



BIG TIME ATTIC
AND PRESENT

SURVEY ALONG A CAVE



Journey along field line



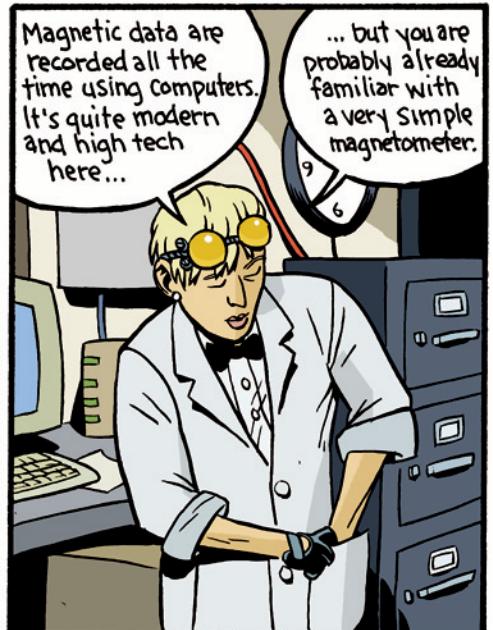
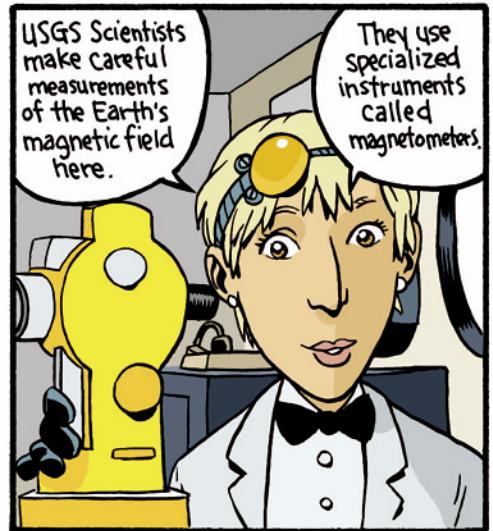
Written and produced by BIG TIME ATTIC
and Jeffrey J. Love of the
US GEOLOGICAL SURVEY.

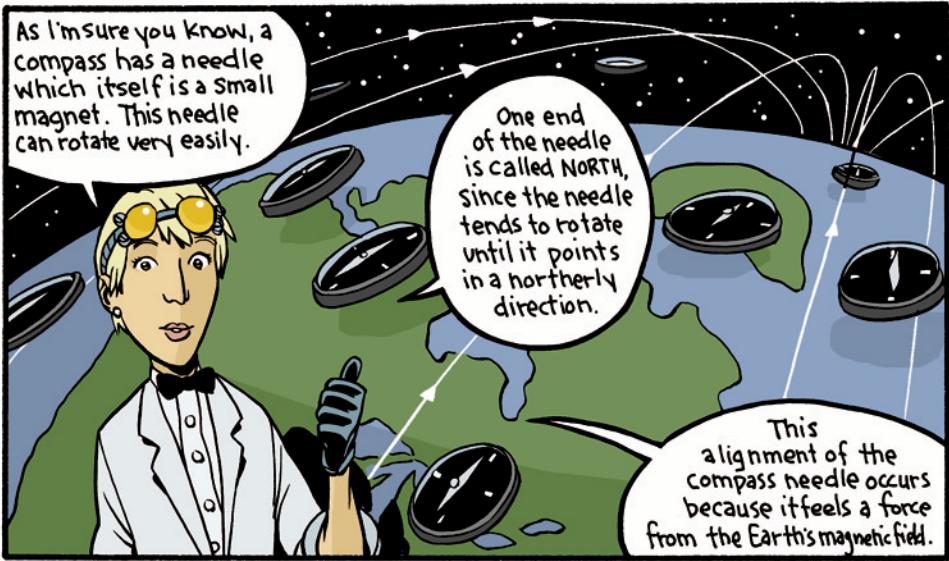
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At the US Geological Survey's
MAGNETIC OBSERVATORY
in
BOULDER, COLORADO





Let's have a quick look at the Earth's magnetic field. At the Earth's Surface, the field has two poles, called North and South magnetic dip poles, where the magnetic field is concentrated.

NORTH DIP POLE

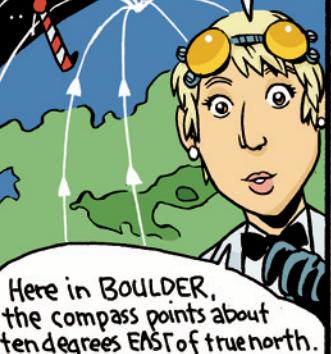


SOUTH DIP POLE

The magnetic field of the Earth points outward at the South dip pole and INWARD at the NORTH dip pole.



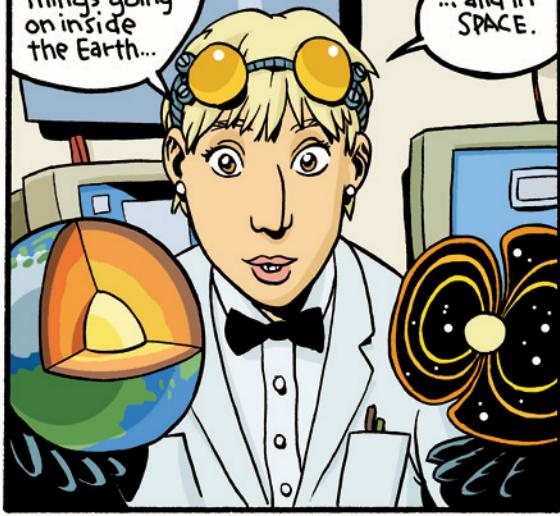
But the magnetic poles are not perfectly aligned with the geographic poles of the Earth. And almost anywhere you go on Earth's surface, you will find that the compass doesn't point exactly NORTH. This has caused problems for navigators over the centuries.



