Desert distribution

- What is a ‘desert’?
  - A region that is so arid (dry) that it contains no permanent streams and supports vegetation on no more than 15% of its surface
  - Aridity due to:
    - Precipitation
    - Evaporation rates
    - Distribution of rainfall

  - Aridity in desert regions causes different weathering, erosion and depositional processes in deserts

Desert distribution

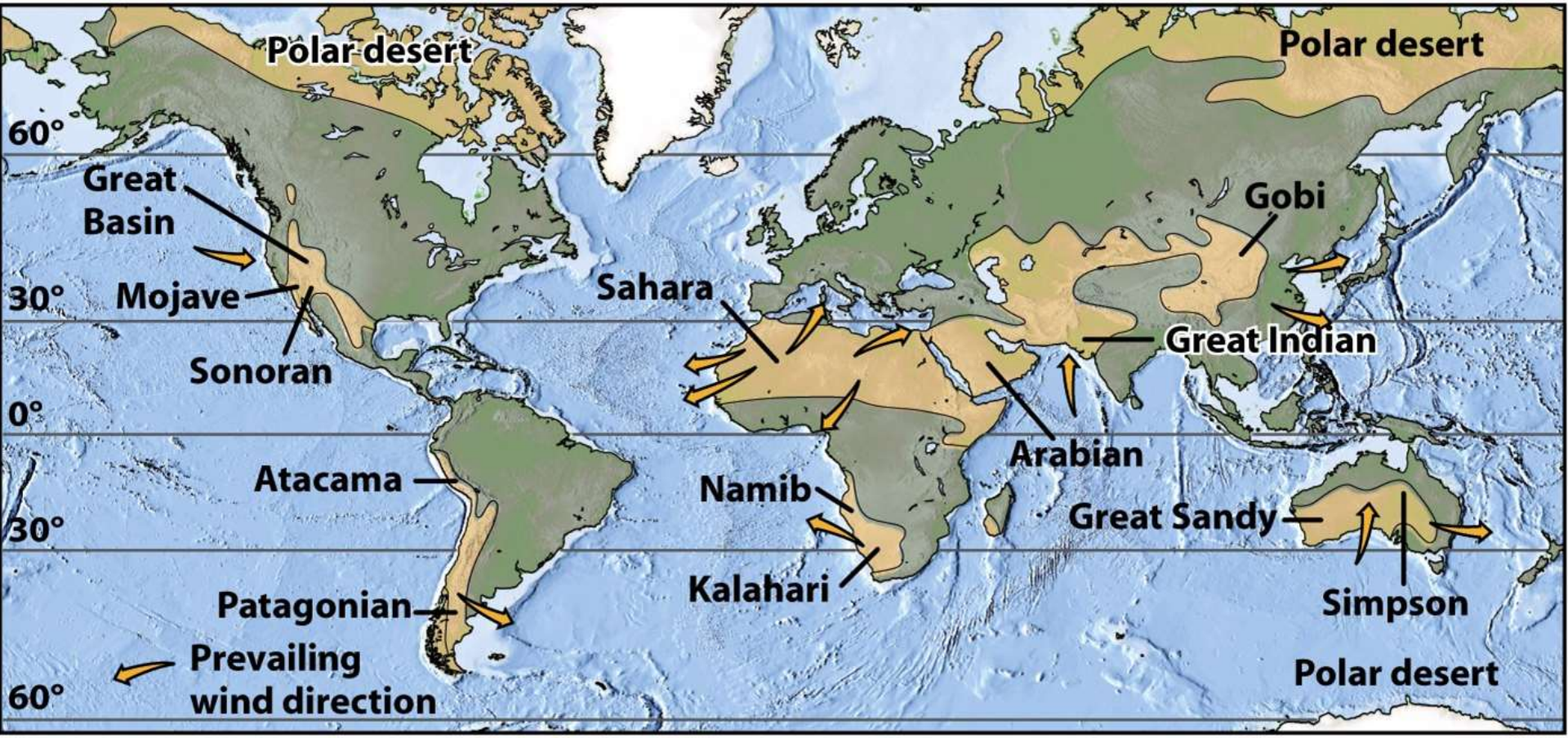


Figure 21-3 Earth: Portrait of a Planet 3/e

Desert distribution

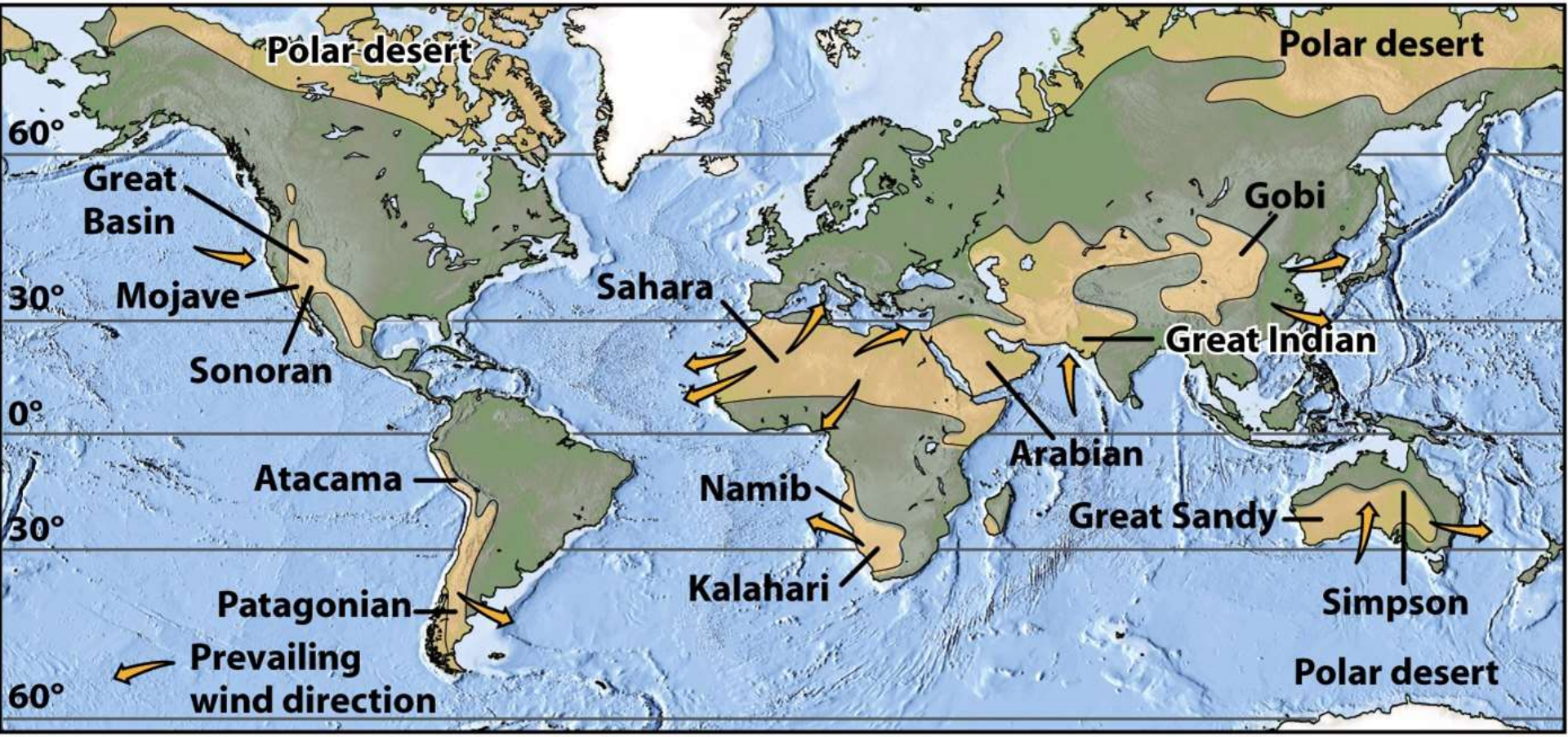


Figure 21-3 Earth: Portrait of a Planet 3/e

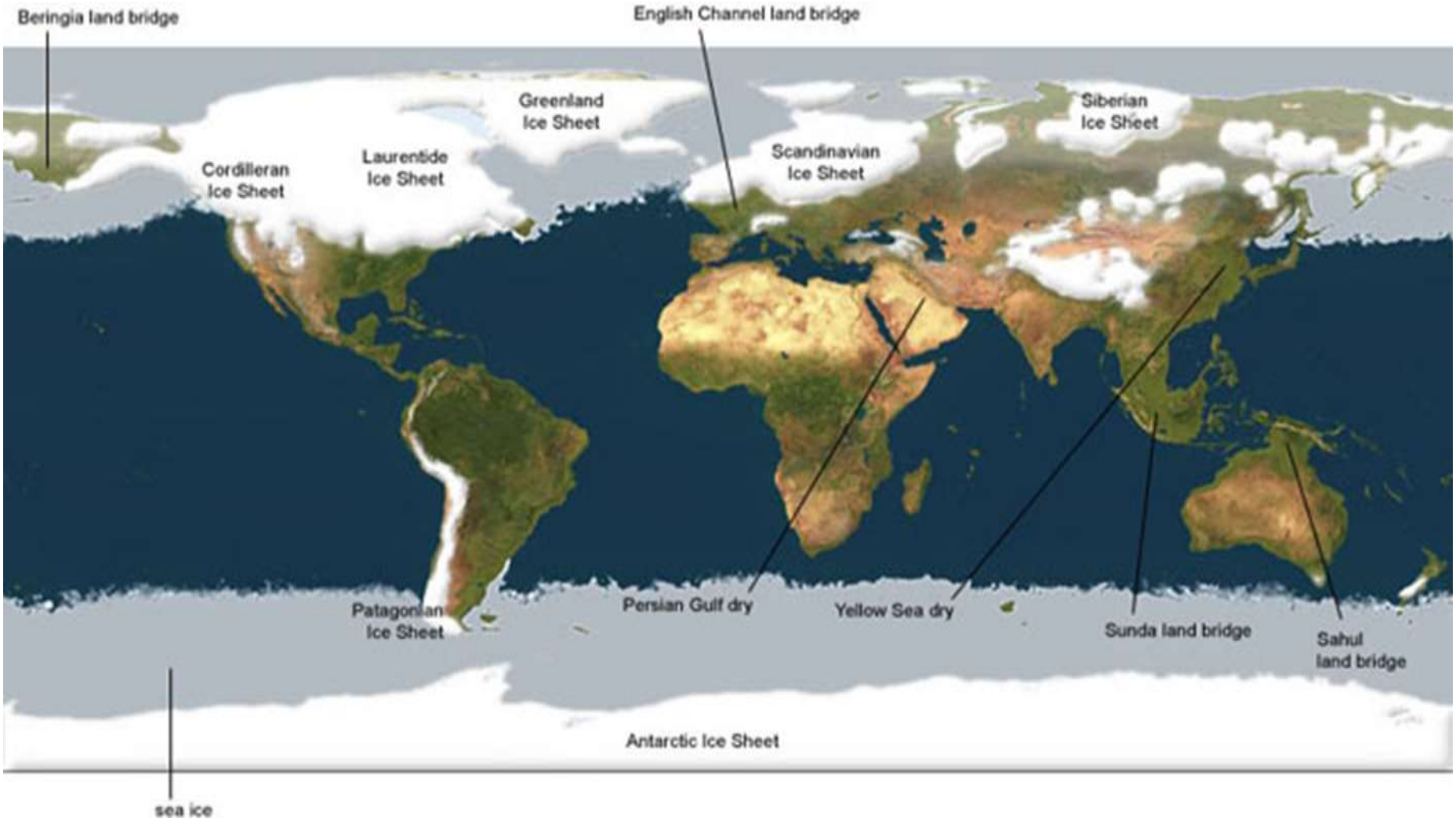
a) Subtropical b) Rainshadow c) Coastal d) Interior e) Polar

