

## **Volcanic Eruption, Tambora**

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# Volcanic Eruption, Tambora

Alan Robock

Rutgers University, New Brunswick, NJ, USA

*The Tambora volcano (8.25°S, 118.00°E) on the island of Sumbawa in Indonesia, erupted on April 10th, 1815, sending a massive cloud of aerosols into the stratosphere. This was the largest eruption of the past 500 years.*

*In the summer of 1816, Lord Byron and his friends Mary and Percy Bysshe Shelley spent their vacation on the shores of Lake Geneva in Switzerland. Rather than the normally delightful weather they expected, “it proved a wet, ungenial summer, and incessant rain often confined us for days to the house.” (Shelley, 1818, p. xxii). In fact it was so gloomy that they held a writing contest to see who could come up with the best ghost story, the most appropriate expression of their common dismal feelings. Mary won, and the famous novel *Frankenstein* was born. The book both begins and ends with the monster trudging across a bleak ice-covered wasteland.*

Byron was also inspired that summer and wrote *Darkness*, the beginning of which is reproduced below:

I had a dream, which was not all a dream.  
The bright sun was extinguish'd, and the stars  
Did wander darkling in the eternal space,  
Rayless, and pathless, and the icy earth  
Swung blind and blackening in the moonless air;  
Morn came and went – and came, and brought no day,  
And men forgot their passions in the dread  
Of this their desolation; and all hearts  
Were chill'd into a selfish prayer for light:  
And they did live by watchfires – and the thrones,  
The palaces of crowned kings – the huts,  
The habitations of all things which dwell,  
Were burnt for beacons; cities were consumed,  
And men were gather'd round their blazing homes  
To look once more into each other's face; . . .

The summer in New England that year also had extreme weather. There was snow every month of the year, and the poor harvests started a mass migration from the US East Coast across the Appalachian Mountains to the Midwest. For these reasons, 1816 has come to be known as the “year without a summer.” Although the cool summer of 1816 was not universally felt around the globe, large regions, including North America, Europe, Argentina, India, and China experienced record anomalies. Even portions of South Africa experienced cool and wet conditions

in the growing season, but Southern Hemisphere climate would not be expected to change much in response to Tambora, due to the overwhelming oceanic influence.

The extensive records of the Hudson's Bay Company prove extremely useful in this regard for determining Canada's climatic record of this period. The effects of the 1816 summer on agricultural productivity of New England did not have much to do with the average temperature, which was low but not abnormally so, but with a series of killing frosts that reduced the growing season. This, along with a severe drought, reduced agricultural output to record low levels. In Europe, by contrast, there were record low temperatures accompanied by above average rainfall and cloudiness, the combination of which slowed the growth of crops and produced fungus and molds. Thus, food production was negatively affected in both regions, but by different mechanisms, pointing out the complex relationship between climate and human impacts.

The Tambora eruption killed more than 90 000 people in the immediate vicinity, 35% of the people on Sumbawa (48 000 in two years; 10 000 immediately and 38 000 from hunger and disease) and 44 000 on Lombok 160 km to the east. A more indirect effect of the Tambora eruption has also been suggested. Because of the bad weather, a typhus epidemic broke out in Ireland, spread to England and Scotland, and killed 65 000 people. Bad harvests in India may have contributed to a cholera epidemic, which spread to Asia and Europe producing the great cholera pandemic of the century.

In addition to historical records, proxy records such as those from tree rings allow us to explore the hemispheric temperature record. While global cooling followed the eruption, climate had already begun to cool before 1815. Ice core records from Greenland and Antarctica preserve sulfuric acid layers from volcanic eruptions, and while all records at both poles show a Tambora layer, they also all show a layer from an eruption almost as large in 1808 or 1809, still unidentified. Thus, the climate was probably already cooling from a previous large eruption and several smaller ones also observed between the two large ones. If Tambora had erupted in a warmer climate, the effects would have been less harsh. While this is true in an absolute sense, in a relative sense they would have been larger and more easily attributable to the volcano.

*See also: **Volcanic Eruptions**, Volume 1.*

## REFERENCE

Shelley, M (1818) *Frankenstein*, Bantam Classic edition, Bantam Books, New York, 1–209.