Deserts

- A desert is any region that receives less than 25cm (10in) of rain per year.
- Evaporation equals or exceeds rainfall.
- Boulder gets about 62 cm (24 in) of rain per year.
- Deserts tend to have sparse vegetation due to low moisture, and high relief due to short duration catastrophic rain with no vegetation to hold soils.

Desert Terms

- Desert
- Descending air
- Leeward
- Plateau
- Mesa
- Butte
- Zone of erosion
- Zone of deposition
- Alluvial fan
- Playa
- Desert pavement
- Deflation
- Yardang
- Ventifact
- Dune
  - Barchan
  - Transverse dune
  - Longitudinal dune
  - Blowout
- Loess

Desert Erosion

- Water is the primary agent of erosion.
- Wind is a secondary agent of erosion.

Geography of Deserts

- The geographic location of deserts is controlled by descending air masses.
- This occurs on the leeward side (rain shadow) of a mountain range.
- This also occurs at latitudes 30 degrees N and 30 degrees S as a result of global air circulation.

Rising and Descending Air

- Rising air masses expand, cool, and precipitate moisture.
- Descending air masses compress, warm, dry, and evaporate moisture.
Thought questions

• Why are ski areas in Colorado on the west side of the divide?
• What is the prevailing wind direction?
• Is the air rising or falling on the western slope?
• Why is it so windy in Boulder?
• Does precipitation add or subtract heat from the air?

Desert Landforms

• Desert regions with sedimentary bedrock develop characteristic landforms.
  – A plateau is a broad, level, elevated region commonly bounded partly by cliffs.
  – A mesa is a smaller, flat-topped hill bounded by cliffs.
  – A butte is a narrow hill of resistant rock bounded by cliffs.
Desert regions with igneous or metamorphic bedrock also develop characteristic landforms with:

- Zones of erosion which have little or no soil or vegetation, high relief and near total outcrop of bedrock.
- Zones of deposition which have low relief, some soil development, and sparse vegetation.
  - Alluvial Fans are fan-shaped deposits of material in zone of deposition.
  - Playa Lakes are ephemeral (temporary) lakes.

Zones of Erosion and Deposition
Zones of Erosion and Deposition

Alluvial Fan

Alluvial Fans
**Playa Lake**

**Dunes and Deflation**
- Wind moves sand and silt in zone of deposition.
- Silt and Clay are removed.
- Sand is moved to leeward end of valley to form a dune field.
- Pebbles and cobbles are left behind to form an desert pavement.
- Process is called deflation.

**Dune field, Great Sand Dunes**

**Dunes:**
- Barchan
- Transverse
- Blowout
- Longitudinal (Linear)

**Barchan Dunes:**
Crescent-shaped with limbs downwind; Formed when sand moves across outcrop / pavement

**Blowout Dunes:**
(Parabolic Dunes)
Crescent-shaped with limbs upwind; formed when winds breaks through vegetation
Transverse Dunes: Perpendicular to wind direction; formed in regions of abundant sand (beaches).

Longitudinal Dunes: Parallel to wind direction; formed in regions of limited sand.

Desert Pavement

Desert Varnish
Desert Varnish

Yardangs, Iran
Result from wind erosion of partially lithified dunes.

Yardangs, Iran
Result from wind erosion of partially lithified dunes.

Ventifact
is a wind-feceted cobble or pebble

Loess
- Silt and clay-sized particles are deposited by wind in wetter regions.
- Loess is a well-sorted deposit of wind-deposited silt and clay sized particles.
- Loess is a common peri-glacial deposit.
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• Ventifact
• Dune
  – Barchan
  – Transverse dune
  – Longitudinal dune
  – Blowout
• Loess

Clicker Question
• Temperate deserts primarily occur:
  – A. At 30°N and 30°S latitude and in the rain shadows of mountain ranges.
  – B. At the equator
  – C. Below mountain ranges
  – D. In Africa
  – E. In the southern hemisphere.

Clicker Question
• A crescent-shaped sand dune with its limbs downwind is a
  – A. Blowout dune
  – B. Barchan
  – C. Transverse dune
  – D. Longitudinal dune
  – E. Waddi

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