



# YESTERDAY'S WEATHER, TOMORROW'S CLIMATE

HUMID OR CHILLY, FLOODED OR PARCHED: HOW DO WE KNOW WHAT OUR CLIMATE WAS LIKE IN THE PAST? STEP THROUGH A TIME PORTAL AND DISCOVER THE SECRETS OF AUSTRALIA'S CLIMATE HISTORY.

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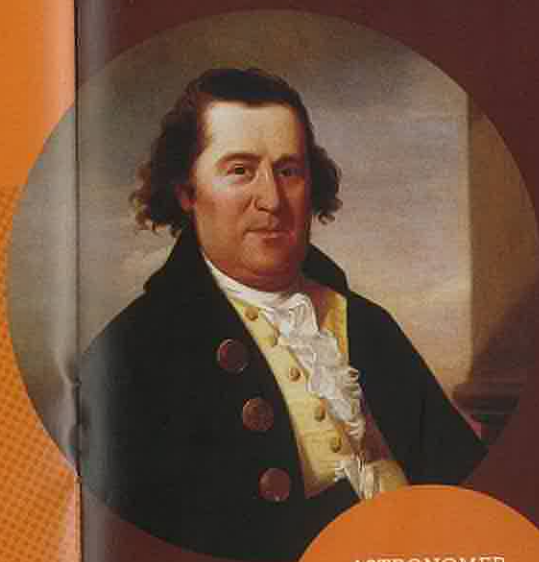
## WEATHER OR CLIMATE?

Climate and weather mean different things, although they are related. The weather in your town might be warm and sunny one day, then cold and rainy the next. The climate is the average of all these days over a month, a year, or even longer. While one Christmas Day's weather might be hotter in Melbourne than Brisbane, the climate of Brisbane is warmer than the climate of Melbourne.

It's easy to tell if the weather is different today from what it was yesterday. A change in weather doesn't mean climate change, however. To figure out if the climate is changing or not, climate scientists need a lot of information about what the weather and climate was like in the distant past.

Knowing more about past weather and climate events, such as floods and drought, is the key to predicting future climate change.

YOU CAN STEP OUTSIDE TO SEE THE WEATHER, BUT YOU'D HAVE TO STICK AROUND FOR A WHILE TO UNDERSTAND THE CLIMATE.



ASTRONOMER WILLIAM DAWES CAME TO AUSTRALIA IN 1788, AND RECORDED THE WEATHER IN SYDNEY FROM HIS HUT BY THE HARBOUR.

## OLD NUMBERS

Lots of different people record the weather. Farmers in the country want to measure how much rain fell on their farm. Sailors need to know the wind strength and direction before going out to sea. Doctors are interested in how temperature affects people's health.

Notes made by such people are the most reliable source of information about the climate in the past. Readings from thermometers and other instruments provide exact values about weather conditions that can be easily understood. Most weather records in Australia only go back 100 years or so, but in parts of Europe they go back more than 350 years!

The oldest weather observations in Australia come from William Dawes, an astronomer with the First Fleet. When

he came to Australia from England in 1788, he brought lots of meteorological equipment. Dawes lived in a small wooden hut in Sydney, right near where the Sydney Harbour Bridge is today. He recorded the weather and the movements of the stars for three years.

Old weather observations, like these ones from Sydney, can be used to explore the climate experienced in colonial Australia.

Before Europeans arrived, Indigenous Australians also kept a close eye on the weather. Changes in plants and animals were used to identify different seasons. Stories passed down in different Indigenous cultures describe times in the distant past when the climate was different from how it is today.



## NEWS AND WEATHER

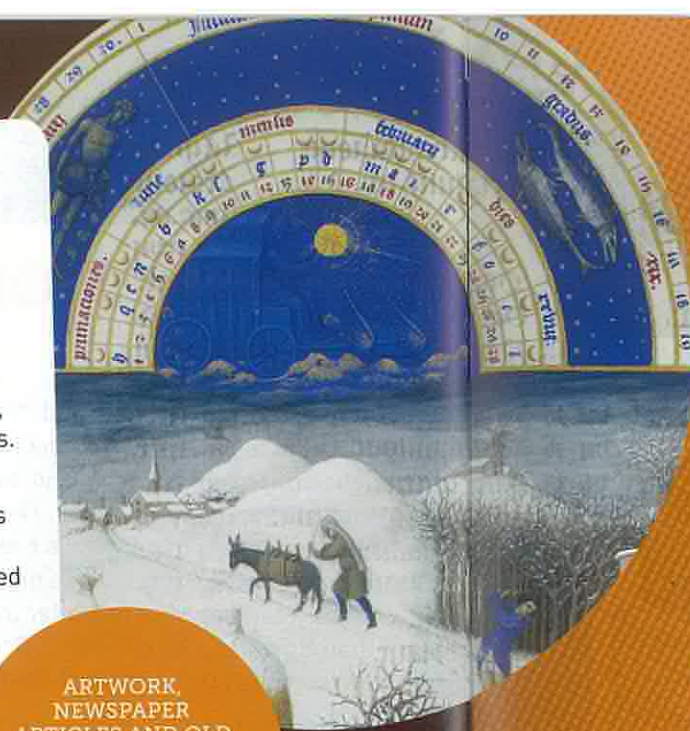
Newspaper articles and old diaries can be great sources of information about the weather and climate of years gone by. Australian explorers would often write about the size of rivers and lakes that they passed on their travels, giving today's scientists an idea of how much rain had fallen in that time.

