



THE FUTURE OF RECLAMATION: AN INTEGRATION OF WESTERN SCIENCE AND TRADITIONAL KNOWLEDGE TO RECONSTRUCT NATURAL ENVIRONMENTAL BACKGROUND IN A WORLD OF CLIMATE CHANGE

Background:

Lubicon Lake Band (LLB) members have hunted and gathered medicines for generations

The applications and methods of the LLB's hunting and gathering practices are kept for proprietary reasons

Joseph Auger (Consultation Manager) is the gate keeper for the knowledge holders

Recent experience pairing the LLB knowledge with western science will help bridge the gap between the knowledge holders, by identifying and tracking the medicines and game in the area of the LLB

Benefits to having the knowledge kept between the two disciplines of Traditional and Western documents is the key to passing down this knowledge to younger generations



**LUBICON
LAKE BAND
#453**

Sometimes, in order for a certain medicine to grow back, another sub-species must grow in that area

Engagement of the elders along with the youth plays an important role, encouraging youth to further their education in the field of research

LLB team: Loretta Laboucan, Joseph Auger, Michael Calliou in the early beginnings, and Dwight Gladue our TEK Holder

We strategized our work with the Elders in our community as well as trappers in the area of Little Buffalo

LUBICON LAKE BAND #453



Benefits to the Community for having N.A.I.T and Solstice Canada as our Research Teams:

Blend our Disciplines together

Deciduous context of Study and Research to the Lubicon Lake Band Area

Elders & Youth

Benefits to the work with Solstice to our Community:

Re-grouping our medicines and teas including re-shaping medicines to areas where they are being damaged from industry players

Re-shaping and creating external classrooms to our youth and older generations, where Elders will share areas where they gather and pick medicines

Lubicon Lake Band #453 /N.A.I.T in Collaborative Efforts of Concern to Lubicon Lake Band members:

Areas to Focus –Forestry –Pipeline Breaks –Industry Sites

Reclamation, re-forestation

Medicinal plant and hunting areas to stay away from ...

Trappers mandate

Interview Questions to our Elders during the study

In all it will better prepare the Consultation Department when Industry players come into the area of the Lubicon Lake Band to address concerns

This was our basis to our GRANT PROPOSAL 'Askiy Ochi Acimonwin – Story of the Land'



Chief &
Council

ELDERS INTERVIEW QUESTIONS



Land Where you Lived :

- Describe in your earliest memories and language you want to share with us. Where did you live in your early child hood in your best memories? How did you and your parents make a living back then?

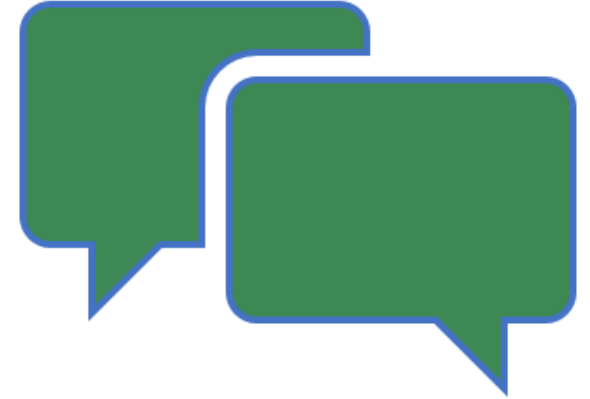
Transportation:

- Any memories of wagon or dog team trails? Areas of hunting? Areas of berry picking? Areas of trapping?
- Where were the first roads built in the community? Do you know of any roads used in the past that our now mainstream roads access?

Lakes :

- Lubicon Lake versus Prairie Lake settlement - what can you share with us? Haig Lake /Fishing Lake? Otter lake? Can you tell us the translation of each lake in your language?
- Any mention in your early child hood of Buffalo Head Hills or later years of your Trapping hunting or berry picking? What is the translation name of this area?

ELDERS INTERVIEW QUESTIONS



Oil & Gas Impact:

- Which event in your earliest memories has impacted your family from oil and gas in the area? What has impacted you the most? E.g. Air, muskeg drinking water areas in the community? Why?

Forestry:

- How do you feel if Herbicides are used in the forestry management areas of the teardrop?

Trapper:

- How many trappers from Lubicon Lake Band #453 are registered and are members of the community? How long has the family had the trap line? At what age did you begin trapping?

Fire Events:

- Do you recall any fire events (forest fires, fires for clearing areas) occurring? Where and when?

Project: Askiy Ochi Acimowin- Story of the Land

Project Introduction Meeting with Chief and Council – January 8th, 2019

1. This first project phase has been developed to **evaluate and understand the effects of climate change on Indigenous traditional food, water, medicines and cultural practices**
2. This baseline understanding will help us with subsequent phases of the project including:
 - the Traditional Land Use study
 - training and education for the LLB youth & hands on teaching and field studies including at the cultural camp
 - development of solutions to help us overcome some of the challenges we face with climate change

Phase 1 Overall Objectives:

1. Tell the Story of the Land through two **perspectives: Traditional knowledge** and environmental change through **western science**
2. This story will be the base (or Phase 1) of our goal of **evaluating and understanding the effects of climate change** on Indigenous traditional food, water, medicines, and cultural practices, and how future temperature and rainfall might drive additional changes in the migration, environment and landscape on these resources and practices



**Beautiful
Field Day!**

Natural Background?



The goal for reclamation is Equivalent Land Capability:

Conservation Reclamation Regulations
(AR 115/93)

1(e) “equivalent land capability” means that the ability of the land to support various land uses after conservation and reclamation is similar to the ability that existed prior to an activity being conducted on the land, but that the individual land uses will not necessarily be identical;



A couple of things to emphasize/think about:

1. “Equivalent is a ‘values’ decision” (Chris Powter, 2010)
 - “Who makes that value decision?”
2. “This ability to change land use(s) is the hidden strength and is what makes reclamation different than restoration” (Powter 2010)
 - Chris Powter argues that this was done intentionally to allow the broadest possible leeway in selecting reclamation options.
 - Maybe the definition makes the complication of natural climatic shifts – less complicated?

