

Chapter 1: Introduction

Lead Author

Henry Huntington, Huntington Consulting, USA

Contributing Authors

Elizabeth Bush, Environment Canada, Canada

Terry V. Callaghan, Abisko Scientific Research Station, Sweden; Sheffield Centre for Arctic Ecology, UK

Vladimir M. Kattsov, Voeikov Main Geophysical Observatory, Russia

Mark Nuttall, University of Aberdeen, Scotland, UK; University of Alberta, Canada

Chapter 2: Arctic Climate – Past and Present

Lead Author

Gordon McBean, University of Western Ontario, Canada

Contributing Authors

Genrikh Alekseev, Arctic and Antarctic Research Institute, Russia

Deliang Chen, Göteborg University, Sweden

Eirik Førland, Norwegian Meteorological Institute, Norway

John Fyfe, Meteorological Service of Canada, Canada

Pavel Y. Groisman, NOAA National Climatic Data Center, USA

Roger King, The University of Western Ontario, Canada

Humfrey Melling, Fisheries and Oceans Canada, Canada

Russell Vose, NOAA National Climatic Data Center, USA

Paul H. Whitfield, Meteorological Service of Canada, Canada

Chapter 3: The Changing Arctic: Indigenous Perspectives

Lead Authors

Henry Huntington, Huntington Consulting, USA

Shari Fox, University of Colorado at Boulder, USA

Contributing Authors

Fikret Berkes, University of Manitoba, Canada

Igor Krupnik, Smithsonian Institution, USA

Case Study Authors

Kotzebue:

Alex Whiting, Native Village of Kotzebue, USA

The Aleutian and Pribilof Islands Region, Alaska:

Michael Zacharof, Aleutian International Association, USA

Greg McGlashan, St. George Tribal Ecosystem Office, USA

Michael Brubaker, Aleutian/Pribilof Islands Association, USA

Victoria Gofman, Aleut International Association, USA

The Yukon Territory:

Cindy Dickson, Arctic Athabaskan Council, Canada

Denendeh:

Chris Paci, Arctic Athabaskan Council, Canada

Shirley Tsetta, Yellowknives Dene (N'dilo), Canada

Sam Gargan, Deh Gah Got'ine (Fort Providence), Canada

Chief Roy Fabian, Katloodeeche (Hay River Dene Reserve), Canada

Chief Jerry Paulette, Smith Landing First Nation, Canada

Vice-Chief Micheal Cazon, Deh Cho First Nations, Canada
Diane Giroux, former Sub-Chief Deninu K-ue (Fort Resolution), Canada
Pete King, Elder Akaitcho Territory, Canada
Maurice Boucher, Deninu K-ue (Fort Resolution), Canada
Louie Able, Elder Akaitcho Territory, Canada
Jean Norin, Elder Akaitcho Territory, Canada
Agatha Laboucan, Lutsel'Ke, Canada
Philip Cheezie, Elder Akaitcho Territory, Canada
Joseph Poitras, Elder, Canada
Flora Abraham, Elder, Canada
Bella T'selie, Sahtu Dene Council, Canada
Jim Pierrot, Elder Sahtu, Canada
Paul Cotchilly, Elder Sahtu, Canada
George Lafferty, Tlicho Government, Canada
James Rabesca, Tlicho Government, Canada
Eddie Camille, Elder Tlicho, Canada
John Edwards, Gwich'in Tribal Council, Canada
John Carmicheal, Elder Gwich'in, Canada
Woody Elias, Elder Gwich'in, Canada
Alison de Palham, Deh Cho First Nations, Canada
Laura Pitkanen, Deh Cho First Nations, Canada
Leo Norwegian, Elder Deh Cho, Canada

Nunavut:

Shari Fox, University of Colorado at Boulder, USA

Qaanaaq, Greenland:

Uusaqqak Qujaukitsoq, Inuit Circumpolar Conference, Greenland

Nuka Møller, Inuit Circumpolar Conference, Greenland

Saami:

