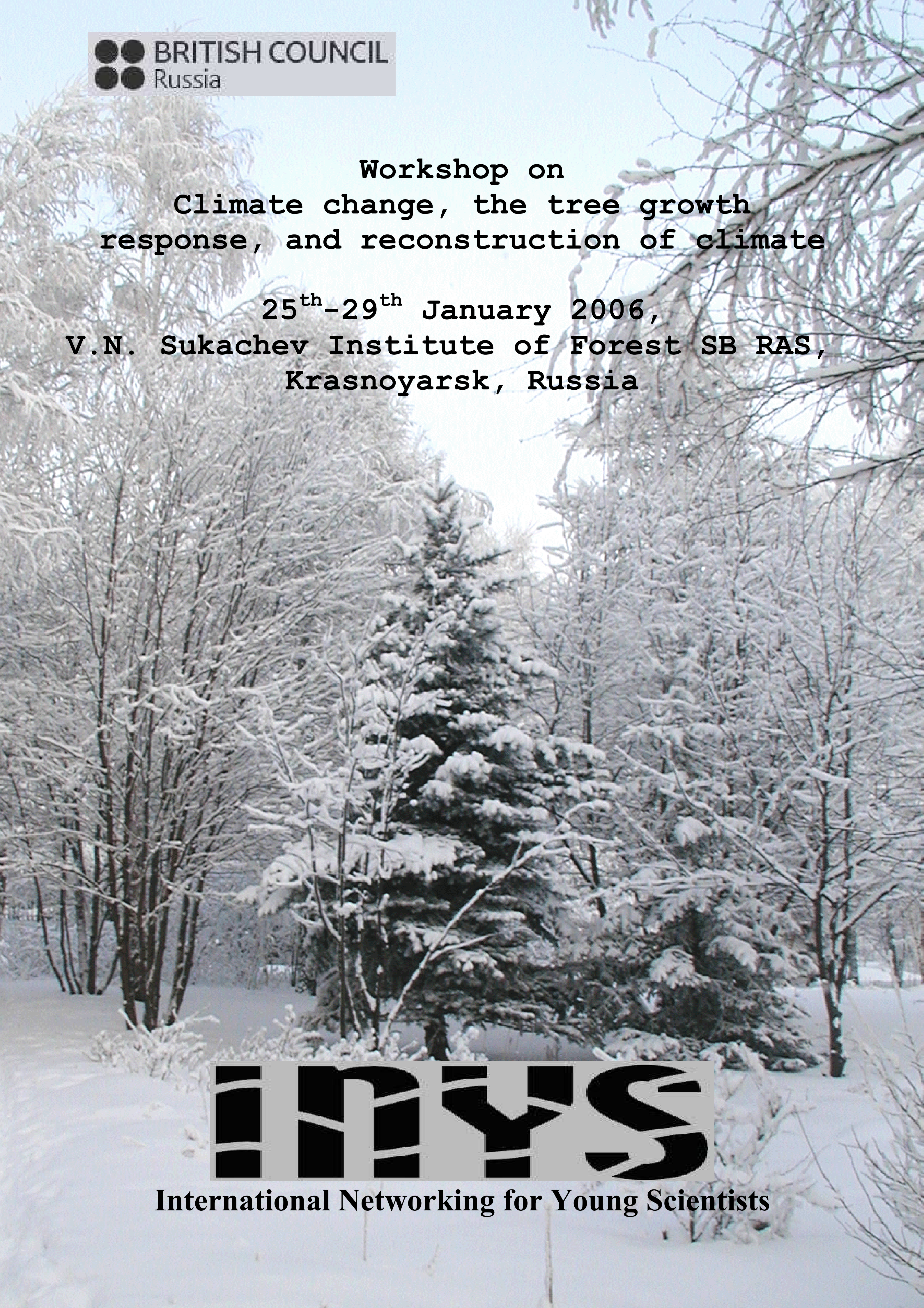
BRITISH COUNCIL
Russia

Workshop on Climate change, the tree growth response, and reconstruction of climate

25th-29th January 2006,
V.N. Sukachev Institute of Forest SB RAS,
Krasnoyarsk, Russia



INYS
International Networking for Young Scientists

TABLE OF CONTENTS

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Foreword

The British Council with the Climatic Research Unit (University of East Anglia, Norwich, UK) and the Sukachev Institute of Forest (Krasnoyarsk, Russia) is organizing a workshop for young scientists in Siberia, to share experience and expertise in the fields of Climate Change and Dendroclimatology (study of the control of climate on tree growth). Well-known speakers from the UK, USA and Russia will give talks and lead workshop discussions focused on current scientific methods.

It is becoming increasingly important in the climate change debate to identify how much climate varied before the effects of human activities became widespread, i.e. there is a need to reconstruct past climate. The change from summer to winter causes trees to produce annual rings which provide records of past tree growth and indirect evidence of past climate conditions. Living tree records can be overlapped with those from dead trees to build long sequences (chronologies) that extend over millennia. Many climate reconstructions incorporate tree ring data and differences in reconstructions are partly dependent on the choice of methods used to produce climate estimates. Recent reconstructions imply larger amplitude of past change (with an implied greater climate sensitivity to natural forcings) than was portrayed in the Third Assessment Report of the IPCC.

The topics to be addressed within this workshop are relevant to the question of which methods provide realistic estimates of past, and by inference, future climate change scenarios. The workshop will focus on:

- chronology construction methods and the preservation of long-timescale signals.
- tree-growth modeling techniques and their value in climate reconstruction
- statistical methods for identifying optimal climate forcing on tree growth
- synthesis of the evidence for climate change as derived from different tree ring parameters (e.g. ring-width, density and isotopic composition).

Expert speakers will give lectures on important research and the invited young scientists will give short presentations about their work, followed by general round-table discussion of the issues raised. Extended discussions among experts and participants will continue over the duration of the workshop and the potential to initiate further international co-operation will be explored.

Invited speakers and organizing committee:
Prof. Keith Briffa (UK); Prof. Eugene Vaganov (Russia); Prof. Malcolm Hughes (USA); Dr. Tom Melvin (UK); Prof. Olga Solomina (Russia); Prof. Sergei Semenov (Russia); Prof. Kirill Levi (Russia); Prof. Valerii Mazepa (Russia); Mr. Kevin Anchukaitis (USA); Dr. Vladimir Shishov (Russia), Dr. Alexander Shashkin (Russia), Dr. Mukhtar Naurzbaev (Russia).

Acknowledgments
We wish to thank the British Council, Russia for their provision of funding and their assistance in the logistics required in the arrangement of this workshop.

We also wish to thank PAGES for their provision of funding for visiting experts.

Programme of work

Wednesday 25, January	
07:00 - 12:00	**Arrival**
13:00 – 14:00	**Lunch**
16:00 – 20:00	**Café scientific** on the topic “*CO2 increases*” Location: Restaurant “Irish Pub” Speakers: *Prof. Keith Briffa* and *Dr. Tom Melvin*“ **Open discussion**

Thursday 26, January	Institute of Forest, Russian Academy of Sciences, Siberian Branch (Krasnoyarsk)
9:00 – 9:30	**Registration**
9:30 - 10:15	**Opening session**: *Irina Titarenko*, British Council Russia – “Works and Perspective in Siberia” *Prof. Eugene Vaganov* – Welcome to the Sukachev Institute of Forest *Dr. Vladimir Shishov* – The programme
10:15 – 11:00	**Keynote Lecture I**: *Prof. Keith Briffa (Norwich, UK)* “Instrumental and Proxy evidence of global warming - Is the 'Hockey Stick' bent?”
11:00 – 11:45	**Keynote Lecture II**: *Prof. Malcolm Hughes (Tuscon, USA)* “Special problems of high elevation trees in dendroclimatology”
11:45 – 13:00	**Lunch**
13:00-14:50	**Short presentations session of young scientists I**:
13:00 – 13:20	*Ms. Rochelle Campbell (Swansea, UK)* “Investigating climate over the last 1000-years in Mora, Sweden using stable isotopes in tree-rings”
13:20 – 13:50	*Mrs. Marina V. Skomorkova (Krasnoyarsk, Russia)* “Dynamics of wood density and 13C in tree rings of beech (Fagus sylvatica L.) growing in Germany and Italy”
13:50 – 14:10	*Dr. Mary Gagen (Swansea, UK)* “Exploring variations in tree ring δ13C time series by cambial age”
14:10 – 14:30	*Maria Dvinskaya and Sergey Im (Krasnoyarsk, Russia) “*Dark needle conifer invasion into larch dominated communities as response to climate trends”

14:30 – 14:50	*Dr. Anna V. Benkova (Krasnoyarsk, Russia)* "Modelling of seasonal dynamics and annual photosynthesis in conifers and its relation with radial growth"
14:50-15:10	**Coffee break**
15:10 - 15:55	**Keynote Lecture III**:
	Prof. Olga. Solomina (Moscow, Russia), G.Wiles and T.Shiraiwa.
	"North Pacific climate linkage over the past four centures inferred from tree rings, ice core and glaciers from Kamchatka and Alaska"
15:55 – 16:40	**Keynote Lecture IV**:
	Prof. Kirill Levi, Dr. S. Yazev, Dr. N. Zadonina *(Irkutsk, Russia)*
	"Global warming and cooling in the Earth history"
16:40-16:50	**Coffee break**
16:50 – 18:30	**Short presentations session of young scientists II**:
16:50 – 17:10	*Mr. Giles Young (Swansea, UK)*
	"Extracting palaeoclimatic information from the oldest trees in Norway, using multi-proxy dendroclimatology"
17:10 – 17:30	*Dr. Anastasiya Knorre (Krasnoyarsk, Russia)*
	"Relation of NPP for ecosystem different components to climate changes"
17:30 – 17:50	*Mr Tommy Wils (Swansea, UK)*
	"Reconstructing the flow of the river Nile from tree rings in Juniperus procera, Ethiopia"
17:50 – 18:10	*Alexei Petrenko (Krasnoyarsk, Russia)*
	"Analysis of tree-ring growth curves form**"**
18:10 – 18:30	*Dr. Vladimir Myglan (Krasnoyarsk, Russia)*
	"Modern warming and date shifting of glacial events for siberian rivers"
18:30	**Welcome party at the British Council Russia**

Friday 27, January	*Institute of Forest, Russian Academy of Sciences, Siberian Branch (Krasnoyarsk)*
9:00 – 9:45	**Keynote Lecture V:**
	Prof. Sergey Bartsev, Prof. Andrei Degermendzhy
	"Forecast of biosphere changes by minimal mathematical models"

