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RAGING PLANET
VOLCANO
火山爆发

讲述自然界最具爆发力的力量

人民教育出版社

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编者 2002年10月

自然英语

Discovery

听读系列

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愤怒的星球

——火山爆发

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Raging Planet —— Volcano

The volcano, a window on the fiery interior of the world, the most explosive force of Nature.

"Rocks as big as television sets were falling around us, so I picked myself up and ran."

The landscape comes alive with a burning terror that we are powerless to resist.

And yet, volcanoes create new land. They're the source of life, but they could destroy it all. Volcanoes, the most powerful force on our raging planet.

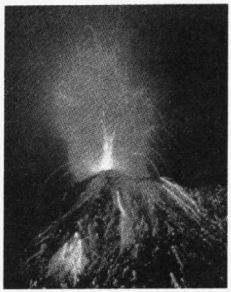
The top of a resting volcano; it's hard to imagine the incredible forces that lie locked beneath this peaceful surface. But, these are the forces which created all life on Earth and which could, in the end, destroy it.

Volcanoes are the most powerful elemental force in Nature. They have molded the face of our planet ever since its birth.

This is Nature's fury at its most intense. Whole landscapes become engulfed in fire.

A single eruption can darken skies across whole continents and change the climate for generations.

愤怒的星球——火山爆发



火山，是炽热地心的窗口，是自然力量最强烈的爆发。

“像电视机那么大的岩石纷纷掉落在我们四周，我拔腿就跑。”

景象变得异常恐怖，让我们无力抵抗。

然而，火山会创造新土地，它们是生命的泉源，但也能将生命摧毁殆尽。火山是地球愤怒时所能展现的最强大威力。

在休眠火山的山顶，很难想象宁静表面之下竟隐藏着强大无比的力量，但是这个力量可以创造地球万物，最终却也能将它摧毁。

火山是自然界威力最强的力量，它们在地球形成时便开始塑造地球表面。

火山爆发时，大自然的愤怒达到极限，整个大地被火舌吞噬。

一次火山爆发可使整个大陆日月无光，使气候长期改变。

The most powerful volcanoes release thousands of times more energy than any nuclear weapon. In 1815, ash from the volcano Tambora created brilliant red sunsets around the world for three years. Larger eruptions have blocked out the Sun for decades causing disastrous changes to the world's climate and frequently driving entire species to extinction.

Volcanoes have molded the face of our planet for billions of years. They can build new land where there was just ocean.

Volcanoes are a window into a different world. Through them, we can glimpse the incredible processes taking place inside our planet.

For all their destructive power, volcanoes are also the most productive forces of nature. They created many of the elements we depend on for survival; the air we breathe, minerals for plant growth, even water. Without volcanoes, there would be no oceans, no clouds, no rain. Our planet would be a lifeless desert.

Volcanoes have given life, but they can also take it away. Today, millions of people live in the shadow of active volcanoes. It's easy to disregard the danger, to forget that it exists. But, an active volcano is a deadly threat. Its power is completely overwhelming.

Around the world there are at least fifteen hundred active volcanoes. Before we can predict them, we must understand how they work. But studying volcanoes is a dangerous job, even on the relatively gentle volcanoes in Hawaii. Here, they sample lava from skylights, holes in the rock above the rivers of lava. The rock crust near the edge is often brittle and thin and one false step could send them to a fiery death.

威力最强的火山释放的能量比核武器大上数千倍。1815年，坦博拉的火山灰使地球产生鲜红的落日景观达3年之久。更强的爆发甚至可遮住阳光达数十年，使地球气候产生灾难性的变化，而且经常造成整个物种的灭亡。

数十亿年来火山一直在塑造地球表面。

如果火山爆发在海洋中发生，就能创造新的陆地。

火山是通往另一个世界的窗口，通过它们，我们可以窥探地球内部不可思议的变化过程。

火山毁灭性虽强，但生产力也强。它可创造我们赖以为生的基本元素，我们呼吸的空气，植物所需的矿物，甚至是水。没有火山就没有海洋，没有云，没有雨，地球将成为没有生命的沙漠。

火山能赋予生命，但也能夺走它。现在有数百万人生活在活火山的阴影下。人们很容易忽视它的危险，忘了它的存在，但是活火山永远是致命的威胁，它的力量令人无法招架。

世界上至少有1500座活火山，我们要预测它们何时爆发，就要先了解火山的形成、爆发过程。但研究火山是件危险的工作，即使是研究相对温和的夏威夷火山也存在危险。他们从天窗采集熔岩，所谓天窗，就是熔岩流上方的岩洞。这个洞口边缘的岩层又脆又薄，一旦失足便会葬身火窟。

"Not too close."

