**SPIDER IMPACT STRUCTURE, WESTERN AUSTRALIA IMAGED WITH SPACE SHUTTLE RADAR.**

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**Introduction:** Several terrestrial meteorite impact structures were planned as ground targets for the Spaceborne Radar Laboratory (**SRL**) experiments flown in 1994 aboard Space Shuttle *Endeavour* [1]. **SRL** was an earth-orbiting synthetic aperture radar system capable of generating high resolution 12m pixel images of ground features, irregardless of cloud cover or time of day. As *Endeavor* switched on to begin Data Take DT32.50 for Wolf Creek Crater, in Western Australia, its radar ground swath fortuitously passed over and acquired the ancient eroded remains of the impact structure known as Spider astrobleme.

**Spider Impact Structure:** During their geologic reconnaissance of the Kimberly Plateau in Western Australia, Roberts and Perry [2] mapped an anomalous region of splayed topographic ridges centered at about latitude 16°44'S, longitude 126°05'E . This system of linear hills is composed of Early Proterozoic sandstones upon the southern flank and near the hinge point and axis of the EW-trending Mount Barnett Syncline. Harms' later report of shatter cones and strongly deformed sedimentary strata confirmed an extraterrestrial impact origin for the site [3] and prompted further detailed mapping by Shoemaker and Shoemaker, [4.5.6]. Disrupted target rocks occur within a 13 by 11 km wide structural depression oriented along a northwest to southest major axis. A central structural dome, some 500m in diameter, is mostly surrounded by a series of imbricated sandstone thrust sheets. These shingled, overlapping beds of relatively thin resistant sandstones are now exhumed by erosion and produce the radiating pattern of topographic ridges which resemble "spider legs" in map view. Individual beds were thrust from the northwest to the southeast, suggesting that the meteoritic projectile impacted along a shallow trajectory from the northwest [4].

**Radar Image:** The **SRL** system obtained digital radar data in three wavelengths (λ); L-band (λ = 24 cm), C-band (λ = 5.6 cm), and X-band (λ = 3 cm). L- and C-band systems could transmit and receive in horizontally (H) or vertically (V) polarized modes, providing the complete scattering matrix of HH, HV, VH, and VV combinations. The X-band system operated in a VV polarization. Backscatter signals from these multiple wavelengths and polarizations are acquired in digital form and can be processed and combined to produce map-like images of ground targets. The image presented here (Fig 1) is a color composite of Red CHH, Green LHH, and Blue LHV images.

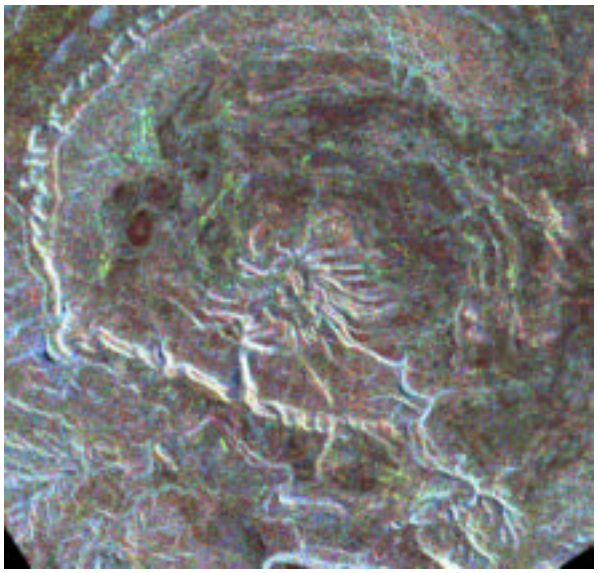

**FIGURE 1: SPIDER ASTROBLEME , SIR-C RADAR**

North up, image is 15 km wide. Radar illumination is from SW corner. Radar bright central dome of fractured target rocks is surrounded by "spider legs" sandstone ridges. Other bright patterns delineate topographic scarps which face the spacecraft, and gravelly stream channels. Darker tones indicate smooth sediments or grassy surfaces.

**References:** [1] McHone, J. F., Greeley, R., Williams, K. K., Blumberg, D. G., and Kuzmin, R. O. (2002) Space Shuttle observations of terrestrial impact structures using SIR-C and X-SAR radars. *Meteoritics & Planet. Sci.*, in press. [2] Harms J. E., Milton D. J., Ferguson J., Gilbert D. J., Harris W. K. and Goleby B. (1980) Goat Paddock cryptoexplosion crater, Western Australia. *Nature* **286,** pp. 704-706. [3] Shoemaker E. M. and Shoemaker C. S. (1985) Impact structures of Australia (Abstract) *Meteoritics* **20**, 4, pp. 754-756. [4] Shoemaker E. M. and Shoemaker C. S. (1988b) The Spider Impact Structure, Western Australia. *Absts. w. Progs., Geol. Soc. Am,* **20**. p. 147. [5] Shoemaker, E. M. and Shoemaker, C. S. 1996. The Proterozoic impact record of Australia, *AGSO J. Australian Geol. and Geophys*. **16**, pp. 379-398.