CANDAC

Canadian Network for the Detection of Atmospheric Change

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- In 2002, a group of university researchers joined together under the title of the Canadian Network for the Detection of Atmospheric Change (CANDAC) with the objective of improving the state of observational atmosphere research in Canada.
- This group recognized the need for an Arctic laboratory and identified the Polar Environment Atmospheric Research Laboratory (PEARL) in Eureka, Nunavut as the ideal station.
- They worked enthusiastically to raise funds to run the facility and had a fully-functional Arctic lab operating in 2005.
- Since then, researchers have been taking various measurements to monitor and better understand current atmospheric conditions.

Funding for CANDAC has been provided by:

Canadian Foundation for Climate and Atmospheric Sciences (CFCAS)
Fondation canadienne pour les sciences du climat et de l'atmosphère (FCSCA)

Ontario Innovation Trust

Canada Foundation for Innovation
Fondation canadienne pour l'innovation

Environment Canada

Environnement Canada

NSERC CRSNG

Ontario MINISTRY OF RESEARCH & INNOVATION

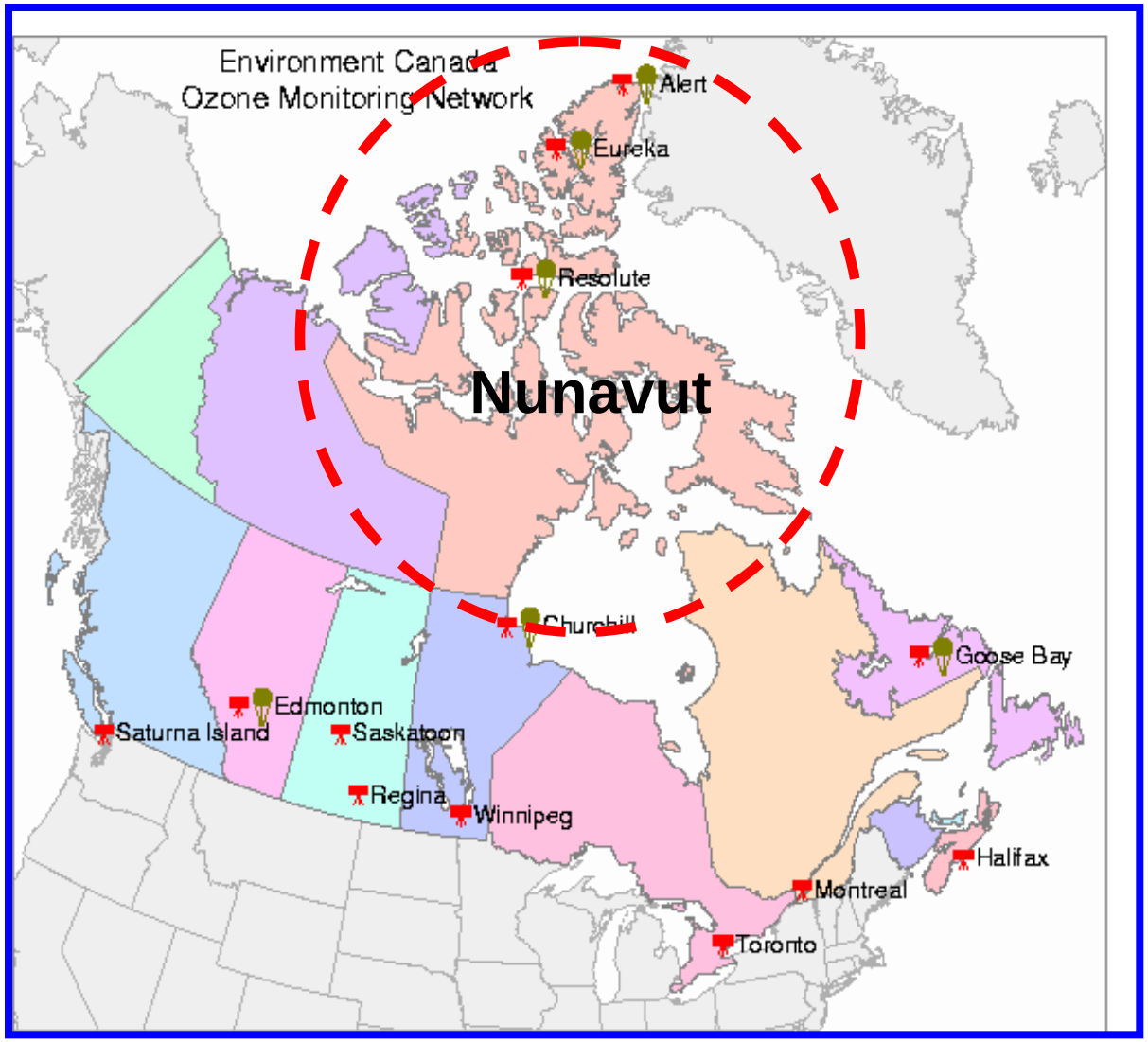
CSA ASC

NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

INTERNATIONAL POLAR YEAR
2007-2008

Nova Scotia Research and Innovation Trust

Where do we take measurements?



