

Geochemical and Textural Variations in Tektites from Indochina and South China: Implications for the Impact Origin of the Australasian Strewn Field.

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The Australasian tektite strewn field (ca. 0.8 Ma) covers nearly 10% of Earth's surface [1, 2]. This study systematically examines the internal structure, geochemical composition, and petrographic characteristics of Indochinite tektites from Thailand and Vietnam, as well as South China tektites. The analyzed samples exhibit a major and trace element composition closely resembling the mean Upper Continental Crust (UCC), consistent with normal-type Australasian tektites, characterized by MgO contents below 6 wt% and an absence of clear impactor signatures. Despite this general compositional uniformity, systematic variations in CaO, FeO, MgO, Pb, Sr, Zn, and Cu concentrations are observed in Indochinite tektites. These deviations, previously noted by [3], suggest the mixing of multiple target rock components, likely influenced by differences in mineral content and chemical composition within stratified target rocks. Indochinites from Thailand and Vietnam show lower Pb and Sr concentrations compared to tektites from more distant regions, such as China, Indonesia, and Australia, likely reflecting proximity to the possible impact site. Petrographic analyses also reveal a decrease in lechatelierite inclusions in tektites from Thailand and Vietnam to South China, corresponding to increasing distance from the impact site, supporting differential ejection and formation under varying pressure and temperature conditions. Additionally, schlieren flow structures provide evidence of extensive melt mixing, likely involving basaltic and sedimentary target rocks, reinforcing the hypothesis that the impact involved multiple lithologies. The stratigraphy of the Bolaven Plateau, Laos [4] where basalt overlies sedimentary rocks, aligns with the observed geochemical trends. These findings enhance the understanding of tektite formation, target rock interactions, and impact processes, further supporting the Bolaven Plateau as a potential impact site. However, continued research is needed to refine the precise impact location and to clarify the roles of fractionation and target rock heterogeneity in shaping the elemental signatures of Australasian tektites.

[1] Glass et al., (1979). Lunar and Planetary Science Conference Proceedings, 10. [2] Jourdan et al., (2019). Meteoritics & Planetary Science, 54(10). [3] Ackerman et al., (2020). *Geochimica et Cosmochimica Acta*, 276. [4] Sieh et al., (2023). Proceedings of the National Academy of Sciences, 120