Introduction to Geology

What is Geology?

Geology is……




Diverse

Fields of Geology (Text -Table P.1)

- Engineering
- Environmental
- Geochemistry
- Geomorphology
- Hydrogeology
- Geophysics
- Paleontology
- Volcanology
- Glaciology
- Sedimentology
- Petrology
- Biogeochemistry
- Petroleum geology
- Seismology
- Oceanography
- Limnology
- Speleology
- Geoarchaeology
- Geochronology
- GIS
- Park Ranger/Interpreter

Why study geology?

Natural Disasters

FLOODING

Drinking water

Natural Resources **Energy**

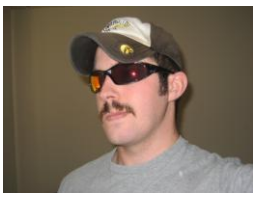
Climate Change

Environmental Sustainability

Human civilization

Big Idea #1

- Earth Scientists use repeatable observations and testable ideas to understand and explain our planet.



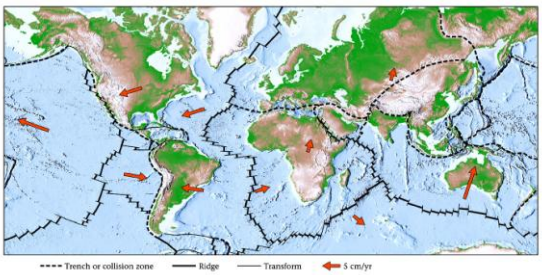
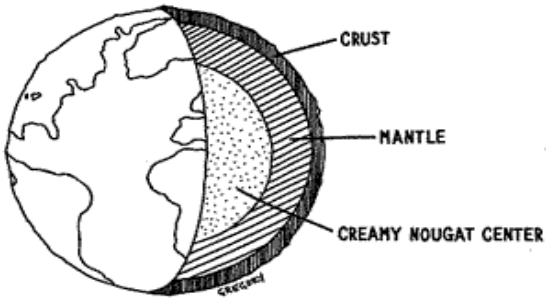


FIGURE P.6

Earth: Portrait of a Planet, 2nd Edition



Are you ready to start correct this cartoon?

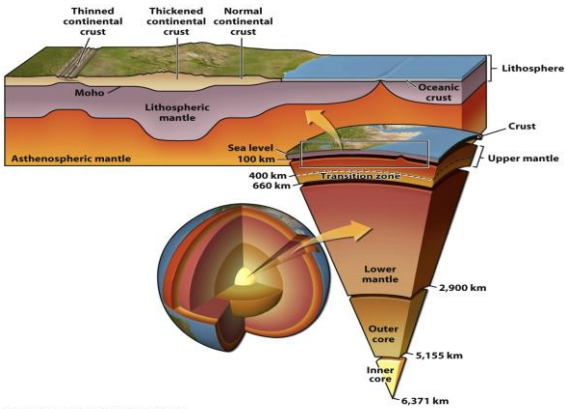
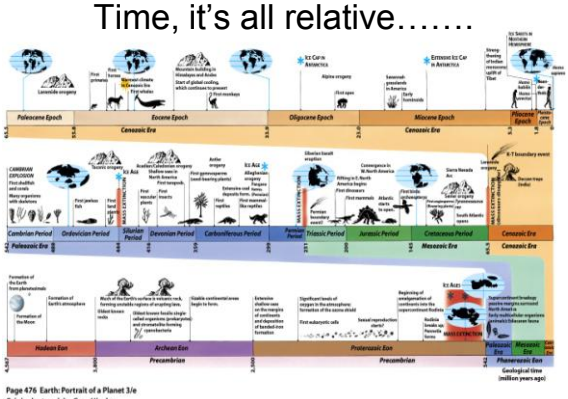


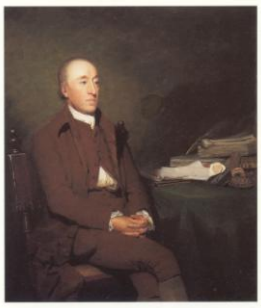
Figure 2-13a Earth: Portrait of a Planet 3/e
© 2008 W. W. Norton & Company, Inc.

Time, it's all relative…….



