

Stratigraphy

The diagram illustrates stratigraphy with three columns of rock layers labeled 'Sedimentary', 'Igneous', and 'Metamorphic'. Below these are two cross-sections of a landscape showing how these layers are deposited and eroded. A geological time scale is shown at the bottom, with a red arrow pointing to the 'you are here' position in the present day.

rst.gsfc.nasa.gov/Sec2/Sec2_1b.html

Biogeography 1 Prof. J. Hicke

Geologic Time Scale

The chart shows the geologic time scale from the Hadaean to the Holocene. It includes columns for eons, eras, periods, and epochs. A red box labeled 'you are here' is placed at the top of the Holocene epoch, with an arrow pointing to the corresponding position on the time scale. Biological icons represent life forms characteristic of various periods.

Biogeography 2 Prof. J. Hicke

Importance of Theory of Continental Drift to Biogeography

"No contribution to biogeography has had more of an impact than the theory of continental drift."

"Plate tectonics, perhaps more than any other phenomenon, has had profound effects on the biogeographic patterns of both terrestrial and marine biotas."

Lomolino et al., 2006, "Biogeography"

"...these changes [geography of continents] explain many aspects of the modern distributions of species."

"Biogeographers recognize that the modern distributions of life reflects both present-day environmental conditions and the past history of the planet."

MacDonald, 2003, "Biogeography"

Biogeography 3 Prof. J. Hicke

Evidence for shifting continents: Cartographic



rst.gsfc.nasa.gov/Sec2/Sec2_1b.html

Biogeography

4

Prof. J. Hicke

Evidence for shifting continents: Geologic mapping

Glacier location and movement in the past



Figure 8 The sites of paleogeographic evidence for movement of the southern continents. Shaded areas indicate the locations of ice sheets and the direction of glacial movement. The shaded areas in the legend indicate the locations of glacial movement. The shaded areas in the legend indicate the locations of glacial movement. The shaded areas in the legend indicate the locations of glacial movement.

Lomolino et al., 2006

Biogeography

5

Prof. J. Hicke

Evidence for shifting continents: Geologic mapping

Locations of rock formations

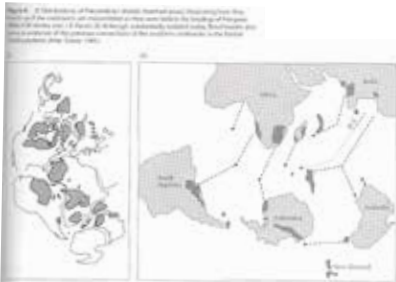


Figure 9 The locations of the southern supercontinent. The shaded areas in the legend indicate the locations of the southern supercontinent. The shaded areas in the legend indicate the locations of the southern supercontinent.

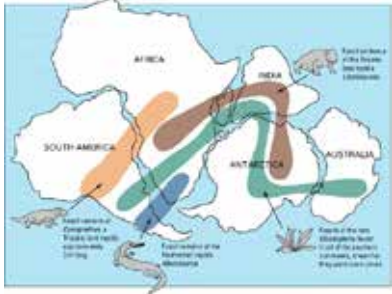
Lomolino et al., 2006

Biogeography

6

Prof. J. Hicke

Evidence for shifting continents: Distributions of fossils

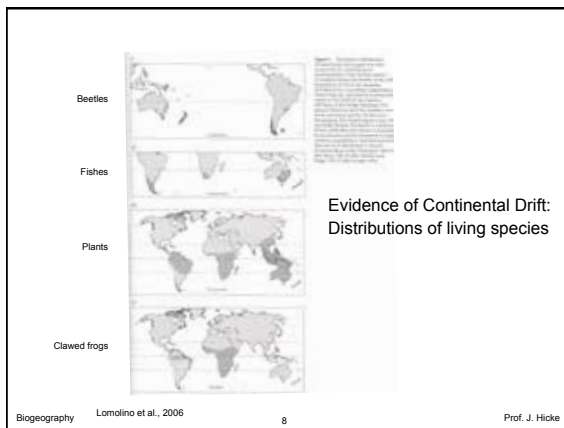


en.wikipedia.org/wiki/Image:Snider-Pellegrini_Wegener_fossil_map.gif

Biogeography

7

Prof. J. Hicke



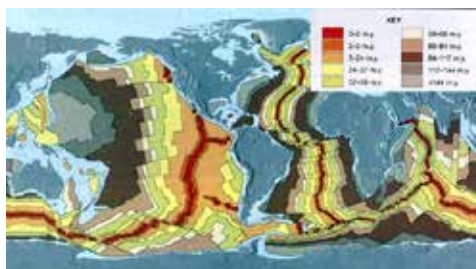
Biogeography

Lomolino et al., 2006

8

Prof. J. Hicke

Mapping age of ocean floor



www.calstatela.edu/faculty/acolvil/plates/sea/sea/ages.jpg

Biogeography

9

Prof. J. Hicke

Examples of Continental Drift



pubs.usgs.gov/gip/dynamic/himalaya.html

Biogeography

10

Prof. J. Hicke

Examples of Continental Drift



FIGURE 18 One possible model for the formation of a land bridge between two continents. The land bridge is formed by the collision of two continental plates. The land bridge is formed by the collision of two continental plates. The land bridge is formed by the collision of two continental plates. The land bridge is formed by the collision of two continental plates.