Desert distribution

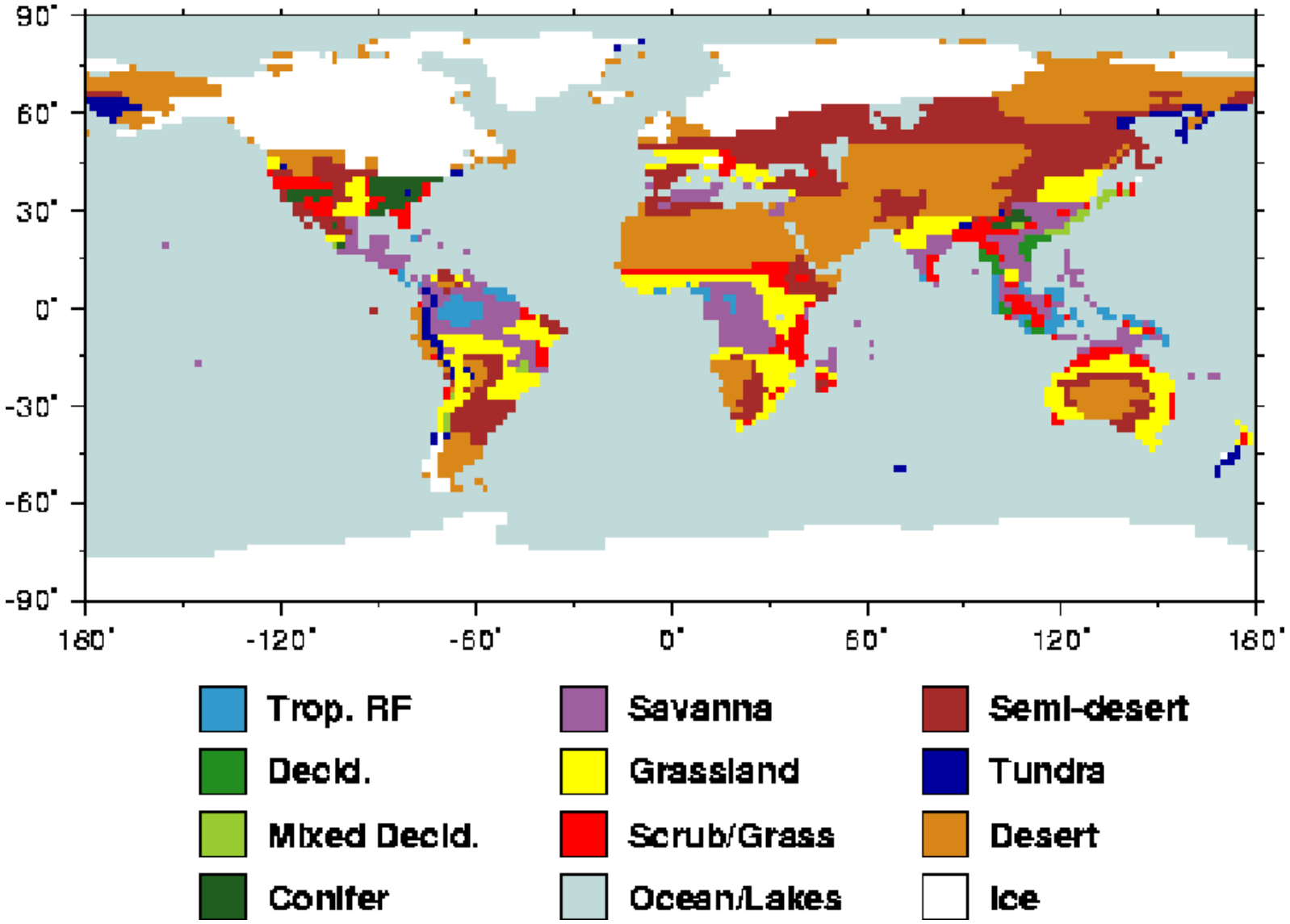
- Subtropical deserts
- Rainshadow deserts
- Coastal deserts
- Interior deserts
- Polar deserts

Deserts through geological time

Last Glacial Maximum a) wetter b) drier



Deserts through geological time



Deserts through geological time

Pangaea

Weathering in deserts

What type of weathering will be most important in desert regions?

a) Chemical
b) Physical

Weathering in deserts

- Physical weathering breaks rocks into pieces which move under gravity
- Very slow chemical weathering but water does leach (dissolve and carry away) minerals

Arid weathering/desert soils

- What are desert soils like?

