MODELING SIBERIAN BOREAL FOREST LAND-COVER CHANGE AND CARBON UNDER CHANGING ECONOMIC PARADIGMS

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ABSTRACT

While change in political and economic structures is occurring in a number of countries worldwide, nowhere else recently has this occurred at the scale of the break-up of the state-controlled Soviet Union and its transition to a market economy. This event stands out in the magnitude of the change; it's rapid transition period, and the geographic extent and global impact of the potential effect, including its effect on the Siberian boreal forest. We hypothesize that these two different economic paradigms – state-controlled and market economy – may leave significantly different imprints on the land, and we propose to develop a case-study model of the contrasting economic drivers and of their past, present, and potential future consequences for land-cover land-use change and carbon in Siberia. **Goals and Objectives**: The goal of the proposed project is to develop a model of Siberian boreal forest land-cover land-use change and carbon that is linked to changing economic paradigms, and that is informed by remote sensing-derived analyses of change. To achieve this goal we will address four objectives: 1) develop an economic model of the factors affecting forests in Siberia over the past 70 years; 2) use time-series Landsat-derived datasets to develop land-cover land-use change matrices and transition probabilities, including their socio-economic spatial dependency; 3) add the carbon content to these land cover states through application of an ecosystems dynamics and carbon models; 4) combine these into an integrated model of land-cover land-use change in Siberia driven by rules associated with different economic paradigms. **Approach**: This project builds on previous work in remote sensing and modeling of Siberian forests specifically using time-series analyses and ecosystem models. We will build on this by using a new Landsat-7 dataset for three test sites in three of the most important administrative units in the Siberian forest sector: Tomsk Oblast, Krasnoyarsk Krai, and Irkutsk Oblast. We will derive land-cover transitions from time series remote sensing and link these to carbon content. We will develop models of the economic paradigms. Land-cover/use transition probabilities and associated carbon contents will be coded into a Markov-based simulation model and this model driven by different scenarios as based on the economic models. **Expected Results**: We will produce an economic model that expresses the institutionalized "rules" of the different paradigms that impact land-cover/use in Siberia. We will construct a time-series Landsat-7 dataset and different land-cover states at each time period and link these with carbon contents. We will integrate these model components into a new coupled model driven by the rules of the different economic paradigms. We will examine the model output in terms of land-cover land-use impacts of the different economic paradigms. This work will be useful for further understanding the relationships between land-cover land-use change and carbon, and economic policy in Siberia.