

Chapter 8

1/ Wind turbine models:

A wind turbine is a device that transforms the kinetic energy of the wind into mechanical energy, known as wind energy, which is then most often transformed into electrical energy. Wind turbines can be either vertical axis or horizontal axis. It requires soils devoid of vegetation.

2/ Wind environments:

It occurs in areas where temperature variations are significant because it promotes the disintegration of rocks, which allows the wind to act more effectively on them. High mountain and desert areas are affected by wind or wind erosion, as well as areas devoid of vegetation.

3/ Shapes shaped by wind erosion:

In the context of erosive action, there are two types of wind erosion:

- Abrasive wind erosion: the wind carries elements such as sand, which cuts and polishes the surface of the exposed rock, thus generating wind patterns on the surface. This process generates characteristic rock shapes known as ventifacts, yardangs, taffonis, and fungal rocks.
- Deflationary wind erosion: the wind blows and sweeps, carries or lifts particles onto the ground. Deflation produces wind holes, depressions and deflation basins, which are common in the dune regions of Canada.

With this type of wind erosion, the desert pavement is formed and three types of deserts can be formed: the Reg or stony, the erg or sandy and, finally, the rocky or mountainous.

Erosion produces a change in the earth's surface. Grains of sand displaced or blown by the wind acquire a characteristic matt appearance by friction; they erode all the reliefs, forming mushroom-like patterns, fluting in the soft clays and shaping faceted pebbles.

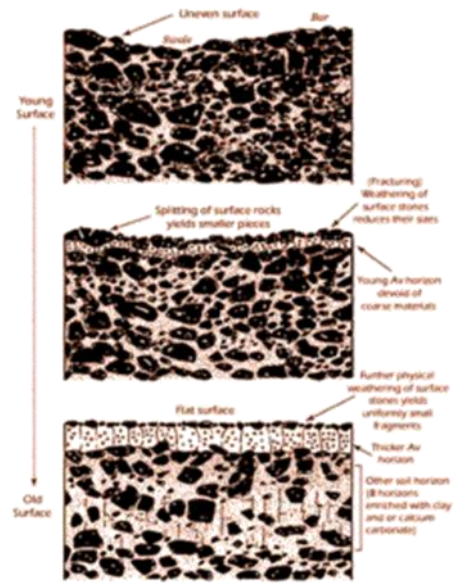


Wind can carry particles in three different ways:

- * By suspension where the finest debris, less than $100\ \mu\text{m}$ moves upwards and is deposited by decreasing the energy of the vortex or during precipitation;
- By saltation: larger grains, medium particles of 100 to $500\ \mu\text{m}$ or moved by a less powerful wind, make successive leaps;
- By creeping, the largest grains that cannot be picked up by the wind, or rarely, move when they are carried away by grains moved by successive saltations. "trawling", which carries large particles from 500 to $2000\ \mu\text{m}$.

Reg:

A reg is a desert of stones, a stony surface cleared of fine elements by the wind (wind deflation). It corresponds to eroded bedrock or ancient pebble layers. Reg (Western Sahara), serir or sébir (Eastern Sahara) or gibber plain (Australia) are terms for a simple or wide depression largely covered with gravel or rocks where sand and fine sediments have been washed away by wind deflation. The wind deflates all the fine materials, leaving the heavier materials behind, which continue to undergo mechanical disintegration. Grains of sand displaced or blown by the wind erode all the landforms. The reg represents the most common type of desert landscape, it is made up of expanses of gravel and pebbles rounded by wind erosion. Very little vegetation survives.



Reg de l'[Adrar mauritanien](#) Paysage de reg dans le [Hoggar](#), Sahara Processus de mise en place d'un pavement dans un reg : déflation éolienne

Hamada:

Hamada or hammada is a high plain or elevated rocky plateau of desert areas where deflation has removed fine-grained surface materials and left the bedrock swept with sand with or without pebble veneer or strewn with boulders. The word hamada in Arabic literally means a flat rocky surface such as the sahara.



La *hamada noire* dans la région du [Tademait](#) en [Algérie](#)

Yardang

The term Yardang originate from the Turkic language, they form in environments where water is very scarce, and the prevailing winds are strong and unidirectional. The abrasive loads carried by the wind carve out elongated ridges that extend out in one direction. Yardangs are typically three times longer than they are wide when viewed from above. They form from generally soft surfaces that get eroded over time. The soft material gets carried away while the hard surface remains behind. They come in diverse shapes depending on the composition of the original material.

They form in semi-consolidated playa sediments. Most yardang fields are in sand-poor areas, but the associated troughs may be invaded by sands.



4/ Shapes shaped by aeolian deposits:

In this process, the particles carried by the wind fall into deposits of sand and dust. This phenomenon is due to the loss of energy from the wind. Depending on the wind direction, there is windward and leeward sedimentation. Sand transported over short distances forms dunes. The formation and birth of a dune depends on the energy of the wind, the amount of sand, the presence or absence of vegetation and the direction of the wind.



The dunes

Is a landform or model made up of a pile of sand accumulated over a greater or lesser width and generally a fairly high slope, under the action of the winds (coastal, border or coastal, desert or continental) or the sea current under the sea (hydraulic dune). Their height is 5 to 10 m for a wavelength of a few hundred meters at most. Their shape varies according to the wind regime and their sand load. The dunes show an internal structure of intersecting bedding. The orientation of oblique bedding and its size are generally variable; They can be tilted up to an angle of 34° . Thus, the following types of dunes can be identified as examples of wind erosion:

- Transverse dunes: the areas where this type of dune forms have a large amount of sand and the soil is devoid of vegetation.
- Longitudinal dunes: this type of dune forms parallel to the wind. These are usually large dunes. They are found in Australia, Africa, and the United States in Arizona and California.
- Parabolic dunes: they are characterized by their sudden formation and, if you look at them from above, you can see that they have the shape of an inverted "U", formed by two arms that join to form a summit. They have two slopes, an internal slope in the direction of the wind and an external slope in the direction away from the wind.



Photographie aérienne oblique d'une dune parabolique d'Athabasca, vive et géante, près de la rivière Williams, en Saskatchewan. La présence à certains endroits d'une végétation de hautes herbes est attribuable à une infiltration des eaux souterraines (photo de P.P. David).

- Barkhane: When this type of dune is formed, the wind goes in one direction and the amount of sand is limited. They are crescent-shaped and they look like parabolic dunes. They are found in Baja California and Sonora.
- Star dunes: As the name suggests, they are called star dunes because they are characterized by several radial arms and the wind that forms them is constantly changing. They are in areas where there is a lot of sand and remain fixed

The Loess

an aeolian silt, often calcareous, also called plateau silt, that was deposited during an ice age. A silt describes a dry sediment, a loose detrital rock, whose grain size is between that of sands and clays. Loess gives a loose, beige to yellowish soil. Loess is a loose detrital sedimentary deposit formed by the accumulation of silt from wind erosion in desert and periglacial regions (peri-desert and periglacial belts). The finer silt is transported farther and forms loess.

It is made up of clay, silica and limestone particles. It comes from the deflation of Quaternary glacial materials. Limescale is dissolved on the surface by seepage water, typical loess is a loose, silty, homogeneous, finely porous, yellowish to brownish colour, often calcareous (10 to 30% CaCO_3). The particle size composition of a typical loess is 10% fine sand, 75% silt (mostly coarse silt) and 15% clay. The aeolian sands are silty-sandy with a predominance of fine sand.