Other mechanisms behind land bridge formation?

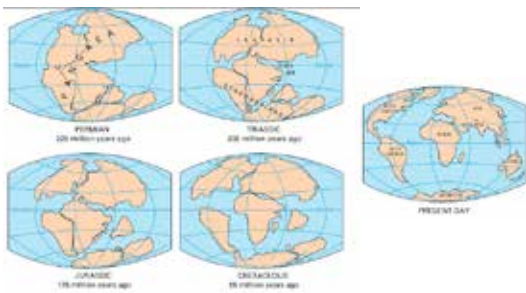
Lomolino et al., 2006

Biogeography

11

Prof. J. Hicke

Movement of Plates Through Time

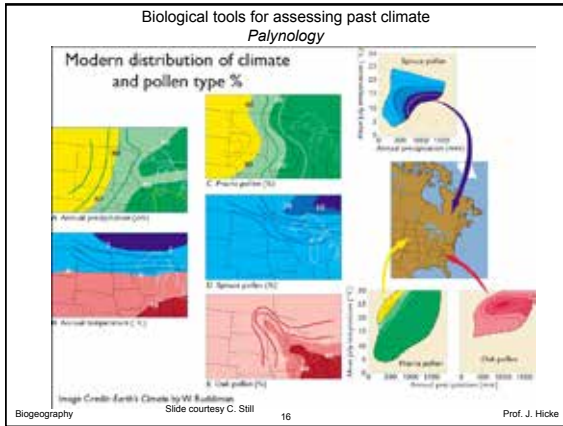


<http://pubs.usgs.gov/gip/dynamic/graphics/fig2-5globes.gif>

Biogeography

12

Prof. J. Hicke



Biological tools for assessing past climate
Packrat middens

up to 40,000 years ago

Why?

- crystallized urine slows the decay of the material
- dry climate of the American Southwest
- middens protected under rock overhangs or in cave

geology.about.com/library/bi/images/bipackratmidden.htm

Biogeography 17 Prof. J. Hicke

Biological tools for assessing past climate
Tree rings and coral bands

up to ~10,000 years ago hundreds of years

en.wikipedia.org/wiki/Tree_rings oceanworld.tamu.edu/students/coral/coral5.htm

Biogeography 18 Prof. J. Hicke

Position of ice sheets, exposed land during LGM

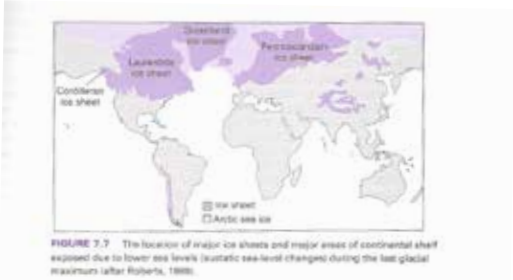


FIGURE 7.7 The location of major ice sheets and major areas of continental shelf exposed due to lower sea levels (eustatic sea-level changes during the last glacial maximum) after Roberts, 1986.

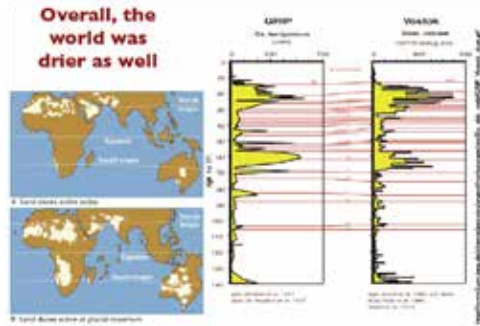
Global mean temperature was 4-5 deg C lower than today

Regional temperature effects during glacial periods



FIGURE 6.7 Glacial cycles of the Pleistocene influenced regional climates far from the edges of the glaciers. Temperature ranges over much of North and South America, for example, ranged from 0° to 8° C cooler during the Wisconsin (after Miller et al. 1995.)

Dust measured in ice cores



Utah during the LGM - definitely not drier!

Biogeography 22 Slide courtesy C. Still Prof. J. Hicke

Eustatic sea level change

Biogeography 23 Prof. J. Hicke

Eustatic sea level change

Biogeography 24 Prof. J. Hicke

