The coarsest blocks scattered about the surface of the Surveyor III site occur primarily in two distinct strewn fields. One field (area *B*, fig. 3–46) is associated with a sharp, raised-rim crater about 13 meters across on the northeast rim of the main crater in which Surveyor III landed; the other field (area *A*, fig. 3–47) is associated with two adjacent subdued craters high on the southwest wall of the main crater.

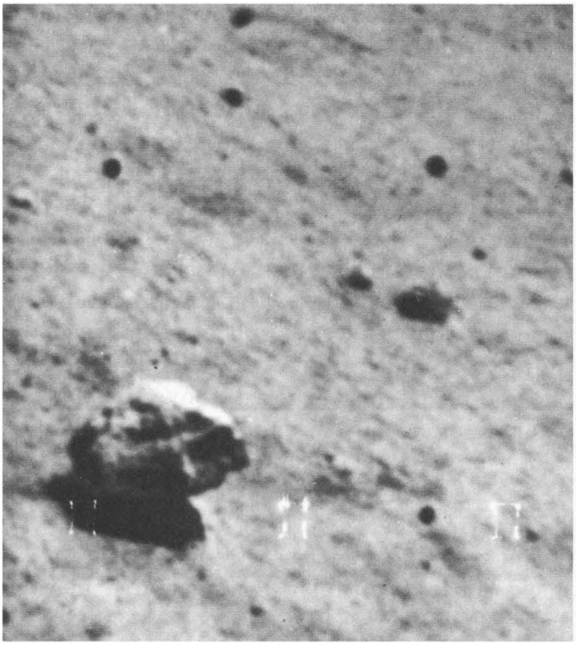

FIGURE 3–45.—Part of a wide-angle Surveyor III picture, showing rounded fragment 20 cm across lying on top of the lunar surface (Apr. 26, 1967, 09:07:06 GMT).

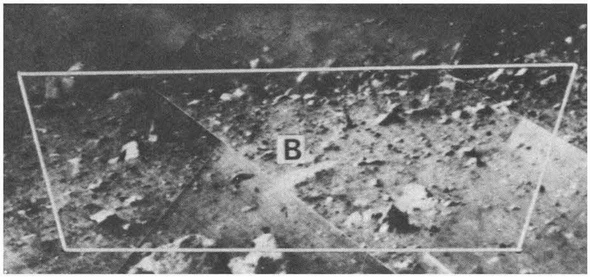


FIGURE 3–46.—Mosaic of narrow-angle Surveyor III pictures, showing a crater 13 meters across and associated strewn field of blocks on the northeast wall of the main crater, in which the spacecraft is located. The outline shows the boundary of area *B*, in which roundness factor and burial factor of blocks were measured (Catalog 88–SI).

