

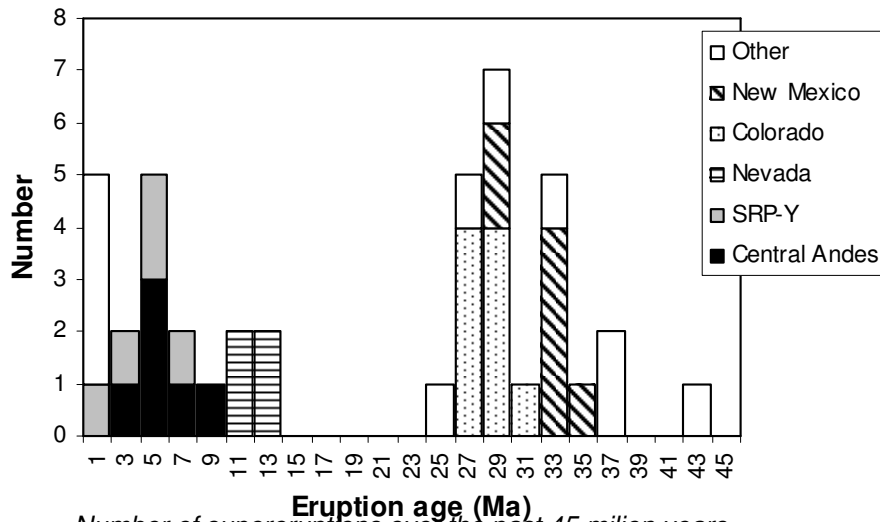
Supereruptions. Dr David Pyle, University of Oxford. www.earth.ox.ac.uk/~davidp

Defined as explosive eruptions involving more than 10^{15} kg of molten rock – or about 1000 cubic kilometres of volcanic ash and pumice. They are rare (1 – 22 events per million years, current best estimate), but damaging events (the last supereruption at Yellowstone covered most of the present-day US with volcanic ash). Two aspects are worth noting: we have a very poor idea of the climatic effects of any particular supereruption of the past; and we don't have a very good understanding of the factors that determine whether a volcano has such large eruptions, or not.

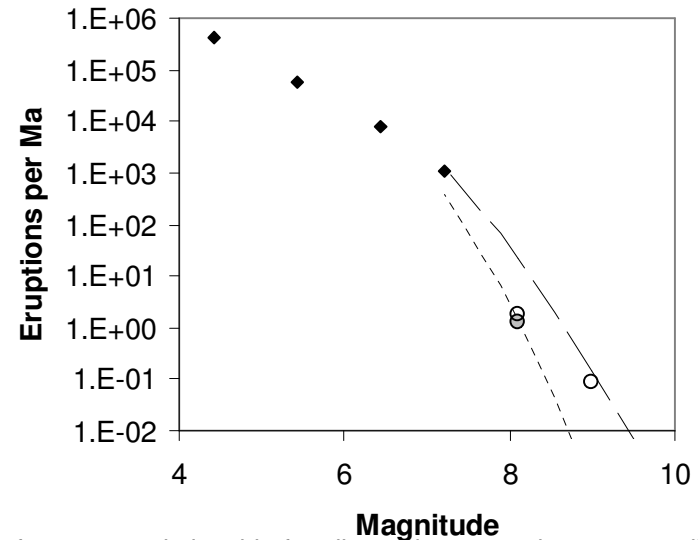
Some 'classic' explosive volcanic eruptions

Event	Equivalent volume of magma erupted, km ³	Peak eruption plume height, kilometres	Peak eruption rate, million kg/s
Toba, ca. 75,000 yrs BP	2800	> 30	?
Tambora, 1815	40 - 80	43	2800
Krakatoa, 1883	12	25	50
Pinatubo, 1991	5	35	400
Vesuvius, AD 79	2.4	32	150
Mt St Helens, 1980	0.5	19	20

