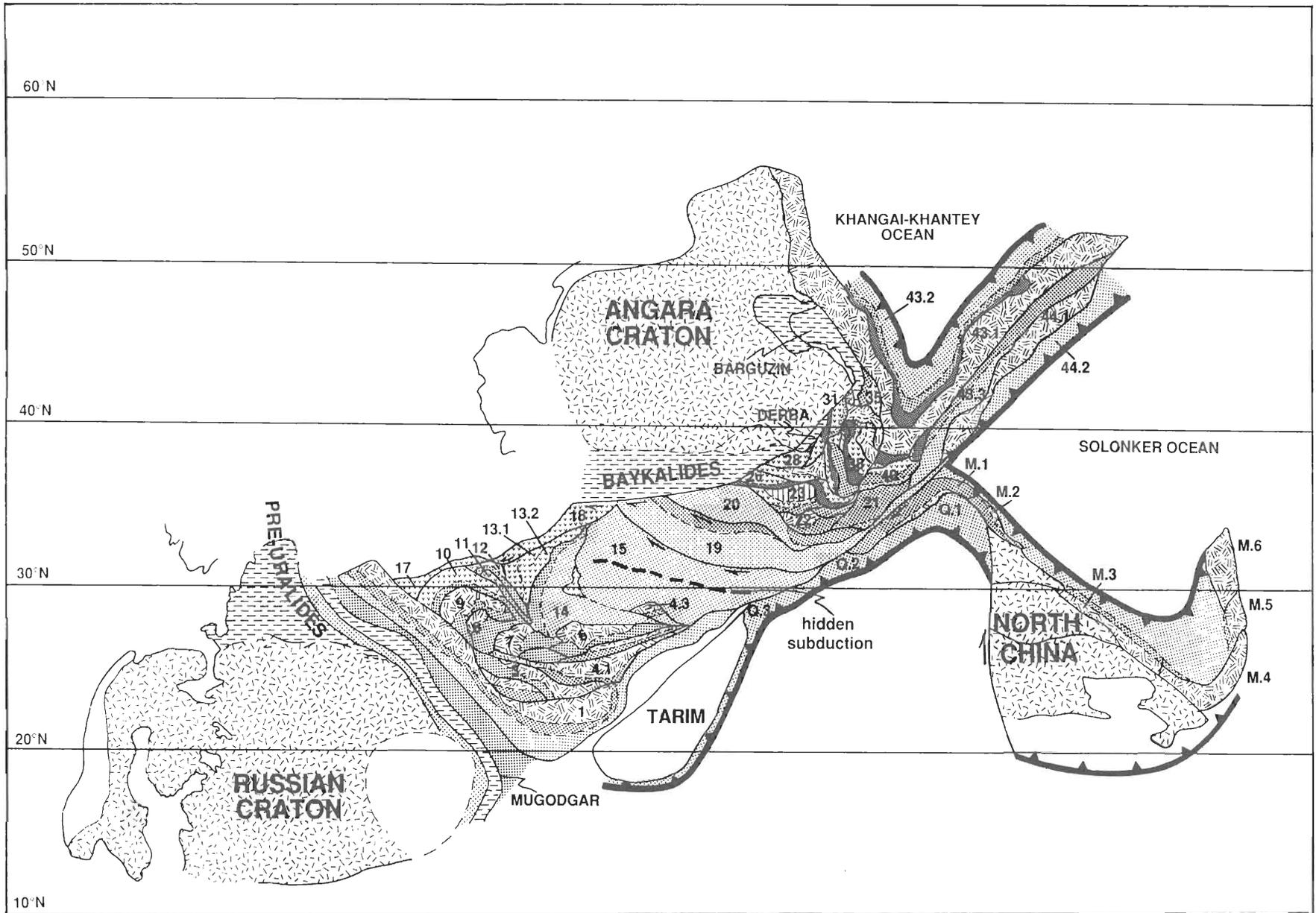
