

Plant phenology monitoring in Inner Mongolia grassland using Terra MODIS imageries



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Introduction

Background

Inner Mongolia grassland, one of the most important grazing regions in China, has long been suffering a serious threat of land degradation and desertification, mainly due to overgrazing.

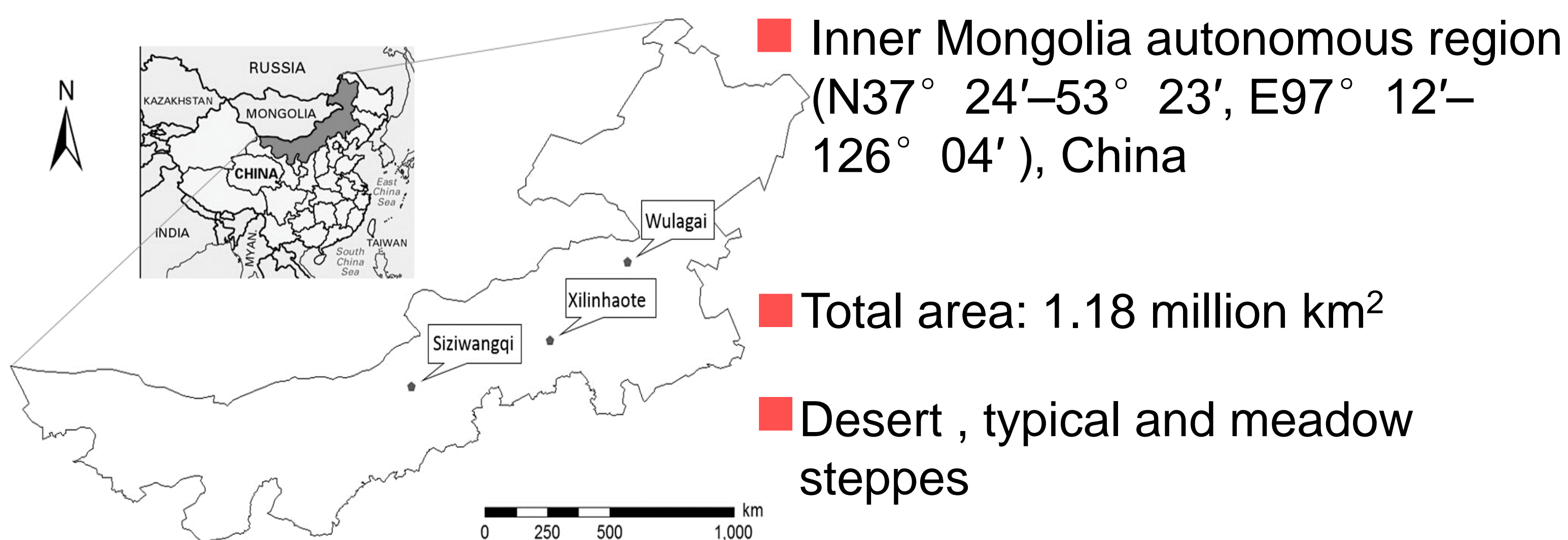
What's the phenology dynamics and spatial distribution in such a huge area?

Objective

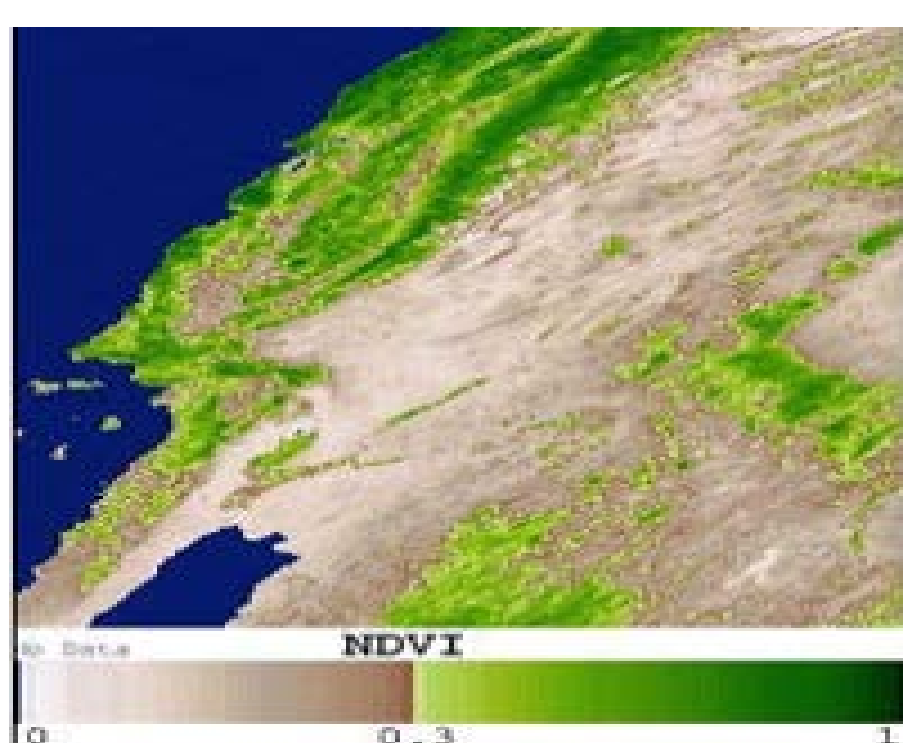
This study assessed phenology dynamics by analyzing the change trend using Terra MODIS satellite data (2002-2012), to understand the environmental and spatial variation in the entire Inner Mongolia grassland area.

