

POLAR SCIENCE PRINCESS ELISABETH ANTARCTICA STATION





WHICH OF THESE DIAGRAMS SHOWS AN ICE SHELF?





An **ice shelf** is the floating extension of a glacier or ice sheet over the ocean. Ice shelves can be around 50 to 600 m thick.

An **ice sheet** is formed by the deposition and compression over time of layers of snow. The ice sheet moves from the interior of the continent to the coast, where it may form an **ice shelf** over the ocean. At the front of the ice shelf, chunks of ice break off into the water forming **icebergs**.



WHAT IS THE NAME OF THE SCIENTIFIC INSTRUMENT IN THIS PICTURE ?

- AUTOMATIC WEATHER STATION (AWS)
- CTD SONDE
- SEISMOMETER
- NONE OF THE ABOVE

Automatic Weather Stations are installed by the meteorologists to collect data from meteorological sensors. The data is saved on site in a data logger and sent via satellite to research institutes.

<u>Note</u>

A **CTD** (Conductivity, Temperature, Depth) Sonde is used to measure conductivity (and therefore salinity) in the ocean and the temperature of the water at different depths.

A seismometer is an instrument which records earthquakes and ice tremors.

JAN LENAERTS, A SCIENTIST AT UTRECHT UNIVERSITY USES MEASUREMENTS MADE BY THE AUTOMATIC WEATHER STATION TO STUDY ALBEDO AT THE SURFACE OF THE ROI BAUDOUIN ICE SHELF. WHAT IS ALBEDO?

- VARIATION IN LIGHT INTENSITY
- A TYPE OF WIND
- THE FRACTION OF SOLAR ENERGY REFLECTED FROM A SURFACE
- THE TEMPERATURE OF THE SNOW

The Automatic Weather Station (AWS) measures the incident solar radiation (at the ice surface) and the reflected solar radiation.

Albedo = reflected solar radiation/ incident solar radiation

Albedo is expressed as a number between 0 and 1. When there is fresh snow on the surface of the ice, the albedo is generally greater than 0.8. The albedo decreases when the snow is older and when the snow melts.

You can see the measurements from the AWS installed by Jan Lenearts on the King Baudouin ice shelf during the 2014/2015 season on his blog: http://benemelt.blogspot.be/p/results.html

JEAN-LOUIS TISON, MORGAN PHILIPPE AND BRICE VAN LIEFFERINGE ARE PREPARING THEIR EQUIPMENT BEFORE LEAVING FOR THE COAST. WHAT WILL THEY USE THIS PIECE OF EQUIPMENT FOR ?

Measuring solar radiation

Collecting ice cores

Analysing particles in the atmosphere

Studying the stars

The glaciology team from Université Libre de Bruxelles <u>collected several</u> <u>ice cores</u> during the 2014/2015 season. Ice cores are cylindrical ice samples taken from drilling in glaciers or ice sheets. The longest core drilled by the team in 2014 was 107m.

See this multimedia animation to find out how ice sheets form.

THE ICE CORES ARE ANALYZED BY THE SCIENTISTS ON THEIR RETURN FROM ANTARCTICA. THIS RESEARCH ALLOWS THEM, AMONGST OTHER THINGS, TO DETERMINE HOW CO_2 CONCENTRATION IN THE ATMOSPHERE HAS EVOLVED IN THE PAST. TO DO THIS THEY :

MELT THE ICE AND ANALYSE THE WATER

- CUT SLICES OF ICE AND OBSERVE THEM UNDER A MICROSCOPE
- ANALYSE THE COMPOSITION OF AIR
 BUBBLES TRAPPED IN THE ICE

ANALYSE THE POLLEN IN THE ICE

fi

Ice cores are climate archives. Ice sheets are formed from the compression over time of layer upon layer of snow. Each slice of an ice core corresponds to a period in the Earth's history, the deepest being the oldest.

