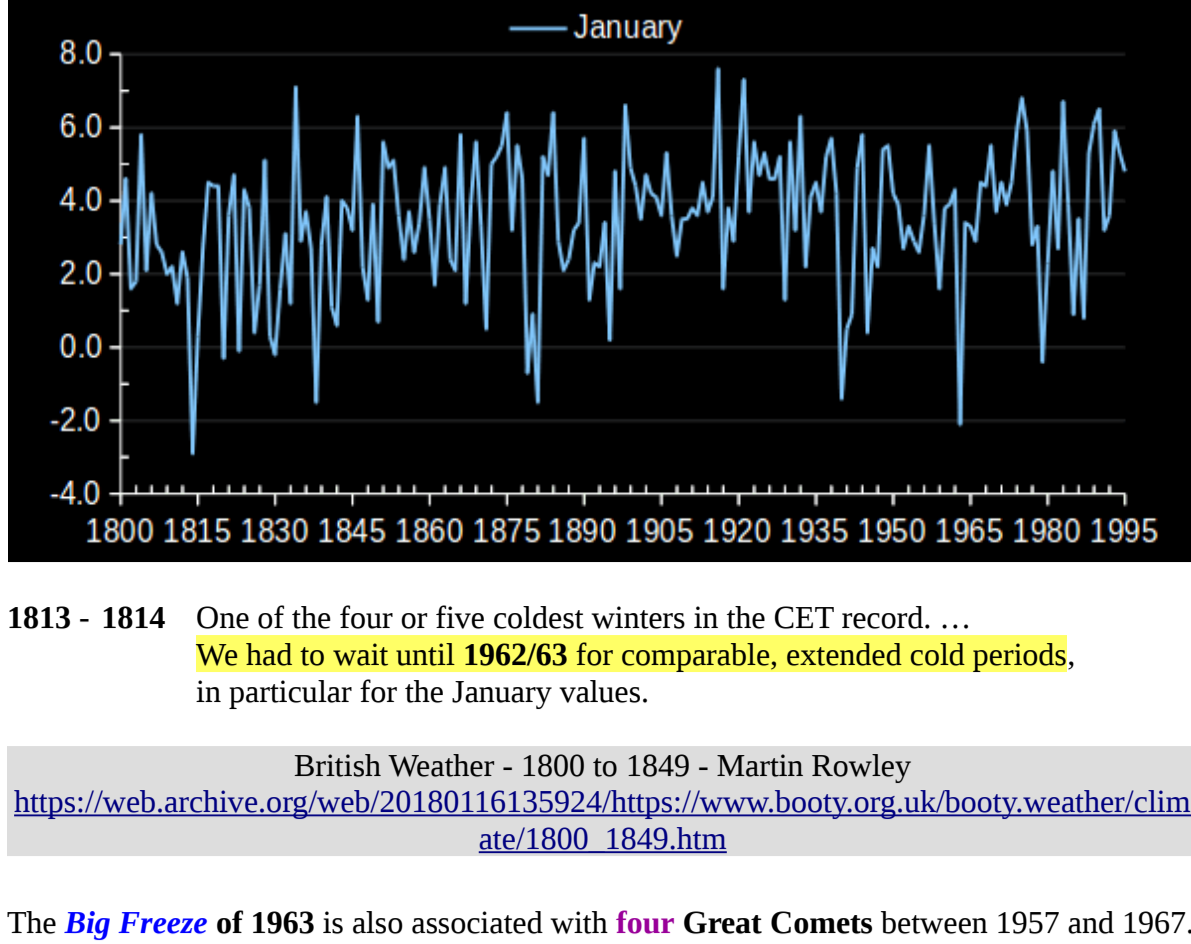




The above analysis of the **1821 Mini Maunder Minimum** provides the basis for identifying similarities with the **Big Freeze** of 1963.



**1813 - 1814** One of the four or five coldest winters in the CET record. ... We had to wait until **1962/63** for comparable, extended cold periods, in particular for the January values.

British Weather - 1800 to 1849 - Martin Rowley  
[https://web.archive.org/web/20180116135924/https://www.booby.org.uk/booby.weather/climate/1800\\_1849.htm](https://web.archive.org/web/20180116135924/https://www.booby.org.uk/booby.weather/climate/1800_1849.htm)

**1<sup>st</sup>** The **Big Freeze** of 1963 is also associated with **four Great Comets** between 1957 and 1967.

Wikipedia - Great Comet  
[https://en.wikipedia.org/wiki/Great\\_comet](https://en.wikipedia.org/wiki/Great_comet)

Perihelion: 8 April 1957 - Perihelion: 0.31604 AU - Inclination: 119.94°

Comet Arend-Roland ... was the third comet to pass through perihelion during 1957 ... Observations of the comet over a period of 520 days allowed precise orbital elements to be computed. However, the distribution of the **orbital elements showed a wavy pattern** that suggested a non-gravitational influence.

... At perihelion, the comet was emitting an estimated  $7.5 \times 10^4$  kg/s (83 tons/s) of dust and was releasing roughly  $1.5 \times 10^{30}$  gas molecules per second. It is believed that an outburst of dust occurred on April 2, six days before perihelion. The antitail was formed from particles released between February 6 and March 1, 1957. Estimates of the total amount of dust released into the zodiacal cloud range from  $3 \times 10^8$  to  $5 \times 10^{10}$  kg.

Wikipedia - Comet Arend-Roland  
[https://en.wikipedia.org/wiki/Comet\\_Arend-Roland](https://en.wikipedia.org/wiki/Comet_Arend-Roland)

Perihelion: 1 August 1957 - Perihelion: 0.355 AU - Inclination: 93.9°

Comet Mrkos ... was a non-periodic comet discovered in 1957 by Antonín Mrkos. ... Observation of the comet revealed the presence of **sodium** and **cyanide** in its spectrum ...

Wikipedia - C/1957 P1 (Mrkos)  
[https://en.wikipedia.org/wiki/C/1957\\_P1\\_\(Mrkos\)](https://en.wikipedia.org/wiki/C/1957_P1_(Mrkos))

Perihelion: 1 April 1962 - Perihelion: 0.031 AU - Inclination: 65.01°

C/1962 C1 (Seki-Lines) ... was a non-periodic comet ... very bright in April 1962 ... At late May the comet remained low as it moved in conjunction with the Sun.

... The **spectrum** of the comet before perihelion was **similar to that of comet Mrkos**, having similar intensity of diatomic carbon and NH<sub>3</sub>. Also present were the [O I] and the sodium D-line, which had spatial asymmetry.