Also, the magnetic field CHANGES over time!

This is caused by surprising things going on inside the Earth...

...and in SPACE.



Take a look at this. If I turn my compass on its side, I see that the needle tends to point kind of downwards...

...into the Earth's interior.

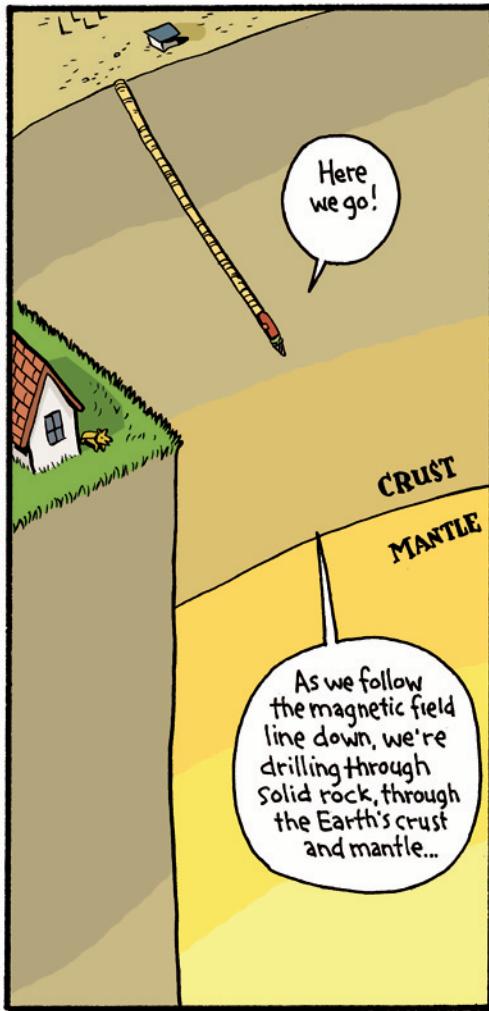
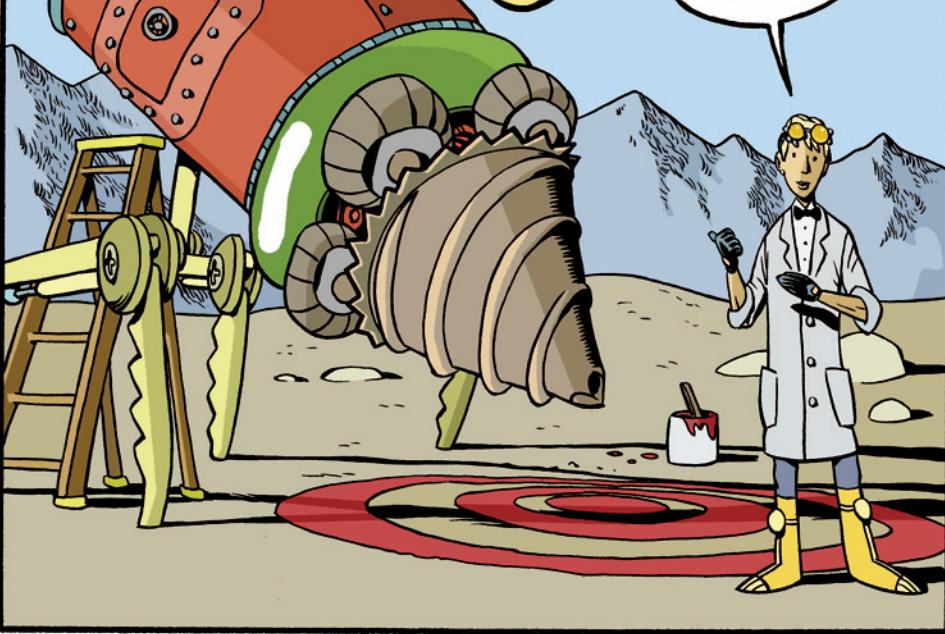
Let's follow our compasses on an incredible ride!

Let's take a...

