

Barringer Crater: Critical Analysis of Impact Evidence

Investigation Overview

A systematic examination of Barringer (Meteor) Crater, Arizona, comparing its characteristics to other impact structures and critically evaluating the standard impact model.

Geological Context

Target Rocks

- Flat-lying sedimentary sequence: Coconino Sandstone, Toroweap Formation (limestone), Kaibab Formation (dolostone), Moenkopi Formation
- No Precambrian basement reached (drilling to 419m remained in sedimentary rocks)
- Located on Colorado Plateau; Precambrian basement exists but at unknown depth below crater

Structural Features

- Squared-off crater outline from pre-existing regional jointing
- Located on "Sunshine Nose" structural trend (N. 8° W, extends 15+ miles)
- Pre-existing structural weaknesses, not conductive basement

Comparison to Large Impact Craters

Unlike Vredefort, Sudbury, Dhala, Gosses Bluff, Manicouagan, and Popigai, Barringer shows:

- No conductive Precambrian basement involvement
- Minimal magnetic anomaly (20 nT vs. hundreds-thousands at other sites)
- Post-impact magnetic alteration, not pre-existing target conductors
- Sedimentary target only

Impact Evidence Analysis

Definitive Shock Features at Barringer

1. **Coesite and Stishovite:** 100g rock flour yields 3g coesite, 0.42g stishovite
2. **Shocked quartz:** Planar deformation features (PDFs)
3. **Rock flour:** Completely pulverized sandstone
4. **Lechatelierite:** Fused silica glass
5. **NO impact melt sheet** (unlike large craters)

Comparison to Large Craters

Gosses Bluff (22 km, 142.5 Ma)

- Reidite, shock-twinned zircon, FRIGN zircon
- Most intensely shatter-coned structure documented
- Impact melt breccia
- No meteorite fragments

Manicouagan (100 km, 214 Ma)

- 1.5 km thick impact melt sheet
- Spherules and shocked quartz in UK ejecta (214 Ma)
- No meteorite fragments

Popigai (100 km, 35.7 Ma)

- Hundreds of km³ of impact melt (tagamite)
- 600m thick suevite deposits
- Impact diamonds from graphite conversion
- No meteorite fragments

Pattern Identified

- Small craters (<2 km): Physical meteorite fragments
- Large craters (>10 km): No fragments, only geochemical traces (PGEs) and extensive melt

The Meteorite Fragment Problem

Canyon Diablo Fragments Found

- **Largest:** Holsinger Meteorite, 639 kg (1,409 lbs)
- **Distribution:** Up to 9 km from crater
- **Total recovered:** ~30 tons
- **Fine dispersed material:** ~8,000 tons
- **Unaccounted:** ~55,000 tons (claimed vaporized)

Fragment Characteristics

- **Composition:** Coarse octahedrite, IAB-MG group, ~7% nickel
- **Shock features:** Widmanstätten patterns destroyed by impact explosion
- **Impact diamonds:** Carbonados in graphite/troilite nodules (400 kbar - 1 Mbar pressures)

- **Evidence:** Fragments experienced the impact event

Critical Physics Problem Identified

The Vaporization Contradiction

Standard Model Claims:

- Main impactor (300,000 tons) completely vaporized
- Impact energy: 10-14 megatons TNT
- Temperatures: 10,000-30,000°C (iron vaporizes at 2,862°C)

Physical Evidence:

- 639 kg fragments with impact shock features survived
- Destroyed Widmanstätten patterns prove fragments experienced impact
- Impact diamonds prove extreme pressures (400 kbar - 1 Mbar)

The Logical Impossibility

A unified object hitting at 20 km/s cannot:

1. Have parts vaporize (main mass → vapor)
2. Have parts survive as large shocked chunks (639 kg fragments)
3. At the same location (all found around crater)

The shock wave propagates through the entire body simultaneously:

- Same energy density per unit volume
- Same compression and heating
- Microsecond timescale - one unified event

Cannot have selective outcomes:

- Front portion: vaporizes completely
- Back portion: fragments into 639 kg pieces
- Physics doesn't allow this in a unified impacting body

Alternative Explanations Examined and Rejected

Atmospheric breakup fragments?

- Would scatter along entry trajectory, not cluster at one crater
- Physics problem: separated pieces follow different paths

Ejected from crater during impact?

- But then should be vaporized or heavily shocked beyond recognition
- Cannot explain intact 639 kg crystalline masses

Condensed from vapor?

- Works for tiny spherules only
- Cannot explain 639 kg chunks with preserved structure

Energy Distribution Problem

If energy sufficient to vaporize 300,000 tons exists at impact point, that same energy field should vaporize 639 kg fragment at same location. Energy either exceeds vaporization threshold for iron or it doesn't - cannot be selective within same unified body experiencing same shock event.

Conclusion

The standard impact model for Barringer Crater contains an internal physical contradiction: the claimed vaporization of the main impactor is incompatible with the survival of large shocked fragments from the same object at the same location. The evidence (large shocked fragments present + main mass absent) cannot be reconciled with the stated physics of hypervelocity impact and vaporization.

Investigation conducted through systematic comparison of geological context, electromagnetic signatures, impact evidence, and physical analysis of recovered materials across multiple impact structures.