Comparative Studies on Carbon Dynamics in Disturbed Forest Ecosystems: Eastern Russia and Northeastern China

PI: Guoqing Sun, Co-PI: Jeffrey G. Masek, Co-Is: Olga Krankina, Vyacheslav Kharuk, and Zengyuan Li
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ABSTRACT

Due to differing management regimes, forests on both sides of the Amur River in Eastern Russia/Northeastern China have experienced very different trajectories of disturbance and recovery. Forests throughout the region are dominated by larch, and fire in early spring is a major factor in forest disturbance and development. A major fire in Spring of 1987 burnt more than one million ha of forests along both sides of the river. While the forests on the Russian side were recovering from 1987 fire naturally and experienced new fires (such as in 1998 and in 2003), the Chinese government implemented a 10-year program to suppress forest fire and plant trees in the burnt area. In addition, a new forest policy implemented in 1999 - the Natural Forest Conservation Program (NFCP) - and the rapid economic development of China, have put heavy pressure on forest resources in the Russian East. The percentage of Russian logs to total logs imported to China increased from about 14% in 1995 to 44% in 2000, and most of the Russian timber was from the Russian Far East.

The proposed study will focus on the characterization of forest disturbances and recovery in response to differing management regimes in Russian Far East and Northeastern China, and the ultimate impact of these natural and anthropogenic disturbances on forest ecosystem dynamics, vegetation diversity, and carbon uptake and storage in the region.

The study will rely on existing NASA-held data and the datasets collected from previous projects. Additional local forest inventory maps, and other statistical datasets and field samples will also be collected during this project. The field measurements and forest inventory maps provide ground truth data for mapping forest disturbance and biomass from Landsat ETM+ and SAR data at intensive study sites. These datasets then will be used to develop models to convert GLAS waveforms to forest stand biomass. The impact of the forest disturbance on forest structure and biomass storage will also be assessed using the high-resolution satellite data. The forests will be stratified using lower resolution data, mainly the MODIS products. The regional carbon storage and dynamics will be quantified from the stratified forests and the biomass sampling for these strata provided by GLAS data. We will contrast the disturbance patterns, the impact of forest management on forest structure, species composition, and carbon uptake/storage between Russian Far East and Northeastern China, and consider the consequences of China's new national forest policy and the economical development.

This study responds to the call of this NRA "to responds to the objectives of the Northern Eurasia Science Partnership Initiative (NEESPI) to develop a better understanding of the interactions between the ecosystems, atmosphere and human dynamics in Northern Eurasia. … to characterize the spatial and temporal distributions of major carbon stocks and fluxes in various ecosystems of Northern Eurasia."