Electromagnetic (EM) Implications of Australasian Tektite Morphology

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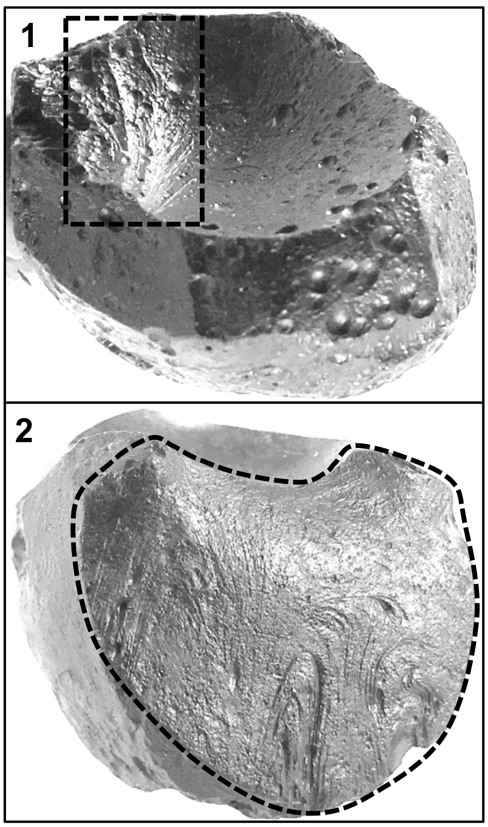
Abstract

Fragment-form Indochinite Australasian tektites show clear indications of electromagnetic involvement in their formative process. High-voltage, high-current arcing can cause effects not previously discussed in the literature, over rapid timescales.

ELECTROMAGNETIC INDICATIONS OF AUSTRALASIAN TEKTITE MORPHOLOGY. T.H.S. HARRIS, GE Astro Space Div., Lockheed Martin, Boeing Helicopter, retired (thsharris1@icloud.com)

Introduction: Indochinite Australasian tektites (AAT) display contorted unit morphology consistent with electric charge saturation, arc-induced heating during magnetic confinement, and magnetic flux expansion with rapid cooling. Common surface textures are consistent with post-solidus flash heating and coincident electromagnetic (EM) field imprinting. Common co-expression of these Indochinite 'fragment-form' tektite features is consistent with disruption by high voltage (HV) arcing in vacuum, requiring explanation.

Fragment-Form Evidence: Two ~3cm-scale spheroid fragment-forms show apparent HV arcing imprints.



Top (1): arcing melt track across left portion of the concave surface with radiating filaments. *Bottom* (2): apparent surface layer EM field line striae imprinted by HV arcing. Both imply initially solid condition.

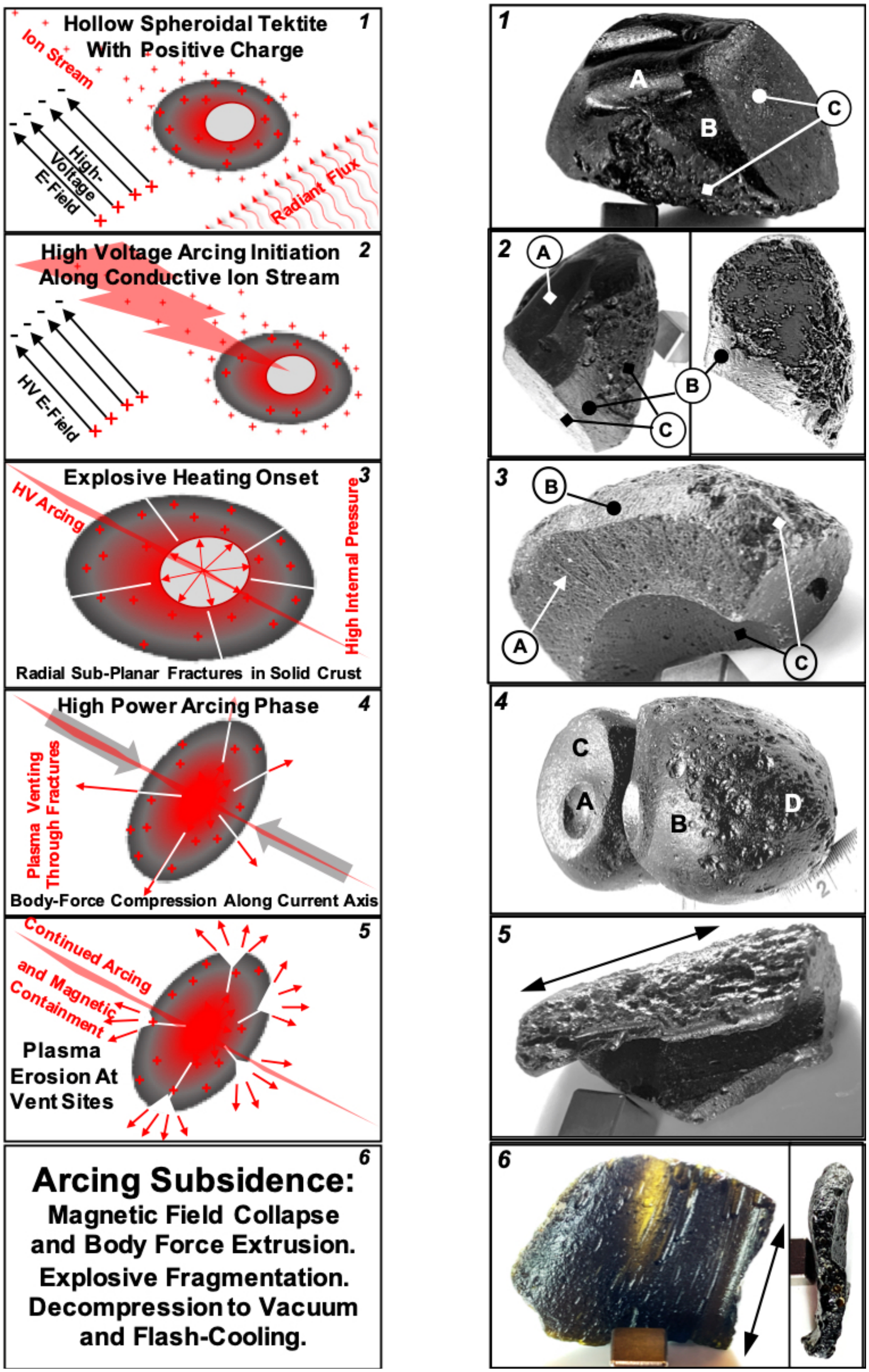
A proposed sequence fits the observations, with arcing timescales explaining rapid thermal cycling. Post-deposition differential etch is inconsistent with AAT splash form melt homogeneity. The indicated KE scale is similar to that of uniquely high test-derived and triple-verified AAT reentry speeds of 80% or more of Earth escape speed per NASA and Chapman et al. (1964) [1] as well as the uniquely broad AAT strewn coverage. These multiple indications of 'extinction-level' KE scale are also considered for further AAT event insight.

