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GEOLOGY

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Brewing a Cup of Volcanic Tea

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Many families along Iceland's fertile southern coast can spin a good yarn about a close escape from an exploding volcano. Take Kristín Vogförð's grandfather, who was tending sheep on the eastern slopes of Katla when it erupted in 1918, melting glacial ice and violently flooding the rivers and fields below. According to an account by the geophysicist from the Icelandic Meteorological Office (IMO), he and the other shepherds rode their tough Icelandic horses through icy waters to safety. Unfortunately, his sheep were not so lucky.

In April, I joined a group of Icelandic volcano experts on a field trip to study rocks, gases and river runoff from Eyjafjallajökull. I witnessed modern escapes and came away impressed by how much Iceland's scientists are doing to learn all they can from the latest eruptions, which have already begun to take a large toll on the small country's tourism and agriculture industries.

The volcano's first eruption, late on the night of March 20, was so well-behaved and accessible that volcano researchers called it a "webcam eruption." It even attracted foreign tourists, providing a boost to Iceland's beleaguered economy as Icelanders welcomed the distraction from all the attention their country's financial crisis had been generating.

In fact, Steingrímur Sigfússon, Iceland's finance minister and a geology graduate, took advantage of the hubbub to call Sigurður Gíslason, a researcher at the University of Iceland, and asked if he could help out on a field trip to the volcano. Gíslason reportedly assigned the minister to drive the off-road vehicle his team would use on the field trip. Sigfússon's quick escape from pot-and-pan clanging protesters in Reykjavik went smoothly until a flood caused by the volcano's second eruption blocked Iceland's ring road and the minister had to catch a helicopter ride back to the capital.

Months before Eyjafjallajökull's awakening, geophysicists from the IMO and the University of Iceland's Institute of Earth Sciences were studying signals from seismic and Global Positioning System (GPS) satellite stations fixed on the mountain's flanks for hints of a possible eruption. In addition to their practical interest in warning nearby residents of potential floods or ash contamination, the seismic activity represented an opportunity for the researchers to improve their understanding of the magma pathways beneath volcanoes. In 2004, the IMO succeeded in forecasting an eruption by the especially active volcano called Grímsvötn underneath an icecap called Vatnajökull. Seismic activity detected underneath Eyjafjallajökull over the summer of 2009 seemed to offer a good opportunity to make another prediction.

Researchers closely watched the volcano's activity, which suggested magma was

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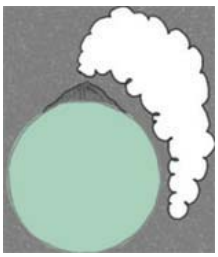

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moving kilometers beneath the surface of Eyjafjallajökull, and installed additional sensors as activity moved eastwards along the mountain. On the day of the March 20 eruption, geophysicist Sigrún Hreinsdóttir was on the mountain placing ultra-sensitive GPS stations that could help her estimate how much magma was building up inside the volcano. That night, after a day of seismic quiet, an eruption of lava lit up the sky above southern Iceland.

As in many cases, it proved to be impossible to predict everything with exact precision. But Icelandic authorities evacuated a large area within hours, and fortunately the first eruption did not claim any casualties. Researchers then quickly swarmed the area to learn everything they could from this eruption.

A few of them invited me to join them as they drove a pair of off-road vehicles up the Markarflót river valley, a landscape braided with glacial streams which change paths so frequently that visitors must find new fords on every trip. We eventually abandoned one truck and crowded into the other. This one had a hydraulic suspension system that would have made it the envy of low-rider car fans everywhere if it weren't for the one meter tall tires that lifted it above the rushing river water.

By the time we started walking, at the mouth of a canyon called Hrunagil, steam was rising from the river water and the volcanologists measured its temperature at 21 degrees Celsius. Water from the neighboring canyon, unheated by lava, was at just 3 degrees.

The researchers took samples of both the water and the gas before splashing across the river in their boots and marching up the canyon walls. They were especially keen to reach the source of all this hot water - a lava stream from the eruption site much higher up the mountain. A lava fall, incandescent with heat, had followed the path of the canyon and filled the top half with smoldering black lava.The water found a path along the margins of the freshly made stones, or even ran beneath them, which was what caused the water's temperature to rise so dramatically.

So when Iceland-bred geochemist Evgenia Ilyinskaya caught sight of the lava though the wind-blown steam she, like her colleagues, tramped straight down the moss-covered slopes toward it. The gray mist muted the researchers' brightly-colored jackets. Ilyinskaya, a graduate student at the University of Cambridge, where I first met her, left her gas collecting device buzzing quietly in the background. The other researchers hammered open lava and noted the crystals that made up the brand-new rock.

Then I heard a shout: Ilyinskaya was ankle-deep in the narrow channel of water between the cooling lava and the riverbank. As she hopped out and peeled off her boot, her heel throbbed an angry red where the water, last measured at 81C, had seeped in. Then she did something extraordinary - she sat down and brewed herself some tea from the volcano water. At first I thought life in Britain had rubbed off on her, but on reflection, I concluded that she may simply have been doing what Icelanders have always done: making the best of her volcanic home.

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