Powter source: <https://www.asga.ab.ca/ckfinder/userfiles/files/AC-CLRA%202012%20-%20Powter%20-%20Equivalent%20Land%20Capability.pdf>

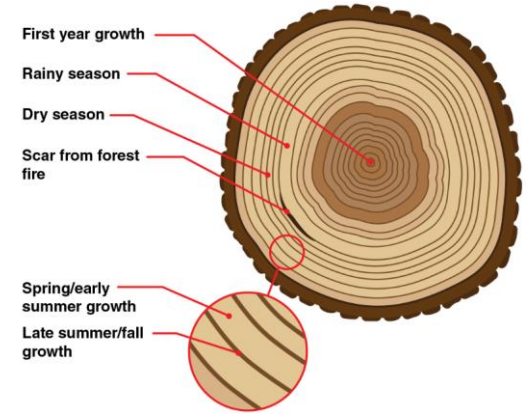
<https://era.library.ualberta.ca/items/49aeb932-ea9b-49fc-ac96-33aeeb945a3c/view/ac43a062-0444-4440-aa21-929b34a4f234/Equivalent-20Land-20Capability-20Workshop-20--202011-2006-2008.pdf>

AER Source:

<https://www.aer.ca/documents/reports/Indigenous%20Knowledge%20Remediation%20Reclamation%20and%20AER%205%202023%2019.pdf>

Askiy Ochi Acimowin Story of the Land

- Historically we have learned much about past landscapes and climate through investigation of tree rings.
- Today the new science of **PALEOLIMNOLOGY** take us further and deeper into those changes.
- This 140 cm sediment core from Otter Lake in NW Alberta covers ~1,000 years of time.



Source: <https://climate.nasa.gov/news/2540/tree-rings-provide-snapshots-of-earths-past-climate/>



Climate Drivers

Climate is driven by natural changes in phenomena such as sea surface temperature and pressure, movement of the trade winds and solar activity.

Common natural climate drivers:

El Niño Southern Oscillation (ENSO)

ENSO is the cyclic behaviour of El Niño & La Niña.
Typically oscillates on 3-7 year cycles.

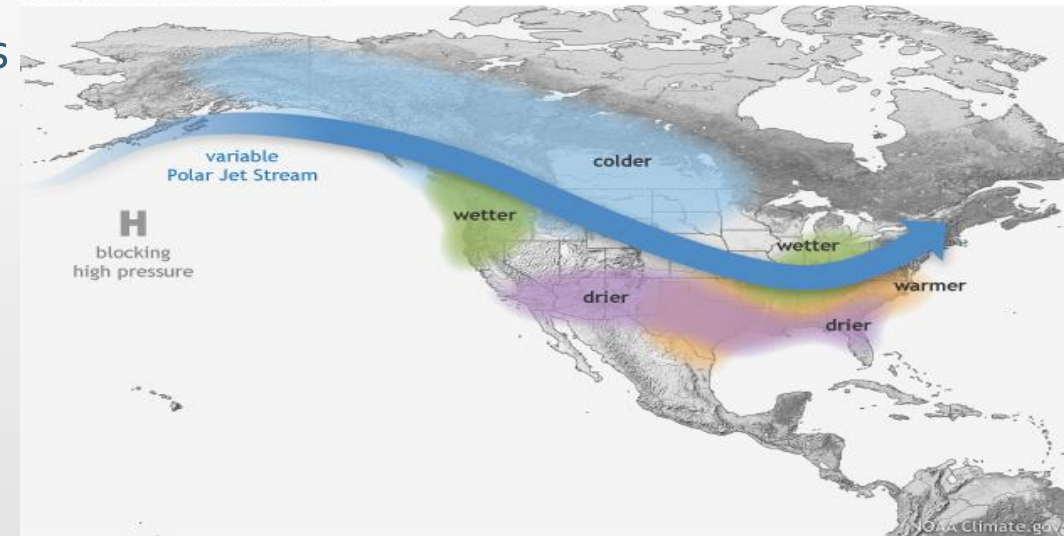
(discovered in 2003)

Pacific Decadal Oscillation (PDO)

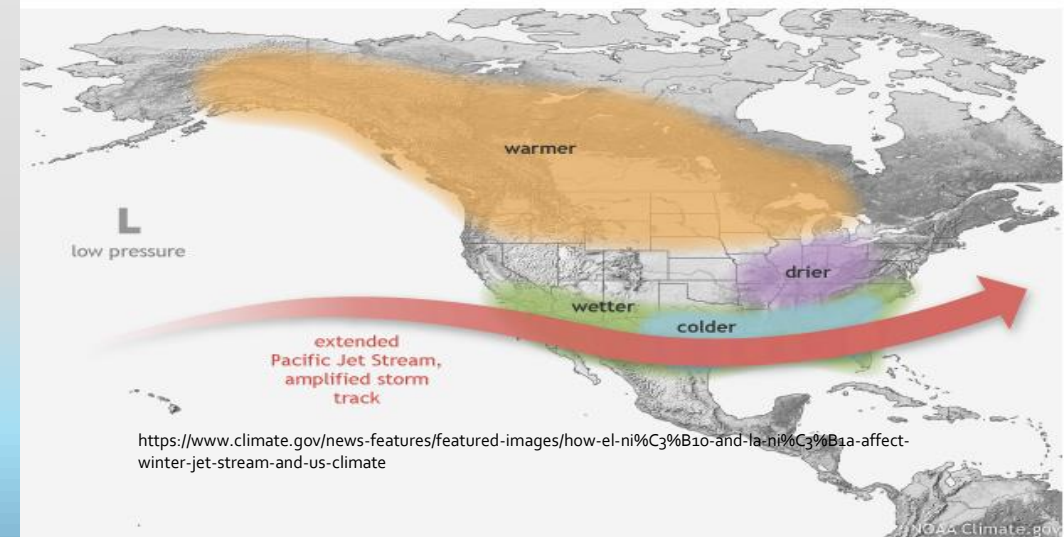
Is a long-lived ENSO like pattern of Pacific climate variability.
Typically oscillates on 15-25 year cycles.

