THE MINERAL VEIN

Official Newsletter of

THE MINERAL SOCIETY OF MANITOBA

NOVEMBER 2016

OCTOBER PRESENTATION SUMMARY

(By Jacques Bourgeois)

They say that third time's a charm. Well, proved to be true this time around as our guest speaker, Ms Aura Diaz, who was supposed to present in May and in September but because of various factors (miscommunication and technical difficulties) couldn't present.

Ms Diaz is a Geological Science graduate student at the University of Manitoba and she is now doing her Masters degree in Environment and Geography. Her topic: "Thermodynamics of Sea Ice in the Arctic throughout the analysis of sea ice energy balance obtained from field data and controlled lab experiment'' finally presented to us at the October meeting!

Our guest speaker, Ms Aura Diaz

Sea ice is an integral part of the Arctic Ocean. During the dark winter months, sea ice essentially covers the entire Arctic Ocean. In summer, some of this ice melts because of warmer temperatures and long hours of sunlight. Sea ice typically reaches its minimum thickness and extent in mid-September, when the area covered by ice is roughly half the size of the winter maximum. The ice then begins expanding again.

The extent of area covered by Arctic sea ice is an important indicator of changes in global climate because warmer air and water temperatures are reducing the amount of sea ice present. Because sea ice is light-colored, it reflects more sunlight (solar energy) back to space than liquid water, thereby playing an important role in maintaining the Earth's energy balance and helping to keep polar regions cool.

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The Mineral Vein is published monthly from September to June.

Meetings are held on the first Wednesday of each month from September to May inclusive at the Manitoba Museum in room P47 on the Planetarium level. They begin at 7:30 PM and feature announcements, an invited speaker and a raffle. Members are encouraged to bring along any new, interesting specimens, or specimens appropriate to the speaker's topic.

Field Trips take place from May to September to interesting sites in Manitoba or neighbouring provinces and states.

Membership: A single membership is $15 while a family membership is $20. Memberships run from October to October.

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UPCOMING EVENTS

November 2, 2016: MSM regular monthly meeting begins at 7:30 p.m. at the Manitoba Museum.

Our guest speaker will be **Jacques Bourgeois** who will discuss and present the field trip to Snow Lake that took place in August.

December 4, 2016: Annual Christmas Party. Save the date and mark your calendar for our annual Christmas Party. This year, we have decided to hold the party at a different location and have a potluck-style gathering. The location has not been chosen at this time but the traditional auction will once again be a good way to raise funds for the Society. Get your traditional recipe books out and dust off those old minerals samples cluttering your basements and get ready for a great evening of good food and good company.

January 4, 2017: **Regular Meeting of the Mineral Society of Manitoba** room P47 (Lower/Planetarium level) in the Manitoba Museum 7:30 p.m.

Guest speaker to be announced.

Founded in 1971, the Mineral Society of Manitoba is dedicated to promoting the study of minerals, rocks and fossils for their scientific and recreational value.

The Mineral Society of Manitoba hosts monthly meetings covering a variety of mineral related topics. In addition, the Mineral Society organizes summer field trips to collecting localities, and hosts educational exhibits about minerals and fossils.

OCTOBER PRESENTATION (CONT.)

