



WHEN THE EARTH FLARES UP

THE STORY OF THE GEOMAGNETIC FIELD

illustrations: Karolina Kučerová
text: Lucie Lukačovičová
concept: Matěj Machek, Petr Brož and David Píša



IT'S NOT PLAYING ANY SONGS,
IT'S JUST SQUEALING.

I BUILT THIS AMATEUR RADIO STATION
BY MYSELF SOME YEARS AGO. I DON'T USE
IT TO LISTEN TO BROADCASTS, BUT TO
TALK TO RADIO AMATEURS FROM ALL
AROUND THE WORLD.

ALL YOU NEED TO TALK TO
SOMEONE IS A MOBILE PHONE.

BUT WHEN YOU HAVE
A MOBILE PHONE, YOU CAN'T HEAR,
FOR EXAMPLE... WHAT SHIP CAPTAINS
ARE SAYING SOMEWHERE
IN THE ATLANTIC.

... AND NOW FOR THE NEWS:
SCIENTISTS ARE PREPARING FOR THE
STRONGEST SOLAR FLARE YET...

操縦士がサ
ボって漫画読
んでる間に嵐
になってた。







THE NEXT DAY

WHERE ARE YOU
TAKING ME, SIS?

WHAT?

TO A LECTURE!

YOU'LL SEE, WE ARE
ALMOST THERE.




IT'S ALL OVER
THE NEWS, I'M PRETTY
WORRIED.

DO YOU THINK THAT
THE SOLAR STORMS COULD
ENDANGER US SOMEHOW?

IT LOOKS FAIRLY...
I DON'T KNOW... WILL THEY
EVEN LET US INSIDE?

THEY SAID THAT THIS
LECTURE ON RADIO WAVES IN SPACE WAS
OPEN TO THE PUBLIC. LET'S GO IN, THEN!



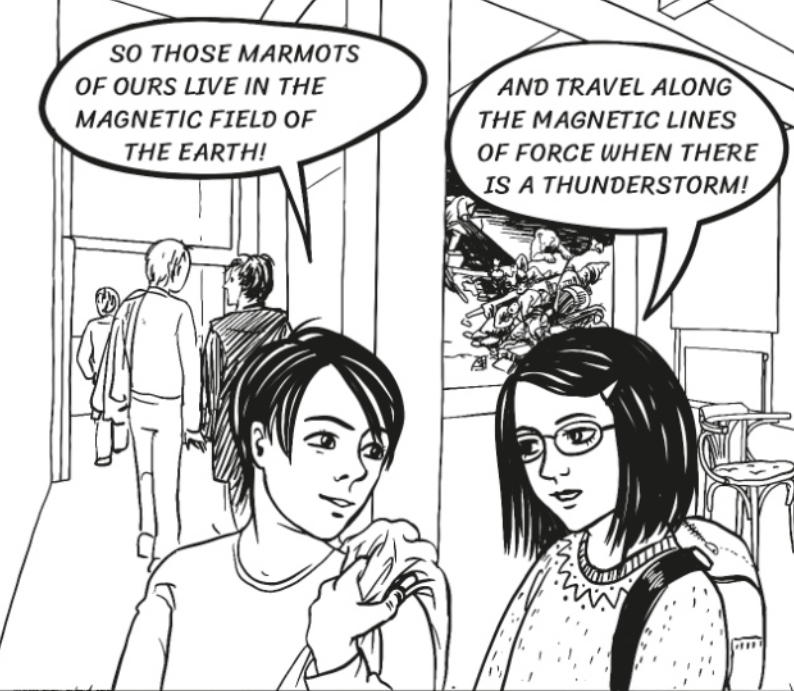
THE EARTH IS SURROUNDED
BY ITS OWN GEOMAGNETIC FIELD THAT
IS CREATED BY ELECTRIC CURRENTS
IN THE EARTH'S CORE...

...ELECTROMAGNETIC WAVES
CREATED BY STORMS, WHICH CAN BE
CAUGHT ON RADIO, SPREAD THROUGH
THIS GEOMAGNETIC FIELD...