Tero Mustonen, Tampere Polytechnic / Snowchange Project, Finland

Mika Nieminen, Tampere Polytechnic / Snowchange Project, Finland

Hanna Eklund, Tampere Polytechnic / Snowchange Project, Finland

Climate Change and the Saami:

Elina Helander, University of Lapland, Finland

Kola:

Tero Mustonen, Tampere Polytechnic / Snowchange Project, Finland

Sergey Zavalko, Murmansk State Technical University, Russia

Jyrki Terva, Tampere Polytechnic / Snowchange Project, Finland

Alexey Cherenkov, Murmansk State Technical University, Russia

Consulting Authors

Anne Henshaw, Bowdoin College, USA

Terry Fenge, Inuit Circumpolar Conference, Canada

Scot Nickels, Inuit Tapiriit Kanatami, Canada

Simon Wilson, Arctic Monitoring and Assessment Programme, Norway

Chapter 4: Future Climate Change: Modeling and Scenarios for the Arctic Region

Lead Authors

Erland Källén, Stockholm University, Sweden

Vladimir M. Kattsov, Voeikov Main Geophysical Observatory, Russia

Contributing Authors

Howard Cattle, International CLIVAR Project Office, UK
Jens Christensen, Danish Meteorological Institute, Denmark
Helge Drange, Nansen Environmental and Remote Sensing Center and Bjerknes Centre for Climate Research, Norway
Inger Hanssen-Bauer, Norwegian Meteorological Institute, Norway
Tómas Jóhannesen, Icelandic Meteorological Office, Iceland
Igor Karol, Voeikov Main Geophysical Observatory, Russia
Jouni Räisänen, University of Helsinki, Finland
Gunilla Svensson, Stockholm University, Sweden
Stanislav Vavulin, Voeikov Main Geophysical Observatory, Russia

Consulting Authors

Deliang Chen, Gothenburg University, Sweden
Igor Polyakov, University of Alaska Fairbanks, USA
Annette Rinke, Alfred Wegener Institute for Polar and Marine Research, Germany

Chapter 5: Ozone and Ultraviolet Radiation

Lead Authors

Betsy Weatherhead, University of Colorado at Boulder, USA
Aapo Tanskanen, Finnish Meteorological Institute, Finland
Amy Stevermer, University of Colorado at Boulder, USA

Contributing Authors

Signe Bech Andersen, Danish Meteorological Institute, Denmark
Antti Arola, Finnish Meteorological Institute, Finland
John Austin, University Corporation for Atmospheric Research/Geophysical Fluid Dynamics Laboratory, USA
Germar Bernhard, Biospherical Instruments Inc., USA
Howard Browman, Institute of Marine Research, Norway
Vitali Fioletov, Meteorological Service of Canada, Canada
Volker Grewe, DLR-Institut für Physik der Atmosphäre, Germany
Jay Herman, NASA Goddard Space Flight Center, USA
Weine Josefsson, Swedish Meteorological and Hydrological Institute, Sweden
Arve Kylling, Norwegian Institute for Air Research, Norway
Esko Kyro, Finnish Meteorological Institute, Finland
Anders Lindfors, Finnish Meteorological Institute, Finland
Drew Shindell, NASA Goddard Institute for Space Studies, USA
Petteri Taalas, Finnish Meteorological Institute, Finland
David Tarasick, Meteorological Service of Canada, Canada

Consulting Authors

Valery Dorokhov, Central Aerological Observatory, Russia
Bjorn Johnsen, Norwegian Radiation Protection Authority, Norway
Jussi Kaurola, Finnish Meteorological Institute, Finland
Rigel Kivi, Finnish Meteorological Institute, Finland
Nikolay Krotkov, NASA Goddard Space Flight Center, USA
Kaisa Lakkala, Finnish Meteorological Institute, Finland
Jacqueline Lenoble, Université des Sciences et Technologies de Lille, France
David Sliney, U.S. Army Center for Health Promotion and Preventive Medicine, USA