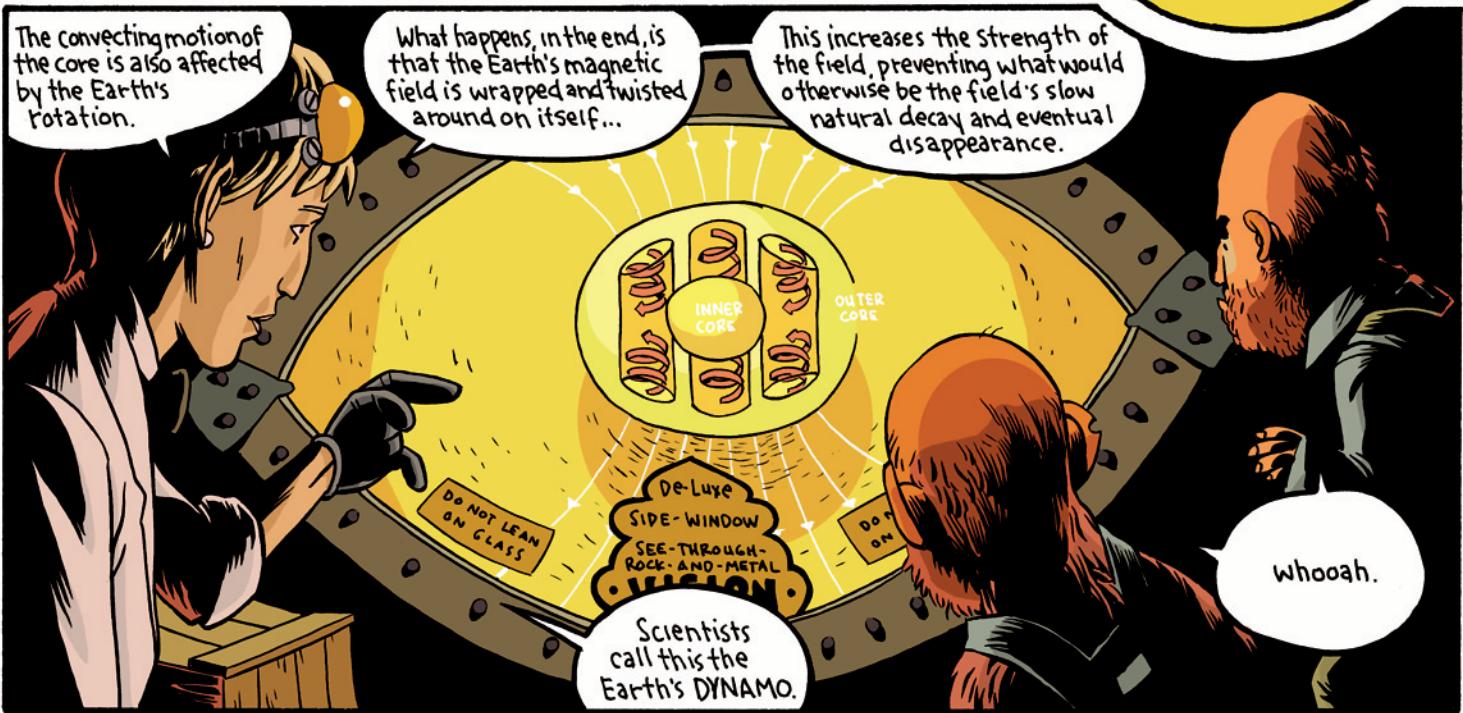
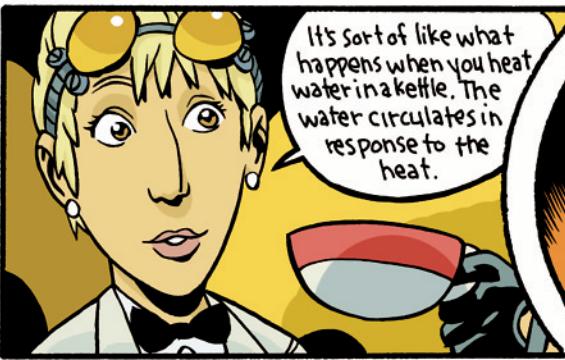
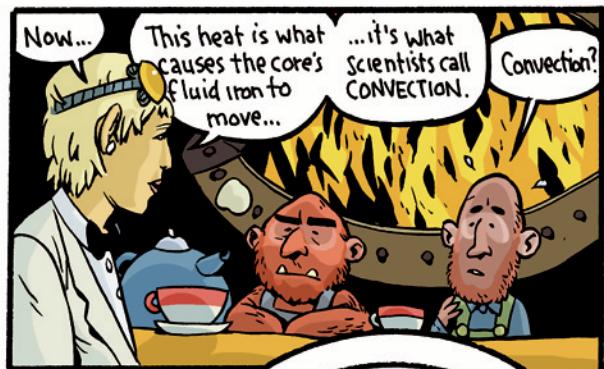
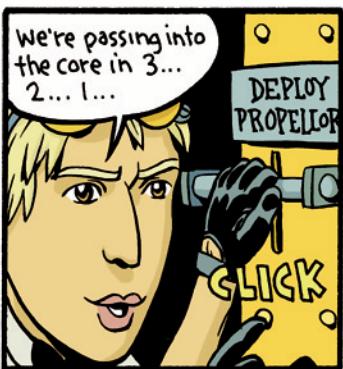
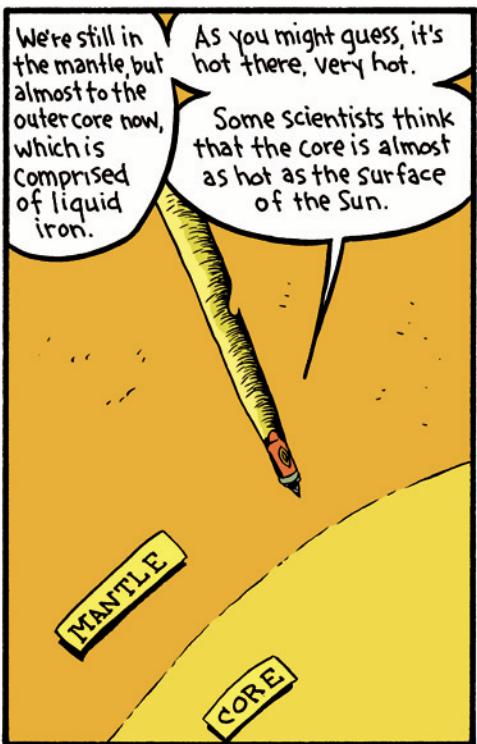


