

Clouds that warm Clouds that cool

Objectives

By the end of this lesson the student will:

- have investigated the effects of clouds on surface temperature.

Background

Clouds are named according to their height, shape and colour. There are low clouds (below 2 kilometres), medium clouds (2 -7 kilometres) and high clouds (above 7 kilometres). There are also clouds that stretch long distances through the atmosphere. Because the air is so cold, high clouds are normally made up of tiny ice particles.

Cirrus are high, white, feathery clouds. They are made up of ice crystals and don't bring rain.

Clouds with a woolly appearance are called cumulus. Sometimes they are small low-level clouds. They can also be present during thunderstorms, reaching heights of 15 kilometres. Cumulus clouds often produce shower.

Stratus are low grey clouds. If the air is very still, tiny water droplets can fall to the ground as a drizzle.

In general, high clouds warm the Earth's surface and low clouds have a cooling effect.

Resources and actions

Use a thermometer in a shady location about a metre above the ground well away from buildings to measure the temperature on clear and cloudy days over several weeks. Along with the temperature measurement, note the time and date. Students should take measurements during both day and night.

Use a cloud chart (photos of different cloud types) <http://www.bom.gov.au/info/clouds/> to record the type of cloud present. Estimate too the fraction of the sky covered by cloud. An easy way is to observe how many eighths of the sky is cloudy. For example, if half the sky contains clouds, you would describe the cover as 4/8. If clouds occupy only a fraction of the sky, you would write 1/8.

Print off the student's worksheet and photocopy one for each student:
http://www.bom.gov.au/lam/Students_Teachers/worksheet24.shtml

Ask the students to carry out the activity from the worksheet then go over their results in a future class.

Questions and solutions

1. Examine your data to see if you can work out what influence clouds have on surface temperatures.

Use the student's answers.

2. Are there some types of clouds that seem to increase surface temperatures? Which types?

High clouds warm the Earth's surface.

3. Are there some types of clouds that seem to lower surface temperatures? Which types?

Low clouds have a cooling effect on the Earth's surface.

Extension activity

For some fun you could have the students play the Mr McCloud Cloud Quiz:

http://www.bom.gov.au/lam/Students_Teachers/animations/cloudzstart.shtml

Time

Follow the timing given in the procedure. You'll need to plan for this to run over a couple of weeks.

Assessment Task

Q1