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COMPUTER MODEL REINFORCES OBSERVED 20-YEAR GREENING TREND IN NORTHERN FORESTS

Study also identifies unexpected "carbon sink" regions

Boston, MA — A new study of how vegetation growth is affected by worldwide changes in temperature, to be published in the May 31 issue of Science, finds that the northern regions of the earth have become more green over the past 20 years. As average temperatures have increased, spring is starting earlier and fall is staying later. Vegetation is increasing and advancing northward.

The study, co-authored by Boston University researcher Ranga Myneni with NASA Headquarters' Earth Science Enterprise funding, uses a computer model to predict fluctuations in green leaf coverage as temperature and other environmental factors change.

The computer model closely matches recent findings by Prof. Myneni and his Climate and Vegetation Research Group at BU that were based on satellite and other measurements. The model corroborates those earlier findings, particularly as it produced a similar decline in growth during a two-year period of cooler temperature caused by the Mount Pinatubo volcano eruption in 1991.

In an unanticipated discovery, the model identified the earth's boreal zone-northern forests around the world above 40 degrees latitude-as having acted as a "carbon sink" during the two cooler years. A carbon sink is a land area where more carbon is taken out of the atmosphere-as carbon dioxide (CO2)-than is put back in.

The Boston University group first determined that the earth's northern regions have been

greening in response to increasing temperature last year, using data from satellite observations and ground-based instruments. The finding helps scientists in their efforts to distinguish between natural and human-induced changes in the earth's ecosystem, particularly with respect to global warming.

Because the data for the finding was gathered by various satellites and instruments used at different times over a 20-year period, the new computer results greatly strengthen the authority of that earlier work.

The Pinatubo eruption acted as a kind of experiment by Mother Nature to test the compatibility of the researchers' work. For two years following Pinatubo the greening trend lessened. This reversal was found in the satellite and other data by Myneni's group last year, and the same effect was produced by the computer model in the new study.

The study's computer simulations were directed by Wolfgang Lucht of the Potsdam Institute for Climate Impact Research using the Lund-Potsdam-Jena Dynamic Global Vegetation Model. This is a "biogeochemical process" model that predicts several growth markers, including the growth of green leaves and the overall exchange of carbon in the ecosystem. The model is driven by monthly climate observations and the global mean increase in the amount of CO2 in the atmosphere. The climate factors include temperature, precipitation, duration of sunlight, and nine categories of soil texture.

Lucht is lead author of the study, titled "Climatic Control of the High-Latitude Vegetation Greening Trend and Pinatubo Effect." Along with Lucht and Myneni, the authors include: from Boston University, Wolfgang Buermann; Laboratoire des Sciences du Climat et de'l Environment, Philippe Bousquet and Pierre Friedlingstein; Lund University, Benjamin smith; Max Planck Institute for Biogeochemistry, Colin Prentice; and the Potsdam Institute for Climate Impact Research, Wolfgang Cramer and Stephen Sitch.

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