6 Wild weather!

By Lydia Harrison

We are grateful to Hymns Ancient and Modern for a grant towards the costs of Messy Adventures – **hymnsam.co.uk**

Theme: sky, weather, sun, moon, planets and stars

MESSY CHURCH GOES WILD CHAPTER LINK: 5 – CARING ABOUT CLIMATE AND WEATHER

Aim: to discover more about God and about good stewardship of our planet through discovering and reflecting on the sky, weather, sun, moon, planets and stars.

Science advisor: Dr Dave Gregory

Remember to complete a risk assessment for each adventure and ensure you are fully compliant with good safeguarding procedures.

Messy Church values:

- Christ-centred – discovering more about God the creator and sustainer through discovering more about the sky, weather, sun, moon, planets and stars.

- Hospitality – the sky is part of the habitats for all sorts of creatures (insects, birds); the interlinked/interdependent nature of the planet, the changing of the seasons and what we can do about global warming/climate change.

- Celebration – celebrating the different types of clouds, the different sorts of weather and the differences between the sky in the day and the sky at night.

- Creativity – imagining different shapes in the different types of clouds (might need some scientific input here!) and exploring ways we can play in different sorts of weather. Exploring the world through science is part of the creativity God has given to us.

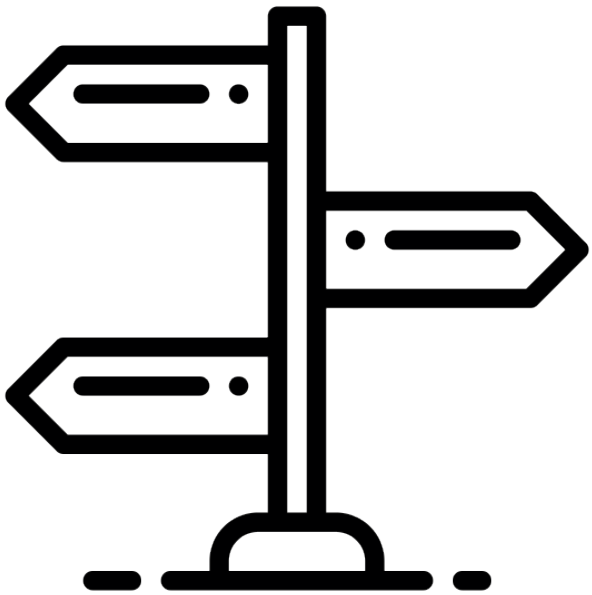
- All-age – opportunities for adults and children to reflect on how they can make a difference to the sky by creating less pollution (in terms of rubbish, carbon, light) and to have an understanding of where they fit into the universe.

Locations: gardens (urban and rural), parks, wooded areas, potentially observatories and science centres where you can see the night sky through telescopes? All weathers (to experience the different sorts of weather we have, which is often unpredictable and changes seasonally).

If these are inaccessible: watching videos of the night sky from YouTube; pictures of the different sorts of clouds; news footage of extreme weather/natural disasters.

Section 1 On the move

Pause at different stops on an adventure around your area. Issue the relevant health and safety warnings needed for your situation. These stops can be used in any order. You could start off by watching this video (youtu.be/QWE0VCGjqxA) of Dr Dave Gregory, a meteorologist, climate scientist and Baptist minister. Each stop has suggestions for local experts you could invite to add specialist knowledge and local context to the Adventure.



1 Clouds

Head to a grassy field.
Section 3, activities 3, 4, 6 and 7 could be used here.

- If the sogginess of the ground permits, lie down on coats and look up into the sky (be careful to not look directly into the sun). What do you notice?

- Talk about the different types of clouds – what do they look like? What do they remind you of? It is often the case that we can see other familiar shapes in them (dragons, dogs, mushrooms, be creative!). Talk about perception – we have each looked at the sky and come up with different things for what the clouds look like. Who is right? Do you think we can understand and appreciate more about our world and about God by listening to each other across the age groups, or is my opinion the only one that matters?

- What other things do you notice in the air? Do you see any birds? Any insects?

- Talk about how there are different creatures in the sky that don't necessarily spend all their lives there but find food and safety there (away from predators on the ground etc.).

- Tell the story of creation (Genesis 1:14–20). God created the world and saw that it was good. As part of this, God separated the day from the night and creatures that fly. What good do you notice around you?

Ask: what questions do you have about this?

Suggestions for specialist input: environmental scientist or meteorologist.

2 Weather types

A spot with different landscape elements to think about, e.g. muddy or watery areas, trees and bushes – a park, garden or field.
Section 3, activities 1, 2, 8, 9 and 10 could be used here.