Wikipedia - C/1962 C1 (Seki-Lines)  
[https://en.wikipedia.org/wiki/Comet\\_Seki-Lines](https://en.wikipedia.org/wiki/Comet_Seki-Lines)

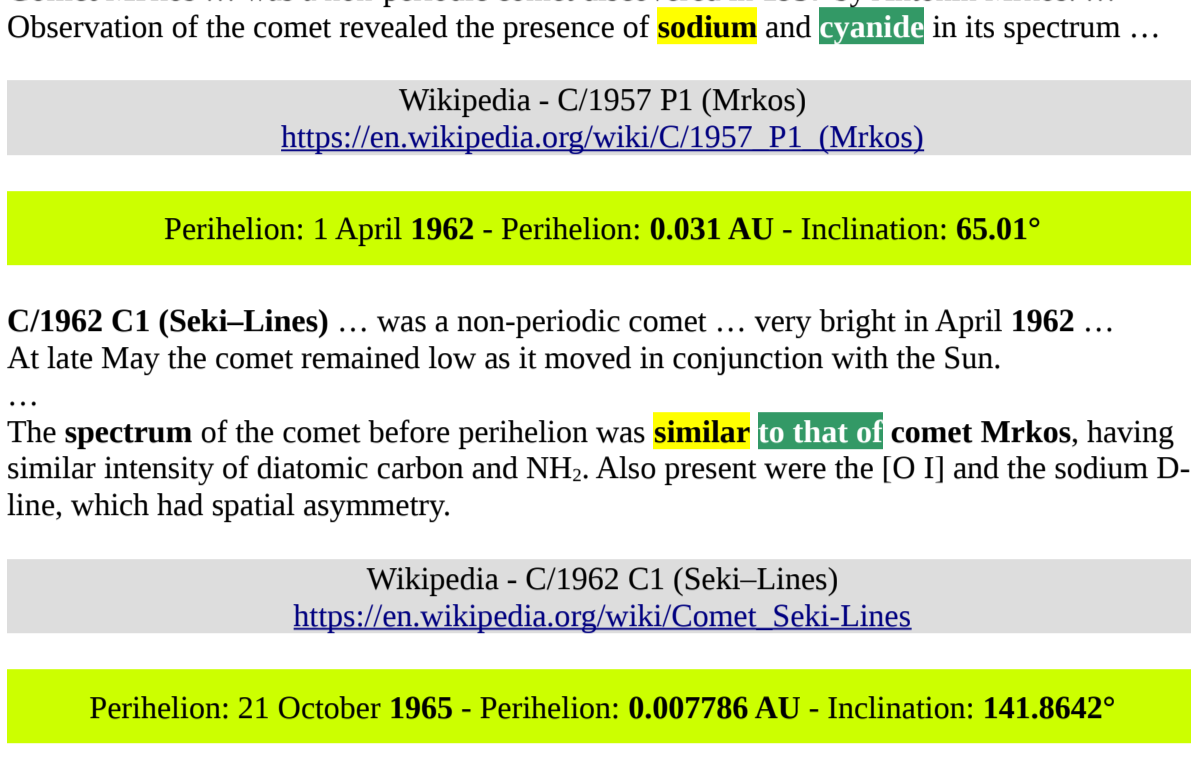
Perihelion: 21 October 1965 - Perihelion: 0.007786 AU - Inclination: 141.8642°

Comet Ikeya-Seki ... was a long-period comet ... 1965 ... The comet was **seen to break into three pieces** just before its perihelion passage. The three pieces continued in almost identical orbits, and the Ikeya-Seki re-appeared in the morning sky in late October, showing a very bright tail. ... Ikeya-Seki continued to brighten as perihelion approached, becoming **comparable in brightness to the full Moon**.

... Observations ... detected emission lines associated with **ionized calcium, chromium, cobalt, copper, iron, manganese, nickel, sodium, vanadium, and cyanide** in Ikeya-Seki's coma.

The properties of the ionized iron and nickel lines suggested Ikeya-Seki reached an effective temperature of around 4800 K around perihelion.

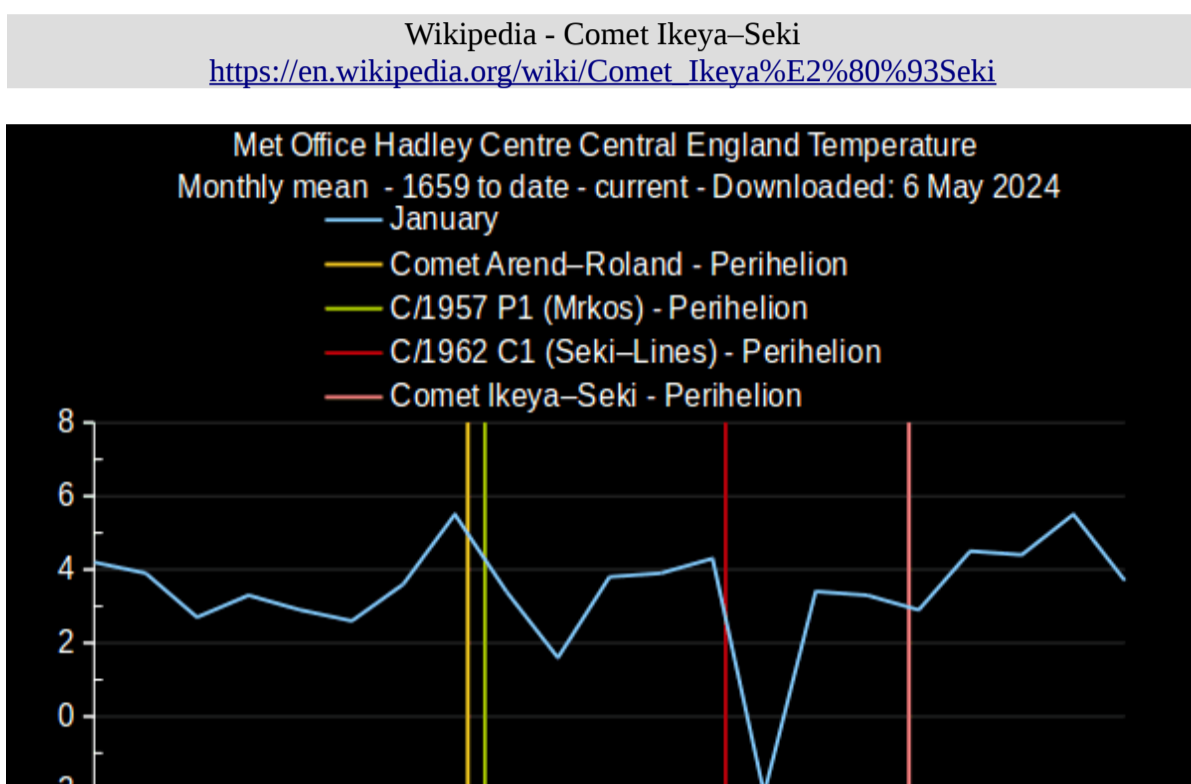
Wikipedia - Comet Ikeya-Seki  
[https://en.wikipedia.org/wiki/Comet\\_Ikeya-Seki](https://en.wikipedia.org/wiki/Comet_Ikeya-Seki)



Central England Temperature dataset  
 Hadley Centre - The Meteorological Office  
<https://www.metoffice.gov.uk/hadobs/hadcet/>

1963 Jan Coldest winter (20<sup>th</sup> Century) in Central England Record.  
 1962 - 63 **Coldest winter of the century.**

British Weather - 1950-1974  
[https://web.archive.org/web/20170510015409/http://booby.org.uk/booby.weather/climate/1950\\_1974.htm](https://web.archive.org/web/20170510015409/http://booby.org.uk/booby.weather/climate/1950_1974.htm)



The last great freeze of the higher Thames was in 1962-63.

