DEPARTMENT OF THE INTERIOR
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IWAHASHI AND HEIRONIMUS—LANDSAT IMAGERY
ALIGNMENTS, FAIRFAX CO., VA.

MAP SHOWING LANDSAT IMAGERY ALIGNMENTS IN FAIRFAX COUNTY, VIRGINIA

by

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1978

This map was prepared from LANDSAT 1 and 2 imagery at an approximate scale of 1:500,000. These are standard false color composite paper prints produced at the EROS Data Center, U.S. Geological Survey, Sioux Falls, South Dakota. Two of seven available imageries were chosen for analysis, NASA-E-1944-15030 taken February 22, 1975 and NASA-E-2076-15080 taken April 8, 1975, as they displayed good vegetation contrast and high landform relief. Standard stereoscopic techniques used in aerial photographic interpretation were applied and alignments were mapped on a clear overlay. This overlay was then enlarged to 1:48,000 by photo-mechnical and manual methods in order to superimpose the results on a county base map at the same scale. Alignments were grouped into five categories according to intensity, and in the case of category 5, distinct landform pattern. The resulting map was divided into 5 square kilometer (2 sq. mile) grid cells. The length and direction of each alignment within a given grid cell was measured and assigned to one of the five categories.

The results are summarized in figure 1. Each rose diagram includes the entire area of Fairfax County and represents a single category. Direction has been divided into sections of 15 degrees. The number of alignments present in each section of each rose diagram is given by numbers in brackets. The length of alignments in each section taken as part of the total length of alignments in the corresponding category was used in order to show meaningful relationships between alignments and orientation. Significant values are shown in percentages of the total length in each category. This is also diagrammatically shown by the relative lengths of the black bars in each section of a given rose diagram. Considering the length of alignments without regard to intensity (i.e. categories), nearly 60% of all measured features have orientations between 15° and 60° NE. Figure 1 shows that 37% of the very strong alignments of category 1 are oriented in a northwest-southeast direction. However, the prevalent orientation of alignments in categories 2,3,5, and, to a lesser extent, 4 is in a northeast-southwest direction. Comparison of this map with the county geologic map(Drake, and others, in preparation) shows that strong and very strong alignments are often associated with alluvial valleys. Some of the medium and weak alignments also coincide with steep valleys in the southern part of Fairfax County. In the northern portion of the county, weak alignments appear to parallel foliation and fold axes, whereas very strong alignments sometimes "crosscut" predominant structural trends. Comparison of this map with the map of planar and linear features (Froelich, 1978) which shows joints, fractures, and faults tends to verify some of these alignments as true, geologically influenced, lineaments. In conclusion, this map may prove useful in further field studies of Fairfax County, such as that done by Langer and Obermeier(1978) on fracture and joint orientation.

References Cited:

Drake,A.A.Jr., Nelson,A.E., and Force,L.M., 1978, Preliminary geologic map of Fairfax County, Virginia: U.S. Geol. Survey open file report(in prep).

Froelich,A.J., 1978, Map showing planar and linear features of Fairfax County, Virginia: U.S. Geol. Survey open file report 78-443.

Langer,W.M., and Obermeier,S.F., 1978, Relationship of landslides to fractures in Potomac Group deposits, Fairfax County, Virginia, in: Proceedings of the 29th Annual Highway Geology Symposium, Maryland Geol. Survey Report of Investigations (in prep.).

Category 1: very strong (heavy bold dashed line)
Category 2: strong (bold dashed line)
Category 3: medium (slender dashed line)
Category 4: weak (short broken line)
Category 5: convex or ridge-shaped (dotted line)

Fig. 1. Rose diagrams of each category illustrating the relationship between orientation and length percentage of LANDSAT alignments.