- CANDAC researchers collect data in Nunavut.
- Nunavut is a Canadian territory located in the Arctic.

http://exp-studies.tor.ec.gc.ca/e/ozone/ozonecanada.htm

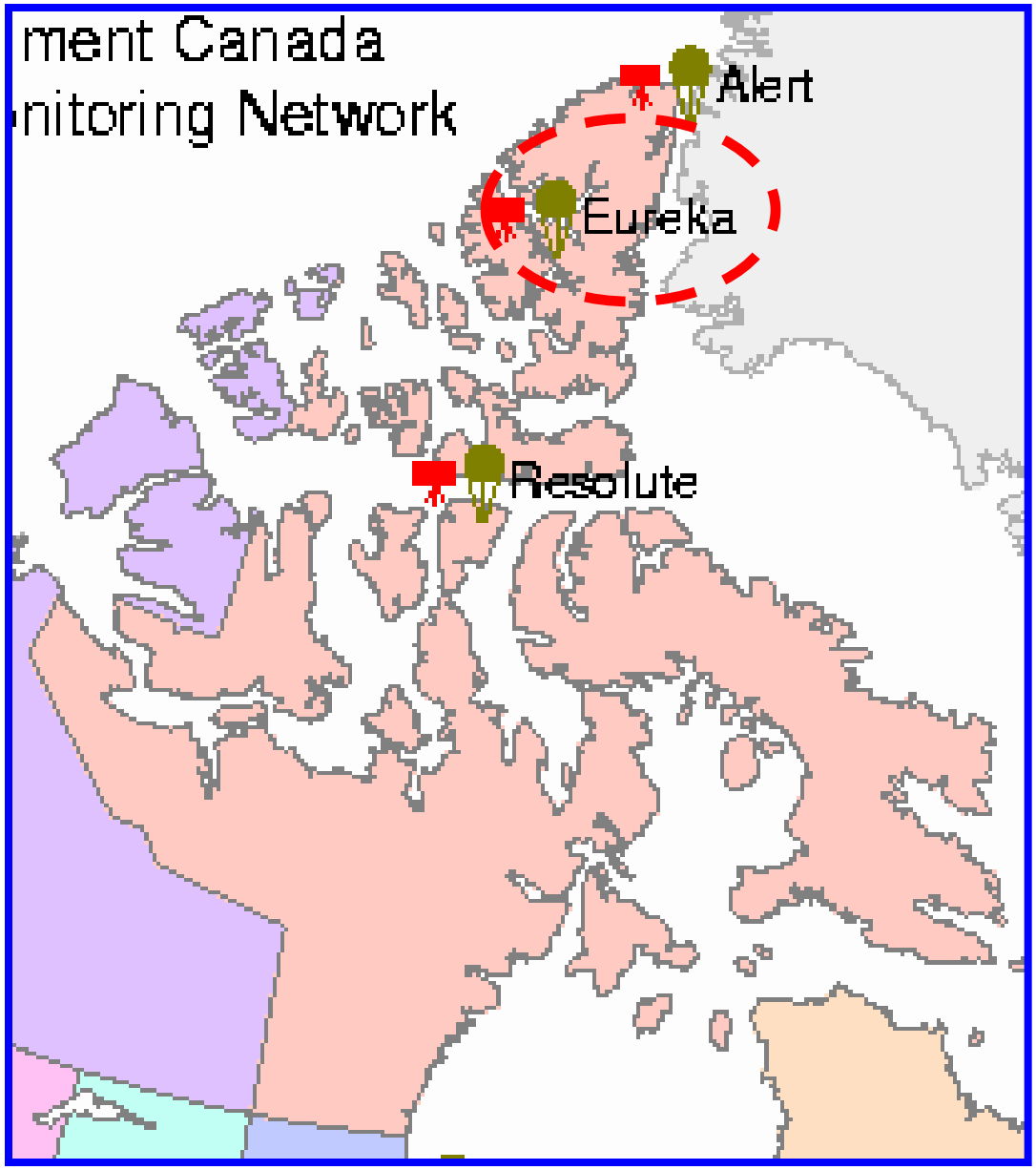
- Many animals including caribou, polar bears, Arctic wolves, Arctic hares, whales and seals live in Nunavut.

