



TOPIC: ANTARCTIC GAMBURTSEV PROVINCE – A MYSTERIOUS MOUNTAIN RANGE HIDDEN BENEATH THE ICE SHEET

PROJECT PERSONNEL:

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GENERAL BACKGROUND INFORMATION ON THE SUBJECT:

Some problems are too hard to solve alone, and some places are too hard to go to. The Gamburtsev Mountains are deep in Antarctica lying beneath Dome A (the highest and perhaps the coldest place in East Antarctic Ice Sheet), and just west of the Pole of Inaccessibility. This location is so remote that it is difficult and expensive for any single country to try and get to. The International Polar Year (IPY) provides opportunities for International Collaboration, with countries working together to plan projects and share their resources, science programs and results. This study will involve scientists from US, Germany, Britain, China and Australia and is only possible because of the international collaboration of IPY.

Fun Fact: There is a statue of Vladimir Lenin (former Soviet leader) left here in 1958!

TERMS YOU SHOULD KNOW (VOCABULARY):

Precambrian – old geologic time ~500 my

Craton – old piece of continent – a stable part of continental crust

Ice core – sample of an ice sheet collected by drilling a hole through

IPY – 125 year old concept when scientists work together to solve a really hard problem

Dome A – Highest point on the East Antarctic Ice Sheet

Pole of Inaccessibility – way in the interior of the continent & the point furthest away from any Antarctic station.

WHY ARE WE STUDYING THIS IN THE POLAR REGIONS?

These are Mysterious Mountain Ranges – Mountains are normally formed by either (1) continents colliding into one another; OR (2) hot spots creating volcanoes as they push up OR (3) continents tearing apart. None of these have happened recently in East Antarctic. It is a precambrian craton - old and stable - . There is no good reason for a mountain range to be there, but this is a big mountain range! About the size of the European Alps!!

This is Changing Ice - Ice sheets are changing today. They can change by melting the ice floating in the ocean that is holding them back. The ice in the ocean acts like someone holding the front edge of a snowboard on a hill. Once they let go the snowboard slides down the hill. The other way an ice sheet can go faster is by greasing the bottom. Water is like grease for an ice sheet. Water in an ice sheet can come from the top or from the bottom (from subglacial lakes!)

HOW DOES THIS AFFECT US HERE IN THE UNITED STATES?

This is OLD ICE - Ice contains samples of air and water so old ice tells us about old climate. To understand changing climate today we want to find the oldest possible ice, and this is probably close to the Gamburtsev Mountains. Scientists are looking for the oldest ice to study!

TO LEARN MORE ABOUT THIS TOPIC:

<http://www.ldeo.columbia.edu/gambit>



TOPIC: AN UNKNOWN SUBGLACIAL WORLD

PROJECT PERSONNEL: Michael Studinger, Robin Bell

GENERAL BACKGROUND INFORMATION ON THE SUBJECT:

Subglacial Lakes are unique environments isolated from the sun for millions of years, yet they may be playing an important role in changing ice sheets today. It is interesting to think that ice floats – Even when it is 2 miles thick. How does water form or stay liquid under ice? Geothermal heat, the heat coming out of the center of the earth, occurs throughout the world. This heat keeps deep mines, down towards the core of the earth, actually hot! It can cause warming and melting at the bottom of a glacier. Additionally, pressure from the several miles of glacial ice thickness can cause melting at the base.

TERMS YOU SHOULD KNOW (VOCABULARY):

Ice sheet – thick piece of ice often over 2 miles thick that can cover an entire continent

Glacier - slow moving mass of ice often found high in the mountains and in polar regions

Subglacial – beneath a glacier or ice sheet/ **Subglacial Lake** – Lake beneath an ice sheet

Subglacial Environments – The environments beneath an ice sheet can include lakes, rivers, streams, swamps

Vostok – Russian word for East/ **Vostok Station** – Russian Station in East Antarctica

Lake Vostok – Biggest subglacial lake found under 2 miles of ice under Vostok station

Microbe – microorganisms that probably live in subglacial lakes

Ice Streams – Rivers made of ice that act like a conveyor belt moving ice in an ice sheet towards the ocean where it becomes icebergs

WHY ARE WE STUDYING THIS IN THE POLAR REGIONS?

There is a lot of water under the Antarctica ice sheets - it collects in lakes, flows between different lakes, in rivers and even drains out in huge flood events. These are unique environments that we did not know existed 10 years ago. ***SO what have we learned:***

- Ice sheets Insulate – the top of an ice sheet is cold (-50C) but the bottom is warm. The ice sheet traps the geothermal heat just like a blanket traps your body heat at night
- Ice Melts – The bottom of an ice sheet can get so warm that it melts!!!
- Ice Melts – If you add friction to the bottom of an ice sheet it will also melt!!
- Ice Sheets are old – The ice at the bottom of the Antarctic ice sheet is almost 1 million yrs . old!!

HOW DOES THIS AFFECT US HERE IN THE UNITED STATES?

Water, in subglacial lakes or streams, can make the bottom of the ice sheet slippery like a banana on a sidewalk. Water draining out of a lake may make the ice sheet flow faster, carrying it towards the ocean where pieces can break off. This can have a wide reaching effect including sea level rise, reduced marine environments, climate change from reduced reflectivity.

TO LEARN MORE ABOUT THIS TOPIC:

<http://www.ldeo.columbia.edu/res/pi/gambit/SubglacialLakes.htm>

<http://www.ldeo.columbia.edu/~mstuding/vostok.html>