

Why is Death Valley so darn hot?

Death Valley's record temperature of 134 degrees Fahrenheit (56.7 degrees Celsius) — the hottest ever measured on Earth — was set exactly 100 years ago today. But the tale of how the rocky expanse of California desert came to be known as the world's hottest place involves a lengthy stretch in the number two slot, a mission to set the record straight, and a scientist who disappeared amid a revolution.

For decades, scientists debated whether El Azizia, Libya, or the eastern California desert expanse had the definitive claim to the hottest temperature ever recorded on the planet. An international meteorology committee was tasked with investigating the competing claims, made decades earlier, but their efforts were disrupted by a revolution in Libya.

In 2011, at the height of Libya's revolution, Libyan scientist and committee member Kahlid Ibrahim El Fadli was searching for the handwritten records in the Middle Eastern country when he disappeared for several months. "I didn't know if he was alive for eight months, and then I got a short email from him saying he and his family escaped from Tripoli," Randy Cerveny, a climatologist from Arizona State University, told LiveScience. "He was part of the revolution, and he was holding the same position as before, but with the revolutionary government."

Incredibly, the Libyan records also survived the chaos. They also put to rest, once and for all, which site can claim the title of hottest place. In looking at the original records, El Fadli, director of the climate division of the Libya National Weather Service, discovered the Libyan measurement of 136.4 F (58 C) was way off from surrounding weather stations. A faulty reading of the thermometer is now primarily blamed for the discrepancy, which was enough evidence for the World Meteorological Organization to overturn the record.

This secured Death Valley as the hottest-known place on Earth, with the record-setting temperature marked on July 10, 1913. The park plans a 100th anniversary celebration on July 10 that will feature talks from scientists as well as an invitation for delegates to watch the usual temperature observation. [8 Hottest Places on Earth]

So what makes Death Valley such an oven? A unique set of environmental factors send temperatures soaring in the desert region, forcing adaptations among the plants and animals that live there.

A sun-scorched environment

The biggest factor behind Death Valley's extreme heat is its elevation. Parts of it are below sea level, even though the area is 250 miles (400 kilometres) inland from any major body of water. Also, a major set of mountains (the Sierra Nevada) block moisture from the Pacific from reaching the basin.

That geological combination makes it possible for summer temperatures to reach 125 F (51.6 C), or even higher, as happened in late June. (The temperature in Death Valley on June 29, 2013, was 129 F (54 C), making it the hottest June day on record for the United States.)

"That really allows for the solar radiation to heat up the air, and really dry it out, and make it an incredibly hot environment," Cerveny said.



Other factors conspire to keep air from moving around in the basin, said Christopher Stachelski, a forecaster at the National Weather Service office in Las Vegas. The valley is narrow, trapping any air from circulating in or out. There's also little vegetation to absorb the sun's rays, and there's a desert nearby. Winter temperatures, however, can actually get quite cold because the desert does not retain heat when the surrounding air cools off.

"There are seasons to Death Valley," Stachelski said. "It can get warm in the winter on certain days, but there are days in the winter that can get to freezing. Most days in the winter have 60s for a high."

Nevertheless, plants and animals in this location require both behavioural and physiological adaptations to survive.

Slow growth and slow movements

There are animals in Death Valley, but they tend to be in low densities. Amphibians stick close to any water they can find. Large mammals rest in the shade. Cave bats remain underground until night falls, and birds fly away or to higher elevations. [Hell on Earth: Tour Death Valley]

The lack of water also forces physiological adaptations, as seen in the notable example of tortoises.

"What's cool about tortoises is the ability to concentrate their urine. They can go a year without drinking," said Linda Manning, a wildlife biologist for Death Valley National Park. "Apparently, when they let it go, it's really stinky."

Plant adaptations include small leaves, extremely deep roots, long-lived seeds and also more desert-friendly features such as waxy cuticles and spines. The most important feature, however, is their extremely slow growth, said Jane Cipra, a botanist at Death Valley National Park.

"Shrubs like creosote and blackbrush may not look like much, but they can be hundreds and sometimes thousands of years old," she wrote in an email.

"Blackbrush is largely dormant most of the time and only puts energy into growth and reproduction in really good years."

Even a century after the hottest recorded temperature, these adaptations are still crucial to allowing animals and plants to survive. The late June temperatures in Death Valley were so hot this year that media and scientists speculated the all-time record was in danger of being broken just after it regained its rightful place.