Transformation of *Big* Imagery into Arctic Science-Ready Products

Cross-Disciplinary Approaches to Advancing Sustainable Arctic Infrastructure

RATIC/T-MOSAiC Community Meeting
Arctic Science Summit Week 2022

Mapping, Modeling and Monitoring Panel Discussion

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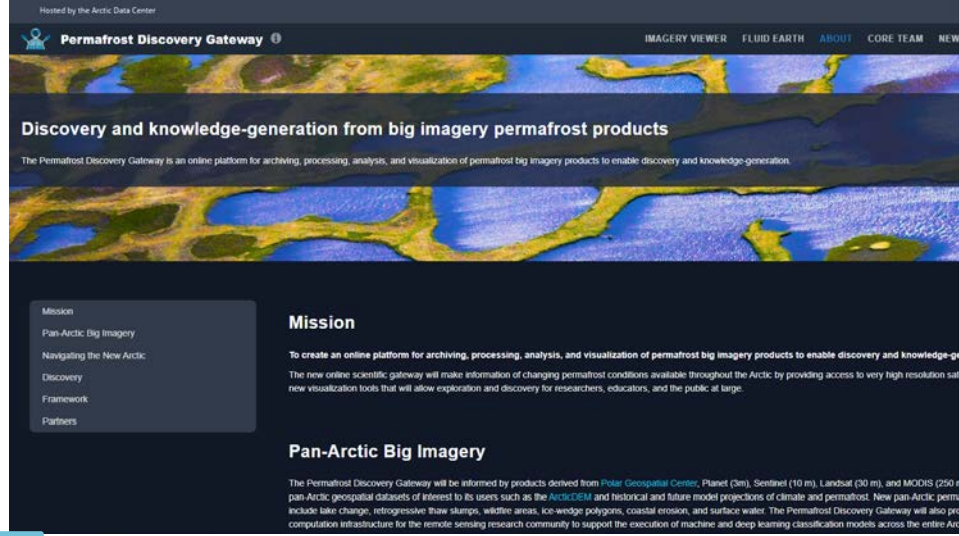
Permafrost Discovery Gateway (PDG)



Navigating the new Arctic tundra through big data, artificial intelligence, and cyberinfrastructure

Anna Liljedahl (lead PI), Woodwell Climate Research Center

Chandi Witharana, University of Connecticut

Kenton McHenry & Aiman Soliman, University of Illinois

Matt Jones & Amber Budden, Arctic Data Center

Ben Jones & Jennifer Moss, University of Alaska Fairbanks

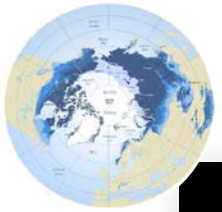
Michael Brubaker, Alaska Pacific University

Jason Cervenec & Aaron Wilson, Ohio State University

Guido Grosse & Ingmar Nitze, Alfred Wegener Institute

Galina Wind, NASA

Developing permafrost big imagery products & making them discoverable for knowledge-generation



DATA

+

ALGORITHMS

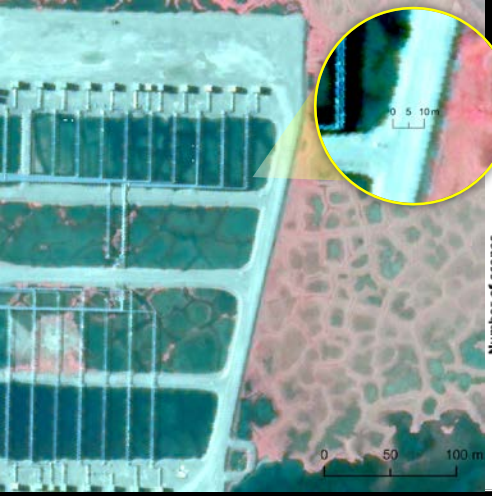
+

COMPUT
(HPC)