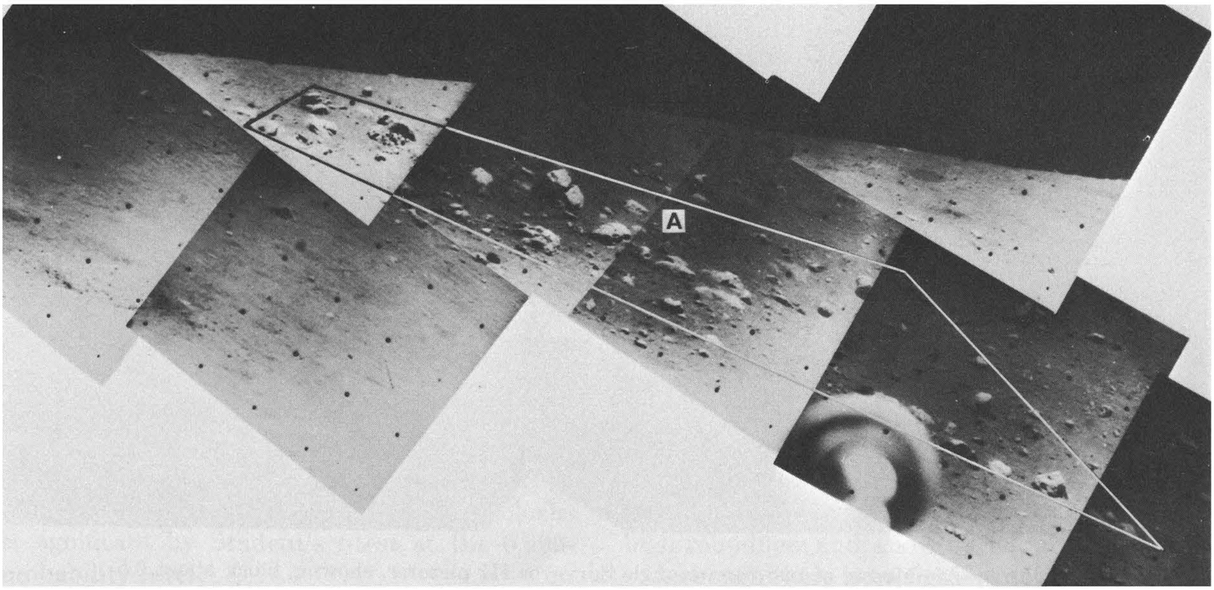


FIGURE 3–47.—Mosaic of narrow-angle Surveyor III pictures, showing part of southwest wall of main crater and strewn field of blocks. Outline shows boundary of area *A*, in which roundness factor and burial factor of blocks were measured. Two subdued rim craters with which the blocks are associated are present, but difficult to discern in these pictures because of high Sun illumination (Catalog 87–SI).

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Most of the blocks in the strewn field associated with the crater to the northeast of the Surveyor III spacecraft (area *B*, fig. 3–46) are clearly related to the crater because there is a rapid increase in spatial density of blocks toward the crater. The crater is also occupied by blocks. The blocks outside are inferred to have been ejected from this crater and to have been derived from material that underlies the surface at depths of only 2 or 3 meters. The observed blocks are strikingly angular and range from a few centimeters (the limit of resolution at this distance from the camera) to more than 2 meters across. Blocks associated with the two subdued craters to the southwest (area *A*, fig. 3–47) show a similar range in size but are more rounded. The larger of these two craters is about 15 meters in diameter; it is inferred that most of the blocks were ejected from the larger crater.

To obtain a measure of roundness that could be used for statistical studies, a descriptive parameter that may be obtained from pictures, here called the roundness factor, was devised as follows. Circles are fitted to all the corners or curved parts of the outline of each block silhouetted against the more distant lunar scene (fig. 3–48). The geometric mean of the radii of these circles is then divided by the radius of the circle that just encloses the outline of the block. This ratio is the roundness factor and, for blocks that are not deeply buried in the surface, it will vary between the limits of 0 and 1. For very round fragments whose tops are just exposed above the surface, it is possible to obtain values for the roundness factor larger than 1, although no values this high were observed for the blocks measured in the strewn fields.

The roundness factor was measured for 25 blocks located within a confined area in each strewn field (fig. 3–49). Blocks associated with the sharply formed crater to the northeast (area *B*) exhibit a mean roundness of 0.17 with

