

# Preface

The Siberian environment is a unique region of the world that is both very strongly affected by global climate change and at the same time particularly vulnerable to its consequences. The news about the melting of sea ice in the Arctic Ocean and the prospect of an ice-free shipping passage from Scandinavia to Alaska along the Russian north coast has sparked an international debate about natural resource exploitation, national boundaries and the impacts of the rapid changes on people, animals and plants. Over the last decades Siberia has also witnessed severe forest fires to an extent that is hard to imagine in other parts of the world where the population density is higher, the fire-prone ecosystems cover much smaller areas and the systems of fire control are better resourced. The acceleration of the fire regime poses the question of the future of the boreal forest in the taiga region. Vegetation models have already predicted a shift of vegetation zones to the north under scenarios of global climate change. The implications of a large-scale expansion of the grassland steppe ecosystems in the south of Siberia and a retreat of the taiga forest into the tundra systems that expand towards the Arctic Ocean would be very significant for the local population and the economy.

I have studied Russian forests from remote sensing and modelling for about 11 years now and still find it a fascinating subject to investigate. Over this time period Russia has undergone substantial social, political and economic changes and developed excellent remote sensing centres that now enjoy a world wide reputation. From 1998 to 2000 the European funded project SIBERIA, in which I started my post-doctoral research career and which was led by Professor Chris Schmullius from Jena, produced the first Synthetic Aperture Radar (SAR) map of forest growing stock over an area of 1 million square kilometers. At the time, the German Aerospace Agency (DLR) had to move a mobile receiving station to Lake Baikal to be able to record the first SAR images of the region. The forest map used over 600 images from three radar sensors, and led to the insight that the remaining forest cover in Siberia is much less than previous global change studies assumed. In the follow-on project SIBERIA-II we examined a much wider concept of using a whole range of biophysical data products from a multitude of satellites in a full greenhouse gas account over a region of 3 million square kilometers. This study was the first such attempt to incorporate many variables that would now be called Essential Climate Variables by the Global Climate Observing System (GCOS) into a real greenhouse gas account.

When I took up the Chair in Physical Geography at the University of Leicester in 2006 I invited a number of eminent researchers with interests in environmental change in Siberia to visit Leicester for a Symposium on Environmental Change in Siberia. We enjoyed 2 days packed with exciting presentations and full of inspiring conversations over coffee, tea and dinner. This book is primarily the outcome of this Symposium with a few additions from authors who I invited to contribute. I am particularly grateful to the University of Leicester for its financial support for the Symposium and to all participants for their contributions to this book. I also want to thank Alex Szumski who was a crucial helper in getting the book manuscript to the printing stage.

The structure of this book covers environmental change processes in the biosphere, hydrosphere and atmosphere and concludes with two contributions on environmental information systems that are being developed to safeguard data that are vital to further advance our understanding of Siberian ecosystems.

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