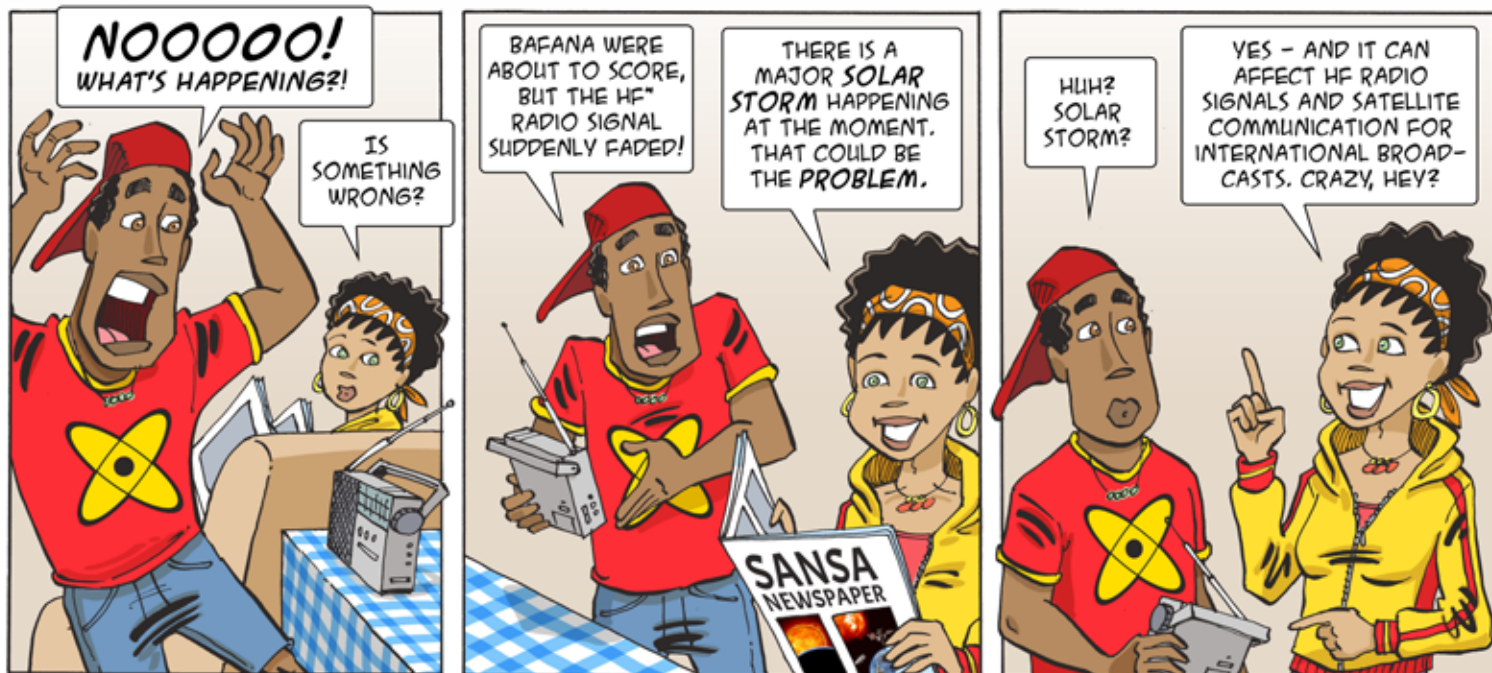




WEATHER IN SPACE



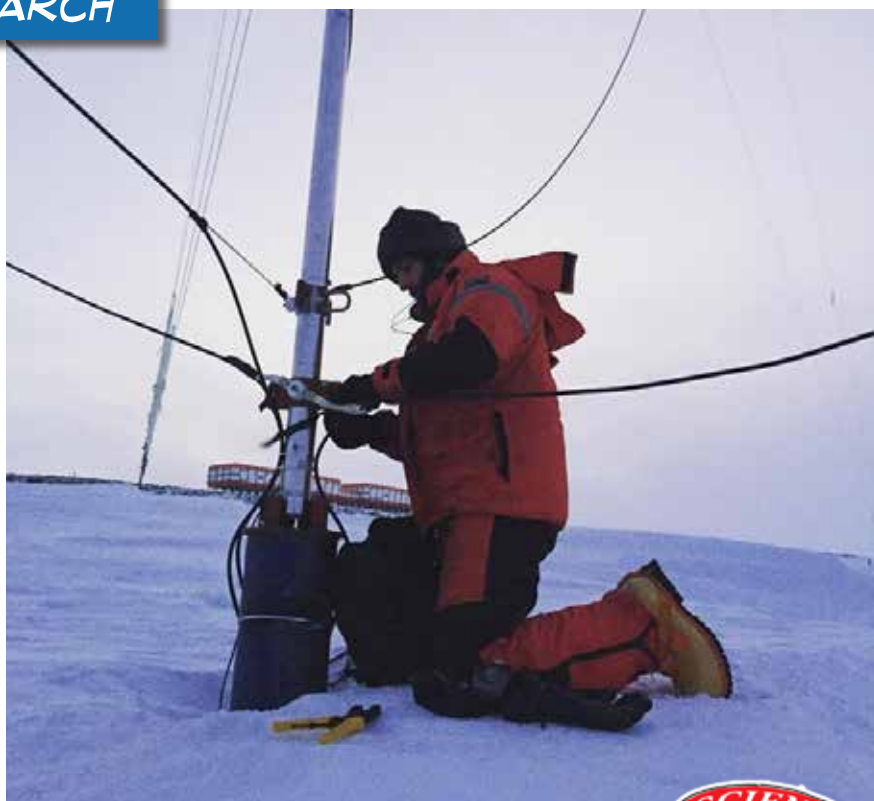
*HIGH FREQUENCY

NEAR-EARTH SPACE RESEARCH

DID YOU KNOW THAT THE SOUTH AFRICAN NATIONAL SPACE AGENCY (SANSA) OPERATES THE ONLY **SPACE WEATHER WARNING CENTRE** IN SOUTHERN AFRICA? THAT MAKES US **LEADERS** IN THIS FIELD!



The SANSA Space Weather Centre is in Hermanus in the Western Cape, and is connected to other *observatories* and *research stations* – including one in *Antarctica*.



ACTIVITY: MAGNETIC FIELDS

YOU WILL NEED:

- THE FOLLOWING ITEMS TO MAKE AN ELECTROMAGNET:
 - A NAIL
 - SOME ELECTRICAL WIRE (PLASTIC-COATED)
 - A BATTERY
 - SOME TAPE OR PRESTIK
- A SEWING NEEDLE
- SOME COTTON THREAD

1

MAKE AN ELECTROMAGNET:

- TIGHTLY WRAP THE ELECTRICAL WIRE AROUND THE NAIL AS MANY TIMES AS YOU CAN.
- CONNECT THE POSITIVE AND NEGATIVE TERMINALS OF THE BATTERY TO THE TWO ENDS OF THE WIRE USING TAPE OR PRESTIK.