Chapter 6: Cryospheric and Hydrologic Variability

Lead Author

John E. Walsh, University of Alaska Fairbanks, USA

Contributing Authors

Oleg Anisimov, State Hydrological Institute, Russia

Jon Ove M. Hagen, University of Oslo, Norway

Thor Jakobsson, Icelandic Meteorological Office, Iceland

Johannes Oerlemans, University of Utrecht, Netherlands

Terry Prowse, University of Victoria, Canada

Vladimir Romanovsky, University of Alaska Fairbanks, USA

Nina Savelieva, Pacific Oceanological Institute, Russia

Mark Serreze, University of Colorado at Boulder, USA

Alex Shiklomanov, University of New Hampshire, USA

Igor Shiklomanov, State Hydrological Institute, Russia

Steven Solomon, Geological Survey of Canada, Canada

Consulting Authors

Anthony Arendt, University of Alaska Fairbanks, USA

Michael N. Demuth, Natural Resources Canada, Canada

Julian Dowdeswell, Scott Polar Research Institute, UK

Mark Dyurgerov, University of Colorado at Boulder, USA

Andrey Glazovsky, Institute of Geography, RAS, Russia

Roy M. Koerner, Geological Survey of Canada, Canada

Niels Reeh, Technical University of Denmark, Denmark

Oddur Siggurdsson, National Energy Authority, Hydrological Service, Iceland

Konrad Steffen, University of Colorado at Boulder, USA

Martin Truffer, University of Alaska Fairbanks, USA

Chapter 7: Arctic Tundra and Polar Desert Ecosystems

Lead Author

Terry V. Callaghan, Abisko Scientific Research Station, Sweden; Sheffield Centre for Arctic Ecology, UK

Contributing Authors

Lars Olof Björn, Lund University, Sweden

F. Stuart Chapin III, University of Alaska Fairbanks, USA

Yuri Chernov, A.N. Severtsov Institute of Evolutionary Morphology and Animal Ecology, RAS, Russia

Torben R. Christensen, Lund University, Sweden

Brian Huntley, University of Durham, UK

Rolf Ims, University of Tromsø, Norway

Margareta Johansson, Abisko Scientific Research Station, Sweden

Dyanna Jolly Riedlinger, Dyanna Jolly Consulting, New Zealand

Sven Jonasson, University of Copenhagen, Denmark

Nadya Matveyeva, Komarov Botanical Institute, RAS, Russia

Walter Oechel, San Diego State University, USA

Nicolai Panikov, Stevens Technical University, USA

Gus Shaver, Marine Biological Laboratory, USA

Consulting Authors

Josef Elster, University of South Bohemia, Czech Republic
Heikki Henttonen, Finnish Forest Research Institute, Finland
Ingibjörg S. Jónsdóttir, University of Svalbard, Norway
Kari Laine, University of Oulu, Finland
Sibyll Schaphoff, Potsdam Institute for Climate Impact Research, Germany
Stephen Sitch, Potsdam Institute for Climate Impact Research, Germany
Erja Taulavuori, University of Oulu, Finland
Kari Taulavuori, University of Oulu, Finland
Christoph Zöckler, UNEP World Conservation Monitoring Centre, UK

Chapter 8: Freshwater Ecosystems and Fisheries

Lead Authors

Fred J. Wrona, National Water Research Institute, Canada
Terry D. Prowse, National Water Research Institute, Canada
James D. Reist, Fisheries and Oceans Canada, Canada

Contributing Authors

Richard Beamish, Fisheries and Oceans Canada, Canada
John J. Gibson, National Water Research Institute, Canada
John Hobbie, Marine Biological Laboratory, USA
Erik Jeppesen, National Environmental Research Institute, Denmark
Jackie King, Fisheries and Oceans Canada, Canada
Guenter Koeck, University of Innsbruck, Austria
Atte Korhola, University of Helsinki, Finland
Lucie Lévesque, National Water Research Institute, Canada
Rob Macdonald, Fisheries and Oceans Canada, Canada
Michael Power, University of Waterloo, Canada
Vladimir Skvortsov, Institute of Limnology, Russia
Warwick Vincent, Laval University, Canada

