

2nd KOREA-ITALY JOINT SEMINAR ON CLIMATE CHANGE

December 16th, 2008

Aula Magna, University of Torino
Conference Room, Regional Museum of Natural Sciences

Organized by



University of Torino



Ewha Womans University



Severe Storm Research Center



Regional Museum of Natural Sciences

Under the patronage of



Provincia di Torino



Regione Piemonte

In the twentieth anniversary of the foundation of IPCC (Intergovernmental Panel on Climate Change), the scientific advisory body of the United Nations, Torino and its University want to be at the front line in trying to clarify the issue of climate change (providing an overview, popular but at the same time scientifically rigorous, of the state of the art in the contemporary research on climate).

The exhibition "The times they are changing", on display with great success since last March at the Regional Museum of Natural Sciences, has been enriched by several conferences held by various climate experts coming from around the world.

The Korea-Italy Joint Seminar on Climate Change is an initiative aiming to provide a periodic comparison between the scientists of the two Nations on issues related to climate change. After the first edition, held one year ago in Seoul at the Ewha Woman's University, Torino is hosting the second edition, which has found an optimal framework in the abovementioned exhibition.

Twenty years after the IPCC foundation, the scientists involved in climate have many more observed data available and much more powerful computer, and also the climate models, although not free of mistakes, have become increasingly reliable. The global warming and the anthropogenic contribution to the greenhouse gas emissions are no longer a hypothesis (as at the time of Svante Arrhenius, the Swedish physicist who theorized the impact of the use of fossil fuels in the energy balance of the earth-atmosphere-ocean system), but a certainty recognized by the whole scientific community.

In particular, the results of the EPICA project have shown that, over the past 800,000 years, the Earth's climate has fluctuated several times between two extremes, the ice ages and the interglacial periods, in one of which we are today. The concentrations of CO₂ and all major greenhouse gases show significant variations very well correlated with those of temperature, but their values are dramatically higher now than in the last 800,000 years, and it is necessary to go back up to few million years ago in order to find similar CO₂ concentration values.

For the near future, researchers agree that the greenhouse gases concentration will continue to grow for long time, even if its production will fall (event very unlikely to occur, at least globally). As a result, the average global temperature will increase significantly. The variation in the precipitations is less homogeneous among the models, but recent studies (i.e. PRUDENCE project) show that some macro-areas (among which the Alps, the Mediterranean, the Korea, and also the majority of tropical and equatorial regions, populated by billions of human beings) could experience drier (wetter) climates during the dry (wet) seasons, thus increasing both drought and flood events in number and strength.

The consequences of these changes could be heavily reflected on human activities and quality of life. This not only because of direct and indirect effects (increase of droughts, floods, extreme weather, loss of coastal areas, regression of mountain glaciers and loss of water resources, vegetation productivity, alteration of ecosystems) but also, and above all, because the speed of these changes could make very difficult the adaptation of human society and ecosystems.

The aim of this seminar is to underline some common aspects of climate change in Italy and Korea: the direct effects on the climate, present and future, and the indirect effects on environment, economy and politics. Our hope is to explain some of these issues, in order that the audience can understand what are the main effects of climate change, and why, in the world (more than in Italy), an increasingly high number of persons is worrying for the speeding-up of the climate changes.

Claudio Cassardo

2nd KOREA-ITALY JOINT SEMINAR ON CLIMATE CHANGE

Programme

Aula Magna - University of Torino

9.00 Opening of the Seminar

Prof. Ezio Pelizzetti, Chancellor of the University of Torino
Dr. Federico Spanna, Phytosanitary Service, Regione Piemonte
Eng. Silvano Ravera, General Director of ARPA (Regional Agency for Environmental Protection) Piemonte, Torino

9.40 Section 1 – Climate Change – Chairman: Dr. Silvia Ferrarese

9.40 Dr. Antonello Pasini (CNR, Rome)

A New Brain for Better Understanding Climate Behaviour

10.10 Prof. Seon Ki Park (Ewha Womans University, Seoul)

Assessing the Impact of Climate Change on Water Cycles

10.40 Prof. Claudio Cassardo (University of Torino)

Considerations on the Exceptional Heat Wave of Summer 2003

11.10 Coffee break

11.30 Dr. Eun-Soon Im (The Abdus Salam International Centre for Theoretical Physics, Trieste)

Potential Changes in Mean and Extreme Climate over Korea due to Global Warming Projected by the Regional Climate Model