Lab Evidence Extended: Kurosawa et al. (2012, 2015) [2, 3] explain *the role of the electron* in shock partitioning. *Elevated* H_2O is suggested per Watt et al. (2011) [4]. H_2O ionization and non-equilibrium shock processes discussed by Skryl et al. (2007) and Khantuleva (2003) [5,6] respectively, explain induced electrical current from strong shock, as correlation-length reduces to the order of H_2O molecular dimension. An inductive-capacitive 'LC' circuit model provides an approximation; with extended period $\tau \propto \sqrt{L * C}$, planetary-scale inductive and capacitive reactance are indicated by τ on the order of tektite melt cooling time.

EM Alteration Sequence: The setting is H_2O component plasma and high induced electric field from shocked ice. Left column (pg. 2) images show radiant flux stripping silicate ions (1) which stream away as a conductive path in the surrounding high potential electric field, leading to high-voltage arcing through the tektite (2). Arc-induced heating adds ions, lowering conductive impedance, increasing current and heating, and fracturing the solid tektite shell (3). Current-induced magnetic field compresses the body-charged tektite (4), trapping fragments during energetic plasma venting erosion (5). Right column shows a compressed discoid fragment (1 & 2) with bulged plastic core A, plasma-eroded facets B and dissimilar exterior and fracture surfaces C. Hollow spheroid fragment (3) shows radial striae on surface A. Truncated spheroid (4) shows raised-rim deposition point A, plasma erosion facet B, fracture plane C and exterior pitting D. Frames (5) and (6) show 'extruded' hollow tektite fragments, with arrow showing extension direction. Scale cube is 1 cm.

Conclusions: EM involvement in post-solidus AAT disruption and thermal alteration is indicated by indochinite fragment-form specimens. Convex surface pitting and pock marks are consistent with post-solidus particle or spatter bombardment during thermal cycling in vacuum. Extensive target mass H_2O ice is indicated, perhaps from large projectile or expanded oblique impact footprint and associated multiple in-track hotspots.

References: [1] Chapman et al. (1964) *Gochimica et Cosmochimica Acta* Vol. 28 p. 841-880. [2] Kurosawa et al. (2012) *JGR*, 117 E04007. [3] Kurosawa et al. (2015) *JGR Planets* [4] Watt et al. (2011) *M&PS*, 46, Nr 7, 1025-1032 [5] Skryl et al (2007) *Physical Review B* 76, 064107 [6] T.A. Khantuleva (2003) in *High-Pressure Shock compression of Solids VI*, Springer.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Hollow Spheroidal Tektite
With Positive Charge
Ion Stream
High-
Voltage
E-Field
Radiant Flux
2
High Voltage Arcing Initiation
Along Conductive Ion Stream
HV E-Field
3
Explosive Heating Onset
HV Arcing
High Internal Pressure
Radial Sub-Planar Fractures in Solid Crust
4
High Power Arcing Phase
Plasma Venting
Through Fractures
Body-Force Compression Along Current Axis
5
Continued Arcing
and Magnetic
Containment
Plasma
Erosion At
Vent Sites
6
Arcing Subsidence:
Magnetic Field Collapse
and Body Force Extrusion.
Explosive Fragmentation.
Decompression to Vacuum
and Flash-Cooling.
1
A
B
C
2
A
B
C
3
B
A
C
4
C
A
B
D
5
6