K/T SPHERULES FROM HAITI AND WYOMING: ORIGIN, DIAGENESIS, AND SIMILARITY TO SOME MICROTEKTITES; Bohor, B.F.¹, Glass, B.P.², and Betterton, W.J.¹
¹U.S. Geological Survey, MS 972, Box 25046, Denver, CO 80225; ²Dept. of Geology, University of Delaware, Newark, DE 19716

Spherules with relict glass cores in the K/T boundary bed of Haiti allow for a comparison of these bodies with hollow goyazite shells in the K/T boundary claystone of Wyoming and with younger microtektites of the Ivory Coast strewn field. Samples of the Haitian beds from undisturbed sections at Beloc, as determined by Jehanno et al. [1], contain both hollow shells and relict glass cores rimmed by palagonite [2] that has been partially converted to smectite. These palagonite rims developed from hydration zones formed when hot, splash-form droplets of andesitic impact glass [3] were deposited into water. Mutual collisions between these droplets in the ejecta curtain [4] may have formed point-source stresses on their surfaces. Initiation of hydration would be facilitated at these surface stress points and propagated radially into the glass. The inner surface of these merged hemispherical fronts appears mammillary (Fig. 1), which is reflected as scalloping in Haitian relict glass cores.

In the Western Interior, hollow spherules in the melt ejecta layer of the K/T boundary unit were designated as Type 1 spherules by Bohor and Betterton [5]. The shells of these spherules are replaced by goyazite at Dogie Creek and Teapot Dome in southern Wyoming, allowing for detailed comparisons with Haiti spherules. All of the features characteristic of palagonite rims in Haiti, such as mammillary inner surfaces, cracks and interior vesicules rimmed with palagonite, and banded and fibroradial texture, strongly resemble features of the goyazite shells in Wyoming. We propose that palagonite rims in Haiti and goyazite shells in Wyoming are identical manifestations of glass hydration and palagonite formation processes operating at both aqueous depositional sites and resulting in Type 1 spherules. The thick Haitian spherule beds (Units 1, 2) contain rare shocked quartz grains but no magnesioferrite, underscoring their identity as a melt ejecta layer (ejecta blanket) equivalent in origin to that of the Western Interior but more proximal to the impact crater.

All of the K/T Type 1 spherules display typical splash-form, melt-droplet shapes characteristic of microtektites. Microtektites in the Ivory Coast strewn field have compositions similar to those of the Haitian relict glasses. Scalloped surfaces displayed by these Ivory Coast microtektites (Fig. 2a) are mimicked by scalloped Haitian relict glass cores (Fig. 2b) and by scalloping on secondary mineral casts pseudomorphing dissolved glass cores in Wyoming (Fig. 2c). Ivory Coast microtektites [6] also display U-shaped grooves (Fig. 3a), duplicated in Haitian relict glass cores (Fig. 2b). In Wyoming hollow shells, these grooves are formed by surface fractures rimmed with goyazite after palagonite (Fig.3b). These morphological similarities between Type 1 spherules in the K/T melt ejecta layers from Haiti and Wyoming and Ivory Coast microtektites are further evidence in support of the hypothesis that Type 1 spherules are, in fact, altered microtektites [7]. Acknowledgements: Haiti samples provided by Dave Larue. BFB partially supported by NASA Grant T-5715.

ORIGIN OF K/T SPHERULES: Bohor, B.F. et al.

Fig. 1. Teapot Dome—goyazite replacing palagonite mammillary shells.

Fig. 2a. Ivory Coast microtektite—scalloped with U-groove.

Fig. 2b. Haitian relict glass core—scalloped with U-groove.

Fig. 2c. Teapot Dome—scalloped secondary mineral cast (core).

Fig. 3a. Ivory Coast microtektite. U-grooves on scalloped surface.

Fig. 3b. Teapot Dome. Surface cracks rimmed with goyazite after palagonite.