"You can certainly find yourself in situations where you're calling on your senses, ...

...here you need to be aware of what's going on around you at all times. Your sight, your ears, everything is important because you just don't know what might happen next."

The rivers of lava beneath this crust can be as hot as two thousand degrees Fahrenheit and give off deadly, sulfurous fumes.

The volcanologists know and accept the risks.

But, sometimes, volcanoes are more dangerous than anyone thinks. Working on them can be fatal.

Professor Stan Williams is a geologist whose work takes him very close to active volcanoes. In 1993, he led a group of volcanologists on a trip to study Galeras, one of Columbia's most explosive volcanoes.

"I'm a volcanologist and that means, to me, I want to study active volcanoes because I think we can learn really special things by being on the scene of eruptions."

While most of the expedition remained at the edge of the volcano, Stan took a party of twelve down to the inner crater to collect gas and other samples.

We had a great time, a few hours of working together with no sense of unusual danger at all. The volcano was a great subject of science. We were doing it, we were really working together.

Although the volcano was active, there had been no eruptions or explosions for six months. Then suddenly, without any warning, the ground started to shake.

"I yelled, 'We got to get out of here.'And before anybody could really react, it exploded."

“不要太靠近。”

“在这里，你时刻警惕着，总是战战兢兢……

……你必须随时注意四周变化，用眼睛看，用耳朵听，任何迹象都很重要，因为你不知道下一刻会发生什么事。”

地壳下的熔岩流温度高达华氏2000度，会冒出致命的硫磺气体。

火山学家了解这种风险，时时经受着这种考验。

但有时火山的危险性远超过想象，研究它们会有生命危险。

斯坦·威廉斯教授是地质学家，经常需要在活火山附近工作。1993年，他带领一群火山学家前往加利拉斯火山进行研究，那是哥伦比亚爆发最频繁的火山之一。

“我是火山学家，对我来说，就是要研究活火山，因为我可以从火山爆发现场获得宝贵的经验。”

大部分的勘察工作是在火山边缘进行的，但斯坦还是带领一个由12人组成的队伍下到火山口内部采集气体和其他标本。

我们干得很愉快，一起工作了几个小时，完全忘掉会有突如其来的危险。火山是项伟大的科学研究项目，我们正在研究它，一起认真地工作。

这是座活火山，但6个月来一直没有爆发过。可是，突然间，在毫无预警的情况下大地开始震动。

“我大喊‘快离开这里！’但是大家还没来得及反应，它便爆发了。”

Stan did the only thing he could: he ran.

"Rocks were as big as television sets falling around us. I made it ten meters, or something, I don't know for sure, before the first big one struck me right in the side of my head, knocked a hole in my head; knocked me flat. I picked myself up and ran and maybe another ten meters before the next bad one broke my left leg and shattered my right leg."

The hot rocks had also set Stan's clothing and backpack on fire. Both his legs were broken and he was still in mortal danger.

"So, I crawled to get behind a big rock, because the rocks which were flying laterally, those were the killers and I had to get behind some barrier, which I found, a big rock."

As the survivors struggled to get help, Galeras erupted again.

"I really thought when the second eruption began that it was probably the end."

But, it wasn't the end for Stan. Two hours later he was rescued, but nine other people died that day.

"It was the most energetic explosion we'd seen in five years and it killed. Six scientists were instantly dead, three tourists were killed and I, by just a fluke, was close to dead but not quite there."

Stan's escape was miraculous. Over the next three years, he had sixteen separate operations. But, his body healed and in 1995, he went back to Galeras.

"I vividly remembered the first time I saw Galeras, again. Got off the plane and there's Galeras sitting at the end of the runway and it's like this monster that really worked hard on killing me and we sat there and talked about death for a few hours, and I survived and now I'm back."

