**Pangea Conundrum**

The existence of the supercontinent Pangea, which formed about 300 million years ago and broke up about 200 million years ago, is a cornerstone of plate tectonics, and processes resulting in its assembly and fragmentation have governed the evolution of Earth's crust for 500 million years.

Over the past 20 years, evidence has been amassing that Pangea is just the latest in a series of supercontinents that formed repeatedly since the Archean, only to break up and reform again.

Although the mechanisms responsible are controversial, many geoscientists agree that repeated cycles of supercontinent amalgamation and dispersal have had a profound effect on the evolution of Earth's crust, atmosphere, climate, and life.

The geological record for the past one billion years is sufficiently well documented that we have a first-order picture of the changing positions of continents. Using these reconstructions in combination with other data, Murphy and Nance show that supercontinents form by different mechanisms and that many current geodynamic models cannot explain the processes that led to the amalgamation of Pangea.

These models suggest that plate tectonics is primarily driven by subduction and that supercontinents break up and migrate from sites of mantle upwelling to reassemble at sites of mantle downwelling where subduction zones exist.

Such models would predict that the young oceans created by the breakup of a supercontinent some 600 million years ago would have continued to expand as the continental fragments migrated toward sites of mantle downwelling that existed in the older ancestral Pacific Ocean. Instead, Pangea assembled as a result of the closure of the young oceans.

The geologic record suggests that there are geodynamic linkages between the younger and older oceans that deserve more detailed study; it also suggests that, in the case of Pangea, the reversal in continental motion may have coincided with emergence of a superplume 460–400 million years ago that produced mantle upwelling in the ancestral Pacific.

If so, the top-down geodynamics driven by subduction, which accounts for the assembly of the supercontinent that broke up 600 million years ago, may have been overpowered by bottom-up geodynamics involving large-scale mantle upwelling that led to the amalgamation of Pangea.

Assignment

* Standard reading assignment with 6 vocab/questions/answers, and a 6 sentence summary
* How can Pangea reform?
* How did Panthalassa and Pangea allow for massive lifeforms?

DUE BY END OF CLASS