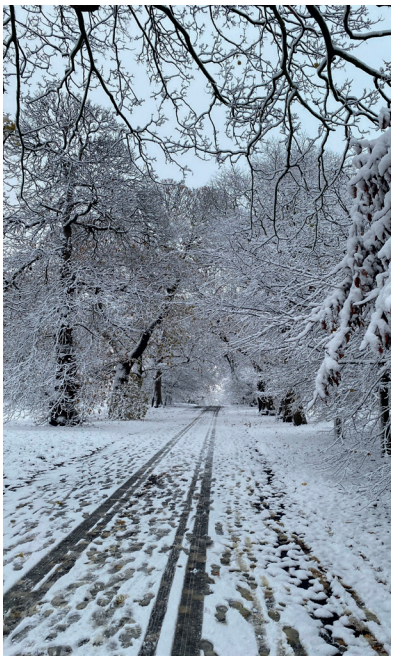
- Looking around you, what would be different about the objects, the colours, the movement, the wildlife, the land under your feet, the water level... if the weather today was sunny? Windy? Snowy or frosty? If we were in a drought? In a flood? Foggy? I wonder how different sorts of weather make you feel?

- What happens to our environment when there is extreme weather? We can't always predict the weather and we certainly can't control it. But what CAN we control to help with the climate change problems the world is facing?

- In Matthew 16, Jesus says the people around him were good at reading the natural world to work out what the weather was going to do, but they were rubbish at reading the signs that told them God's Son was in front of them. From what you know of Jesus, what sort of things can you remember him doing that were signs of who he was?

- Rainbows – try making rainbows with water sprayed from a bottle and sunshine or look at the colours in a prism. What Bible story can you think of with a rainbow in?

Ask: what questions do you have about this?



3 Sun

Somewhere sunny, at a sundial (you could stick a post in the ground if there's no sundial near you), a pub/cafe with 'Sun' in the name, or at a spot like a bandstand with a roof to shade you from the sun.
Section 3, activities 5, 6 and 7 could be used here.

- The sun rises in the east and sets in the west. Throughout history, this has helped travellers know where they are, and its position in the sky helps people to be able to tell the time. Use a compass to work out what direction local landmarks are in around you – you could play a game where you call out the name of somewhere local, national or global and people point in the direction they think it is. Talk about ways you know of to work out what direction you're facing by using the weather (e.g. in the northern hemisphere, the sun is always in the south, so trees may be heavier in growth on the southern side; the prevailing UK wind is from the south west).

- You might want to make your own sundial out of natural resources (soil, some sticks and stones). Could you leave it where you made it and come back later to tell the time?

- Read Psalm 121:5–6 ('The sun will not harm you by day, nor the moon by night'). What might the psalm writer mean? How could the sun or moon hurt you? How does it feel to know that God is watching over you, keeping you safe?

- Can you focus the sun's rays using a magnifying glass and a piece of paper on a non-flammable background, like a large rock? Can you set the paper on fire? How can a star so far away provide the energy to do this?

- It can be easy on a sunny day to forget to put sunscreen on. Why do we need it?

- Have you ever seen a solar eclipse? How did that feel? What do you think the earth would look like if it was closer to or further away from the sun? Please don't look directly at the sun!

- In the ancient world, some people worshipped the sun and the moon as gods, because of the way the sun gives life and light and because the moon is so mysterious and beautiful. In the Bible, the writer of Genesis describes the sun and moon as not being created until the fourth 'day' – what might the writer have been trying to communicate by this? If the sun gives so much light and life but is created by God, what might that say about God? If the moon is so mysterious and beautiful but is created by God, what might that say about God?

- 'And God said, "Let there be lights in the vault of the sky to separate the day from the night, and let them serve as signs to mark sacred times, and days and years, and let them be lights in the vault of the sky to give light on the earth"' (Genesis 1:14–15). Why do you think measuring time matters to human beings? The sun makes shadows. Have the shadows around you changed since you set out on your Adventure? What do you know about the way ancient people measured time? How do you think God sees time? (2 Peter 3:8, 'With the Lord a day is like a thousand years, and a thousand years are like a day.')

- Tell the story of the sun and moon stopping to give God's people extra time to win a battle in Joshua 10. Would you have the faith to pray for this miracle, if something incredibly important depended on it?

Ask: what questions do you have about this?

4 The night sky

Either do the following at night-time or find spots that have something to do with the moon or stars (a hilltop that you could describe as the closest point to the moon locally; a dark cave or warehouse; a pub called 'The Seven Stars' or similar; anything with 'space' in its name; at a pinch, a garden growing rocket).

Probably better to look at in the winter months when there are shorter days, and may be better in a more rural location where there is less light pollution.
Section 3, activity 11 has several suggestions that could be used here.

***Messy Church Does Science* chapter 2 – 'Earth, stars and space' – also has some activities with links to science that might be useful to explore space topics in the daytime setting.**

- Explore how different the night sky looks from the day. What do you notice? On a cloudy night you might not see much, but the clouds might appear differently (especially around sunset). What animals (e.g. bats) and insects (e.g.moths) do you notice?

- Talk about parts of the world where the sky does not get dark at night because they are closer to the poles – how might that feel? Would you be able to sleep if it was still light outside?

- Discuss how navigation by the stars helped travellers on land and sea before there was GPS or instrumentation. What star could you navigate by and how do you recognise it? Talk about the wise men seeing the star that started their epic journey to find Jesus.