(discovered in 1996)

WINTER LA NIÑA PATTERN



WINTER EL NIÑO PATTERN



<https://www.climate.gov/news-features/featured-images/how-el-niño-and-la-niña-affect-winter-jet-stream-and-us-climate>

Climate Drivers

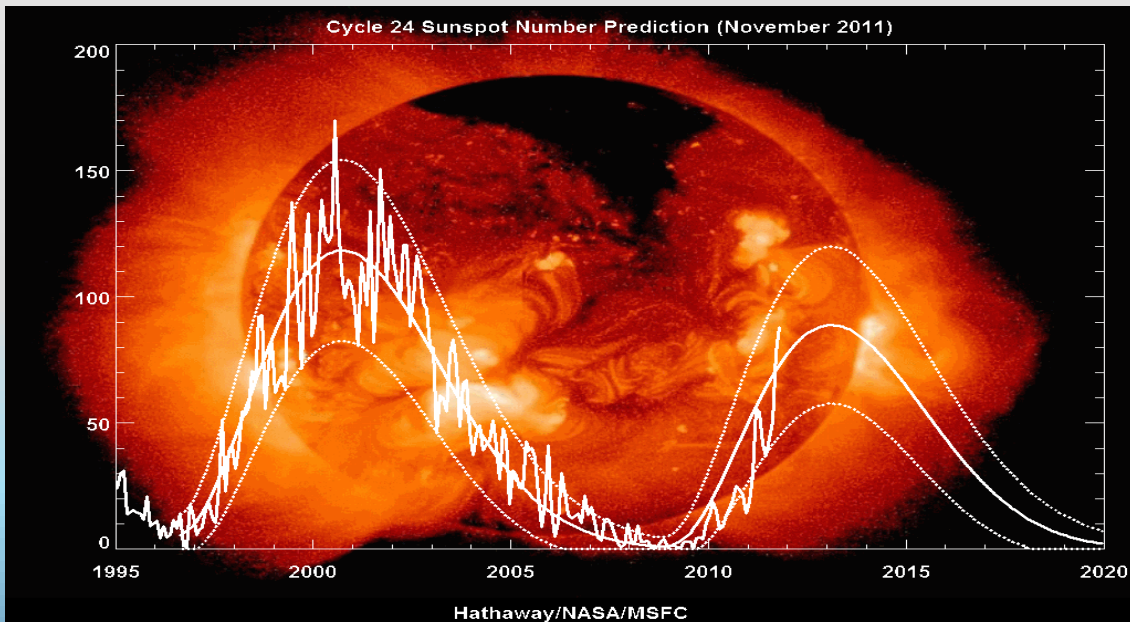
Solar activity

Sunspots are planet-sized islands of magnetism on the surface of the sun.

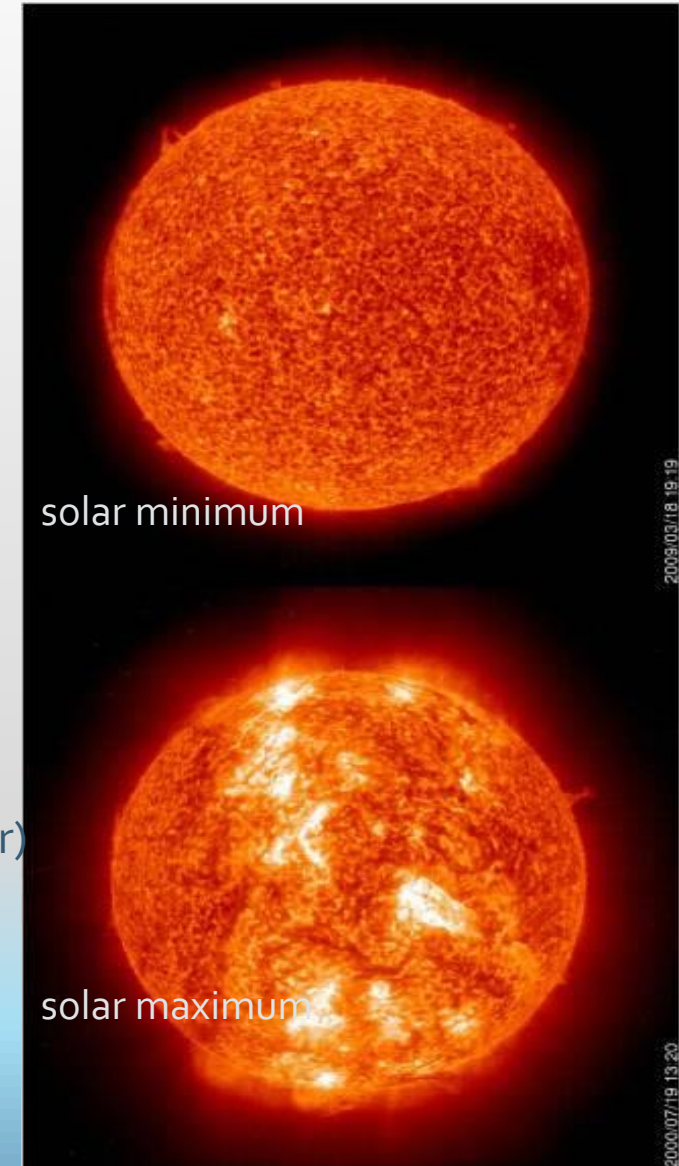
Changes in the amount of sunspots on the sun is cyclic = solar cycles.