12.00 Dr. Luca Mercalli (Italian Meteorological Society)

Climatic Change in Alpine Environment: Snow, Glaciers and Extreme Events

12.30 Student's Sub-Section

12.30 Mr. Marco Galli (University of Torino)

The Effects of Climate Change on the Energy Balance in the Po Valley and the Alpine Area

12.45 Miss Seung Min Oh (Ewha Womans University, Seoul, and University of Torino)

The Hydrological Effects of Climate Change in the Po Valley and the Alpine Area

13.00 **End of sub-Section and Section 1**

13.00 Lunch

Conference Room - Regional Museum of Natural Sciences

15.00 **Section 2 – Effects of Climate Change on Environment, Economy and Politics – Chairman: Prof. Seon Ki Park**

15.00 Prof. Roberto Burlando (University of Torino)

Bio-economics, Climate Change, Energy and Development Patterns: Preannounced Crises vs. Structural Adjustments

15.30 Prof. Jeong-In Kim (Chung-Ang University, Seoul)

Bali Road Map and the Key Issues in the Future

16.00 Prof. Yong Pyo Kim (Ewha Womans University, Seoul)

Below-cloud Scavenging Process: Comparison between the Modeling and the Measurement Results

16.30 Coffee break

17.00 Prof. Sang Don Lee (Ewha Womans University, Seoul)

Spatio-temporal Mismatches in Species Responses to Climate Change in Korea and Japan

17.30 Prof. Marco Deriu (University of Parma)

The Times of the Nature and the Times of the Politics: The Democracy in Front of the Environmental Crisis

18.00 **End of Section 2**

20.00 Dinner



Antonello Pasini

Researcher at the Institute of Atmospheric Pollution, National Research Council (CNR)

Leading scientist of a CNR project regarding the application of neural modeling to climate change studies

Author of neural models for climate-attribution studies and for forecasting physical variables in the boundary layer

Author of more than 60 scientific papers and of some books, and co-editor of the book "Artificial intelligence methods for the environmental sciences", in press on Springer

1990: Specialization in Physics of the atmosphere and Meteorology at the Italian Meteorological Service

1986: Specialization in General and Theoretical Physics at the University of Bologna

1985: Graduation in Physics at the University of Bologna

1999-present: Researcher at the National Research Council

1988-1999: Meteorologist at the Italian Meteorological Service

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A New Brain for Better Understanding Climate Behaviour

Antonello Pasini

Climate is the prototype of a complex system and understanding its behavior is a challenge for contemporary science.

The standard approach to the reconstruction of past climate and to the projection of future changes is founded on dynamical modeling. Here I present a complementary attitude in terms of a more "holistic" modeling strategy, by applying artificial intelligence techniques. These two distinct approaches show very similar results in reconstructing recent climate changes and they may be used together for forecasting purposes.

Several applications of a neural network model involving climate change (at different spatial scales) are shown and their results are presented and discussed. We will see that the adoption of an artificial brain in order to investigate the climate system leads to better understand its complex behavior and supplies us with a further instrument for deepening our knowledge and for fine-tuning our future actions on this vulnerable system.



Seon Ki Park

Professor of Environmental Science and Engineering

Director of Severe Storm Research Center, Ewha Womans University, Seoul, Korea

Editor-in-Chief, *Atmosphere*, Korean Meteorological Society

1990-1996: Ph.D. in Meteorology, University of Oklahoma

1984-1986: M.S. in Atmospheric Sciences, Seoul National University

1980-1984: B.S. in Meteorology, Seoul National University

2008-present: Professor, Dept. of Environmental Sciences and Engineering, Ewha Womans University (EWU)