- TEST YOUR ELECTROMAGNET BY TRYING TO PICK UP THE NEEDLE WITH IT.



2

MAKE A "MAGNETIC FIELD" TESTER:

- ATTACH A PIECE OF COTTON THREAD, ABOUT 20 CM IN LENGTH, TO THE SEWING NEEDLE.
- HOLD THE NEEDLE UP BY THE THREAD, AND SLIDE THE THREAD ALONG THE NEEDLE UNTIL IT IS BALANCED AND HANGS HORIZONTAL TO THE GROUND.

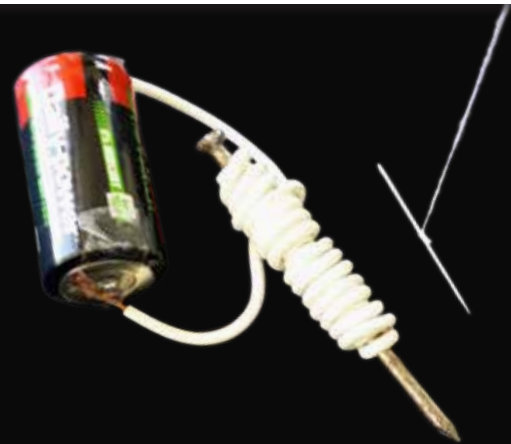


3

TEST THE MAGNETIC FIELD OF THE BAR MAGNET OR ELECTROMAGNET:

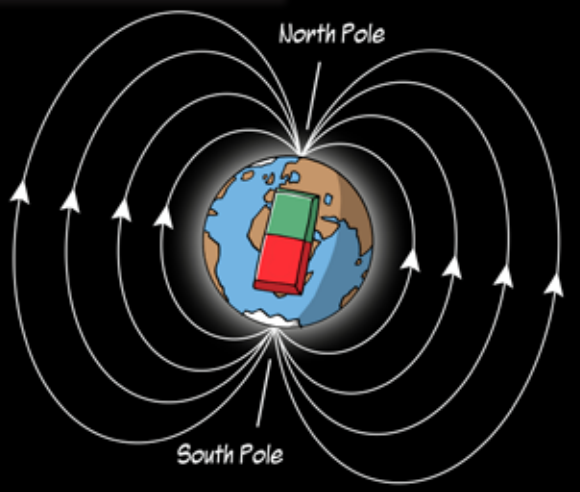
- HANG THE NEEDLE NEAR THE SIDE OF THE MAGNET.
- MOVE IT SLOWLY TOWARDS EITHER OF THE ENDS OF THE MAGNET, AND OBSERVE WHAT HAPPENS.

(NOTE: YOU CAN ALSO USE A BAR MAGNET FOR THIS.)



WHAT'S HAPPENING HERE?

DID YOU KNOW THAT THE EARTH HAS A **MAGNETIC FIELD**? THE NORTH AND SOUTH POLES OF THE EARTH ARE LIKE THE **ENDS OF A BAR MAGNET**.



These particles *collide* with oxygen and nitrogen in the earth's atmosphere. The result is an amazing display of lights, called *Aurora Australis* or Southern Lights (at the South Pole).

