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Response of Forest Growth to Climate Variability and Change: Remotely-Sensed and in situ Data for European Russia

We plan to place satellite observations of forest growth in European Russia in a longer-term context, so as to better understand the nature and causes of interannual to multidecadal variability, and potential response of forest to climate change. Three main kinds of data would be used: 1) Estimates of forest growth derived from satellite observations. This dataset would be almost 30 years long by the end of our project; 2) A new network of tree-ring chronologies to be developed for a major part of European Russia, specifically designed for this project. Virtually all, if not all, of these data will be 100 years or longer; 3) Meteorological data from the region (40-150 years data, depending on location).

The study area would be a latitudinal belt from Central European Russia to the northern limit of tree growth. The key questions to be addressed would be: a) Are the remotely-sensed and tree-ring derived measures of vegetation growth consistent with one another? b) Can their similarities and inconsistencies be explained by known mechanisms in nature? c) To what extent do they capture the same or complementary aspects of forest growth? d) What is the role of climate variability in causing the individual and common patterns of variability in the remotely-sensed and tree-ring data? e) How typical have the past 30 years been of the previous 100 years? e) Have relationships between climate and forest growth changed in recent years, or are they within the range of variability of the last 100 years? e) To what extent can the relationships between forest growth and climate as derived from these datasets help constrain expectations of near future change in forest growth?

This would also be the first large-region attempt to evaluate space-based data on a regional scale against tree-ring data, providing an independent check of the remotely sensed measurements. The project would support the LCLUC-relevant science questions of the NEESPI program by combining our observations and modeling of forest over a huge region with our Russian colleagues' intensive measurement of forest metabolism at the Federovskoe flux tower site.