2007-present: Director, Severe Storm Research Center, EWU

2007-2008: Associate Dean, College of Engineering, EWU

2006-2008: Chairman, Dept. of Env. Sci. & Eng., EWU

2003-2008: Associate Professor, Dept. of Env. Sci. & Eng., EWU

2001-2003: Assistant Professor, Dept. of Env. Sci. & Eng., EWU

2001-2001: Staff Scientist, NASA/Goddard Space Flight Center

1999-2000: Assistant Research Scientist, University of Maryland

1996-1999: Research Scientist, CAPS/CIMMS, University of Oklahoma

1987-1990: Weather Forecasting Officer, ROK Air Force

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Assessing the Impact of Climate Change on Water Cycles

Seon Ki Park

Climate change exerts significant impact on global and local water resources due to changes in water cycles. Water is included in all components of the climate, which makes understanding the influence of climate change quite complex. Thus understanding the behavior of water cycle, including water vapor, precipitation, soil moisture, etc., is utmost important in adaptation to climate change. In this study, trend of total precipitable water will be analyzed using the MODIS data since 2001. In addition the Land Surface Process Model (LSPM) will be employed to investigate characteristic behavior of major components of water cycle based on different climate change scenario, especially in the East Asia. The database of water cycle components constructed by the LSPM will be useful in policy making in management of water resources.



Claudio Cassardo

Associate Professor of Environmental Physics, Physics of Climate and Meteorology

Director of the Master in meteorology and climatology

Editor of the Journal of Chongqing University (English Edition) and of the International Journal of Hydrological Research (IJHR)

Scientific responsible of the exhibition "I tempi stanno cambiando" at the Regional Museum of Sciences, Torino, Italy

Responsible of the two meteorological stations of the Torino Univ.

1990-1993: Post-Doc grants from University and Polytechnic, Torino, Italy

1987-1990: Ph. D. in Geophysics, University of Genoa, Italy

1982-1986: Graduation in Physics, University of Torino, Italy

2000-Present: Associate Professor, University of Torino

1993-2000: Researcher, University of Eastern Piedmont, Italy

1990-1993: Post-Doc grants from University and Polytechnic, Torino, Italy

1986-1987: Weather Forecasting Officer, Italian Meteorological Service

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Considerations on the Exceptional Heat Wave of Summer 2003

Claudio Cassardo

During June, July and August 2003, most of western and central Europe was affected by an exceptional heat wave, which caused many impacts on human life and activity. Some important consequences of these abnormally high temperatures recorded in Piedmont as well as in many European countries were the drought conditions, the acceleration of the glacier ablation, and the increase of the frequency of forest fires.

Analysing the period with the help of a SVAT (Soil Vegetation Atmosphere Transfer) scheme, it was possible to evidenciate the physical mechanism which has contributed to exacerbate the heat wave. The amount of global and net radiation was much larger than normal, and this excess of energy available in the surface layer was converted mainly in an increase of the sensible heat flux, while the latent heat flux was reduced by the scarcity of soil moisture due to the lack of precipitations in the previous winter.



Eun-Soon Im

Visiting Scientist - Earth System Physics - Weather and Climate - The Abdus Salam International Centre for Theoretical Physics

Permanent affiliation: Research Scientist - National Institute of Meteorological Research, Korea

Research Interests: Regional climate change with a focus on the Korean Peninsula, Dynamical downscaling using a regional climate model, Evaluation of regional climate simulation

2000-2006: Ph.D. in Atmospheric Sciences, Busan National University (BNU)

1998-2000: MS in Atmospheric Sciences, BNU

1994-1998: BS in Atmospheric Sciences, BNU

2007-present: Visiting Scientist, ESP, ICTP, Italy

2004-2007: Research Scientist, Climate Research Laboratory, METRI, Korean Meteorological Administration

2003-2004: Research Scientist, Remote Sensing Research Laboratory, METRI, Korean Meteorological Administration

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Potential Changes in Mean and Extreme Climate over Korea due to Global Warming Projected by the Regional Climate Model