- You can now sponsor/name/buy stars – what would you call 'your' star if you were naming one?

- Look at a star chart to see if you can spot any planets in the night sky (see section 3, activity 11). Do you know some of their names? How does it feel to know that you are part of a bigger picture? God created a whole universe that we are just a small part of.

- The moon is generally associated with the night, but you can also see it during the daytime too. If you have a telescope, look at it. How does it appear different to the

earth? (see section 3, activity 11). The *Messy Church Does Science* activity 'The lesser light' in the 'Earth, stars and space' chapter suggests building a model of the moon's surface.

- The moon does not make its own light but reflects light from the sun back to the earth, and when it sets, the sun's light reflects/refracts off the moon, and together with the stars, the moon provides us with light at night. The *Messy Church Does Science* activity 'The lesser light' in the 'Earth, stars and space' chapter suggests exploring how different surfaces reflect light.

- The moon takes 28 days to go around the earth, the same time as it takes to rotate. This means that one side always faces the sun, and it is always day-time. The other side always faces away from the sun, and it is always night-time. As it orbits the earth, we see different parts of the day and night sides, and this causes the phases of the moon. A new moon is when we just see the dark side, while a full moon is when we just see the daytime side. You could use a ball for the moon and a bright light for the sun to show how this works. This reflects the changing seasons of our lives and the way our lives can change. Can we think of any examples of this?

- Make a solar system out of mudballs. Can you learn which planet is which? Would you be able to remember? Can you see how they all fit together? How might it change if one of the planets were missing? The *Messy Church Does Science* activity 'solar system' gives a template for making a large model solar system.

- Talk about the moon landing/space exploration. What is it like to be an astronaut? To explore strange new worlds?

- Read Psalm 89:37, where the moon is described as 'the faithful witness in the sky'. What do you think about the idea that the moon is witnessing to God, praising God in its own way?

- As you walk home, try repeating the line from Psalm 148:3, 'Praise him, sun and moon; praise him, all you shining stars.'

- Light a candle or torch and see how that changes the amount of light around you. A small candle can make a big difference if lit indoors, but how much difference does it make outside?

- When Jesus says, 'I am the light of the world' (John 8:12), what does this mean? How big a difference can he make? Think about the difference he has made in your life and think about who you might share this with so that they can experience the light of Jesus too.

- How do you see science and faith working together for the good of the planet and of people?

Celebration

Invite everyone to share one new thing they've learned today and one thing they're going to do this week that's different because of what you've done today. Remember to ask about how you all got on next time you meet.

Prayer

Think about the vastness of the universe and that God's creative hand formed it. That same God loves you, too!

What would you like to pray for today? If you'd like to, pray for something to change – perhaps an illness, a difficult situation, a problem – we've seen today how the sky can change during the day and with the seasons, and God changes things through our prayers. So perhaps look into the sky and remember that you are part of a much bigger picture, the whole of creation is formed by a loving God. Know that you are loved.

As you leave

Invite everyone to talk on your way home about where you saw God at work today – what stood out for you? What are you going to do differently?

Section 2 Adventure area in one spot

Meet in a garden or field (day or night).
Issue the relevant health and safety warnings needed for your situation.

- Look up at the sky. What do you see? How does the vastness of it make you feel? What shapes can you see in the clouds? What stars can you see, do you recognise any constellations? Have you noticed any insects or birds flying?

- Spend some time just looking at the sky, breathing in for four beats then breathing out for four beats. Notice how you felt before, and how you feel now. How does it feel to know you're part of something bigger?

- How does the sky change when there is different weather? What impact does that have on the environment around us? What impact does that have on our mood?

- Invite people to take a printed copy of Psalm 8, finding somewhere comfortable to sit and read it together. What happens to the author of the psalm when he thinks about the glory of God, the one who made the heavens and the earth? Do they begin to think about their own identity? What does that mean? How does it feel to know that the God who created the universe, made you too? The God who created the earth and said, 'it is good', says that you are loved and cared for?

- You might want to build a mini-solar system out of mud balls, stones, twigs, anything you can find. Can you put the planets in order? Read Psalm 8 again and think about the vastness of the universe and the vastness of God's love for all parts of creation.

- Use a selection of the activities in section 3 to explore the sky.

- Explore how the sky can change day-to-day and season-to-season. Think about the sun rising in the east and setting in the west, how this can help us to tell what time of day it is and where we are geographically. Think about how different the environment looks when it rains or snows or is sunny.

- Think about how we can make a difference to the environment, perhaps by using less greenhouse gases, reducing our carbon footprint and buying less 'stuff'. All of these are great ways to preserve our planet. What can you do as a family? As a church community?

- Challenge: this week, why not set yourself a challenge to intentionally turn any lights off that you aren't using. Unplug any unused devices.

Wonder:

- How does the sky change throughout the day and through the seasons? What do you notice? Summer changes to autumn, winter changes to spring – this has an impact on our environment and our mood. What does this look like?