Sunspot cycles range in duration from 11 to hundreds of years.

Changes in the phase of a solar cycle also influences environmental conditions such as temperature and precipitation.

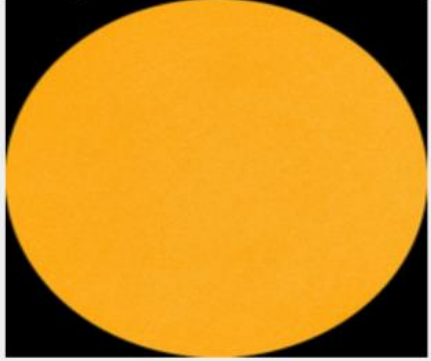


- Schwabe solar cycle (11 yr)
- Gleissberg solar cycle (70-124 yr)
- Bond cycle (250-400 & 1500 yr)
- Hale solar cycle (22 yr)
- deVries cycle (200 yr)
- 2300-yr cycle



Climate Drivers

Daily Sun: 06 Feb 19



The sun is blank--no sunspots. Credit: SDO/HMI

Sunspot number: 0

[What is the sunspot number?](#)

Updated 06 Feb 2019

Spotless Days

Current Stretch: 6 days

2019 total: 20 days (54%)

2018 total: 221 days (61%)

2017 total: 104 days (28%)

2016 total: 32 days (9%)

2015 total: 0 days (0%)

2014 total: 1 day (<1%)

2013 total: 0 days (0%)

2012 total: 0 days (0%)

2011 total: 2 days (<1%)

2010 total: 51 days (14%)

2009 total: 260 days (71%)

2008 total: 268 days (73%)

2007 total: 152 days (42%)

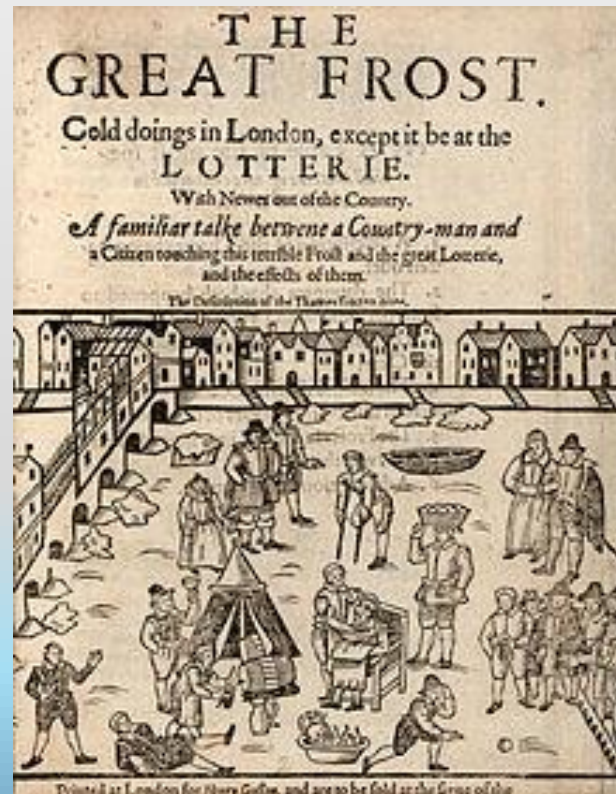
2006 total: 70 days (19%)

Updated 06 Feb 2019

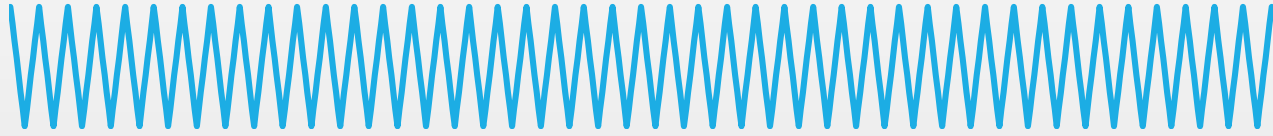
Maunder Minimum = "prolonged sunspot minimum" = 1645 to 1715

Maunder Minimum = middle part of the **Little Ice Age**

Charles Dickens Winters



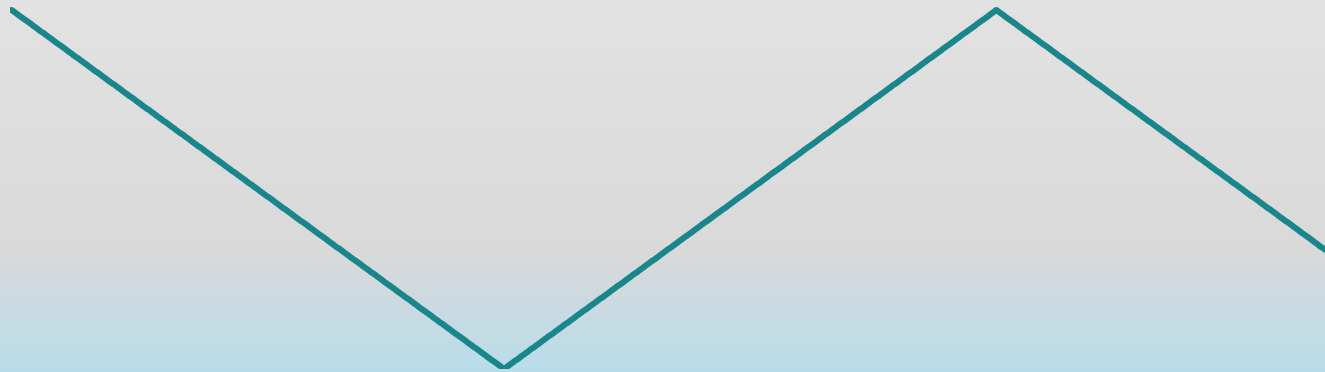
Climate Drivers



ENSO 3-7 yr.



