SRL-1: Radar Scenes of Impact craters

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In April 1994, the Spaceborne Radar Laboratory aboard the Space Shuttle Endeavour imaged three terrestrial impact craters mantled by aeolian and other sedimentary deposits (Zhamanshin, Roter Kamm, and Wolfe Creek). Impact craters are often distinct thin-skinned, structural, and morphologic features constructed instantaneously, and rapidly subjected to degradation; consequently, SAR remote sensing of impact craters and their deposits can provide information concerning the state of degradation of structural features and surficial impactite deposits which are commonly anomalous to the background geologic units. Furthermore, radar can penetrate dry, unconsolidated sedimentary deposits, revealing buried features and can sense textural subtleties of impact related deposits.

Florenskiy and Dabizha described Zhamanshin impact crater [48.33° N, 61.0° E] in the North Aral region of Kazakhstan. The landform is 14 km in diameter and formed some 870,000 years ago (Al Deino and Garvin) in an event which melted and vaporized large masses of target material. Superheated glass fragments and droplets are widely distributed around the crater. At Zhamanshin radar brightness increases in L- band (λ=24 cm) toward the center of the crater. SRI .-C band images clearly reveal the interior drainage patterns of the degraded impact landform, while L-band data is more sensitive to textures associated with the differentially eroded interior deposits. Roter-Kamm [27.76° S; 16.3° E] is a 2.4 km diameter circular structure in the Namib Desert. Formed in Precambrian gneisses and metasediments, the crater is surrounded by a narrow raised rim and is partly covered by active windblown sand. At Roter Kamm possible remnants of the ejects blanket or outer ramparts are revealed under a sand mantle by radar penetration. Differential penetration is observed in comparison of the three wavelengths (X- 3cm; C - 5.6crn; L- 24 cm) with L-band suggesting greatest penetration. Wolfe Creek [19.3° S; 127.77° E] in West Australia is formed in late Precambrian quartzite. It is a nearly circular structure with a rim diameter of -900 m which appears as a bright feature in the X-band data. Outer slopes of the rim rise 35 m above the surrounding plain, Desert vegetation established in the basin of the crater produces a distinct bright crater floor.

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