Polar bear photos courtesy of Andrea Moss

Arctic hare Photo courtesy of Pierre Fogal.

Wolf photos courtesy of Emily McCullough

Caribou Photo courtesy of Pierre Fogal.



- Eureka is located on Ellesmere Island in the High Arctic.
- It is not too far from the North Pole.

http://exp-studies.tor.ec.gc.ca/e/ozone/ozonecanada.htm

Photo courtesy of Pierre Fogal

- Many CANDAC researchers operate their instruments from the Polar Environment Atmospheric Research Laboratory (PEARL) located in Eureka.
- Researchers typically travel to PEARL by airplane.

Photo courtesy of Pierre Fogal

CANDAC International Polar Year Legacy Project: Educational Resources

- As part of the International Polar Year (IPY) Legacy Project, CANDAC has created educational resources aimed at enhancing environmental science education in classes from kindergarten to grade 12.
- Educational materials can be found at: http://candac.ca/candac/Outreach/Outreach.php .
- This particular presentation is about:

Weather Instruments and Weather Forecasting!

What is Weather?

Weather is….

- what is happening outside.
- temperature, cloudiness, snow/rain and wind.
- always changing.

What kind of weather?

Photo courtesy of Jonathan Franklin

What kind of weather?

What kind of weather?

Photo courtesy of Niall Ryan

What kind of weather?

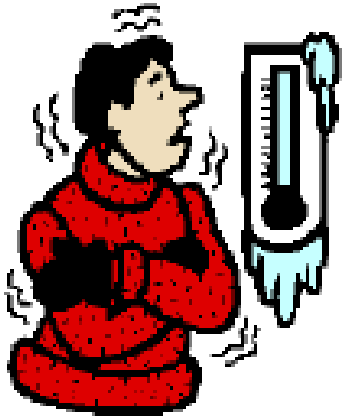
http://www.freeimages.co.uk/

What kind of weather?

Photo courtesy of Tara Cunningham

The study of weather is call meteorology.

How do we measure the weather?



