



Oldest 'earthquake' in South Africa (Robben Island, 07 April 1620) discredited

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The oldest recorded earthquake in South Africa is widely accepted (in several seismic catalogues) to have occurred on 07 April 1620. This earthquake was regarded as having a Modified Mercalli Scale intensity of II-IV, corresponding to a Richter Scale Magnitude of ~4. An examination of the original sources on which the record of this earthquake rests, reveals that it was based on a description of 'two startling thunderclaps like cannon shots while ship was becalmed near Robben Island' by Augustin de Beaulieu, who was the head of a fleet of three ships which put in Table Bay in March–April 1620. A full excerpt of Beaulieu's account reveals that the thunderclaps took place in a short period of calm during an extended period of stormy weather, and that the observations were made on board ship, so that no seismic ground vibration was felt. The Western Cape has a much lower incidence of lightning than the interior of South Africa, and the fact that the thunderclaps were not accompanied by lightning is not unusual. Thus the simplest explanation of the thunderclaps is that they were the result of atmospheric phenomena, and not a result of seismic activity, as interpreted by J.N. Theron in 1974. The events of 07 April 1620 should thus be removed from the catalogues of historical seismicity in South Africa, making the slight shock felt in Cape Town in 1690, with a Modified Mercalli Scale intensity of III, the oldest recorded seismic tremor in the history of South Africa.

Introduction

In several catalogues of historical seismicity in South Africa,^{1,2,3} the oldest recorded earthquake in South Africa is considered to have occurred in 1620, on 07 April. This event was originally attributed to a seismic origin by Theron¹ (1974), based on information from Edward Strangman⁴ (1936). Theron¹ summarised the observations related to this supposed earthquake as: 'Two startling thunderclaps like cannon shots while ship was becalmed near Robben Island for several days'. He implicitly attributed the thunderclaps to a seismic origin, because the events occurred while the ship was 'becalmed' for several days. The underlying assumption behind this attribution, although not explicitly stated, was that thunderclaps do not occur in calm weather, only during a storm; in the absence of other ships which could have set off cannons, the only other agency that could have produced these sounds was an earthquake. Having deduced a seismic origin for the phenomena, Theron¹ then assigned them to an intensity of III-IV on the Modified Mercalli Scale,⁵ which corresponds to a Richter Scale Magnitude of ~4. In the Modified Mercalli Scale, an intensity of III is described as 'Slight, like the vibrations due to a passing lorry; felt by people at rest, especially on upper floors', while an intensity of IV is described as 'Moderate: felt by people while walking; rocking of loose objects, including standing vehicles'⁵. Subsequent catalogues of southern African seismicity have uncritically reproduced Theron's¹ observations and calculations, and the event of 07 April 1620 has become entrenched as the oldest recorded seismic event in South African history.^{2,3}

Augustin de Beaulieu's account

The information concerning the 'earthquake' of 07 April 1620 was obtained from Strangman⁴ (1936), who in turn gave a translated excerpt from the work of Augustin de Beaulieu⁶ (1666), published by Melchisedech Thévenot 29 years after Beaulieu's death. Augustin de Beaulieu (1589–1637) was a French general, who, at the behest of merchants from Paris and his native Rouen, was placed in command, from 1619 to 1622, of a fleet of three ships – the *Montmorency*, the *Espérance* and the *Hermitage* – which sailed to the East Indies.^{4,7,8} This fleet, known as the 'Fleet of Montmorency' put into Table Bay on 15 March 1620 and left a month later on 14 April^{6,9} (Figure 1). Beaulieu had the following to say about his stay at the Cape, and about the events of 07 April 1620^{4,6,9}:

A tempest from the South South-East, which lasted until the 3rd of April [1620], prevented me from weighing anchor. On that day, however, at 10 o'clock in the morning, the wind having moderated and coming from the South-East, we set sail. But we had not made two leagues towards the open water

of the Bay before we found ourselves becalmed in a heavy sea from the South, with a tide running North, which threatened to drive us on to the island. We were therefore constrained to anchor about a league from this island, which lay from us North one quarter North-East. We were in twenty fathom water, with bottom of muddy sand, but the swell from the South made us roll prodigiously, and everything in the ship creaked and cracked.

During the calm, I went to inspect the island. [...] When I wanted to return on board a violent storm from the South-East suddenly broke upon us. It came over the Bay from the land and swept so furiously between the mainland and the island that we - ourselves and one of the boats of the Vice-Admiral which had also been ashore - were forced to seek shelter on the island, where we passed a very bad night. There was scarcely any wood, not enough to enable us to dry our clothes, which had become thoroughly soaked in our attempt to force our way back to the ship through the storm. The next day, however, at dawn, we went aboard, where I was told that they had had no wind at all, only complete calm, a circumstance which had troubled them greatly, as they could not conceive why we had remained all night on the island.