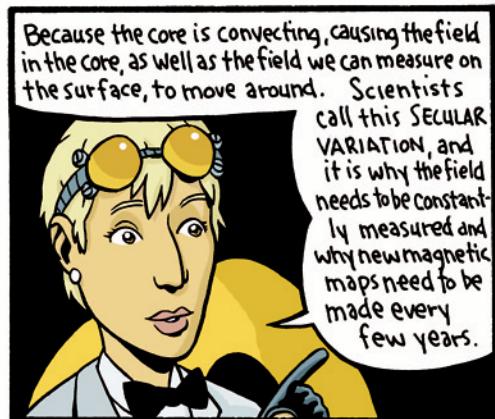
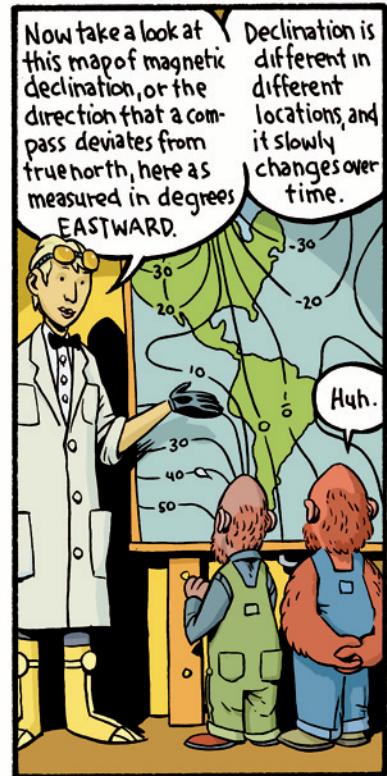
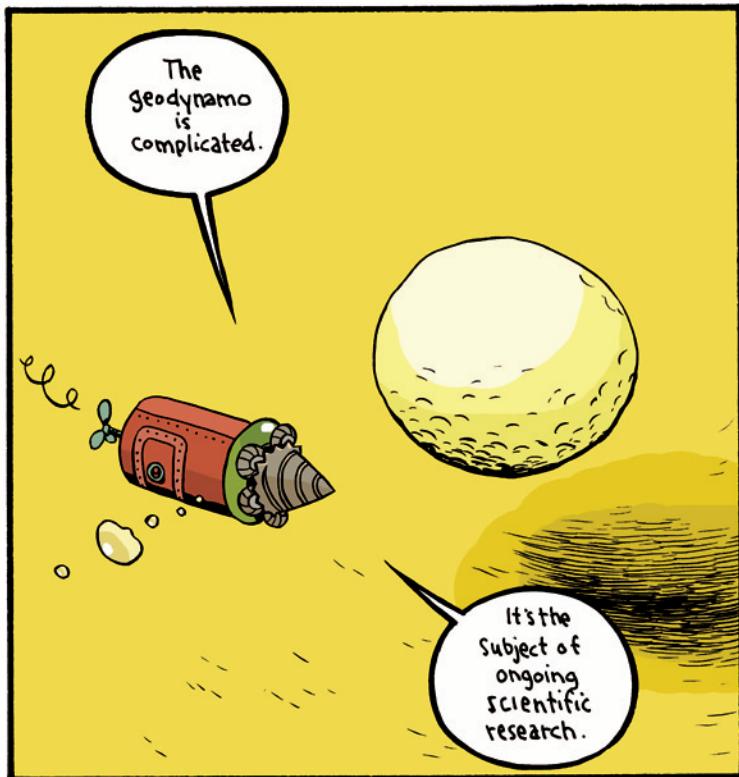
JOURNEY along a FIELD LINE

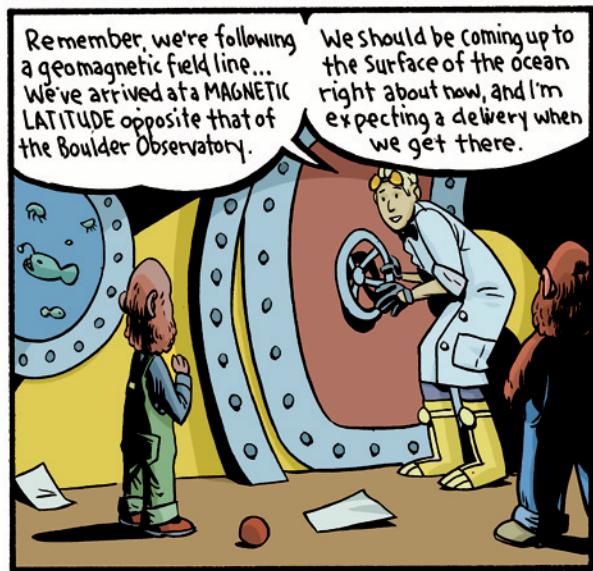
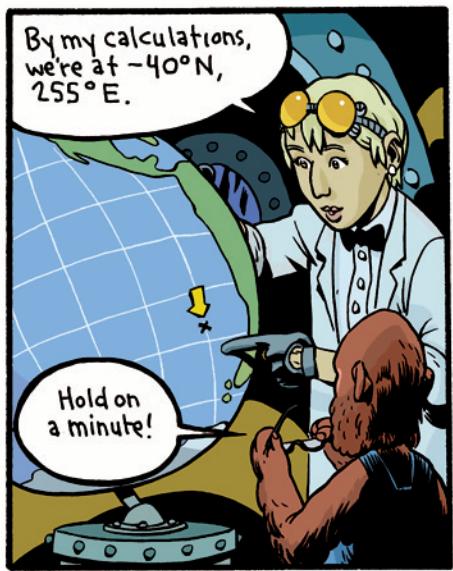
Hop on in;
there's plenty
of room!