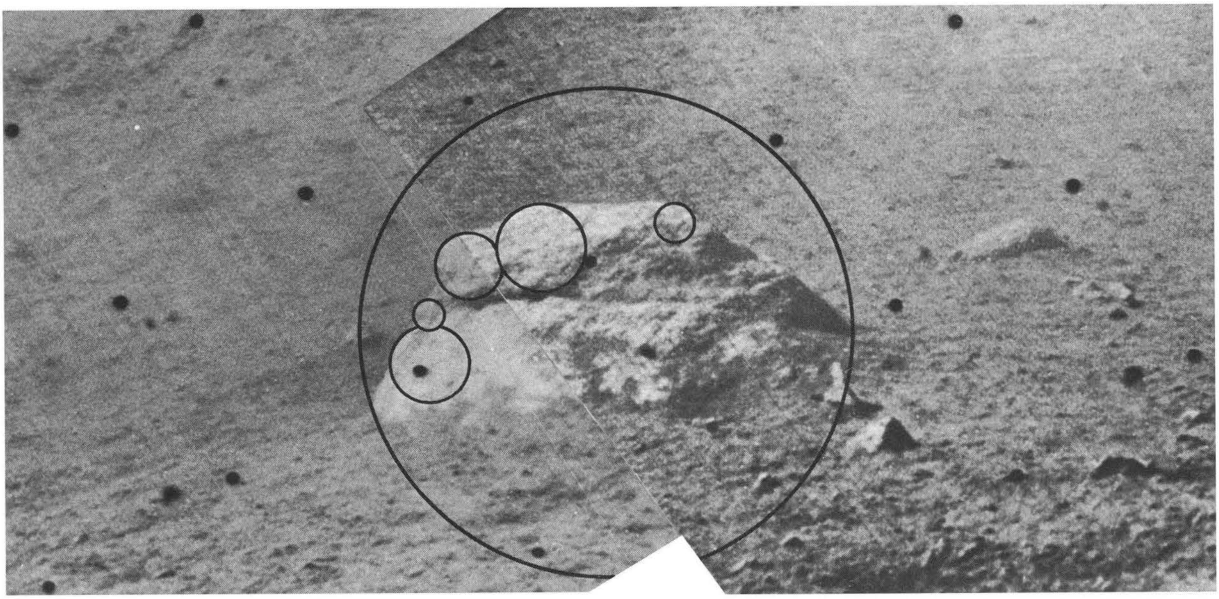

FIGURE 3–48.—Mosaic of two narrow-angle Surveyor III pictures, showing block about 0.5 meter across close to the spacecraft and position and size of circles used in measuring roundness factor. The largest circle encompasses the entire block. Smaller circles are fitted to corners and rounded parts of the outline of block that occults the distant lunar scene. The geometric mean of the radii of the small circles divided by the radius of the large circle is defined as the roundness factor (Apr. 30, 1967, 14:54:23 and 14:52:22 GMT).

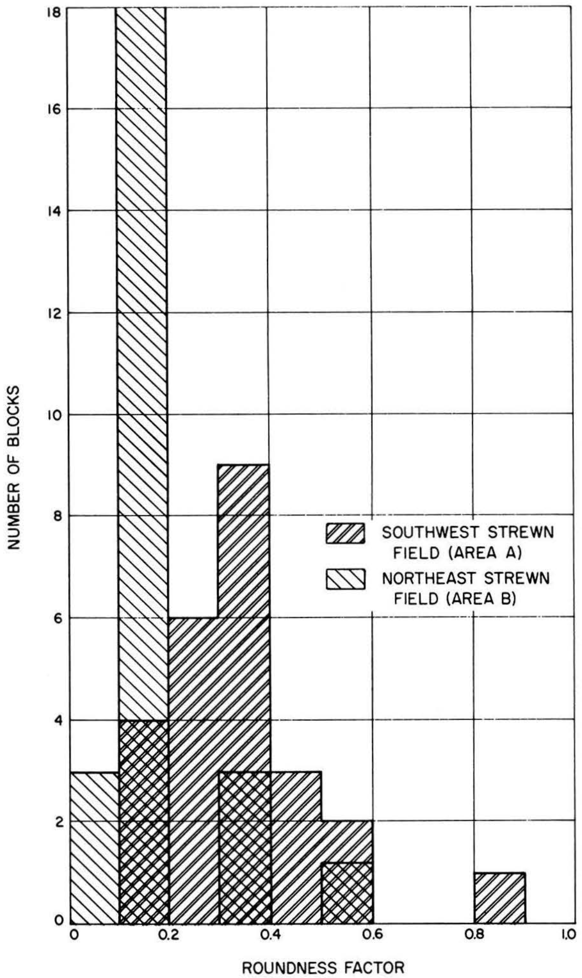


FIGURE 3–49.—Histograms showing frequency distribution of roundness factors for 25 blocks in area *A* and 25 blocks in area *B*. Blocks in area *A*, associated with subdued rim craters, are significantly more rounded than blocks in area *B*, associated with a sharp-rim crater.

a standard deviation of roundness of 0.11. The blocks associated with the more subdued, rounded-rim crater to the southwest exhibit a mean roundness of 0.33 and a standard deviation of roundness of 0.17. The difference in roundness between these two samples of blocks is significant by Student's *t*-test at the 0.999-probability level.