- Rainwater containing salts and $CaCO_3$ percolates into soil/sediment but does not get carried away – precipitates out forming **calcrete**

Figure 21-7a Earth: Portrait of a Planet 3/e
Stephen Marshak

Arid weathering/desert soils

- **Desert varnish** = dark brown coating of iron oxide, manganese oxide and clays
- Forms when dust settles on rock then microorganisms extract elements and transform dust into iron or manganese oxide
- Thickness gives estimate for how long rock has been exposed

Figure 21-7c Earth: Portrait of a Planet 3/e
Stephen Marshak

Erosion by water

- Impact of rain drops erodes sediment
- With little or no soil ground becomes saturated which creates runoff, carrying sediment with it
- Rapid and large amounts of runoff create flash floods
- Flash floods cause large amounts of erosion, carving steep-sided channels known as dry washes or arroyos

Erosion by wind

- Sediment transported as suspended load and bed load
- What will control amount and size of these?
- What would be the characteristics of the sediment deposited?

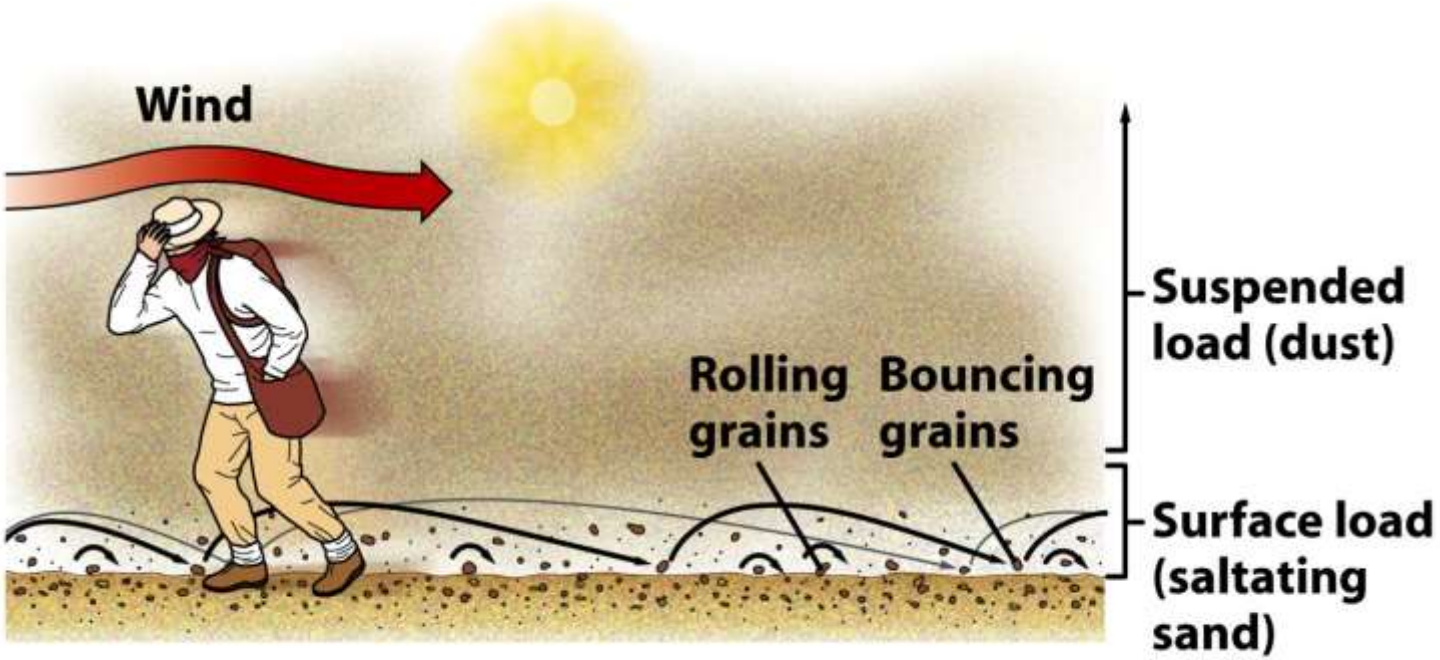
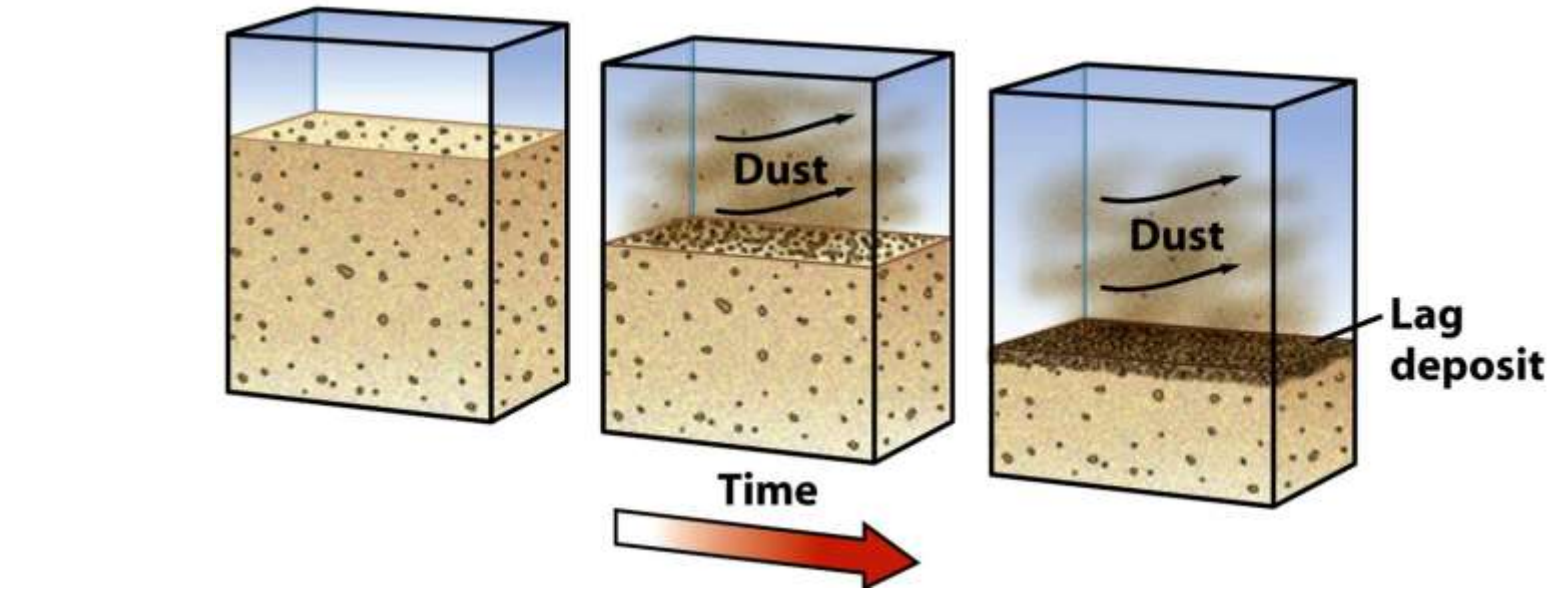
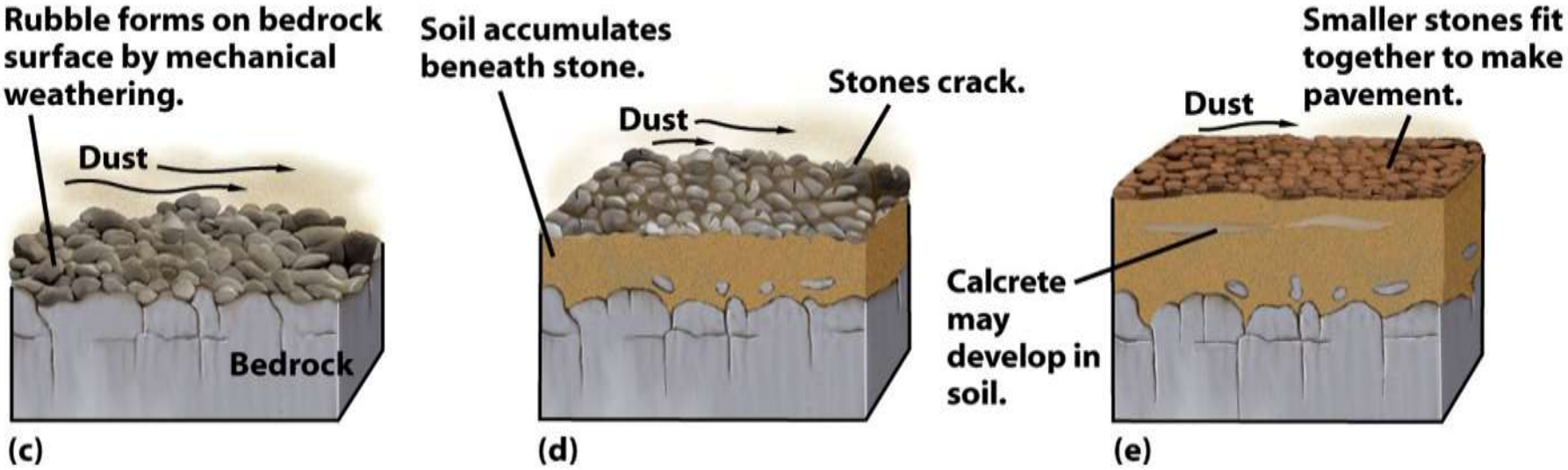


