

MONITORING FOREST DYNAMICS IN NORTHEASTERN CHINA IN SUPPORT OF GOFC

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ABSTRACT

The forests in Northeastern China have been undergoing dramatic changes during the last several decades due to forest fire, insect infestation, massive logging, agricultural conversion, and afforestation. These changes affect the climate, the ecosystem, the economy and living heritage in the region, and may impact on the global carbon cycle.

To monitor the dynamics of the forests in the vast Northeastern China region, we propose to develop an operational forest monitoring system using satellite remote sensing data. The major components of this system will include both standard and enhanced methodologies for forest cover mapping and change detection within a PC-based Geographic Information System (GIS) database. Landsat-7 ETM+ data and ERS tandem SAR data will be used to generate fine resolution forest characteristics base maps for the region. The derived forest cover and change maps will be validated with ground observation data collected at the permanent sample sites already established over the area, and by new field measurements to be collected during the course of this project in concert with our Chinese collaborators.

When the global land cover and land cover change products from the Moderate Resolution Imaging Spectroradiometer (MODIS) on EOS-AM1 satellite (Terra) become available, they will also be used in a preliminary step to locate areas within this vast region where forest changes are occurring. An algorithm similar to that used for creating the MODIS enhanced land cover change products will be used for detecting these areas of forest change. Once the change areas are identified, fine resolution Landsat 7 ETM+ and SAR data corresponding to these geographical locations and time periods will be utilized to characterize the nature/cause of the change(s).

Furthermore, existing forest maps and historical Landsat-5 data will provide the forest status for this decadal time period, and they will be used to map the major forest changes due to natural and human-induced disturbances. Additional fine resolution data from near-term future satellite missions, such as the SRTM and ENVISAT radar sensors, will be requested for test sites within the region to investigate the capability of these data for the extraction of forest structure information. Such information is critical in deriving a better assessment of standing biomass. Thus, we feel that the potential effects of the forest changes on the carbon cycle during this period can be quantified for this region. A test run for predicting forest changes using the database and forest growth models will be performed at selected sites and evaluated in the third year of this project. All of the data sets output from this project, as well as the algorithms employed for this forest monitoring system, will be published and made available to other GOFC partners and other users.