Stevenson Screens

Photo courtesy of Tobias Kerzenmacher

Thermometer

Thermo-barograph

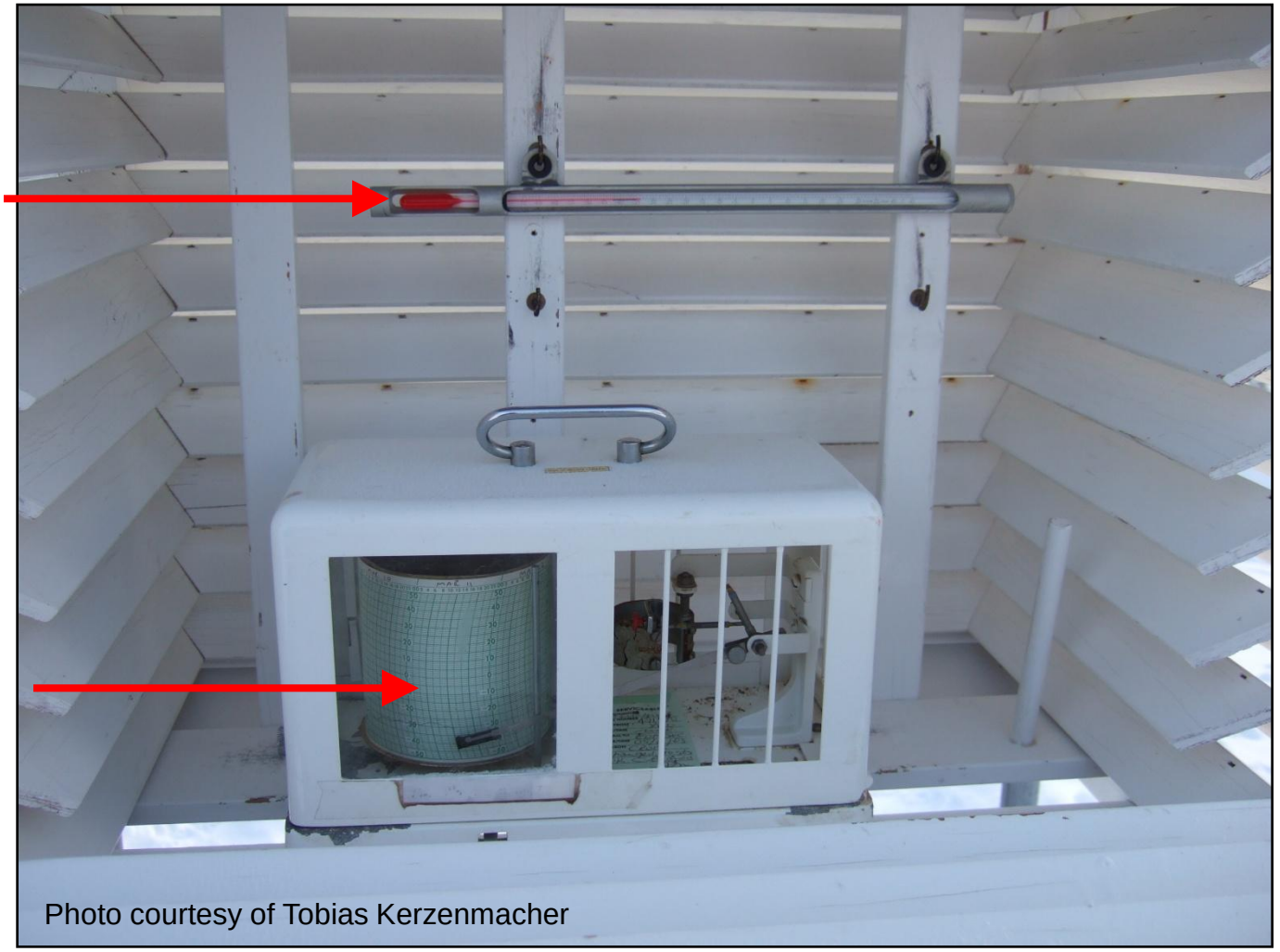


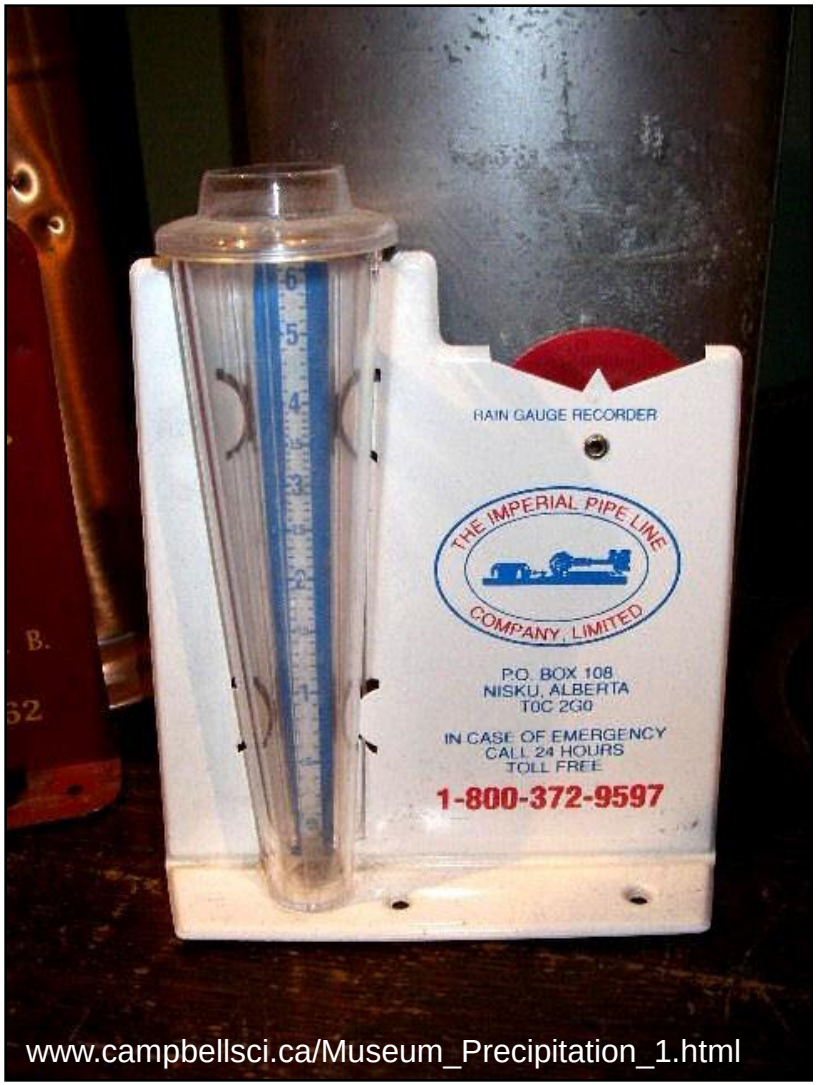
Photo courtesy of Tobias Kerzenmacher

- This photo shows the inside a Stevenson Screen.