Figure 21-10 Earth: Portrait of a Planet 3/e

Erosion by wind





Erosion by wind

- Ventifacts

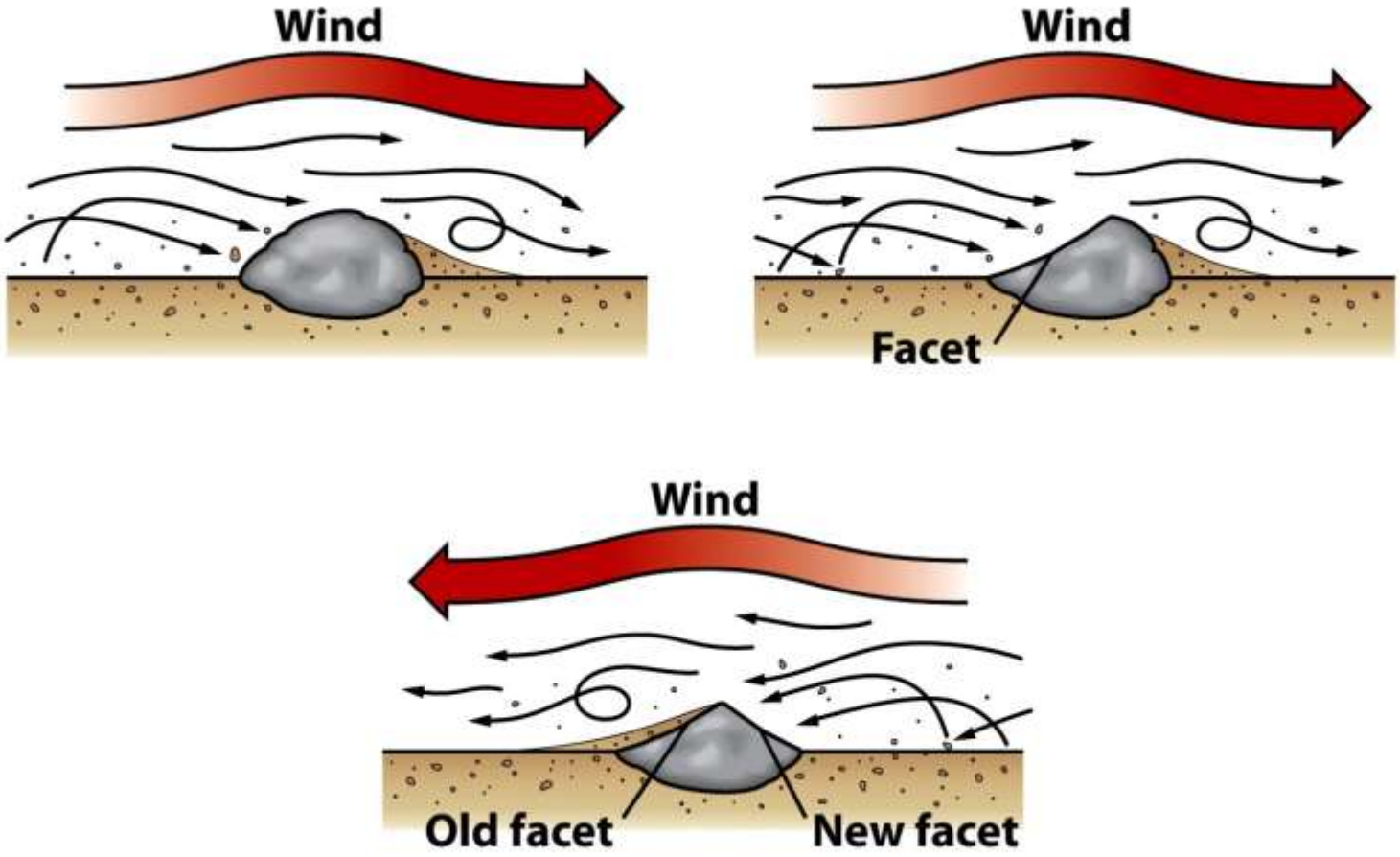


Figure 21-13a-c Earth: Portrait of a Planet 3/e

Erosion by wind

- Ventifacts

Figure 21-13d Earth: Portrait of a Planet 3/e
Stephen Marshak

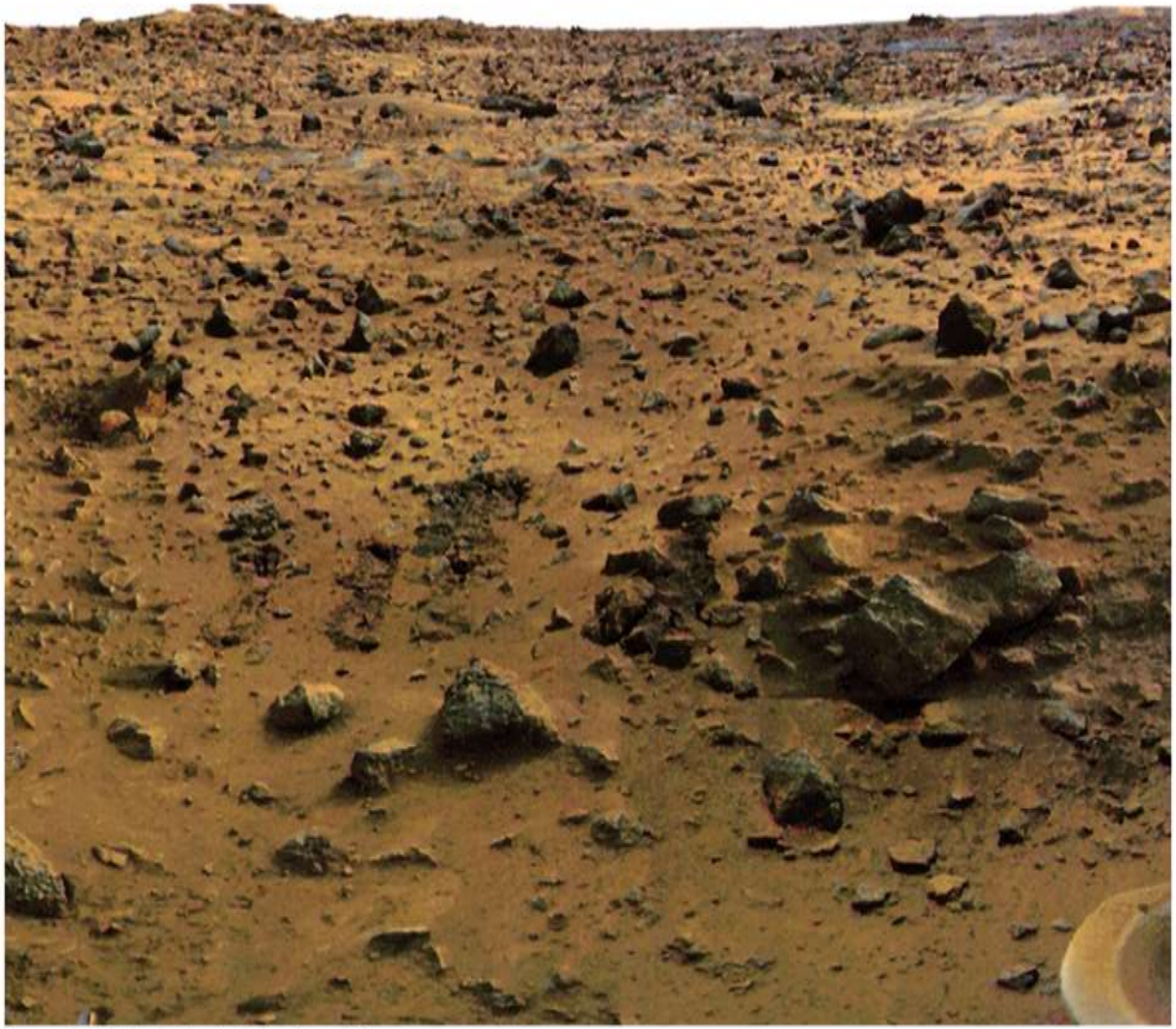
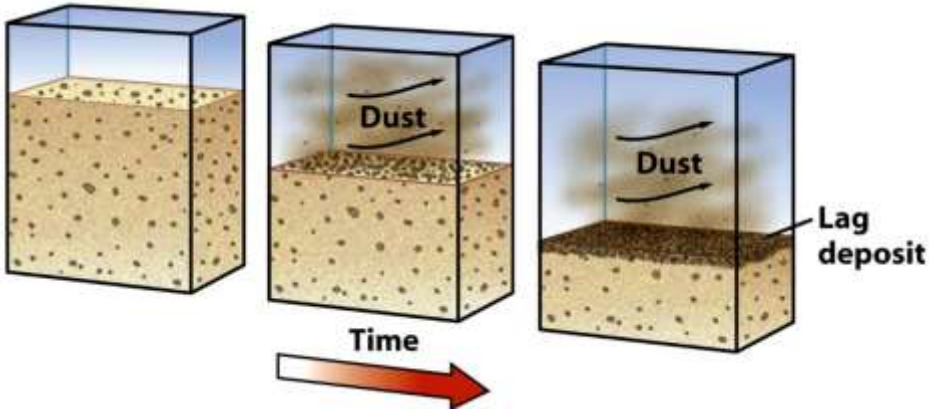