9:45 - 10:30	**Keynote Lecture VI:**
	Dr. Tom Melvin (Norwich, UK)
	"Process-based standardization in dendroclimatology"
10:30 – 11:30	**Short presentations session of young scientists III:**
10:30 – 10:50	*Mr. Vladimir Kukarskih (Ekaterinburg, Russia)*
	"Climate impact on tree growth in the forest-steppe zone (South Ural)"
10:50 – 11:10	*Mrs Penny Blackmore (Swansea, UK)*
	"The construction of composite Pinus sylvestris chronologies using heterogeneous populations of trees in Jotunheimen, central southern Norway."
11:10 – 11:30	*Mrs. Nadezhda M. Davi (Ekaterinburg, Russia)*
	"Climate driven growth form change of Siberian larch in the Polar Ural Mountains"
11:30 - 13:00	**Lunch**
13:00 – 13:45	**Keynote Lecture VII:**
	Prof. Sergei Semenov (Moscow, Russia)
	"Anthropogenic Change in Global Climate and Some Climate Change Impacts over CIS Territory"
13:45 – 14:30	**Keynote Lecture VIII:**
	Prof. Valerii Mazepa (Ekaterinburg, Russia)
	"Stand dynamics in the last millennium at the upper treeline ecotone in the Polar Ural Mountains""
14:30 - 14:50	**Coffee break**
14:50 – 15:30	**Short presentations session of young scientists IV:**
14:50 – 15:10	*Mr. Artem Ivanovsky (Krasnoyarsk, Russia)*
	"Simulation modelling of tree-ring series in temperature and water limited sites"
15:10 – 15:30	*Dr. Dmitrii Ovchinnikov (Krasnoyarsk, Russia)*
	"Relationships of climate changes with glacier indicated by tree-ring research (Altay montains, Siberia)"

15:30 – 16:00	*Dr. Vladimir Shishov (Krasnoyarsk, Russia)* "Modern tendencies in tree-ring growth for Russia"
16:00 - 16:20	**Coffee break**
16:20 - 18:20	**Round-table discussion I:** "Extracting signal from tree-measures"

Saturday 28, January Institute of Forest, Russian Academy of Sciences, Siberian Branch (Krasnoyarsk)

10:00 – 10:45	**Keynote Lecture IX:** *Mr. Kevin Anchukaitis (Tuscon, USA)* "Forward models of the climate influences on tree-ring growth dynamics"
10:45 – 11:30	**Keynote Lecture X:** *Dr. A. Shashkin (Krasnoyarsk, Russia)* "Eco-physiological modeling of tree-ring growth and structure"
11:30 – 13:00	**Lunch**
13:00 – 15:00	**Round-table discussion II:** "Problems of tree-ring modeling"
15:00 – 15:15	**Coffee Break**
15:15 – 15:45	**Keynote Lecture XI:** *Dr. N. Tchebakova (Krasnoyarsk, Russia* "Possible change in distribution of vegetation, tree species and their climatypes in Siberia in a warming climate"
15:45 – 16:05	*Dr. M. Naurzbaev, Dr. V. Shishov* (Krasnoyarsk, Russia) "**The use of scanning X-ray fluorescent techniques to analyse the distribution of chemical elements in tree rings**"
16:05 – 17:35	**Round-table discussion III:** "Reconstructions / comparisons"
17:35 – 18:00	**Coffee break**

Sunday 29, January

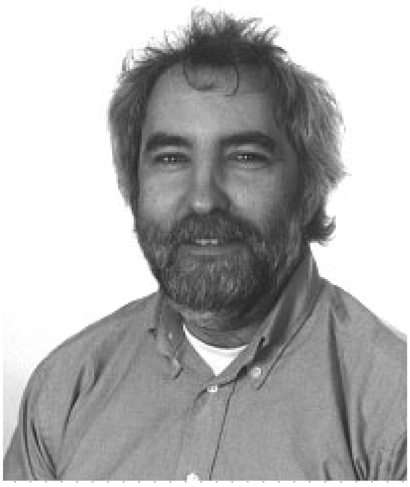
06:00	**Departure** (Hotel "Oktyabrskaya", Hotel "House of Scientists")

Organisers' Biographies

Professor Evgeny Vaganov
V.N. Sukachev Institute of Forest SB RAS, Krasnoyarsk, Russia
(E-mail: eavaganov@forest.akadem.ru)

Evgeny Vaganov is the academician of RAS, the Director of V.N. Sukachev Institute of Forest SB RAS and the Director of the Siberian International Center of Ecological Boreal Forest Research.
The main scientific achievements are related to research of wood plants as indicators of long-term climate change in Eurasia, to assessment of biospheric role of boreal forests in global biochemical cycles and influence of forest fires on the structure and forest ecosystem biodiversity in Siberia.
Prof. Vaganov is an organizer of the complex international research of biospheric functions and forest ecosystem biodiversity in Siberia and of their role in extra carbon accumulation. The developments of schemes of Siberian forest ecosystem management are of great importance in practice. The important role is played by the GIS-center, accumulating the information on forest ecosystems of Siberia which is the base for monitoring of forest cover state and distinguishing especially protected forest areas to maintain biodiversity.
The his international activity is awarded by the USA Forest Service and the Humboldt foundation. He is also awarded with medal of the public recognition of Russia.

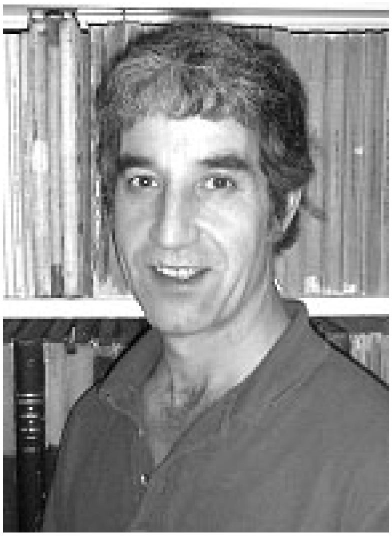
He is a member of the IUFRO scientific council, a member of the IGBP national committee, a member of the RAS scientific council on forest problems, a member of editorial board of domestic (Forest science, Siberian ecological journal) and international (Tree-Ring Bulletin, Holocene, Eurasian J. For. Research) journals. The professor E. Vaganov is reading lectures in forest ecology at Krasnoyarsk state university. E.Vaganov is the author of more than 160 papers including some books.



Professor Keith Briffa
Climatic Research Unit, University of East Anglia, Norwich, UK
(E-mail:k.briffa@uea.ac.uk)

Keith Briffa was born in 1952 and is currently Deputy Director of the climatic Research Unit where he has worked since 1977. His primary research interests are in the general area of late Holocene climate change, with a geographical emphasis on Europe and northern Eurasia. His specialism is dendroclimatology, the study of tree growth for the purposes of climate reconstruction. He has produced detailed reconstructions of individual summer temperature patterns across the Northern Hemisphere spanning some 600 years and a number of widely cited longer regional reconstructions of past climate variability (for example in Canada, Fennoscandia and Northern Siberia), often used by other researchers studying the changes in Hemispheric mean temperature through the last millennium. Besides tree-ring research, his interests encompass the study of recent climate change based on instrumental records, and the theory and general application of various palaeoclimate data for describing 'natural' climate variability, its relationships with possible forcing factors and use for anthropogenic climate change detection.

For six years (1994-2000) he served on the Scientific Steering Committee (SSC) of the International Geosphere-Biosphere Past Global Changes programme (PAGES) and recently on the SSC of the UK NERC Rapid Climate Change programme (RAPID). He currently sits on the PAGES/CLIVAR Intersection committee and the SSC of the European Science Foundation's HOLIVAR programme. He has coordinated several large EU-funded research projects and is currently joint coordinator (with Dr. Tim Osborn) of SOAP, a collaboration between eight European data and climate modelling groups in five countries, exploring the empirical evidence for climate changes and their links to possible forcing factors over the last 500-1000 years, and the realism with which these are simulated by two policy relevant coupled ocean/atmosphere models developed in the UK and Germany. He is an Associate Editor of the journals The Holocene, Dendrochronologia, and Boreas.



Dr. Tom Melvin
Climatic Research Unit, University of East Anglia, Norwich, UK
(E-mail: t.m.melvin@uea.ac.uk)
Tom Melvin was born in 1951 and worked for HM Treasury as a computer programmer, systems analyst and IT consultant for 22 years before a career change. In 1997 Tom started a degree course in geophysics at UEA and, in a continuation of his third year project, a PhD for Keith Briffa in dendroclimatology which was completed in October 2004. The PhD was an attempt to improve the extraction of long-timescale signals from tree-growth measures and included a detailed examination of existing standardization techniques, mainly the RCS method, followed by the development of some new methods designed to overcome existing problems. For the last year Tom has worked for the ALP-IMP project, on the extraction of tree-growth signals from series of measures and assessing their relationships with climate. ALP-IMP has collected and developed tree growth measures from 200+ sites in the Alps and created 200-year long grids of temperature, precipitation and drought index data. Tom is planning to develop process-based standardisation as a generally available tool for use in dendroclimatology and in the validation of tree-growth models.

Dr. Vladimir Shishov
V.N. Sukachev Institute of Forest SB RAS, Krasnoyarsk, Russia
(E-mail: shishov@forest.akadem.ru)
Vlad Shishov graduated from the Krasnoyarsk State University in 1992 (University diploma with honors). He then began work at the Sukachev Institute of Forest, Siberian branch of Russian Academy of Sciences, Krasnoyarsk, Russia. His present position is a Senior Research Associate in the Sukachev Institute of Forest and a Head of Information System and Mathematical Modelling the Krasnoyarsk State Trade-Economical Institute, Russia. He is an author and co-author of 16 papers published in different International and Russian journals. In 1994 he was invited as a visiting scholar to the University of Arizona, USA. He was twice

awarded the International Soros Science Education Program (ISSEP) "Soros post-graduate student" (1996, 1997). In 1998 he successfully defended his PhD thesis "Spatial-temporal analysis of tree-ring chronologies by relational mathematics". In 2003 he was invited as Senior Research Associate to the Institute of Earth Environment, Chinese Academy of Sciences, China. In 2004 he was awarded 1-year Royal Society NATO/FSO postdoctoral fellowship at the Climatic Research Unit (University of East Anglia, UK) to study "Modeling spatial patterns of tree growth in Siberia and Europe".

