Converging lines of evidence for burial of the Australasian impact crater within the Bolaven volcanic field, Southern Laos

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Physical and chemical characteristics of the Australasian tektites suggest that they originated within the Thai-Lao Khorat Plateau, and more specifically within the 100,000 km^2 inner strewnfield of Muong Nong-type tektites. The lack of an obvious crater and very low rates of erosion in this region imply that the crater must lay buried. Several converging lines of evidence imply that indeed the 0.8-Ma impact crater is buried beneath the 350-m thick summit flows of the 5,000-km^2 Bolaven volcanic field in southern Laos. Chemical compositions of the tektites indicate the presence of a weathered basaltic component that had accumulated mostly during the few million years before the impact. Accordingly, ^{40}Ar-^{39}Ar dates from distal lava flows can be traced uphill to weathered pre-impact basalts now buried beneath younger flows of the summit impact region. Also as predicted by the hypothesis, all ^{40}Ar-^{39}Ar dates from exposed flows at and near the impact region post-date the impact. Moreover, a gravity anomaly there may reflect the presence of a buried ~15 km wide elliptical crater with low-density fill. We interpret a thick deposit of crudely layered, bouldery sandstone and mudstone breccia in two outcrops 10–20 km from the center of the impact crater to be part of the proximal ejecta blanket. Fractured quartz grains within these boulder clasts lend support to this interpretation of an impact origin of these peculiar deposits. A pebbly, cobbly layer that extends and thins for more than 100 km from the impact site, almost everywhere containing angular muong nong tektites, comprises the more distal part of the ejecta blanket. Commonly, atop this layer is a massive, meters-thick coarse-silty to fine-sandy layer that we interpret to be partially or largely comprised of fallout of fine debris driven and convected into the atmosphere during and immediately following the impact. In this talk, we will present available physical and geochronologic evidence for the Bolaven impact as the source for the Australasian tektite strewnfield. In an accompanying contribution, we will present correlative geochemical evidence.

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