A measurement of degree of burial of blocks in the lunar surface was obtained by the following method. The angle between a line parallel to the horizon that meets the block where its outline against the more distant lunar scene intersects the surface, and the tangent to the outline of the block at this point was measured on each side of each block (fig. 3–50). The sum of these two angles for each block, divided by $2\pi$ radians, is here defined as the burial factor; values of this parameter can vary between 0 and 1. Rounded fragments whose tops just barely show above the surface have burial factors that approach 1, whereas rocks that sit on the surface and exhibit overhanging sides have burial factors that approach 0.

Measurement (fig. 3–51) of the burial factor for the same 25 blocks in each strewn field that were studied for roundness gave the following results: The mean burial factor of blocks associated with the sharp-rim crater to the northeast (area *B*) is 0.62 with a standard deviation of burial factor of 0.09. The blocks associated with the more subdued, rounded-rim crater to the southwest (area *A*) have a mean burial factor of 0.69 with a standard deviation of burial factor of 0.07. The difference between these means is significant at the 0.995-probability level by Student's *t*-test.

No significant correlation was found between roundness and burial of individual blocks within each strewn field. The linear correlation coefficient between the roundness factor and burial factor for the blocks in the strewn field around the northwest crater is $-0.07$; for the blocks in the strewn field associated with the southwest crater, it is $-0.16$. Both these coefficients are well below the 95-percent confidence level. If the blocks in both the strewn fields are examined as a single sample, the linear correlation coefficient between roundness factor and burial factor is $+0.13$, which is also below the level of significance. Examination of the scatter diagram (fig. 3–52) of burial factor versus roundness factor shows that, although there is no significant linear correlation, relatively few blocks in the strewn fields tend to have both high roundness and a low burial factor.

Although there is no significant linear correlation between roundness and burial for blocks in a given strewn field presumably of one age, there should be a correlation between the roundness and degree of burial for fragments generally mixed together in the debris layer, or