Similar to the way the *needle was pulled in* at the ends of the magnet, so *particles from the sun* travel along the magnetic field lines into the earth's atmosphere, where the field lines come together at the poles.

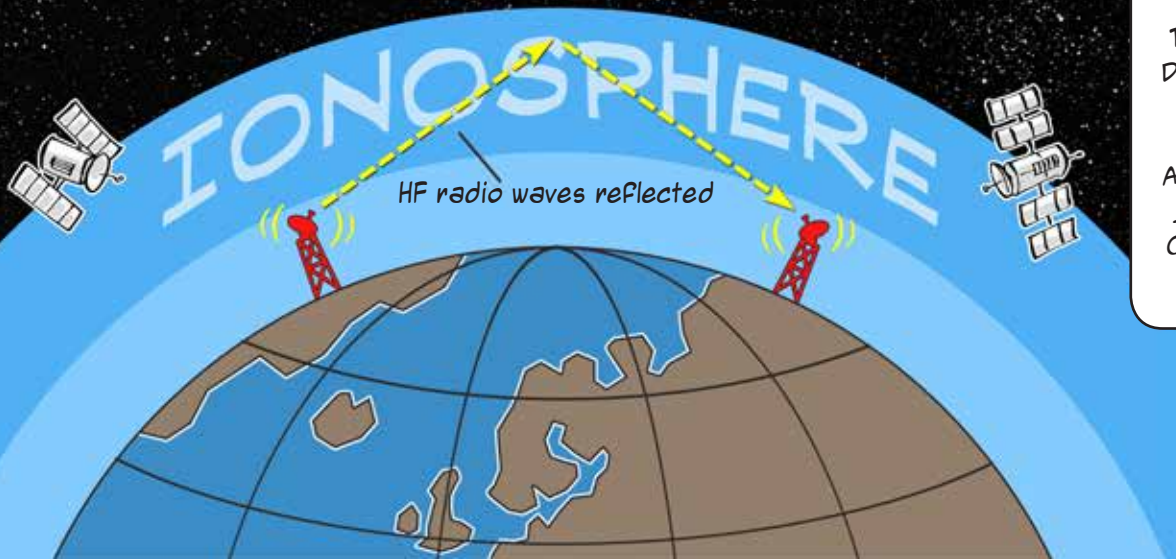


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SPACE WEATHER AND TECHNOLOGY

RESEARCHERS AT SANSa STUDY NEAR-EARTH SPACE. THEY MONITOR CHANGES USING INSTRUMENTS ON THE GROUND AS WELL AS DATA FROM SATELLITES. THEY RESEARCH HOW TECHNOLOGY IS AFFECTED BY CHANGES IN SPACE WEATHER AND CHANGES IN THE EARTH'S MAGNETIC FIELD.



Space weather can affect the earth's ionosphere (the region around the earth which is able to reflect radio waves). When this happens, you can experience dropped cell phone calls, incorrect GPS directions, and disturbances to radio communications and DSTV.



CAREERS:

- **Space Scientists** are like detectives who search for new knowledge about the world around us to make life better on Earth. They study everything from the sun to the earth's core.
- **Antarctic Engineers** maintain and develop the scientific infrastructure required for space science research.
- **Satellite Operations Technicians** operate and maintain electronic equipment associated with satellite operations.



Danielle Taljard is a Radar Engineer, and has worked for SANSa in the South African National Antarctic Programme. She holds a Bachelor of Engineering (Electronics) degree. While working in Antarctica for 14 months, she operated and maintained the space-monitoring equipment. She describes her job as "interesting", "insane" and "incredible".

CURRICULUM LINKS

- **GRADE 7: Natural sciences** – Properties of matter; **Technology** – Electrical systems and control (magnetism)
- **GRADE 8: Natural sciences** – Planet Earth and beyond (relationship of the sun to the earth, the solar system, atmosphere)



PUZZLE YOUR MIND!!!

FIND THE LISTED WORDS IN THE PUZZLE BLOCK, AND DRAW A RING AROUND EACH WORD. THE WORDS RUN IN ALL DIRECTIONS, SO LOOK CAREFULLY!

- IONOSPHERE
- ANTARCTICA
- RADAR
- MAGNETIC
- SPACE
- AURORA
- PHYSICS
- SATELLITE



R Q T F V I A U W T J F J F
 X Y T M L E T I L L E T A S
 U Z B A G F V A M N P V I H
 L Z K G G K V C W V V Z R J
 P G N N Z E Y I U A H H A I
 Y W X E B R Z T T R E C U I
 D V Y T X E F C V O V N C Q
 U L W I B H V R P R J X V Z
 V R E C K P D A H U H W Q O
 Y M E F S S T T Y A S S Z M
 X T C I E O B N S K F K S I
 Q H A F V N D A I O E E H S
 A G P H S O O P C R A D A R
 G D S Z E I V N S N V E M E

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The South African National Space Agency (SANSA) was established in 2010. The agency's mandate is to derive greater value from space science and technology for the benefit of South African society.



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