Eolian Geomorphology

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SAHARA, EGYPT
The Wind

• Where effective?
  – Deserts
  – Coasts
  – Polar regions
  – Outwash plains

• Deserts
  – Ergs (sand seas)
  – Regs (desert pavement)
  – Playas
  – Bedrock
GREAT SALT LAKE DESERT, UTAH
Particle diameter (grain to be moved)

- Wind velocity
- Wind turbulence
- Particle shape & density
- Surface roughness
- Vegetation
- Soil moisture
Bagnold, 1941

- Fluid threshold
- Impact threshold
Sediment movement

- Suspension (clay and silt)
- Saltation (fine sand)
- Surface creep (coarse sand and fine pebbles)
RACETRACK PLAYA, DEATH VALLEY, CALIFORNIA
Racetrack Playa is famous for its mysteriously moving rocks.

One of the more remote and unique places to visit in the park is Racetrack Playa, a dry lakebed with an almost perfectly flat surface made up of fine sediments of silt and clay, famous for its mysteriously moving rocks. The drive to the Racetrack is about 45 kilometers of rough road and

weigh several hundred kilograms, is that during storms, strong winds slide the rocks across the slippery lakebed, leaving long, smooth trackways. Other explanations include ice, force fields and, of course, alien shuffleboard.
Wind loss equation: $A = f(I, C, L, V, K)$

- $A =$ soil loss per unit area
- $I =$ erodibility
- $C =$ climate
- $L =$ unsheltered distance (topography in direction of prevailing wind) [longer distance, more soil loss]
- $V =$ vegetation
- $K =$ ridge roughness (small scale surface roughness) [rougther, less soil loss]
Wind erosion

- Abrasion
- Deflation

Acacus, Libya
SAHARA, AFRICA
TAVAN HAR,
GOBI,
MONGOLIA
DEATH VALLEY, CALIFORNIA
Yardang

KHARGA DEPRESSION, EGYPT
WHITE SANDS, NEW MEXICO
Deflation and transport

HAAST RIVER, SOUTH ISLAND, NEW ZEALAND
Deflation basin

RAWLINS, WYOMING
Desert pavement

ALVORD DESERT, OREGON
GOBI, MONGOLIA
Sand deposition

TOSONCHANGEL, MONGOLIA
ZARKHAN, MONGOLIA
Wind waves (wavelengths)

- Ripples
  - 0.5 – 2000 cm
  - (no overlap)
- Dunes
  - 3 – 600 m
  - (overlap)
- Draas
  - 300 – 5500 m

Marzuk Sand Sea, Libya
Wind rose
OREGON DUNES NATIONAL RECREATION AREA, FLORENCE
BARCHANOID DUNES IN SAUDI ARABIA
EGYPT
SAHARA, EGYPT
STAR DUNES IN ALGERIA
RUB AL KHALI, ARABIAN DESERT
BRUNEAU DUNES, IDAHO
NORTH ISLAND, NEW ZEALAND
coppice  dune = nebkha
MUSTANG ISLAND, TEXAS
CURRITUCK, NORTH CAROLINA
CURRITUCK COUNTY, NORTH CAROLINA
BRUNSWICK COUNTY, NORTH CAROLINA
STRATFORD, TEXAS   April 1935
VICKSBURG, MISSISSIPPI