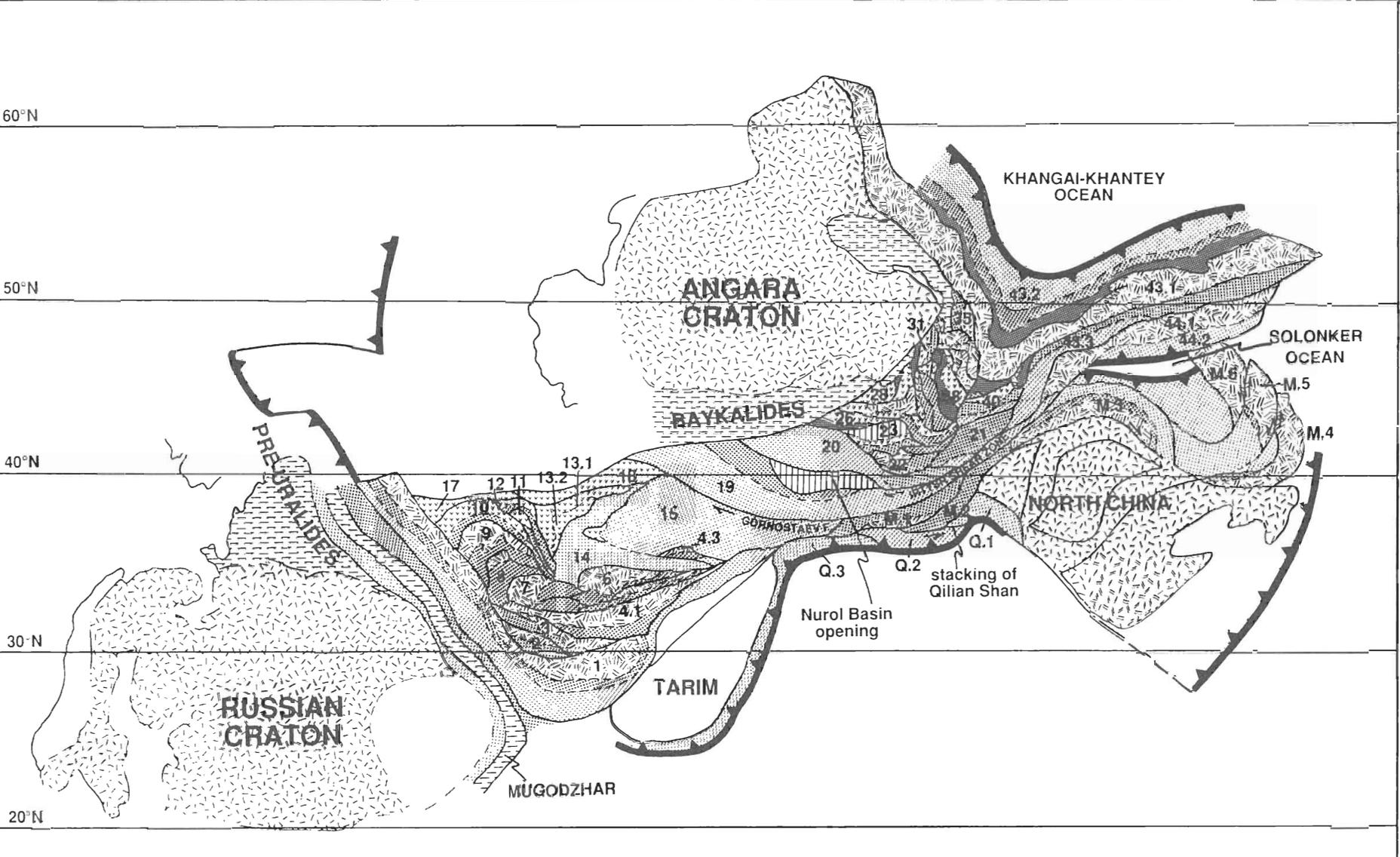