...WHEN THERE ARE STORMS
IN THE SOUTHERN HEMISPHERE,
THESE WAVES CAN TRAVEL ALL THE WAY
TO US ALONG THE MAGNETIC
LINES OF FORCE.

OTHER TYPES
OF ELECTROMAGNETIC WAVES ALSO
ORIGINATE IN THE GEOMAGNETIC FIELD, AND
CAN SOUND LIKE BIRDS, FROGS, RATTLESNAKES,
OR MARMOTS ON THE RADIO.

THERE IS EVEN A MOBILE APP
THAT YOU CAN USE TO MEASURE
THE GEOMAGNETIC FIELD.



SO THOSE MARMOTS
OF OURS LIVE IN THE
MAGNETIC FIELD OF
THE EARTH!

AND TRAVEL ALONG
THE MAGNETIC LINES
OF FORCE WHEN THERE
IS A THUNDERSTORM!



LOOK! THERE WERE HUGE
THUNDERSTORMS IN AFRICA
JUST YESTERDAY!

I WILL DOWNLOAD
THE APP!



THEY LIVE IN THE GEOMAGNETIC
FIELD... WHERE HAVE I ONLY...

LOOK, IT'S LIKE A COMPASS!




OF COURSE, THE EARTH'S
MAGNETIC FIELD ALWAYS TURNS
THE NEEDLE NORTHWARDS.

WE CAN SEE WHAT
DIRECTION WE ARE GOING
ON THE WAY HOME!



IT'S GOING
CRAZY. WASN'T NORTH
IN THAT DIRECTION
A MOMENT AGO?

YOU'RE RIGHT,
IT'S NOW POINTING IN
ANOTHER DIRECTION...




...UHM, THAT'S BASALT.
IT SAYS HERE. "ROCKS FORM ON
THE EARTH'S SURFACE WHEN LAVA
SOLIDIFIES. LAVA CONTAINS A LARGE
AMOUNT OF MAGNETIC MINERALS.
GEOLOGISTS TAKE ADVANTAGE
OF THIS IN THEIR WORK FOR..."

...OF COURSE,
MAGNETITE! IT ATTRACTS
THE COMPASS NEEDLE
TO IT!

WOOOW! THOSE ARE OUR
RATTLESNAKES AND MARMOTS!

YOU'RE RIGHT!
AND THEY ARE TRAVELING
ALONG SOME TRACKS!



