Acknowledgements

2015 Summit Attendees (photo by Te Rawhitiroa Bosch)
Existing data resources

- USGS National Water Information System
Existing data resources

- USGS National Water Information System
Alaska is ripe for anyone who wants to participate in ‘science’

- An actual community with a geographic location!

- A group of stakeholders with a common interest
Citizen Science Design

Benefits
- Establish Project Goals and Protocols
- Establish Partnership Agreement

Challenges
- Conduct Research
- Analyze Data
- Give Back Results
Community-Based Participatory Design

Benefits

- Identify Community Partner
- Establish Partnership Agreement
- Determine Research Objectives & Design
- Conduct Research
- Analyze Data
- Validate Research
- Give Back Results

Challenges

(Wilson 2012)
THE YUKON RIVER WATERSHED

- 4th largest watershed in North America
- Drains an area twice the size of California
- Home to a population of ~ 126,000 people
- 60% rely on subsistence resources
- 8% of Arctic oceans fresh water supply
- Longest Pacific Salmon run in world!

Karklis 2008
Program Details

• Largest Indigenous International Monitoring Network in the world!

• Data collected at over 50 sites, from Atlin to Kotlik (2,400 miles, over 5,000 km)

• Combined with US Geological Survey, we have data for over 30 years at select sites

• Collected over 2000 samples

• Monitors over 30 different parameters

• Over 300 community members have developed capacity to conduct sampling and analysis.
Closing the loop!
Closing the loop!


The Active Layer Network: A collaborative project the US Geological Survey, Yukon River Inter-Tribal Watershed Council, and Yukon River Basin Communities.

A five year summary report for Allakaket

KOTLIK

THE ACTIVE LAYER NETWORK: A COLLABORATIVE PROJECT BETWEEN THE US GEOLOGICAL SURVEY, YUKON RIVER INTER-TRIBAL WATERSHED COUNCIL, AND YUKON RIVER BASIN COMMUNITIES. A FIVE YEAR SUMMARY REPORT FOR KOTLIK

USGS
science for a changing world

Yukon River Inter-Tribal Watershed Council
www.yritwc.org
Welcome to the Indigenous Observation Network

The Indigenous Observation Network (ION) is the largest international, Indigenous initiative combining Indigenous Knowledge and western science to research, sustain and protect the Yukon River Watershed, its resources and cultures. ION is a network of communities along the Yukon River and its tributaries who conduct research and monitoring that is applicable at the community, watershed, circumpolar and global scales; an amazing feat in the world of science.

What would you like to do?

- MAP DATA
- ENTER DATA
- GRAPH DATA
- HELP

My Project Content

Login to see your saved content

Upcoming Events
Find out what’s going on in the Indigenous Observation Network.

There are no scheduled events.

Project News

Water Quality Data
https://www.Yukon.fieldscope.org
Water-Quality Data from the Yukon River Basin in Alaska and Canada

Dates
- Start Data: 2009
- Publication Date: 2016

Citation

Summary
The water-quality data available here has been collected as part of a collaborative monitoring project between the US Geological Survey, Yukon River Inter-Tribal Watershed Council, and Yukon River Basin communities known as the Indigenous Observation Network. Since 2006 the USGS National Research Program (NRP) and Yukon River Inter-Tribal Watershed Council (YRTWC) have been partnering to collect water-quality samples from the Yukon River and tributaries with the assistance of trained community members living in the Yukon River Basin. The YRTWC provides support for this project through sample collection, sample processing and shipment logistics with communities and to the USGS. The USGS provides water analysis and data interpretation support. Through this collaboration over 300 samples were collected from 2009 to 2016.

Spatial Services
ScienceBase WMS: https://www.sciencebase.gov/catalog/item/573f8b8de4b36a3a5a24ae28

Active Layer Data from the Yukon River Basin in Alaska and Canada

Dates
- Publication Date: 2017-07-19

Citation

Summary
The active layer data available here has been collected as part of a collaborative monitoring project between the US Geological Survey, Yukon River Inter-Tribal Watershed Council, and Yukon River Basin communities known as the Active Layer Network (ALN). The active layer is the layer of soil above the permanently frozen ground (permafrost) that thaws during the summer months and freezes again in the autumn. By measuring the depth of the active layer in the late summer at the time of maximum thaw, we are able to better understand the effects of a warming climate on permafrost. ALN monitoring sites were installed across the Yukon River Basin in Alaska and Canada, in 2009 and 2010. Each monitoring site consists of a 45 meter by 45 meter grid and sensors. Active layer depth measurements are taken every 5 meters across the grid resulting in 100 measurements made each year. Sensors installed at each location include soil moisture, soil temperature, and air temperature sensors. Sensor data is collected throughout the year and downloaded annually. Active layer depth measurements and sensor data are presented here.
Braving thin ice

May 28, 2020

“I’d say within the last 20 years maybe about 15 of those years we’ve seen a lot of changes in our climates with floods, erosions, fall storms.”

