

STRUCTURE AND KINEMATICS OF A COMPLEX CRATER, UPHEAVAL DOME, SE UTAH. B.J. Kriens¹, K.E. Herkenhoff², and E.M. Shoemaker³, ¹Dept. of Earth Sciences, CSU Dominguez Hills, Carson, CA 90747, bkriens@dhvx20.csudh.edu, ²JPL, MS 183-501, Pasadena, CA 91109, keh@jplsc8.span.nasa.gov, ³USGS Branch of Astrogeology, Flagstaff, AZ 86001, gshoemaker@astrog.span.nasa.gov.

Two vastly different phenomena, extraterrestrial impact and salt **diapirism**, have been proposed for the origin of Upheaval Dome, a ca. 2.5 km-diameter structural dome surrounded by a 5 km-diameter ring structural depression which is in turn flanked by extensive, **nearly** flat-lying Colorado Plateau strata. Seismic refraction **data**[1] and geologic mapping indicate that **the** dome originated by collapse of a transient cavity formed by impact and that rising salt has had a negligible influence on dome development. Evidence is: 1) the occurrence of a rare lag deposit of **impactite**, 2) fan-tailed fracture surfaces (**shattersurfaces**) and a few **shattercones** are present, 3) the top of the underlying salt horizon is at least 500 m below the center of the dome and there are no exposures of salt in the dome to support the possibility that a salt **diapir** has ascended through it, 4) sedimentary strata in the center are significantly **imbricated** by top-to-the-center thrust faulting and are complexly **folded** as well, 5) top-to-the-center low-angle normal faults are found at the perimeter of the structure, and 6) elastic dikes are widespread. The scarcity of melt rocks and shock **fabrics** is attributed to approximately 0.5 km of erosion; the structures of the dome reflect processes of complex crater development at a depth level of about 0.5 km below the crater floor.

Based on mapping and kinematic analysis, we infer that the dome formed **mainly** by **centerward** motion of rock units along **listric** faults. Outcrop-scale folding and upturning of beds, especially common in the center, was largely a consequence of this motion. In addition, we have also detected some **centerward** motion of **fault-bounded** wedges resulting from displacements on **subhorizontal** faults that conjoin and die out within horizontal bedding in the perimeter of the structure. Collectively, the observed deformation accounts for the creation of both the central uplift and the encircling ring **syncline**.

[1] Louie, J.N. et al. (1995) *EOS*, 76, 337.