Materials & methods

Study area

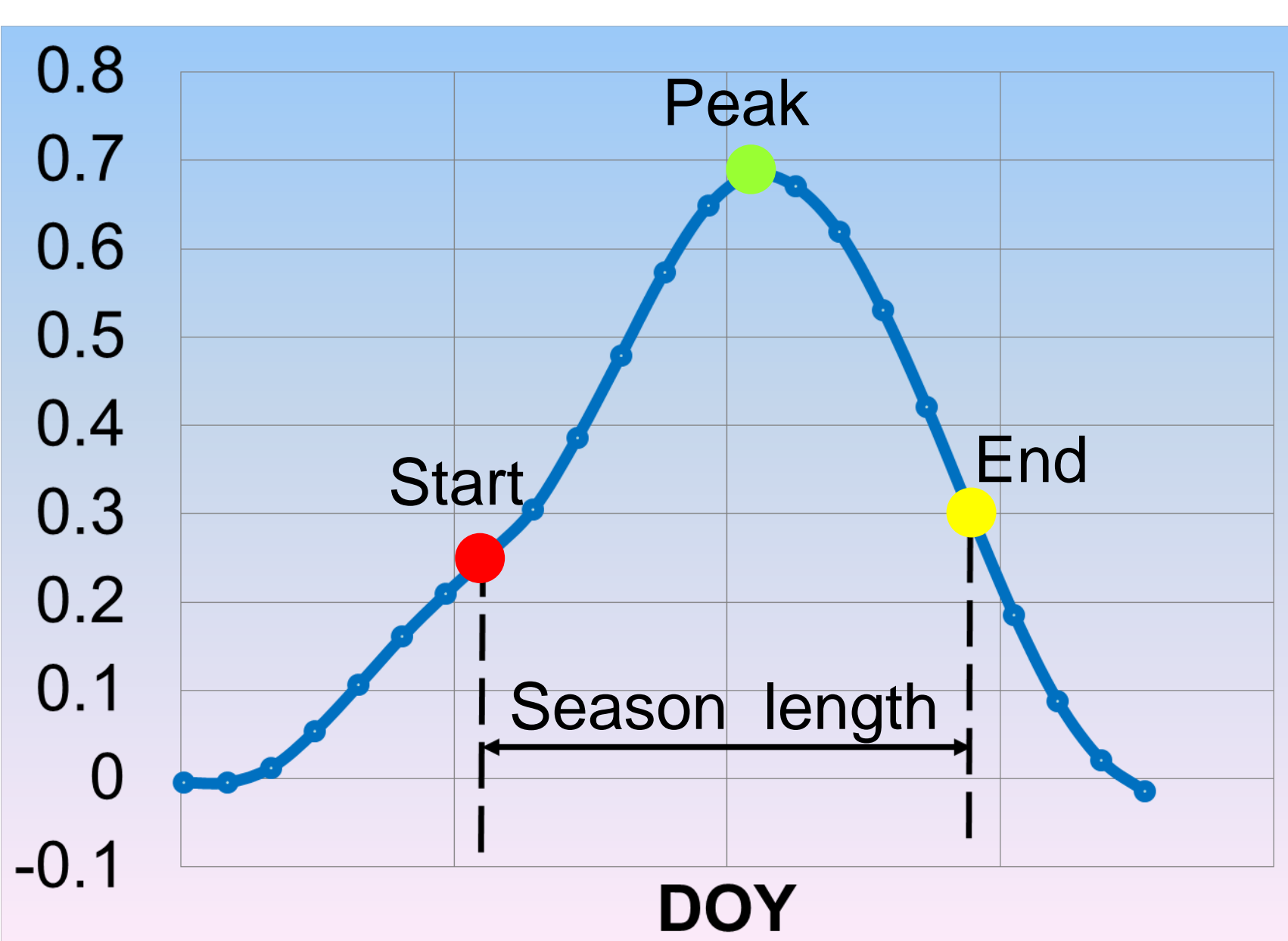


Terra MODIS NDVI data



Time-series MODIS-NDVI using MOD13Q1 product (Vegetation Indices 16-Day L3 Global 250m, Collection 5)

