The Sky

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b4u publishing

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Earth's cover

The sky presents us with various spectacles: it can be bright blue with white clouds, a sorrowful grey, or a black expanse dotted with stars. We look at the sky through Earth's atmosphere and beyond that into space.

The atmosphere

We can think of the atmosphere as Earth's cover. But unlike the peel of an orange, for instance, it is a mixture of gases that cannot be handled. It protects us from the perils of radiation from space, keeps us warm, and allows us to breathe. Earth is the only planet known to support life – all thanks to its atmosphere.

aurora

KÁRMÁN LINE

It is generally agreed that at this point, one hundred kilometres above Earth's surface, space begins. International Space Station

flaming meteoroids

eather balloons

Kármán line

Wow, we're so high!

living creatur

Exosphere

The outermost layer of the atmosphere, it is extremely cold. Because it fades into space gradually, opinions differ on where it ends.

1000 km 500 km

Thermosphere

As its name suggests ("thermo-" means "heat"), this layer is very hot. Its temperature may exceed 2000°C! Even so, if you were in the thermosphere, you would feel cold, because there aren't enough gas particles to get the heat to you.

Mesosphere

The atmosphere's middle layer has enough gas molecules to create friction to set falling meteors alight, but not so many that you would be able to breathe freely. It is also very cold, with temperatures falling to -90°C.

Stratosphere

This very dry layer contains the OZONE LAYER, which absorbs harmful ultraviolet radiation from the Sun. Without this protection, life on Earth as we know it would be impossible.

Troposphere

This layer of the atmosphere embraces our planet. Its air is breathable, making life possible - this is where we find humans and other living creatures and organisms. It is here that processes occur that we refer to as weather. 100 km 85 km

50 km

10 km







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Upcoming weather

Weather can be predicted. Such predictions are most reliable for the near future; if you want to know about the weather a month from now, it is better to wait a while. To forecast how the weather will develop, we must first measure its current state. For this, we have several handy devices:



Who sees into the future?

Weather forecasting is the work of meteorologists. But weather can be very changeable and difficult to predict. To make their forecast as accurate as possible, meteorologists collect data from various sources. The result may appear simple, but there is a lot of science behind it!



A **WINDSOCK** shows wind strength and wind direction.

"Weatherspeak"

To describe weather conditions, meteorologists use a range of terms. A forecast must be brief and comprise expressions that will mean the same a year from now as they do today.

To understand weather forecasts properly, you must know these terms.







FORECASTING GUIDED BY NATURE

To know whether to wear a raincoat or a T-shirt, you don't have to be a meteorologist. You are guided by nature. How does nature tell us that rain is on the way?

1 Swallows are flying low, because the insects they feed on are flying closer to the ground.

- 2 Mist is rising from the forest.
- 3 Flowers droop or close their heads.
- 4 Bees return to the hive.
- 5 Cloud is dark and low-lying.

WHY DO CLOUDS HAVE SUCH STRANGE NAMES?

Their names reveal their type.

WHITE RIPPLES



Cirrocumulus

- No rain falls from these clouds.
- They appear in fine weather but may signal a coming storm.

HOOKED



Cirrus

- splodges, lines or threads of white high in the sky
- often end in "hooks"
- They don't bring precipitation, but once they begin to change to cirrostratus, rain is expected within a day.

MISTY WHITE VEIL



Cirrostratus

• Doesn't produce rain but may signal coming precipitation.



Nimbostratus

- continuous, dense cloud
- grey or dark grey
- Heavy rain or snow is on the way.

LIKE COTTON WOOL



Altocumulus • No rain will fall from this.

GREYISH OR BLUISH CURTAIN

Altostratus

- thin layer of blue or grey • Often turns into a rain-
- filled nimbostratus. Umbrellas at the ready!

GREY VEIL



Stratus • continuous layer of grey

• May produce drizzle.

CLOUD PAVING

Stratocumulus

- White or grey shreds of cloud that cover the sky.
- The sun may shine through breaks in the cloud.

KNOW A CLOUD BY ITS NAME

CIRRUS	high-lying wisps, ice crystals
STRATUS	dense layers of a
CUMULUS	fluffy clumps

STORM WALL





Clouds with "nimbus" in their name are bringers of rain.

Cumulonimbus

• It will soon be raining cats and dogs.

LITTLE LAMBS

Cumulus

- fluffy white clouds, alone or in herds
- A growing, darkening cumulus may change into a storm cloud.



made of

cloud

rack! Do you hear that rumble? A storm is approaching, so you had better hurry home. At any given time, about 2000 storms are in progress in the world. A storm usually comes on a hot day, when hot air bears water vapour upwards, causing it to cool quickly. This explains why most storms are in summer.



A cumulonimbus storm cloud can grow to be 15 kilometres high! Such a giant will cover the sun, bringing darkness to where the storm is.

Storms

Strong wind

We commonly experience a strong, gusty wind during a storm.

