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Tuesday, 17 February 2009 16:48

Changes in tundra greenness linked to sea-ice retre

Written by Louise Huffman

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February 17, 2009 — FAIRBANKS, Alaska — The Greening of the Arctic (GOA) I contributing to documenting, mapping and understanding the rapid and dramat the circumpolar Arctic as a result of a changing climate.

These changes will likely affect the permafrost, active layer, carbon reserves, tr wildlife populations and the human habitability of Arctic ecosystems, says GOA of the Institute of Arctic Biology's Alaska Geobotany Center at the University of

Russia. Photo by D.A. Walker

North American Arctic Transect

The North American Arctic Transect (NAAT) was the first of the GOA projects wh along a 1800-km (1118-mile) transect in the western North American Arctic wh Alaska, and between Inuvik and Isachsen in Canada. The NAAT is the only vege subzones in the Arctic. A similar transect is being developed on the Yamal Penir of the GOA initiative.

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The Arctic landscape includes patterned-ground features including small regula
striking features that have puzzled several generations of Arctic scientists. Geo
these features extensively, but the role of the vegetation had not been consider

The NAAT team discovered how the vegetation affects the different types of pat
involved in patterned-ground formation including how the plant canopy affects
of thawing of the soil and frost heave.

One of the major findings of this project was that patterned ground controls ho
Lu Ping and Gary Michaelson, scientists at the University of Alaska Palmer Rese
layer of permafrost beneath patterned-ground features and found that physical
ground drive organic matter deep underground where it can be stored in the pe
Arctic soils through this process than had been previously estimated. Such esti
Arctic in global carbon budgets.

Patterned ground was mapped at 11 locations along the NAAT. Soils, permafros
leaf-area, spectral data and other ground survey information were collected as
These data are critical to understanding how climate will affect Arctic ecosyster

The NAAT/GOA is a legacy of the Biocomplexity of Patterned Ground Ecosystem
Environment Program at the National Science Foundation (NSF).

Field work: Proposed for 2009 includes Inuvik, NWT; Green Cabin, Banks Island
Ringnes Island and Nunuvut, Canada.