Read More
Figure 2. Box-plots of data reported by each project. [NWQN, National Water Quality Network; ION, Indigenous Observation Network; Arctic GRO, Arctic Great Rivers Observatory; Mg/L, milligrams per liter]

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Sites</th>
<th>Number of Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>19</td>
<td>86</td>
</tr>
<tr>
<td>2007</td>
<td>27</td>
<td>135</td>
</tr>
<tr>
<td>2008</td>
<td>35</td>
<td>183</td>
</tr>
<tr>
<td>2009</td>
<td>31</td>
<td>178</td>
</tr>
<tr>
<td>2010</td>
<td>33</td>
<td>193</td>
</tr>
<tr>
<td>2011</td>
<td>41</td>
<td>139</td>
</tr>
<tr>
<td>2012</td>
<td>43</td>
<td>200</td>
</tr>
<tr>
<td>2013</td>
<td>38</td>
<td>287</td>
</tr>
<tr>
<td>2014</td>
<td>54</td>
<td>239</td>
</tr>
</tbody>
</table>

Total 2006-2014: 1,619

Sampling locations 2009 - 2014

![Sampling locations map](image)
Community participation 2006-2014 Alaska only

- Samples collected by community technicians since 2006-2014: **1,163**
- Community technicians 2006-2014: **203**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Average</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of samples per tech 2006-2014</td>
<td>6</td>
<td>1</td>
<td>60</td>
</tr>
<tr>
<td>Years participating per community</td>
<td>5</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Number of years sampling per tech</td>
<td>1.5</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Number of samples collected per year per tech</td>
<td>4</td>
<td>1</td>
<td>34</td>
</tr>
<tr>
<td>Number of sites per community</td>
<td>1.4</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Number of samplers per community</td>
<td>9</td>
<td>1</td>
<td>24</td>
</tr>
</tbody>
</table>
Figure 1. Annual wet deposition (kg/ha), precipitation and discharge (Q) with no observed trends.

Toohey et al. 2016
2. Annual flux increases in the Yukon and Tanana Rivers with Thiel-Sen trend lines.
Figure 9: Nitrate mean concentration were observed in July and August 2009 compared to mean concentration of for ION surface water samples collected at Tagish River, Stewart River, Porcupine River, Tanana River, Hess Creek, Chena River above Fairbanks, Koyukuk River and Yukon River above Whitehorse, Eagle, Fort Yukon, Galena and St Mary’s from 2006-2014 The sample groups with a p-value of 6.76 E-13.
ION builds relationship that create new projects
Strategic Needs Of Water on the Yukon (SNOWY)
Partnering Communities:
• Kotlik
• Kwigillingok
• Quinhagak
• Iliamna
• St. Michael
The Sensitivity of Alaskan & Yukon Rivers, Fish, and Communities to Climate
Project Team

University of Colorado
  Keith Musselman
  Mike Gooseff
  Cassandra Brooks
  Noah Molotch
  Sabre Duren

U.S. Geological Survey
  Nicole Herman-Mercer
  Josh Koch
  Ryan Toohey
  Mike Carey

Yukon River Inter-Tribal Watershed Council
  Edda Mutter

National Center for Atmospheric Research
  Andy Newman
  Joe Hamman
  Tony Craig

Institute for Tribal Environmental Professionals
  Karen Cozzetto
  Ann Marie Chischilly
  Nikki Cooley

University of Saskatchewan
  Karl-Erich Lindenschmidt

University of Waterloo
  Heidi Swanson

* Bold indicates those present at AFE
Peer-reviewed publications related to ION


Databases related to ION

- Sciencebase. 2014. https://www.sciencebase.gov/catalog/item/573f3b8de4b04a3a6a24ae28


In summary

- Alaska is data sparse both temporally and spatially. Remote sensing and modeling approaches often work at these large scales. These approaches need ground-based field data.

- Community-based research requires ‘buy-in’ from stakeholders.

- Listening, science communication and application are key components of developing this ‘buy-in’.

- ION has greatly benefitted from having long-term, professional USGS data as part of its project design.

- Non-traditional scientists can be trained to perform complex calibration and sample collection procedures to produce high quality data.

- While often efficient, due in large part to leveraging, our network has been most successful when there is consistent funding.
Stay tuned...Questions?

emutter@yritwc.org   nhmercer@usgs.gov   rtoohey@usgs.gov

Quyana, Mahsi Cho!

Thank you to the ION Team: Environmental Program Staff and Managers, Yukon River Tribal Councils, YRITWC Staff. This work was funded by the AKSC, AKCSC, USGS NRP, TESNAR, SISNAR Administration for Native Americans and the National Science Foundation Award# 1020417