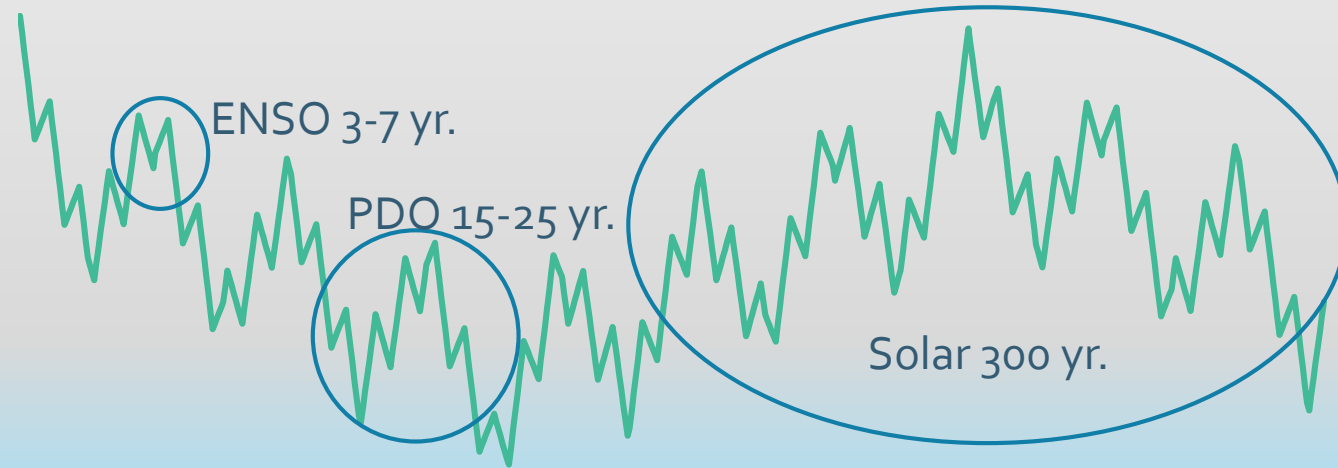
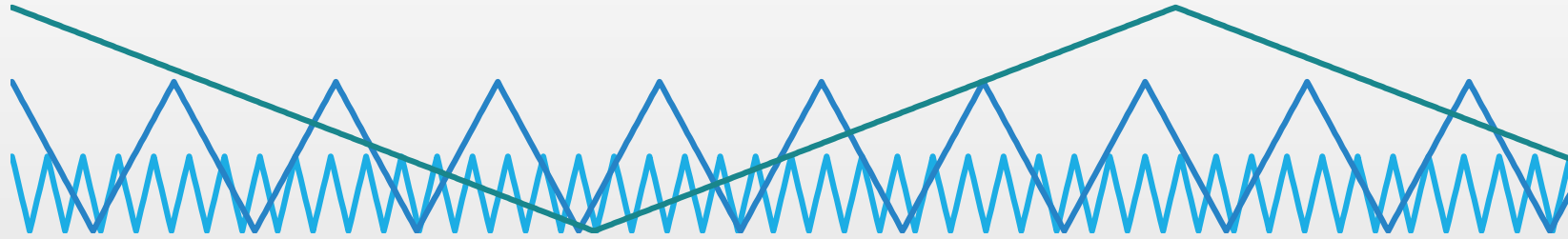
PDO 15-25 yr.



Solar 300 yr.

Frequency and Magnitude

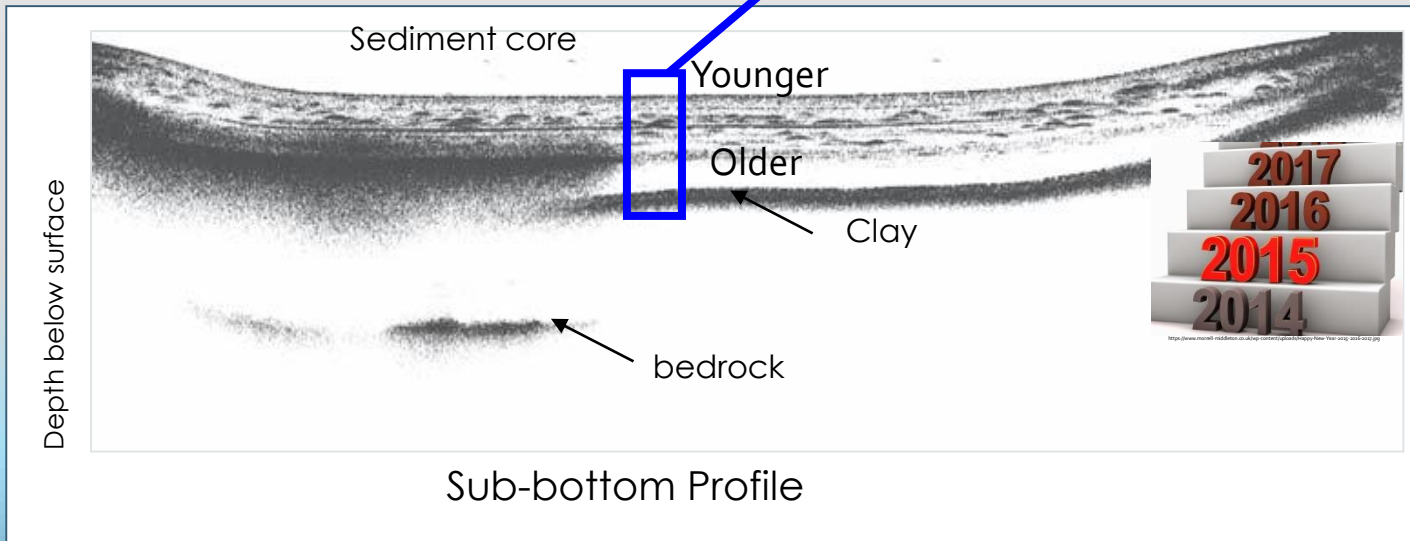
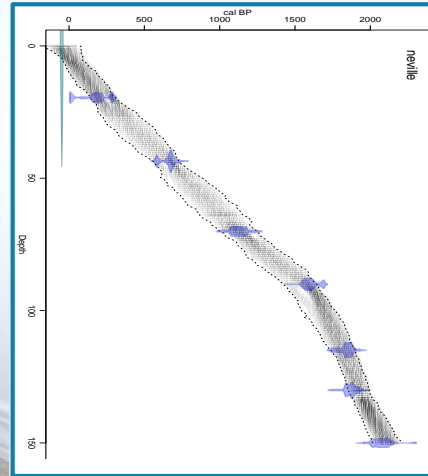
Climate Drivers



