Mars: Dry Ice and Dunes

We tend to think of Mars as a dead planet where all the exciting geologic activity happened billions of years ago. But information from the Mars Reconnaissance Orbiter shows us that Mars is still a very dynamic place.

Mars has a permanent ice cap made up of water ice at its north pole.
This pole is ringed by sand dunes, which we're looking straight down on.
These dunes are made of small bits of basalt, dark volcanic rock similar to the rocks found around the Hawaiian volcanoes.

In the fall and winter, the temperatures are so cold that 30 percent of the Martian carbon dioxide atmosphere freezes onto the ground, forming a seasonal polar cap. The ground gets covered with a bright layer of seasonal carbon dioxide ice, or "dry ice," that's about one to two feet thick.

When we flip between images taken at different times in the spring, we can see the dry ice cracks form under the sun's heat as the solid carbon dioxide turns into gas. The gas beneath the ice escapes, carrying dark sand and dust that move, as we can see, down the steep sides of the dunes.

We are now looking at different parts of the vast field of dunes. These are called Barchan dunes.

At the start of this time-lapse, the dunes are covered with seasonal dry ice so everything is roughly the same color. The dark streaks and splotches are sand from the dune. There are small splotches of sand at the crest of the dune. Then we start seeing the ice crack. Sand is pushed to the top of the ice layer by the escaping gas outlining the cracks.

As time goes on, the cracks widen and fresh bright frost condenses in the vicinity.

Now, we see sand coming from the crest of the dune and sliding down the steep dune slopes. A ferocious wind has picked up, blowing sand and dust across the dune. Until the dark sand dune is free of seasonal ice.

Let's watch that whole sequence again. We start with ice-covered dunes in the early Spring. Some areas of the ice rupture and crack, allowing sand and dust to escape along with the escaping gas. The gas from the dry ice destabilizes the slopes, reshaping the dunes.

This activity happens every Spring in the vast dune fields of the Martian polar regions. These are not the sort of events that would naturally occurs on Earth. Mars may look Earth-like, but in some ways it is a very different planet from our own.