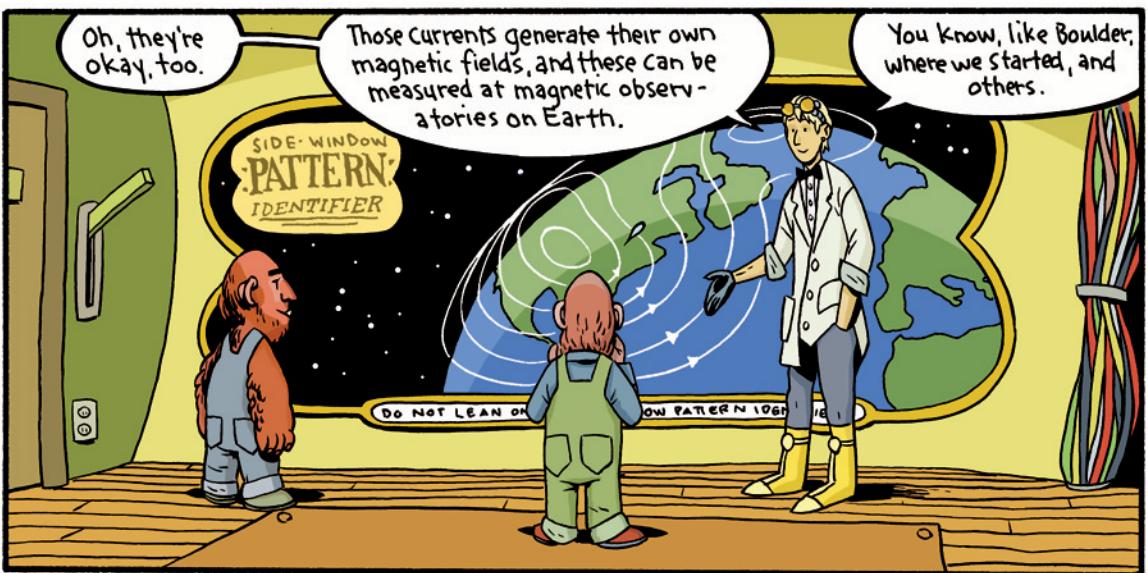
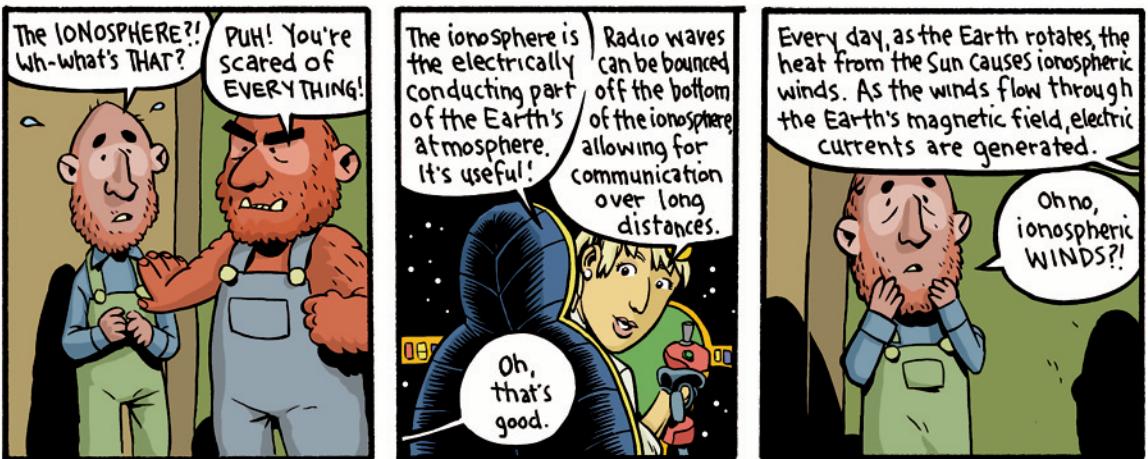