Consulting Authors

Robert Clark, Canadian Wildlife Service, Canada
Brian Dempson, Fisheries and Oceans Canada, Canada
David Lean, University of Ottawa, Canada
Hannu Lehtonen, University of Helsinki, Finland
Sofia Perin, University of Ottawa, Canada
Richard Pienitz, Laval University, Canada
Milla Rautio, Laval University, Canada
John Smol, Queen's University, Canada
Ross Tallman, Fisheries and Oceans Canada, Canada
Alexander Zhulidov, Centre for Preparation and Implementation of International Projects on Technical Assistance, Russia

Chapter 9: Marine Systems

Lead Author

Harald Loeng, Institute of Marine Research, Norway

Contributing Authors

Keith Brander, International Council for the Exploration of the Sea, Denmark

Eddy Carmack, Institute of Ocean Sciences, Canada
Stanislav Denisenko, Zoological Institute, RAS, Russia
Ken Drinkwater, Bedford Institute of Oceanography, Canada
Bogi Hansen, The Fisheries Laboratory, Faroe Islands
Kit Kovacs, Norwegian Polar Institute, Norway
Pat Livingston, NOAA National Marine Fisheries Service, USA
Fiona McLaughlin, Institute of Ocean Sciences, Canada
Egil Sakshaug, Norwegian University of Science and Technology, Norway

Consulting Authors

Richard Bellerby, Bjercknes Centre for Climate Research, Norway
Howard Browman, Institute of Marine Research, Norway
Tore Furevik, University of Bergen, Norway
Jacqueline M. Grebmeier, University of Tennessee, USA
Eystein Jansen, Bjercknes Centre for Climate Research, Norway
Steingrímur Jónsson, Marine Research Institute, Iceland
Lis Lindal Jørgensen, Institute of Marine Research, Norway
Svend-Aage Malmberg, Marine Research Institute, Iceland
Svein Østerhus, Bjercknes Centre for Climate Research, Norway
Geir Ottersen, Institute of Marine Research, Norway
Koji Shimada, Japan Marine Science and Technology Center, Japan

Chapter 10: Principles of Conserving the Arctic's Biodiversity

Lead Author

Michael B. Usher, University of Stirling, Scotland, UK

Contributing Authors

Terry V. Callaghan, Abisko Scientific Research Station, Sweden; Sheffield Centre for Arctic Ecology, UK
Grant Gilchrist, Canadian Wildlife Service, Canada
O.W. Heal, Durham University, UK
Glenn P. Juday, University of Alaska Fairbanks, USA
Harald Loeng, Institute of Marine Research, Norway
Magdalena A. K. Muir, Conservation of Arctic Flora and Fauna, Iceland
Pål Prestrud, Centre for Climate Research in Oslo, Norway

Chapter 11: Management and Conservation of Wildlife in a Changing Arctic Environment

Lead Author

David R. Klein, University of Alaska Fairbanks, USA

Contributing Authors

Leonid M. Baskin, Institute of Ecology and Evolution, Russia
Lyudmila S. Bogoslovskaya, Russian Institute of Cultural and Natural Heritage, Russia
Kjell Danell, Swedish University of Agricultural Sciences, Sweden
Anne Gunn, Government of the Northwest Territory, Canada
David B. Irons, U.S. Fish and Wildlife Service, USA
Gary P. Kofinas, University of Alaska Fairbanks, USA
Kit M. Kovacs, Norwegian Polar Institute, Norway
Margarita Magomedova, Institute of Plant and Animal Ecology, Russia
Rosa H. Meehan, U.S. Fish and Wildlife Service, USA

Don E. Russell, Canadian Wildlife Service, Canada
Patrick Valkenburg, Alaska Department of Fish and Game, USA

Chapter 12: Hunting, Herding, Fishing and Gathering: Indigenous Peoples and Renewable Resource Use in the Arctic

Lead Author

Mark Nuttall, University of Aberdeen, Scotland, UK; University of Alberta, Canada

Contributing Authors

Fikret Berkes, University of Manitoba, Canada
Bruce Forbes, University of Lapland, Finland
Gary Kofinas, University of Alaska Fairbanks, USA
Tatiana Vlassova, Russian Association of Indigenous Peoples of the North (RAIPON), Russia
George Wenzel, McGill University, Canada