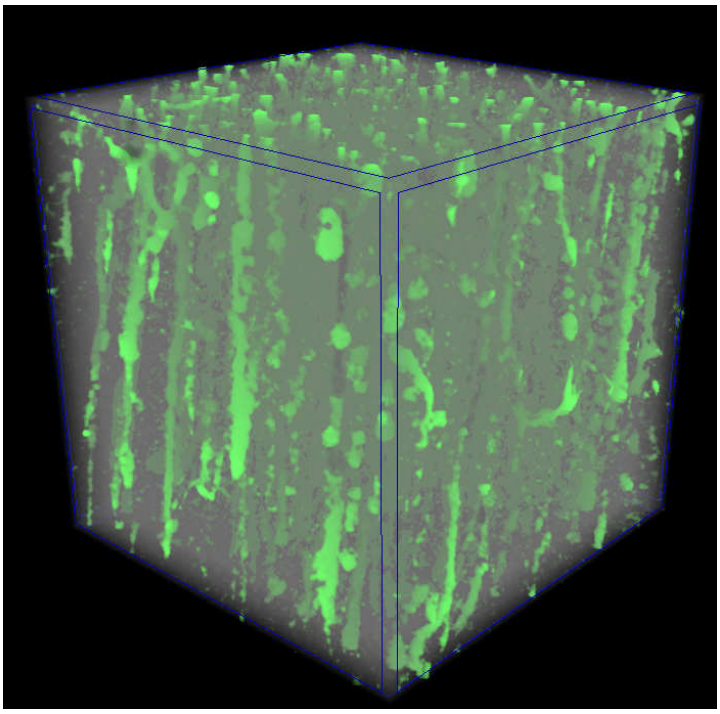
Sea ice also keeps the air cool by forming a barrier between the cold air above and the relatively warmer water below. As the amount of sea ice decreases, the Arctic region's cooling effect is reduced, and this may initiate a "feedback loop" whereby ocean warming caused by more absorption of solar energy leads to an even greater loss of sea ice and further warming.

The age of sea ice is also an important indicator of Arctic conditions, because ice that has accumulated over many years is generally thicker and stronger than younger ice. A loss of older ice suggests that the Arctic ice cover is becoming thinner. Evidence also suggests that the melt season has become longer; the ice is starting to melt earlier in the year and freeze later than it used to.

Changes in sea ice can directly affect the health of Arctic ecosystems. Mammals such as polar bears and walruses rely on the presence of sea ice for hunting, breeding, and migrating. These animals face the threat of declining birth rates and restricted access to food sources because of reduced sea ice coverage and thickness. Impacts on Arctic wildlife, as well as the loss of ice itself, are already restricting the traditional subsistence hunting lifestyle of indigenous Arctic populations.

The study site in Cambridge Bay, Nunavut

Her study on sea ice was conducted in Cambridge Bay, Nunavut, during the spring and summer transition in 2015 to collect the ice core samples for analysis.



Cross section of sea ice showing the brine pockets (green)

When sea ice forms, salt accumulates into droplets called *brine*, which are typically expelled back into the ocean. This raises the salinity of the near-surface water. Some brine droplets become trapped in pockets between the ice crystals. These droplets are saline, whereas the ice around them is not. The brine remains in a liquid state because much cooler temperatures would be required for it to freeze. At this stage, the sea ice has a high salt content. Over time, the brine drains out, leaving air pockets, and the salinity of the sea ice decreases. Brine can move out of sea ice in different ways: Aided by gravity, the brine migrates downward through holes and channels in the ice, eventually emptying back into the ocean. The ice surrounding the brine compresses and breaks the brine pockets, allowing the brine to escape to the ocean.

When the sea ice begins to melt during the summer, small freshwater ponds (called melt ponds) form on the top layer of the ice. This freshwater travels through the cracks and holes in the ice, washing out remaining brine.

When the sea ice surface cools, brine increases in salinity to the point at which it can melt ice at its underside. This leads to a downward migration of brine droplets, ultimately allowing the brine to escape into the ocean below the ice sheet.

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OCTOBER PRESENTATION (CONT.)

Once in the laboratory, an elaborate setup allowed to recreate the formation of sea ice under different conditions to help understand the various dynamics of sea ice according to different temperature increase scenarios.

The sea ice making setup.

Sea water as found in the Arctic.

The same water after being exposed to cold.
Notice the formation of sea ice.

After several experiments with the se ice in the laboratory, they came to several conclusions:

1. Temperature changes will prompt variation in the volume of sea ice components such as brine.
2. Seasonal progression in the sea ice cover and in the snow cover can be identified through changes in the surface energy balance.
3. Changes in the surface energy balance may prompt melting, delay melt onset or prolong the duration of the melt.
4. Evolution of meltpond coverage is determined by the ability of meltwater to percolate through ice.

Following her discussion, some members had questions about the immediate impacts of melting of sea ice.

While diminished sea ice can have negative ecological effects, it can also present commercial opportunities. For instance, reduced sea ice opens shipping lanes and increases access to natural resources in the Arctic.