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AEROMAGNETIC MAP OF THE LONGVIEW AREA, SOUTHWEST
WASHINGTON AND NORTHWEST OREGON

by

U.S. Geological Survey

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DESCRIPTION

An aeromagnetic map of the area straddling the Columbia River in western Washington and Oregon was compiled from digitally-recorded aeromagnetic data acquired during summer, 1995. Total-field aeromagnetic data were collected at an altitude of 1000 ft. (304 m) above terrain with lines directed east-west and spaced 500 m apart in the northeastern section of the map and 1000 m apart in the southwestern part. Eight tie lines were flown in the perpendicular direction and two were directed northwest and northeast, but these were not included in the present compilation. Navigational information was provided in real time using an on-board Global Positioning System (GPS) with estimated total accuracy of 15 to 20 m. The Cesium magnetometer had a 0.1 nT sensitivity. Airborne magnetic values were recorded every 0.5 second. A ground-based proton-precession magnetometer monitored daily variations of the earth's magnetic field.

Airborne measurements of the total magnetic field were adjusted for daily magnetic field variations using data from the ground magnetometer. Adjusted total-field values were converted to total-field anomaly values by removing the Definitive International Geomagnetic Reference Field (DIGRF1990) adjusted for secular variation.. These data were projected using a Lambert Conformal Conic projection with a central meridian of 122° W, a base latitude of 45° N and standard parallels of 33° and 45° N. The projected data for the east and west halves were interpolated onto regularly spaced grids by means of a computer program (Webring, 1981) that uses a minimum-curvature interpolation formula (Briggs, 1974). These grids were merged together and color shaded to make the accompanying map. The dashed line shows the boundary between the northeastern and southwestern sections of the surveys. The lines delineate rivers and other water bodies.

The magnetic data were acquired by the USGS to assist ongoing geologic mapping efforts and to improve understanding of earthquake-related faulting, Quaternary aged volcanism and the tectonic history of the area, especially where concealed by vegetation, water and urban development. High amplitude positive anomalies west of the Cowlitz river are primarily caused by Eocene basalts and gabbros of the Crescent Formation (Finn, 1990). Magnetic lows over the Tillamook Highlands are caused by reversely-magnetized volcanic rocks. Associated with overturned normally magnetized Crescent rocks (Wells and Coe, 1985) at 123° 15' W and north of 46° 15'W is a high-amplitude north-trending magnetic low. This deformation may be causing normally-magnetized rocks to appear reversed on the aeromagnetic map. The high-frequency positive anomalies on the eastern side of the map are related to Cascade volcanic rocks (Finn, 1990). Miocene Columbia River basalts also produce high-frequency positive anomalies on the map west of 123° W. Some linear gradients and anomalies correlate with known faults, while other anomalies may reflect previously unrecognized faults beneath covered areas. The aeromagnetic map abuts another survey over the Portland area (Snyder et al., 1993); some north-west trending anomalies interpreted to be faults from Portland area (Blakely et al., 1995) continue northwest.

This map and description is available at a scale of 1:250,000 in postscript format for downloading from the World Wide Web. The URL is http://geophysics.cr.usgs.gov/potential_field/longview_mag.html. It is also available via anonymous ftp on [musette.cr.usgs.gov/pub/cfinn/longview_mag.ps](ftp://musette.cr.usgs.gov/pub/cfinn/longview_mag.ps).

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