Snow Gauge

Photo courtesy of Tobias Kerzenmacher

Rain Gauge



www.campbellsci.ca/Museum_Precipitation_1.html

Model CS700 (c) 2002 Campbell Scientific (Canada) Corp.

http://www.campbellsci.ca/Catalogue/prfull/cs700.jpg

Wind Measurements

Anemometer
(measures wind speed)

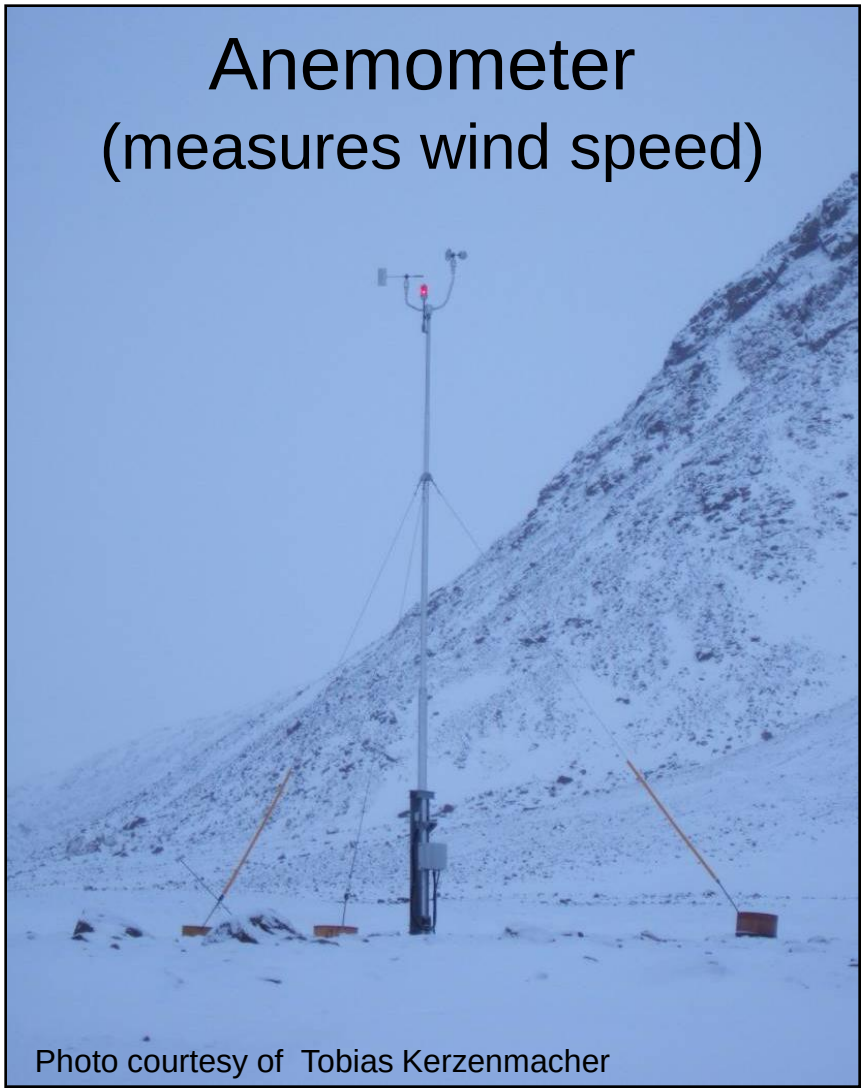


Photo courtesy of Tobias Kerzenmacher

Wind Sock
(measures wind direction)

