USING BOUNDARY-BASED MAPPING PROJECTIONS TO REVEAL PATTERNS IN DEPOSITIONAL AND EROSIONAL FEATURES ON 433 EROS. C.S. Clark[1] and P.E. Clark[2]. [1]Chuck Clark architect, 1100 Alta Avenue, Atlanta, GA 30307 (rightbasicbuilding@yahoo.com); [2]L3 Communications GSI, 3750 Centerview Drive, Chantilly, VA 20151 (pamela.clark@gsfc.nasa.gov).

Purpose: We are exploring the utility of Constant Scale Natural Boundary (CSNB) maps [1,2,3,4] for revealing surface morphology [5,6,7,8,9] and patterns in the distribution of depositional and erosional features on 433 Eros [10], a typical larger asteroid.

Constant Scale Natural Boundary Mapping of Impact-driven Morphologies: The Constant Scale Natural Boundary (CSNB) mapping method produces maps that are markedly different from those produced by more traditional methods, particularly for impact-driven surface morphologies [4,11]. CSNB maps are based on well-defined boundaries which, in the case of asteroids, are 'edges' formed at the interface of two or more impact events which occurred at different times. The asteroid, an irregular, faceted object, is logically segmented along facet-edges. If these edges are selected in a representative way, such facets act as hinges at occasional points along boundaries, resulting in a foldable 'shape model' which accurately represents the asteroid in three dimensions [4].

Traditional and CSNB maps of Eros Features: We have applied the CSNB approach to Eros, using a topography map as the background. Depositional ponds and craters with eroded bright patches are superimposed [10]. For comparison to the mercator projection [7], two CSNB projections are shown: one a more compressed, traditional-looking map centered at the largest crater, Psyche, illustrating the ridge structure relative to that feature, and the other a 'splat' map segmented along facet edges with the sharp end in the center. Understanding morphological patterns requires minimizing the distortion in important features. CSNB maps are designed to be conformal for antipodal areas and to preserve proportions in map interiors. 'Splat' projections preserve resolution as well. Mercator maps, although familiar and thus allowing instant orientation, maintain neither proportion nor resolution, producing great distortion at higher latitudes [12]. A disadvantage in use of the unfamiliar 'splat' projection is the vigilance required to keep track of features to allow orientation.

Implications for Understanding Asteroid Morphology: CSNB maps allow relationships between noses, saddles, and poles to be observed without areal distortion. Local maxima and minima in topography, representing bombardment history, are clearly aligned with map boundaries and thus emphasized on the CSNB 'splat' maps. The mercator projection gives the impression that most of the significant regolith depositional and erosional features are found in the equatorial region [10], where area/map element is greatest. The CSNB 'splat' map gives the least distorted distribution of ponds and bright patch craters. Clearly both features are found at considerable distances from the equator, even approaching the poles. Ponds are found near or on boundaries, particularly fanned out on the 'lee' side of 'noses' or ends, all near local topographic maxima which apparently act as 'dust collectors'. Bright patch craters are found at all elevations surrounding the ponds, perhaps providing a source of the dust.

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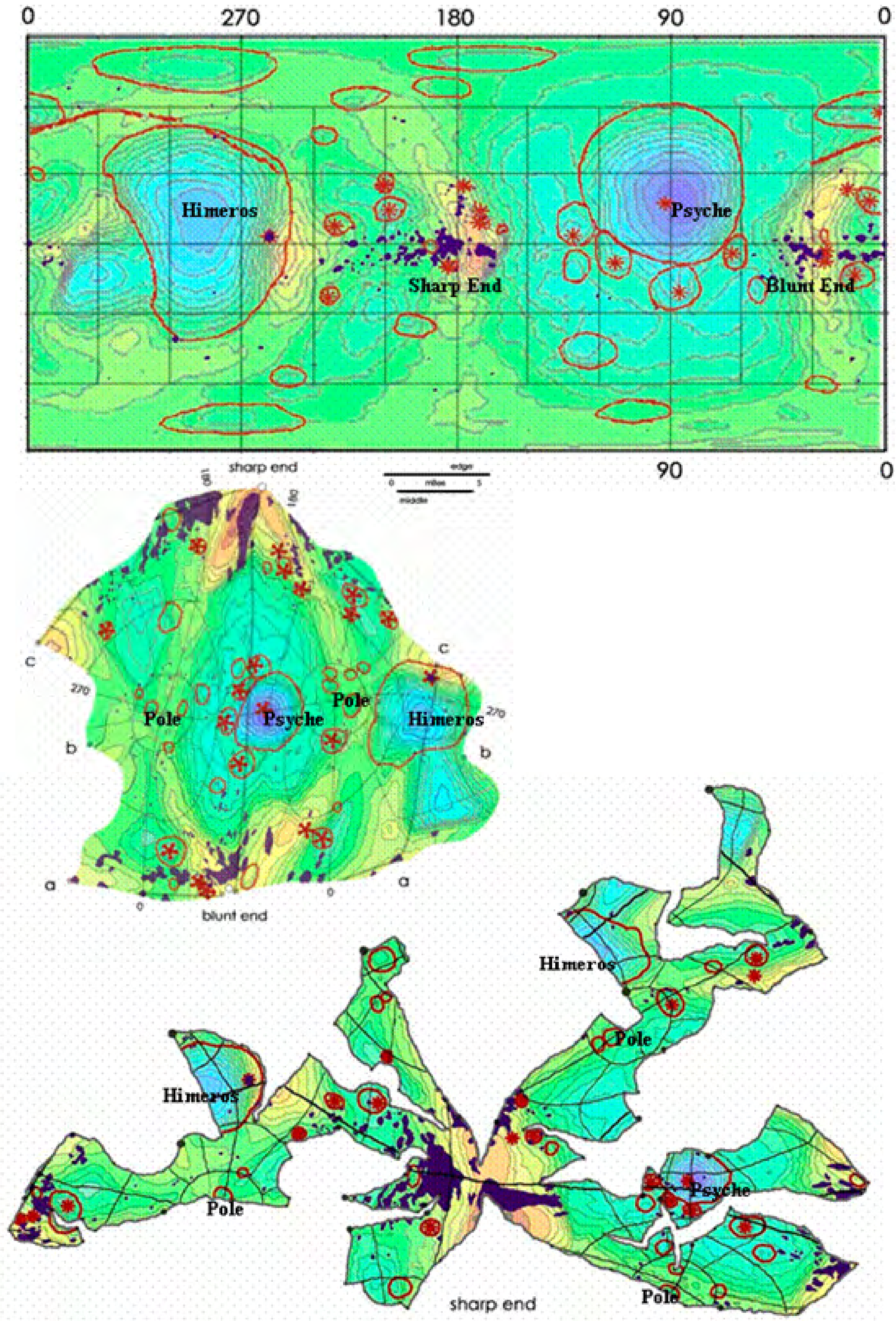
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