Floods and unusual weather events almost always made the news in the past, just as they do today. In 1849, for example, it snowed in the middle of Melbourne! The newspapers published a big article about the snowfall, saying that it was the first time snow had fallen in the town since it was settled in 1835. This kind of information can be used to figure out how cold it might have been back then.

Written reports about other things can also help to uncover past weather and climate events. Farmers often keep a tally of how much grain they grow every year, or how many lambs are born in their flock. If there are lots of lambs, or great amounts of grain, this could be due to good weather conditions.

Other things, such as the amount of wine produced at a vineyard, the number of frosts that happen during winter, or even the number of fish caught every year can be used as climate clues. However, it is important to combine these observations with other information on climate to be accurate.

ARTWORK, NEWSPAPER ARTICLES AND OLD ILLUSTRATIONS CAN ALL PROVIDE INFORMATION ON WHAT THE WEATHER AND CLIMATE WAS ONCE LIKE.



AS SNOW FALLS, IT TRAPS BUBBLES OF THE ATMOSPHERE. SCIENTISTS CAN DIG THESE UP AND STUDY THEM FOR INFORMATION ABOUT THE CLIMATE.



## ICE INFORMATION

Ice sheets are another 'cool' source of information about old climate. When snow falls and makes up the ice sheets in Antarctica and the Arctic, it is like a snapshot of what the atmosphere was like at that time. Volcanic eruptions and changes in the amount of oxygen in the atmosphere are all measured in these snow snapshots, saving important clues about changes in global temperature and rainfall patterns.

To uncover these clues, scientists drill a hole down into the ice sheet and take out a long cylinder of the ice at different levels. This is called an ice core. Dr Mauro Rubino, from CSIRO's Marine and Atmospheric Research team, recently worked on an ice core from Greenland that was over 2.5 kilometres long.

By studying the chemical make-up of the ice core, Dr Rubino and his group were able to estimate the temperature over 120 000 years ago. "The ice is an archive of past climate," says Dr Rubino. "Analysis of the core is giving us pointers to the future."

## RINGS OF TRUTH

To look at the climate before people started writing things down, scientists turn to natural record keepers. Certain tree species are sensitive to changes in temperature and rainfall, and this is reflected in their rings.

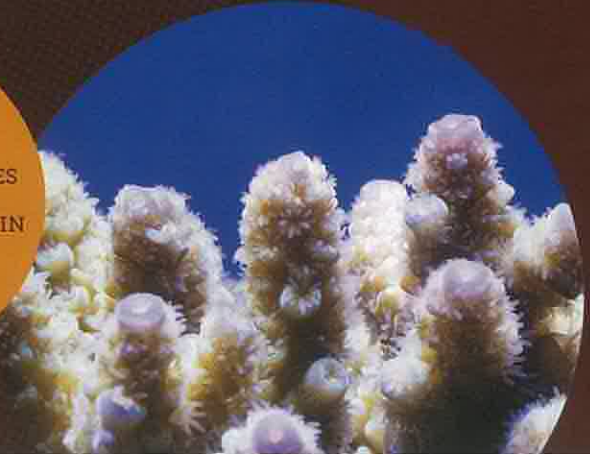
Pine trees in Tasmania and New Zealand grow much better during warm summers. When a tree has a good year, this means big thick tree rings. Poor growth during a cold year or a drought makes for small narrow rings.

Scientists who use trees to explore the climate are called dendroclimatologists (DEN-dro-cly-mat-OL-oh-jists), because dendron means 'tree' in

Greek. These scientists drill holes into live trees to extract a slice of tree rings. The tree rings are dated by counting them in the lab and comparing them to other tree rings. The longest record from a tree in Tasmania goes back more than 4500 years!

Corals might not be as famous for their rings, but they also grow a new layer every year. Coral rings tell scientists a lot about ocean temperatures and the chemistry of the seawater. Corals in the Great Barrier Reef are used to study rainfall in Queensland. When there is a flood, fresh water flows from the rivers into the ocean, leaving a clear mark on the skeletons of hard corals.

SIMILAR TO TREES, CORAL ALSO PRODUCES RINGS AS IT GROWS, RECORDING CHANGES IN THE ENVIRONMENT.



THE WEATHER AFFECTS HOW TREES GROW, WHICH CAN BE MEASURED OVER A LONG PERIOD AS RINGS IN THEIR WOOD.



Images: Thinkstock Images, CSIRO Marine and Atmospheric Research