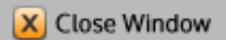




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CONTROL ID: 1487551**TITLE:** Widespread Expansion of Boreal Shrublands in the Siberian Low Arctic Is Linked to Cryogenic Disturbance and Geomorphology

ABSTRACT BODY: Declassified imagery from the KH-4B “Corona” and KH-7 “Gambit” Cold War satellite surveillance systems (1963-1972) are a unique, high-resolution dataset that establishes a baseline for landcover-change studies in the Russian Arctic spanning 6 decades. We co-registered Corona/Gambit and modern high-resolution imagery for seven ~65 km² Low Arctic sites in northwest Siberia and Chukotka and quantified changes in the extent of tall shrublands dominated by Siberian alder (*Alnus fruticosa*) using a point-intercept sampling approach. We made ground observations at two sites to identify important geomorphic processes and physiographic units associated with shrub expansion.

Alder shrubland cover increased at all sites; relative to the 1960s extent, shrubland extent increased by 5-31% at the northwest Siberian sites and by 9% at both Chukotkan sites. In northwest Siberia, alder expansion was closely linked to cryogenic disturbances related to patterned-ground and active-layer detachments. At the Chukotkan sites, most alder expansion occurred on hillslope colluvium and floodplains; we also observed modest increases in Siberian dwarf pine (*Pinus pumila*). The close correspondence between expanding shrub patches and disturbance processes indicates that sparsely-vegetated, mineral-rich seedbeds strongly facilitate alder recruitment, and that the spatio-temporal attributes of disturbance mechanisms are a key determinant of landscape susceptibility to shrub expansion. Shrub expansion, in turn, initiates a cascade of effects on permafrost thermal regime and disturbance, promoting the accumulation of biomass and potentially buffering permafrost from climate warming.

CURRENT SECTION/FOCUS GROUP: Global Environmental Change**CURRENT SESSION:** GC019. Environmental, Socio-economic and Climatic Change in Northern Eurasia and Their Feedbacks to the Global Earth System**INDEX TERMS:** [1632] GLOBAL CHANGE / Land cover change, [0475] BIOGEOSCIENCES / Permafrost, cryosphere, and high-latitude processes, [0439] BIOGEOSCIENCES / Ecosystems, structure and dynamics, [0768] CRYOSPHERE / Thermal regime.**AUTHORS/INSTITUTIONS:** G.V. Frost, H.E. Epstein, Dept of Environmental Sciences, University of Virginia, Charlottesville, VA;

D.A. Walker, Alaska Geobotany Center, University of Alaska, Fairbanks, AK;

SPONSOR NAME: Gerald Frost**CONTACT (E-MAIL ONLY):** gwf5y@virginia.edu**TITLE OF TEAM:**