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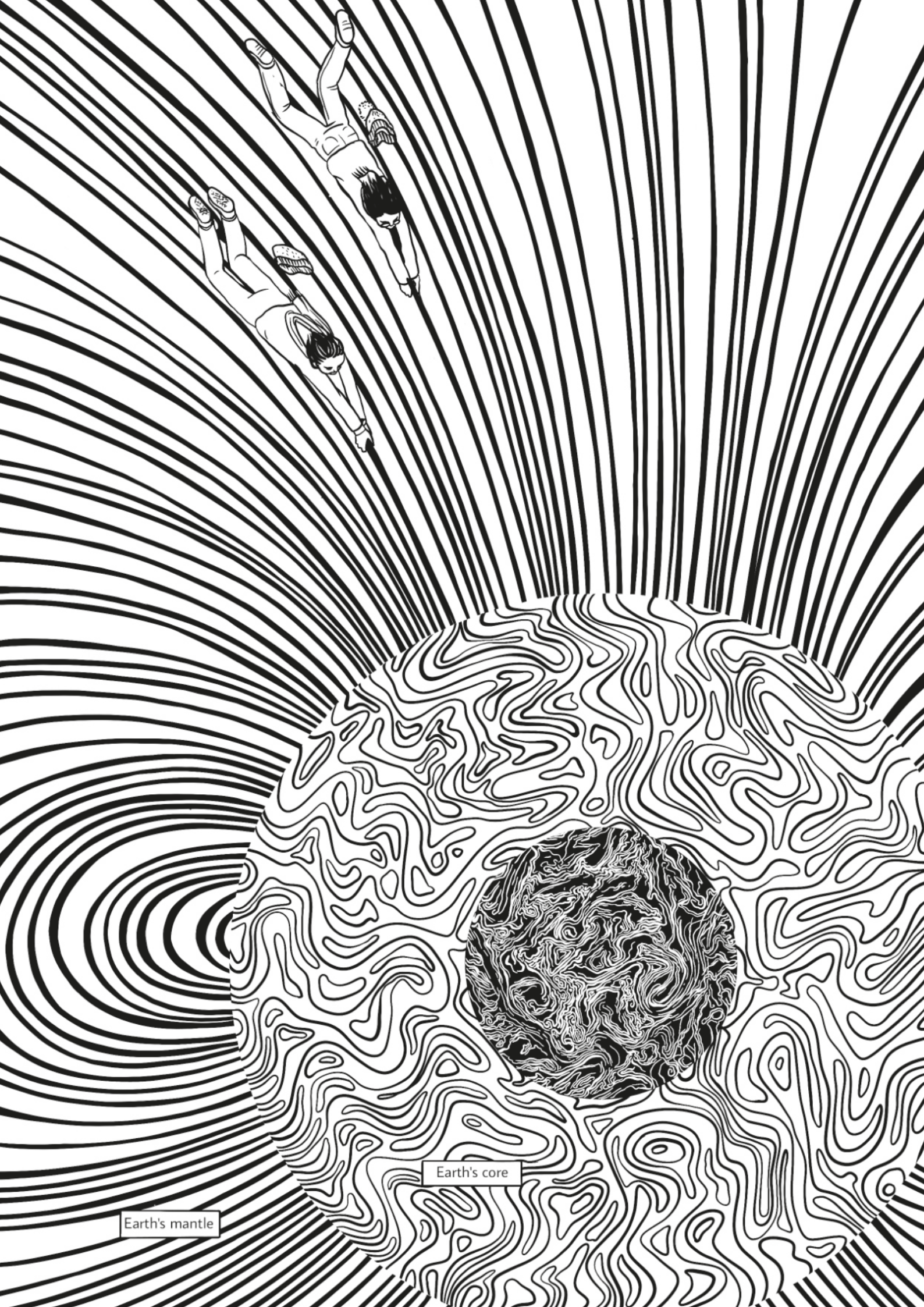
YOU'RE RIGHT!
AND THEY ARE TRAVELING
ALONG SOME TRACKS!



I WANT TO GO, TOO!