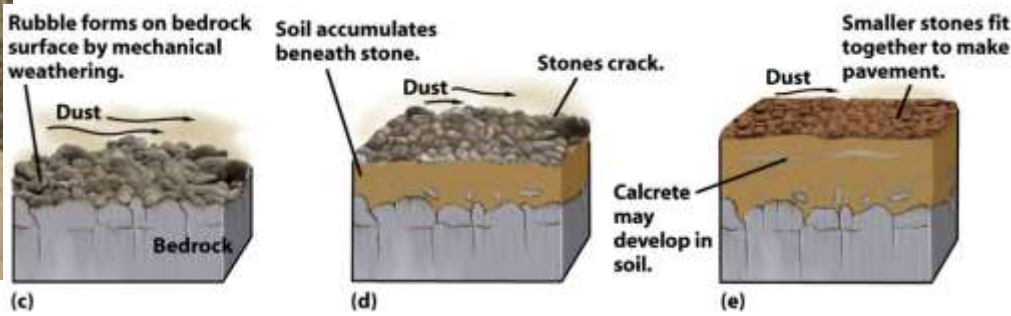
Figure 21-16 Earth: Portrait of a Planet 3/e
JPL/NASA

Erosion by wind

- Yardangs

Figure 21-14 Earth: Portrait of a Planet 3/e
O. Alamany & E.Vicens/Corbis





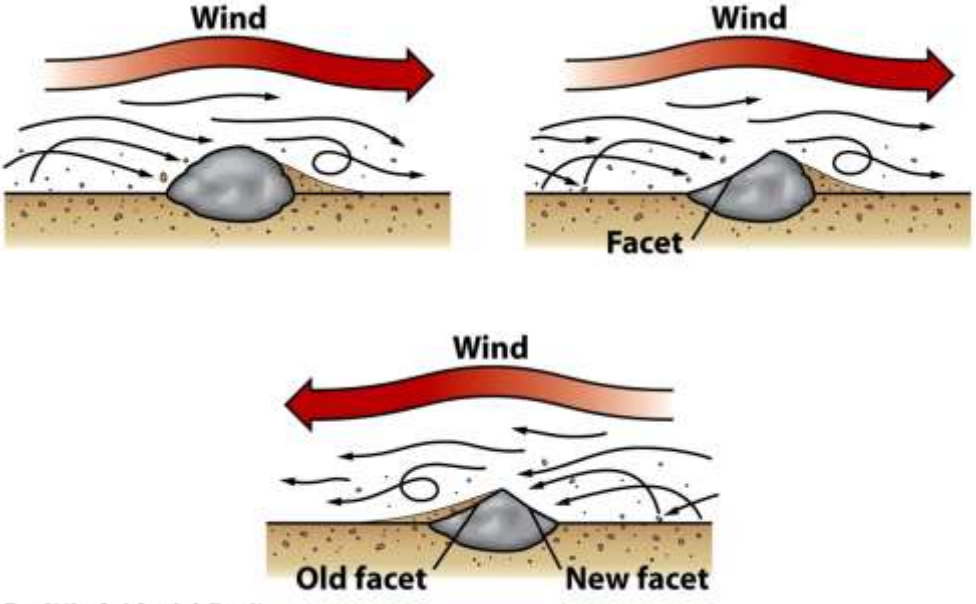


Figure 21-13a-c Earth: Portrait of a Planet 3/e

Figure 21-14 Earth: Portrait of a Planet 3/e

Desert deposition

- Talus aprons – deposited by gravity

Figure 21-17 Earth: Portrait of a Planet 3/e
Stephen Marshak

Desert deposition

- Alluvial fans – deposited by water

Desert deposition

- Alluvial fans – deposited by water

Figure 21-18 Earth: Portrait of a Planet 3/e
© Marli Miller/Visuals Unlimited

