

DESCRIPTION

An aeromagnetic map of the Portland-Vancouver metropolitan area was compiled from digitally-recorded aeromagnetic data acquired by the U.S. Geological Survey (USGS) during September, 1992. The survey was flown with a Fairchild Helio-Porter STOL aircraft at a nominal elevation of 240 m above terrain along 122 flightlines spaced approximately 450 m apart and directed northeast-southwest (fig. 1). Four tie lines were flown in the perpendicular direction, but these were not included in the present compilation. Total flightline distance was approximately 5700 km. Navigational information was provided in real time using an on-board Global Positioning System (GPS) with estimated accuracy of 15 to 20 m. The airborne magnetometer was of the proton-precession type with 0.5-nT sensitivity. Magnetic values were recorded every 0.5 second. A ground-based, proton-precession magnetometer monitored daily variations of the earth's magnetic field.

Map compilation included the following steps: Airborne measurements of 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 subtracting the International Geomagnetic Reference Field (IGRF85) adjusted for secular variation. Navigational information was merged with the magnetic data using standard practices established by the USGS. This procedure included the elimination of obvious errors ("spikes") from the data. Corrected data were prepared for machine contouring by interpolating to a rectangular grid using a minimum-curvature technique (Briggs, 1974); grid intersections were spaced 0.2-km apart. Two adjacent flightlines were not used in the compilation because of a temporary failure of the GPS navigational system. The location of these missing flightlines is apparent on figure 1. Other data gaps occurred because radio towers on elevated regions interfered with the aircraft flight plan.

The accompanying color map shows contours of the total-field anomaly superimposed on a digital basemap. The basemap consists of both hydrographic and cultural features, such as roads, towns, and section lines, digitally scanned from topographic quadrangle maps published by the USGS at 1:100,000 scale (Nehalem River, Oregon and Washington; Vancouver, Washington; Yamhill River, Oregon, and Oregon City, Oregon). Basemap files and aeromagnetic data were combined digitally using a variety of raster, vector, and display tools in Arc/Info, a commercial Geographic Information System (GIS) software package from Environmental Systems Research Institute, Redlands, California. Color presentation was prepared by Digital Prism, San Carlos, California.

These magnetic data were acquired by the USGS to assist ongoing geologic mapping efforts and to improve understanding of earthquake-related faulting and Quaternary-aged volcanism in the Portland-Vancouver metropolitan area, especially where concealed by vegetation, water, and urban development. Magnetic anomalies in this area originate principally from three volcanic units: Eocene basaltic basement, presumably representing an accreted oceanic terrane; folded and faulted flows of the Miocene Columbia River Basalt Group; and locally erupted basalt of Plio-Pleistocene age. Some linear anomalies and gradients correlate with several known faults in these rocks, while other anomalies may reflect previously unrecognized faults beneath covered areas (Blakely and others, 1993).

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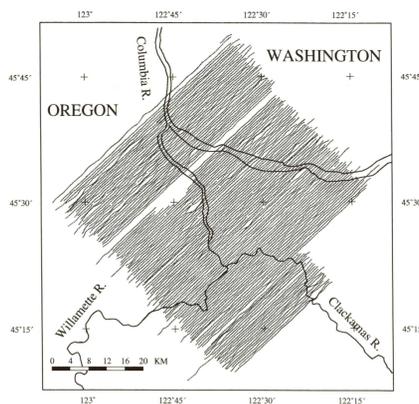
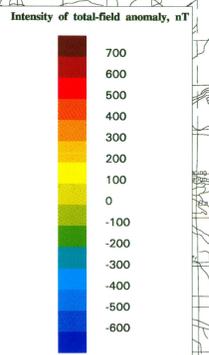


Figure 1—Map showing location of flightlines.

SCALE 1:100000
1 2 3 4 5 6 7 KILOMETERS

AEROMAGNETIC MAP OF THE PORTLAND-VANCOUVER METROPOLITAN AREA, OREGON AND WASHINGTON

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