Dark sky

Thunder

Thunder is caused by lightning rapidly heating the surrounding air. As this hot air expands rapidly, it makes a loud noise.

Lightning

Lightning is caused by the creation of an electrical charge by rising and falling air in a storm cloud. The temperature of the air around the lightning can reach 30,000 °C.

Torrential rain

Water vapour amassed in a storm cloud becomes heavy before falling as rain.



Many colours

A rainbow is created by refraction of sunlight by droplets of water, which is why we see it only when the Sun shines through rain. It is always made up of the same colours in the same order. A rainbow is circular; we see it as an arc because part of it is obscured by the horizon. Myths tell us that there is treasure at the end of a rainbow. Before you go looking for it, remember that a rainbow is an optical phenomenon with no real end.



The unpredictable sky can produce phenomena that leave us in awe. Today, most such phenomena can be explained. A few questions remain unanswered, however.



Dangerous fog

Smog is pollution of the atmosphere harmful to health. The word is a combination of "smoke" and "fog". Smog occurs most commonly over large cities. When an episode of smog is reported, you should limit your time outdoors and open-air sports activities.

Hide-and-seek

Strange phenomena

A total or partial solar eclipse occurs when the Sun is obscured by the Moon, as seen from Earth. A lunar eclipse occurs when the shadow of Earth obscures the Moon. An eclipse is an amazing sight. Even so, never look directly at the Sun without protection; doing so could damage your eyesight.





Dancing lights

As their name suggests, the polar lights (aurora) are most often seen around Earth's poles. This colourful dance of lights - in shades of green, pink, violet, blue or yellow - is a breathtaking spectacle caused by a stream of particles from. Sun known as a solar wind.

EXCEPTIONAL PHENOMENON

lt's raining frogs!

You're out for a walk when the sky suddenly clouds over. Then it starts raining... frogs. It's hard to say whether you or the poor amphibians are the more surprised! It may seem incredible, but there are rare cases of frogs, fish, jellyfish or snakes raining from the sky. We don't have a precise explanation for this, but it is widely believed that it is caused by a tornado sucking in living creatures before releasing them in another place.



Tricks of the atmosphere

Earth's atmosphere can confuse the onlooker by various optical illusions. These include halos - ring-like formations around the Sun that may give the appearance of several suns shining in the sky.

How to fly

Do you ever dream at night that you can fly? If you do, you're not alone. Such dreams are very common among humans, even though the ways this flight is achieved vary greatly. So, how might a human take to the skies?

Active flight Requires a lot of wing-flapping.



MODEL AEROPLANES

Gliding Makes use of air currents.

LANTERNS

Floating Easy if you are lighter than air.

BALLOONS

Powered flight All it takes is the right vehicle. It took humans a long time to figure out how to take to the skies. You may be surprised to learn that all these types of flight are possible for humans today with the right equipment, of course. But flying certainly isn't as simple as it appears in our dreams.

Things that fly

DRONES

So what if you were able to fly into the sky? Isn't it just endless blue and clouds? Actually, you can encounter many things there.

KITES

LEAVES

FEATHERS

A view like no other



Is your neck aching? If it is, it is hardly surprising: we have spent a lot of time looking up at the sky. Let us now change things around and enjoy a view of the ground from on high. Such a view is something special...

The sky and time

Time changes are caused by our planet's movement in space. To make sense of them, let us look at them one by one.

1. This is Earth:



2. Let us imagine a straight line passing through its middle...



3. ... and that the planet is tilted, the line along with it. This is the position of Earth in relation to the Sun.



Day and night

Our round, blue planet is constantly turning. This means that sunlight only ever falls on one side. The side turned away from the Sun is in shadow. Day reigns in the half lit by the Sun, night in the half in shadow.

Seasons of the year

Since Earth travels through space at a tilt, it is always the case that one of its hemispheres is facing the Sun and the other is turned away from it. As the closer half receives more direct sunlight, it is warmer than the one further away. This explains Earth's seasons: summer reigns in the more heated half, winter in the less heated one.

THE MOON

The Moon, too, knows no rest: it constantly orbits Earth. It is this movement that makes it appear that the Moon keeps changing shape. All that actually changes is the amount of the Moon lit by the Sun when viewed from Earth. The Moon emits no light of its own.

The year

Earth orbits the Sun unceasingly, as well as rotating on its own axis. In the time it takes to complete one full orbit, it will have rotated on its axis 365 times – the period of a year, which for simplicity's sake we round off to 365 days.



This book is about the sky. But what exactly is it? The answer may seem obvious, but it is difficult to explain. The words "sky" and "heavens" cover a huge number of meanings, connotations, metaphors and allegories, as well as specific objects. The sky was here before us. As it was here before our planet, too, does that mean it wasn't then yet the sky? Let's set out to explore the sky together, from all possible sides and angles, some real, some imaginary.

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