Comment on “Outburst flood at 1920 BCE supports historicity of China’s Great Flood and the Xia dynasty”

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Wu et al. (Reports, 5 August 2016, p. 579) reported geological and archaeological evidence about an earthquake-induced landslide dam outburst flood around 1920 BCE and claimed a support to the historicity of China’s legendary Great Flood and Xia dynasty. We argue that the physical evidence is unreliable and their arguments are unconvincing.

I t has been challenging to prove the historicity of the semimythological narratives of the Great Flood and the Xia dynasty in the absence of contemporary textual evidence. Wu et al. (1) presented physical evidence about an outburst flood around 1920 BCE and claimed verifications to the authenticity of these historical events. Here, we question the reliability of the physical evidence and soundness of their arguments.

For the first key evidence about the outburst flood, Wu et al. assumed that the time when the dammed-lake sediment began to deposit approximately represented the onset of the flood outburst. However, Wu et al. only dated the middle-upper parts of the lacustrine sections, left huge, thick sediment (e.g., 25 m for P7a and 10 m for P4) for the lower parts undated, and then inappropriately used the date for the middle-upper parts of the lacustrine sections as the beginning date for the outburst flood. Thus, their dated age older than 2000 BCE apparently contradicted their claim that the dam was breached around 1920 BCE. It also violated the sedimentary law because it cannot explain the time it took for the enormous lower thick sediments to be deposited. Actually, previous researchers who systematically dated the whole sequence of the dammed-lake sediments found that the dam was formed before 8.1 thousand years before the present (B.P.) and was either gradually eroded away (2) or suddenly breached (3) before 5.6 thousand years B.P., which considerably predated 1920 BCE.

The second key evidence about the causes of the Lajia ruins was seriously challenged by taphonomic phenomenon. Detailed excavations on the Lajia settlements revealed strong evidence of in situ burial features: (i) human skeletons, animal bones, and pottery vessels were concentratedly distributed in a limited area rather than being widely scattered; and (ii) some human skeletons were grouped together rather than being separated, and others rested on the dwelling floors instead of being lain face down or prostate (4). These burial features cannot be explained by the flooding burial scenarios. Their reconstructed high-energy overflowing floodwater with a water level more than 10 m above the Lajia settlements and sweeping for at least 8 hours over the already seismically shattered cave dwellings composed of loosely deposited loess would generate off-site burial effects. Competing research indicated that it was an earthquake and immense local mudflows that jointly destroyed the Lajia settlements, which can explain well the in situ burial features (e.g., (5)).

Wu et al.’s further causal links to the historical events are problematic for five reasons. First, Wu et al. inappropriately treated the dating results and created a seemingly precise date for the outburst flood. They (i) used an inverse weighting method to obtain a deceptively accurate date of 3578 ± 1814C years with a margin of error smaller than any of the original three dates on which it is based; (ii) then reduced date accuracy to obtain a calendar date 1922 ± 28 BCE by lowering its dating confidence level from 95% to 68%; and (iii) further simplified dating range as an exactly fixed chronological point 1920 BCE. Thereafter, they used 1920 BCE to subtract 22 years of controlling floods and obtain an exact date of 1900 BCE and then correlated it with a historical exact date of 1914 BCE proposed for the beginning of the Xia dynasty. However, such subtraction is meaningless because the original dating error margin amounts to more than 200 years, much larger than 22 years. Furthermore, the flood occurrence was related to locally abnormal rainfall and resultant waterlogging conditions (22).

Finally, the causal links between the outburst flood and the Erlitou culture formation and Neolithic-Bronze Age transition are also questionable. Recent improvements in dating technique and availability of new radiocarbon dates generated an age 1790 BCE for the beginning of Erlitou culture (23), much later than 1900 BCE. It is highly unlikely that a single short-lived outburst flood could cause such profound and widespread cultural-economic transformations along the Yellow River valley. Wu et al. neglected previous studies that convincingly indicated that this transformation was closely related to the 4.2 to 4.0 thousand years B.P. global climate event (H4, J5).

In summary, Wu et al.’s physical evidence for the outburst flood is questionable, and its causal links to historical events are more generally assumed than convincingly demonstrated. Their claim of support for the historicity of the Great Flood and the Xia Dynasty is thus unfounded.

REFERENCES AND NOTES

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