Dr. Shishov specialty is Informatics, Applied Mathematics and Mathematical Modelling (in Dendroclimatology). He is a highly skilled programmer in Delphi 7.0 and creator of the "Tree-Ring GIS" software. He has a particular interest in Tree Growth Modelling (VS-model), Spectral Analysis (Wavelets analysis, Multi-taper methods, Singular spectrum analysis, Cepstrum) and Non-parametric statistics (Rank correlations).

Dr. Mukhtar Naurzbaev
V.N. Sukachev Institute of Forest SB RAS, Krasnoyarsk, Russia
(E-mail: mukhtar@forest.akadem.ru)

Mukhtar Naurzbaev was born in 1959. He was graduated in Ural forestry institute as engineer of forestry. He received the degree of Ph.D. (1998) from the Institute of Forest. He worked as forestry officer (1984), research officer (1986), senior research associate (1998) in State natural reserve "Taymjrsky". He then became senior research associate (1999) of the laboratory of dedroclimatology in the V.N.Sukachev Institute of Forest. Dr. Naurzbaev is head of fieldwork expeditions in Taymjr and Indigirka river regions. In the Institute of Forest he is a supervisor of scientific group, engaged in the analysis of super long-term tree-ring chronologies in Subarctic region of Central and Eastern Siberia. Dr. Naurzbaev has coordinated several big Russian projects. He participated in different international programs supported by INTAS and NSF.
He is an author and co-author of 29 papers published in different International and Russian journals. He is a creator of the "Tree-Ring Siberian Data-Bank". He has a particular interest in developing of tree-ring standardization techniques and spectral analysis.

Dr.Vera Benkova
V.N. Sukachev Institute of Forest SB RAS, Krasnoyarsk, Russia
(E-mail: benkova@yandex.ru)

Vera Benkova was born 1951. She graduated at the physical faculty of Krasnoyarsk State University in 1973. She is currently Senior Researcher of the dendroclimatology laboratory Institute of Forest.
Her scientific interest are wood anatomy, particularly, wood science and technology. Dr. Benkova defended Ph.D. thesis "Dielectric Relaxation of Bound Water in Wood" in 1987 and confirmed it in 2005.
She is leader of the research group "Ecological Wood Science". Dr. Benkova is autor of the set of papers concerning properties and state of bound water in wood, comparative and ecological wood anatomy and co-editor/compiler of Russian version of Multilingul Glossary of Dendrichronology

(by compilers Kaennel M. and Schweingruber F.H.), co-author of monography "Anatomy of Russian Woods. An atlas for the identification of trees, shrubs, dwarf shrubs and woody lianas from Russia"(2004).

She was a member of Organizing Committee for international and russian conferences on modern problems in Wood Science, modeling of tree growth, chairperson of Section in IUFRO Interdivisional Symp. From 1994 she is a member of the expert group of IUFRO Working Unit "Trends in Forest and Wood Science terminology".

Dr. Anastasia Knorre
V.N. Sukachev Institute of Forest SB RAS, Krasnoyarsk, Russia
(E-mail: aknorre@forest.akadem.ru)

Anastasia Knorre was born in 1974. Since 1999, she has worked in the Dendroclimatology and Forest History department of the V.N. Sukachev Institute of Forest SB RAS. In April 2003 she successfully defended her thesis and was awarded a PhD degree in ecology. Over the last four years, she has been one of the major specialists at the Institute, carrying out studies of the forest, forest-tundra, and bog ecosystems of Northern Siberia aimed at the investigation of annual biomass production and carbon fluxes. The activities of several major research groups, from institutions and organizations in Russia and other countries, in which the Institute of Forest plays major role, are aimed at the investigation of different aspects of Northern Eurasia forest ecosystems, such as ecosystem productivity and carbon budget, forest history, interactions in system biocenosis, climate and other fields of environmental science.
Dr. Knorre's main interests concern ecosystem productivity; the estimation of productivity using layer structures, the response of annual production to climate, and the contribution of phytocenosis components to total ecosystem production. She has participated as a co-investigator in projects supported by international foundations (CRDF and INTAS) and several projects supported by Russian foundations. The main results of her studies have been published in international (*Oecologia, Tellus*) and high rated Russian journals and conference proceedings.

Speakers' Biographies

Professor Malcolm Hughes
Laboratory of tree-ring Researsh, University of Arizona, Tucson, USA
(E-mail: mhughes@ltrr.arizona.edu)

Malcolm K. Hughes was born 24 July 1943 in Matlock, England. He received the degrees of B.Sc. in Botany and Zoology (1965) and of Ph.D. (1970) from the University of Durham, and was a postdoctoral fellow at the Soil Biology Institute of the University of Aarhus, Denmark (1968-1969) and again at the University of Durham (1969-1971). He taught and researched Ecology at the Liverpool Polytechnic (now Liverpool John Moores University) from 1971 until 1986. He then became Director of the Laboratory of Tree-Ring Research of the University of Arizona, a position he held until 1999. He continues his research and teaching as Professor of Dendrochronology. He has conducted research projects and given lectures in many countries, including Russia, China, India, Jordan, France, Finland, Denmark, as well as the USA and the UK. He is a Fellow of the American Geophysical Union (1998) and held a CIRES Visiting Fellowship at the University of Colorado, Boulder (1992-1993) and a Bullard Fellowship at Harvard University (1999-2000).

Professor Olga Solomina
Corresponding Member of RAS
(E-mail: olgasolomina@yandex.ru)

Olga Solomina was born in 1956. She was graduated in Moscow State University as historian, but than changed the field and her first and second dissertations were in glaciology. She does research in the Institute of Geography of Russian Academy of Science. Her main scientific interests are glacier variations, paleoclimatic reconstructions, mostly using tree-rings, and the combination of both with ice-core records. In 1999 she published a book "Mountain glaciation of Northern Eurasia in the Holocene". Her papers are published in "The Holocene", "Arctic and Alpine Research", "Plaeo3", "GRL", "Annals of Glaciology", "Geografiska Annaler" and other international Journals. Olga spent a lot of time in the field and studied glaciers in the Pamirs, Tien Shan, Altay, Caucasus, Kamchatka, Urals, Alps, Andes, and in Antarctica. She is a member of the PAGES SSC, a Council Member of the International Glaciological Society (UK). Currently she is involved in the Fourth Assessment of the Intergovernemental Panel of Climatic Change as one of the lead authors in the chapter on paloeclimate.

Climate change, the tree growth response, and reconstruction of climate

Professor Serguei SEMENOV
Institute of Global Climate and Ecology, Moscow, Russia.
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Serguei Semenov was born in 1948, graduated from Moscow State University (1970). He got PhD in mathematics (1973), DSc in biophysics (1985), and the Professor degree in ecology (1997). Currently he is Deputy Director and Head of Department of Atmosphere-Land Interactions of the Institute of Global Climate and Ecology, Moscow, Russia where he has been working since 1974. Recent research interests: atmospheric physics, global climatology, and climate change and air pollution impacts on terrestrial ecosystems. He did research as visiting scientist at School of Forest Resources (University of Arkansas at Monticello, USA), at the Swedish Environmental Protection Agency (Uppsala, Sweden), and at the Plant Ecology Department of Bayreuth University (Bayreuth, Germany). He also worked for the United Nations Environment Programme in Nairobi, Kenya. Since 1988 to present he has been working for the Intergovernmental Panel on Climate Change as Lead Author and Coordinating Lead Author. He is Executive Editor of 'Problems of Ecological Monitoring and Ecosystem Modelling', member of Moscow Mathematical Society, Moscow Nature Protection Society, and Russian Ecological Academy. Major books: 'Mathematical Modelling of Ecological Processes' (1982), 'Tropospheric Ozone and Plant Growth in Europe' (1999), 'Greenhouse Gases and Present Climate of the Earth' (2004). The recent publication: Izrael Yu.A., Semenov S. M. Critical Levels of Greenhouse Gases, Stabilization Scenarios, and Implications for the Global Decisions. In: Avoiding Dangerous Climate Change, Schellnhuber, H J., Cramer, W., Nakicenovic, N., Wigley, T. and Yohe, G (Eds). Cambridge University, Press, 2006.

Kevin Anchukaitis
Laboratory of tree-ring Researsh, University of Arizona, Tucson, USA
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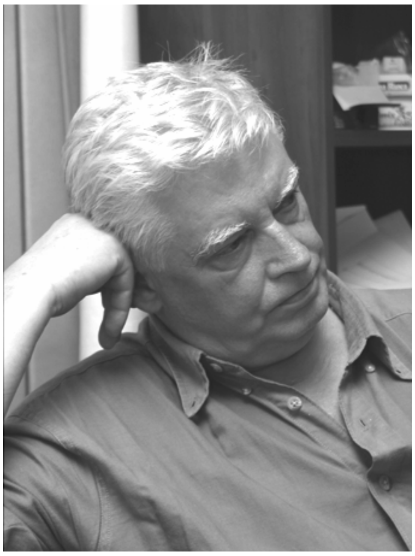
Kevin is a PhD candidate in the Department of Geosciences and the Laboratory of Tree-Ring Research at The University of Arizona. He holds a B.S. from Georgetown University and an M.S. from the University of Tennessee. Kevin's research focuses on various aspects of high resolution paleoclimatology and dendroclimatology, including the application of forward models to the interpretation of climate-proxy relationships. He uses process-based models and statistical techniques to better understand the relationship between climate and tree-growth, with the ultimate goal of improving climate reconstructions from dendroclimatology. His dissertation research also involves techniques to extract high-resolution proxy records of climate variability from trees in the tropics, primarily through the use of stable oxygen isotope analysis.

Dr. Valeri Mazepa
Institute of Plant and Animal Ecology,UB RAS,, Ekaterinburg, Russia.
(E-mail: mazepa@ipae.uran.ru)

Valeri Mazepa was born in 1952 and is currently Senior Research Assistant of the Laboratory of Dendrochronology at the Institute of Plant and Animal Ecology in Ekaterinburg, Russia, where he has worked since 1976. His primary research interests are in the general area of mountain forest ecology and climate change, with a geographical emphasis on Urals and northern Eurasia. His specialism is dendroclimatology, the study of tree growth for the purposes of climate reconstruction. He has produced detailed reconstructions of individual summer temperature patterns across northern Eurasia spanning some 300 years. Besides tree-ring research, his interests encompass the study of stand dynamics and climate change in the last millennium at the upper tree-line ecotone in the Polar Ural Mountains.



