

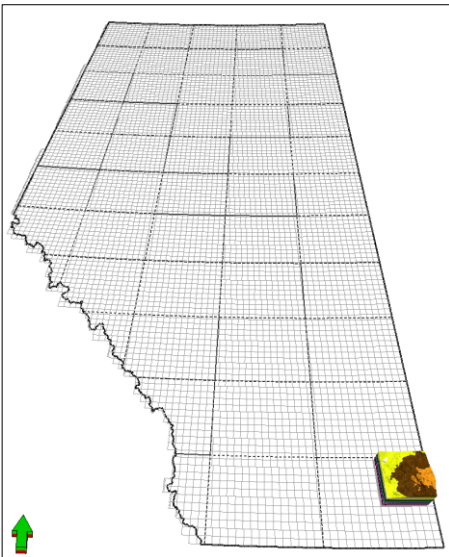
3D Print: Eagle Butte Meteorite Impact Structure, Southeastern Alberta

Summary

A 3D geomodel was created around the Eagle Butte meteorite impact structure, situated in southeastern Alberta. The model covers an area 6 by 6 townships (~360 km²) and goes from the top of bedrock (sediment cover is not represented in this model) to a depth of 750 m below sea level.

The model was extracted from the Geological Framework of Alberta (<https://ags.aer.ca/activities/3D-geological-framework.htm>), and simplified into a 10-layer model. These 10 layers were exported as STL files for 3D printing.

Location of the geomodel within
Alberta (3D view)



Eagle Butte Impact Structure 3D print



3D Print Specifications

A portion of the geological framework of Alberta was extracted to create a 3D print with the specifications listed below. Please refer to your 3D printer's user manual for any information pertaining to 3D printing, including how to resize the 3D print.

Size of print bed required: X = 320 mm, Y = 210 mm, Z = 250 mm

Amount of filament required: Layers 1 and 2 : 107,000 mm. Layer 3: 66,000 mm. Layer 4: 80,000 mm. Layer 5: 86,000 mm. Layer 6: 65,000 mm. Layer 7: 50,000 mm. Layer 8: 50,000 mm. Layer 9: 65,000 mm. Layer 10: 90,000 mm.

Volume of rock represented: 59 km (X) by 58 km (Y) by 1.7 km (Z)

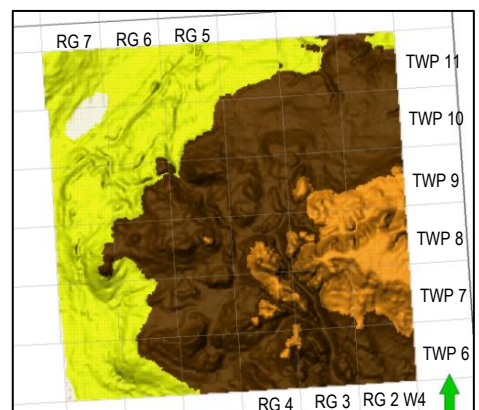
Resolution: 200 m by 200 m

Vertical exaggeration: 25 times

Number of layers: 10

Geographic location: encompasses townships 6-11, ranges 2-7 W4

View from above of the geomodel



About Eagle Butte

The Eagle Butte meteorite impact structure formed when a meteorite struck southern Alberta probably less than 65 million years ago (Grieve, 2006). The impact resulted in a circular, complexly faulted structure with a raised rim, an inner trough, and a central uplift, which was later partially eroded and covered by ice-age sediments leaving very little evidence of its existence at the surface. The buried structure has been mapped and imaged using information from wells as well as 2D and 3D seismic (e.g., Sawatzky, 1976; Hanova et al., 2005). The presence of shatter cones and planar fractures in quartz grains (Grieve, 2006) confirm the structure as an impact crater.

Presented here is a simplified model of the Eagle Butte impact structure, based solely on available nearby wellbore interpretation, and with no faults modelled. The deformation due to the meteorite impact can be seen in the middle portion of the 3D print.

