Abstract View

Volume 11, Issue 18 (December 2007)

Earth Interactions
Article: pp. 1–30 | Full Text | PDF (902K)

Intraseasonal Interactions between Temperature and Vegetation over the Boreal Forests

Weile Wang and Bruce T. Anderson

Department of Geography and Environment, Boston University, Boston, Massachusetts

Dara Entekhabi

Ralph M. Parsons Laboratory, Department of Civil and Environmental Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts

Dong Huang, Yin Su, Robert K. Kaufmann, and Ranga B. Myneni

Department of Geography and Environment, Boston University, Boston, Massachusetts

(Manuscript received 22 September 2006, in final form 19 April 2007)

DOI: 10.1175/EI219.1

ABSTRACT

This paper uses statistical and analytical techniques to investigate intraseasonal interactions between temperature and vegetation [surrogated by the normalized difference vegetation index (NDVI)] over the boreal forests. Results indicate that interactions between the two fields may be approximated as a coupled second-order system, in which the variability of NDVI and temperature of the current month is significantly regulated by lagged NDVI anomalies from the preceding two months. In particular, the influence from the one-month lagged NDVI anomalies upon both temperature and vegetation variability is generally positive, but the influence from the second-month lagged NDVI anomalies is often negative. Such regulations lead to an intrinsic oscillatory variability of vegetation at growing-season time scales across the study domain. The regulation of temperature variability by NDVI anomalies is most significant over interior Asia (Siberia), suggesting strong vegetation–atmosphere couplings over these regions. Physical mechanisms for these statistical results are investigated further with a stochastic model. The model suggests that the oscillatory variability of the temperature–NDVI system may reflect the dynamic adjustments between the two fields as they maintain a thermal balance within the soil and lower boundary layer of the atmosphere; the particular role vegetation plays in this scenario is mainly to dissipate heat and therefore reduce surface temperatures.

KEYWORDS: Land–atmosphere interaction; Remote sensing; Modeling

top

Headquarters: 45 Beacon Street Boston, MA 02108-3693
DC Office: 1120 G Street, NW, Suite 800 Washington DC, 20005-3826
amsinfo@ametsoc.org Phone: 617-227-2425 Fax: 617-742-8718
Allen Press, Inc. assists in the online publication of *AMS* journals.