- Talk about the differences between the light in the day and the light at night. The sun gives us energy and light in the day that makes plants and animals grow, it gives us food for our journey. The night is usually a time for resting and recharging – but the night is also a place for other creatures to wake up (bats and moths). What does light and dark mean to us? How does it affect us?

- There's so much life and diversity in the sky! There are several different types of cloud and many different weather patterns (see section 3, activities 3, 4, 8 and 9). How does this feel? How does it feel when we can't control the weather?

- Some people say that God created this universe – how does it feel to know that the God who made everything, also made and loves you?

- If we look in a telescope at the night sky, we can see things that might be hundreds of light years away. A light year is the distance that it takes light to travel in a year. While it is the fastest thing in the universe, it can still take billions of years for light from some objects to reach earth. The star that you see in the night sky may not even exist when the light reaches your eye! How might this make you feel? How do we let go of things that we need to leave behind because they have run their course?

Section 3 Activities to explore the properties of the sky, weather, sun, moon, planets and stars

1 It’s a home – what a beautiful world

You’ll need: a blue sheet/pillowcase or large piece of blue paper/card; green and brown natural materials you can find around you. Please don’t break bits off living plants.

What to do: using the blue fabric or paper as your canvas, create a natural collage of the earth. Leave bits of the fabric/paper visible to represent the seas, and use green and brown foraged materials to create the land. Can you find anything white to represent the two poles?

Big thinking: if you look at pictures of the earth from before we had space satellites, you will find that while the earth had land and sea, and ice at the north and south poles, there was hardly any cloud. It wasn’t until we saw pictures from space that we realised how much cloud the earth is covered in. It can be up to 70%, but it’s hard to measure very accurately because it is always changing. Compare your earth image with some from satellites you can find online. What are some of the differences?

? **Big question:** what would stop our planet from being a good home for us and other creatures? Would that matter? Think about God’s love for us and for our world. What makes you feel loved? Who do you know who needs help to feel loved by God right now? How can we help to show God’s love to the world? What can we do differently that will make a difference to our planet? What challenges could you set yourself (for example, turning unused lights off or reducing plastic waste by recycling)?

2 It can move – observing the wind

You'll need: space to run around, bubble solution and bubble wands.

What to do: how many bubbles can you make? Watch them blow around in the wind. Do they rush off in one direction? Or just float around in all different directions? Do you notice how they change direction and move upwards toward the sky? Do they behave differently if you are in an open space or near a building or a tree? Do you notice how they change colour when the sun shines/reflects off them?

Big thinking: you can't see wind, but you can see the effect it has on things, like the bubbles. If the wind is strong and steady, and flowing from one direction, then the bubbles will move nearly in straight lines. But if the wind is lighter, they will get blown in all different directions. That's because there are always little movements called turbulence in the air even when the air is still. Even when the wind is strong, when it flows past a tree or over a building, little swirls can be produced.

? **Big question:** the Bible says: 'No one has ever seen God; but if we love one another, God lives in us, and his love is made complete in us' (1 John 4:12). What do you think this means? We cannot see God, but we can see the effect he has on the world, when people show love to one another. How do we show love to each other and to the world?

3 It changes – cloud watching

You'll need: a space where you can sit or lie down and watch the clouds in the sky.

What to do: you will need to do this activity when there are clouds in the sky. Sit, or preferably lie down and look at the clouds. Can you spot different types of cloud? Do they have different textures, shapes and colours? Do they move differently? Do some move over in front of others? What might that tell you about how high they are?

You can play a game too with clouds. Can you see any shapes in them – like a dog, teddy, mushroom, face or even an angel? Let your imagination run wild.

Big thinking: there are different types of clouds that you can see. Some are fluffy, bumpy and round. These are cumulus clouds caused by air moving quickly upwards due to the warm surface; sometimes they grow into large cumulonimbus clouds – thunderstorms – which produce rain and sometimes thunder and lightning.

Other clouds are flat. These are called stratus clouds and are caused when large sheets of air move upwards. They too can produce rain, from drizzle to heavy rainfall depending on how quickly the air inside them rises. Sometimes, if they are thin enough, these flat clouds can break up into bumpy bits due to small air movements within them. These are called stratocumulus clouds.

Some clouds look very wispy. They are not made from water, but ice and are called cirrus clouds. As you go up in the atmosphere, as the pressure falls so does the temperature and water droplets turn to ice, although it often happens at temperatures much lower than the freezing point of water. Sometimes you can see snow falling from cirrus clouds. It does not fall straight down but gets bent to the side by the wind. These are called fall streaks.

There is more detail on cloud types in the cloud spotting guide (**metoffice.gov.uk/weather/learn-about/weather/types-of-weather/clouds/cloud-spotting-guide**) on the UK Met Office. website.

? **Big question:** clouds change and move continually throughout the day as the air moves around and up and down. Clouds that make rain provide moisture so that our plants can grow and so that we have enough to drink. Jesus calmed the storm (Mark 4:35–41), which was a miracle that saved the lives of everyone on the boat he was on. He can also calm us too. When you sat and watched the clouds, what happened to you? Did you find it a calming experience? Did you notice what happened in your body as you relaxed? I wonder if you could ask Jesus to help you calm down when you are next feeling anxious. I wonder why Jesus was not afraid of the storm.