Photo courtesy of Tobias Kerzenmacher

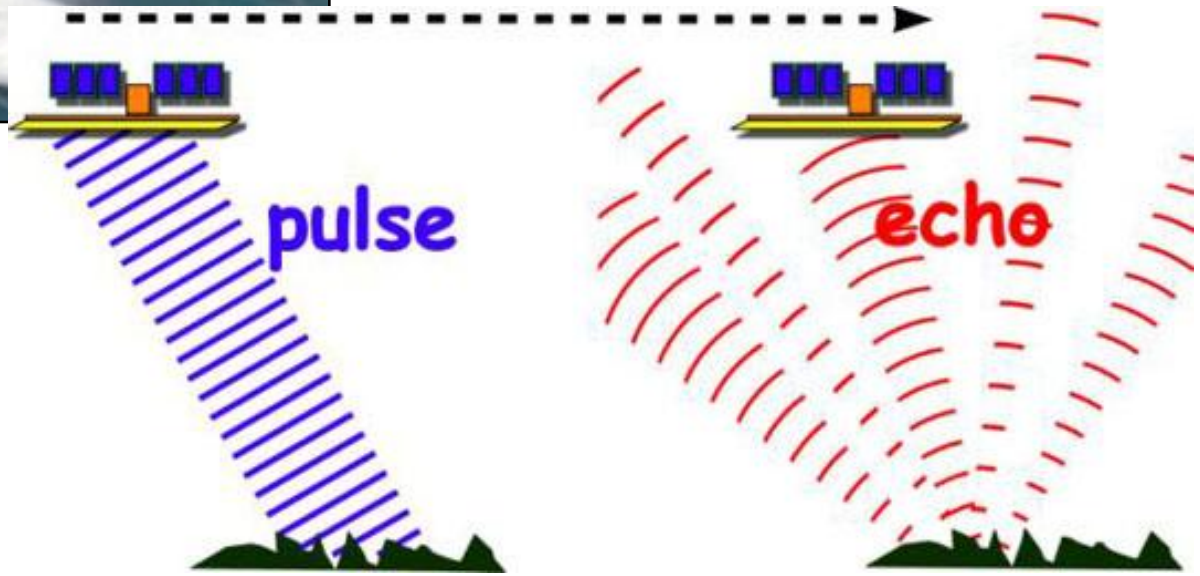
Ice Thickness Measurements

Chris Polashenski of Dartmouth College (left) and Benny Hopson from the Barrow (Alaska) Arctic Science Consortium bore a hole through sea ice in the Chukchi Sea on July 4.
Caption courtesy of:
http://www.nasa.gov/topics/earth/features/icescape2010_arctic_ice.html
Photo courtesy of NASA/Kathryn Hansen

- Ice thickness can be determined using drill-hole measurements.
- A hole is drilled in the ice using an ice auger.
- Ice thickness is measured using a measuring tape equipped with a hinged weight at the end.
- The tape and weight are lowered through the hole and then pulled upward until the weight catches on the bottom of the ice.
- The tape is then read to determine the thickness of the ice.

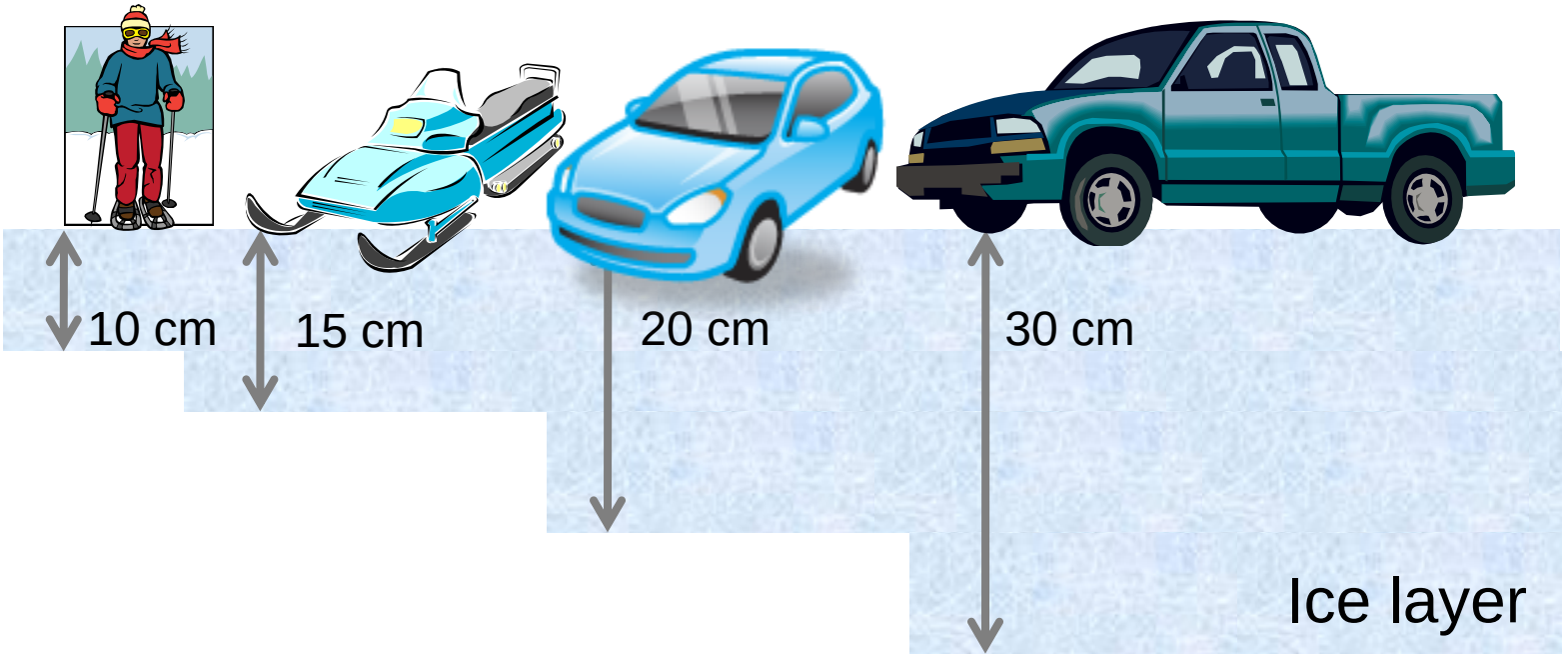
http://www.asc-csa.gc.ca/images/recherche/photo.aspx?id=448&format=0&search=radarsat-1&l=eng

