

IGARSS 2000 ABSTRACT SUBMISSION TEMPLATE

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ABSTRACT TITLE:

Assessment of Boreal/Arctic Biogeochemistry using Radar Derived Freeze/Thaw State and an Ecosystem Process Model

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ABSTRACT TEXT:

The important role of the high latitudes (>40 deg. N) in the Earth's climate system is well established. The size and remoteness of boreal and arctic ecosystems, however, pose a significant challenge to accurate quantification of ecosystem processes and associated trace gas exchanges with the atmosphere. Our objective is to improve regional assessment and monitoring of boreal/arctic ecosystem processes through the integration of space-borne radar remote sensing derived surface freeze/thaw state as a primary driver within a regional ecosystem process model (BIOME-BGC). Multi-temporal analyses of ERS SAR, NSCAT and Quikscat (ADEOS-2) scatterometer data are used to estimate surface freeze/thaw state. This information is then used to improve model representation of snow melt and soil thaw timing, as well as stand photosynthetic and phenological activity. Model results are evaluated using biophysical information obtained from a network of field sites along a north-south transect in Alaska. Sensitivity analyses are performed to quantify the relative improvement, if any, provided by the addition of radar derived freeze/thaw information given the relative uncertainty in meteorological information obtained from the sparse boreal weather station network. These results are intended to provide more accurate assessment of boreal ecosystem processes and their response to long term and interannual variability in spring thaw timing and associated length of the non-frozen growing season. – This work was carried out at the Jet Propulsion Laboratory, California Institute of Technology, and at the University of Montana, under contract with the National Aeronautics and Space Administration.

TOPIC PREFERENCE: A.15, C.5