



FROM POLE TO POLE

THE NORTH POLE ISN'T WHERE YOU THINK IT IS AND WITHOUT MORE FREQUENT UPDATES TO THE WORLD MAGNETIC MODEL, YOU WON'T BE WHERE YOU THINK YOU ARE EITHER, SAYS **ALISTAIR MACLENAN**

This February, an updated version of the World Magnetic Model (WMM) was released that included a new location for the North Pole. This update had been scheduled for 2020 but given the speed that the pole is racing from Canada to Siberia, the American National Centers for Environmental Information took the unusual decision to bring it forward. And with good reason.

The WMM was created by the joint forces of the US Department of Defense, the UK Ministry of Defence, NATO and the World Hydrographic Office to be a common global-magnetic model for navigation. You can imagine that location accuracy is important to these organisations.

With a quartet like that behind it, it's unsurprising to learn that many civilian organisations have adopted the model as the basis of their navigation systems. For example, the WMM is installed in both the Android and Apple iOS mobile phone operating systems.

But if the world's digital compass needles are pointing at a North Pole that isn't there, we may know 'where' we are, just not which direction we are facing.

That the North Pole is moving is not unusual. Like all the other poles – although North and South are the strongest, the planet supports a number of other 'quadrupolar' poles – our beacon of the North completes a daily circuit of some 80km and in the past 150 years it has

journeyed northwards more than 1,110km.

What is surprising those who watch these things is the speed with which it is now moving – some have estimated the rate of change is up to five times what it was 50 years ago.

So, is it a love of vodka and the politics of a single-party state that is drawing this natural phenomenon over the International Date Line towards a delightful dacha somewhere outside Moscow? Unlikely.

The magnetic poles exist because of what is quite some distance under our feet. We live on the solid outer crust of the Earth,

spans the entire globe and one you can see when it interacts with the solar winds to provide the ethereal aurora borealis.

So why is it moving so quickly now and what does that mean for future pathfinders?

Since the magnetic field itself is generated by the outer core, it seems sensible to theorise that something has changed within it. One explanation is that a fast-moving, 'jet stream'-like mass of molten metal is dragging the pole with it as it moves.

And it may drag the North Pole far enough that it 'flips' and becomes the South Pole. According to the history

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which wraps around the plasticine-like mantle below it. Under that is a molten outer core of liquid metals, such as iron and nickel, which in turn envelops the solid inner core.

The movement of those metals in the outer core, brought on by the spin of the earth (a Coriolis force) combined with local changes in temperature, pressure and metallic compositions, create a mass of whirling convection currents and hence a flow of electricity.

As every student of James Clerk Maxwell knows, electric current produces its own partner magnetic field – in this case, one that

stored in the orientation of grains within rocks, this has happened many times in the past, which suggests that there is no reason it won't happen again.

So, as ever, the future is uncertain. Updates will likely come more often than once every five years to account for the increasing errors in location. But there may come a time when up is down and then where will we be?

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