How non-local are the effects of land-atmosphere feedbacks?

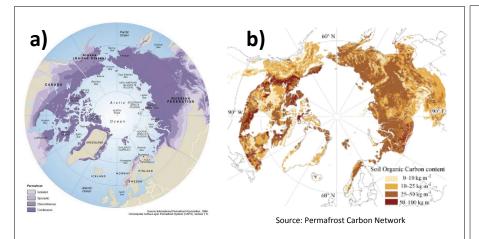


Figure 1: permafrost and soil carbon in the Arctic). a) permafrost distribution in the Arctic from the International Permafrost Association 1998 map. b) soil organic carbon (SOC) content in the Arctic from the Permafrost Carbon Network.

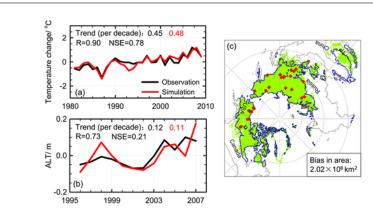


Figure 2: From Guo and Wang (2017), comparison of simulated and observed changes in (a) soil temperature at a depth of 1m, (b) active layer thickness from 1996 to 2007, and (c) comparison of the present-day extent of permafrost with observations (areas outlined in blue). Bias in area between simulated and observed is in the bottom right-hand corner.

Land-atmosphere feedbacks can be much more powerful than you might expect. Climate-induced changes in permafrost extent, snow cover, albedo, vegetation and shallower active layer depths feedback on the atmosphere.

You might think that these effects are only local – but think again! In fact, studies have shown that landatmosphere coupling can even affect temperature profiles over the Arctic Ocean. Atmospheric circulation over the Arctic Ocean is also significantly affected. So, exactly how non-local are these effects?

Diana R. Gergel

Ph.D. Student

University of Washington

E-mail: gergel@uw.edu