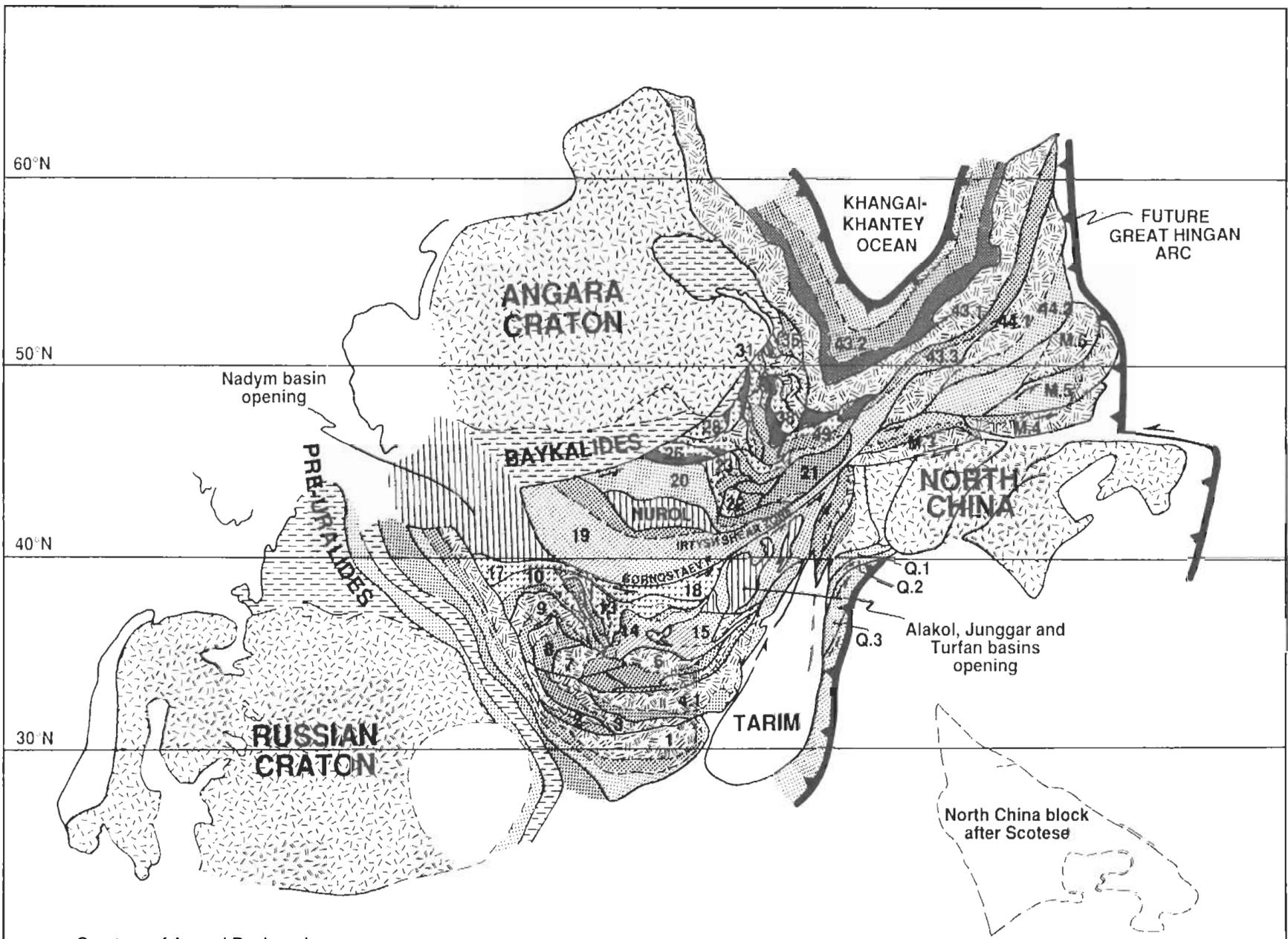


