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The Changbaishan Millennium eruption tephra recorded in the Yueliangwan peatland, northeast China

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Changbaishan Tianchi volcano is one of the most famous active volcanoes in Northeast Asia. Its Millennium eruption (ME, 946-947 CE) is considered to be one of the largest explosive eruptions over the past 2000 years, which had produced widely distributed tephra layer across Northeast Asia. However, little attention has been paid to the tephra buried in peatlands around this volcano. Here we present petrographic, geochemical and AMS¹⁴C data of the volcanic glasses within a new discovered macro-tephra layer buried in the Yueliangwan peatland, northeast China. The results suggest that buried tephra was the product of Changbaishan Millennium eruption. The eruptive sequence of the ME included comendite eruption and trachyte eruption from bottom to top. Tectonic background analyses reveal that Changbaishan Tianchi volcano fields belong to the anorogenic within plate back-arc extensional tectonic environments. Eruptive and sedimentary processes of the buried tephra were postulated as follows: a large amount of volcanic glasses formed through the eruption of trachyte magma that had high contents of rare earth elements (REE) and trace elements (TE). Then, fine grained volcanic glasses were sprayed into the atmosphere and transported to the Yueliangwan areas. The volcanic glasses deposited and formed airborne pumice layer. This buried tephra layer would act as a key isochronous marker horizon for the chronological framework in a range of sedimentary contexts across Northeast Asia. And it provides accurate eruptive sequence of Changbaishan Millennium eruption. This study would attract more attentions on the buried tephra in peatlands around active volcanoes, which would be of significance for the reconstructions of volcanic eruption history.