4 It covers us – measuring cloud cover

You'll need: a partially cloudy sky and a space to view it from; compass (optional).

What to do: start by identifying which way is north. You can use the compass. Or get someone to note which direction the sun is at midday – the opposite direction is approximately north. Alternatively, if there are trees, then the mossy side will be north facing.

Face north and try to estimate how much of the sky is covered by clouds. If it's fully covered that is two points; if half covered then one point; if a quarter covered, half a point. Discuss among the group what their estimate is – if there is only a bit of cloud, you might find there are a lot of different answers. It can be hard to know how much cloud there is.

Now turn a quarter of a circle clockwise to face east. Again estimate how much cloud there is. Then, turn another quarter turn to face south and repeat the exercise, and finally another quarter turn to face west.

Add together the points for each of the four quarters of the sky and divide by eight. So, if you have five points the sky is covered by 5/8th of clouds. Or three points, 3/8th. If the sky is cloud free, then is 0/8th, while full cloud cover is 8/8th.

Is your measurement the same as everyone else's? Why not? How could you improve the method to help everyone get the same answer?

Big thinking: traditionally, meteorologists – people who study the weather – measured cloud cover in oktas or eighths. But it can be quite difficult to estimate and so people come up with different values even when they are looking at the sky from the same location!

Satellites help us to get a better view of how much of the earth is covered in clouds. But some clouds can be very thin so even difficult for satellites to see. And although clouds seem very 'solid', their edges can be difficult to find. Have you ever walked up a hill into a cloud? The boundary can be very broad, with visibility reducing very gradually over quite a distance.

? **Big question:** God asked Job, 'Who has wisdom to count the clouds?' Perhaps you have found out how difficult it is! And even with our space satellites, we still cannot be sure how much of the earth is covered in clouds. How do you feel when you cannot know everything? Is God inviting us to trust the one who can count the clouds when life is uncertain?

5 It helps us to tell the time – making a sundial

You'll need: a clear, sunny day; a space where the sun can cast shadows; some sticks – perhaps collected from the local area; a compass.

What to do: in the middle of the space, drive one of the sticks into the ground so it is standing upright. Note the position of the shadow that its casts and mark its position with a stick on the ground. What direction is it facing – measure it with the compass?

You will have to be patient for the next bit! Watch what happens to the shadow over 10–20 minutes. Does it move? Which direction? Does its length change? Is it bigger or smaller? Mark off the location of the shadow as it changes with sticks laid along or stuck into the ground. You can use the compass to measure how many degrees the shadow moves. You have made a giant sundial.

This activity can take some time, so while you are waiting you might like to decorate your sundial. In the past, sundials were often works of beauty, with drawings and patterns on them. Collect things from your area to decorate your sundial.

Big thinking: before clocks, watches and phones, people used the movement of the sun to tell the time – well at least during the day. The sun rises in the east and sets in the west. So, the shadow of the stick will move from the west to the east – in a clockwise direction (at least in the northern hemisphere). It will be longest in the morning and evening because the sun will be low in the sky, and smallest at midday when the sun is highest in the sky.

The sun moves around the entire sky – that is 360 degrees of angle – in 24 hours. That is 15 degrees an hour. Does this agree with how fast your sundial shadow moves every hour? Of course, the sun isn't moving this fast across the sky each day. But the earth is revolving once every 24 hours, making it look like the sun is moving. It took hundreds of years for people to figure this out and it just goes to show that even scientists cannot always believe their eyes or come up with the right answer the first time around!

? **Big question:** the Bible says that 'The Lord watches over you – the Lord is your shade at your right hand; the sun will not harm you by day, nor the moon by night' (Psalm 121: 5–6). How does it feel to know that God is watching over you, keeping you safe? How does it feel to know that he protects you?

6 It gives light – observing the sun (safely)

You'll need: a large cardboard box; scissors; sticky tape; foil; greaseproof or similar transparent paper; a pin; a sunny day!

Warning: this activity provides a safe way to observe the sun. NEVER, I SAY NEVER, look directly at the sun with your naked eye as it may permanently damage your vision. AND NEVER, EVER, EVER, look at the sun through binoculars or a telescope! That will blind you.

What to do: on one side of the box, cut a square about 2.5 cm square. Cover the hole with tinfoil making sure that it is tight. In the middle of the foil, use the pin to make a small hole. On the other end of the box, cut a larger hole and cover this with the greaseproof paper.

Then, on a sunny day, point the end of the box with the foil towards the sun. You may need to move the box around until you get an image of the sun on the paper at the other end of the box. The longer the box, the bigger the disk of the sun will be, but it will be fainter. What do you see? Can you see any markings on the sun? You could take a photo of the image of the sun cast on the side of the box.