Page 476 Earth: Portrait of a Planet 3/e
Original artwork by Gary Hincks

Pioneers of Geologic Time



Apennine Mountains

What a Geologist Sees

Figure 12-8b Earth: Portrait of a Planet 3/e

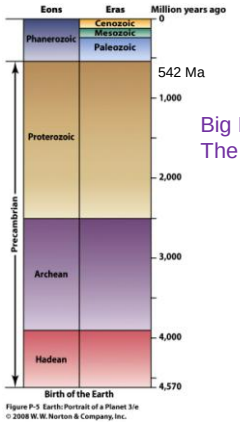
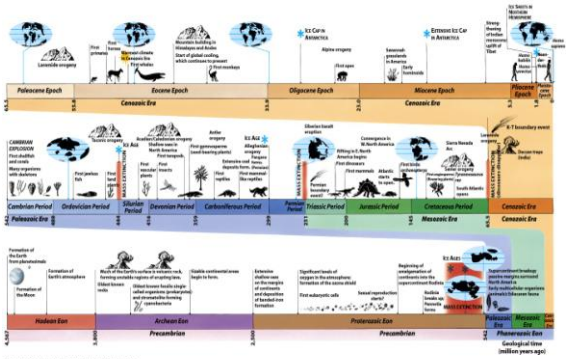


Figure P-5 Earth: Portrait of a Planet 3/e
© 2008 W. W. Norton & Company, Inc.

Geologic Time

Big IDEA #2
The Earth is 4.6 billion years old!



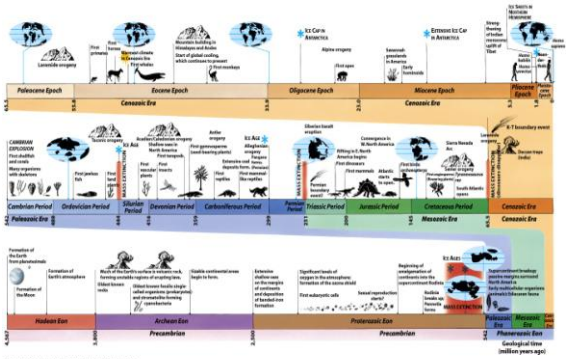
Page 476 Earth: Portrait of a Planet 3/e
Original artwork by Gary Hincks

TABLE 12.1 Isotopes Used in the Radiometric Dating of Rocks

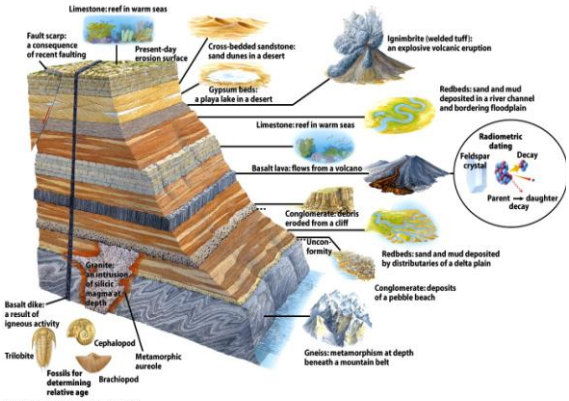
Parent → Daughter	Half-Life (years)	Minerals in which the Isotopes Occur
$^{147}Sm \rightarrow {}^{143}Nd$	106 billion	Garnets, micas
$^{87}Rb \rightarrow {}^{87}Sr$	48.8 billion	Potassium-bearing minerals (mica, feldspar, hornblende)
$^{238}U \rightarrow {}^{206}Pb$	4.5 billion	Uranium-bearing minerals (zircon, apatite, uraninite)
$^{40}K \rightarrow {}^{40}Ar$	1.3 billion	Potassium-bearing minerals (mica, feldspar, hornblende)
$^{235}U \rightarrow {}^{207}Pb$	713 million	Uranium-bearing minerals (zircon, uraninite, apatite)

Sm = samarium, Nd = neodymium, Rb = rubidium, Sr = strontium, U = uranium, Pb = lead, K = potassium, Ar = argon

Table 12-1 Earth: Portrait of a Planet 3/e
© 2008 W. W. Norton & Company, Inc.