Professor Kirill Levi
Institute of the Earth's Crust, SB RAS, Irkutsk, Russia.
(E-mail: Levi@crust.irk.ru)

His primary research interests are neotectonics, geodynamics, and recent geodynamics. He is an author and co-author of a series of neotectonic maps published in different years and a co-author of more than 183 scientific publications. He teaches at the university and is a chairman of the department of recent geodynamics and natural disasters organized on his own initiative on the basis of the Institute of the Earth's Crust SB RAS and Irkutsk State Technical University within the frameworks of the federal special-purpose program "INTEGRATSIYA". He participated in regional scientific and technical programming applied to seismic safety and flooding control on urban areas of the Irkutsk region.

He currently is a member of the Seismology Council of the RAS and Scientific Council on physics of solar-terrestrial relationships of the RAS and takes an active part in multidisciplinary studies in collaboration with scientists from research studies institutes and higher education establishments of Russia. He is involved in the editing of three scientific journals. These are "Federal seismic survey and seismic prediction", published by the Russian Academy of Sciences in association with the Ministry of Emergency Situations of the Russian Federation, Russian-Chinese journal "Earthquake prediction", and on-line "Russian Journal of Earth sciences", published within the frameworks of Russian-American project. He was awarded the governor's diploma and medal of II Order of Merit for his activity in the area of applied research in the Irkutsk region.

Dr. Nadezda Tchebakova
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Nadezda Tchebakova graduated from Moscow State University, Geographical faculty, Division of Climatology in 1972. She took a post-graduate course in forestry and forest ecology at the Institute of Forest, Russian Academy of Sciences in 1972-1975. She defended her PhD dissertation in 1983 on "Climatic influence on the distribution and productivity on montane forests in southern Siberia". Her main fields of interest are vegetation modeling, predictions of vegetation, tree species, climatypes, phytomass, biodiversity, in a changing climate. During her scientific career, she has been involved into numerous international projects in: International Institute for Applied System Analysis, Austria, 1989-1992; US Forest Service, USA, 1992-2005; Canadian Forest Service, Canada, 1999, 2000, 2006; Trondheim University, Geographical Faculty, Norway, 1992; Potsdam Institute for Climate Change Research, Germany, 1993; Oregon State University, USA 1994; Fulbright scholarship, USA, 1995; Max-Planck Institute for Biogeochemistry, Jena, Germany, 1998-2000; University of Tuscia, Viterbo, Italy, 2002-2004; NEESPI Project supported by NASA, 2006-2008.

Participants' Biographies

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Giles Young is a Physical Geographer currently researching for a PhD in dendroclimatology at the University of Wales, Swansea. Giles pursued a number of diverse occupations before returning to full time education, successfully completing a BSc (Hons.) in Geography (1^{st} Class) at Swansea University in 2004. He subsequently took up the offer of a National Environmental Research Council (NERC) funded PhD place at Swansea supervised by Professor Danny McCarroll. His research interests lie in the area of Holocene climate change and more especially the climate of the past Millennium. His current research involves a reconstruction of climate over the past 1000 years at Forfjorddalen on the Vesterålen archipelago in northwest Norway using multi-proxy dendroclimatology. He has collected cores for a 500 year reconstruction and is currently processing these for isotopic analysis and plans to return to Forfjorddalen in early summer 2006 to collect samples back to AD 1000, to complete a millennial length climatic reconstruction. This research will also form part of the €12 million EU-funded Millennium project led by Professor Danny McCarroll at Swansea University which seeks to address the key question as to whether the magnitude and rate of 20^{th} Century climate change exceed the natural variability of European climate over the last millennium. This will be answered by reconstructing, at high resolution, the climatic variability of the past 1000 years at sites spread across Europe. He is also one of the current editors of the Swansea Geographer.

Vladimir Kukarskih
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Vladimir Kukarskih was born in 1983. He graduated in the biological department in the Ural State University in 2005 and now he is PhD student of Laboratory of dendrochronology at the Institute of plant and animal ecology UB RAS, Ekaterinburg, Russia. His primary research interest is dendroclimatology, especially in the reaction of tree growth to climate and climate change in semiarid conditions. He plans to investigate the main regularities of growth reaction to climate conditions in forest steppe zone in the South Urals. Also, his interests encompass study of the formation of anomalous anatomical structures in tree rings under extreme climatic events

Climate change, the tree growth response, and reconstruction of climate

Penelope Blackmore
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Penny Blackmore is a geographer with particular research interests in climate and glacier fluctuations during the late Holocene. She completed her degree in geography at the University of Wales Swansea (UWS) in 2001 where she specialised in climatology and the reconstruction of past environments. During 2002 she worked as a Rural Development Advisor for the Department for Environment, Food and Rural Affairs (DEFRA) in Bristol. In 2003 she returned to UWS to start a PhD supervised by Professor John Matthews and funded by the Jotunheimen Research Trust. For her PhD project Penny is constructing site, subregional and regional *Pinus sylvestris* ring-width chronologies for the region of Jotunheimen in central southern Norway. She is developing a 500-year temperature reconstruction with the aim of understanding how the regional climate has fluctuated during and since the 'Little Ice Age'. She is now in the final year of her PhD and hopes to complete by the summer of 2006.

Marina Skomarkova
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Marina Skomarkova was born in 1981 and is PhD-student at the Department of Dendroclimatology and Forest History, Institute of Forest, Krasnoyarsk, Russia. Special attention was concentrated on studies of tree-ring structure and analysis the influences of climatic variables on trees growth. Experimental analysis of seasonal tree ring formation in relation to the climate conditions of the growing season was carried out in some CARBOEUROPE sites in Germany, Italy, Sweden and TCOS-Siberia in Russia. Border range of tree types (deciduous and coniferous) and climate conditions (temperate and mediterrenian) will be used to supplement data about peculiarities of the growing season. To obtain more detailed information about tree-ring formation traditional and novel methods of dendroclimatology were used: 1) measurements of radial growth, wood anatomy (cell size and cell wall thickness), profiles of wood density and associated wood anatomical image analysis; 2) measurements of isotopic composition in wood, using a laser ablation-combustion line coupled to a isotope-ratio-mass-spectrometer (analysis was carried out in Max-Planck Institute for Biogeochemistry (Jena, Germany)). The results of studies provide the possibility for an evaluation of climate effect on wood growth in the past and improve simulation models of tree-ring formation for predicting effects of climate change on forest growth. In the near future following work will be devoted: 1) to identify the key intervals of growing season and climate which determine growth; 2) to relate tree ring structure to current weather conditions and to the CO_2 flux; 3) to increase range of tree species for the existing tree-ring growth model and use it for the prediction of forest growth.

Climate change, the tree growth response, and reconstruction of climate

Dr. Mary Gagen
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Mary Gagen is a geographer with primary research interests in climate change; specifically in developing reconstructions of past climates, over the last thousand years, from the information stored in tree-rings. Mary followed an undergraduate degree programme in Geology and Geography at the University of Birmingham. On completion in 1997 she joined the Geography Department at the University of Wales Swansea to carry out a Ph.D., under the supervision of Prof Danny McCarroll, which she completed in 2002. Mary's PhD explored a, then emerging, tree-ring climate proxy that of stable carbon isotope ratios. Designing a project to explore the palaeoclimatic potential of this new proxy, she carried out fieldwork in the Southern French Alps, working in conjunction with colleagues at the University of Aix Marseille through the EU fifth framework project FOREST. After spells as a post-doctoral researcher within the Dept. of Physics at the University of Galway, Ireland and a lecturer in Physical Geography at the University of Sheffield, she re-joined the tree-ring research group at UWS in 2003. For the past two years Mary has worked on the EU sixth framework project PINE (Predicting Impacts at Natural Ecotones http://www.pine.oulu.fi/) and has carried out fieldwork in Britain and the USA, Slovenia, Finland, France and South Africa. Her research plans for this year include a trip to Sabah in Malaysian Borneo where she will sample ancient tropical trees through a Royal Society South East Asian Rainforest Programme grant.
Mary recently completed a sabbatical at the Laboratory of Tree Ring Research at the University of Arizona, returning to UWS in December to take up a Research Council UK Fellowship and begin work as a post-doc. researcher on The MILLENNIUM Project, a €12million EU-funded palaeoclimate project co-ordinated by Danny McCarroll at UWS. The MILLENNIUM project (http://geography.swan.ac.uk/millennium/) will combine much of the relevant research skills of the European palaeoclimatic community to investigate whether the magnitude and rate of 20th century climate change has exceeded the natural variability of European climate over the last millennium, a vital question within the climate change debate.
Mary pursues an interest in educational outreach through the UK's Researchers in Residence high school programme and joins a team of volunteers, from around the world, each summer to carry out fieldwork in the Ancient Bristlecone Pine Forest in the White Mountains of California, co-ordinated by a team from the University of Arizona.

Dr. Vladimir Myglan
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Vladimir Myglan was born in 1979. He is educated in history and has worked at the Institute of Forest, Siberian branch of Russian Academy of Science, as a science researcher since 1999. In 2005 he defended the degree of PhD history. His primary research interests are the creation of a data bank for Siberian climate history on the basis of historic facts. His interest is the study of

Siberian history for the purposes of social processes reconstruction. He has produced a detailed reconstruction of the climate impact on Siberian society in XVIII-XIX centuries. Besides history, his interest is in the use of dendroclimatic and dendroarcheologic studies to investigate climate change.

Rochelle Campbell
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Rochelle Campbell is a physical geographer with primary research interests in natural and cultural disturbances of forest ecosystems across a broad range of temporal and spatial scales. She uses standardized dendrochronological techniques and stable isotopes in combination with other natural archives and documentary sources to reconstruct the histories of fire, insect outbreaks, human land uses, and climate. More recently, she has focused on the developing reconstructions of past climates, over the last thousand years, from the information stored in tree-rings. In 2003, under the guidance of Dan Smith at the University of Victoria, British Columbia, Rochelle was awarded a first class degree in physical geography, for research looking at multi-century outbreaks of western spruce budworm in British Columbia. Since October 2005, Rochelle has been pursuing a PhD, with Iain Roberston at the University of Wales Swansea, in dendro-isotope research. Her PhD will attempt to extract millennium long climate and disturbance records from living trees, buildings and timbers in Mora, Sweden. This research will combine existing instrumental, proxy palaeo-climate data and documentary sources, to investigate the past and future impacts of anthropogenic climate forcing using realistic patterns of natural climate variability across the region.

