Seventh International Conference on Global Change: Connection to the Arctic (GCCA-7)

19-20 February, 2007
The Fairbanks Princess Riverside Lodge
Fairbanks, Alaska

Jointly Organized by:

International Arctic Research Center, Fairbanks Alaska
National Institute for Polar Research, Tokyo Japan
Japan Aerospace Exploration Agency, Tokyo Japan
International Organizing Committee for GCCA-7

Local Organizing Committee:

Larry Hinzman	University of Alaska Fairbanks, Chair
John Walsh	University of Alaska Fairbanks, Secretary
Craig Dorman	University of Alaska
F. Stuart Chapin	University of Alaska Fairbanks
Glenn Juday	University of Alaska Fairbanks
Terry Whitledge	University of Alaska Fairbanks
Vladimir Romanovsky	University of Alaska Fairbanks
Douglas Kane	University of Alaska Fairbanks

Committee of the University Consortium for GCCA

Syun-Ichi Akasofu	University of Alaska, Chair
Hiroshi Fukunishi	Tohoku University
Isao Murata	Tohoku University
Masami Fukuda	Hokkaido University
Hiroshi Tanaka	University of Tsukuba
Yutaka Matsumi	Nagoya University
Hiroshi Kanda	National Institute of Polar Research
Yojiro Matsuura	Forestry & Forest Products Research Institute
Minoru Kasahara	Hokkaido University
Shinichi Urano	Hokkaido University
Fumiaki Kimata	Nagoya University
Yasuhiro Murayama	National Institute of Information and Communications Technology
Noriyuki Tanaka	Hokkaido University
Yoshinobu Harazono	University of Alaska
John Walsh	University of Alaska
Vladimir Romanovsky	University of Alaska
F. Stuart Chapin	University of Alaska
Larry Hinzman	University of Alaska

Conference Venue

The Fairbanks Princess Riverside Lodge
4477 Pikes Landing Road
Fairbanks Alaska 99709

Secretariats

Larry Hinzman
International Arctic Research Center
University of Alaska

Masami Fukuda
Institute of Low Temperature Science
Hokkaido University

Hiroshi L. Tanaka
Center for Computational Sciences
University of Tsukuba

Preface

Seventh International Conference on Global Change: Connection to the Arctic (GCCA-7)

It is our great pleasure to hold the 7th International Conference on Global Change: Connection to the Arctic (GCCA-7) at the International Arctic Research Center (IARC), University of Alaska Fairbanks (UAF) during 19 to 20 February 2007. The GCCA conferences have been organized by the IARC/UAF and the Committee of the University Consortium for GCCA in order to study and predict the arctic climate change in the context of the recent global warming. The conference is aimed to summarize our understanding of the climate variability and climate change and the goal is extended to find the new directions and perspectives of polar climate investigation. To these purposes, climate experts in a wide variety of relevant disciplines have been invited to present papers and to hold panel and informal discussions.

IARC/UAF is a unique focal point of international climate change research in the Arctic, which was built in 1999 by the "Common Agenda" between the United States of America and Japan. During the phase of the establishment, two Wadati Conferences were held in 1995 and in 2001 to summarize the research progresses in global change connected to the Arctic. Professors John E. Walsh and Andrey Proshutinsky served as the first and second Wadati Chair Professors, respectively. The summarizing activity was succeeded by the GCCA, organizing the International University Consortium. The first GCCA conference (GCCA-1) was held at Tohoku University in Sendai in August 2000; GCCA-2 at Hokkaido University in Sapporo in January 2001, GCCA-3 at the IARC/UAF in November 2002, GCCA-4 at the Solar-Terrestrial Environment Laboratory of Nagoya University in November 2003, GCCA-5 at the University of Tsukuba in November 2004, GCCA-6 at Miraikan in Tokyo in December 2005, and GCCA-7 here in IARC/UAF.

A preparation for the next stage of the International Conference on Global Change connected to the Arctic and Subarctic is in progress with a strong support by the National Institute of Polar Research (NIPR) in Japan. As an organizer of the GCCA from the beginning, we sincerely appreciate the attendants to the GCCA-7, and hope the continuous participation to the International Conference on Global Change connected to the Arctic and Subarctic.

