

Simulated climate effects of land degradation near Urumqi, China

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Preliminary Results

Abstract

Western China's drylands, particularly around Urumqi are changing due to increased grazing pressures, urban growth, and increasing population. These changes, driven by national policies of openness and economic activity, are expected to continue for the foreseeable future. The continued degradation of rangelands surrounding Urumqi can impact not only socioeconomic characteristics but also regional climate patterns. Here we show results from high-resolution regional climate simulations of the Urumqi area using the RAMS regional climate model. Under differing levels of rangeland degradation, from no degradation in fractional cover and LAI to 75% reduction a variety of impacts are found. We examine the impacts of these changes in land cover parameters via current rangeland management approaches, including influences on summertime rainfall (important for grassland production) and year-round wind patterns (which can influence air quality).

Land degradation and Urban Expansion near Urumqi:

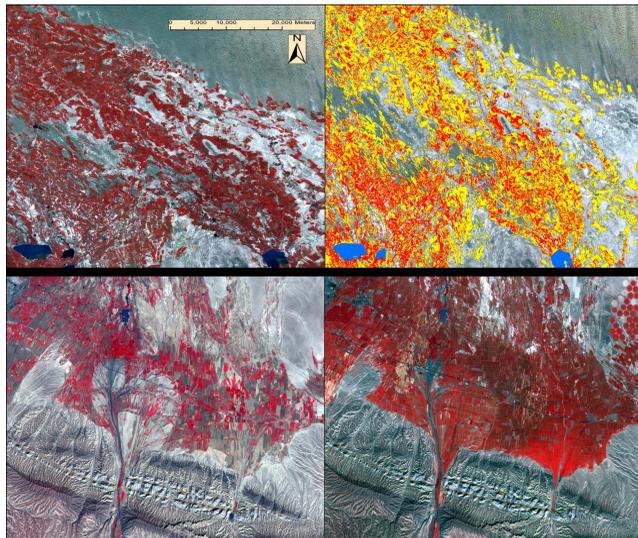


Figure 1: Fine-scale (30m) illustration of land use expansion and degradation in Urumqi, China region.

- A.)** False color (4:3:2) Landsat 5 TM;
- B.)** Red shows mixed agriculture land use in 1989 and Yellow shows mixed agriculture land use expansion and intensification in 2007;
- C.)** Falsecolor (4:3:2) Landsat 4 TM (9/19/1989) with Red representing vegetative agriculture surfaces; and
- D)** False color (4:3:2) Landsat 5TM (path/row: 143/29) from 09/29/2007 with Red representing land use intensification and expansion in the form of mixed agriculture.

Land degradation around Urumqi has accelerated (Figure 1). The trend is for degraded pastures and urban expansion primarily along major roads. What consequences will this land use change have on the local climate and on air quality?

Hypothesis: increased degradation of pastureland will result in faster surface winds, leading to reduced convection and rainfall.