Paleoclimatology

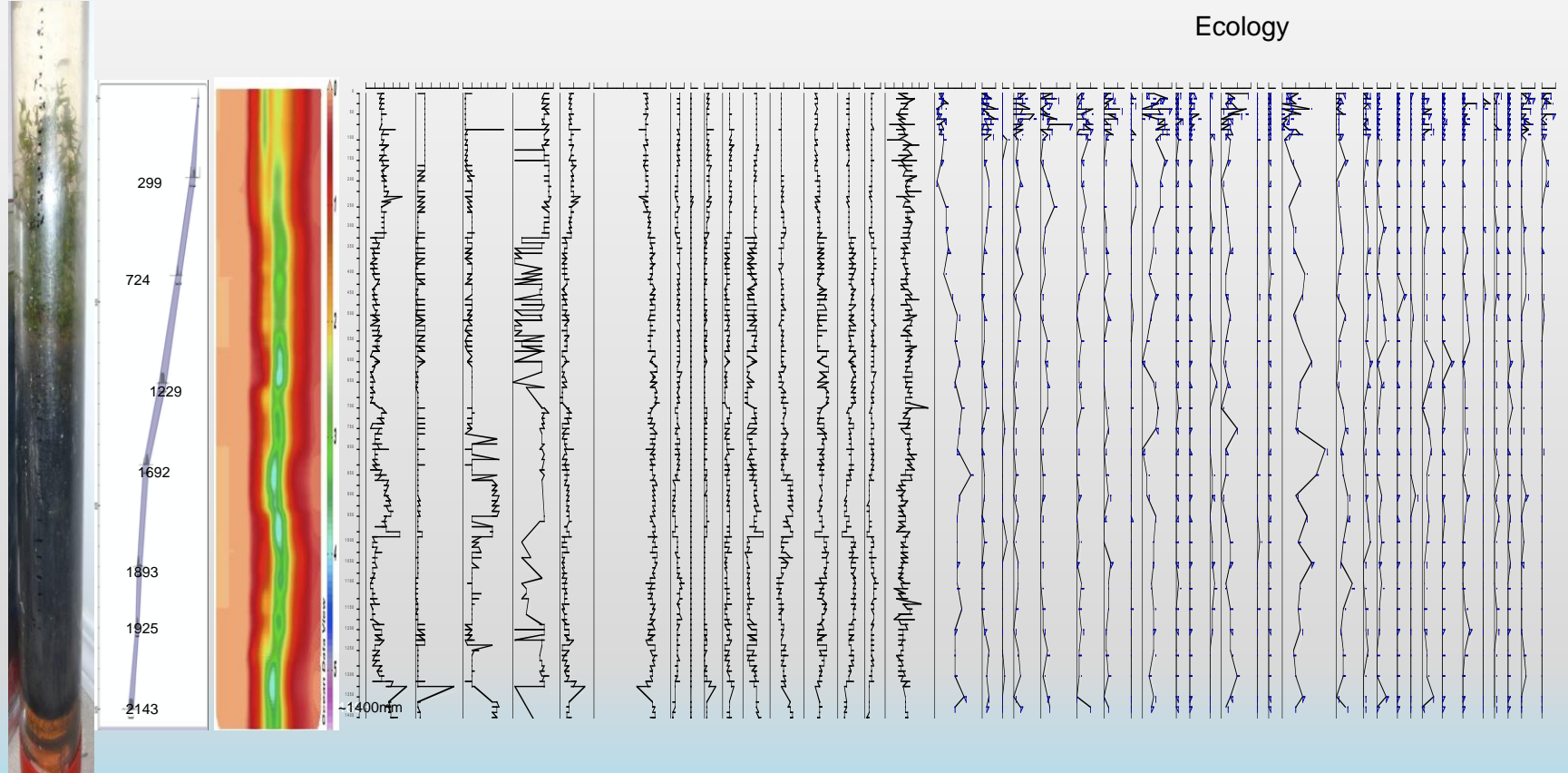
Limnology - study of lakes

Paleolimnology - study of past conditions of lakes

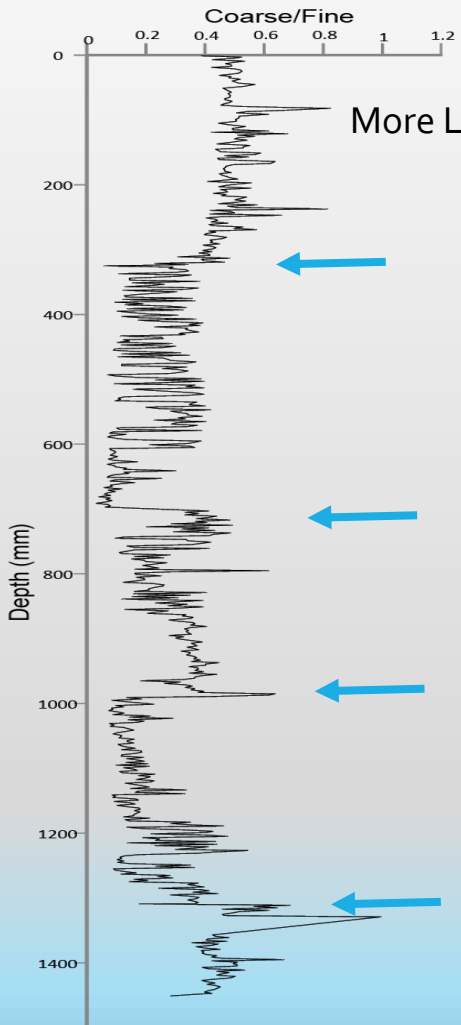


Paleoclimatology

- Sedimentology
- Hydrology
- Chemistry
- Ecology
- Isotopes
- Temperature
- Vegetation



Climate Reconstructions



More La Niña-like phase

Currently entering a
“neutral” PDO and
neutral ENSO regime

“Cool” PDO regimes have primarily
prevailed so far in 21st century.

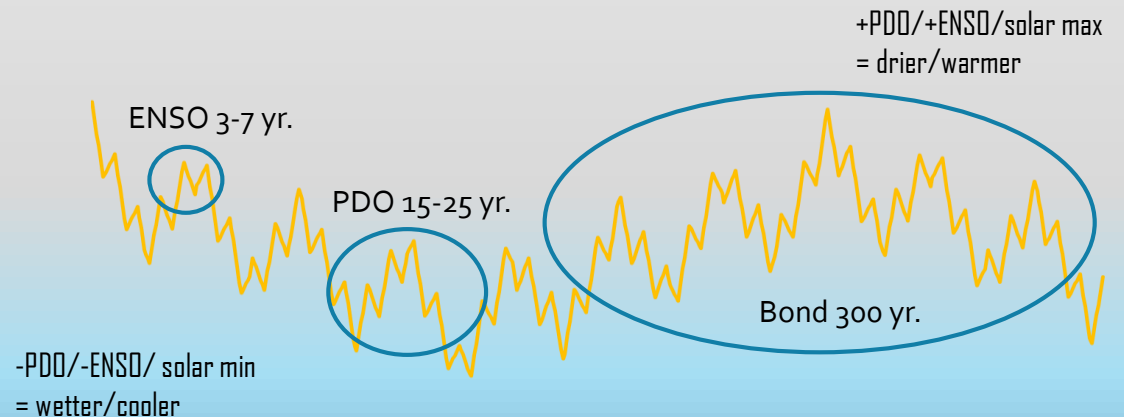
The 400-Year Wet-Dry Climate Cycle in Interior North America and
Its Solar Connection

The 400-Year Wet-Dry Climate Cycle in Interior North America and Its Solar Connection

Zicheng Yu and Emi Ito

Possible solar forcing of century-scale drought frequency in the
northern Great Plains

Zicheng Yu* } Department of Geology and Geophysics and Limnological Research Center, University of Minnesota, Minneapolis,
Emi Ito } Minnesota 55455, USA





