Recent Trends in Land Surface Dynamics Across NEESPI and MAIRS Revealed by MODIS Collection 5

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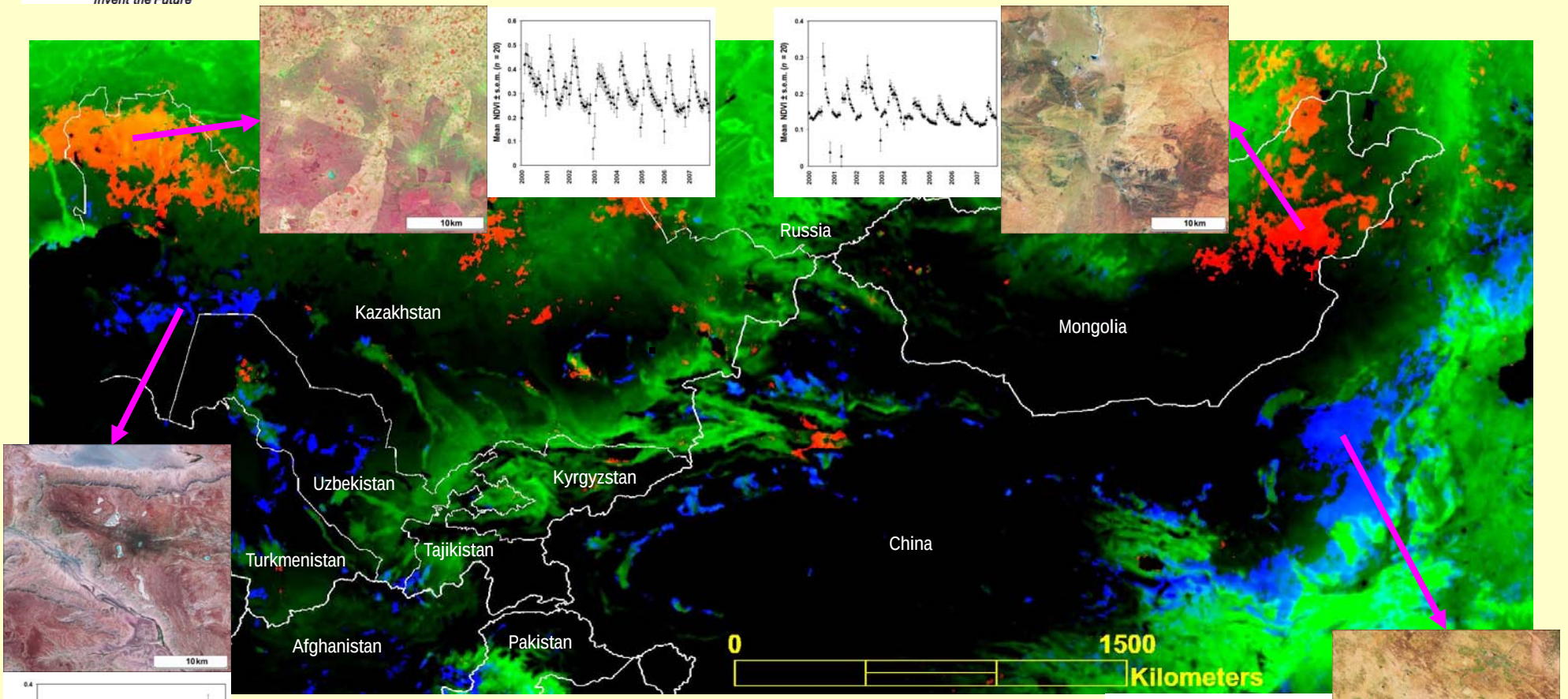

MODIS NBAR Collection 5 NDVI Trends: 2000-2007

- Highly significant ($p < 0.01$) increasing NDVI trends in blue
- Highly significant ($p < 0.01$) decreasing NDVI trends in orange
- Mean NDVI > 0.13 in green (higher values in lighter shades)
- Mean NDVI < 0.13 masked to black

Overview

We show here highly significant trends in the vegetated land surface across central Eurasia over the past eight years. A variety of natural disturbances and anthropogenic impacts may account for these trends. The purpose of the trend map is (1) to reveal hotspots of change, (2) to focus on particular areas that merit additional attention to identify the change processes, and (3) to illustrate how much of the land surface has experienced significant change at spatial scales relevant to interactions with the atmospheric boundary layer.

Methods

We calculated NDVI from MODIS Collection NBAR Climate Modeling Grid (0.05 degree) 8-day composites. We then recomposited to 16 days and applied a median filter to attenuate spatial noise.

We selected a seasonal time series from DOY 73 (mid-March) to DOY 313 (early November) for 2000 through 2007 (16 composites x 8 years = 128 obs). We applied the nonparametric Seasonal Kendall (SK) trend test (*de Beurs & Henebry, 2004, 2005*) to the image time series on a pixel-by-pixel basis. The SK test indicates the direction and significant of the trends, but not their magnitude. We display here only the highly significant trends (P<0.01). We excluded pixels exhibiting low NDVI from the trend test, thus excluding Eurasian drylands from this analysis.

Results

We highlight four hotspots of change and offer attribution.

1. Negative trends in northwest Kazakhstan within the central Eurasian grain belt result primarily from drought (Lioubimtseva & Henebry 2009).
2. Positive trends in southwest Kazakhstan within the Central Asian Northern Desert between the Caspian and Aral Seas may be from increases in cryptogamic crusts following release from grazing pressure (Lioubimtseva & Henebry 2009).
3. Negative trends in northeastern Mongolia within the Mongolian-Manchurian grassland may result from drought and desertification.
4. Positive trends in the central China loess plateau south and west of Beijing may result from recovery from drought as well as institutional changes in agricultural policies and programs (Liu et al. 2008).

What are your ideas about these and other hotspots?

References

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