Analysis of air bubbles trapped in different slices of ice make it possible to determine the composition of the air at the time when the snow fell.

Find out what glaciologists do and why their research is important in this International Polar Foundation interview.

Moraine	Firn	Ice stream	Ice sheet

Firn is the correct response.

What do the other terms mean?

Ice sheet

Huge expanse of glacial ice covering most or all of a continent. Today there are just two, in Antarctica and Greenland.

Ice stream

Within ice sheets there are regions where some ice moves much faster than the surrounding ice, forming an ice stream.

Moraine

Rock debris of all sizes carried by the glacier and deposited usually as ridges at its sides or terminus.

NEXT

DENIS LOMBARDI, A SCIENTIST AT THE ROYAL OBSERVATORY OF BELGIUM, HAS INSTALLED SEVERAL COUPLED GPS-SEISMIC INSTRUMENTS ("SEISMOCUBES") IN THE ICE ON THE ROI BAUDOUIN ICE SHELF. WHY ?

D TO STUDY SNOW PRECIPITATION

TO STUDY ICE DYNAMICS

D TO MEASURE THE MELTING OF THE ICE

The purpose of the installation of a series of GPS and seismic instruments in the <u>SMEAIS</u> project is to take measurements of the seismic energy released by the flow of ice and the displacement of the ice at the same place. This will provide information about the **behaviour of the ice sheet and its progress towards the ocean** (ice dynamics).

EVERY DAY, <u>METEOROLOGISTS</u> LAUNCH A BALLOON WHICH CAN REACH A HEIGHT OF 20 TO 30 KM. WHY ?

TO MEASURE THE WIND SPEED AND DIRECTION

	TO COMMUNICATE THEIR
D	MEASUREMENTS TO RESEARCHERS AT
	OTHER RESEARCH STATIONS

• TO ASSESS THE VISIBILITY IN THE AREA

 TO MEASURE TEMPERATURE,
 ATMOSPHERIC PRESSURE AND HUMIDITY AT DIFFERENT ALTITUDES

An instrument (radiosonde) hooked to the weather balloon measures temperature, humidity and pressure at various altitudes. The data is transmitted by radio to a ground receiver.

STEPHAN BRACKE, SCIENTIST AT THE GEOPHYSICAL CENTRE OF DOURBES, HAS SET UP A NEW GEOMAGNETIC OBSERVATORY. THE INSTRUMENTS HE HAS INSTALLED ENABLE HIM TO GET MEASUREMENTS OF THE VARIATION IN TIME OF THE DIRECTION AND STRENGTH OF THE EARTH'S MAGNETIC FIELD.

WHAT IS THE MEASUREMENT UNIT FOR THE STRENGTH OF THE EARTH'S MAGNETIC FIELD?

Ohm

lesla	

Pascal

Joule

Tesla is the correct answer.

What are the other measurement units ?

Ohm	Electrical resistance
Pascal	Pressure
Joule	Energy

WHY IS ANTARCTICA A GOOD PLACE TO COLLECT AND STUDY <u>METEORITES</u> ?

METEORITES ARE ATTRACTED BY THE POLES AND FALL MORE OFTEN IN THESE REGIONS THAN ELSEWHERE.

METEORITES FALL MORE EASILY THROUGH THE OZONE HOLE OVER ANTARCTICA.

 THE ATMOSPHERE IS VERY PURE AND IT IS EASIER FOR SCIENTISTS TO SEE THE METEORITES FALL.

THE DARK COLOUR OF THE METEORITES IS EASY TO SEE ON THE ICE AND ICE ALSO PRESERVES THEM WELL.

Antarctica is a good place to study meteorites as they are **easy to spot on the ice** and because the **cold preserves them well**.

Well done!

You can now do this quiz again or visit <u>www.educapoles.org</u> for other quizzes, teaching files and educational projects for the polar regions, polar science, climate change and sustainable energy.

START AGAIN

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