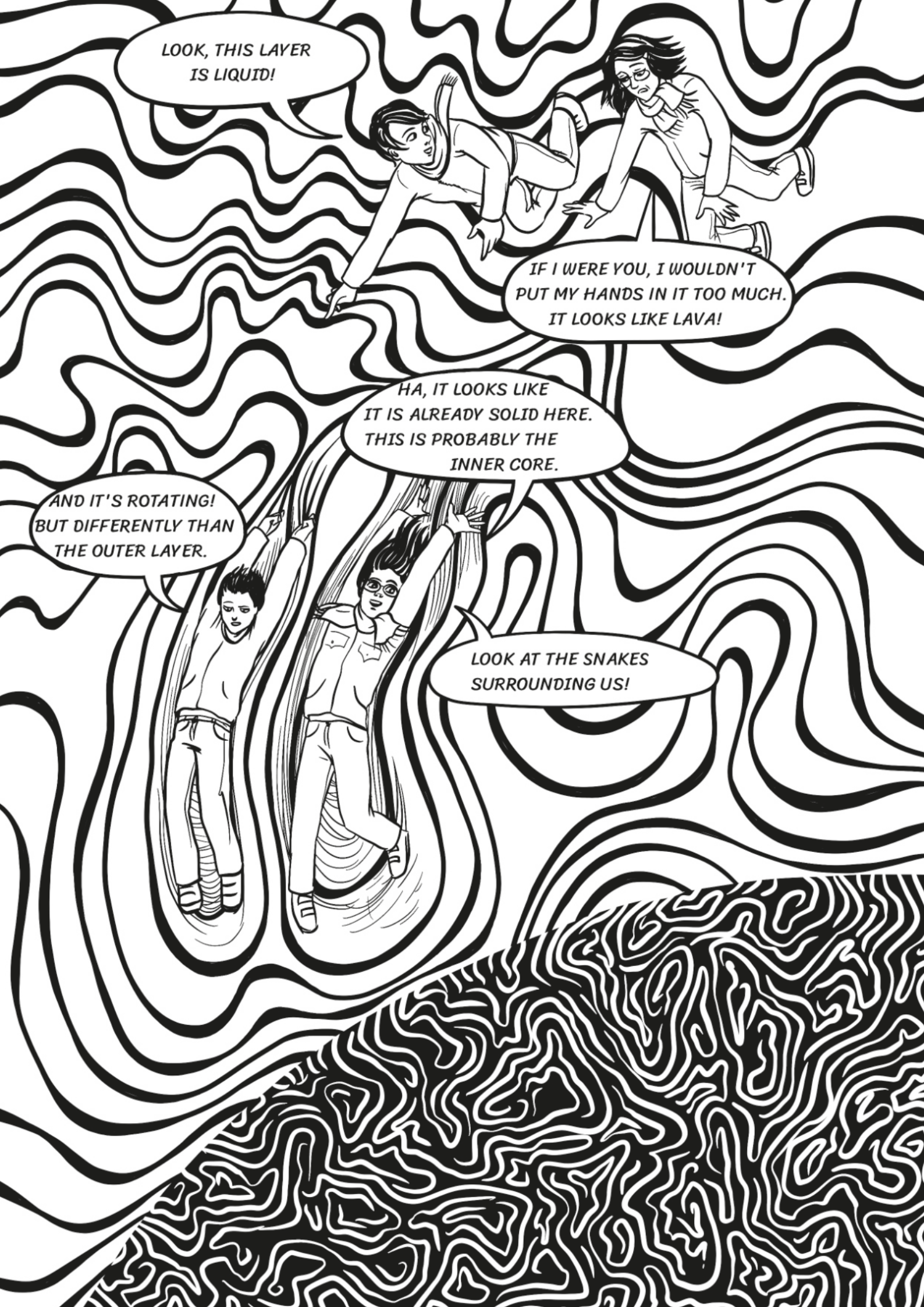
WHAT IF IT'S
DANGERO-

HEEEY?!
WAIIT!!



Earth's core

Earth's mantle



LOOK, THIS LAYER
IS LIQUID!

IF I WERE YOU, I WOULDN'T
PUT MY HANDS IN IT TOO MUCH.
IT LOOKS LIKE LAVA!

HA, IT LOOKS LIKE
IT IS ALREADY SOLID HERE.
THIS IS PROBABLY THE
INNER CORE.

AND IT'S ROTATING!
BUT DIFFERENTLY THAN
THE OUTER LAYER.

LOOK AT THE SNAKES
SURROUNDING US!



HEY, YOU LOOK LIKE A PORCUPINE!


AW!

I WAS SHOCKED!

ELECTRICITY!

INDUCED ELECTRICAL
VOLTAGE, YES.

HUMMM... SO BE
CAREFUL.



WHERE DOES THIS
ELECTRICITY COME FROM?


AND WHERE DID YOU
COME FROM?

LOOK... THE LIQUID CORE OF THE EARTH
IS MOVING... THIS CAUSES ELECTRICAL
CURRENTS. AND OUT OF THEM,
I AM CREATED THROUGH
ELECTROMAGNETIC INDUCTION.

YOU ARE THE EARTH'S
MAGNETIC FIELD!


HUMM, HUMMM,
THE GEOMAGNETIC
FIELD, THAT'S RIGHT,
UH-HUH.





THE MARMOTS AND BIRDS
LED US HERE, AND...

...AND RATTLESNAKES, TOO!
WHY DID THEY DISAPPEAR?