Dr Anna Benkova
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Benkova Anna was born in December, 1977. Since 2000 she works in Forest Monitoring department of the V.N. Sukachev Institute of Forest SB RAS. In February 2004 she successfully defended her thesis and got a PhD degree on bioinformatics. She had professional travels to several field-stations located in Siberian boreal forests (Krasnoyarsk territory, Turuchansk and Ermakovsky regions) where she was a member of working group on complex investigations of wild forest ecosystems and provenance trials. The main interests of Dr. Anna Benkova concern experimental and theoretical study of the photosynthesis process; estimation of photosynthesis rates in trees; net primary productivity and growth processes in a tree in relation to limiting external factors in the spatial--temporal scale by mathematical modeling. She participated in several projects supported by Russian foundations. The main results of her studies were published in high rated Russian journals and conference proceedings.

Tommy Wils
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Tommy Wils was born in 1979 in Eindhoven, The Netherlands. He was awarded a Master's degree with first class honours (cum laude) in Physical Geography from Utrecht University. During this time, he cooperated on projects to reconstruct past climates from the ring widths of *Pinus cembra* and from dendrogeomorphologically dated rockglaciers and moraine deposits in the French Alps. He also collaborated with researchers from Amersfoort, Utrecht (The Netherlands) and Jülich (Germany) on a pilot project to investigate the potential climate signal in stable isotopes in Dutch bog oaks.

After his Master's degree, Tommy did a one-year teacher training course and worked for two years as a teacher in geography at a school for secondary education in The Hague. In September 2005, he was awarded one of the few University of Wales Swansea PhD studentships. His current research is focused upon investigating the nature of the climatic signal in *Juniperus procera* from Ethiopia.

Nadezda Devi
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Nadezda Devi was born in 1980. She graduated at the Biological Faculty of Ural State University (USU) in 2002. She was given a qualification: Biologist, Teacher of Biology. In 2003 she started a post-graduate course at the Institute of Plant and Animal Ecology of the Ural Branch of Russian Academy of Sciences. Her main interests are concentrated in □endrochronology, dendroclimatology and the morphology of coniferous trees. She has worked in several projects (RFBR and INTAS), investigating the relation between climatic change and tree-growth, using dendro-ecologocal methods. Nadezda Devi has 10 published works.

Artem Ivanovsky
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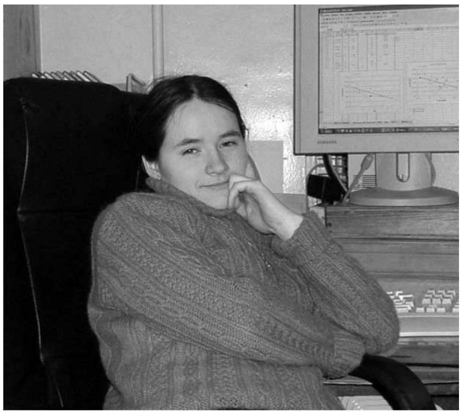
Artem Ivanovsky was born in 1982. He graduated from the Department of Mathematics and Information Science, Krasnoyarsk State University, 2005. Now he is PhD-student at the Institute of Forest, Krasnoyarsk, Russia. Mr. Ivanovsky specialty is Applied Mathematics and Mathematical Modelling (in Dendroclimatology). He is a highly skilled programmer in C++. He has a particular interest in tree-ring modeling (biophysical VS-model)



Maria Dvinskaya

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Maria Dvinskaya graduated from the Krasnoyarsk State Technological University in 2003 (University diploma with honors). On the last year of studying she began work at the Sukachev Institute of Forest, Siberian branch of Russian Academy of Sciences, Krasnoyarsk, Russia. Her present position is post-graduate student and a laboratory assistant in the Sukachev Institute of Forest. She is a co-author of 12 papers and conference materials published in different International and Russian journals.
Her specialty is Informatics, in GIS field. She has an interest in fire cycling, climatic trends and it connection with the forest dynamics.

Dr. Sergey Im

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Sergey Im graduated from Krasnoyarsk State Technical University in 2001 (University diploma with honors). In 2001 he post-graduated from V. N. Sukachev Institute of Forest SB RAS. In 2004 he successfully defended his PhD thesis "Microwave and optical remote sensing in the forest territory investigations". He is author and co-author of 8 papers published in Russian and international journals. His specialty is informatics, GIS and other information systems. He is skilled programmer in Object oriented C++ (Visual C++). His has a particular interest in application of microwave and optical remote sensing for analysis of land cover dynamics.

Alexei Petrenko

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He was born in Krasnoyarsk in 1982. In 2004 he graduated from Krasnoyarsk State University as a biophysicist. Graduation work was concerned with usage of allometry relationships in biophysical researches. Current field of research is reflection of characteristics of stand's development by tree-rings research.

Climate change, the tree growth response, and reconstruction of climate

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Dmitry Ovchinnikov has worked at the Institute of Forest since 1996. His research interests are the late Holocene climate change and glacier advances at global and regional scales and especially in Central Asia and Europe. His research fields are dendroclimatology, geomorpholohy and dendroglaciology. His general idea is to improve the dendrochronological methods applied to glacier research in Central Asia which has a lot of potential as an area of paleoclimatic research. His best scientific results are presented in different papers and conferences (e.g. Argentina, Korea). He is member of Russian Geographical Society.

Speakers' Abstracts

Instrumental and Proxy evidence of global warming - Is the 'Hockey Stick' bent?

Keith Briffa
Climatic Research Unit, University of East Anglia, Norwich, UK

A brief overview of the instrumental-based evidence for large-scale 20th-century warming will be presented. Though the rates of warming vary with location and season, the annual mean surface temperature of the globe has risen significantly (by 0.4 to 0.8 degrees Celsius) over this time, even allowing for the statistical uncertainty in the global representation of these data.
Though far more limited in geographical coverage, and with a strong bias towards European locations, sparse earlier instrumental records allow us to place the rising trend in 20-th century temperatures in a longer, 200-300-year, context and the anomalous nature of recent warmth is still strongly apparent in these data.

To place the evidence in an even longer relevant time frame, say 1000-2000 years, we can use some documentary climate indicators from rare locations such as China and Europe, but mostly we must rely on indirect physical or biological evidence of climate change, so-called "proxy" climate data. The most valuable in this respect are those with high temporal resolution (i.e. annual or even seasonal) and, very importantly, those for which an accurate time scale can be established. To date, the most widespread data meeting these criteria are derived from tree rings, though some ice cores and corals also provide valuable evidence. Examples of these types of records will be shown and their particular attributes and limitations will be described.

In 2001, the Third Assessment Report on Climate Change, produced by Working Group 1 of the Intergovernmental Panel on Climate Change (IPCC TAR) highlighted the subsequently-termed "hockey stick" picture of temperature change during the last millennium: this showed a gradual cooling trend for 900 years, followed by an abrupt warming (as seen in the instrumental record) during the 20th century. Over the last decade or so, the number of reconstructions of global, or more particularly Northern Hemisphere, temperature changes during the last 1000-2000 years has proliferated, as the debate on the causes of recent warming has intensified. These new reconstructions, using variously selected combinations of proxy data and different statistical approaches in their interpretation, provide a somewhat different picture of climate change than shown in the TAR. In general this picture is characterized by a greater amplitude of past change, mostly associated with cooler 18th century conditions rather than by warmer temperatures in medieval times. Hence, the case for "unusual" warmth in the 20th century is reinforced by these new reconstructions. The "state of the art" evidence showing the history of hemispheric-scale temperature changes will be presented, along with new analyses of the various proxy data that show the significance of the extent as well as the magnitude of recent warming in a 1000-2000 year context.

Process-based standardization in dendroclimatology

Tom Melvin
Climatic Research Unit, University of East Anglia, Norwich, UK

The critical "standardisation" process in traditional dendroclimatology, involves converting series of tree-growth measures into a chronology of dimensionless indices, calculated as deviations from some underlying statistical model of expected growth. The main control of climate on tree growth is via photosynthesis which is used by tree-growth models to simulate the growth of trees. Tree-growth models use climatic variables to calculate the mass of carbon (growth material) produced in foliage by photosynthesis and they use empirically defined processes and parameters to allocate this carbon to the growth of new tree structure resulting in annual stem increments i.e. climate is used to insert an age related (geometric) trend into ring-width measures. Reversing these processes has the potential to remove the age related trend from series of ring-width measures and in doing so will perform dendroclimatic standardization.

The name "process-based standardization" (PBS) is coined to describe this novel method. A prototype PBS model has been developed and tested using chronologies of *Pinus sylvestris* trees from sites in northern Scandinavia. Mechanical strength constraints are used to estimate tree sizes and foliage efficiency is used to model the rise of crown base. Pith estimates are used to generate initial saplings and then, for each ring in turn, the mass of carbon consumed in the growth of that ring is calculated and divided by the estimated foliage mass at the start of that year to generate a tree index based on foliage production rates. A count of sapwood rings beneath the bark gives an estimate of sapwood area in the final year of growth and an exact measure against which to test that the PBS model is correctly estimating foliage mass for each individual tree. Indices based on foliage production rate do not suffer from the low-frequency limitations implicit in traditional detrending techniques and in theory do not have low-frequency variance limitations. A detailed description of the PBS model will be presented along with a discussion of the potential benefits of this method of standardisation.

Modern tendencies in tree-ring growth for Russia.

Vladimir Shishov
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The analysis of long tree-ring chronologies for Northern timberline has revealed differences between temperature changes (principal factor limiting tree growth) and a measured tree growth after 1960 (Briffa et al, 1998; 2004). There are several hypotheses about the reasons for such a difference (Briffa et al., 1998; Vaganov et al., 1999; Briffa et al., 2004, Wilmking et al., 2004). But the reasons could be much more complex and combine the interaction of factors which are limiting and accelerating tree growth. The purpose of the present work was a spatial analysis of tree-ring growth, as forced by climatic factors, both before and after 1960 over extensive territories in Russia. Statistical modeling of standardized tree-ring chronologies against climate factors was used on different time scales: calibration interval (1935-1965), verification interval (1965-1998) and vice versa (when these intervals have been traded places).

