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Project Abstract

Application of Space-Based Technologies to Examine Land-Cover/Land-Use Change Along a Transect on the Yamal Peninsula and Novaya Zemlya, Russia

The overarching goal of our proposed research is to use remote-sensing technologies to examine how the terrain and anthropogenic factors of reindeer herding and resource development, combined with the climate variations on the Yamal Peninsula, affect the spatial and temporal patterns of vegetation change and how those changes are in turn affecting traditional herding by indigenous people of the region. The Yamal Peninsula in northern Russia has been identified as a "hot spot" for both Arctic climate change and land-use change. The Yamal has undergone extensive anthropogenic disturbance and transformation of vegetation cover over the past 20 years due to gas and oil development and overgrazing by the Nenets reindeer herds. We propose to establish a transect of eight sites across the Yamal to investigate the combined effects of climate change and anthropogenic influences. We will investigate how vegetation changes in this heavily impacted region on poor sandy soils compares with other areas in the Arctic, especially a similar transect on loess soils with less grazing impact in North America. We will use a combination of ground-based studies, remote sensing studies, and studies of Nenets land-use activities to help develop vegetation-change models that can be used to predict future states of the tundra. This research is in response to the Northern Eurasia Earth Science Partnership Initiative (NEESPI). It principally addresses the NEESPI science questions regarding the local and hemispheric effects of anthropogenic changes to land use and climate. Furthermore, it will use and contribute to NASA's global-change observations, particularly work exploring the consequences of the dramatic decline in the Arctic sea ice and the greening of terrestrial vegetation that is occurring in the northern latitudes. The project will combine the long-term record available through AVHRR and MODIS sensors with the most recent sensors that provide very detailed spatial and spectral information regarding land-cover/land-use change in the Arctic. The project is also the intersection of three International Polar Year (IPY) initiatives: (1) "Greening of the Arctic" (GOA), (2) "Cold Land Processes in NEESPI" (CLPN) and (3) "CircumArctic Rangifer Monitoring and Assessment" (CARMA).