Big thinking: the sun is a huge ball of gas, 150 million km from earth. It's so big that it could fit over one million earths inside it. The surface temperature of the sun is 6,000 degrees centigrade, compared to the average temperature on earth which is 15 degrees centigrade. The light it provides makes the sky light, the energy it provides warms the land and oceans of the surface of the earth and causes the air to move which leads to our weather. Without the energy from the sun, the earth would be a frozen snowball floating in space!

The surface of the sun has marks upon it called sunspots. Just like on earth, where some regions are hotter and others colder, sunspots are cooler regions – well, still around 4,000 degrees centigrade – that appear as small dark marks. They appear dark because the surrounding sun is so bright. Mind you, they are so big that you could fit the earth inside one. You might have been able to see some in the pin-hole sun viewer, but probably only if they were very large. Over a few days, you can watch them move across the face of the sun and by watching them scientists have measured that the sun rotates once in every 25 days, although at the poles it rotates every 35 days! The sun also has sunspot seasons, roughly every eleven years, as the magnetic field of the sun changes. Scientists don't fully understand how these changes happen. Look at some detailed pictures (**solarsystem.nasa.gov/solar-system/sun/overview**) of the sun taken through special telescopes and from space.

Big question: the Bible says that God made the sun to 'govern the day' (Genesis 1:18a). But the sun does more than separate the day from the night. It gives energy to all life that exists on earth and also makes the weather, which provides water for life. In Psalm 104:27, it says 'all creatures look to [God] to give them their food at their proper time'. Do you think the sun is something we should give thanks to God for? Or do you just moan when it's not a sunny day?

7 It's wondrous – watching for sun dogs

You'll need: a sunny day, with the sun shining through 'cirrus' ice clouds; an arm and a hand!

Note: this experiment will need a particular weather pattern as described above. You may want to do the 'cloud watching' activity first so you can identify ice clouds. It also involves looking just to the side of the sun. Be careful not to look directly at the sun for too long.

What to do: locate the sun in the sky, shining through thin ice clouds. Lift up your arm in the direction of the sun. Open up the figures of your hand and put the tip of the thumb where the sun is. Now look at where your little finger is. Do you see a bright patch in the clouds? If there are clouds on each side of the sun, you may see one either side. Sometimes, you will see the colours of the rainbow within the bright patch.

Big thinking: the bright patches are called 'mock suns' or sun dogs – because they follow the sun around the sky just like a dog might follow their owner. Unlike a normal rainbow, where light from the sun is broken up into different colours as it travels through water drops, in sun dogs the brightness and colours are caused by light passing through ice crystals. Ice crystals come in lots of different shapes – needles, intricate six-branch crystals and sometimes they all clump together! The ones that make sundogs are hexagonal plates – flat ice crystals with six sides. Sometimes, you can also see a complete halo around the sun but that is rare and can appear very faint.

? **Big question:** one of the song writers in the Bible says: 'The heavens declare the glory of God; the skies proclaim the work of his hands. Day after day they pour forth speech; night after night they reveal knowledge. They have no speech; they use no words; no sound is heard from them. Yet their voice goes out into all the earth, their words to the ends of the world' (Psalm 19:1–4). Have you ever had a 'wow' moment when you look at the sky? What does it tell you about God?

8 Water, water, everywhere – the water cycle

You'll need: reusable plastic containers and lids or glass jars with lids; ice cubes.

What to do: put several pieces of ice into the bottom of the plastic container or glass jar and put the lid on. Place in a sunny spot and leave it for a while. Watch what happens as the ice melts. After some time you should begin to see water droplets beginning to form on the underside of the lid, well away from where the ice and its melted water is. Now, where did that come from?

Big thinking: you have just made a model of the water cycle of the atmosphere. The sun melts the ice into water and provides energy for it to evaporate into water vapour which mixes with the air in the bag. It travels to the top of the container, where it condenses on the lid and drips back into the jar, like rain.

This is what makes much of our weather. The sun causes water to evaporate from our oceans into the air. The warmth of the surface causes the air to rise, and as it does so, it begins to cool. As it cools, small particles of dust in the atmosphere cause the water vapour to condense around them making cloud droplets. These then grow by collecting more water vapour and merging with one another to make drops of water that are heavier. These fall to the ground as rain.

? **Big question:** people have known about the water cycle since ancient times. The book of Job in the Bible has this description: '[God] draws up the drops of water, which distil as rain to the streams; the clouds pour down their moisture and abundant showers fall on mankind' (Job 36:27–28). While they did not know as much as scientists today, they were good observers of the sky. Ice, water, water vapour and the sun all work together to bring life. How do you see God working in all the things of your life to bring you blessing and hope?

Water – ice, liquid and vapour – are all the same thing even if they look different. Jesus Christ is the same yesterday, today and forever (Hebrews 13:8) and he promised that 'I am with you always, to the very end of the age' (Matthew 28:20). What might that mean for you? How does it feel to know that God is with you always, no matter what changes you experience?

9 Sometimes it surprises – chaos

You'll need: some A4 paper – try and use paper that is recycled; something to mark a place for people to stand on the ground.

