

LINEAMENT ANALYSIS OF SATELLITE AND HIGH ALTITUDE IMAGERY,
BLACK HILLS - BIGHORN REGION

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ABSTRACT

Lineaments (here defined as generally rectilinear lines or zones of structural discordance of regional extent) are structural elements of fundamental tectonic significance. Their extent and role are, however, topics of considerable debate. One of the objectives in the analysis of ERTS-1 and Skylab imagery in this region was to determine whether known lineaments could be extended beyond their presently mapped limits and to verify the presence or absence of other proposed lineaments.

The Nye-Bowler lineament cannot be extended eastward from the Pryor Mountains. The Ten-sleep lineament shows no surface expression in the basins. Similarly, the Tongue River and Florence Pass lineaments are essentially restricted to the Bighorn uplift. The Thermopolis lineament is cut off by a north trending structural linear east of Thermopolis and no sign of it is seen across the southern Bighorns. A possible on-line segment in the Powder River basin is an abrupt change in strike of the Lance and Fort Union Formations and an associated group of short northeast trending en-echelon faults. Winter scenes of the Black Hills region show that the prominent Fanny Peak lineament is on line with the Old Woman anticline and Hartville uplift to the south but there is no continuous connection between these structures apparent on the imagery.

These observations suggest that speculated lengthy extensions of individual lineaments are probably not warranted and that the surface expressions of lineaments are mainly limited to the uplifts. Even though there are possible extensions into the basins based on subsurface data, there appear to be no surface indications of their presence in the cover of younger Tertiary sediments. The most recent movements along these zones appear to be Laramide and to have been concentrated primarily in the uplifts.