



The Chobot site (Alberta, Canada) cannot provide evidence of a cosmic impact 12,800 y ago

Continued reference in the paper by Wittke et al. (1) to the Chobot site regarding an impact occurring at the Younger Dryas boundary (YDB) concerns scientists familiar with this region. The authors claim that no radiometric dating at the site is possible but have previously reported ages that are not consistent with their interpretation. They also claim that abundant Clovis points are present to justify the age of the site and associated impact spherules.

Chobot and other sites surrounding Buck Lake have been investigated by professional archaeologists within the provisions of the Historical Resources Act of Alberta. The Chobot site is thinly stratified: artifact-bearing deposits are within 50 cm of the surface. Critically, the Chobot collection contains a record of the entire Holocene cultural sequence, with rare Early Prehistoric and more common Middle and Late Prehistoric diagnostic projectile points. Spatial analytical approaches can be applied to disentangle such records to a degree but require rigorous analysis of provenience data, a measure not applied at this site. The statement by Wittke et al. (1) that there are abundant Clovis points is not accurate: The fluted point they illustrate is one of three known from the site (2). Similarly, the assertion that there are “tens of thousands of Clovis-age flakes and tools” (1) is unsubstantiated. Because the great majority of diagnostics postdate the Clovis era, most accompanying artifacts are undoubtedly from later time intervals

too (e.g., ref. 3). Charlie Lake Cave has provided the only radiometric dates for fluted points in western Canada (4). There, fluted points postdate the YDB; this could also be true of the Chobot fluted points.

Wittke et al. illustrate a sampling column of 23 cm depicting a 1-cm-thick YDB layer as 12 cm beneath a carbon rich “black mat layer” (figure S5A and figure S5B in ref. 1). This YDB depth of 12 cm is represented graphically in their figure S5D in ref. 1 at a depth of 12 cm below the surface. This same stratigraphic arrangement was observed during excavations at the Chobot site, but the “black mat” is simply the surface leaf litter and humic materials (the LFH horizon typical of Luvisols and Brunisols), whereas the underlying “YDB” layer likely reflects pedogenically translocated clays and organics, residues from slope wash, or deposits from a recent higher stand of Buck Lake. No evidence has been presented for a black algal mat, nor have these been documented in western Canada.

The authors claim “no radiometric dates exist for this site” (1), but Firestone (5) reported dates of $1,520 \pm 20$ ^{14}C yr BP (UCIAMS 29314) and $3,645 \pm 20$ ^{14}C yr BP (UCIAMS 29315) on charcoal from depths of 12 and 15 cm, respectively, at the Chobot site: these dates bracket their “Clovis” layer and are consistent with the later projectile diagnostics common in the assemblage.

We see no support for the assertion of an age “of no less than 12.8 ka” based on

“archaeological stratigraphy” (1) and find compelling evidence to the contrary. The Chobot site cannot be compared with the well-documented geoarchaeological findings at locations such as Murray Springs, nor can it provide the clear evidence required to support the impact hypothesis.

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1 Wittke JH, et al. (2013) Evidence for deposition of 10 million tonnes of impact spherules across four continents 12,800 y ago. *Proc Natl Acad Sci USA* 110(23):E2088–E2097.

2 Ives JW (2006) *Alberta Formed—Alberta Transformed*, eds Payne M, Wetherell D, Cavanaugh C (Univ of Calgary Press, Calgary, AB, Canada, and Univ of Alberta Press, Edmonton, AB, Canada), Vol 1, pp 1–34.

3 Gryba EM (1983) *Sibbald Creek: 11,000 Years of Human Use of the Alberta Foothills, Paper 22*, Archaeological Survey of Alberta Occasional (Alberta Culture, Edmonton, AB, Canada).

4 Driver JC, et al. (1996) Stratigraphy, radiocarbon dating and culture history of Charlie Lake Cave, British Columbia. *Arctic* 49(3):265–277.

5 Firestone RB (2009) The case for the Younger Dryas extraterrestrial impact event: Mammoth, megafauna, and Clovis extinction, 12,900 years ago. *J Cosmol* 2:256–285.

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