Wikipedia - River Thames Frost Fairs - 08:15 30 July 2015  
[https://en.wikipedia.org/w/index.php?title=River\\_Thames\\_frost\\_fairs&oldid=673756933](https://en.wikipedia.org/w/index.php?title=River_Thames_frost_fairs&oldid=673756933)

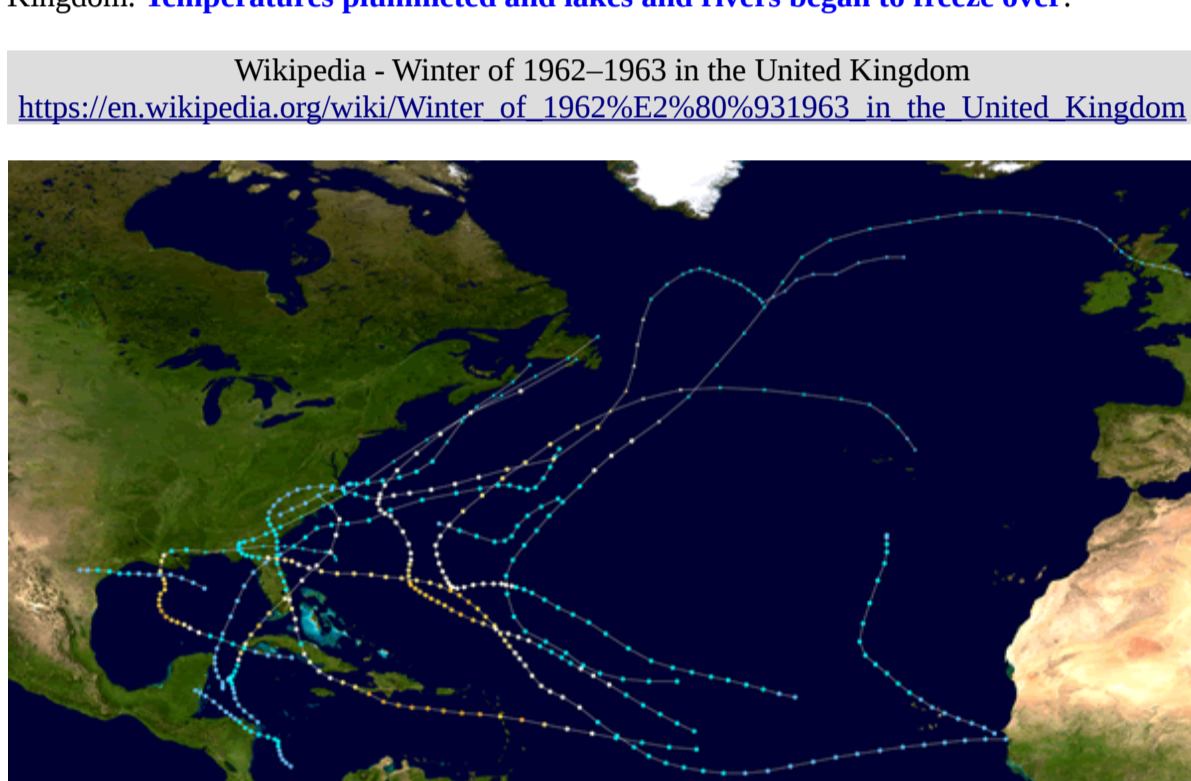
The winter of 1962-1963, known as the **Big Freeze** of 1963, was one of the coldest winters (defined as the months of December, January and February) on record in the United Kingdom. **Temperatures plummeted and lakes and rivers began to freeze over.**

Wikipedia - Winter of 1962-1963 in the United Kingdom  
[https://en.wikipedia.org/wiki/Winter\\_of\\_1962%E2%80%931963\\_in\\_the\\_United\\_Kingdom](https://en.wikipedia.org/wiki/Winter_of_1962%E2%80%931963_in_the_United_Kingdom)



The 1964 Atlantic hurricane season featured the **highest number of U.S.-landfalling hurricanes since 1933.**

Wikipedia - 1964 Atlantic Hurricane Season  
[https://en.wikipedia.org/wiki/1964\\_Atlantic\\_hurricane\\_season](https://en.wikipedia.org/wiki/1964_Atlantic_hurricane_season)



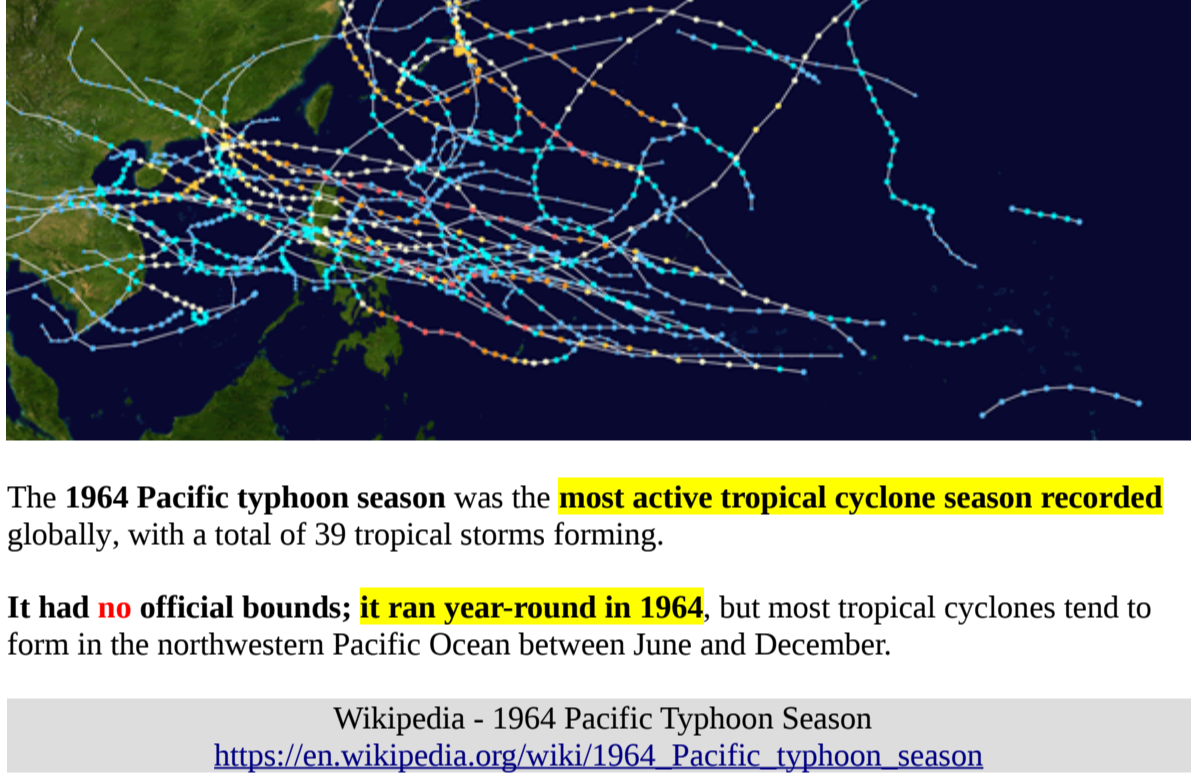
The 1964 Pacific typhoon season was the **most active tropical cyclone season recorded** globally, with a total of 39 tropical storms formed.

It had **no official bounds; it ran year-round in 1964**, but most tropical cyclones tend to form in the northwestern Pacific Ocean between June and December.

Wikipedia - 1964 Pacific Typhoon Season  
[https://en.wikipedia.org/wiki/1964\\_Pacific\\_typhoon\\_season](https://en.wikipedia.org/wiki/1964_Pacific_typhoon_season)

The 1964 Pacific typhoon season was the least active ... since 1953.

