Geophysical Research Abstracts
Vol. 15, EGU2013-548, 2013
EGU General Assembly 2013

Migration potential of tundra plant species in a warming Arctic: Responses of southern ecotypes of three species to experimental warming in the High Arctic

Anne Bjorkman (1), Greg Henry (2), and Mark Vellend (3)

(1) Department of Geography and Biodiversity Research Centre, University of British Columbia, Canada (bjorkman@biodiversity.ubc.ca), (2) Department of Geography and Biodiversity Research Centre, University of British Columbia, Canada, (3) Département de biologie, Université de Sherbrooke, Sherbrooke, Québec, Canada

Climatic changes due to anthropogenic activity are predicted to have a profound effect on the world's biodiversity and ecosystem functioning. The response of natural communities to climate change will depend primarily on two factors: 1) the ability of species to adapt quickly to changing temperatures and precipitation trends, and 2) the ability of species and populations from southern latitudes to migrate northward and establish in new environments. The assumption is often made that species and populations will track their optimal climate northward as the earth warms, but this assumption ignores a host of other potentially important factors, including the lack of adaptation to photoperiod, soil moisture, and biotic interactions at higher latitudes. In this study, we aim to better understand the ability of southern populations to establish and grow at northern latitudes under warmer temperatures. We collected seeds or ramets of three Arctic plant species (Papaver radicatum, Oxyria digyna, and Arctagrostis latifolia) from Alexandra Fiord on Ellesmere Island, Canada and from southern populations at Cornwallis Island, Canada, Barrow, Alaska, and Latnjajaure, Sweden. These seeds were planted into experimentally warmed and control plots at Alexandra Fiord in 2011. We have tracked their survival, phenology, and growth over two growing seasons. Here, we will present the preliminary results of these experiments. In particular, we will discuss whether individuals originating from southern latitudes exhibit higher growth rates in warm plots than control plots, and whether southern populations survive and grow as well as or better than individuals from Alexandra Fiord in the warmed plots. In both cases, a positive response would indicate that a warming climate may facilitate a migration northward of more southerly species or populations, and that the lack of adaptation to local conditions (soil chemistry, microhabitat, etc.) will not limit this migration. Alternately, a negative response may indicate a need to reassess our fundamental assumptions about species migrations in response to climate change.