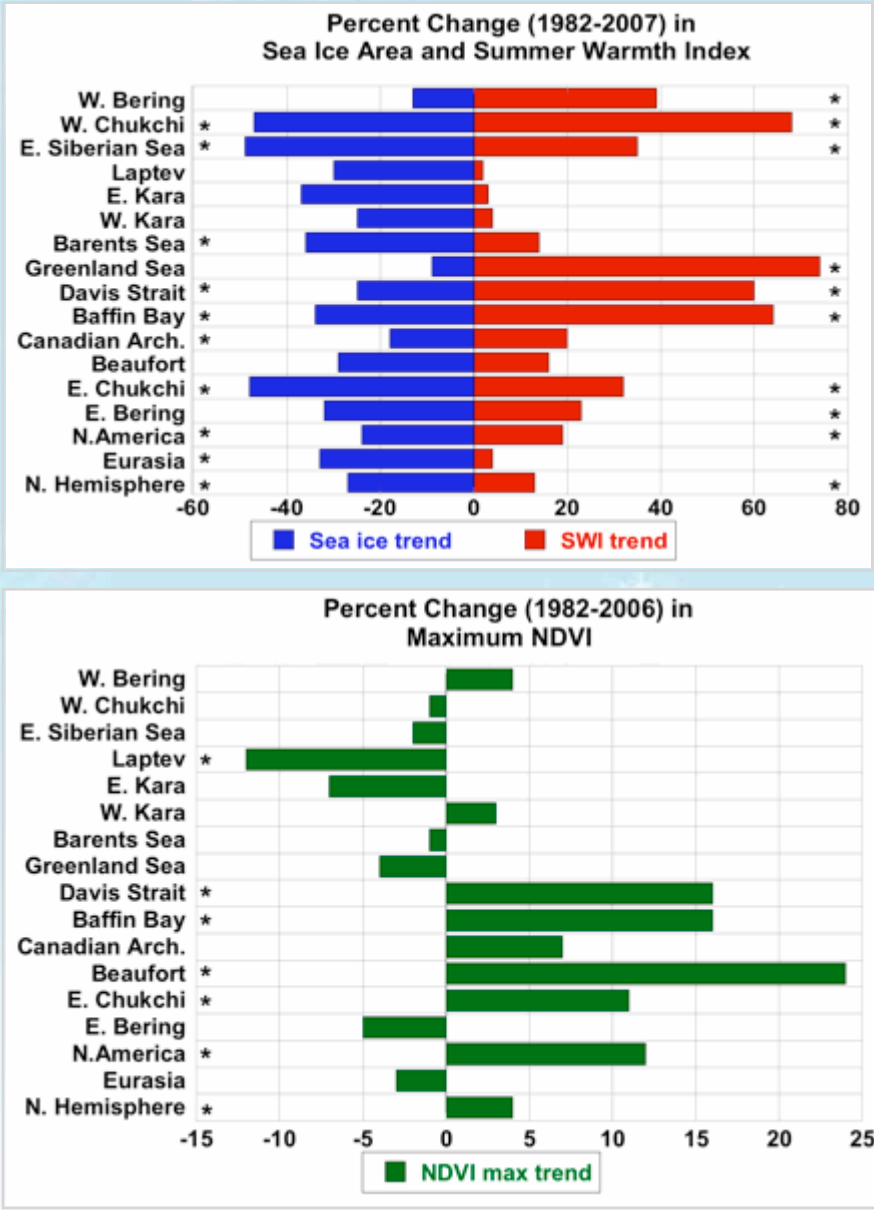
Project personnel

Dachi field site, Yamal Peninsula, Russia. Photo by D.A. Walker

Synthesis and Models to Examine Pan-Arctic Vegetation Change: Climat
This GOA project uses ground data from the NAAT to directly address the quest
responded to climate change to date and how it will respond in the future as pc
as indicated by our current understanding of trends in sea ice.

Climate analysis, remote sensing analysis and vegetation-change models are us
future changes in the land surfaces in the Arctic as measured from space. Gree
and intensity of visible and near-infrared light reflected by the land surface into
greenness algorithm called the normalized difference vegetation index (NDVI).

Atmospheric scientist Uma Bhatt, from the UAF Geophysical Institute, examine
NDVI data along the coastlines of 14 seas composing the Arctic Ocean and adja
Bhatt found that periods of lower sea-ice concentration are correlated with war
or NDVI values. The largest increase in NDVI was found along the Beaufort Sea
24% during the 25-year record. This trend is consistent with observations rega
evidence linking temperature increases to increases in vegetation (biomass).



*spring (when the long-term mean 50% concentration is reached) during 1982-
each of the major seas of the Arctic. Bottom: Percentage change in the summe
summer warmth index (SWI = sum of the monthly mean temperatures above
Bottom: Percentage change in greenness as measured by the maximum Norm
denote significant trends.*

Walker's team submitted a new proposal to NSF which builds on this project an
greenness and how it is related to sea-ice concentration and thickness, ocean a
snow cover and vegetation. The project will focus in the Beaufort Sea area, wh
and along the Eurasian coast where greenness appears to have decreased.

NSF provided funding for this project, which is a component of the NSF Synthes

Field work: None

Project personnel

The NASA Yamal Project
The Yamal project is examining the spatial and temporal patterns of vegetation
Russia and how those changes are in turn affecting traditional herding by the ir
uses remote-sensing technologies, ground-level sampling and interviews with t

The Yamal has undergone extensive anthropogenic disturbance and transforma
to gas and oil development and overgrazing by reindeer herds. "The vegetation
said. "Satellite-based data indicate a rapid greening is occurring in the Arctic, b
change there's virtually nothing out there."

"Surprisingly, there are no long-term repeated measures of biomass in the Arct
systematic way so that we can look at change over time," Walker said.

NASA's Land-Cover Land-Use Change program provides funding for this project
Science Partnership Initiative.

Field work: Yamal Peninsula: Belyy Ostrov (2009), Vaskiny Dachi (2010), Franz

Project personnel

Arctic Geobotanical Atlas
The Arctic Geobotanical Atlas (AGA) project is the education and outreach comp
plant-to-planet Arctic Geobotanical Atlas which uses tools such as Google Earth
managers, governments and the public to understand issues related to vegetat

Users can download and use GIS data from the Circumpolar Arctic Vegetation M
and the Yamal Peninsula vegetation transect in combination with other remote-

The AGA includes maps at eight different scales, from 1-m² plots to the entire A
Arctic Biology's Toolik Field Station and Imnavait Creek, Alaska, but also covers
Alaska and the circumpolar Arctic. Geobotanical themes include geology, topogr
vegetation. The maps and Web site were developed at the Alaska Geobotany Ce
UAF. Project personnel also maintain Web sites for the other GOA IPY initiative
University of the Arctic.

NSF provided funding for this project.

Field work: None
Project personnel. Donald A. Walker, PI., Edie Barbour, Hilmar Maier: Alaska Ge
Hass: Geographic Information Network of Alaska (GINA), Geophysical Institute,

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Marie Gilbert, information officer, Institute of Arctic Biology, University of Alaska

You can also download an updated version of the science that was presented at
document.

On February 25th 2009, the IPY Joint Committee will release a report on 'The S
major IPY research projects are releasing information for the press, and makin
range of projects will be profiled reflecting the diversity of IPY. For more inform
/detail/feb09_projects/ or contact Rhian Salmon (ipy.ras@gmail.com)

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