The difference between modeled and observed (derived from ring measures) standard tree-ring chronologies is shown to be stable. Statistical modeling (calibration intervals: 1935-1965 and 1935-1975) of tree-ring growth overestimates indices of tree growth in comparison with observed values for recent decades (verification intervals: 1965-1998) and modeled growth underestimates indices of tree-ring growth (calibration intervals: 1965-1998 and 1955-1998) in comparison with observed values for the middle of 20^{th} century. It is possible to assume, that a principal cause of tree-ring decrease is an increasing imbalance between photosynthesis and respiration, i.e. temperature increase accelerates respiration rates, creating losses which are not compensated by increased photosynthesis. As result, there is decrease of tree-ring growth for the Eurasian north.

The use of scanning X-ray fluorescent techniques to analyse the distribution of chemical elements in tree rings.

Mukhtar Narzbaev, Vladimir Shishov
V.N. Sukachev Institute of Forest SB RAS, Krasnoyarsk, Russia

In this work tree cores of Siberian Larch (*Larix Sibirica*) from the Altai Mountains, Russia were used. We assume that the distribution of chemical elements within the tree-rings is the same as the distribution found in the local environment of the tree. The main goal of this work is to recover a year-to-year biochemical, geochemical and climatic history of a tree's local environment. The method of X-ray fluorescent analysis based on synchroton radiation was created for the scanning-element analysis of sediment samples of Baikal lake (Zolotaryov et. al., 2002). The same approach was used here for tree-ring samples. Experiments have shown satisfactory reproducibility of measurements of the concentrations of 14 elements. Reproducibility of the elemental concentration in tree rings was confirmed by the comparative analysis with meteorological data. The density of Compton's dispersion captures the seasonal variability of tree rings and the optical range of fluorescent data within the image can be compared with dendrochronological information (tree-ring structure, etc).

Special problems of high-elevation trees in dendroclimatology

Malcolm Hughes
Laboratory of tree-ring Researsh, University of Arizona, Tucson, USA

The high elevation conifers of the semi-arid western USA have been used in many reconstructions of past climate, but those at the highest elevations present special problems. For example, there a strong upward trend in ring width of high elevation conifers since the late19th century, unique on a millennial timescale, on a sub-continental scale. This conclusion is based on analyses of a network of 24 tree-ring chronologies from the region stretching from the Sierra Nevada of California to the Rocky Mountains of Colorado. All cover at least the period from AD 1000 to the late 20th century with good replication, have a minimum segment length of 500 years, and were only minimally detrended so as to conserve century and multi-century-scale variations. Their site elevations range from approximately 2500 to 3500 meters a.s.l.. The upward trend of the last 150 years is clearly strongest in the chronologies from above 3100 meters. It has been difficult to establish clear, consistent, correlations between this trend and the variability around it and local climate variables during the instrumental period. This is doubtless in part due to the paucity of long meteorological records in the high mountains. On the other hand, chronologies from lower elevations show clear and strongly significant correlations with precipitation-related variables. Several explanations have been proposed for the upward trend during the past 150 years of the series from above 3100 meters elevation, including CO_2 fertilization mediated through increased water use efficiency. A new explanation will be proposed, based on greatly accelerated spring-summer warming at these elevations in this region over at least the last 100 years, seen in NCAR/NCEP reanalysis data and in coupled ocean-atmosphere climate model results. This same anomalous warming at higher elevations is also seen in an ensemble of forced millennial runs of a climate model of intermediate complexity (MIC). If the relationship between tree-ring growth near upper tree limit (circa 3500 m.a.s.l. in this case) and meteorological data typically from lower elevation (few stations above 2000 m.a.s.l.) is changeable, where does that leave our statistical derivation of transfer functions?

Tree-rings, ice cores and moraine dates in Alaska and Kamchatka provide a better understanding of climate changes in the North Pacific.

Olga Solomina
Moscow, Russia

Three lines of evidences – ring width, moraine dates, and ice cores - have been used to estimate the agreement between climatic and glacier variations within Alaska and Kamchatka as well as between the regions during the last five centuries. Regional larch chronology in Kamchatka (KAML) (1633-2003) (Solomina et al., 2005) smoothed by 11-year running mean agrees well with the spruce chronology from Alaska for the periods 1770s-1820s and 1860s-1920s; both chroniologies are temperature sensitive. Spruce chronology from Kamchatka also correlates positively with Alaska chronology for 1770s-1820s, but the curves are negatively correlated in 1860s-1940s. The accumulation estimated by Mt Logan (Alaska) and Ushkovsky (Kamchatka) ice cores show similar trends in 1840s-1870s and 1920s-1970s.

Accumulation measured in Ushkovsky ice core displays a strong similarity with the KAML larch chronology in 1830s-1970s. The peaks of accumulation precede the peaks of summer temperature by few years, though this might be the result of small errors in the ice core dating. In Alaska the similarity of ice core and tree-ring records is evident for 1760s-1880s. The periods of high accumulation (precipitation) coinciding with high tree-ring growth (summer temperature) indicate the decrease of continentality of climate both in Alaska and Kamchatka, the synchronous lows of both parameters on the contrary point to the periods of colder dryer continental climate (e.g. in 1810s-1820s).

The main cluster of moraines in Kamchatka deposited in 1840s-1920s corresponds to the generally cold period in 1820s-1920s. This period of glacier advances roughly coincides with the main peak of moraine accumulation in Alaska. However in Kamchatka the resolution of moraine dates (mostly dated by lichenometry) is not enough to estimate the correspondence of individual advances to the decadal variations of temperature and accumulation neither to tell whether the three earlier peaks (in ca 1700s, early 17th century, early 1500s) are synchronous with glaciers advances in Alaska. However, the precise tree-ring dates of moraines in Alaska in combination with ring width and density chronologies and ice core data, open a possibility to estimate the relative role of temperature and precipitation contributing the glacier advances of the last five centuries.

Anthropogenic Change in Global Climate and Some Climate Change Impacts over CIS Territory.

Serguei SEMENOV

Institute of Global Climate and Ecology, Moscow, Russia.

The Earth's climate has natural variations. A reconstruction of surface temperature from ice cores (Antarctic station Vostok) showed that even in the Common Era in pre-industrial time surface air temperature variations of approximately 0.5 - 1.5^{o}C magnitude emerged, developed and ended within roughly 100 years time spells. These natural variations were caused by factors of astrophysics and celestial mechanics interacted with the non-linear climate system of the Earth. In the industrial era (approximately since 1750) humans have got a power to affect the global climate through emitting the greenhouse gases (GHG) to the atmosphere. This raises the GHG concentration, enhances natural greenhouse effect, and warms our planet. A rise of mean surface temperature during last 100-140 years was estimated at 0.6^{o}C. This may have both negative and positive outcomes for ecosystems, human life supporting systems, and human health. For the territory of CIS countries actual climate change effects on biota in 20th century seems very moderate and ambiguous due to strong non-linearity, are mostly of sub-regional scale. All ways and means for stabilization of climate through reductions of GHG emissions are rather expensive. Therefore, a global stabilization program of this type requires careful comparative analysis of expected stabilization costs and climate change caused damage. Even if a stabilization program is optimized in this regard, it cannot prevent climate warming driven by natural factors, i.e. natural upward trend in temperature. In this perspective, perhaps, alternative methodologies of climate management should be considered, in between, anthropogenic increase of reflectance of the atmosphere.

Forward models of the climate influences on tree-ring growth dynamics

Kevin Anchukaitis
Laboratory of tree-ring Researsh, University of Arizona, Tucson, USA

Dendroclimatic reconstructions of climate typically utilize statistical inverse models empirically calibrated using the overlapping periods of observed climate data and the tree-ring proxy measurement. These statistical models are based on empirical correlative associations that implicitly assume, but often do not explicitly identify, a biophysical relationship between tree-growth and climate. This empirical-statistical approach to dendroclimatic reconstruction has many strengths, although it has its limitations as well. Perhaps of most concern is the fact that it can only incorporate the range of variability and the type of proxy-climate associations that occur during the calibration period.

One way to address this is through the use of process-based (mechanistic) forward models of tree-growth that explicitly simulate the influence of environmental variables on the processes and structures that control tree-ring proxies. Determining which of these are important is critical, as is a comprehensive understanding of model sensitivity, biases, and applicability across a diversity of environments, with respect to different species, and for distinct assumptions and methodologies.

Here, we examine applications of the Vaganov-Shashkin tree-ring growth model in eastern North America. We use principal components analysis of networks of real and simulated chronologies in the southeastern United States to examine the skill of the model in a warm mesic environment, and to observe and predict the consequences of low frequency climate variability on the stationarity of climate-tree ring growth relationships. We also examine the Vaganov-Shashkin model's ability to simulate the tree-ring growth dynamics of *Tsuga canadensis* in southern New York State. Other applications and methodological issues are also considered in the context of eastern North America, including parameterization, model/proxy assimilation methods, model data needs and limitations, and null model generation.

Stand dynamics in the last millennium at the upper tree-line ecotone in the Polar Ural Mountains.

Valeri Mazepa
Institute of Plant and Animal Ecology UB RAS,, Ekaterinburg, Russia.

Significant spatiotemporal changes in the establishment, mortality, and abundance of trees have taken place in the upper tree-line ecotone in the Polar Ural Mountains over the last millennium. Until now, these forests have developed mainly under the influence of natural factors. A large number of well-preserved tree remains can be found up to 60-80 m above the current tree line, some dating to as early as a maximum of 1300 years ago. The research reported here extends the work begun by S.G. Shiyatov, who examined evidence of tree growth dynamics along a transect on the eastern slope of the Polar Ural Mountains in the 1960s. For this study, 769 discs from dead trees and 378 increment cores from living trees were collected along an altitudinal transect 860 m long and 80 m wide. The positions of all living trees, fallen dead trees, and wood remains were mapped. Dimensions of each living tree, including saplings and understory plants, were measured: basal diameter, diameter at breast height, crown diameter, and height of stems. Calendar years of tree germination and death were estimated using dendrochronological techniques. 21 selected trees were dug out of the ground to enable estimates of the biomass of different fractions to be measured. Combining these data, dynamics of a biomass for last millenium has been estimated. The recent temperature increase observed in the 20th century is reflected in the high number of young trees observed.

Global warming and cooling in the Earth history.