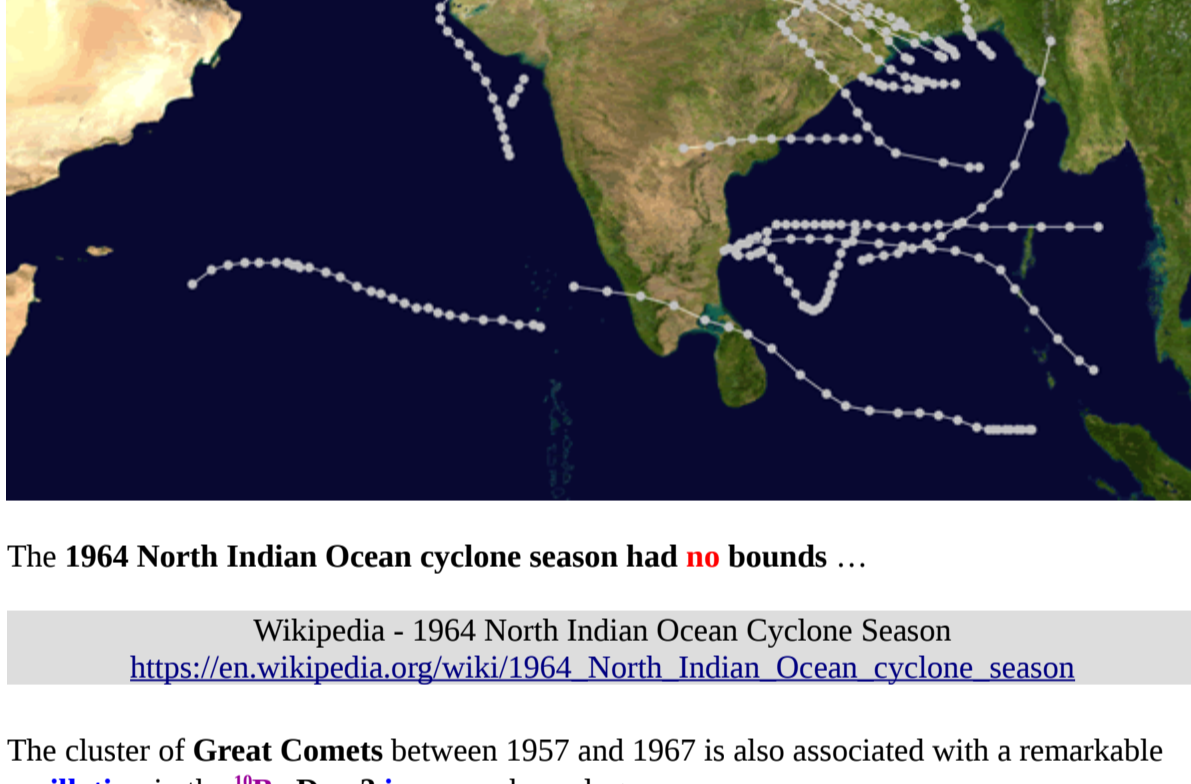
Wikipedia - 1964 Pacific Hurricane Season  
[https://en.wikipedia.org/wiki/1964\\_Pacific\\_hurricane\\_season](https://en.wikipedia.org/wiki/1964_Pacific_hurricane_season)



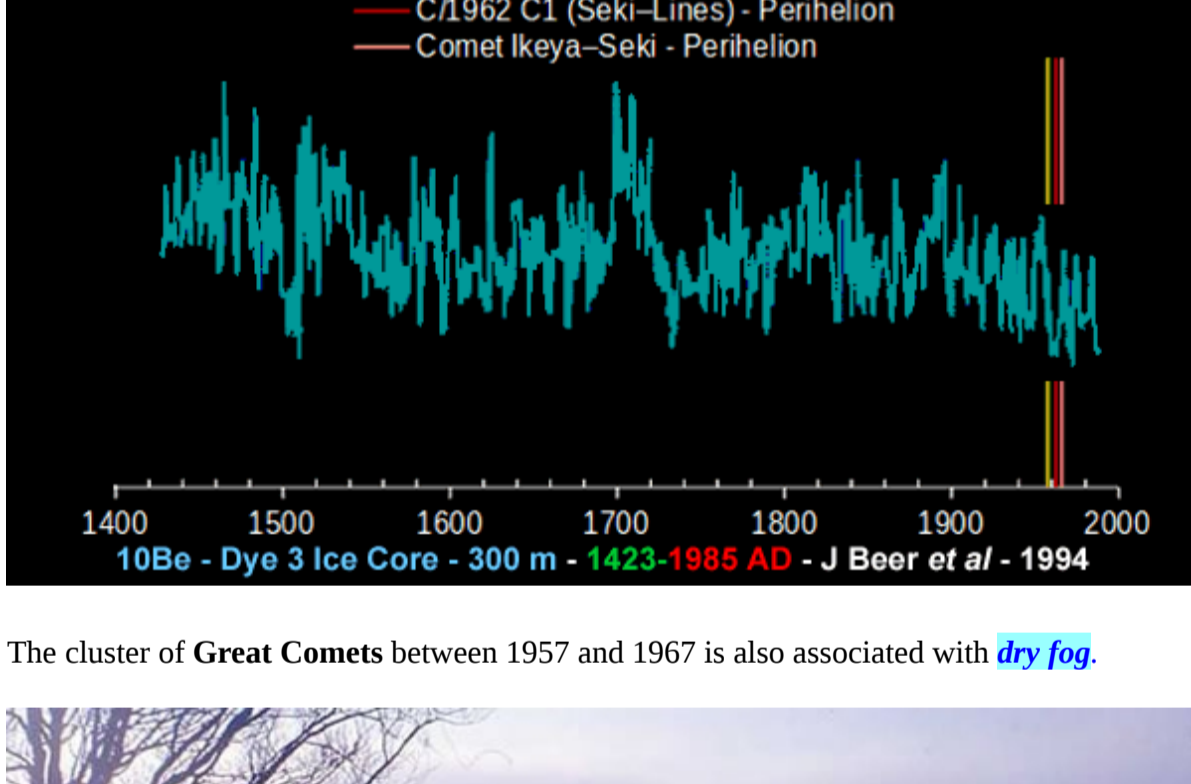
The 1964 North Indian Ocean cyclone season had **no bounds** ...

Wikipedia - 1964 North Indian Ocean Cyclone Season  
[https://en.wikipedia.org/wiki/1964\\_North\\_Indian\\_Ocean\\_cyclone\\_season](https://en.wikipedia.org/wiki/1964_North_Indian_Ocean_cyclone_season)

**2<sup>nd</sup>** The cluster of **Great Comets** between 1957 and 1967 is also associated with a remarkable **oscillation** in the <sup>10</sup>Be Dye-3 ice core chronology.



**3<sup>rd</sup>** The cluster of **Great Comets** between 1957 and 1967 is also associated with **dry fog**.



January 29, **1959**  
**Dense smog** rolled into London, Manchester, and Birmingham at concentrations **worse than the first day of the Great Smog of 1952** ... **winds dissipated the yellow cloud** after three days.

Wikipedia - January 1959  
[https://en.wikipedia.org/wiki/January\\_1959](https://en.wikipedia.org/wiki/January_1959)



The **1962 London smog** was a severe smog episode that affected London ... between 4 and 7 December 1962. Visibility was reduced to a level that **lighted objects could only be seen as far as 50 feet** away, while the smog caused the cancellation of flights at Heathrow Airport as well as the closure of the airport itself. Railway services became severely limited as train drivers could not see signals.

A **strong smell of sulphur** and coal smoke became overwhelming, and pedestrians largely wore scarfs, surgical masks, handkerchiefs, or other makeshift filtering devices across their faces. ... The smog had the effect of causing a continual **metallic taste** in the mouth and irritation of the nose and eyes.

