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ID# GC31A-0699
Location: Poster Hall (Moscone South)
Time of Presentation: Dec 16 8:00 AM - 12:20 PM

Mapping and Monitoring Boreal Wetlands within the NEESPI Domain Using Spaceborne Synthetic Aperture Radar for Assessing Carbon Release

E. Podest[1]; *K. C. McDonald*[1]; *R. Schroeder*[1]; *T. J. Bohn*[2]; *D. P. Lettenmaier*[2]
1. Water and Carbon Cycles Group, Jet Propulsion Laboratory, Pasadena, CA, United States.
2. Civil and Environmental Engineering, University of Washington, Seattle, WA, United States.

Carbon and methane emissions from wetlands and lakes can have a large impact on global climate. These ecosystems are dominant features in the northern high latitudes hence the importance of assessing their spatial and temporal extent to improve upon global net carbon exchange estimates. Spaceborne synthetic aperture radar (SAR) is an effective tool for this purpose since large inaccessible areas can be monitored on a temporal basis regardless of atmospheric conditions or solar illumination and it is sensitive to vegetation and standing water. We employ multi-temporal PALSAR data (L-band, 30 m resolution, HH and HV-polarizations) and combined QuikSCAT and AMSR-E in this study to map wetland distribution and inundation state within sub-regions of the NEESPI domain. These products are then used within a carbon modeling framework.

Multi-temporal PALSAR data spanning the beginning of the seasonal non-frozen period through the end of summer has been assembled over selected hydrologic basins within the NEESPI domain. A decision tree classification approach is then used to classify the radar data. Supplementary data layers are used within the classifier in order to support generation of the results. These data layers include Landsat imagery, a DEM, a proximity to water data layer, and image texture. The classification results depicting wetland extent are used to assess bi-weekly landscape inundation products derived from coarse resolution (~25 km) AMSR-E and QuikSCAT. These products will provide information on wetland extent and inundation dynamics on a bi-weekly basis. The coarse and high-resolution products are then used to calibrate and validate a carbon-modeling framework. Examples of how the remote sensing products are used to calibrate and validate the modeling framework will be presented as well.

This work was carried out at the Jet Propulsion Laboratory, California Institute of Technology and at the University of Washington under contract with the National Aeronautics and Space Administration. This work has been undertaken in part within the framework of the JAXA ALOS Kyoto & Carbon Initiative. ALOS PALSAR data have been provided by JAXA EORC.

Contact Information

Erika Podest, Pasadena, California, USA, 91109-0000, click here to send an email