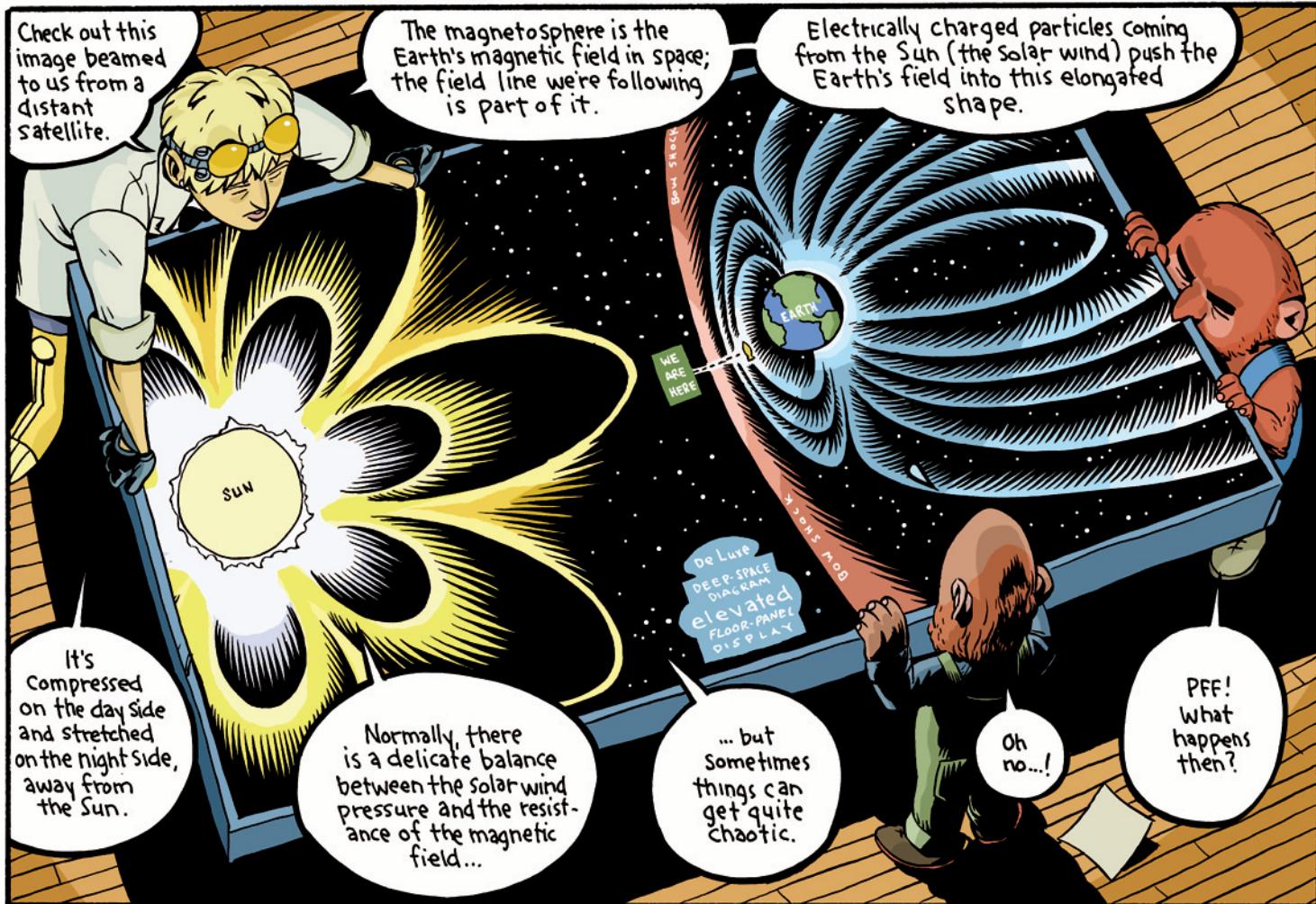


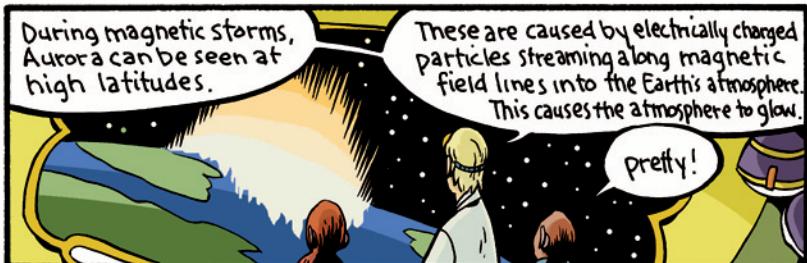
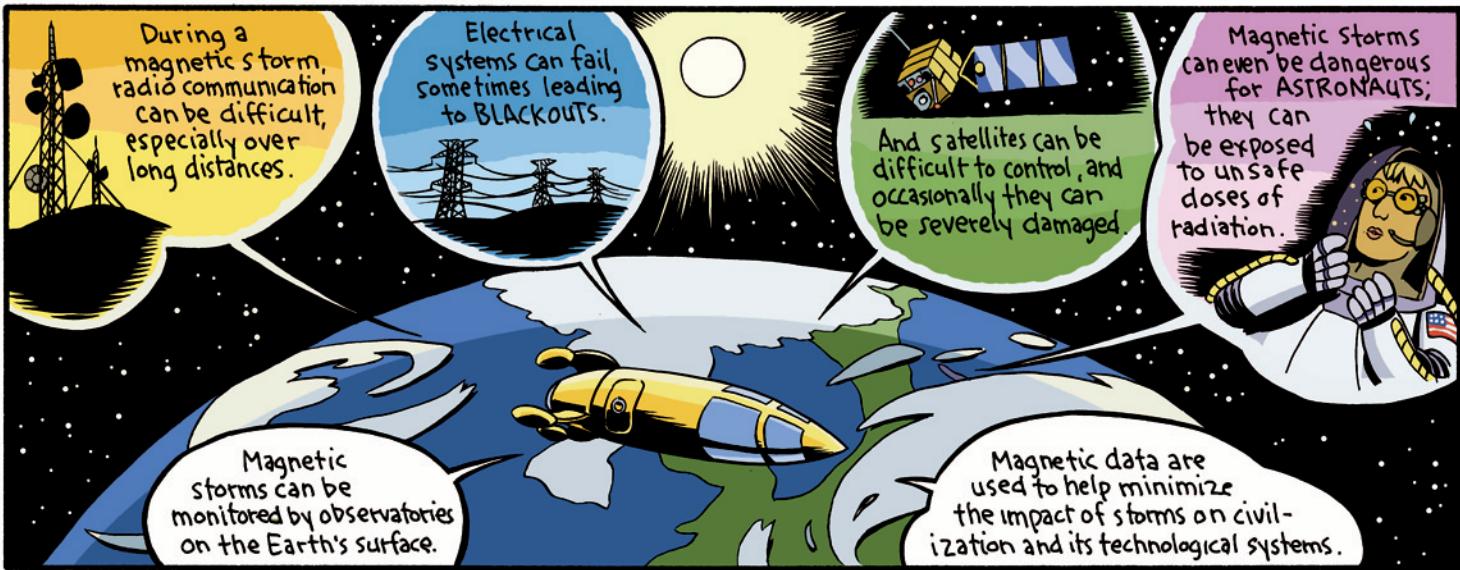
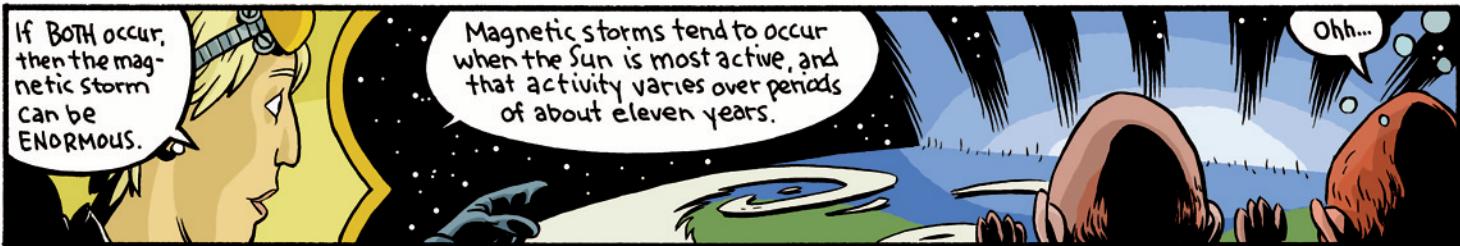