Wikipedia - 1962 London Smog  
[https://en.wikipedia.org/wiki/1962\\_London\\_smog](https://en.wikipedia.org/wiki/1962_London_smog)

**Bituminous coal** has an composition of about 84.4% carbon, 5.4% hydrogen, 6.7% oxygen, 1.7% nitrogen, and **1.8% sulfur**, on a weight basis.

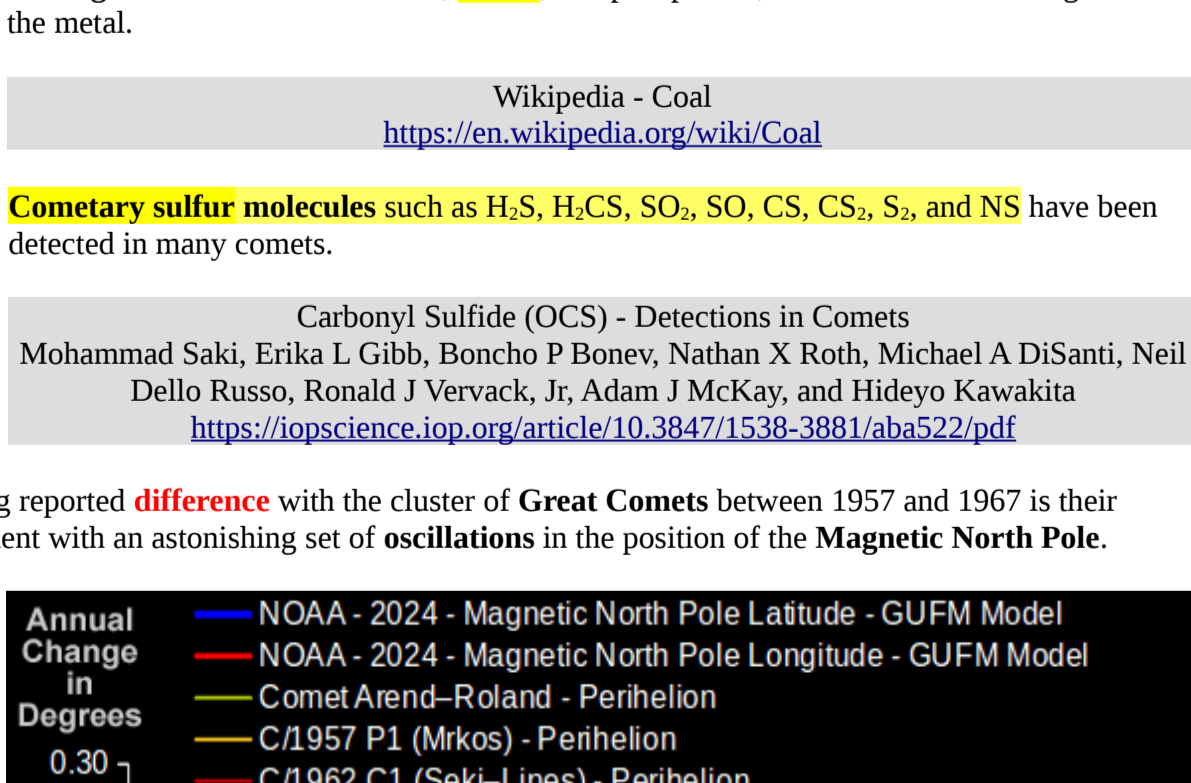
... **Coal** should be **low** in ash, **sulfur**, and phosphorus, so that these do not migrate to the metal.

Wikipedia - Coal  
<https://en.wikipedia.org/wiki/Coal>

**Cometary sulfur molecules** such as H<sub>2</sub>S, H<sub>2</sub>C, SO<sub>2</sub>, SO, CS, CS<sub>2</sub>, S<sub>2</sub>, and NS have been detected in many comets.

Carbonyl Sulfide (OCS) - Detections in Comets  
 Mohammad Saki, Erika L. Gibb, Boncho P. Bonev, Nathan X. Roth, Michael A. DiSanti, Neil Dello Russo, Ronald J. Vervack, Jr., Adam J. McKay, and Hideyo Kawakita  
<https://iopscience.iop.org/article/10.3847/1538-3881/aba522/pdf>

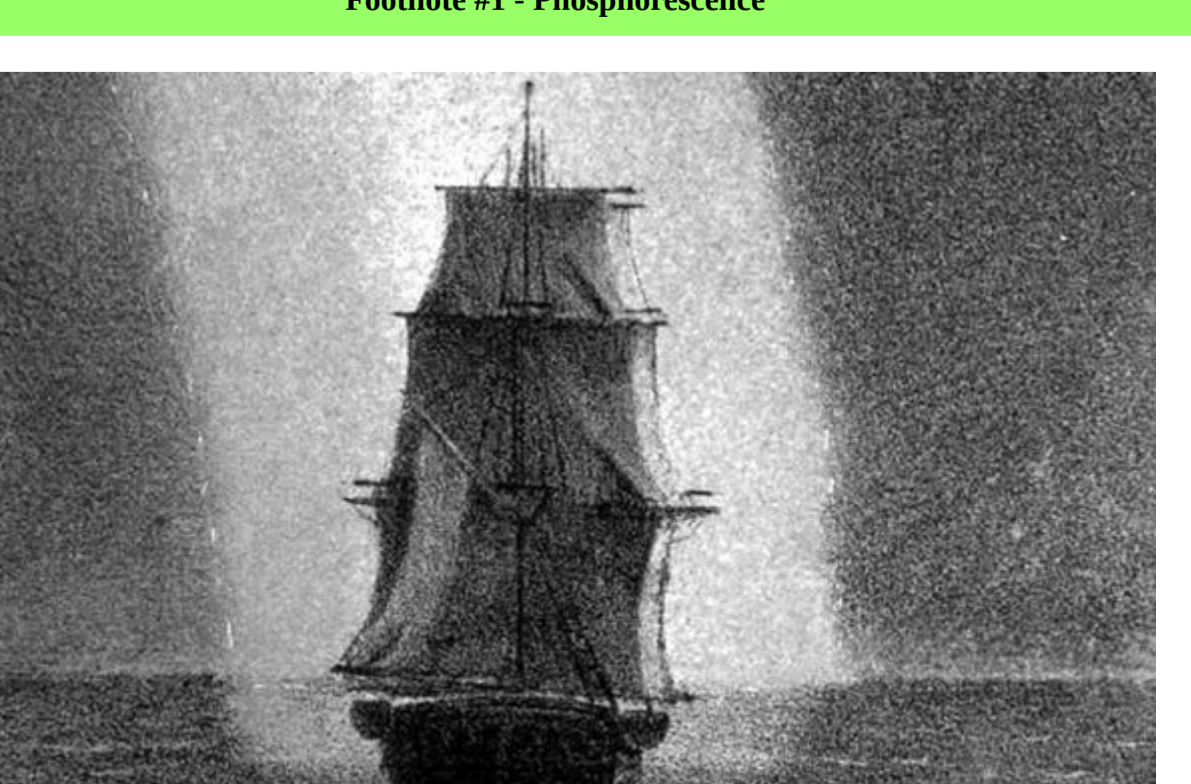
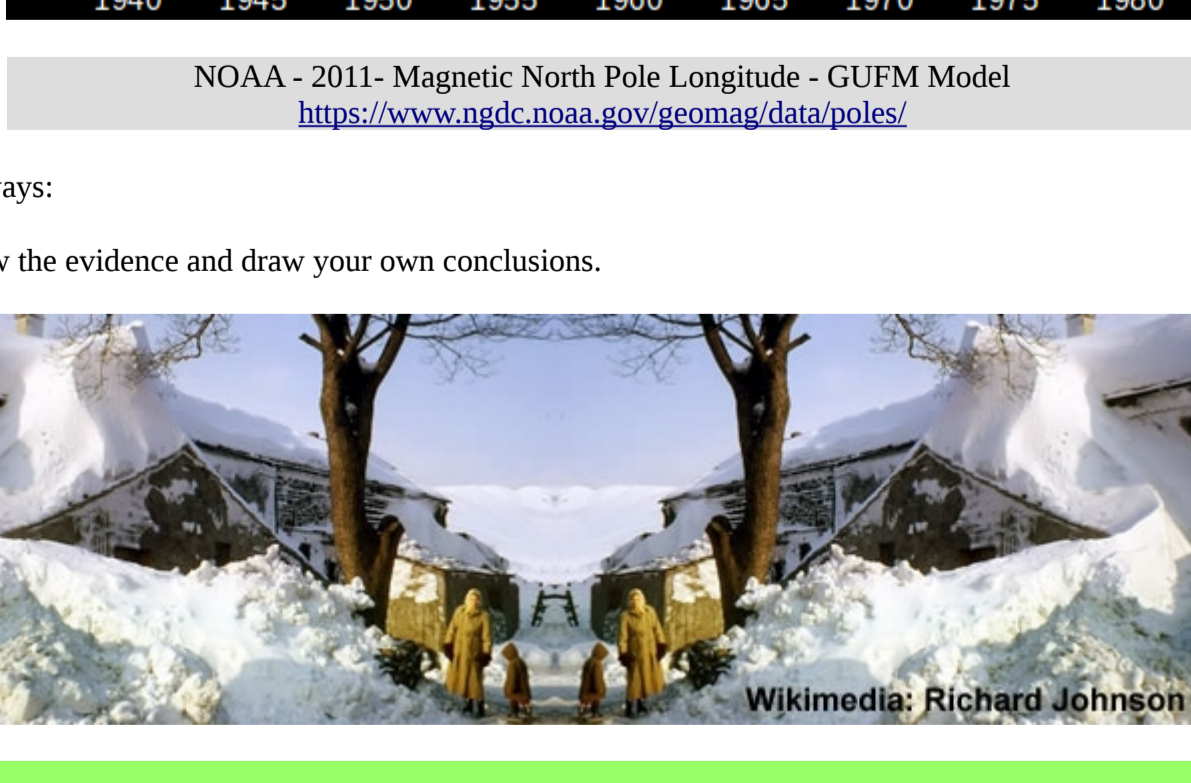
The big reported **difference** with the cluster of **Great Comets** between 1957 and 1967 is their alignment with an astonishing set of **oscillations** in the position of the **Magnetic North Pole**.