Core Collection



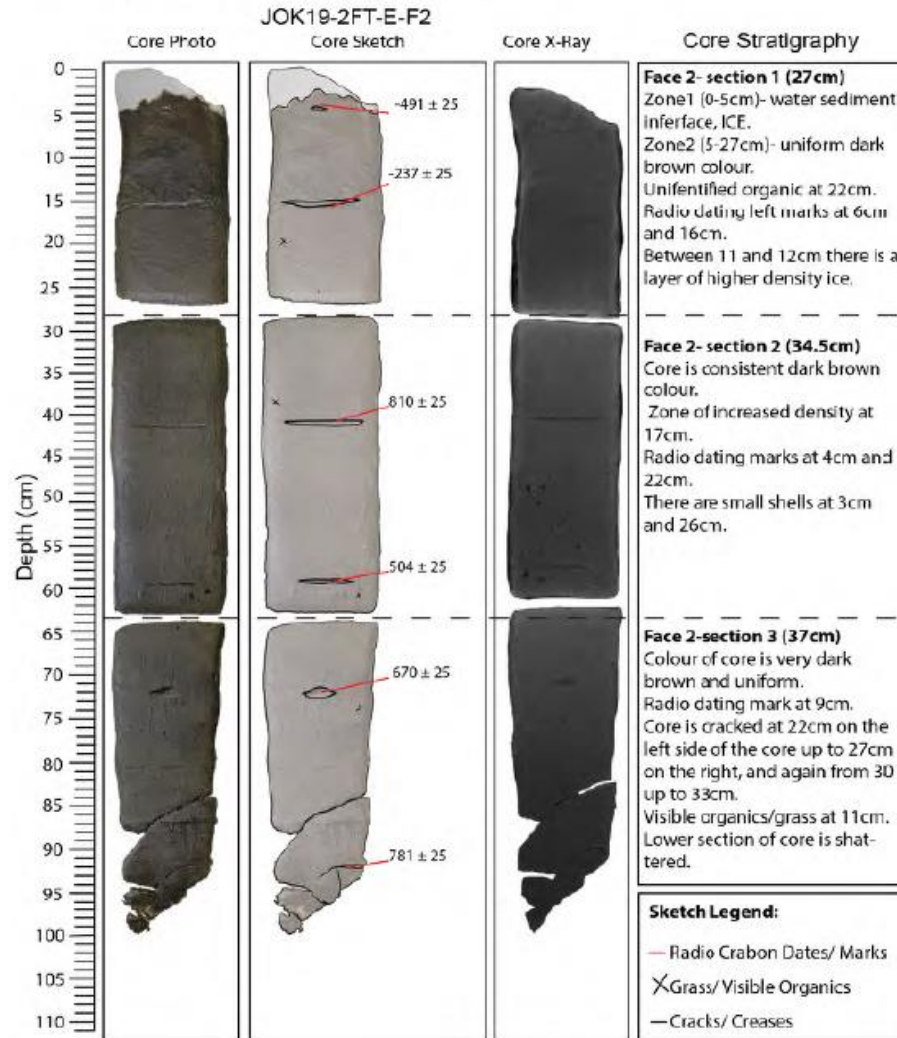
Core Collection



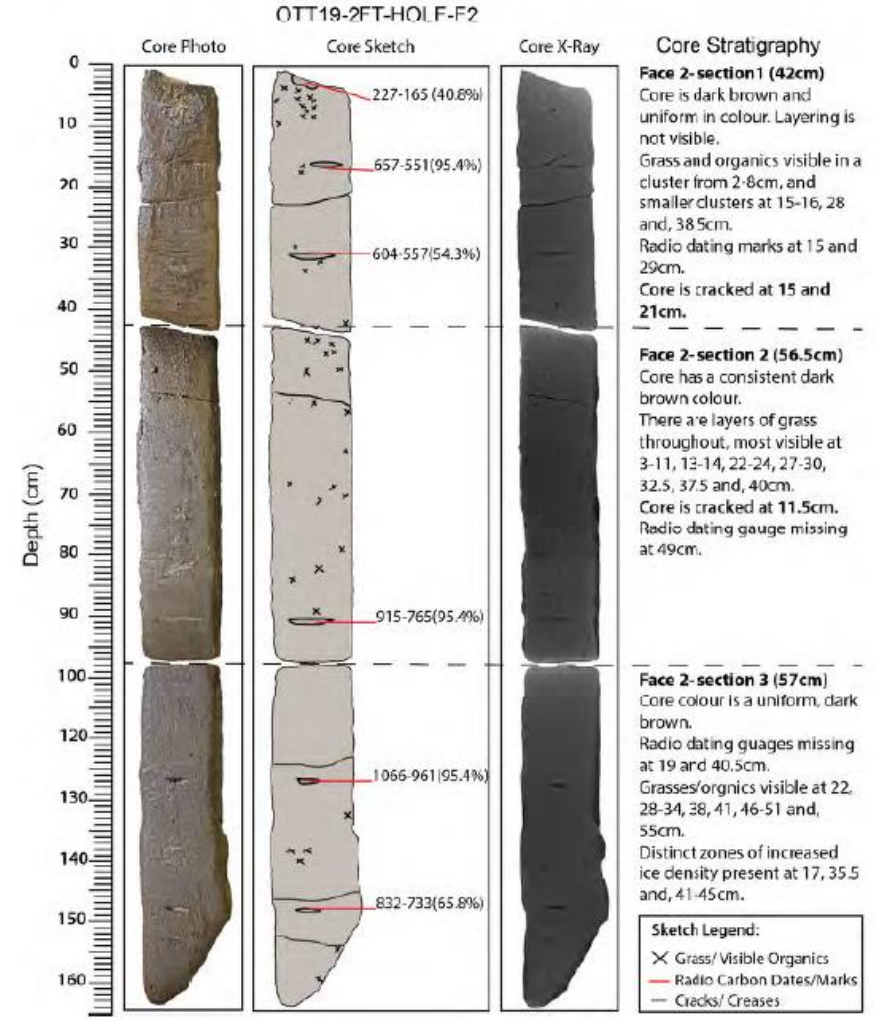
UP CLOSE & PERSONAL

Our Project Cores

Project: Lubicon Nation Lake Cores
 Core ID: JokerLake 2019-2FT Hole E Face 2
 Latitude: 56.499463 Longitude: -115.937974
 Researchers: Andrew Macumber, Lisa Neville
 Date Collected: March 5/2019 Date Logged: May 24/2019



Project: Lubicon Nation Lake Cores
 Core ID: OtterLake 2019 2FT-HOLF Face 2
 Latitude: 56.696670 Longitude: -116.0047044
 Researchers: Andrew Macumber, Lisa Neville
 Date Collected: March 6/2019 Date Logged: May 23/2019



Key Outcomes

Traditional Knowledge Results

On the one side of the core, imagery and wording representing the stories and historical knowledge gained from the Elders & Knowledge Keepers

Western Science Results

On the other side of the core, the western science results will be described (e.g. the large deposit of ash indicates an intense forest fire).



ACKNOWLEDGEMENTS

- This project was undertaken with the financial support of the Government of Canada through the federal **Department of Environment and Climate Change**
- The concept for the Story of the Land originated in our project collaborators shop: **Enviro-Verse: Sean Kelly**, President & Lisa Neville (now with AGAT Labs)
- **AGAT Laboratories** graciously donated Dr. Lisa Neville's field time and technical expertise, and they continue to allow Lisa to support this project in her new role with AGAT
- **Dr. R. Tim Patterson**, Ph.D., Professor with the Department of Earth Sciences at Carleton University leads the paleolimnology aspects of the project



Contact Information:

Michelle Cotton, P.Ag.
President, Solstice Environmental
Management
780-443-3431
mcotton@solsticecanada.com

Lisa Neville, Ph.D., CD
Director; Technical Services
AGAT Laboratories
403-919-0506
Nevile@agatlabs.com

Darrell Ghostkeeper
LLB Trades Coordinator
780-435-5848
Trades.Coord@lubiconlakeband.ca