Desert deposition

- Playas and salt lakes – deposited by water

Figure 21-19a Earth: Portrait of a Planet 3/e
Stephen Marshak

Desert deposition

- Loess and dunes – deposited by wind

Sand dunes

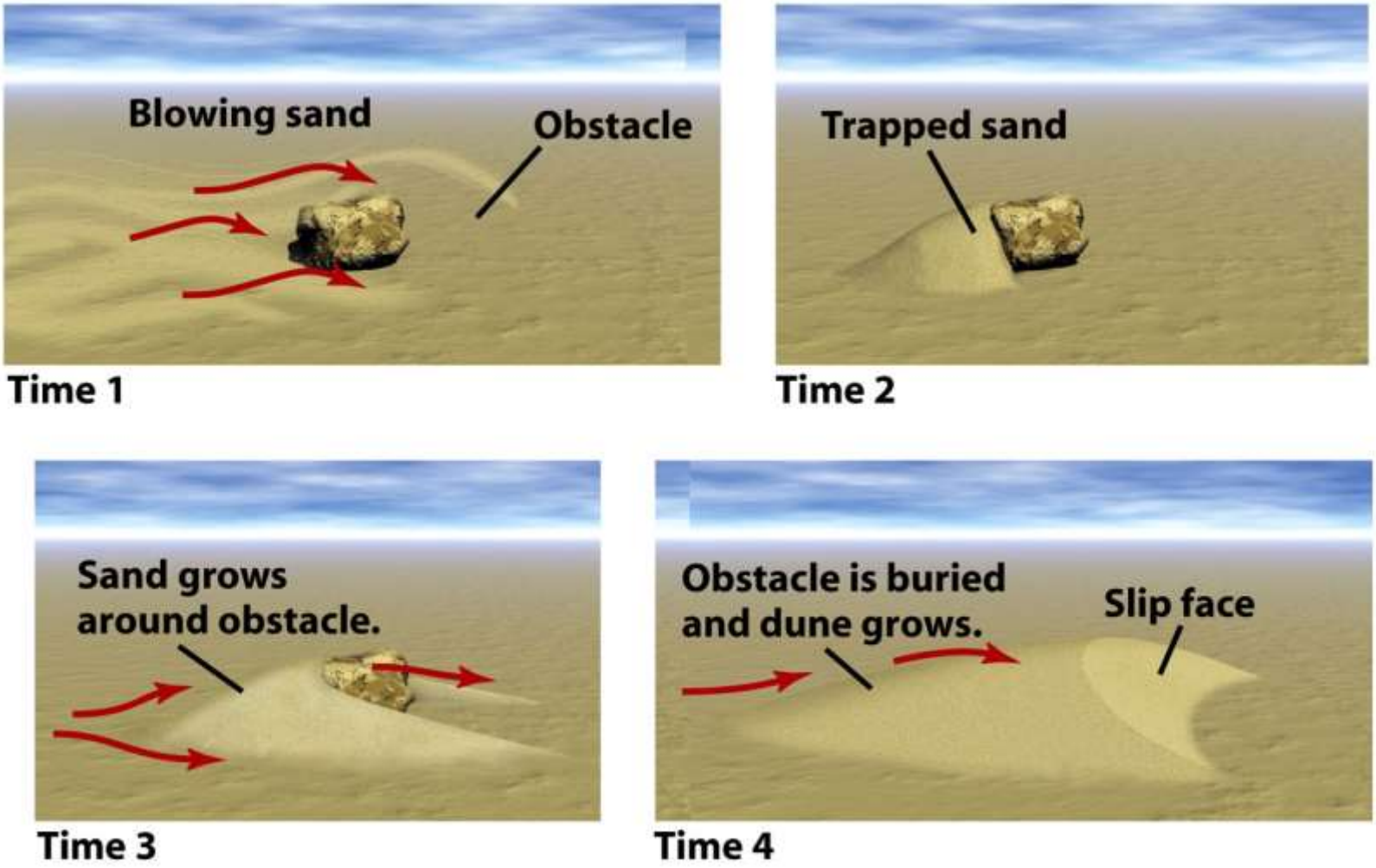


Figure 21-23 Earth: Portrait of a Planet 3/e

Sand dunes

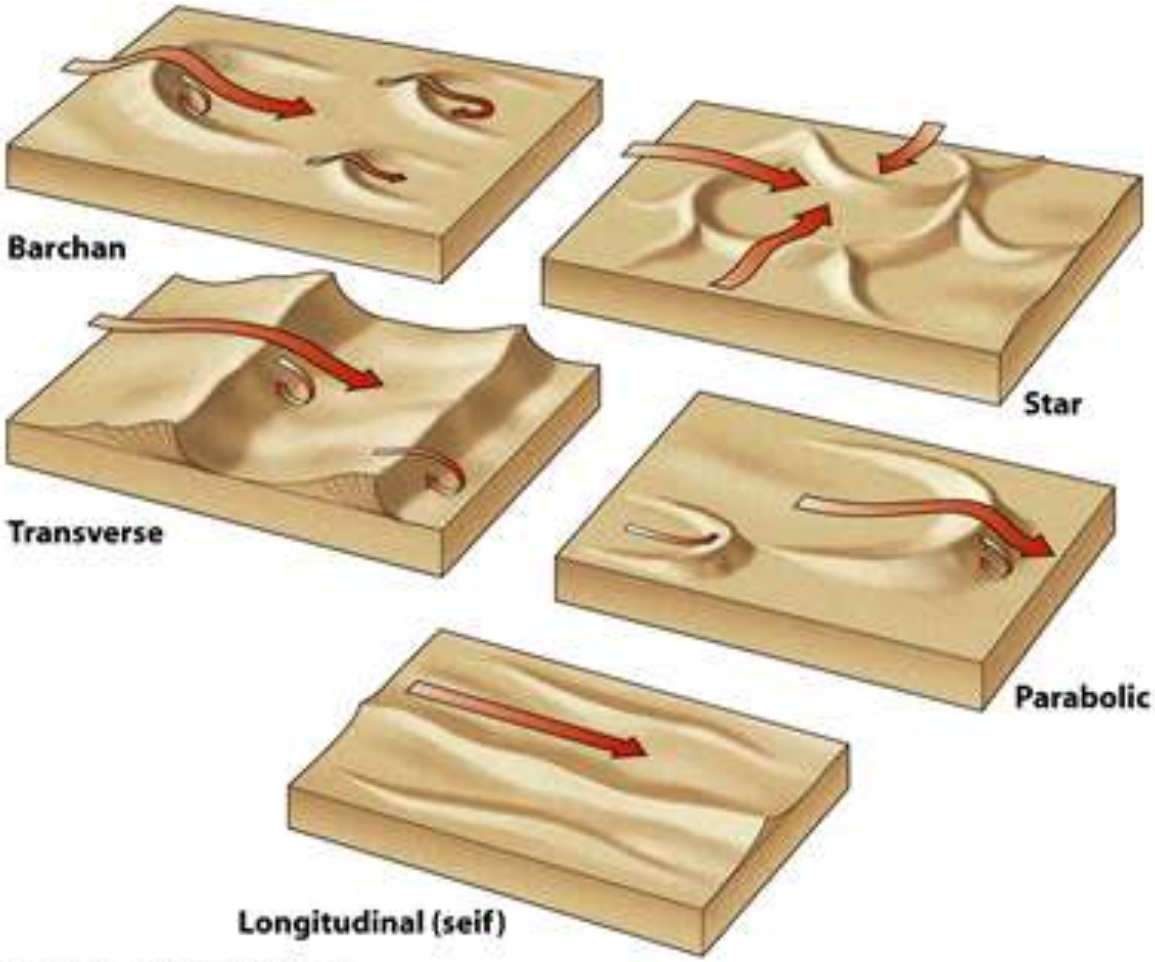


Figure 21-25 Earth: Portrait of a Planet 3/e
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Desert vs Temperate Landscapes

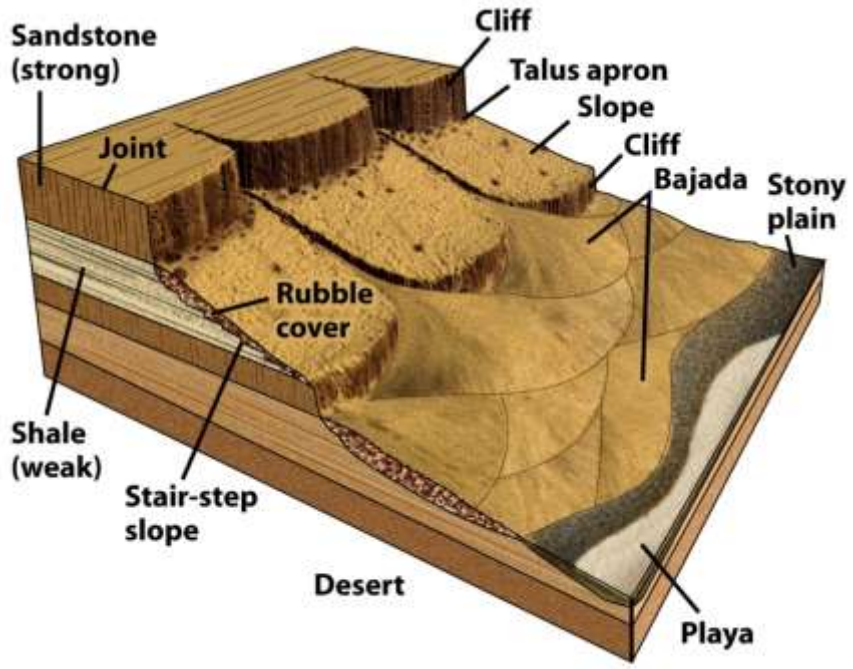

Figure 21-20b Earth: Portrait of a Planet 3/e
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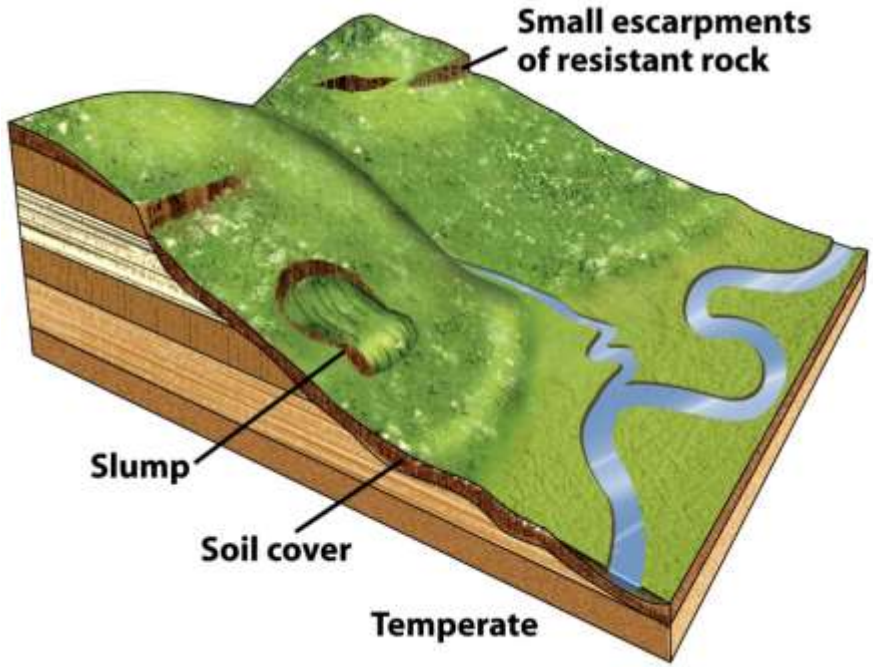