Chapter 13: Fisheries and Aquaculture

Lead Authors

Hjalmar Vilhjalmsón, Marine Research Institute, Iceland
Alf Håkon Hoel, University of Tromsø, Norway

Contributing Authors

Sveinn Agnarsson, University of Iceland, Iceland
Ragnar Arnason, University of Iceland, Iceland
James E. Carscadden, Fisheries and Oceans Canada, Canada
Arne Eide, University of Tromsø, Norway
David Fluharty, University of Washington, USA
Geir Hønneland, Fridtjof Nansen Institute, Norway
Carsten Hvingel, Greenland Institute of Natural Science, Greenland
Jakob Jakobsson, Marine Research Institute, Iceland
George Lilly, Fisheries and Oceans Canada, Canada
Odd Nakken, Institute of Marine Research, Norway
Vladimir Radchenko, Sakhalin Research Institute of Fisheries and Oceanography, Russia
Susanne Ramstad, Norwegian Polar Institute, Norway
William Schrank, Memorial University of Newfoundland, Canada
Niels Vestergaard, University of Southern Denmark, Denmark
Thomas Wilderbuer, NOAA National Marine Fisheries Service, USA

Chapter 14: Forests, Land Management and Agriculture

Lead Author

Glenn P. Juday, University of Alaska Fairbanks, USA

Contributing Authors

Valerie Barber, University of Alaska Fairbanks, USA
Hans Linderholm, Göteborg University, Sweden
Scott Rupp, University of Alaska Fairbanks, USA
Steve Sparrow, University of Alaska Fairbanks, USA
Eugene Vaganov, V.N. Sukachev Institute of Forest Research, RAS, Russia
John Yarie, University of Alaska Fairbanks, USA

Consulting Authors

Edward Berg, U.S. Fish and Wildlife Service, USA
Rosanne D'Arrigo, Lamont Doherty Earth Observatory, USA
Paul Duffy, University of Alaska Fairbanks, USA
Olafur Eggertsson, Icelandic Forest Research, Iceland
V.V. Furyaev, V.N. Sukachev Institute of Forest Research, RAS, Russia
Edward H. (Ted) Hogg, Canadian Forest Service, Canada
Satu Huttunen, University of Oulu, Finland
Gordon Jacoby, Lamont Doherty Earth Observatory, USA
V. Ya. Kaplunov, V.N. Sukachev Institute of Forest Research, RAS, Russia
Seppo Kellomaki, University of Joensuu, Finland
A.V. Kirilyanov, V.N. Sukachev Institute of Forest Research, RAS, Russia
Carol E. Lewis, University of Alaska Fairbanks, USA
Sune Linder, Swedish University of Agricultural Sciences, Sweden
M.M. Naurzbaev, V.N. Sukachev Institute of Forest Research, RAS, USA
F.I. Pleshikov, V.N. Sukachev Institute of Forest Research, RAS, Russia
Ulf T. Runesson, Lakehead University, Canada
Yu.V. Savva, V.N. Sukachev Institute of Forest Research, RAS, Russia
O.V. Sidorova, V.N. Sukachev Institute of Forest Research, RAS, Russia
V.D. Stakanov, V.N. Sukachev Institute of Forest Research, RAS, Russia
N.M. Tchebakova, V.N. Sukachev Institute of Forest Research, RAS, Russia
E.N. Valendik, V.N. Sukachev Institute of Forest Research, RAS, Russia
E.F. Vedrova, V.N. Sukachev Institute of Forest Research, RAS, Russia
Martin Wilmking, Lamont Doherty Earth Observatory, USA

Chapter 15: Human Health

Lead Authors

Jim Berner, Alaska Native Tribal Health Consortium, USA
Christopher Furgal, Laval University, Canada

Contributing Authors:

Peter Bjerregaard, National Institute of Public Health, Denmark
Mike Bradley, Alaska Native Tribal Health Consortium, USA
Tine Curtis, National Institute of Public Health, Denmark
Ed De Fabo, The George Washington University, USA
Juhani Hassi, University of Oulu, Finland
William Keatinge, Queen Mary and Westfield College, UK
Siv Kvernmo, University of Tromsø, Norway
Simo Nayha, University of Oulu, Finland
Hannu Rintamaki, Finnish Institute of Occupational Health, Finland
John Warren, Alaska Native Tribal Health Consortium, USA