HUMMM... THEY AREN'T HERE.
THEY LIVE IN THE ATMOSPHERE AND IN THE
SURROUNDING SPACE... THEY ARE
WAVES THAT ARE SPREAD
THANKS TO ME. BUT YOU
WON'T FIND THEM UNDER
THE EARTH'S SURFACE
OR HERE IN THE CORE.

THEY ARE ALIEN
ANIMALS! THEY CAN
GO TO SPACE!

YOU BETCHA, HUMMM...
I CAN REACH FAR BEYOND
THE ATMOSPHERE.






OH NO, WE
PROBABLY WON'T SEE
THEM ANYMORE.

SO, NOTHING
EXCITING HAPPENS
HERE? AREN'T
YOU BORED?

I TURNOVER FROM TIME TO TIME,
MAKE MYSELF COMFORTABLE.
THAT TURNS OVER THE MAGNETIC
FIELD, AND THE POLES SWITCH.

THAT'S WHEN THE
COMPASS STOPS POINTING
NORTHWARDS?!


HUMM, HA-HA.
ACTUALLY, IT DOESN'T STOP POINTING
NORTH. IT'S JUST THAT NORTH SHIFTS TO
WHERE THE SOUTH WAS. I'VE TURNED OVER
LIKE THIS SEVERAL TIMES ALREADY.



HOW OFTEN DO YOU
TURN OVER LIKE THIS?

HAH, THE LAST TIME WAS
ABOUT 780,000 OF YOUR YEARS
AGO. IT TAKES THOUSANDS OF
YEARS BEFORE I TURN OVER
COMPLETELY. I MAKE NOTE OF IT
HERE IN THE EARTH'S CRUST.

AND HOW?

THE WAY THAT I AM TURNED OVER  AT THE
TIME IS IMPRESSED INTO THE ROCKS WHEN THEY
ORIGINATE, LIKE WHEN LAVA COOLS DOWN...


Mid-ocean ridge

expansion of the
ocean's crust

this is where the new
ocean crust originates


melting of the
Earth's mantle

magma chamber




OF COURSE, THERE ARE
MAGNETIC MINERALS IN BASALT.

SO, WHEN WE LOOK AT THE LAYERS
OF BASALT, WE CAN SEE JUST WHEN HE
TURNED OVER TO YOUR OTHER SIDE?



HUMMMM, YES. BUT THAT'S
ENOUGH CHIT-CHAT FOR NOW,
SKEDADDLE TO THE SURFACE.


BUT WHY?



THERE ARE SOLAR FLARES ON
THE SUN. I HAVE WORK TO DO...

FLARES? THAT WAS ALL
OVER THE INTERNET.

YOU SHOULDN'T HAVE
WISHED FOR SOME ACTION...



SUCH FLARES SENT OUT TONNES OF
ROENTGEN AND GAMMA RAYS TOWARDS
THE EARTH... AND MOST IMPORTANTLY
CLUSTERS OF KILLER PARTICLES!

HMM, ALL OF THIS CAN SHAKE UP THE
ELECTRONICS OF SATELLITES. BUT DON'T
WORRY, I CAN DEFLECT MOST OF IT...

YOU WILL BE SAFE ON EARTH.



The final panel shows the two characters in a dynamic pose, with one pointing towards the swirling background. The background consists of dense, swirling white lines on a black field, creating a sense of motion and energy.







SISTER

BROTHER

GRANDAD



...THE STRONG SOLAR FLARE CAUSED AURORAS, NORMALLY TYPICAL FOR NORTHERN REGIONS SUCH AS LAPLAND OR ICELAND, BUT WHICH WERE EXCEPTIONALLY ALSO VISIBLE IN PRAGUE. NO MALFUNCTIONS HAVE BEEN REPORTED IN CONNECTION WITH THIS SOLAR FLARE...



When the Earth Flares Up, The Story of the Geomagnetic Field

Illustrations: Karolina Kučerová

Text: Lucie Lukačovičová

Concept: Matěj Machek, Petr Brož and Davis Píša

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Would you like to learn more about the Earth's magnetic field and about auroras? Then visit www.ig.cas.cz/komiks.

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