Figure 21.37. Late Carboniferous paleotectonic reconstruction of the

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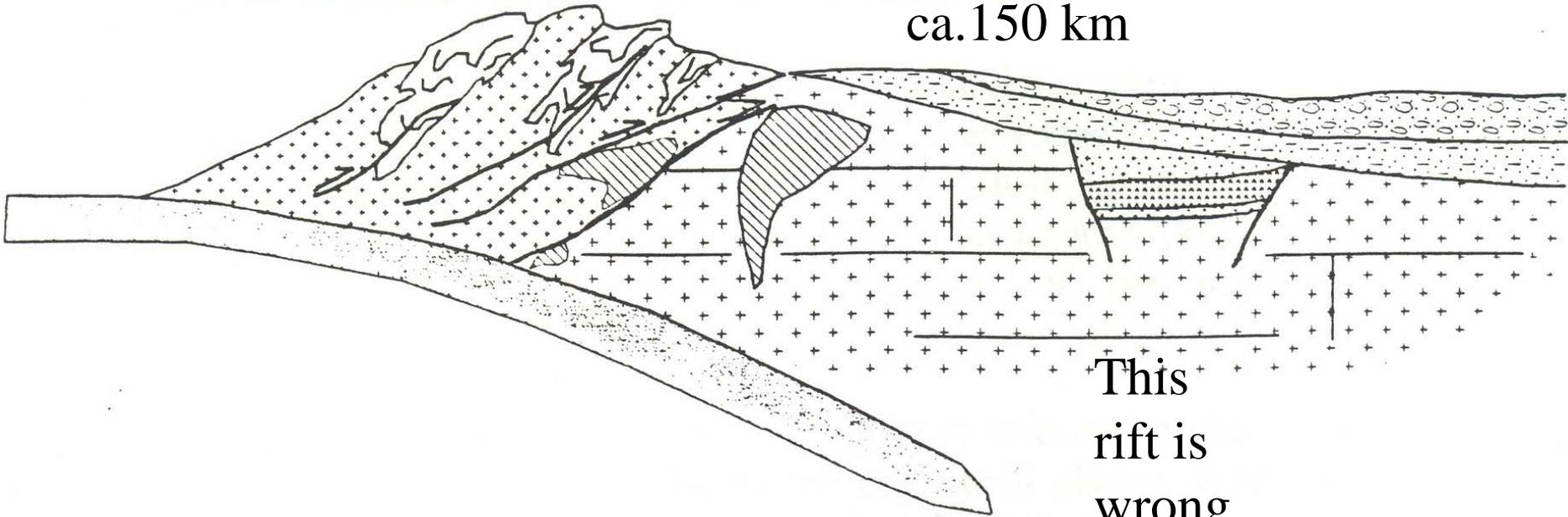
# Witwatersrand deposition in a foreland basin

ca. 3.0 Ga- 2.8 Ga

Ancient environments are recognizable, although often not ancient paleogeographies