Smoothing and growing season detection



- Noise removal using Savitsky-Golay smoothing filter
- Threshold by NDVI = 20% of the amplitude

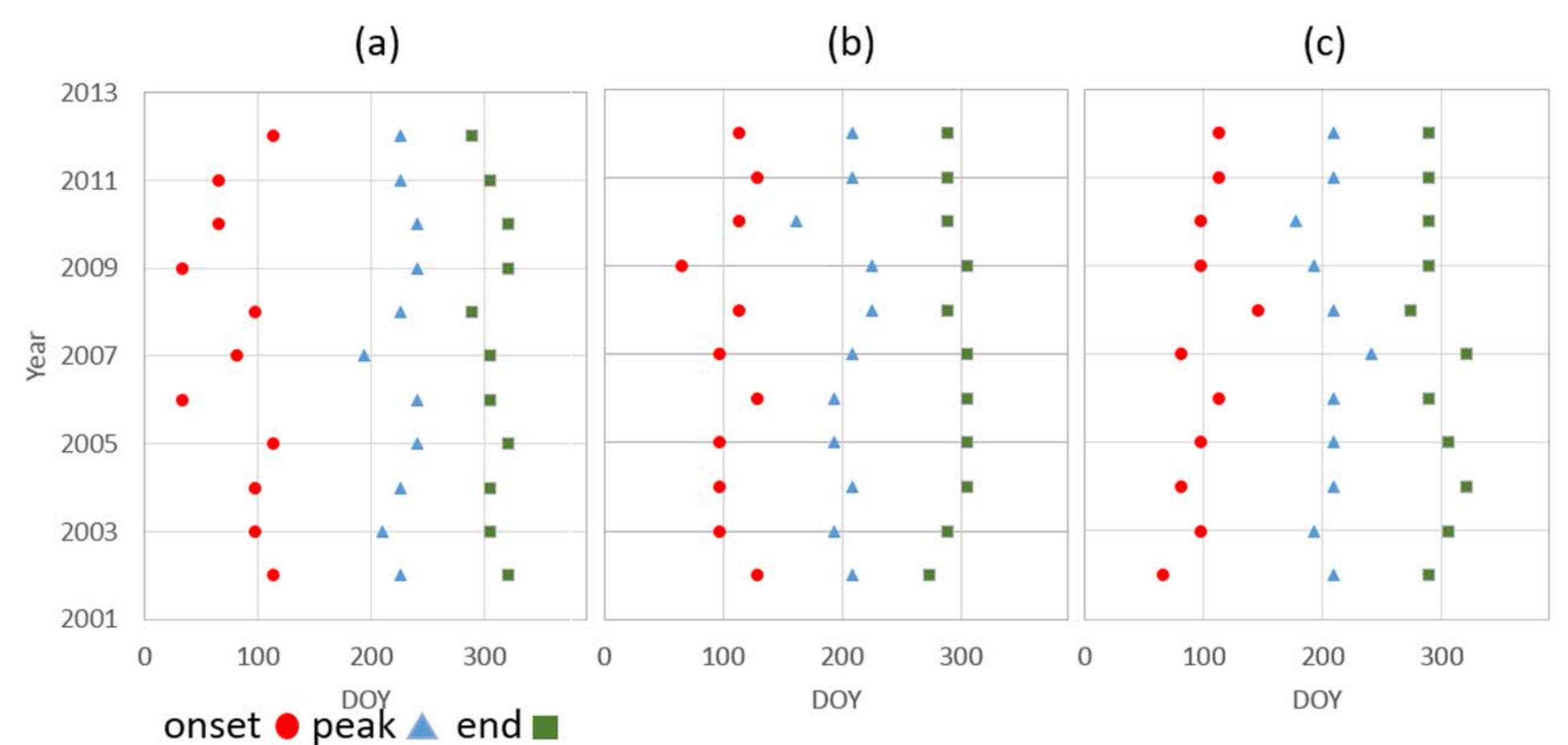
*NDVI curve in typical steppe sampling site (2011)

