

The Earth's Magnetic north pole is in the North Pole

First, let's make the distinction between North Pole (capital N and capital P) and magnetic north pole (lower case n and lower case p). North Pole with capitals is a location on Earth where Santa Clause is supposed to live and we often call it the geographic North Pole. Magnetic north pole without capitals is where the north pole of a magnet would be if the Earth were a huge bar magnet and I'll be calling that the magnetic north pole.

Turns out that the magnetic north pole is not located near Santa's hometown. It is actually in the Geographic South Pole in Antarctica. The reason for this is more historical than it is scientific. Keep in mind that you cannot look at a magnet under a microscope and determine which end is north. You cannot sprinkle iron filings on it and figure it out either. North pole is simply a name that we gave one end of the magnet and there is no scientific reason to call it that. It is simply a name.

Early in the history of compasses, the end that points to the North was called the "North Seeking Pole." Eventually, this was shortened to "North Pole." So, the end of the bar magnet labeled with the letter "N" is the north pole of the magnet and it points north. But if the north pole of a magnet is attracted to the Earth's magnetic pole in the north, that pole must be the south magnetic pole because it attracts the north pole of the compass or magnet.

So, the south magnetic pole is near the geographic North Pole and the north magnetic pole is near the geographic South Pole. Strange, but true.

The reason that I said that it is "near" the geographic pole is that the spot where the magnetic field is most concentrated and the axis on which the Earth spins are not aligned. A compass points to the magnetic south pole which is near the geographic North Pole. Depending where you are on Earth, the difference between geographic North Pole and magnetic north pole varies and can be substantial. If you are using a compass to find a camping spot, it is not worth worrying about. But if you are circumnavigating the globe in a hot air balloon, it might.

To help crush this misconception, make sure that students truly understand the attraction and repulsion of the magnetic poles by allowing them to play with labeled magnets. Have them build a compass by rubbing a paper clip on a strong magnet and then floating it on water. Have them label the end of the paper clip that points north as the "north pole" of the magnet. Then ask them which magnetic pole that end of the magnet would be attracted to. If that end is pointing north and is attracted to magnetic south poles, then the Earth's magnetic south pole must be in the geographic North Pole. You can also purchase Earth-shaped balls that have magnets inside of them and students can use compasses and other magnets to investigate how the magnetic field changes around the Earth. Just make sure that they put the magnet in there the right way.

In summary, because of the way that magnets are labeled, the Earth's magnetic north pole is in the Geographic South Pole and the magnetic south pole is in the Geographic North Pole.