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CONTROL ID: 1797861

TITLE: Impacts of climate change on plant productivity in the Cajander larch woodlands of northeastern Eurasia

ABSTRACT BODY: Climate change in Northern Eurasia is driving shifts in the productivity and extent of forest ecosystems, which can in turn feedback on the climate system. Few studies have examined plant response to climate change near latitudinal treeline in northeastern Siberia. We therefore quantified trends in climate and plant productivity, as well as productivity-climate relationships, in the Cajander larch (*Larix cajanderi* Mayr.) woodlands of the Kolyma River watershed using satellite-derived normalized difference vegetation indices (NDVI), tree ring measurements, and climate data. Averaged across the watershed there was a 1.0°C increase in mean summer temperature (*T*) from 1938 to 2009, but no systematic change in precipitation or climate moisture index (*CMi*). Plant productivity, as indicated by mean summer NDVI (NDVI_s), was widely correlated with *T* and exhibited positive trends across 20% of the watershed, primarily in the climatically coolest area. In the climatically warmest areas NDVI_s was positively associated with *CMi* instead of *T* and positive trends in NDVI_s were uncommon. Annual larch basal area increment was positively correlated with NDVI_s ($r=0.44$, $P<0.05$, 1982-2007), but showed no trend during the period of overlap with the satellite record despite a positive trend in NDVI_s. Larch growth from 1938 to 2007 was positively associated with June and August temperature, as well as with prior summer *CMi*. Our analysis revealed that warming enhanced plant productivity in the coolest areas, yet in the warmest areas moisture availability likely limited increases in productivity. Unless there is a concomitant increase in moisture availability with future warming, it is possible that increased moisture stress could progressively limit forest productivity and perhaps slow the rate of forest expansion into the tundra, which could have significant climate feedback implications due to impacts on carbon storage and surface energy balance.

CURRENT SECTION/FOCUS GROUP: Global Environmental Change (GC)

CURRENT SESSION: GC049. Environmental, Socio-Economic and Climatic Changes in Northern Eurasia and their Feedbacks to the Global Earth System

INDEX TERMS: 0439 BIOGEOSCIENCES Ecosystems, structure and dynamics , 0480 BIOGEOSCIENCES Remote sensing, 1630 GLOBAL CHANGE Impacts of global change, 1637 GLOBAL CHANGE Regional climate change.

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TITLE OF TEAM:

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