What to do: use the paper to make identical paper aeroplanes, one for each person. Now, get everyone in turn to stand on the same spot and throw their paper aeroplanes into the air. Watch to see where they land and leave them on the ground. Do they all land in the same place? What determines the path they take? The wind? The speed at which they are thrown, the size of the person who threw them? Once everyone has had a go, collect the planes and repeat the experiment to see if you can make the spread of where they land smaller.

Big thinking: it's very difficult to predict the weather. In fact, it's amazing that we can do it at all! We can get lots of information about what the weather is like now all around the world. We get this from measurements across land, from ships and aeroplanes as well as special balloons that people launch. And then there are satellites that orbit the earth and tell us about temperature, wind and clouds. We can also know the rules of how the weather works and huge supercomputers – like thousands of laptops linked together – work them out. This helps show us what the weather will be like in the future.

Sometimes we can predict the weather a week in advance. Other times we struggle to do so for even a few days ahead. That's because we don't know the exact details of what the weather is like now. And small changes at the start, can lead to huge differences in our forecasts later. Scientists call this 'chaos theory'.

It's like the experiment with the aeroplanes. The scientific rules that determine how the planes fly were the same each time the planes flew. The paper aeroplanes were the same design, but there would have been small differences. Not everyone stood in exactly the same place or threw the plane at the same speed. This led to the planes landing in different places.

A scientist called Ed Lorenz helped to discover 'chaos theory' in the early days of weather forecasting with computers, 60 years ago. He said the atmosphere worked like this: 'If a butterfly flaps its wings on the banks of the Amazon, then five days later there might be a tornado over Texas!'

? **Big question:** Jesus knew about how the weather changes. He commented that: 'When evening comes, you say, "It will be fair weather, for the sky is red," and in the morning, "Today it will be stormy, for the sky is red and overcast."' (Matthew 16:2–3). This is like our saying 'red sky at night, shepherds delight. Red sky in morning, shepherds warning'. But he also said: 'The wind blows wherever it pleases. You hear its sound, but you cannot tell where it comes from or where it is going.' (John 3:8). He said that this is how the Holy Spirit acts. If you are a weather person trying to predict the weather, you have to be ready for surprises. When has God surprised you? Has God worked out things in your life differently to how you thought or expected?

10 Nature responds to it

You'll need: some pine cones; trees; a compass.

What to do: this activity may take some time! Search around the area you are in for some pine cones. Or if there are none locally, find some before the session and hide them around the area.

Look at the cones. Are they open or closed? Think about what the weather has been like in the past week. Has it been wet? Has it been dry? Was it sunny? How might the weather conditions affect whether the cones are open or shut? Take the cones home and put them in a warm place. Watch what happens over several days. Do the cones open up?

Now, look around at the trees. Observe how the bark looks in different directions. Use the compass to check the direction. Is there any difference between the north side and south side of the tree trunk?

Big thinking: pine cones open and close depending on the humidity, to help seed dispersal. Inside the pine cone there are lots of feather-like seeds. When you place the cone in a warm environment at home, the humidity is lower, and the cones will open up. Outside, the wind will catch the seeds and allow them to be dispersed in the air, far away from the original tree.

The north side of a tree will not get as much sun as the south side (in the northern hemisphere – opposite in the southern hemisphere). So this side tends to be darker and damper, allowing moss to build up on the tree. This is how you can tell which way is north (or south) if you are in a forest and don't have a compass.

? **Big question:** 'There is a time for everything, and a season for every activity under the heavens' (Ecclesiastes 3:1). The seasons and weather might change, but God is constant. God has a plan and a time for everything, even though sometimes we might be impatient. How does that feel? What might that mean? How could that help when you are facing change?

11 It gets dark – moon and stargazing

You'll need: an open space, preferable with little light pollution; a star map, telescope or binoculars; a clear night! Or for a daytime activity – pieces of black paper; pins; printed star chart.

There are online star maps available on lots of different sites that will tell you what stars you can see from your location at each time of the year. For example, **skyandtelescope.org/interactive-sky-chart** or the BBC sky at night website (**bbc.co.uk/programmes/b006mk7h**).

If you can, gather for a 'Messy Church Goes Wild star party'. Is there anyone who is an astronomer in your local community that can come and guide you around the night sky?

There are additional space activities in the *Messy Church Does Science* chapter 'Earth, stars and space' chapter which can be used in the daytime with further links to science explanations.

What to do: using the star map for your location and time of year, try and identify some of the constellations in the night sky. Are all the stars the same colour? Can you try and count the stars? Try and divide up the night sky between you by taking different directions and count how many stars you can see. If you can connect with a Messy Church in another place, perhaps one where it is darker, compare your counting!

If the moon is up, what phase is it – a thin crescent, half-moon or full moon? If you have a telescope or binoculars, then use it to look at the moon. What can you see? Craters? Mountains? Dark plains – called seas (even if they are dry and have no water).