Results

Phenology dynamics in sampling sites

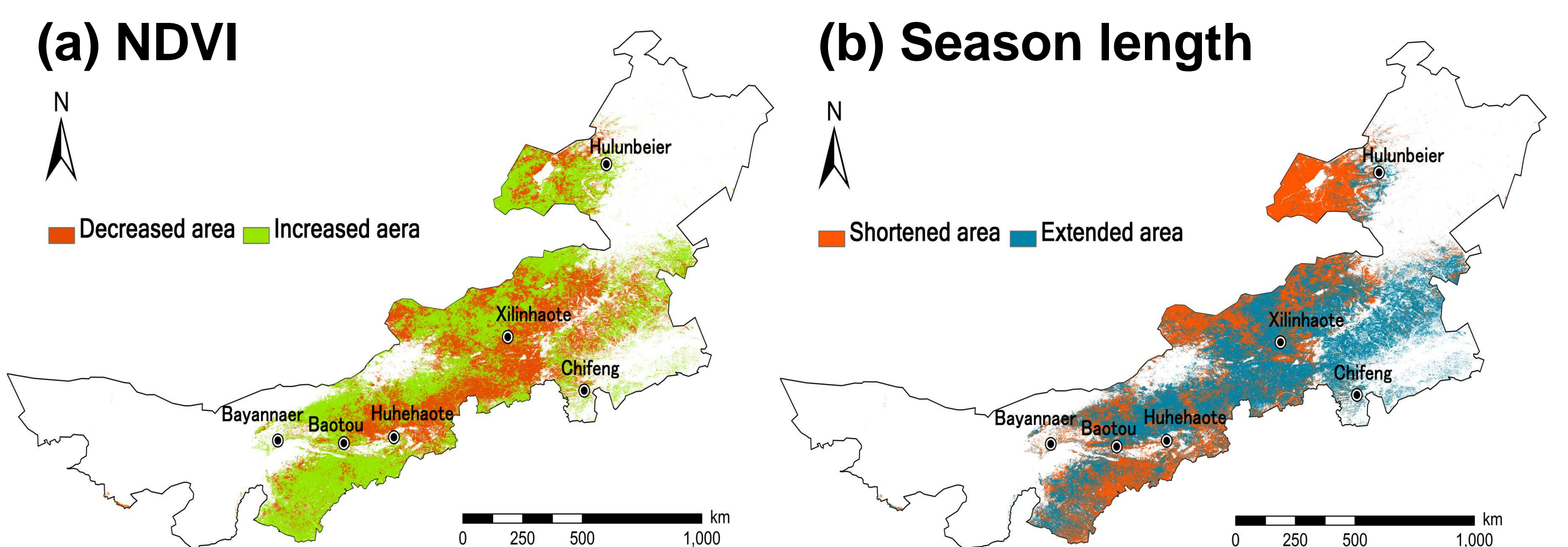
Mean ± SD of phenology date (Day of Year) of the growing season in three sampling sites

	Siziwangqi (desert)	Xilinhaote (typical)	Wulagai (meadow)
start	82.45 ± 29.89	107.18 ± 19.30	99.91 ± 21.25
Peak	226.45 ± 15.10	203.18 ± 17.92	206.09 ± 15.71
End	307.91 ± 12.01	294.82 ± 10.79	296.27 ± 14.95
Season length	225.45 ± 34.65	187.64 ± 26.86	196.36 ± 32.86



* Phenology change in 3 sample sites. (a), (b), (c) showed the crucial dates in Siziwangqi, Xilinhaote and Wulagai.

NDVI and growing season length dynamics



Discussion & conclusion

Our results generally corresponded to the recent research that earlier onset date and longer season length had happened in temperate China. Area with both higher NDVI and longer growing period mainly located in the west and north part, which principally covered by desert and meadow steppe.

However in some northeast (meadow steppe) and north (desert steppe) area, NDVI tended to decrease and growing period tended to be shortened. The situation in the middle part (typical-meadow mixed steppe) were more complicated.