References and Resources

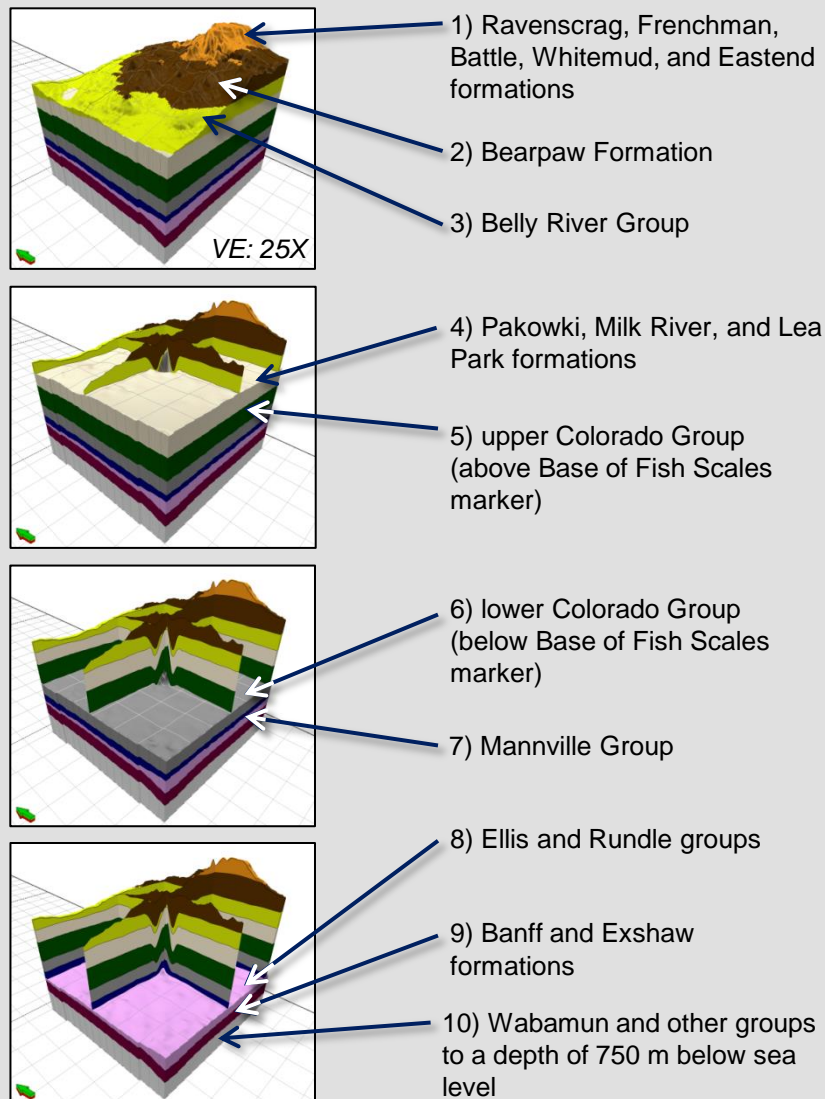
Grieve, R.A.F. (2006): Impact structures in Canada; Geological Association of Canada, GeoText 5, 219 p.

Hanova, J., Lawton, D., Visser, J., Hildebrand, A. and Ferriere, L. (2005): 3D structural interpretation of the Eagle Butte impact structure, Alberta, Canada; 36th Annual Lunar and Planetary Science Conference, March 14–18, 2005, League City, Texas, 2 p.

Model Zones in 3D Space:

Below are images showing the geomodel that was used to build the STL files for this 3D print.

Geomodel in 3D space



O'Dale C.P.T.: Crater Explorer: Eagle Butte Impact Structure;
<<http://craterexplorer.ca/eagle-butte-impact-structure/>>

Planetary and Space Science Centre: Earth Impact Database: Eagle Butte; <http://www.passc.net/EarthImpactDatabase/New%20website_05-2018/Eaglebutte.html>

Sawatzky, H.B. (1976): Two probably late Cretaceous astroblemes in western Canada – Eagle Butte, Alberta and Dumas, Saskatchewan; Geophysics, v. 41, p. 1261–1271.

3D Print Layers

Below are photographs of the 3D print, viewed from above, with the topmost layer(s) labelled for each photograph.

1) Ravenscrag, Frenchman, Battle, Whitemud and Eastend formations; 2) Bearpaw Formation (printed together)



3) Belly River Group



4) Pakowki, Milk River and Lea Park formations



5) upper Colorado Group (above Base of Fish Scales marker)



6) lower Colorado Group (below Base of Fish Scales marker)



7) Mannville Group



8) Ellis and Rundle groups



9) Banff and Exshaw formations



10) Wabamun and other groups to a depth of 750 m below sea level