NOAA - 2011- Magnetic North Pole Longitude - GUFM Model  
<https://www.ngdc.noaa.gov/geomag/data/poles/>

As always:

Review the evidence and draw your own conclusions.



But one of the most curious phenomena ever witnessed was doubtless that described as having been seen by **General Sabine** and **Captain James Ross** in their first northern expedition [1818].

Being in the **Greenland seas during the period of darkness**, they were called up by the officers on deck to observe an extraordinary appearance. Ahead of the vessel, and lying precisely in her course, appeared a **stationary light resting on the water**, and rising to a considerable elevation.

Every other part of the heavens and the horizon all around the ship were in utter darkness. As there was no known danger in this phenomenon, the course of the vessel was not altered; and when the **ship entered the region of this light** ["an arch, formed partly of an uniform yellowish light, and partly of vertical or nearly vertical streamers" Page 59], the officers and crew looked on with the liveliest interest.

The **whole vessel was illuminated**; the most elevated parts of the masts and sails, and the minutest portions of the rigging, became visible.

The extent of this luminous atmosphere might have been about 450 yards.

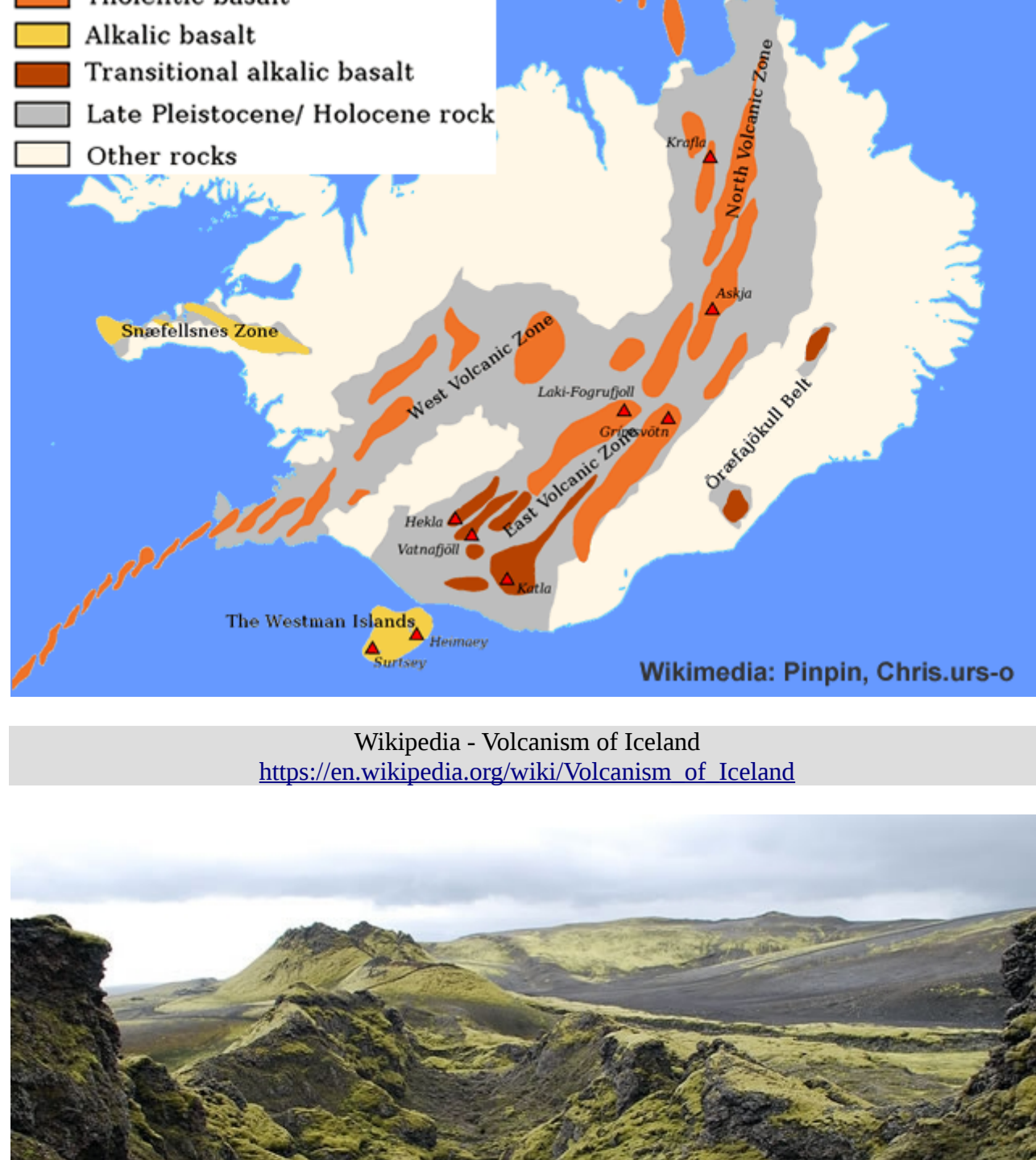
When the bow of the ship emerged from it, it seemed as if the vessel were suddenly plunged in darkness. There was no gradual decrease of illumination. The ship was already at a considerable distance from the luminous region when it appeared still visible as a stationary light astern.