Kirill Levi, *S.Yazev, N. Zadonina*
Institute of the Earth's Crust SB RAS, Irkutsk, Russia

Consideration is being given to global climatic changes that occurred in the geological past of the Earth in accordance with the data available. It is beyond question that the alternation of large-scale and long-term glaciations with warm-climate intervals was typical of the Earth. The causes of these changes have been under discussion since the discovery of their reliable traces and are considered in this article with regard to present-day ideas. Besides, much information about the start of new global warming that may result in disastrous effects for mankind has appeared recently in press and scientific periodicals. Therefore, the question if the currently observable processes can be really assigned to global changes is being considered in all its bearings.

Possible change in distribution of vegetation, tree species and their climatypes in Siberia in a warming climate

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Distributions of vegetation zones (biomes), dominating tree species *Larix spp. (L. sibirica, L. dahurica,* and *L. sukaczewii)* and *Pinus sylvestris* and their climatypes over Siberia were studied in a changing climate**.** The approach employed a tri-variate (degree-days above 5^{o}C, degree-days below 0^{o}C, and a moisture index) estimate of the climatic envelope within which exists the actual ecological distribution of biomes, species and their constituent climatypes (genotypes physiologically attuned to similar environments). Effects of permafrost along with climatic indices and interspecific competition between Siberian larches were considered. Mapping distributions of biomes, species and their climatypes was done for the current climate and future climates predicted by the HadCM3GGa1 scenario of Hadley Centre.

The results showed enormous changes in the vegetation cover of Siberia for a warmed climate. Southern vegetation types such as southern taiga, subtaiga, and forest-steppe are expected to expand from about 10% to 70% coverage. This increase in coverage would be largely at the expense of northern and middle taiga each of which would then occupy less than 20%. Forest-tundra and sparse forests would nearly dissappear, while tundra and bare lands should disappear completely. Forest-steppe also is expected to reach latitudes of some 1000 km north of their current distribution. The distributions of species will shift northwards and genotypes within species will be redistributed. Some contemporary climatypes are projected to disappear from Siberia while others common elsewhere would evolve. To mitigate these effects, climatypes should be transferred today to the expected future location of their climatic optima, a distance that is likely to approach 700-1200 km for Siberian species of larches.

Participants' Abstracts

Relation of NPP for ecosystem different components to climate changes.

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To investigate variability in the primary production of boreal forest ecosystems under changing climate we compared the dynamics of annual increments and productivity of the main components of plant community (trees, bushes, mosses) at three sites in the north of Siberia (Russia). Annual radial growth of trees and bushes is mostly defined by summer temperature regime (positive correlation), but climatic response of woody plants is species specific and depends on local conditions. The dynamics of annual increments of mosses is opposite to those of tree growth. This difference in climatic response of the different vegetation components of the forest ecosystems indicates that these components are adapted to use climatic conditions during the short and severe northern summer. Average values of productivity in the northern forest ecosystems varies from 0,05 to 0,14 t ga^{-1}yr^{-1} for trees, from 0,05 to 0,18 t ga^{-1}yr^{-1} for bushes and from 0,54 to 0,66 t ga^{-1}yr^{-1} for mosses. The higher values of tree productivity and lower values of moss annual production were found for sites in northern taiga than in forest tundra. Different trends were also found for inter-annual variations of productivity of the dominant species from each vegetation level during the last 10 years. Whereas productivity of mosses is increasing, productivity of trees is decreasing. For the productivity of bushes there is no obvious trend during this period. Our results show that the main contribution to changes in annual biomass productivity in forest-tundra and northern taiga ecosystems under the predicted climatic changes will be determined by living ground cover.

Extracting palaeoclimatic information from the oldest trees in Norway, using multi-proxy dendroclimatology

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A reconstruction of annual climate in NW Norway applying multi-proxy dendroclimatology to the oldest trees in Norway (Pinus sylvestris L.) will be undertaken. Stable carbon and oxygen isotopes from the latewood of tree rings will be used in conjunction with ring widths to reconstruct annual climate using a chronology stretching back to AD 877. The maritime climate in this area makes it difficult to extract a strong climatic signal using ring widths alone; however in conjunction with the other proxies it should be possible to extract a stronger climate signal from this archive. Several trees will be individually sampled for each year to determine between tree variability and allow confidence limits to be placed around mean annual values. Climate will be reconstructed for the past 1000 years to include the "Medieval Warm Period"; the "Little Ice Age"; and late twentieth century climatic trends**.**

Climate impact on radial growth of trees in South Ural forest-steppe

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It is noted that the effects of global climatic change are observed in ecosystems with severe climate. Therefore a number of studies are carried out in Arctic and Subarctic forest ecosystems and also at the upper timberline of mountain areas. At present, the question about climatic changes in semi- and arid ecosystems is also topical. Undoubtedly, climate is a limiting factor for tree radial growth in the semi-arid and arid zones and it is necessary to study its influence on the forest. A dendroclimatic study of climatic (mainly temperature, precipitation) influence on the growth of Scots pine (*Pinus sylvestris* L.) and Siberian larch (*Larix sibirica Ledeb*) was carried out in the south-east side of the forest-steppe region of the South Ural (Russia). Our results demonstrate a significant negative relationship of the tree radial growth to air temperature of the current year. As regards the precipitation, there is a significant positive relationship between the tree radial growth and current year precipitation.

The construction of composite *Pinus sylvestris* chronologies using heterogeneous populations of trees in Jotunheimen, central southern Norway

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The aim of this project is to determine how composite *Pinus sylvestris* chronologies should be constructed when trees are sampled from heterogeneous populations of trees from the same region (Jotunheimen, central southern Norway). Ten sites were selected, representing a range of habitat conditions from 'very dry' to 'wet' and approximately 30 living trees were sampled from each. Ring-width series were detrended using a 67% cubic-smoothing spline and the resulting indices combined to form site chronologies. Correlation analysis shows that the site chronologies are all highly correlated ($p \geq 0.01$). However, Non-metric Multidimensional Scaling (NMDS), cluster analysis and spectral analysis indicate that the chronologies fall into two main groups based on their spatial distribution, rather than habitat-type. As a consequence, two composite chronologies (Eastern and Western Jotunheimen) and a 500-year regional chronology have been constructed.

Moving response function analysis has demonstrated that the dominant signal in all of the chronologies is a positive response to July temperature. This relationship is strongest in the more continental Eastern chronologies. Stepwise multiple regression has been used to develop transfer functions for the reconstruction of July temperature. The coldest decades were the AD 1630s-1640s and early 1700s. The warmest decades were the AD 1750-1760s and the 1830s. There is little evidence of 20th century warming. However, it is expected that the development of a SARCS chronology will improve the variability retained in the most recent part of the series, thus providing a more accurate record of the relationship between tree-growth and climate over the last ca 150-years.

Dynamics of wood density and $\delta^{13}C$ in tree rings of beech (*Fagus sylvatica* L.) growing in Germany and Italy.

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Isotope composition in tree rings expands the potential of the dendroclimatic analysis because the $^{13}C/^{12}C$ ratios of wood and cellulose may reflect the climatic conditions (Leavitt 1993, Duquesnay et al. 1998, McCarrol and Loader 2004). We investigated the variability of wood density and $^{13}C/^{12}C$ in beech tree-rings (*Fagus sylvatica* L.), and analyzed the influences of climatic variables on these parameters. Wood cores taken from 36 dominant trees of beech growing in three different stands in Germany and Italy were sampled at breast height. To obtain the density profiles of tree-rings, we used densitometry. $\delta^{13}C$ was estimated for fifteen samples using Laser-Ablation-Combustion-GC-IRMS. The sensitivity of wood density and $\delta^{13}C$ to climatic variables differed; maximum density correlated with temperatures in the second part of a growing season (July – September), $\delta^{13}C$ variations indicate effects of drought during the main growing season. The comparison of seasonal changes in tree-ring maximum wood density and isotope composition revealed that an increasing seasonal water deficit changes the relationship between density and ^{13}C concentration from a negative relation in years with optimal moisture to a positive relationship in years with strong water deficit. There was an unexpected high variability in mid season $\delta^{13}C$ values of wood between individual trees (-31 o/oo to -24 o/oo). Maximum wood density showed less variation (930 to 990 g cm^{-3}). The relationship between seasonal changes in tree-ring structure and carbon isotope composition can be used to study carbon storage and re-allocation, which is important for improving models of tree-ring growth and carbon isotope fractionation.

Exploring variations in tree ring $\delta^{13}C$ time series by cambial age.

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Stable carbon isotope measurements from tree rings trees are now a significant and viable palaeoclimate proxy. Rapid online sample preparation techniques combined with increased understanding of the mechanistic controls over carbon isotopes in wood and climate calibration studies are allowing the development of the first millennial long carbon isotope tree-ring series. However, the sub-discipline is still in relative infancy and several methodological protocols are yet to be established, the most significant of which, concerns developing protocols for handling age effects in $\delta^{13}C$ series. For the first time we have been able to study age related variability in non-pooled, highly replicated $\delta^{13}C$ tree ring series from 10 sites across Europe, on a transect stretching from the southern French Alps to northern Fennoscandia. This unprecedented data set allows a thorough assessment of variations in $\delta^{13}C$ by cambial age and a number of detrending methods, including the use of Regional Curve Standardization, to be piloted. We pose three questions:

1. Is there a long-term age-related trend in isotopes that needs to be removed, or can we avoid series-length de-trending issues?
2. Can RCS be used to characterise and remove the juvenile effect?
3. Does the mathematical correction for changes in atmospheric ^{13}C remove the effect entirely, or is there some trend left unexplained?

The current warming and shifting of ice events on the siberian rivers

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This study represents the results of an analysis of long-timescale series of annual observations of the melting and freezing of ice on Siberian rivers (Ob, Irtysh, Enisey, Angara, etc.). The dates of these ice events are related to spring and autumn temperatures. The relation between an indirect indicator of changing summer temperatures, tree-growth indices derived from tree-ring chronologies, and the period of open water is shown. The last two centuries are characterized by a steady trend, with shifts in the timing of ice melting towards earlier dates and of ice freezing towards later ones. The trend in these long-timescale series of ice events, marking the period of open water, is evidence of a longer warm season over the considerable territory of Southern Siberia, that confirms the general tendency of increased warming in temperate latitudes of the northern hemisphere.

The linear trends in ice events and the long temperature-sensitive tree-ring chronologies were found to diverge after the 1950s. As ice events are a consequence of physical processes, it appears necessary to look for the cause of this divergence in the biological reaction of trees to changing climate or to other active biological factors of the environment. The revealed close coupling between the ice events and the measured temperature of some months enables the statistical characteristic of this relationship to be used to forecast the impact of predicted global warming on the ice-event dynamics of Siberian rivers.

