Using Landsat and Radar satellite data to assess burn severity of two fires in East Siberia using a differenced normalized burn ratio approach

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East Siberian forests contain one-quarter of the world's growing stock volume of coniferous forests. The main disturbance-based impacts on boreal forests in East Siberia are pervasive summer fires. Recent modifications to the Arctic carbon budget demonstrate the large role of greenhouse gas emissions (GHG) from Siberian fires that are significant at the global scale. Understanding the severity of fires across the Siberian arctic landscape is critical if we are to better refine estimates of GHG emissions and forest regeneration capacities. Typically, fires are of anthropogenic origin and can be quite severe, often burning through most of the seasonally-thawed active layer of soils. Previous studies suggest that fires are stand reducing and expose carbon-laden permafrost to microbial decomposition. In this study, we use Landsat Thematic Mapper (TM) and synthetic aperture radar (SAR) satellite imagery pre- and post-burn to investigate burn severity. Two fires that burned in the summer of 2007 were identified in Landsat TM imagery based on the Moderate Resolution Imaging Spectroradiometer (MODIS) Level 5 Burned Area product. Using a differenced Normalized Burn Ratio (dNBR) approach we quantified burn severity and validated it using SAR data to detect changes in surface roughness. We show correlations between SAR-based surface roughness and Landsat-based dNBR for both fires, suggesting this method is appropriate for detecting burn severity in East Siberian forests. Using the measure of severity from these two datasets, we make preliminary inferences about burn severity of other fires in the East Siberian landscape and discuss the effects of severe burns on carbon cycling throughout the region. This project is part of the Polaris Project, an NSF-funded undergraduate field program based out of Cherskiy, Russia (www.thepolarisproject.org).