Boreal Zone Forest Type and Structure From EOS Data Sets

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The boreal forest is an important component of the world's forests covering 12×10^6 km^2, nearly 30% of world's forest, and 73% of its coniferous forest area. General circulation models predict regions of Canada and Siberia, especially the northern and sub-arctic parts, will experience significant warming over the foreseeable future (Hansen et al 1996). The magnitude of the boreal forest area suggests that it plays a critical role in the global climate system, e.g., as potential sink or source of atmospheric carbon (Stocks et al. 2002). Forest cover type and structure (e.g., height, biomass) are fundamental parameters for understanding the global carbon cycle and ecosystem dynamics in the face of changing climate. **Objectives** The purpose of the project is to map boreal forest type and structure using Terra instrument data aided by point measurements of canopy height, density and biomass inferred from satellite lidar data. The primary objective is to improve forest identification and biomass estimation by combining MODIS, MISR, and Geoscience Laser Altimeter System (GLAS) data sets. **Methods** The emphasis of this project is to map boreal forest structure parameters (i.e. age, coverage, height and biomass) using temporal, multi-angle, and vertical profile information of MODIS, MISR and GLAS data. Field samples, GLAS point data, and MISR images will be used at test sites to develop training and testing datasets, which will be used in MODIS data classification and for further algorithm development. The relationships between MODIS data and forest structure parameters will be investigated using the datasets. The relationships will then be used to map forest structure parameters from MODIS data, and the results will be compared with the map produced from MODIS classification and GLAS samples. **Expected results** Methods for mapping boreal forest structure parameters from Terra and GLAS data, a validated biomass map for a portion Eurasia boreal forest. Other maps such as tree height, tree coverage, may also be produced. The results of this proposal will be applicable to answering several important questions posed by NASA's Earth Science Enterprise including: *How are global ecosystems changing*? and, *How is the Earth's surface being transformed and how can such information be used to predict future changes?* The results of this study will address these questions for a large portion of the Siberian boreal zone and help pave the way for future circumpolar boreal forest studies.

References

Hansen, J., R. Ruedy, Mki. Sato, and R. Reynolds 1996. Global surface air temperature in 1995: Return to pre-Pinatubo level. *Geophys. Res. Lett.* 23:1665-1668. (see http://www.giss.nasa.gov/data/update/gistemp

Stocks, B.J., J.-G. Goldammer, D.R. Cahoon and W.R. Cofer, (2002) Fire Research in the Boreal Zone of Eurasia and North America, http://www.igac.unh.edu/newsletter/15/boreal.php.