



# Dust: A True World Traveler

About one third of Earth's land areas are covered in dust — and we are not talking about the dust in your attic, shed, or your sibling's room. While there can be a lot of dust indoors, there is a great deal more outside. Dust comes from particles of rock and sand (**mineral dust**) that have eroded or broken down over time.

We find the most dust on Earth's deserts, beaches, and dry lands. Thanks to winds, these particles can fill our skies, too. In fact, on many days there is enough dust in the air (22 million tons or 20 teragrams) that satellites can track it from space.



The Taklamakan Desert in China lies 1,800 miles (2,900 kilometers) from Beijing. In March 2021, strong winds carried dust from this desert all the way to the capital and darkened skies.

#### **Frequent Flyers**

When dust (a type of **aerosol**) is lofted into our atmosphere, it can travel great distances. It most often arises from deserts, where strong winds can lift up vast clouds of dust and debris. The plume of material from a dust storm can be miles long and reach several thousand feet high.

People like to call these events "sandstorms" because they often think of the sand in deserts. However, the heavier sand grains are not picked up by the wind. It is the finer, lighter mineral dust that gets lofted into the skies. These small particles can travel thousands of miles.

#### Vocabulary

**mineral dust** — Fine particles of rocks and sand.

**aerosols** — Tiny solid or liquid particles in the air; they can be natural (dust, smoke, sea spray, volcanic ash) or human-caused (pollution).

#### Where Does Dust Go?

The Sahara Desert is the largest source of dust on our planet. Every year, dust from the Sahara blows from Africa to South America and the Caribbean via the **trade winds**.



These maps show the movement and density of dust plumes from the Sahara as measured by NASA satellites in June 2020. Red areas indicate the densest plumes, which blew from Africa to the Americas.

2020 was an extraordinary year for dust blowing out from northwestern Africa. A monstrously large plume of dust in June 2020 was nicknamed the "Godzilla" dust cloud. Scientists determined that the concentration of particles over the Atlantic Ocean was the thickest it had been in 17 years of satellite measurements. Across the Atlantic in places like Puerto Rico, dust from the Sahara darkened skies to a yellow color. The air quality was so bad that people stayed indoors.

## Vocabulary

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**trade winds** — Winds that generally blow from the east to the west in tropical regions around the Equator. They are related to the rotation of the Earth.

Astronaut Alex Gerst took this photograph in September 2014 as a windy weather front stirred up a tremendous dust storm in the Sahara Desert.

#### What Can Dust Do?

Dust can darken the skies and pollute the air, which can affect people's breathing or worsen their asthma. The particles can also damage ventilation systems and engines. Airplanes are sometimes grounded during extreme dust storms because the particles

reduce visibility and can damage the turbines of jet engines.

Be careful: If you are experiencing a dust storm, protect yourself by staying indoors or wearing a mask when outdoors.



Severe dust storms led to poor air quality for people in western India in January 2022.

Dust also can help feed **phytoplankton** in our oceans. In Alaska, Greenland, and other icy and dry places, winds can pick up a fine type of dust called **glacial flour**. Carried by the wind and dropped into the ocean, this dust provides iron that phytoplankton need to grow.







Did you know: The Sahara Desert is larger than the entire continental United States.

**phytoplankton** — Tiny plant-like organisms that float in the ocean. **glacial flour** — Fine dust formed when moving glaciers grind down rock.

## What Else Does Dust Do?

Dust has another unwelcome effect: it can make snow and ice melt faster. That might be welcome in the lowlands, but not in the mountains. In the Rocky Mountains and the Himalayas, snow and ice act like big reservoirs of fresh water. Snow usually melts slowly in spring and summer, flowing down into rivers and lakes to provide fresh water for plants, animals, and humans in drier seasons.

However, dust storms can change the color of snow. Fresh white snow reflects 80 to 90 percent of sunlight, while dusty snow

reflects only 50 to 60 percent. This causes snow to absorb more sunlight (heat) and melt faster. Snow water then runs down



faster from the mountains, instead of slow and steady across the seasons. It also means less sunlight is reflected back into space, allowing the area to get warmer.



These two images from Landsat 8 show the mountains near Telluride, Colorado, in early May and late June 2013. While melting in the spring sunshine, the snow also got coated by dust — which made it absorb more sunlight and melt faster.

There is evidence that some dust storms can also spread disease. Dust storms in the United States and Africa can sometimes carry a fungus that causes Valley Fever. NASA's Aqua satellite took this image of a dust storm over southern Algeria.





Dust from the Gobi Desert in Asia — as much as 56 million tons a year — can travel all the way to the Arctic and North America.



If you notice hazy skies, it could mean dust or other aerosols are affecting local air quality. Aerosols can reduce visibility and change the color of the sky. Using this hands-on test, learn how to tell if there is a high number of particulates in the sky.



Dust rises toward blue skies in the Mojave Desert in California.

#### **Materials**:

- A printout of page 6
- 5 small clear glass or clear plastic cups (ideally 4 inches tall (10 cm) with a 2 inch (5 cm) diameter base)
- Water (to fill the cups)
- Milk or liquid creamer
- A pipette or a straw (to use as a siphon)
- A spoon or other stirring utensil
- A ruler (if needed)

### Instructions:

Fill each cup with 2 inches (5 centimeters) of water. Place the cups on the blue circles on page 6. Add drops of milk/creamer to the cups as directed. Stir each to mix. Now observe and compare the "sky color" and "visibility" through each cup.

**1.** To best observe the sky color (the blue circle under the cup), look straight down into each cup. What do you see? What happened to the blue circles below?

**2.** To observe the visibility, look through each cup from the side. Compare the liquids in the different cups side by side. What do you notice?

- 3. What could the water and drops of milk/creamer represent?
- 4. What happened when more milk/creamer was added?

## **Extension** Activity

Are you noticing hazy skies in your town? Do you think that it could be a dust storm? Help NASA scientists track dust events by making observations with the GLOBE Observer app. Learn more here: <u>https://observer.globe.gov/get-data/dust-data</u> (Always follow guidelines from your local officials, and only participate in GLOBE activities or use the GLOBE Observer app if it is safe to do so.)