Figure 21-20c Earth: Portrait of a Planet 3/e
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Rocky cliff and mesa landscapes

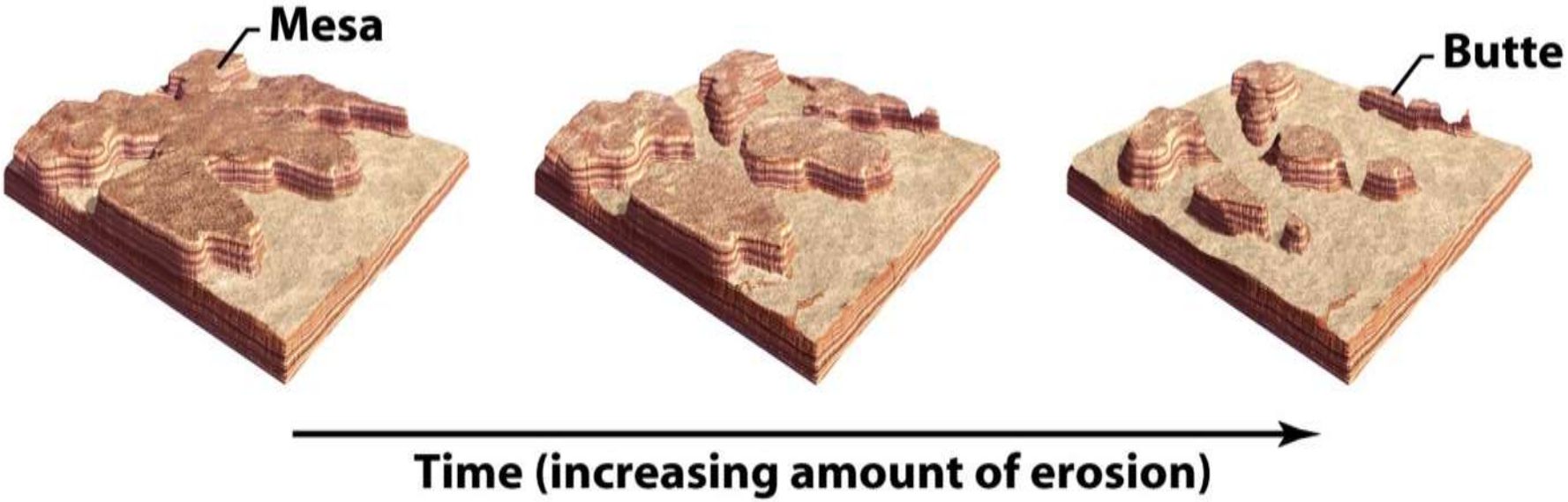

Figure 21-20d Earth: Portrait of a Planet 3/e

Rocky cliff and mesa landscapes

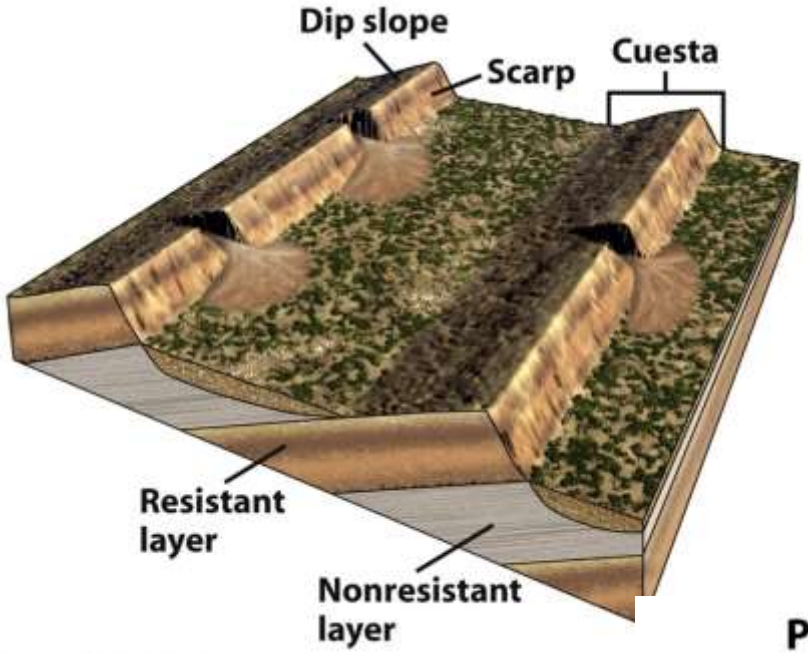

Figure 21-21 Earth: Portrait of a Planet 3/e
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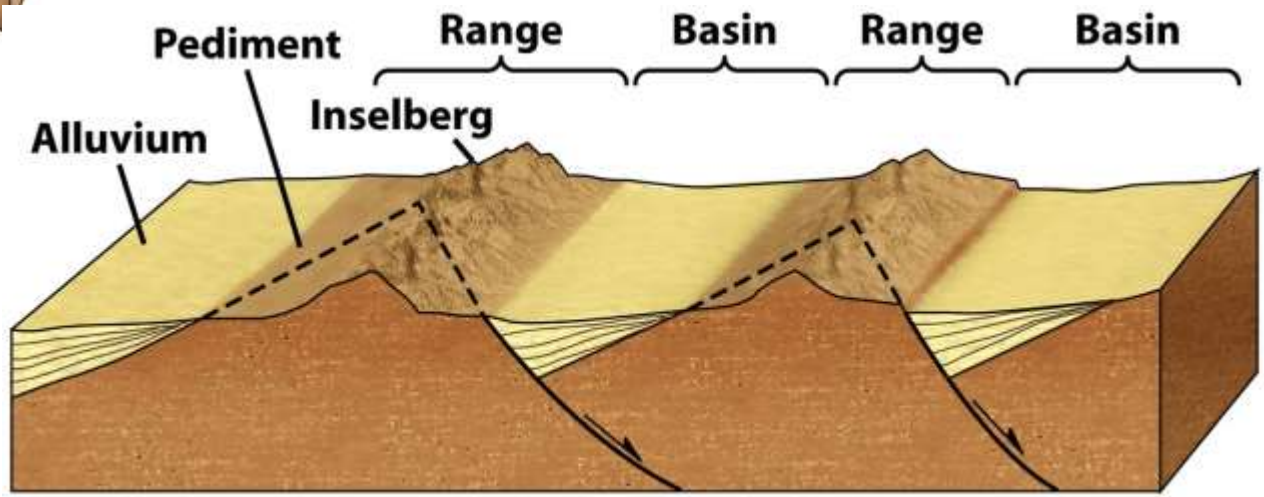