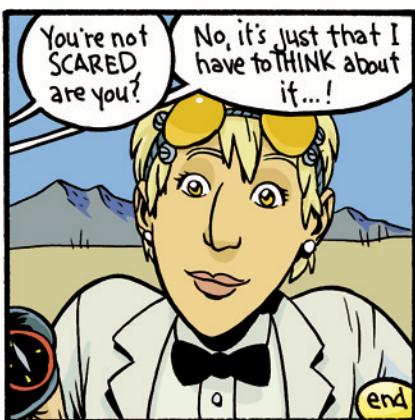
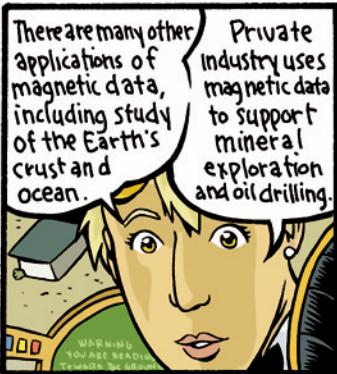
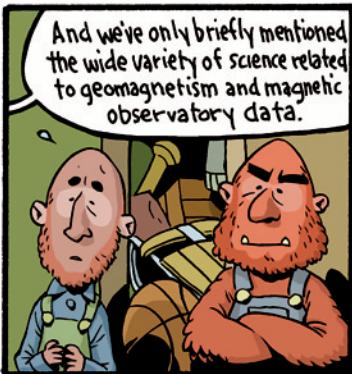
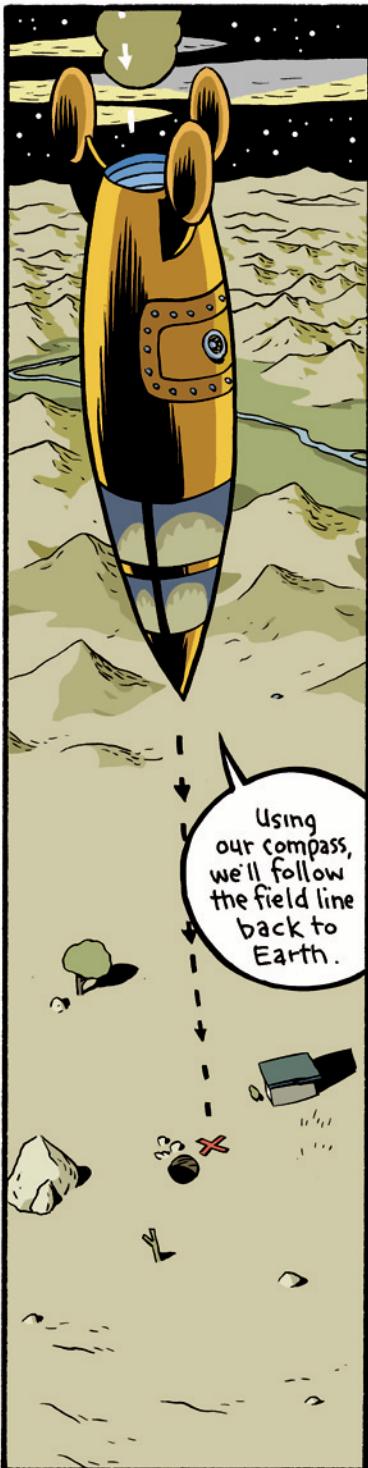














AURORA: atmospheric glow, seen at high latitudes, caused by the collision of charged particles from space with the molecules of the atmosphere. In the north, aurora are also known as the northern lights or aurora borealis, and in the South, as the Southern lights or aurora australis.

CORE of the **EARTH**: the 1000 km diameter iron center of the Earth. The outer part of the core is liquid iron, and it convects due to heat and chemical separation. The core acts like a dynamo generating the main part of the Earth's magnetic field.

DECLINATION: the deviation of the main part of the Earth's magnetic field from true North, and what is usually measured by a compass.

DYNAMO: something that converts energy of motion into electrical energy. The Earth's core is a natural dynamo.

INCLINATION: the angle that the direction of the geomagnetic field makes with the horizontal plane.