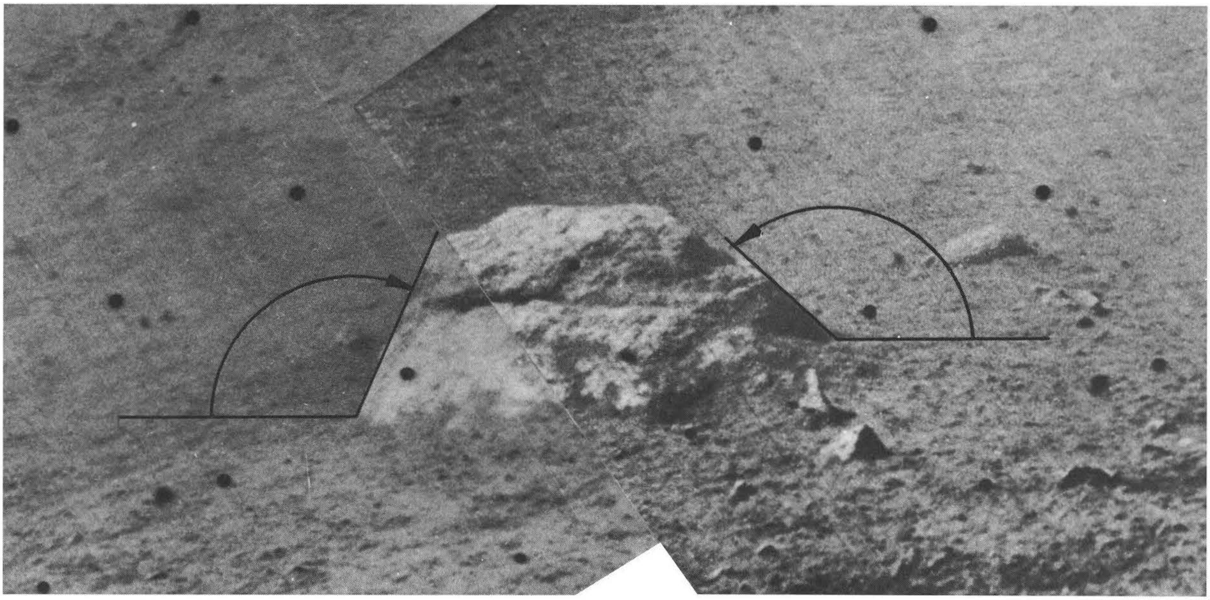

FIGURE 3–50.—Mosaic of two narrow-angle Surveyor III pictures, showing block about 0.5 meter across close to spacecraft and angles measured to determine burial factor. Angles are measured between lines parallel with the horizon and the tangents to the outline of the block, where the outline of the block against the more distant lunar scene meets the surface. The sum of the two angles divided by $2\pi$ radians is defined as the burial factor (Apr. 30, 1967, 14:54:23 and 14:52:22 GMT).

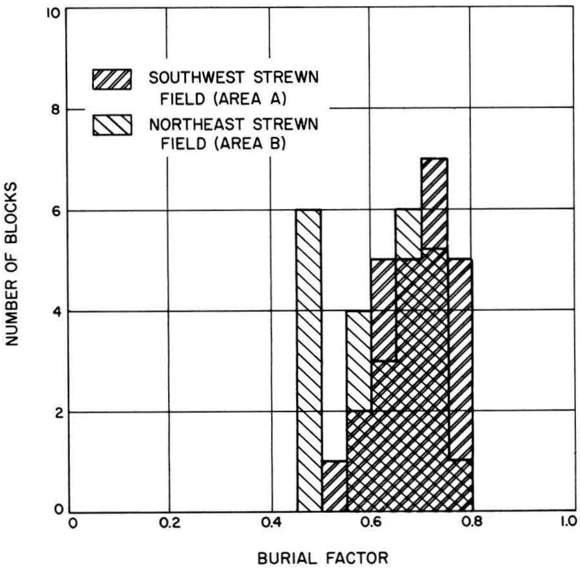


FIGURE 3–51.—Histograms showing frequency distribution of burial factors for 25 blocks in area *A* and 25 blocks in area *B*. Blocks in area *A*, associated with subdued rim craters, are significantly more deeply buried in the surface than the blocks in area *B*, associated with a sharp-rim crater.

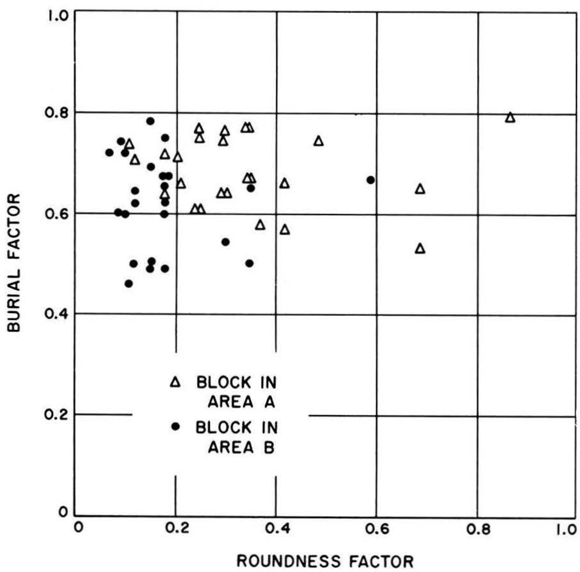


FIGURE 3–52.—Scatter diagram of roundness factor versus burial factor for 50 blocks in areas *A* and *B*. The roundness factor and burial factor have no significant linear correlations; relatively few blocks, however, exhibit both high roundness and low burial.