Investigating climate over the last 1000-years in Mora, Sweden using stable isotopes in tree-rings.

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To understand the natural variability of European climate it is necessary to investigate the climate, with both warm and cold periods, for the last one thousand years. Stable isotopic data collected from tree-rings provide a unique opportunity to test and calibrate the response of pine trees (*Pinus sylvestris*) to climate variables. It is hoped these records will capture the full variability of natural climate. The aim of this research is to understand the magnitude of natural variability focusing on a number of sites near Mora, Sweden and combine this data with researchers in other parts of Europe.

The advantages of stable isotopes of carbon are *i*) the factors that control the relative amounts of the stable isotopes in wood are much more restricted than those that control ring-width and density variations and *ii*) the strength of the common signal is often higher than other proxies and requires minimal detrending, so that fewer trees are required to provide a representative average. This research will assess the impact of competing influences by determining carbon isotope ratios, tree-ring widths, tree-ring density and earlywood-latewood ratios. Multiple proxies will be measured at annual resolution and from at least ten trees to ensure an adequate degree of replication. The tree-ring reconstruction for central Sweden will be combined with existing instrumental and historical sources, to allow us to model the past and future impacts of anthropogenic climate forcing using realistic patterns of natural climate variability across the region. Preliminary results will be presented at this workshop.

Modelling of seasonal dynamics and annual photosynthesis in conifers and its relation with radial growth.

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This paper is devoted to long-term simulation of NPP dynamics in Coniferous (where NPP is primary net-productivity assumed to be a difference between photosynthesis and respiration). We have built a mathematical simulation of assimilation rate, primary productivity and radial growth in relation to climate conditions. The model is based on the main biochemical principals and empirical models by Farquhar, Running, etc. Our model calculates net photosynthesis subject to biochemical leaf properties (stomatal conductance), microclimatic variables (daily temperature, precipitation, humidity, soil moisture, etc.), radiation (photosynthetic active radiation PAR) and stem respiration. The relative dynamics of net assimilation rate in Scots pine and three species of Siberian larch from central and the northern Siberia have been estimated by the model. Radial growth is the only component of tree growth that has been used for verification of this model.

It has been revealed that the relation between modelled photosynthesis and radial growth varies from one to another span of time belonging to investigated long-term interval. The periods of feed forward, and feedback have been separated. Synchronism between simulated and experimental curves shows that model allow to calculate adequately tree productivity for optimal span of time rather then a complete long-term interval. Thus, at high latitudes, where temperature determines the growth process, the calculated dynamics of productivity adequately describe real dynamics of certain conifer growth. In time periods, when the link between productivity and radial growth decreases, water regime of a tree plays an increasingly important role.

Reconstructing the flow of the river Nile from carbon isotopes and other proxies in *Juniperus procera* tree rings.

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The aim of this project is to extend the limited discharge records of the river Nile by several centuries using carbon isotope ratios and other proxies from tree rings in 400-year-old *Juniperus* *procera* trees growing at a number of sites in Northwest Ethiopia. The resulting hydrological and climatic records will highlight the influence of climate change on Nile discharge and improve water resources management in the basin, which is of great importance due to the increasing population depending on the Nile waters for agriculture and electric power. Rainfall in the Ethiopian Highlands accounts for most of the Nile waters in Egypt through the Blue Nile, Atbara and Sobat rivers. Carbon isotope ratios in trees are strongly related to precipitation through its influence on stomatal conductance. However, this proxy is also influenced by varying rates of photosynthesis. This project will assess the impact of these competing influences by determining carbon isotope ratios, tree-ring widths, tree-ring density and earlywood-latewood ratios. All proxies will be measured at annual resolution and from at least five trees to ensure an adequate degree of replication. The reconstructed flow of the river Nile will be validated against historical measurements from the Rauda Nilometer in Cairo, Egypt.

Climate driven growth form change of Siberian larch in the Polar Ural Mountains.

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There are large numbers of Siberian larch (*Larix sibirica Ledeb*.) trees that have changed through several growth forms in the course of their lifetime in the treeline ecotone on the eastern macroslope of the Polar Ural Mountains. The purpose of this work is to study the effect climate has on form genesis and growth characteristics of different life forms of Siberian larch trees.

Major research goals are to:
- reveal the dates of formation of the different growth forms and history of change;
- examine peculiarities of axial growth rate and radial growth of orthotropic and plagiotropic parts of stems;
- estimate the distribution of biomass between above and below-ground compartments of single-stemmed, multi-stemmed and creeping trees of Siberian larch.

Our results demonstrate that the change of the larch growth form occurred under the long-term and stable transition of habitat conditions and is related to climate warming

Simulation modeling of tree-ring series in temperature and water limited sites

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285 tree-ring chronologies were used for tree-ring modeling (biophysical VS-model). All chronologies are located in the Eurasian part of Russia. Due to limitations of the present meteorological network in this territory for use in spatial tree-ring modeling, monthly climatic data were obtained from the high spatial resolution climate dataset (Climatic Research Unit, UEA, Norwich, UK) for each site. Average monthly temperature and cumulative precipitation were converted into daily data using a technique created by the author. These daily datasets were used by the VS-model. The biophysical tree-ring VS-model has more than 30 parameters and for each dendrochronological site, a set of optimal parameters were obtained by coordinatewise optimization. These methods and software could be introduced into the present system of ecological monitoring and used for forecasting regional and global climate changes.

Climate change and glaciers indicated by tree-ring chronologies

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The relationship between glaciers and climate changes are very strong in different regions but it is difficult to reconstruction glacier dynamics with high resolution during the late Holocene. Using dendrochronological methods, the balance and ablation of the Maliy Aktru glacier (Altai Mountain, Central Asia, Russia) was reconstructed using maximum latewood density. For this analysis we used a regional chronology which was built from four upper tree-line sites. The Malii Aktru glacier was first visited in 1911 by Sapozhnikov (1912), who identified the moraine of its recent advance. Other moraines dated by 14C and lichenometry were deposited at the end of 17^{th} to early in the 18^{th} centuries and in the middle of the 19^{th} century. Since the mid 19^{th} century the length of M. Aktru glacier has reduced by 0.6 km and the area has decreased by 7.3%.

Dendroclimatic analysis shows that summer temperature is a common limiting factor which influences mass balance, ablation and maximum density therefore it is not surprising that these are closely correlated (r=0,67-0,72; p<0,05). We used the balance and ablation measured in 1962-1994 (Narozhny, 2001) to calibrate the maximum latewood density chronology and reconstruct the mass balance and ablation of Malii Aktru glacier for AD 1840-1994. Up to 67% of summer temperature, 68% of ablation and 44% of balance variability can be explained by these models. The model reproduces well the increase of the glacier balance in the middle of 1980s and the decrease of mass balance from the middle 19^{th} to the late 20th century.

Dark needle conifer invasion into larch dominated communities as response to climate trends

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Larch dominates vast areas in Siberia, competing effectively with "dark needle conifers" (DNC: Siberian pine, spruce, fir) due to its higher resistance to harsh climatic conditions. Milder climatic conditions could decrease its current competitive advantage. The purpose of this study is to find an evidence for an invasion of DNC and birch into the larch habitat.
The species composition was investigated in 110 test plots along the "West-East" (91° - 106° N), and "South-North" (57° 30′ - 64° deg 30′ E) transects.
The expected invasion of DNC into larch habitat was quantified as an increase of the proportion of those species both in the overstory and regeneration. Abundance and invasion potential was expressed using the following variables: (1) n_i *and* N_i – the proportion of a given species in the overstory and regeneration, respectively, and (2) K_i – "the normalized multiplying coefficient" defined as $K_i = (n_i - N_i) / (n_i + N_i)$.
The results show that Siberian pine and spruce have high K_i values both along the margin and in the center of zones of absolute larch dominance. There is a tendency of K_i to increase for DNC and birch from south to north and from west to east. Scots pine did not significantly penetrate into the zone of larch dominance. The age structure of the regeneration showed that it was formed mainly during the last 2-3 decades. During this period, also an increase of larch radial increment was observed. On the western and southern margins DNC regeneration formed a second layer in the forest canopies, which could eventually replace the larch in the overstory.

Analysis of tree-ring growth curves form

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Climate change, the tree growth response, and reconstruction of climate

Measurements of conifers tree ring width from 280 dendrochronological sites were analyzed for Russia. Tree-ring series aligned by the cambial age of the ring (also known as regional growth curves) were fitted with negative-exponential curve using maximum and minimum ring width and a constant related to site as the parameters of approximation. Good correlations were obtained. These parameters allows to evaluate specific growth rate of radius and cross-sectional area of the stem. For each site average values of annual radial growth were calculated for two periods (1935-65 and 1965-95). Comparison of these values showed less average growth in later period for the majority of sites.

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Conclusion from Simon Kay Deputy Director British Council Russia

The British Council works to build to build mutually beneficial relationships between people in the UK and Russia, and to increase appreciation of the UK's creative ideas and achievements. One of the ways we do this is through science and technology. We aim to build links between scientific communities in the UK and Russia and to contribute to public understanding of science. Our work in climate change supports both of these approaches.

Last May the Zero Carbon City campaign had its Russia launch in Krasnoyarsk with the NorthSouthEastWest exhibition and associated activities and debates. We are pleased that the public events of last year are now being complemented by this scientific meeting at the Sukachev Institute of Forest.
To help answer the question, what does the British Council hope to achieve (?) the following is taken from our corporate statement on the ZeroCarbonCity programme. The programme will:

- Improve perceptions of the UK's contribution to tackling climate change, by developing understanding of its domestic commitments and international contribution.
- Build greater mutual understanding between the UK and other countries, by sponsoring the wide-ranging debate needed to promote long-term action on climate change.
- Build stronger ties between the UK and other countries, by linking people working on climate change, especially those outside national governments.

ZeroCarbonCity
Reacting to Climate Change
Increasing awareness, reducing emissions.

In the British Council we believe that much more can be done to facilitate a sharing of expertise between the UK and Russia, particularly with the Siberian regions of Russia where there is such a deep history of scientific research. We are also proud that by using the British Council's International Networking of Young Scientists programme (INYS) we are able to bring a group of younger scientists together.

I wish all participants a successful meeting and hope that during the meeting some new partnerships are forged and that both sides discover something new about both each others' science and cultures.

Simon Kay 21 January 2006