Chapter 16: Infrastructure: Buildings, Support Systems, and Industrial Facilities

Lead Author

Arne Instanes, Instanes Consulting Engineers, Norway

Contributing Authors

Oleg Anisimov, State Hydrological Institute, Russia
Lawson Brigham, U.S. Arctic Research Commission, USA
Douglas Goering, University of Alaska Fairbanks, USA
Branko Ladanyi, École Polytechnique de Montreal, Canada

Jan Otto Larsen, Norwegian University of Science and Technology, Norway
Lev N. Khurstalev, Moscow State University, Russia

Consulting Authors

Orson Smith, University of Alaska Anchorage, USA
Amy Stevermer, University of Colorado at Boulder, USA
Betsy Weatherhead, University of Colorado at Boulder, USA
Gunter Weller, University of Alaska Fairbanks, USA

Chapter 17: Climate Change in the Context of Multiple Stressors and Resilience

Lead Authors

James J. McCarthy, Harvard University, USA
Marybeth Long Martello, Harvard University, USA

Contributing Authors

Robert Corell, American Meteorological Society and Harvard University, USA
Noelle Eckley, Harvard University, USA
Shari Fox, University of Colorado at Boulder, USA
Grete Hovelsrud-Broda, Centre for International Climate and Environmental Research, Norway
Svein Mathiesen, The Norwegian School of Veterinary Science and Nordic Sámi Institute, Norway
Colin Polsky, Clark University, USA
Henrik Selin, Boston University, USA
Nicholas Tyler, University of Tromsø, Norway

Consulting Authors

Kirsti Strøm Bull, University of Oslo and Nordic Sámi Institute, Norway
Inger Maria Gaup Eira, Nordic Sámi Institute, Norway
Nils Isak Eira, Fossbakken, Norway
Siri Eriksen, Centre for International Climate and Environmental Research, Norway
Inger Hanssen-Bauer, Norwegian Meteorological Institute, Norway
Johan Klemet Kalstad, Nordic Sámi Institute, Norway
Christian Nellemann, Norwegian Nature Research Institute, Norway
Nils Oskal, Sámi University College, Norway
Erik S. Reinert, Hvasser, Tønsberg, Norway
Douglas Siegel-Causey, Harvard University, USA
Paal Vegar Storeheier, University of Tromsø, Norway
Johan Mathis Turi, Association of World Reindeer Herders, Norway

Chapter 18: Summary and Synthesis

Lead Author

Gunter Weller, University of Alaska Fairbanks, USA

Contributing Authors

Elizabeth Bush, Environment Canada, Canada
Terry V. Callaghan, Abisko Scientific Research Station, Sweden; Sheffield Centre for Arctic Ecology, UK
Robert Corell, American Meteorological Society and Harvard University, USA
Shari Fox, University of Colorado at Boulder, USA
Christopher Furgal, Laval University, Canada

Alf Håkon Hoel, University of Tromsø, Norway
Henry Huntington, Huntington Consulting, USA
Erland Källén, Stockholm University, Sweden
Vladimir M. Kattsov, Voeikov Main Geophysical Observatory, Russia
David R. Klein, University of Alaska Fairbanks, USA
Harald Loeng, Institute of Marine Research, Norway
Marybeth Long Martello, Harvard University, USA
Michael MacCracken, Climate Institute, USA
Mark Nuttall, University of Aberdeen, Scotland, UK; University of Alberta, Canada
Terry D. Prowse, University of Victoria, Canada
Lars-Otto Reiersen, Arctic Monitoring and Assessment Programme, Norway
James D. Reist, Fisheries and Oceans Canada, Canada
Aapo Tanskanen, Finnish Meteorological Institute, Finland
John E. Walsh, University of Alaska Fairbanks, USA
Betsy Weatherhead, University of Colorado at Boulder, USA
Fred J. Wrona, National Hydrology Research Institute, Canada