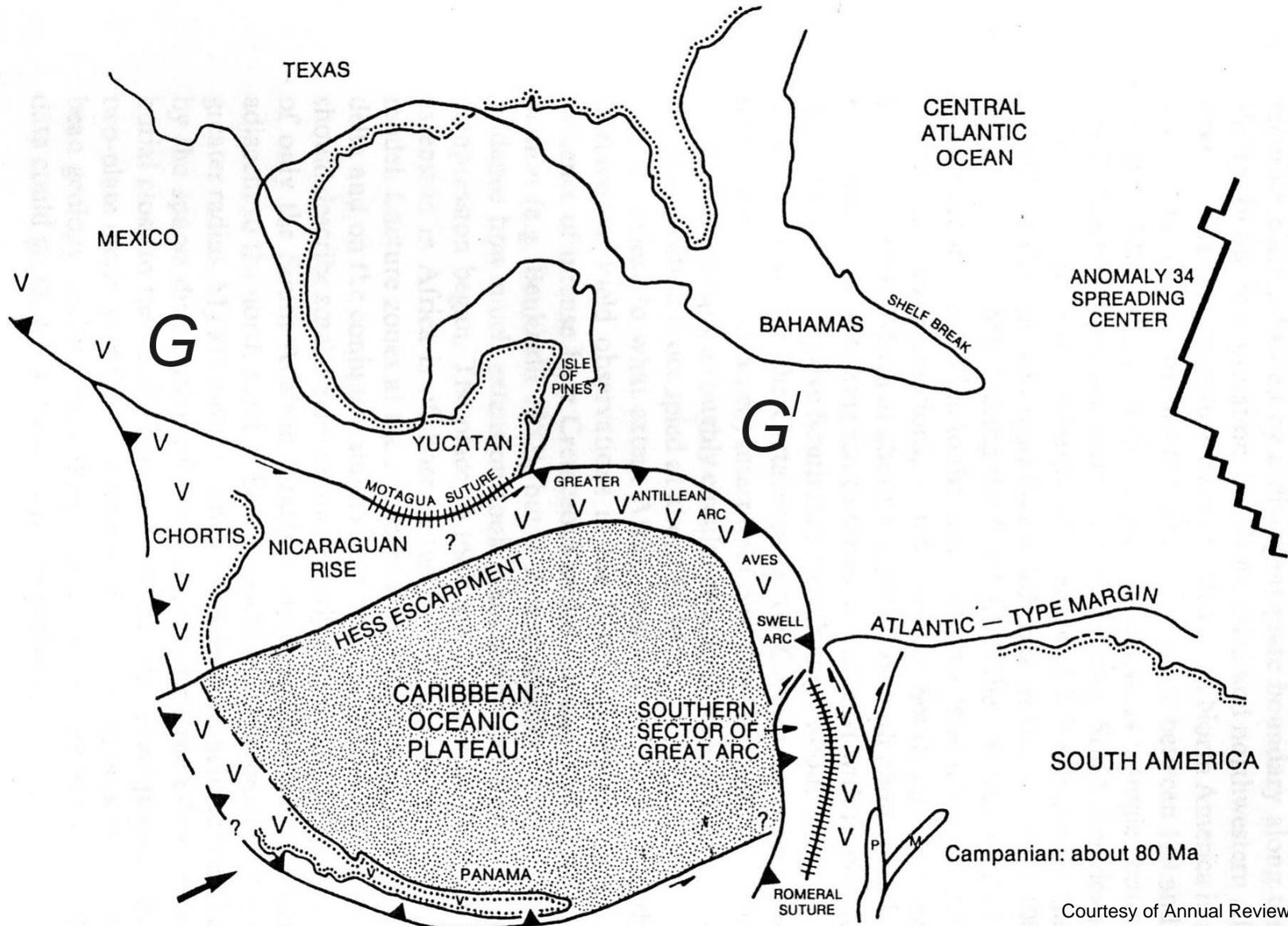
Deformed and tectonically  
sutured granite-greenstone terranes  
along the northern and western margins of the Kaapvaal Craton