Eruption	Magnitude	Area of complete destruction, km ²	Atmospheric effects
Toba	8	> 1000,000	Global
Taupo	7	32,000	S. Hemisphere
Pinatubo	6	>2500	Global
Mt St Helens	5	700	N. Hemisphere, slight
Laki 1793	4	609	N. Hemisphere, severe
Montserrat	4	<100	Regional

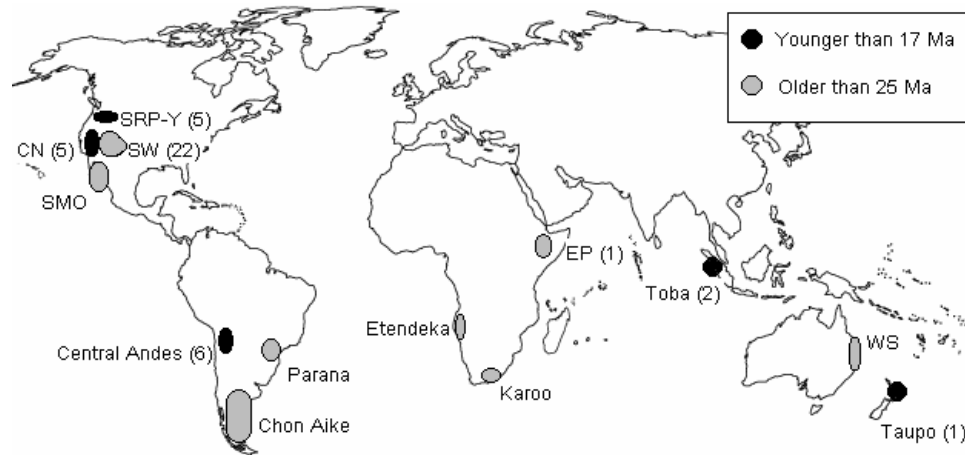


Number of supereruptions over the past 45 million years

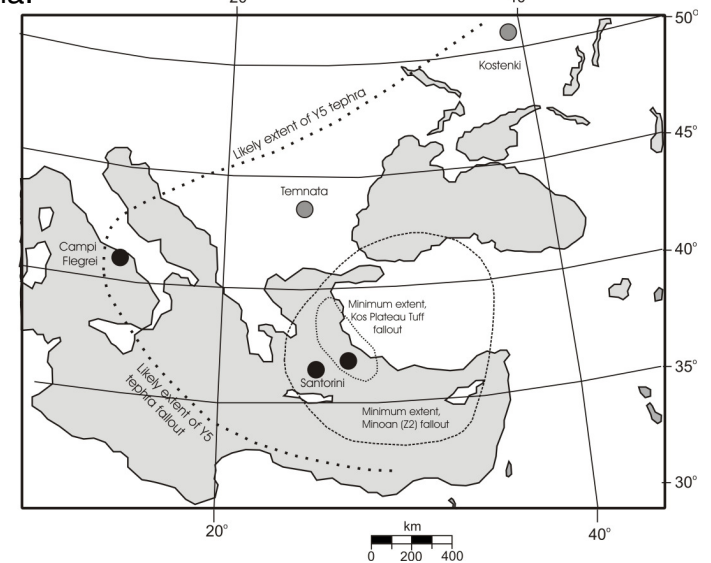


Size – frequency relationship for all eruptions over the past 45 million years

Supereruptions occur mainly in areas where the continents are thick; and they typically recur a few times over the life of a supervolcano. There have not been any eruptions quite this large in Europe, at least in the past 200,000 years – but an eruption about 39,000 years ago left an ash blanket stretching from Italy to Russia.



Locations of supereruptions over the past 40 million years



Dispersal of ash from two major eruptions in Europe in the past 40,000 years

Further reading:

The Geological Society of London – Report on Super-eruptions: global effects and future threats <http://www.geolsoc.org.uk/supereruptions>

H. Sigurdsson, editor, Encyclopedia of Volcanoes, Academic Press, 1999 (no entry for supervolcano, though)

<http://en.wikipedia.org/wiki/Supervolcano> isn't far off the mark, either! Figures from Mason et al., Bull Volcanol, 2004; Pyle et al., Quaternary Science Reviews, 2006.