Eun-Soon Im

The climate of Korea has experienced a gradual warming throughout the twentieth century in agreement with the warming observed at the global scale. As the global mean surface temperature is projected to further increase in the twenty-first century, it is reasonable to expect that Korea will be strongly vulnerable to climate change. In fact, discernable evidences of increased rainfall intensity, shifts of climatic seasons and lengthening of the growing season have already been observed over Korea. It is thus important that credible scenarios of climate change over Korea are developed in order to evaluate related impacts and adaptation/mitigation measures. In this study, we present an analysis of future climate change over Korea from the downscaled climate change scenario. For simulating the fine-scale climate information over Korea characterized by complex topography and coastline, we developed the one-way double-nested regional climate model system (RegCM3). The mother domain covers East Asia at 60 km grid spacing while the nested domain focuses on the South Korean peninsula at 20km grid spacing. Using this modeling system, we perform the dynamic downscaling of the ECHAM5/MPI-OM A1B scenario covering a 130-year long period (1971-2100). To obtain the confidence in a future climate projection, we first evaluate the reference simulation (1971-2000) against observation. We then address the future change aspects in response to anthropogenic emission forcing. The mean climate state as well as the frequency and intensity of daily extreme events are investigated at various temporal and spatial scales. In addition, the multi-decadal length of our simulation allows us to examine interdecadal variability and trends of the climate change signal, thereby providing a more reliable projection. It is expected that this study is significant as it provides the baseline information for detecting and guiding the regional climate change over Korea due to global warming.



Luca Mercalli

President of the Italian Meteorological Society (IMS)

Founder and Director of Nimbus, the official journal of the IMS

Specialized in climatology and alpine glaciology

Author of about 100 scientific publications, about 700 divulgation papers on newspapers and several magazines, and of several popular books

Appeared several times as meteorologist and opinion maker in many television transmissions

2000-present: invited Professor of climatology and meteorology at several universities, specializations courses and professional formation

1993-present: responsible of the meteorological observatory of Real Collegio Carlo Alberto in Moncalieri, founded in 1865

1986-1990: employed at the agro-meteorological office of the Regione Piemonte

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Climatic Change in Alpine Environment: Snow, Glaciers and Extreme Events

Luca Mercalli

Mountain environment is particularly sensitive to climatic change. In Western Alps, snow pack was monitored for a century, and shows a significant reduction in amount and duration. Glacier area show a 50% reduction in the period 1850-2000. Mass balance measurements in Gran Paradiso mountain range give a mean recent loss of about 1.7 m water equivalent yr^{-1} , compared with -1.1 m in the 1992-2001 period. Glacial hazards like supraglacial lakes threatened alpine villages, as in the case studies of Rocciamelone and Belvedere, included in the Glaciorisk European project.

This collapse of mountain cryosphere is consistent with the temperature increase measured in local weather observatories during the last two centuries, accounting for 1.1 °C following the result of the European project Alp-Imp and the data base Histalp.



Marco Galli

Post-graduate grant student at the University of Torino

Argument of thesis: Land Surface Models and initialization of soil moisture for mesoscale models

2005-2007: M.S. in Environmental and Biomedical Physics, University of Turin

2002-2005: B.S. in Physics, University of Turin

2007-present: Grant student at the University of Turin

2007: Weather forecaster for ARPA Piedmont regional weather service

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The Effects of Climate Change on the Energy Balance in the Po Valley and the Alpine Area

Marco Galli

In the latest years the consideration of the importance of the land-surface processes increased regarding to meteorological and climatological studies. For example, a correct description of convective phenomena strongly depends on a right description of soil moisture, soil temperature, and energy and water mass exchanges between soil and atmosphere.

The effects of climate change on the soil-atmosphere interface energy balance will be analyzed. The goal of the ongoing work is to create a dataset which includes the variables that describe the soil hydrologic and energy balance in the present and future climate for a mesoscale river basin, the Po Valley, and its surrounding mountains, the Alps.