Figure 21-22 Earth: Portrait of a Planet 3/e
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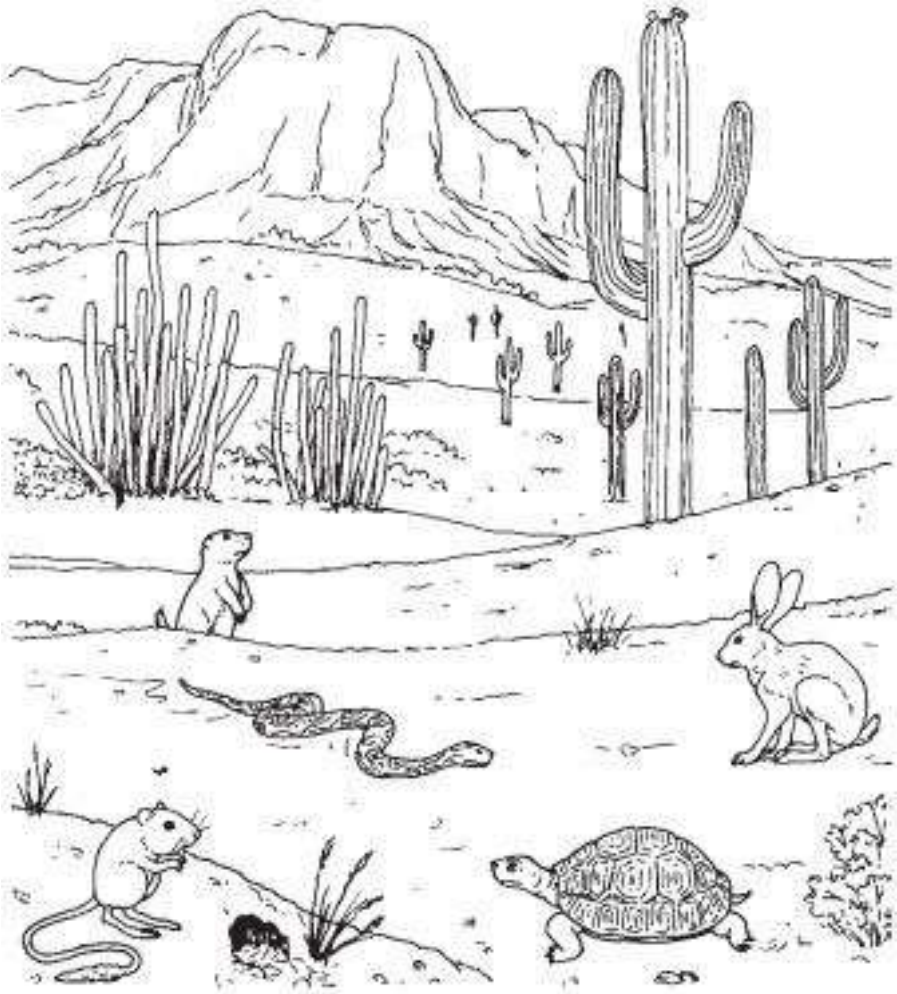
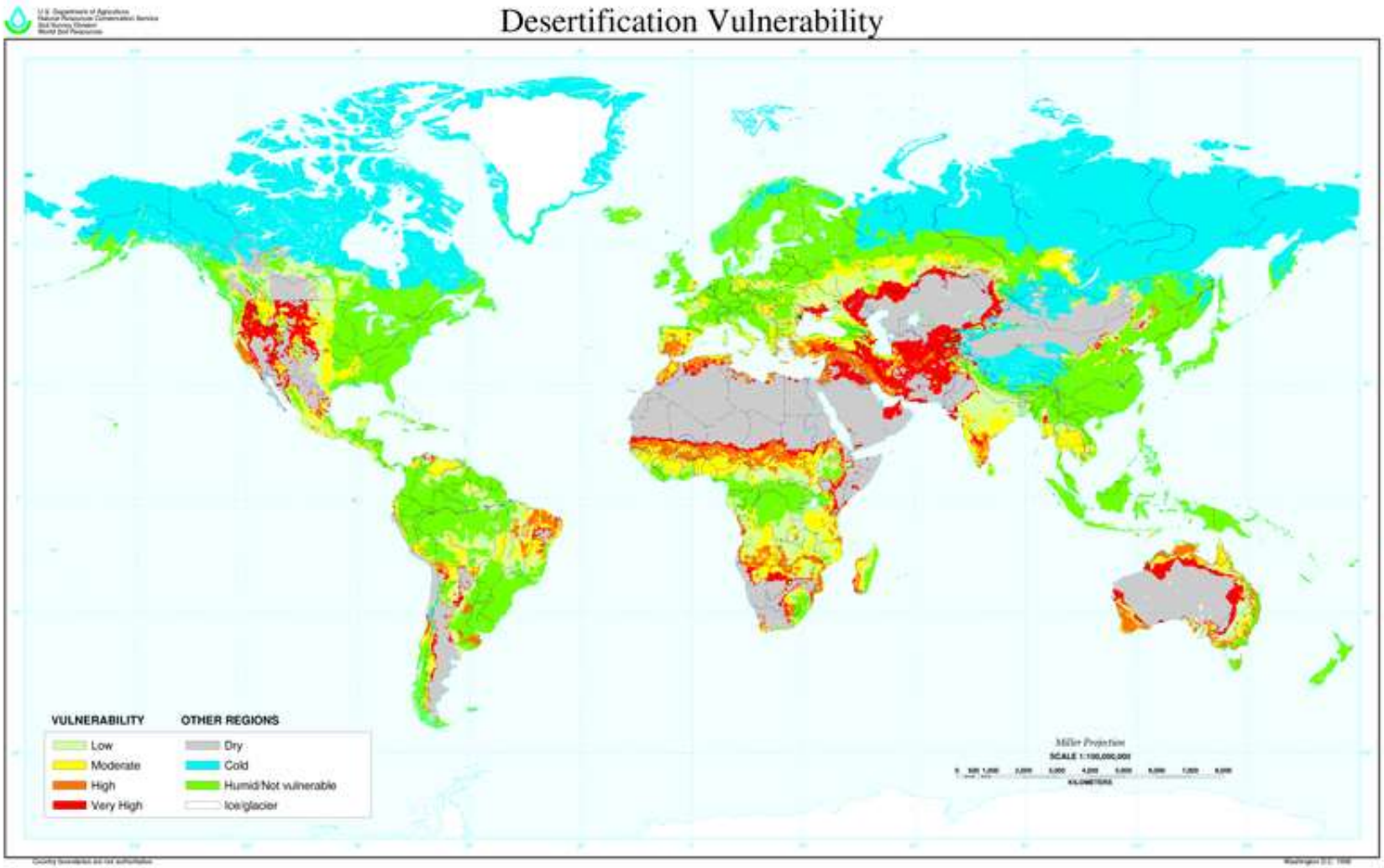
Life in the desert



Desertification

What is ‘desertification’?
What could cause it?
What can be done to prevent it?

Desertification



Desertification

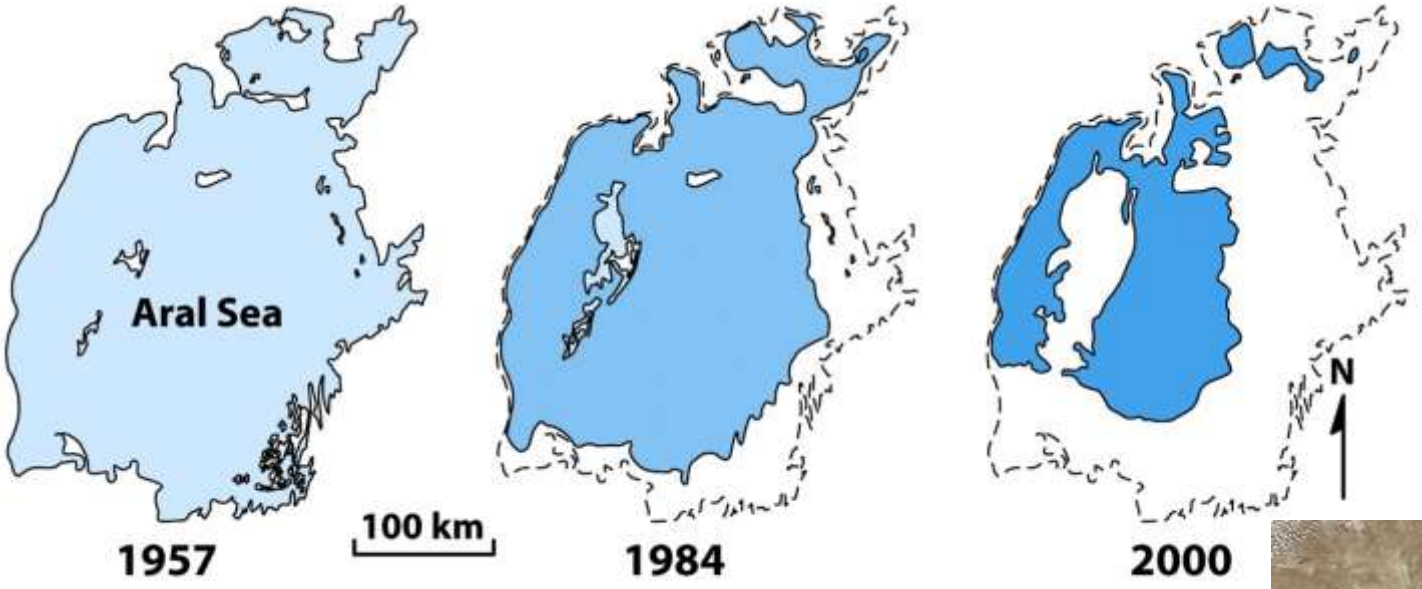


Figure 21-29c part 1 Earth: Portrait of a Planet 3/e

2009

Example – Salton Sea

In 2018, most water will be diverted away from the lake, how fast will the lake respond?