



## Letter to the editor

## Comment on “Thermoluminescence and optically stimulated luminescence signals from volcanic ash: History of volcanism in Barren Island, Andaman Sea” by D. Banerjee (Quaternary Geochronology)

## A B S T R A C T

**Keywords:**  
Barren Island  
Thermoluminescence  
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Pyroclastics  
Ash

Banerjee, D. [2009. Thermoluminescence and optically stimulated luminescence signals from volcanic ash: History of volcanism in Barren Island, Andaman Sea, *Quaternary Geochronology*, doi:10.1016/j.quageo.2009.01.011] aimed at determining the history of volcanism and evolution of Barren Island by dating a single ash sample using thermoluminescence and optically stimulated luminescence signals. An attempt to date the volcanic episodes and decipher the history of the volcano with just one sample, the stratigraphic position of which is not known (or at least specified in the paper), does not make any sense, at least in the context of history of volcanism on Barren Island. The title of the paper is a misnomer, as it does not in fact address the reconstruction of the history of volcanism on the Barren Island, but discusses the methods and problem of age underestimation using this technique instead.

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### 1. Introduction

There are no radiometric or other chronological data available for the Barren Island volcanic rocks so far. This data is needed for the prehistoric rocks (that form the caldera wall, described later). However, the age of these rocks can be conveniently bracketed between Late Pleistocene and Holocene, considering its disposition in the Andaman–Sumatra–Java region and based on the available regional geochronological data (e.g., Gasparon, 2005). Hence there is no doubt that these rocks are of Quaternary age. Though Banerjee (2009) aimed at determining the history of volcanism and evolution of Barren Island using Thermoluminescence and Optically Stimulated Luminescence (hereafter, TL & OSL) method on the pyroclastics and ash bed samples from stratigraphic sections, which are not identified in the paper, but failed to do so.

### 2. About the sample

Banerjee (2009) has not given the proper description of the sample, except for the geographical coordinates, viz., its position in the stratigraphic sequence, which is very important in delineating the volcanological history. Since these authors (Alam and Chandrasekharam) camped on this uninhabited volcanic island for field investigations and did extensive work on the Barren Island volcano, they presume that the sample chosen by Banerjee (2009) is located in a site somewhere in the caldera wall; which is the remnant of the primitive volcanic cone, the collapse of which has given rise to the caldera. All the historical and recent

eruptions are confined to the caldera depression, within and around an active polygenetic cinder cone. This sequence has been conveniently termed as Prehistoric (e.g., Alam et al., 2004; Luhr and Haldar, 2006; Shanker et al., 2001), for being formed prior to the historical eruptions, in the absence of proper age data. However, a more appropriate term ‘Pre-Caldera formations’ has been used by Chandrasekharam et al. (2009), as they represent the eruptions before the formation of the caldera. This sequence contains several lava flows separated by pyroclastic beds (Alam et al., 2004), with at least six lava flows recognized along the northern part of the caldera wall (Chandrasekharam et al., 2009). These pyroclastic beds are traversed by normal faults (Fig. 6 in Chandrasekharam et al., 2009). These lava flows and intermittent pyroclastic beds belong to different eruptive cycles, the absolute ages of which are not known. So, an attempt to date the volcanic episodes and decipher the history of the volcano with just one sample, the stratigraphic position of which is not known (or at least specified in the paper), does not make any sense, at least in the context of history of volcanism on Barren Island. In this context, the title of the paper is a misnomer, as it does not address to the reconstruction of the history of volcanism on the Barren Island. It should not have been given this title just because the sample belong to ‘somewhere’ in the stratigraphic sequence of Barren Island volcanics. It would have been more appropriate not to use the later part of the title, i.e. ‘History of volcanism in Barren Island, Andaman Sea’; and if at all it had to be used, then something like ‘An attempt to delineate the history of volcanism in Barren Island, Andaman Sea’ would have been used instead.

### 3. About the methodology

Banerjee (2009) has discussed the TL & OSL dating technique in most part of the paper, which has already been described by various workers (see the references in Banerjee, 2009) and have been used for dating of fine volcanic glass (Berger and Huntley, 1983; Berger, 1992). However, the exercise to date the sole Barren Island sample fails for the reasons not mentioned by the author or accounted in the limitations of this technique by Krbetschek et al. (1997) and needs to be investigated. It is apparent from the observations about feldspar phases (Spooner, 1994) that in order to make this technique work for dating the Barren Island volcanics, the author should focus on ways to eliminate the problem of underestimation of the age, because all the Barren Island volcanics are rich in plagioclase irrespective of their age, so will inherit this problem.

### 4. Concluding remarks

Considering this problem/limitation, the best method can be C-14 technique on charcoal samples for dating the historical eruptions and U–Th disequilibrium technique for dating the prehistoric lava flows and pyroclastics. However, we do recommend and suggest the author to continue working on refining the TL & OSL method to use it for dating the Barren Island volcanics, eliminating or at least minimizing the chances of underestimation, with more samples systematically selected from well defined horizons in the stratigraphic sequence.

*Editorial handling by:* R. Grün

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