- Ice thickness can also be measured using satellites equipped with radar.



http://polar09.yesican-science.ca/Blogs/?view=136

- Thicker ice can usually support more weight than thinner ice, but the quality of the ice and the way it formed is also important.
- People planning to travel or play on ice should determine the thickness and approximate weight the ice is able to support.



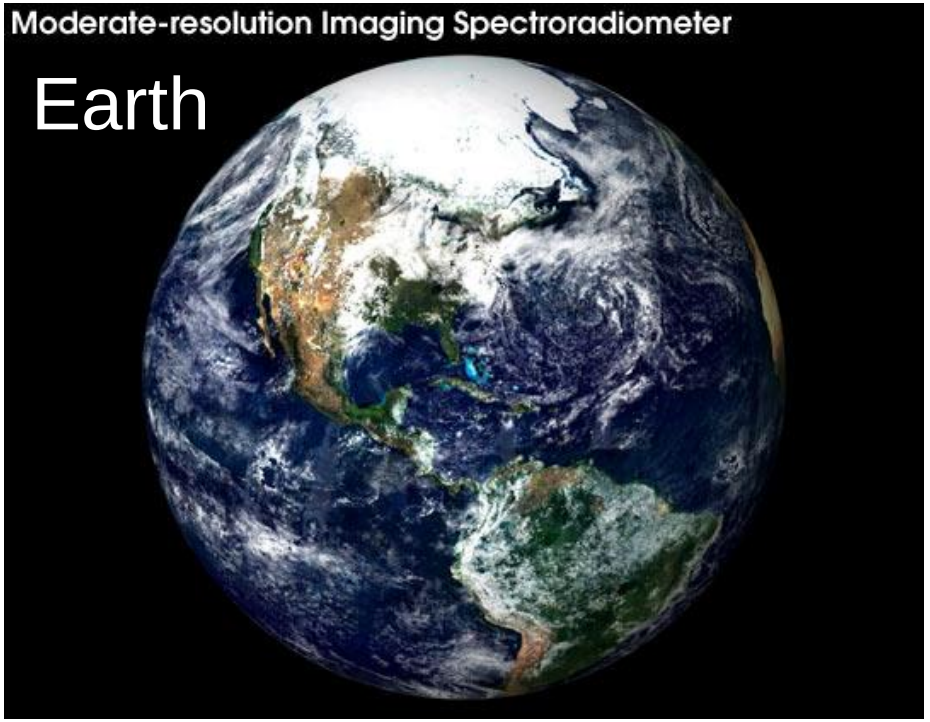
The diagram above is based on the Ontario Outdoors ice safety chart found at http://www.ontariooutofdoors.com/images/icefish/safetychart.jpg.