Page 476 Earth: Portrait of a Planet 3/e
Original artwork by Gary Hincks



Page 426 Earth: Portrait of a Planet 3/e
Original artwork by Gary Hincks

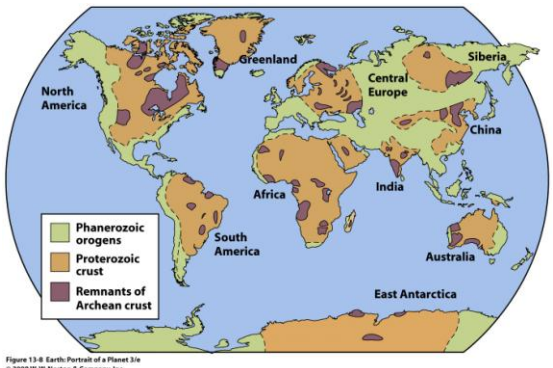


Figure 13-8 Earth: Portrait of a Planet 3/e

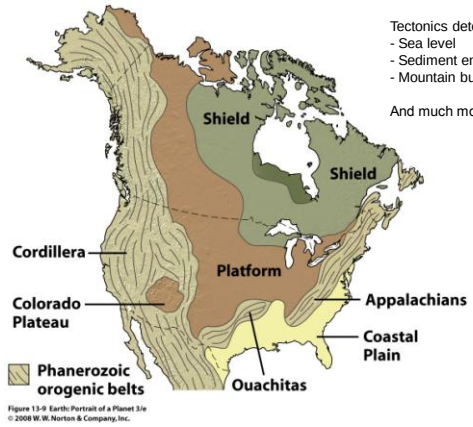


Figure 13-9 Earth: Portrait of a Planet 3/e
© 2008 W. W. Norton & Company, Inc.

Tectonics determines
- Sea level
- Sediment environments
- Mountain building

And much more…

Big Idea #3

The Earth is a complex system of interacting rock, soil, water, air, and life.

Hike up to the summit of Mt. Washburn Yellowstone N.P.

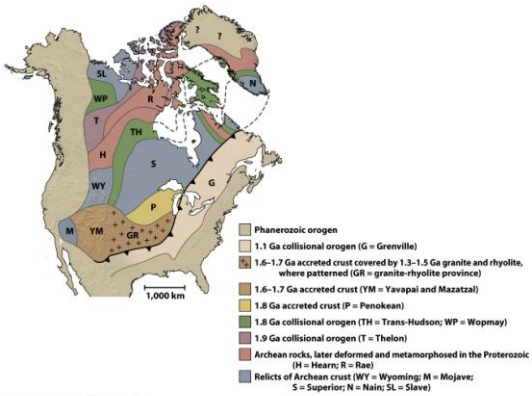


Figure 13-10 Earth: Portrait of a Planet 3/e
© 2008 W. W. Norton & Company, Inc.

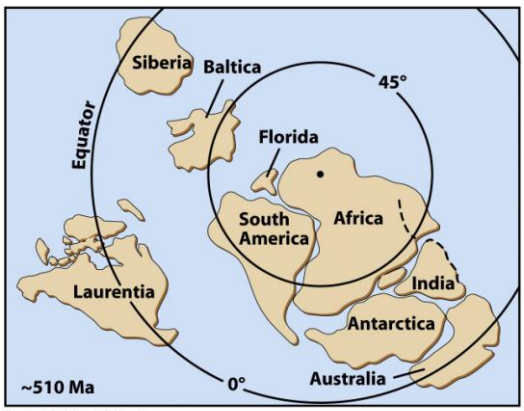


Figure 13-15 Earth: Portrait of a Planet 3/e
© 2008 W. W. Norton & Company, Inc.

Cambrian Life Explosion

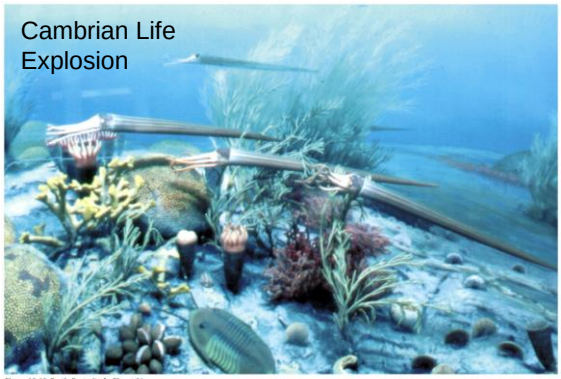


Figure 13-19 Earth: Portrait of a Planet 3/e
Courtesy Jonathan J. Havens, Irving Materials Inc.

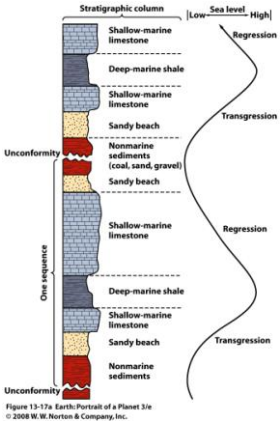


Figure 13-17a Earth: Portrait of a Planet 3/e
© 2008 W. W. Norton & Company, Inc.