Seung Min Oh

Grant student of the World Wide Style Project for the University of Torino

Argument of study: Land Surface Models and initialization of soil moisture for mesoscale models

2004-2008: B.S. in Environmental Science and Engineering, Ewha Womans University

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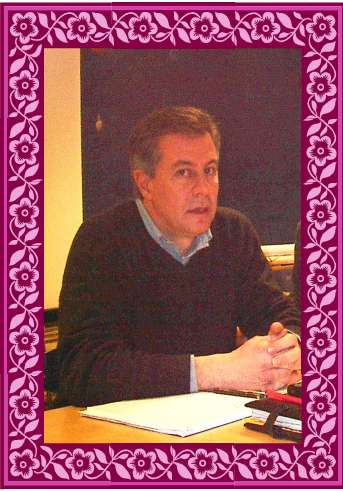
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The Hydrological Effects of Climate Change in the Po Valley and the Alpine Area

Seung Min Oh

Nowadays the climate change is a critical issue through its impact on every corner of the world. To diagnose the effects of the climate change on the hydro-meteorological components, the energy and hydrological budget under the current and future climate for the Po valley and the Alpine area is simulated using a Soil-Vegetation-Atmosphere Transfer (SVAT).

This presentation will be focused on the hydrological parts, especially the soil moisture, due to its importance in the extreme events such as floods or droughts.



Roberto Burlando

Lecturer in Economics, Department of Economics, Univ. of Torino
Hon. Research Associate, Economic Psychology Group, School of Psychology, Exeter
Treasurer of International Association for Research in Economic Psychology (IAREP)
Editorial Board Member of Journal of Economic Psychology and Journal of Socio-Economics
1984: Master of Science in Economics, London School of Economics
1980: Laurea in Political Sciences, specialized in Economics, University of Turin

2001-present: Member of the Editorial Board, Journal of Socio Economics
1998-present: Recognized teacher for the Experimental Economics course (MSc in Economic Psychology) at the Exeter School of Psychology
1998-2002: Treasurer and Member of the Managing Committee of Iarep (International Association for Research in Economic Psychology)
1997-2004: Hon. Research Associate, Economic Psychology Group, School of Psychology, University of Exeter
1996-present: Member of the Editorial Board, Journal of Economic Psychology
1993-2002: Italian country representative in the Iarep Board

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Bio-economics, Climate Change, Energy and Development Patterns: Preannounced Crises vs. Structural Adjustments

Roberto Burlando

Climate change and fossil fuels shortage: evidences and analyses.

Technical analyses

Cost-benefit analyses – the Stern review

Global scenario analysis

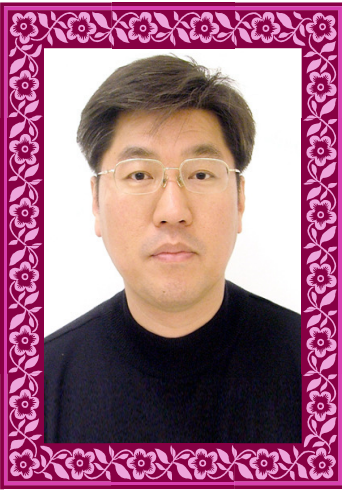
Crises and/or structural changes?

The “cruel dilemma” revised

Globalization, consumerism and “rogue” economies

Development patterns

Theoretical requirements and changes to face the new challenges



Jeong-In Kim

Lecturer at the Chung-Ang University and Seoul National Education University

Consultant for UNESCAP, KEPCO, and other Ministry Committees

Awarded in 2000 with the Environmental Minister's Award for the Excellent Achievement and in 1995 with the Best Research Award at POSRI

1987-1993: Ph.D. in Applied Economics, University of Minnesota

1985-1986: M.S. in Applied Economics, University of Wisconsin

1977-1985: B.A. in Economics, Chung-Ang University

2005-present: Consultant for the UNESCAP (Bangkok) in "Green Growth and Eco-Efficiency" Sustainable Management Committee Member, Hyundai Steel Co.

2005-present: Sustainable Management Committee Member for KEPCO (West Power Electric Co.)

2000-2001: Special Advisor for the Environmental Policy Analysis under the Office of Prime Minister

1998-present: Committee Member in 'Responding Global Warming Issues in Korea' Ministry of Trade, Commerce and Industry, Ministry of Envir., Ministry of Construction and Transp.

