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Glikson (*1*) suggests that any "true" extraterrestrial impact structure should include shocked minerals (for example, quartz with planar deformation features, or PDFs), high-pressure polymorphs (for example, coesite or diamond), shatter cones, and chondritic chemical signatures of platinum group elements (PGEs). He ignores the criteria we present (shocked glass or maskelynite) and later dismisses the data as being indicative of a volcanic breccia. Moreover, his suggestion that the identification of maskelynite in an impact breccia necessitates the presence of PDFs is incorrect. As stated in (*2*), the shock pressures for the formation of maskelynite (35 to 45 GPa) and silica glass (>45 to 65 GPa) that characterize the Bedout core are well above the shock pressures for preserved PDFs. In addition, some researchers (*3*) now distinguish between "plagioclase diaplectic glass" and "maskelynite," with the latter forming without being initiated in PDFs as suggested by Glikson. Chen and El Goresy (*3*) recently described maskelynite grains in several SNC martian meteorites as smooth with no cleavage, no contraction cracks, and no shock-induced fractures, which is what we see in the Bedout core [see, for example, figure 6 in (*2*)]. Thus, the notion that the presence of preserved PDFs is required to interpret maskelynite in a melt breccia core—especially one that is 250 million years old and highly altered—is overstated. The petrology and geochemistry of this "volcanic breccia," as interpreted by Glikson, are unlike those of any volcanic rock in the world. It is not surprising that, as Glikson notes, some of the clasts resemble altered basalts; as we stated in (*2*), the target rocks likely contained basalts, and unmelted basalt clasts are among the more noticeable features of the Bedout-1 core.

The evidence for impact glass that we presented in (*2*) comes from the lowermost section (3044 m) of the Bedout core, where many of the observed features are completely at odds with a magmatic origin and are most consistent with impact-induced melting. At that depth, large plagioclase crystals (An 50) have transformed to glass [figures 6 and 8 in (*2*)]; the shocked grains are isotropic but maintain the perfect outline of a plagioclase lath [figure 6 in (*2*)]. They do not even remotely resemble nearby grains of crystalline plagioclase, as suggested by Glikson. Instead, the texture indicates shock-induced melting and quenching of the dense melt at high pressure, which erased the inherited shock-induced fractures but retained the morphology of the plagioclase lath (*3*). The chemistry of this isotropic region is exactly that of plagioclase with <0.1% TiO_2 and <1% Fe and Mg; no volcanic glass in existence resembles that composition.

Could the isotropic regions result from alteration or spilitization, as suggested by Glikson? It is unlikely that it could, and still retain the isotropic optical character and the exact chemical signature of An 50 plagioclase. The altered region within the core of the plagioclase [table S1, no. 21 in the supporting online material in (*2*)] shows the changes in chemistry that occur during alteration (loss of Na and Ca and addition of Mg and Fe; addition of H_2O). Conversely, the unaltered isotropic core [table S1, no. 4 in the supporting online material in (*2*)] and the crystalline rim of the plagioclase [table S1, no. 3 in the supporting online material in (*2*)] have identical "plagioclase" chemistry (within error). There is no core-rim zonation that would typify plagioclase zoning or "overgrowth," as Glikson would assert. The only logical conclusion is that the core of the plagioclase was shock-melted and quenched at high pressure. Both figures 6 and 8 in (*2*) show large feldspar laths (300 to 500 μm) that have begun to alter over 250 million years of burial, and there is clear evidence of maskelynite in fresh plagioclase laths [figures S4 and S5 in the supporting online material in (*2*)]. There is no visible evidence of alteration in plane polarized light, yet the core of the feldspars is isotropic; it is not even remotely "cryptocrystalline," as suggested by Glikson.

As noted in (*2*), the high-silica glass that we described cannot be a magmatic product. We agree with Glikson that silica does exist in ancient volcanic rocks, precipitated as veins during hydrothermal circulation. However, the high-silica glass in Bedout differs from vein filling in several important respects: (i) The rare occurrences of silica have the shape of "relict quartz grains" and do not resemble a vein. (ii) There are no silica veins in this core; all veins examined in the Bedout core [see, for example, figure S11 in the supporting online material in (*2*)] are filled with lower temperature carbonates. (iii) The high-silica glass contains substantial amounts of TiO_2 (~5%), which is not an element commonly associated with veins of opal or chert but which does occur as rutile inclusions in quartz. Glikson also notes that some of the glass that we describe in (*2*) resembles volcanic lapilli. The glass photomicrographs in figure 7, A and B, in (*2*) do resemble volcanic lapilli in gross texture, because they both formed in explosive, high-energy events. However, the chemistry of the altered glass in figure 7B in (*2*) resembles no known volcanic product. In particular, the glass contains background levels of TiO_2 in a composition that would otherwise be considered basaltic. Overall, the textures and chemical compositions that we described in the Bedout core require a wide range of bulk rock compositions, from acid to ultrabasic, in the same thin section—a paradoxical situation that can only be explained by a process such as impact.

Perhaps the most troubling aspect of Glikson's interpretation of Bedout as volcanic in origin is that he cites no examples or analogs of a comparable volcanic product—nor does he attempt to explain how Bedout, as a volcano, would have formed. We looked at a number of possible explanations for the nature of Bedout, including a volcanic origin. However, we could find no explanation for an isolated volcano the size of Bedout (40 to 60 km in diameter and 3 to 4 km in height) forming along a passive continental margin. This has been grossly overlooked by Glikson and others (*4*). The discovery of the Chicxulub crater prompted a similar set of arguments pertaining to interpreting its origin. For example, the Yucatan-6 core was originally interpreted as being from a "volcanic dome" based on the presence of "andesite" in the basement rocks, even though such a large feature was clearly inconsistent with the region's passive-margin geology. More work is needed to confirm that the Bedout structure is consistent with an impact origin. For example, we agree with Glikson that the presence of PGEs (for example, iridium or chromium) in the melt breccia would strengthen our interpretation. However, we remain confident that the data we present in (*2*) are most consistent with an impact origin for Bedout.

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