斯坦只得死命地跑。

“像电视机那么大的岩石掉落在我们四周。我大概跑了10米吧，我不太确定。一块岩石打中了我的头，头被打破了一个洞。我被打倒在地，但接着爬起来，大概又跑了10米远，又被一颗岩石打断左腿，右腿也被砸碎了。”

炽热的岩石烧着了斯坦的衣服及背包，他的双腿都断了，他处在致命的危险之中。

“所以，我爬到一颗大岩石后面，因为岩石会从侧面飞来，这些都会令人丧命。我必须找个屏障躲起来，于是我找了块大石头。”

当幸存者还在努力逃脱之际，加利拉斯火山再度爆发。

“第二次爆发时，我真的以为我要完了。”

但斯坦并没有真的完了，2个小时后，他获救了，但是当天有9个人丧生。

“这次爆发是我5年来看到的最严重的一次。有6位科学家当场丧生，3位游客死亡，而我侥幸地死里逃生。”

斯坦能脱身真是奇迹。接下来的3年中，他接受了16次手术。但是他痊愈后，于1995年又回到加利拉斯。

“我清楚记得再度看到加利拉斯火山时的情景。下了飞机，便看到了跑道尽头的加利拉斯。它像个怪兽，真想致我于死地。我们在那里聊了好几个小时，谈论了死亡的问题，最后我还是活了下来，而现在又回到这里。”

The explosion on Galeras killed six geologists and three tourists. But, in volcanic terms, it was very small. When Mount St Helens erupted in 1980, about one cubic mile of the mountain disintegrated into ash. Several hundred square miles of forest were devastated and more than sixty people died.

Yet, even this pales compared with some ancient eruptions. Two million years ago, a gigantic volcano erupted in what is now the Yellowstone National Park. It blew apart over five hundred cubic miles of rock. When the dust settled, it covered over one third of the United States.

Volcanoes are created by the movement of the great plates of rock that make up the Earth's crust.

These tectonic plates, carrying the ocean and continental landmasses, float on top of the mantle that surrounds the planet's core.

The plates move as the intense heat inside the Earth creates giant convection currents in the mantle.

This lake of molten lava in Hawaii shows the process in miniature, with convection currents shifting and breaking up the thin solid crust.

One type of volcano occurs where these currents rise to the surface. The crust is pulled apart and new rock takes its place. This happens in great ridges down the middle of the oceans. New magma comes straight from the mantle deep inside the Earth. Its liquid and called basalt. Where volcanoes form, they often create islands like Iceland and the Canary Islands in the Atlantic Ocean. The liquid rock comes to the surface and flows out of the volcano as lava.

加利拉斯的爆发夺走了6位火山学家和3位游客的性命，但对火山而言，这只是个小数目。1980年的圣海伦斯山火山爆发，使得约1立方英里的山头化为灰烬，数百平方公里的森林被摧毁，60多人丧生。

但如果拿这个和古代的一些火山爆发相比，简直又不值一提。200万年前在现在的黄石国家公园便发生过一次巨大的火山爆发。那次爆发炸毁了500立方英里的岩石，尘埃落定后，火山灰覆盖了美国1/3的领土面积。

是地壳的岩石板块运动造成了火山爆发。

地壳上有海洋板块和大陆板块，它们漂浮在地核外围的地幔上。

当地球内部的高热在地幔产生巨大的对流，板块便会移动。

夏威夷的熔岩湖可以看成是这个过程的微型展示，热流移动时，薄地壳便会隆起。

当热流升到地表，便形成火山。地壳裂开时，形成新的岩石。这种情形常见于大洋中脊处。新岩浆会直接从地底的地幔喷出，这种液体就是玄武岩[①]。如此形成的火山，常成为岛屿，如冰岛和大西洋的加那利群岛。融化的岩石喷出地表，从火山口流出，便形成熔岩。

注①：这种液体冷凝之后形成的岩石叫玄武岩。

This is what happened in 1973, to the busy fishing port of Heimaey in Iceland. Suddenly, with no warning, a huge fissure opened up just on the edge of town and a massive volcanic eruption began.

Within days, the lava and the constant rain of black ash had destroyed and buried hundreds of homes.

Then, one lava flow changed direction and threatened to block the harbor entrance, a lifeline to these fishing people. They decided to challenge the volcano.

They could not stop the flow, so they tried to divert it. They brought in huge water pumps, and for several days they sprayed the edge of the lava with millions of gallons of seawater.

Incredibly, it worked. The lava solidified into a wall, which diverted the main flow safely away. The town and its livelihood were saved.

But, in other parts of the world, there are different types of volcanoes, far more powerful than Heimaey. In some places, two tectonic plates collide. One plate is forced down into the mantle. The intense pressure and temperature melts this rock and forces it back up towards the surface. It creates an entirely different, and more dangerous, volcano.

These volcanoes explode, hurling out ash, rock and gas. Unfortunately, these explosive volcanoes are the most common.

This is Mt Unzen on Kyushu Island. It is one of twelve active, explosive volcanoes, which threaten Japan. In 1991, after two centuries of quiet, it erupted with appalling violence and again in 1993.

In the town of Shimabara, at the volcano's foot, day became night as fast ash clouds filled the sky.