MARTIAN EVAPORITE DEPOSITS? A COMPARISON OF VIKING 3-POINT SPECTRA.
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Multispectral images can be used to distinguish surface materials of different composition apart from albedo differences. Here we report on a study comparing the color properties of three potential evaporite deposits on Mars.

Recent morphological studies have proposed two crater-basin deposits as analogs to Earth’s salt pans. Several other intracrater features exhibit similar albedo, size, and shapes that distinguish them from more typical eolian crater deposits (1).

High resolution Viking Orbiter coverage exists for the two previously identified candidates: A thinly-bedded deposit is visible in the interior of Bequeral crater, at 21.3N, 7.0W (2); secondly, detailed examination of a stereo pair of “White Rock” (at 8.0S, 335.0W) has supported an evaporite hypothesis as the most likely interpretation of its origin (2).

Viking Orbiter color sets (red, green, violet) taken at lowest phase angle with least atmospheric obscuration are the basis for this comparison study, which adds a third candidate we refer to as “Aeolis” (at 23.7S, 224.5W). Our measurements of color properties seek to answer two questions. How are these formations spectrally distinct from surface materials in the surrounding region? Are the deposits’ color spectra similar to one another?

All three candidates were noticed during a systematic global survey of Mars for anomalous spectral units. The search method, producing color ratio images utilizing green filter data, was previously used to identify the unique color of “Red Mesa” in West Candor Chasma (3).

A moderate resolution stereo pair shows “Aeolis” as an eroded, irregularly shaped, isolated deposit located off-center in a 40km diameter crater basin (Fig. 1). Remnants of the crater’s eroded central mountain peak are nearby, nearly buried by subsequent resurfacing. A smaller impact crater appears on top of the deposit. An ejecta origin immediately comes to mind--however, the asymmetrical shape and large extent of the deposit relative to the impact would make this a very puzzling rampart crater. Other remarkable aspects to this structure are a sloping upper surface, with high scarp to the northwest, and interior erosion that has detached portions of the deposit from the main body.

If the three candidates are compositionally similar, we can expect a better correlation between their 3-point spectra than with surface material in the surrounding region. The data used for this analysis include reflectance values at red, green and violet wavelengths from at least two radiometrically calibrated color sets covering each site; samples of nearby typical surface materials, which appear dark grey, dark red, and bright red in enhanced color composite images, are likewise measured.

If these intracrater deposits possess similar color properties, a supervised classification for such sites may be proposed to aid in the identification of other locations where photo interpretation is inconclusive.
Figure 1. Crater basin deposit seen in Viking Orbiter frame 425S01. The superposed small impact crater is thought to be coincidental.