Foreland basin  
wavelength, as now:  
ca.150 km



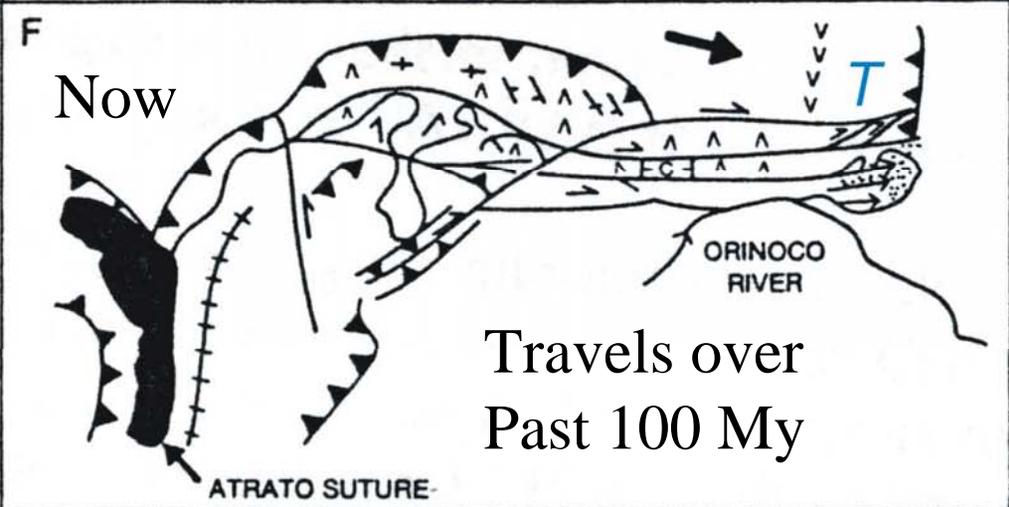
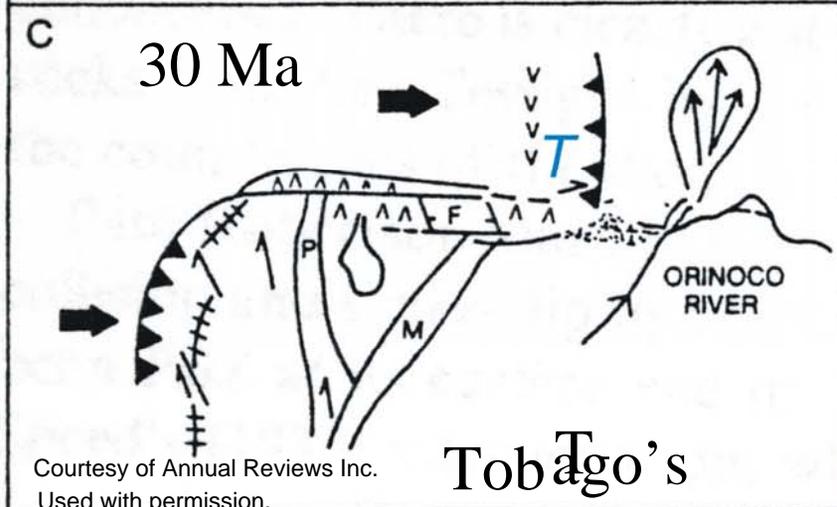
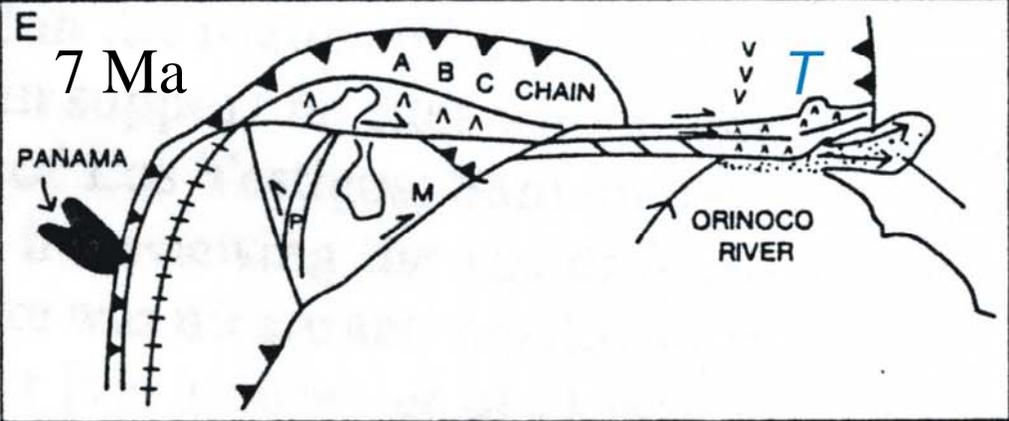
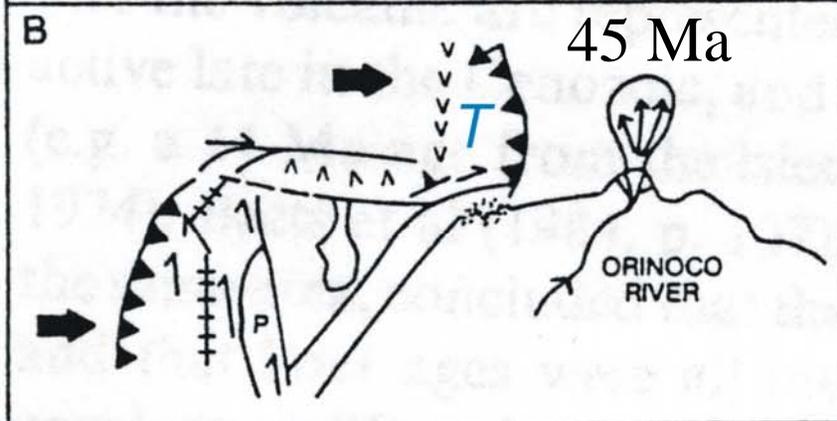
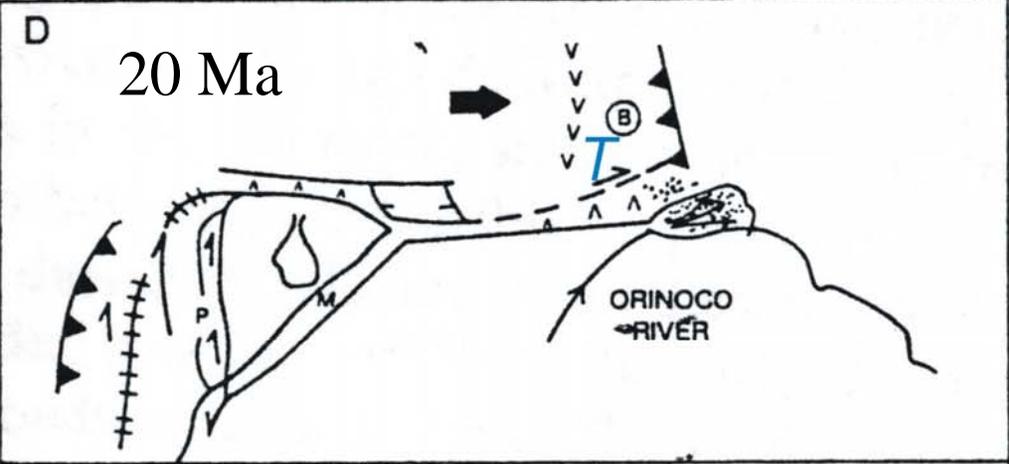
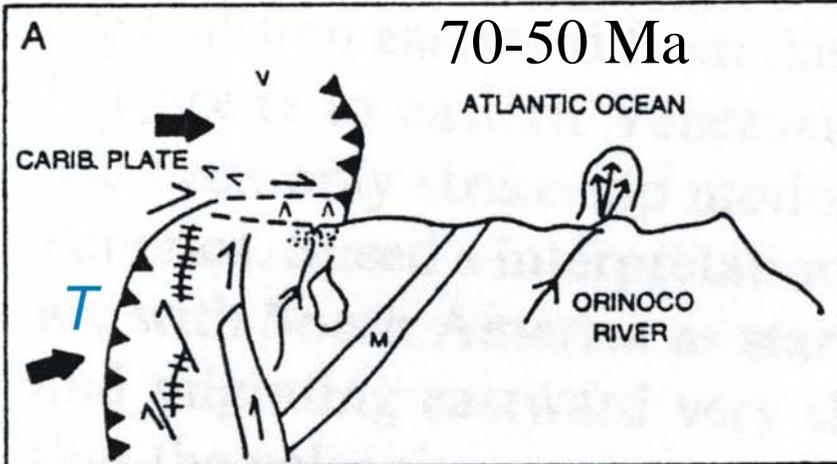
This  
rift is  
wrong.  
Based solely on  
bi-modal volcanism

# How "Grenville" Rock Reached Cuba from Mexico



Campanian: about 80 Ma

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Used with permission.



Travels over  
Past 100 My

Tobago's

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