IONOSPHERE: the electrically conducting part of the Earth's upper atmosphere, extending from about 60 km altitude and outwards into space. Tides, daytime heating, and nighttime cooling drive ionospheric winds. These, in turn, sustain ionospheric electric currents whose magnetic fields can be measured at magnetic observatories.

MAGNET: an object composed of an orderly arrangement of atoms, each of which generates its own small magnetic field and all of which, in total, give the object a magnetic field.

MAGNETIC FIELD: a field of force surrounding an electric current or moving electric charge, in which another electric current or moving electric charge experiences a force.

MAGNETIC OBSERVATORY: a ground-based facility designed specifically to accurately measure the intensity and direction of the geomagnetic field over time.

MAGNETIC STORM: a disturbance of the Earth's magnetic field, sometimes lasting for several days. Caused by the Sun's solar wind and magnetic storms can be monitored by magnetic observatories.

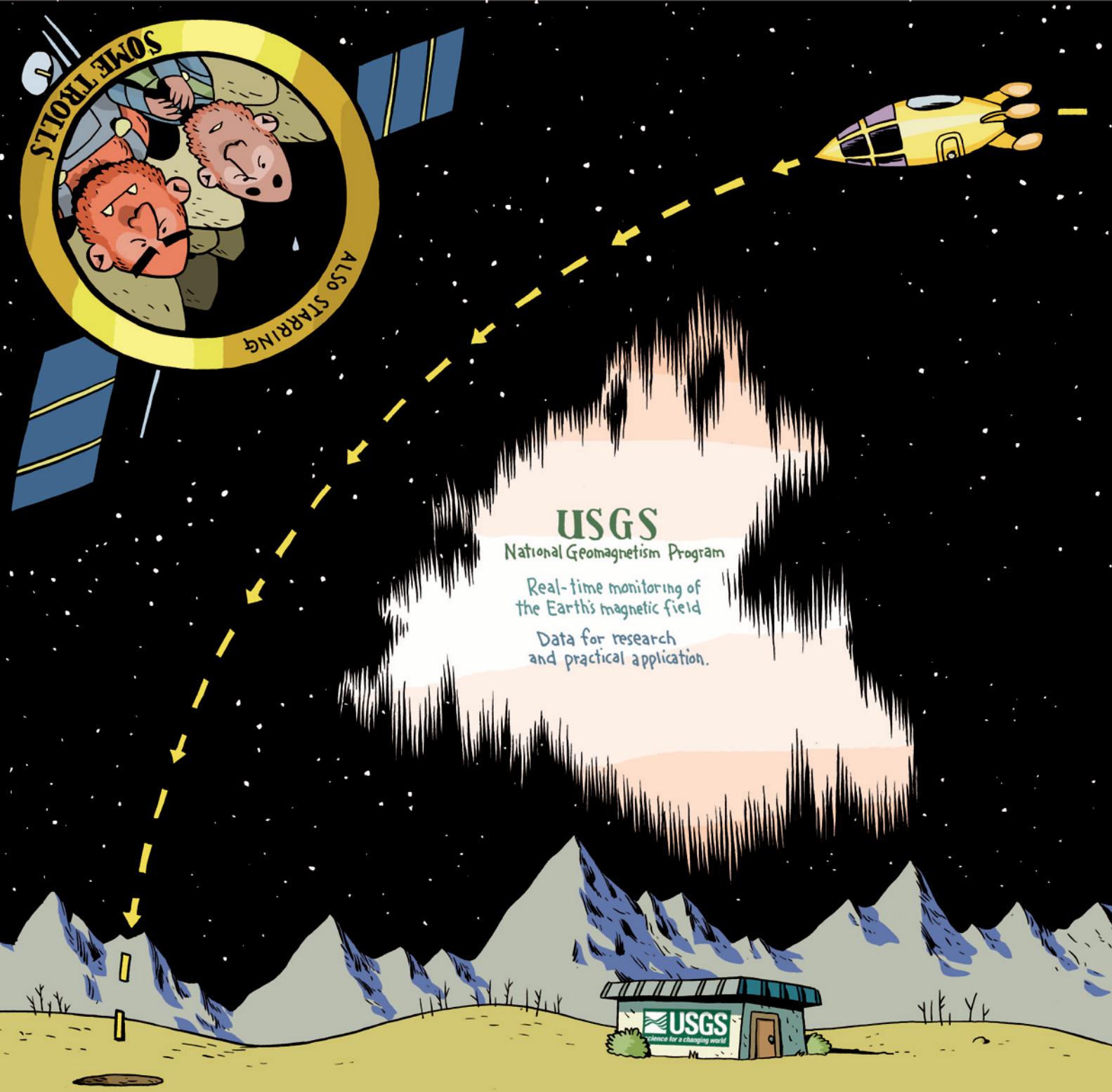
MAGNETOMETER: an instrument used to measure the intensity and/or direction of a magnetic field.

MAGNETOSPHERE: the region of space surrounding the Earth defined by the extent of the geomagnetic field. The Sun's magnetic field and solar wind interact with the Earth's magnetic field and magnetosphere. On the day side of the Earth, the magnetosphere only extends to about 70,000 km since it is compressed by the solar wind. On the night side, however, the magnetosphere is stretched by the solar wind, with the magnetotail extending to millions of kilometers.

SEcular VARIATION: slow drift in the shape of the Earth's magnetic field caused by motion in the Earth's liquid iron outer core.

SOLAR WIND: particles emitted from the flow of charged particles emitted from the Sun.

FOR MORE INFORMATION VISIT:
[www.geomag.usgs.gov](http://geomag.usgs.gov)
[www.intermagnet.org](http://intermagnet.org).



USGS
National Geomagnetism Program

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