Many persons would look upon this curious phenomenon as an intensely **phosphorescent mist**. ...

Mr. Crosse and other observers have found **fogs** to be **highly electrical**.

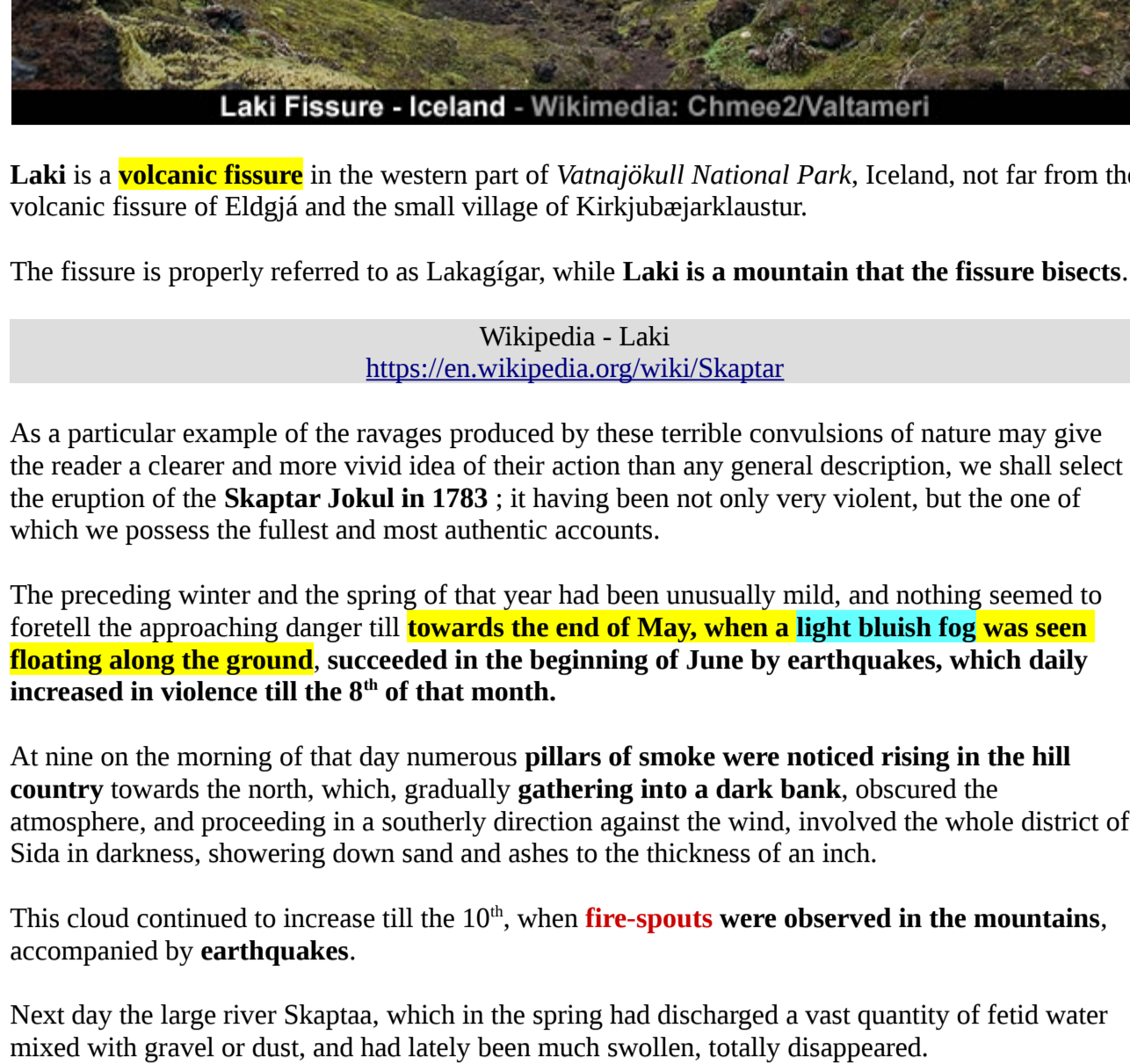
Phosphorescence - Thomas Lamb Phipson - 1862  
<https://archive.org/details/phosphorescence00hiprich/page/57/mode/1up>

## Footnote #2 - Laki aka Skaptar



Wikimedia: Pinpin, Chris.urs-o

Wikipedia - Volcanism of Iceland  
[https://en.wikipedia.org/wiki/Volcanism\\_of\\_Iceland](https://en.wikipedia.org/wiki/Volcanism_of_Iceland)



Laki Fissure - Iceland - Wikimedia: Chmee2/Valtameri

**Laki** is a **volcanic fissure** in the western part of *Vatnajökull National Park*, Iceland, not far from the volcanic fissure of Eldgjá and the small village of Kirkjubæjarklaustur.

The fissure is properly referred to as Lakagígur, while **Laki** is a **mountain that the fissure bisects**.

Wikipedia - Laki  
<https://en.wikipedia.org/wiki/Skaptar>

As a particular example of the ravages produced by these terrible convulsions of nature may give the reader a clearer and more vivid idea of their action than any general description, we shall select the eruption of the **Skaptar Jokul in 1783** ; it having been not only very violent, but the one of which we possess the fullest and most authentic accounts.

The preceding winter and the spring of that year had been unusually mild, and nothing seemed to foretell the approaching danger till **towards the end of May, when a light bluish fog was seen floating along the ground, succeeded in the beginning of June by earthquakes, which daily increased in violence till the 8<sup>th</sup> of that month.**

At nine on the morning of that day numerous **pillars of smoke were noticed rising in the hill country** towards the north, which, gradually **gathering into a dark bank**, obscured the atmosphere, and proceeding in a southerly direction against the wind, involved the whole district of Sida in darkness, showering down sand and ashes to the thickness of an inch.

This cloud continued to increase till the 10<sup>th</sup>, when **fire-spouts were observed in the mountains**, accompanied by **earthquakes**.

Next day the large river Skaptaa, which in the spring had discharged a vast quantity of fetid water mixed with gravel or dust, and had lately been much swollen, totally disappeared.

This incident was fully accounted for on the 12<sup>th</sup>, when a huge current of **lava burst from one side of the volcano and rushed** with a loud crashing noise **down the channel of the river**, which it not only filled, but even overflowed, though in many places from four to six hundred feet deep and two hundred broad.

The **fiery stream**, after leaving the hills, threatened to deluge the low country of Medalland, when a lake that lay in its way intercepted it during several days.

But at length the incessant torrents filled the basin and proceeded in two streams,— one to the east, where its progress was for a short time interrupted by the Skalarfiall, up which, however, the accumulating flood soon forced its way, rolling the mossy covering of the mountain before it like a large piece of cloth.

The other current directed its progress towards the south through the district of Medalland, passing over some old tracts of lava, which again began to burn, whilst the air in its cavities escaped with a strange whistling noise, or, suddenly expanding, threw up immense masses into the air to the height of more than 120 feet.

The waters of the rivers, swollen by the melting of the jokuls in the interior, and intercepted in their course by the glowing lava, were thrown into a state of violent ebullition, and destroyed many spots spared by the fire.