Weather Balloons

Photos courtesy of: Tara Cunningham

Weather Satellites

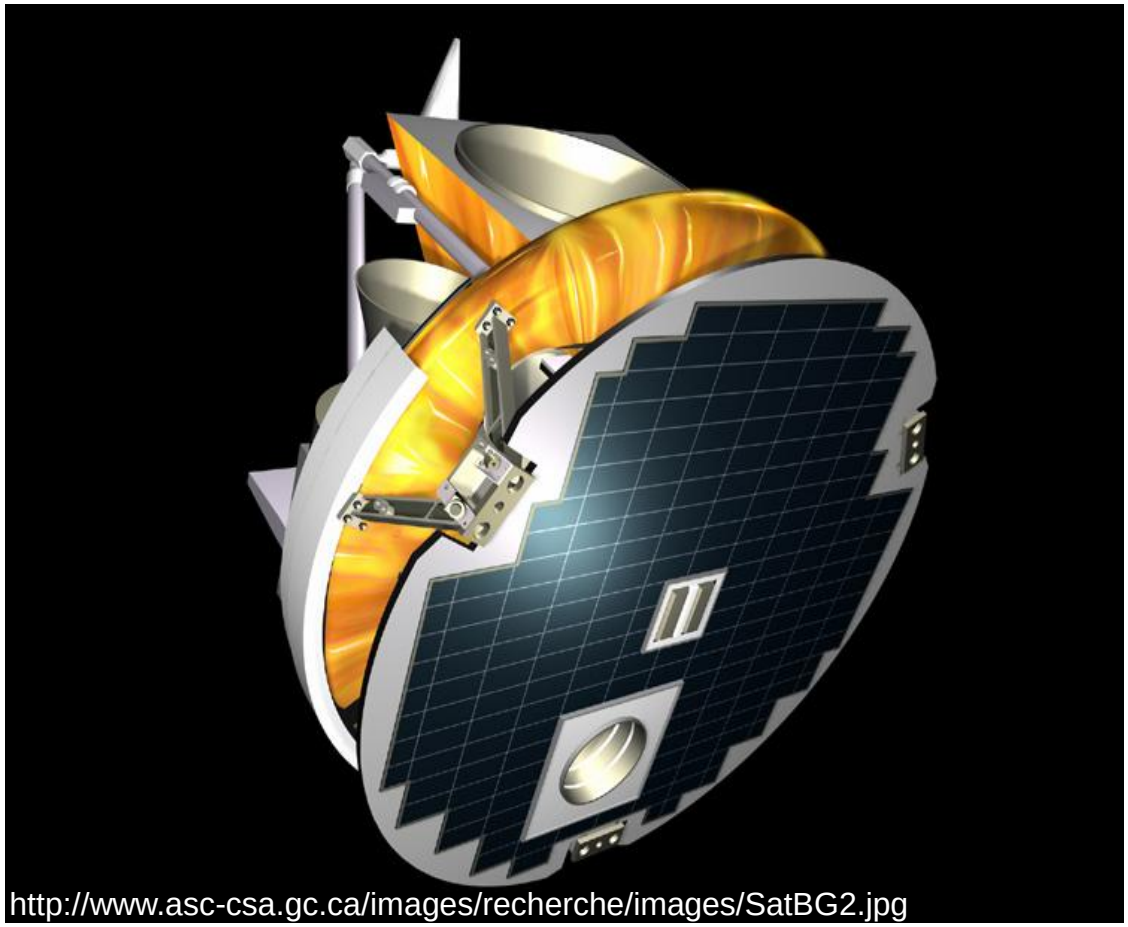
http://www.asc-csa.gc.ca/images/recherche/images/ENVISAT-01.jpg



http://visibleearth.nasa.gov/view_rec.php?id=172

SCISAT-1

- Launched in 2003, the Atmospheric Chemistry Experiment (ACE) is a Canadian satellite used to study the Earth's atmosphere.



http://www.asc-csa.gc.ca/images/recherche/images/SatBG2.jpg

Launching a Satellite

First stage of ACE launch. Photo courtesy of http://www.ace.uwaterloo.ca/gallery.html

Second stage of ACE launch. Photo courtesy of http://www.ace.uwaterloo.ca/gallery.html

- Space shuttles carry some satellites into space, but most satellites are launched by rockets that fall into the ocean after their fuel is spent.

Weather Forecasting

- Once meteorologists have collected weather data and observations from hundreds of weather observation sites, as well as from satellite and radar installations, they analyse the information and make weather forecasts.
- Weather forecasts are often able to predict extreme weather events such as:
  - droughts, floods, storms, heat waves, tornadoes, tsunamis, etc.
- Weather events significantly impact human populations living in affected areas.

- For example, the 2010 Haiti Earthquake affected an estimated three million people and caused approximately 250,000 homes and 30,000 commercial buildings to collapse or be severely damaged.

- Also in 2010, Hurricane Igor blew through Newfoundland bringing powerful winds and heavy rain. It caused over $100 million in damage, left 70 000 residents without power, and destroyed roads causing 50 communities to be isolated for several days.


http://rapidfire.sci.gsfc.nasa.gov/gallery/?2010256-0913/Igor.A2010256.1640.2km.jpg


Photo courtesy of Paul Daly/Canadian Press


Photo courtesy of Kim Toope

How to Make a Rocket!

- STEP ONE
  - Roll your large piece of paper into a tube and tape it together (ask a friend for help!).
- STEP TWO
  - Cut out a circle from your small piece of paper to form the point of the rocket.
- STEP THREE
  - Tape the top of the rocket onto the cone (best if done with a friend).
- STEP FOUR
  - Decorate and add fins and fire onto the bottom of the rocket.
- STEP FIVE
  - When you're done, raise your hand and you will get string to hang your rocket.

Photo courtesy of Tara Cunningham

Build A Hygrometer!

Build A Barometer!

For instructions visit:

http://www.science.gc.ca/Lesson_Plans/Lesson_Plans:_Monitoring_the_Atmosphere-WS8E2607CB-1_En.htm