Sincerely,

Hiroshi L. Tanaka
Committee of the University Consortium for the GCCA
University of Tsukuba, Japan

Introduction

Seventh International Conference on Global Change: Connection to the Arctic (GCCA-7)

Climate change in the Arctic is real; the verification of a change is apparent throughout the Arctic and Subarctic in a wide variety of environmental components. Very rapidly our world's population and our political leaders are accepting that realization, and the evidence they most often cite is from the polar regions. Most of our scientists, our agency leaders and many of our policy makers have understood and acknowledged that premise for many years due in a large part to scientific meetings such as this series of conferences entitled Global Change: Connection to the Arctic. Through arduous field studies, intensive numerical analyses and integration and synthesis of a broad array of results, arctic researchers have proven the climate has indeed changed markedly over the last century. But many challenges remain. We must continue to synthesize our study results into a coherent understanding of the arctic system. The complex interplay of physical, chemical, biological and social processes interact to such a degree that it is not possible to understand future trajectories without developing more fully holistic perspectives of the complete system.

Arctic researchers must continue to work as collaborators and partners if we hope to reach our common goal of understanding the whole Arctic, the interactions with the more temperate regions and the external drivers. Although it is a bit overwhelming to consider attempting to develop a quantitative understanding of the whole Arctic system, we can work on distinct linkages and associated feedbacks, which will contribute to a broader understanding of the system as a whole. In a collaborative effort with arctic researchers around the world, we can achieve this level of understanding.

We are pleased to welcome researchers from Japan, Russia, Canada and across the United States to Alaska to participate in the Seventh International Conference Global Change: Connection to the Arctic (GCCA-7). GCCA conferences have previously been held in Sendai (2000), Sapporo (2001), Fairbanks (2002), Toyokawa (2003), Tsukuba (2004), and Tokyo (2005). This series of conferences have been organized by the member universities of the University Consortium for GCCA in Japan and the International Arctic Research Center at the University of Alaska Fairbanks in order to study Arctic climate change, global warming, and to improve our predictive capability for the future changes. The focus of this conference is (1) to synthesize a broad range of arctic research activities to enhance understanding of the linkages among system components (2) to integrate our understanding of the role of the Arctic in the global climate change in order to provide direction for Arctic research for the next decade and (3) to initiate joint research projects among arctic researchers to be conducted during the International Polar Year (IPY) to be held in 2007 to 2009. It is our hope through such cooperation and collaboration, we can achieve the level of understanding needed to be confident in our predictions of future environmental changes in arctic regions. Research results presented here in the Seventh International Conference on Global Change: Connection to the Arctic will help us advance towards that goal.

Larry Hinzman
Director
International Arctic Research Center
University of Alaska Fairbanks

Keynote Speaker

Atsumu Ohmura

President, International Glaciological Society
Director, World Radiation Monitoring Centre (WCRP, GCOS)
Institute for Atmospheric and Climate Science

Special aspects of mass balance of Arctic glaciers in the warming climate

Although the expected temperature rise in the polar regions in this century appears to become very large in terms of annual mean temperature, the change in summer temperature in the Arctic remains small. This is one of the most important and common results coming from most GCM experiments. This rather strange pattern of temperature change is due to the damping effect owing to the sea ice melt over the vast area in the Arctic. According to the transient experiment based on ECHAM5 and IPCC scenario A2, the mean temperature rise for the summer months June, July and August remains within 1 deg C even towards the end of the 21st century for most of the glacierized regions of the Arctic. This aspect puts the future of the Arctic glaciers and their effect to the sea-level rise into a very different situation in comparison with other mountain glaciers and ice caps in middle and lower latitudes.

Table of Contents

Posters

3. Oceanic Circulation and Sea Ice

Oral presentations

Posters

4. Middle Atmosphere and Space Weather/Geodynamics

Oral presentations

Poster

5. Hydrology and Permafrost

Oral presentations

Posters

6. Arctic System Model

Oral presentations

Posters

7. Ice Sheets, Glaciers and Paleoclimate

Oral presentations

8. Arctic Ecosystem and Fire Impacts

9. Remote Sensing of Environmental Change

Oral presentations

Posters