In this district the liquid matter continued to flow till the 20<sup>th</sup> of July, following principally the course of the Skaptaa, where it poured over the lofty cataract of Stapafoss, filling up the enormous cavity the waters had been hollowing out for ages.

During the whole of this eruption **the atmosphere was filled with mephitic vapours or darkened with clouds of ashes**, by which **the sun** was either concealed from the miserable inhabitants, or **appeared like a blood red globe**, adding to their terror and consternation.

The molten elements had so long confined their fury to the Skaptaa that the inhabitants of the eastern district on the Hverfisfliot, though much incommoded by the showers of ashes, hoped to escape its more immediate visitations.

But on the 28<sup>th</sup> of June a **cloud of sand and smoke caused so thick a darkness** that in the houses at noon a sheet of white paper held opposite the window could not be distinguished from the black walls, whilst **redhot stones and dust burned up the pastures, poisoned the waters, and threatened to set fire to the dwellings**.

On the 3<sup>rd</sup> of August a thick vapour rising from the Hverfisfliot, the entire disappearance of its waters, and a foaming fire-stream which on the 9<sup>th</sup> rushed with indescribable fury down its bed, overflowing the country in one night to the extent of more than four miles, converted the fearful anticipations of the natives into dreadful realities.

The eruptions of sand, ashes, pumice, and lava, continued till the end of August, when the volcano appeared completely exhausted ; **but flames were still seen in February 1784, and thick clouds of smoke** even in July of that year.

**The whole catastrophe closed in August with an earthquake of such extreme violence** that men were thrown to the ground.

The immediate source whence this enormous mass of water issued is entirely unknown, being situated in that great central desert of sand and snow which none of the natives have ever penetrated; and no traditions of any former occurrence of this kind have been preserved.

Some persons who went up into the mountains during the continuance of the eruption were, in consequence of the thick smoke, compelled to return, and some subsequent attempts met with no better success.

It is not even known whether the current that flowed down the Skaptaa and that in the Hverfisfliot proceeded from the same crater.

It is, however, probable their sources were different though closely connected.

The extent of the lava can only be accurately known in the inhabited districts.

The stream that flowed down the Skaptaa is calculated at about fifty miles in length by twelve or fifteen at its greatest breadth, — that in the Hverfisfliot at forty miles in length by seven in breadth.

In the narrow channel of the Skaptaa it rose to 500 or 600 feet, but in the plains its extreme height does not exceed 100, and in many places is only eight or ten feet.

From its immense thickness, it was a long time in cooling, being so hot in July 1784, twelve months after the eruption, that Mr Stephensen could not cross it, and even then sending up a thick smoke or steam.

In the year 1794 it still retained an elevated temperature, emitting vapours from various places, and many of its crevices being filled with warm water.

This long retention of heat will appear more extraordinary when we consider the numerous globular cavities and fissures it contained permitting a free circulation of the water and atmosphere.\*

\* The mass of matter ejected on this occasion must have been enormous, and gives no countenance to the opinion that the igneous agents operating on the earth are diminishing in intensity.

Assuming the average breadth of the first current as six miles, and of the second as three, both probably below the truth, the one would cover 300 square miles, the other 120, or 420 in all. With an average depth of fifteen yards, the combined mass would contain 420 X 3097600 x 16 = 19,514,880,000 cubic yards, or nearly twenty thousand millions.

But this comprises only that portion which flowed into the inhabited districts, whilst it is likely that an equal or greater quantity remained heaped up around the crater, or flowed off into the unknown regions of the interior.

To this must also be added the **pumice, sand, and ashes scattered** not only over the whole island, but **to a distance of 300 miles round**, in such abundance as to destroy the fisheries in the neighbouring sea.

With these additions it would amount we may believe to fifty or sixty thousand millions of cubic yards, exceeding the solid contents of Hekla, which, if six miles in diameter at the base and 1700 yards high, would contain nearly fifty thousand millions (49,537,270,000) of cubic yards. This is probably larger than any individual mass of the older igneous rocks known to exist.

The destructive effects of this volcano were not confined to its immediate vicinity, vast quantities of sand and ashes being scattered over the remoter parts of the country, and some were conveyed to the Faroe Islands, a distance of nearly 300 miles.†

† This also happened during the eruption of Hekla in 1693.

The noxious vapours that for many months infected the air were equally pernicious to man and beast, and covered the whole island with a dense fog which obscured the sun, and was perceptible even in England and Holland.

The steam rising from the crater, or exhaled from the boiling watery was condensed in the cooler regions of the atmosphere, and descended in floods, that deluged the fields and consolidated the ashes into a thick black crust.

A fall of snow in the middle of June, and frequent showers of hailstones of unusual magnitude, accompanied with **tremendous thunder-storms tearing up huge fragments of rock** and rolling them down into the plains, completed the scene of desolation.

The grass and other plants withered, and became so brittle that the weight of a man's foot reduced them to powder ; and even **where the pastures seemed to have recovered, the cattle refused to touch them, dying of actual starvation in the midst of the most luxuriant herbage.**

Small unknown insects covered many of the fields, whilst other portions of the soil formerly the most fertile were changed by the ashes into marshy wastes overgrown with moss and equisetæ.

A **disease resembling scurvy** in its most malignant type **attacked both men and cattle**, occasioned in the former no doubt by the want of food, and the miserable, often disgusting, nature of that which alone they could obtain.

Many lived on the bodies of those animals which had perished from hunger or disease, whilst others had recourse to boiled skins, or substances still more nauseous and unwholesome.

The numerous earthquakes, with the ashes and other matter thrown into the sea, caused the fish to desert many parts of the coast, whilst the fishermen seldom daring to leave the land, enveloped in thick clouds during most of the summer, were thus deprived of their usual stock of winter provisions.

We cannot better conclude this frightful catalogue of evils than by the following summary of the numbers of men and cattle more or less immediately destroyed by it in two years.

The most moderate calculation makes these amount to 1300 human beings, 19,488 horses, 6801 homed cattle, and 129,937 sheep.\*

\* Stephensen says 9336 men, 28,000 horses, 11,461 cattle, and 190,488 sheep, but his numbers are thought exaggerated. The description in the text is chiefly abridged from this gentleman's "Account of the Eruption" published at Copenhagen in 1785, which will be found translated in Hooker's Journal, vol. ii. p. 124-261. Comp. Henderson, vol. i. p. 272-290; Gliemann, p. 107-109.

**The violent earthquakes in Sicily and Calabria were almost synchronous in commencement and duration with this eruption. The first shock was felt on the 5th February 1783, and they continued till the following May.**

An Historical and Descriptive Account of Iceland, Greenland and the Faroe Islands  
 Nicol James - 1841

<https://archive.org/details/anhistoricaland00nicgoog/page/n43/mode/1up>



Laki Fissure - Wikimedia: Areuland

**James Nicol** FRSE FGS (1810-1879) was a Scottish geologist.

...

In 1847 Nicol was appointed assistant secretary to the Geological Society of London, being appointed a Fellow of the Society in the same year. He was also elected a Fellow of the Royal Society of Edinburgh his proposer being George Wilson.

In 1849 professor of geology in Queen's College, Cork, and in 1853 professor of natural history in the University of Aberdeen, a post which he retained until a few months before he died.

Wikipedia - James Nicol (geologist)  
[https://en.wikipedia.org/wiki/James\\_Nicol\\_\(geologist\)](https://en.wikipedia.org/wiki/James_Nicol_(geologist))