



TARGET GROUP

STUDENTS 13-19 YEARS OLD

Content of TOOL-KIT:

- RESEARCHING PAST ENVIRONMENTS-BACKGROUND MATERIAL FOR TEACHERS (BASIC/ADVANCED) + PRESENTATION + WEBINAR RECORDING
- 2 ANIMATIONS
- DETAILED LESSON PLAN
- WORKSHEET FOR STUDENTS
- 1 EXPERIMENT INSTRUCTION, 2 ONLINE GAMES
- WORKSHEET WITH ANSWERS FOR TEACHERS

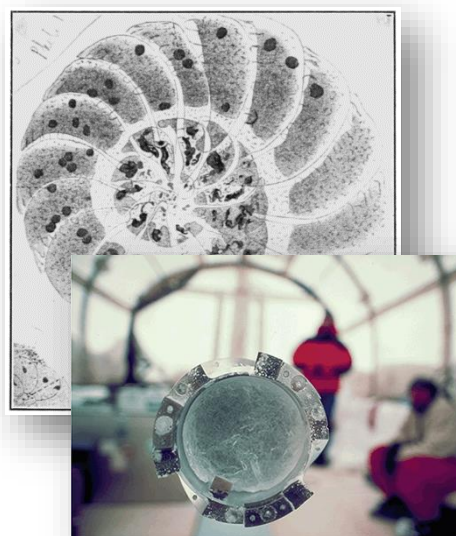


PHOTO: HÅKAN SAMUELSSON/NATURAL RESOURCES CANADA

EDUCATIONAL TOOL-KIT

INTRODUCTION

The Earth's climate is not stable and fluctuates between colder periods called Ice Ages, and warmer periods known as Interglacials. We live in an interglaciation, which in Europe is called Holocene. This period with warm climate started about 11.700 years ago when the last ice age ended. Scientists studying modern climates use land instruments, balloons, and even satellites. These sophisticated monitoring devices are recent. In fact, simple instruments such as thermometers and rain gauges have only been used for about 150 years. To learn what the climate was like before 1850, scientists must use other approaches. The study of past climates is called paleoclimatology. Rather than using instruments to measure past climate, paleoclimatologists must use "proxy" records. Scientists can reconstruct a general picture of an ancient environment by collecting information about the soil and the plant and animal remains that are found at a site. Comparisons of living plants and animals with these ancient remains can then indicate the types of environments that existed in the past.

ARCTIC ISSUES:

STUDYING PAST ENVIRONMENTS

THINGS TO LEARN – 5 basic questions:

How do we study past environments - instrumental, historical, and environmental records - ice cores, sediments, tree rings, corals, peatlands and fossils.

Peatlands: what's the issue and why are they important?

How does understanding the past help to predict the future?

What was the climate like in Little Ice Age and Medieval Warm Period?

GLOSSARY

WHERE IS IT STUDIED? EXAMPLES OF POLAR STATIONS WITHIN INTERACT NETWORK:

[CHOKURDAKH SCIENTIFIC TUNDRA STATION](#)

[IGARKA GEOCRYOLOGY LABORATORY](#)

[MUKHRINO FIELD STATION](#)

[CHURCHILL NORTHERN STUDIES CENTRE](#)

[ICE CORE](#)
[CLIMATE PROXY](#)
[PEATLAND](#)
[PALEOCLIMATOLOGY](#)
[LITTLE ICE AGE](#)
[MEDIEVAL WARM PERIOD](#)
[TREE RINGS](#)
[FORAMNIFERA](#)
[ICE AGES](#)
[INTERGLACIATIONS](#)
[ISOTOPES](#)
[DIATOMS](#)

SYLLABUS

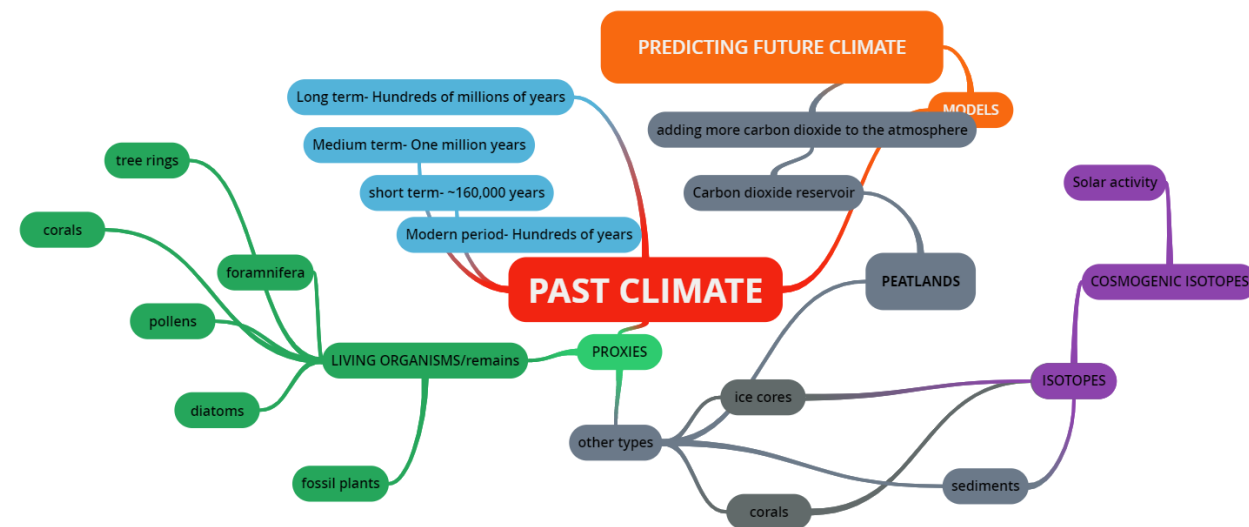
They study tree rings, ice cores, and lake and ocean sediments that provide a record of climate change over thousands of years. For example, favourable climatic conditions cause a tree to grow a lot in one year, while poor conditions mean slower growth. Scientists can "read" these changes by comparing the width of annual tree rings. The chemistry of dust and air bubbles trapped in glaciers and ice sheets also provides information about local temperatures, precipitation, and the composition of the atmosphere. These records can extend information back as much as 100,000 years. Data can even be obtained on climatic conditions hundreds of millions of years ago by studying the chemical composition of ancient rocks and the fossils embedded within them.

Environmental conditions may have stimulated important developments in human origins. Diverse species have emerged over the course of human evolution, and a suite of adaptations have accumulated over time, including upright walking, the capacity to make tools, enlargement of the brain, the emergence of complex mental and social behavior, and dependence on technology to alter the surroundings.

The period of human evolution has coincided with environmental change, including cooling, drying, and wider climate fluctuations over time. Periods of lower or higher average temperatures have also affected human history, contributing either to wars and austerity or abundant development and prosperity. Accounts, artistic depictions, and photographs of advancing and retreating mountain glaciers during recent centuries provide evidence of climate change on more recent timescales.

Scientists are using the theories they have constructed to explain the paleoclimate data record to understand the modern climate and to predict how we can expect it to change in coming years or decades.

MIND MAP



ADDITIONAL RESOURCES

[ARTICLE: An extended Arctic proxy temperature database for the past 2,000 years](#)

[VIDEO: The Last Time the Globe Warmed](#)

[LECTURE RECORDING: CLIMATE AND HUMAN EVOLUTION](#)

[DATABASE: NOAA PALEOCLIMATIC DATASETS](#)

[Synchronization of ice cores using cosmogenic isotopes](#)

[VIDEO: tree rings explained](#)