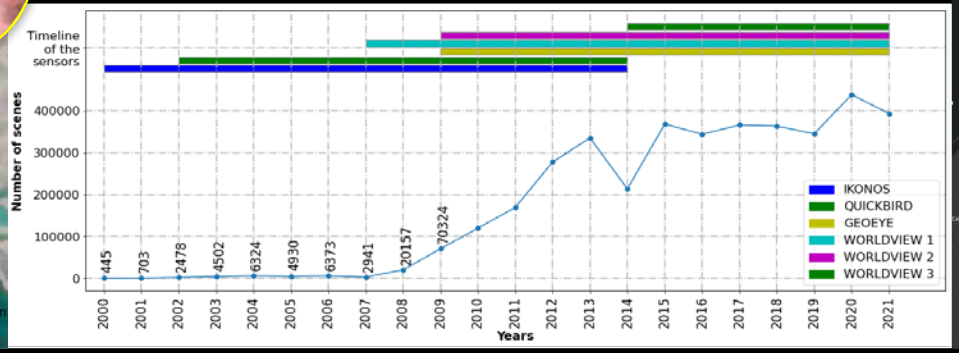
=

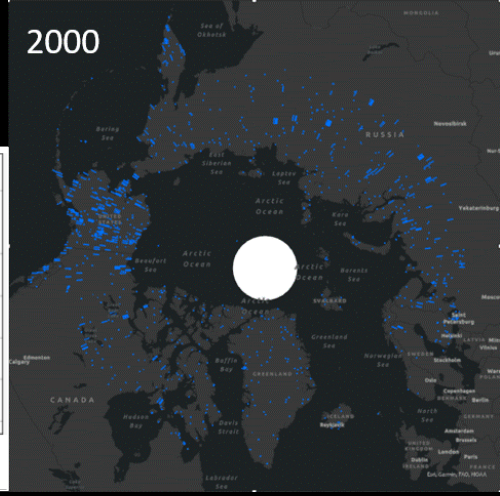
SCIENCE-READY PRODUCTS

User Community



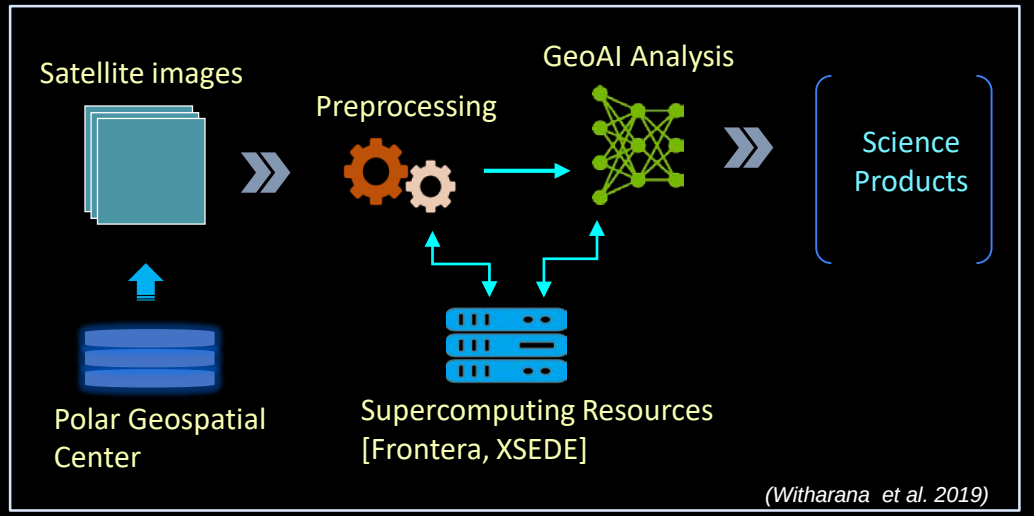
Pan-Arctic Coverage of Maxar Commercial Satellite Imagery





Mapping application for **A**rctic **P**ermafrost **L**and **E**nvironment - MAPLE

- Operational-scale GeoAI pipeline
- Translation of ***big*** commercial imagery into science-ready products
- Production of first pan-Arctic ice-wedge polygon map
- Transferability across image data and targets of interest
- Scalability and interoperability across heterogenous computing resources

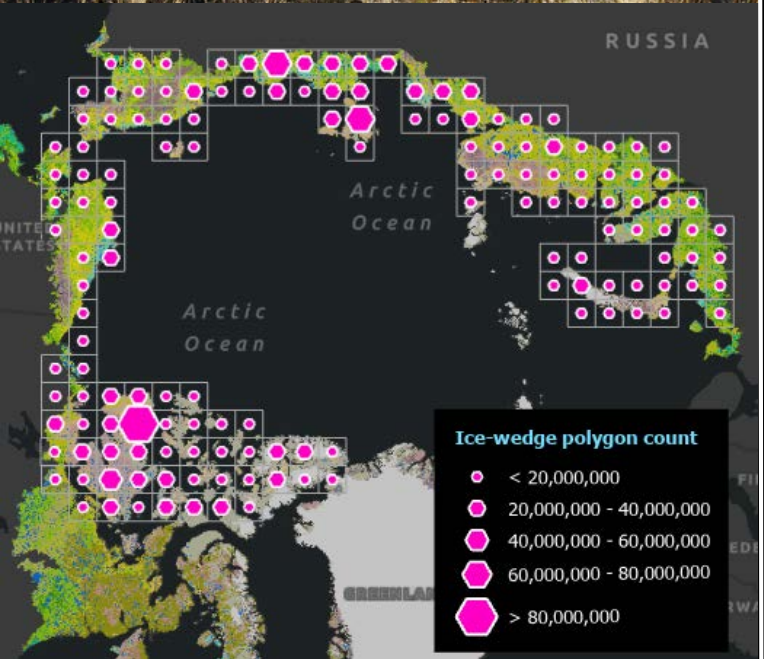


Automated Recognition of Ice-wedge Polygons from Maxar Imagery

So far, we have mapped

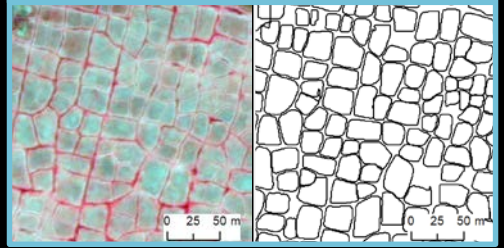
> 1 billion

individual ice-wedge polygons …

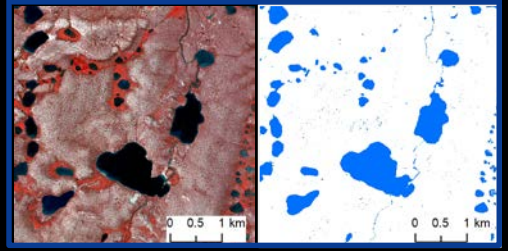


Our Pan-Arctic sub-meter resolution products

Ice-wedge Polygons



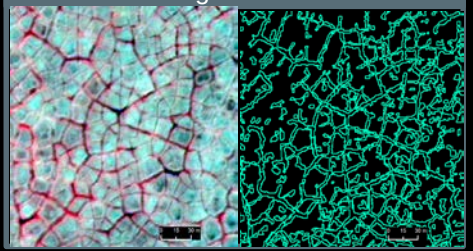
Water Bodies



We have demonstrated the extensibility of our GeoAI pipeline for other high-res Pan-Arctic mapping applications

Human-built Infrastructure

Trough Network



Retrogressive Thaw Slumps