Post-K&C – First Report

L-band Sensitivity to Biomass and Landcover Structure in the ABoVE domain

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Post-KC Science Team meeting #1
Tokyo, Japan, January 20-24, 2020
To study biomass and landcover structure sensitivity to environmental factors, such as soil moisture, permafrost and seasonal dynamics, in the 0 – 100 tons/ha biomass regime. This is in line with NISAR goals, needs for NASA’s ABoVE program, and is an important region for ALOS-2 and ALOS-4 biomass mapping.

Project area(s) – Boreal Ecosystems, especially in Canada and Alaska
ABoVE: Arctic Boreal Vulnerability Experiment

NASA ABoVE Study Region
Project aims to support K&C thematic drivers

- **Carbon cycle science:** Through its extensive peatlands, the Boreal ecosystem is a significant source of carbon storage. Release of methane, through a melting permafrost and extended summer season is a significant carbon source.

- **Climate Change:** With changes in permafrost, wetland dynamics and recent advent of megafires, in a global context, the boreal region is experiencing some of the most drastic changes due to climate change.

- **Environmental Conservation:** Identification of wetlands and forest structure are critical for characterizing plant and animal habitats in an abbreviated growing season.
Detection of Forest disturbance
Accuracy: > 50% disturbance at ha scale annually

Active agricultural crop area
Accuracy: 80% at 1 ha resolution every 3 months

Wetland inundation Extent
Accuracy: 80% at 1 ha resolution every 12 days

Permafrost
Accuracy: 5.2 mm @ 100m, 16 mm @ 10 km, semi-monthly

NISAR Ecosystem Requirements Illustrated

Biomass
100 Mg/ha
Accuracy: 20 Mg/ha annually

Woody vegetation Biomass
0 Mg/ha
The global distribution of regions dominated by woody biomass $< 100$ Mg/ha

- **Regions with AGB $< 100$ Mg/ha**: 50% of area
- **Regions with AGB $> 100$ Mg/ha**: 50% of area
- **Regions with AGB $< 20$ Mg/ha**: 50% of area
- **Regions with No woody vegetation**
- **Open Water**

Regions with woody biomass $< 100$ Mg/ha are highlighted in green, regions with woody biomass $> 100$ Mg/ha are highlighted in red, regions with woody biomass $< 20$ Mg/ha are highlighted in yellow, and regions with no woody vegetation are in white. Open water is marked in blue.
Results and significant findings

For use of ALOS data, we are in the early stages of analysis

- Time variability
- Ground validation (Wetland, forest, and forest regrowth sites)

Low biomass (< 100 t/ha) and strong inundation dynamics make the region ideal for a focused time-series collection

Region has not been the focus of ScanSAR time series or consistent FBD collection

This makes it a good candidate for one of the “super super sites”
Deliverables and other output

Describe planned output of your project.

- Project deliverables
- Peer-reviewed publications
- Non-peer-reviewed publications (conference papers, reports etc.)
- Other results
PKC & ABoVE

0 < biomass < 100 t/ha

strong inundation dynamics

disturbance

permafrost monitoring
Great Slave Lake Region
Heterogeneous Landscape

in-tact forest
burn scar
wetlands
Large-scale fires

Legend
- 2015 fires
- 2014 fires
- Roads
The combined effect of remote sensing and ABoVE

- Different land-use histories (i.e. burn history and severity) and soil type governs the forest cover
- Permafrost depth, soil moisture and biomass provide a means for understanding how the past effects the current state, and how things will change in the future
The ABoVE Landscape
Strong inundation dynamics

May 2017

September 2017

Wetland water channels
The ABoVE Landscape
Changing Permafrost Dynamics

UAVSAR Repeat-pass Interferometry from June & Sept 2017 indicate deformation in locations of the 2015 Yukon-Kuskokwin Delta fire (from Schaefer et al., 2018)
Early Time Series Analysis
HH, HV, HH/HV

- Vegetation is green (HV – Volume scattering)
- Water is blue (HH/HV – smooth surfaces are very bright)
L-band Time Series

140917  
September

141126  
November

150204  
February

150708  
February

160203  
February
Compare HH and HV RCS for different landcovers.
Compare HH and HV RCS for different landcovers
PALSAR/PALSAR-2 data access

Please list the PALSAR/PALSAR-2 data you have
(1)Requested: just finished completing PI-agreement
(2)Obtained: N/A
Screenshots from JAL

Japan satellites protect earth?/JAXA

Duration: 18 mins
Genre: Documentary / Others
Rating: NR
Languages:
日本語
English subtitles

Edo-era astronomer Goryu Asada looks into the role and development of JAXA's artificial satellites.

Now, DAICHI's mission is done, so it has been replaced by DAICHI-2.