ruled out, these values are interpreted to be indicative of primary compositional variations among the small pyroclastic deposits and are consistent with changes in the amounts of juvenile components (such as low-Ca and high-Ca pyroxene and/or olivine and volcanic glasses) and/or degrees of mixing with local highlands and mare lithologies as noted by previous authors [e.g., *Hawke et al.*, 1989].

3.2. Intradeposit Compositional Variation: The Atlas Crater Example

A key question in the compositional analysis of small lunar pyroclastic deposits is the nature and extent of possible variations within a single pyroclastic deposit [e.g., *Robinson et al.*, 1996]. Such variations, if present, may be the result of several competing effects, including maturity differences, mixing with adjacent or underlying materials (perhaps due to a thin mantling deposit overlaying a unit of different composition), and intrinsic mineralogic differences. The latter possibility is the most intriguing and may include differences in crystallinity due to eruption style or duration [e.g., *Weitz et al.*, 1998] or variations in mineralogy due to multiple eruptions occurring from a single vent or to changes in composition of a single eruption with time. Here we examine the Atlas crater floor deposits in detail to determine the nature of possible intradeposit compositional variations in this area. We selected this example because we can readily identify two distinct vents (North and South), the deposits are spatially separable (~80 km distant), topographic variations do not appear to be substantial, and the areas are covered by a single Clementine orbit with ~100 m/pixel spatial resolution.

Atlas is an Upper Imbrian crater (3.25 to 3.72 b.y. ago [*Wilhelms*, 1987]) in the highlands northeast of Mare Serenitatis, and its composition is primarily that of mature highlands materials with superimposed low-albedo, mafic deposits surrounding two irregular depressions along floor fractures in the North and South regions of the crater floor [e.g., *Hawke et al.*, 1989] (Figure 6a). To examine the possible compositional variations within the dark deposit, we measured 200-pixel (~20-km) transects in the Clementine 950/750 nm ratio data across the probable vents for the North and South floor deposits in Atlas crater (Figure 6b). Transects extend to distances of 30 to 40 pixels beyond the farthest reaches of the ~120-pixel-long deposits (Figures 6b, 7). The profiles clearly show both the spatial distribution of the deposit in a single dimension and the superimposed effects of topography (i.e., increased bright/dark patterns due to hummock slopes, floor fractures, and vents facing toward or away from the Sun and/or sensor, marked with "t" in Figure 7). Although substantial spatial variation at the pixel-

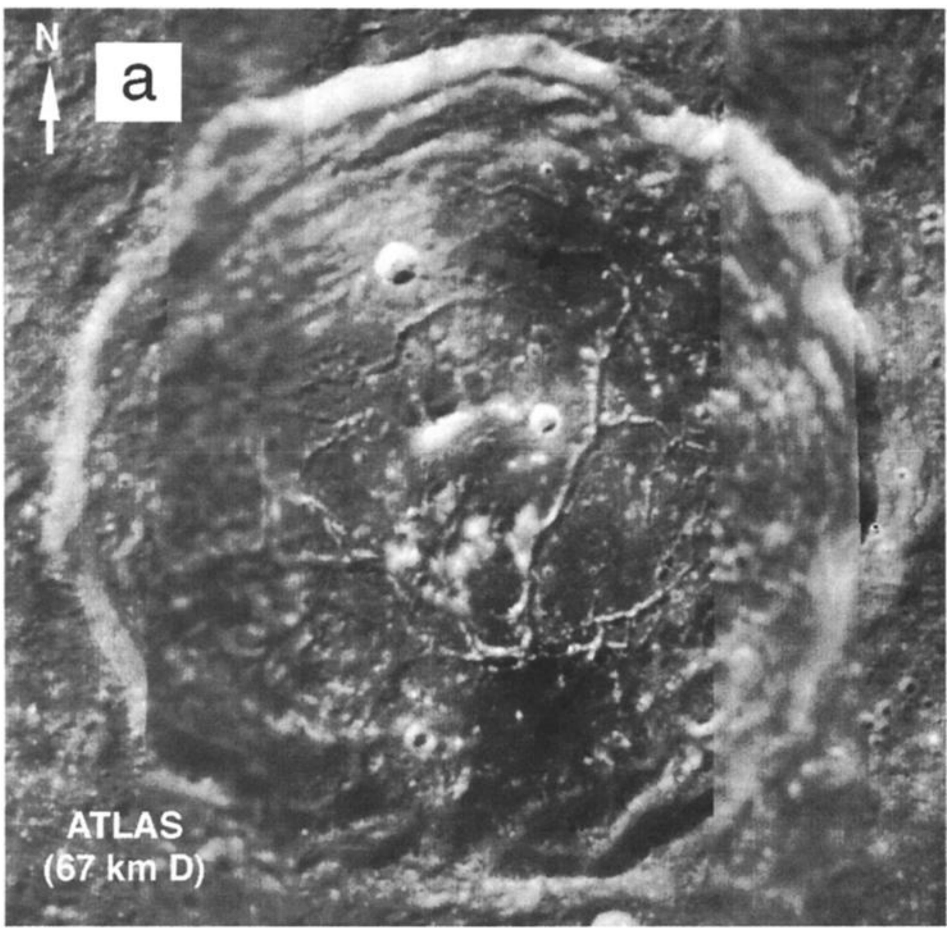

Figure 6. Atlas crater (67 km diameter): (a) Clementine albedo (750-nm) data. Note the dark pyroclastic deposits in the North and South crater floor. (b) Clementine 950/750 ratio image depicting the mafic absorption band in this area. Ratio values of ≤0.9 are black and have stronger mafic absorptions; white areas have ratio values of ≥1.11, and they have weaker mafic bands. Profile locations for Figure 7 are marked.