

Alaska Science Forum

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Why are magnetic compasses so notoriously inaccurate at high latitude? The reason is not the weakness of the magnetic field near the pole. In fact, the earth's magnetic field near the north or south pole is about twice as strong as near the equator. The trouble is that, near the poles, the magnetic field points the wrong direction—it is nearly vertical. At the equator the magnetic field is horizontal, and there it points roughly north-south.

In navigation one wants to know the direction in the horizontal plane, that is, the direction of north, south, east and west. But in the polar regions, a compass needle suspended from its center will align itself almost vertically—not too useful when one is seeking the direction of north.

At Ketchikan the free compass needle points 17 degrees from the vertical; in the Nome and Anchorage areas, about 15 degrees; at Whitehorse, 14 degrees; at Fairbanks, 13 degrees; and at Barrow, only 11 degrees from vertical. Hence in Alaska and northern Canada, the magnetic field exerts little horizontal force on a compass needle. The force that is exerted causes the compass to point horizontally well east of north, by amounts ranging from less than ten degrees in the Aleutians to as much as 40 degrees near Barter Island.

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