Mesozoic

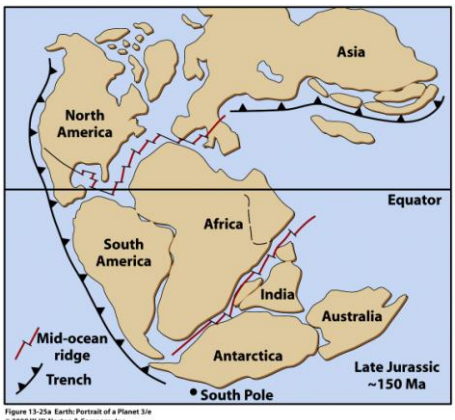
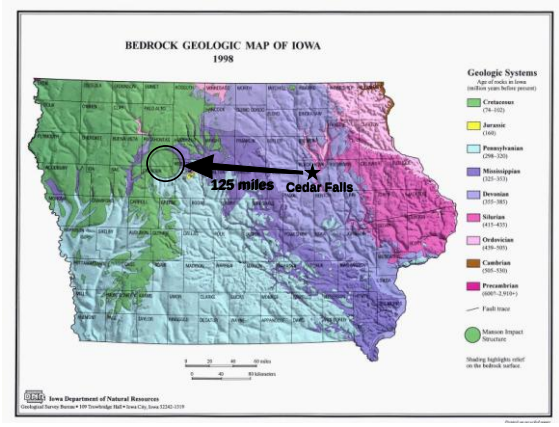
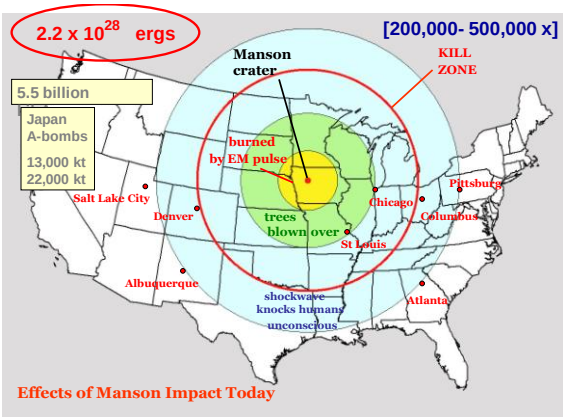


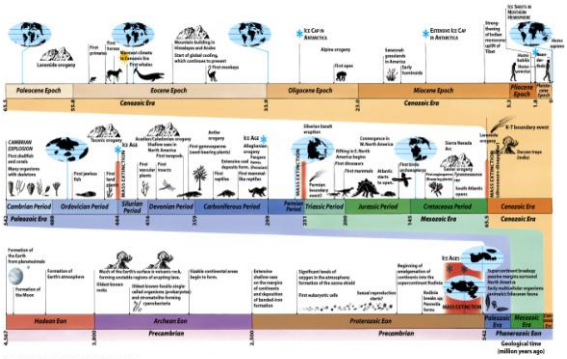
Figure 13-25a Earth: Portrait of a Planet 3/e
© 2008 W. W. Norton & Company, Inc.

Big Idea # 4

- The Earth is constantly changing



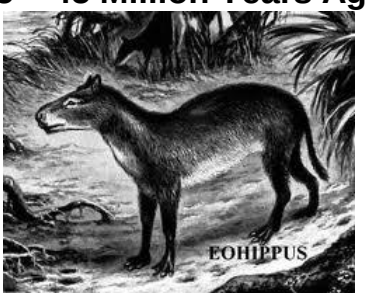




Page 476 Earth: Portrait of a Planet 3/e
Original artwork by Gary Hincks

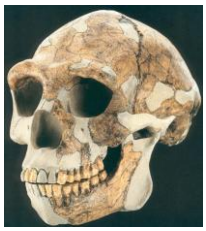
Figure 13-34 Earth: Portrait of a Planet 3/e
© 2008 W.W. Norton & Company, Inc.

55 – 45 Million Years Ago

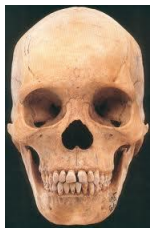


HOMO-

Habilis



Erectus



Sapiens

Big idea # 9

- Humans significantly alter the Earth.
  - Yes, this is a bit out of order…