Can you see any planets – use the star chart to tell you want might be visible. Venus, Mars, Jupiter and Saturn should be visible with the naked eye. Do they look different to the stars? What are their colours? Through a small telescope you should be able to see the disks of these planets and also the four largest moons of Jupiter and the rings of Saturn.

Alternatively, if you are meeting in the daytime, use a circular star chart downloaded from the internet. Use a pin to make small holes where the main stars are. Now hold the chart up to the sky and see the lights shining through. Or you could make your own night sky. Print off some black circles and, with a pin, make some star patterns on them. Ancient people gave names to the star patterns. They called Ursa Major the Great Bear and Cygnus the Swan, because they thought this is what the pattern looked like. What do your star patterns look like?

Big thinking: the stars are like the sun, but much further away. It takes eight minutes for light to reach the earth from the sun. The next nearest star, Alpha Centauri (only visible from the southern hemisphere) is just over four light years away – that means it takes light over four years to travel from there to the earth.

Stars come in different colours depending upon their temperatures. Red ones are cooler, while white ones are hotter. The planets do not make light on their own but reflect light from

the sun. Their colour depends upon the surface. Mars has a very red surface so it looks red. Venus is covered in thick white clouds, so it looks bright white. Jupiter and Saturn have a yellow tinge. They are called gas giants and are balls of gas without any solid surface.

The earth's moon looks very different to the earth. It has no atmosphere or water, so craters caused by rocks hitting the moon long, long ago, don't erode like on the earth. Before we had telescopes, people thought the dark areas might be covered in water, but we now know they are vast plains of volcanic rock covered in dust.

? **Big question:** God challenged Abraham, 'Look up at the sky and count the stars – if indeed you can count them' (Genesis 15:5). Yet, the Bible also says, 'He determines the number of the stars and calls them each by name' (Psalm 147:4). In the earth's galaxy alone, the sun is one of up to 400 billion stars! Do we feel small when we look at the stars? Do you ever feel small compared to everyone around you? But like the stars, you are not small to God – he knows your name.

Bigger activities

- Create a weathervane and observe it over time.
- Visit an observatory or science museum.
- Take a field trip to a field or rural setting where there is less light pollution so you can see the stars yourself.
- Look at the Met Office website to find out how they forecast the weather.
- Ask Richard Branson for a lift to space!

Section 4 Celebration

Sit everyone in a circle and ask people what they might have learned about weather today. For example, they might have learned the names of some of the different clouds, or found out why the seasons change, or learned the relationship between the planets in our solar system.

As you prepare to tell the story of Jesus calming the storm (Mark 4:35–41), invite people to hold the edges of a large round piece of blue material or a parachute if you have one. They should shake and flap the material to represent the storm at sea. Get them to practise sound effects for the story such as howling like the wind and stamping their feet on the ground to be rain. Make sure you come up with a signal for all noise to stop!

Have everyone shake and flap the material again. As they do this, invite them to call out (or think of) all the things they are worried about. Then, when the leader says, 'Peace, be still' they should hold the material flat and calm, to represent the peace that Jesus brings, and say together something like, 'We trust in God who stills the storm.' (Idea from Martyn Payne's *Creative ways to tell a Bible story*.)

Alternatively, Psalm 8 would work well as a Bible reading for this Adventure.

Read out Psalm 8, slowly and carefully, pausing to think about what has been said. Or act it out with various people representing the different parts of the sky.

Sit down together and watch the sky – depending on whether the celebration is in the day or the night the sky will look different. In the day you might see clouds, at night you might see stars. Ask people to say what they see or share a memory of when the sky was particularly pretty. Chat about what part of the psalm they like best. What does it tell them about God?

There's a vast expanse of sky above us and loads of different planets and stars in the sky. How does it feel to know you're part of a bigger picture? We are all interconnected, we all relate to one another, everything we do has a knock-on effect on the environment around us.

Discuss what the word 'dominion' means? What might it mean to us, thinking of looking after our world? Ask if they are proud of things they have made during the session today. Do they think God is pleased with his creation? It is magnificent. And so are we!

Song suggestions

You may want to sing a version of ‘He’s got the whole world in his hands’ at this point, coming up with things to fill the verse, for example, he’s got all the clouds in his hands, he’s got the whole universe in his hands, he’s got everybody here in his hands. See what you come up with together! Other songs may be used like, ‘Our God is a great big God’, ‘Creator God’ or ‘All through history’ by Becky and Nick Drake.

Prayer

As we have thought about the sky and the vastness of it, maybe cup your hands over your eyes so your view is narrowed. Focus on the smaller piece of sky that you can see now. As you are doing so, what does it make you think about? What thank you, sorry or please prayers would you like to say to God in response? You could pray these out loud, in small groups or silently in your heart.

Finish with the Messy Grace.

Section 5 Eating together

Pick an idea from the Messy take-out menu or another source for outdoor meals, snacks and treats. Perhaps something round like scotch eggs, tomatoes, pancakes or pizza, remembering the shapes of the sun, moon and planets as you eat. If it's a hot day, can you find a surface hot enough to fry an egg on by the heat of the sun?!