Tuesday, the 7th April, found us at the same anchorage, for lack of wind, though the rolling was still exceeding great. At break of day there was a startling thunder-clap, followed immediately by another, which burst as though they had been cannon-shots, without any rumbling in the air as is usual with thunder. We feared a storm was coming, but the calm continued to the next day, when, about 2 o'clock in the afternoon, there came a gentle breeze from the West, which made me resolve to re-enter the Bay. Drizzling mists, however, so thick that we could scarcely see from one end of the ship to the other, overtook us, and I had to give orders for the drum to be beaten and the trumpets to be sounded, so that the other ships might be guided by the noise of these instruments. Groping our way with the sounding-line, we returned to our former anchorage, having previously noted that the head of the Bay lay South-East of us.



Source: Wikimedia Commons

FIGURE 1: Not a good platform for making seismic observations from – Augustin de Beaulieu's 'Fleet of Montmorency', which put into Table Bay in 1620. From an anonymous 17th-century French engraving.

Discussion and conclusions

It is clear from the above account that no seismic shock was actually felt. The observers were located on a ship, and merely heard two loud thunderclaps, during a lull in an extended period of stormy weather. Lightning strikes are much less common in the Western Cape than in the interior of the country (the coastal Western Cape has 0.1 to 1 strikes per km², compared to >10 strikes per km² in Gauteng, southern Mpumalanga and north-western KwaZulu-Natal).^{10,11} In the period from 30 March to 14 April 2011, the Western Cape had between 0 and 2000 lightning strikes per day, compared to the South African national average of between 75 and 153 000 lightning strikes per day.¹¹ So the crew of Beaulieu's ships may have been startled by the sound of the thunderclap, without having seen lightning, or heard the normal rumbling in the air associated with thunder. But this is not unusual, and cannot be used to argue for a seismic origin. The tenuousness of the claim for a seismic origin¹ is further exacerbated by the fact that the observations of the two thunderclaps were made on board ship in twenty fathoms of water, and not on terra firma, and hence no ground vibration was felt.

Although there are techniques to compress and speed up instrumentally recorded seismic signals to make them audible,¹² modern seismic instruments do not capture sounds in the audible range, and most accounts of earthquake sounds are anecdotal. Historical records of past earthquakes in the Cape Town area indicate that these earthquakes were accompanied by sounds like distant thunder, but very much louder, and by low subterranean rumblings.^{13,14} It should be borne in mind that in the original description by Beaulieu,^{4,6} the sounds were recorded as two 'thunderclaps' in a matter-of-fact way, with no indication that there was anything mysterious or unusual about them, and the author should be taken at his word. Thus the most reasonable and uncomplicated explanation, in accordance with the principle of Occam's razor, is that the thunderclaps were merely atmospheric phenomena, and not seismic ones.

Aside from lightning-induced thunderclaps, there are other possible, although less likely, explanations for the atmospheric sounds that were heard by Beaulieu's crew on 07 April 1620. These possibilities include sounds generated by rainfall-induced landslides, and widely reported phenomena called 'skyquakes'. Gunshot-like sounds were heard during the initiation of flood-induced landslides at Chilinda in the Nyika Plateau of Malawi on 23 April 1960, and during the December 1991 landslide at Punta Delgada, Madeira.¹⁵ 'Skyquakes' is the name given to the increasingly commonly reported phenomenon of mysterious booming sounds that are recorded in the atmosphere from many localities around the world; the commonest explanation for these is that they represent sonic booms generated by meteorites or fireballs entering or exploding in the atmosphere.^{16,17}

The discreditation of the events recorded on 07 April 1620 as being the result of an 'earthquake' means that the slight shock felt in Cape Town in 1690, with a Modified Mercalli Scale intensity of III,^{1,3} is now the oldest recorded seismic



tremor in the history of South Africa. The field of historical seismology relies on historical records of earthquakes and their effects in order to assess seismic hazards in particular regions.¹⁸ The historical record of South African earthquakes has been shortened by 70 years, which is unfortunate, but in the process a false report of a seismic phenomenon has been removed from the history of the seismicity of the region around Cape Town, which is one of the hotspots for natural seismicity in southern Africa.^{2,3,14}

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Competing interests

I declare that I have no financial or personal relationships which may have inappropriately influenced me in writing this paper.

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