1998-present: Committee Member in 'International Emission Trading and its Use' Ministry of Environment

1998-present: Consultant for the "Global Warming and Reduction of the CO2 in Energy Intensive Industry", KEMCO

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Bali Road Map and the Key Issues in the Future

Jeong-In Kim

After the Bali decision in 2007, many countries are trying to make some progress on the climate change issues. When we think about the Bali road map, several issues such as NAMA, MRV (Measurable, Reportable and Verifiable) and sectoral approaches will be hot issues in the UNFCCC. In this paper, we review Korean situation government's strategy for the next COP and try to suggest some ways of handling for these issues. Finally we will give some suggestions for the Korean government as well as UNFCCC.



Yong Pyo Kim

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Research interests:

- Interactions between gaseous species and aerosol components
- Modeling of aerosol dynamics and equilibrium
- Measurements of ambient trace species.
- Air pollution control strategies

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2004-present: Professor at the EWU

2000-2004: Associate Professor at the EWU

1992-2000: Principal Research Scientist at the KIST (Korea Institute of Science and Technology)

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1983-1986: Research Scientist at the Korea Advanced Institute of Science and Technology

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Below-cloud Scavenging Process: Comparison between the Modeling and the Measurement Results

Yong Pyo Kim, Chang Hoon Jung*, Soo Ya Bae

We have developed an expression for the below-cloud scavenging process based on the below-scavenging coefficient form derived by Bae et al. (J. Aerosol Sci., 37, 1507, 2006). Using the derived expression, the dynamics of particle size distribution by the below-cloud scavenging process is calculated and verified with the measurements. The removal rate calculated with the derived expression is smaller by $10^{-2} \sim 10^{-3}$ than the measured data. Similar comparison results were also reported by other researchers. When thermophoresis, diffusiophoresis, and electrical charge effect are added to the conventional mechanisms such as Brownian diffusion, interception, and impaction, the calculated scavenging coefficient becomes larger up to 20 times. However, the differences between the calculated and measured scavenging coefficients are still large.

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Sang Don Lee

Professor of Environmental Ecology at the Department of Environmental Science and Engineering, College of Engineering, Ewha Woman's University

Division chair of Environmental engineering and Food Technology and Department Head

1993: Ph.D. in Wildlife Ecology, University of Washington

1985: M.S. in Wildlife Ecology, Texas Tech University

1983: B.S. in Forest Resources, Seoul National University

2008-present: Editorial Board of Open Ecology Journal

2006: Visiting Professor of The University of Tokyo

2004-present: Vice President of Korean Council of Conservation of Nature, of Korean Water Resources Corporation and of EQA/ICC International Environment Institute

2004-present: Journal of Korean EIA (associate editor)

2002-present: Journal of Korean Env. Biology (associate editor)

1997-2002: Korea Env. Institute (Senior Research Associate)

1994-1995: Univ. of Toronto, Div. of Life Sciences (post-doc)

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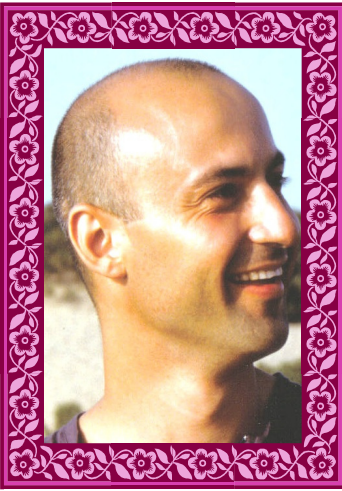
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Spatio-temporal Mismatches in Species Responses to Climate Change in Korea and Japan

Sang Don Lee

A comprehensive understating of species phenological responses to global warming will require spatial- and temporally-extensive observations. Here we present an analysis of the phenological response to climate variation of twelve species: six plants, three birds, a frog, and two insects. Phenology was monitored at 176 meteorological stations in Japan and South Korea from 1953 to 2005, and in some cases even longer. We developed a hierarchical Bayesian model to examine the complex interactions of temperature, site effects, and latitude on phenology. Results show species-specific variation in the magnitude and the direction of their responses to increasing temperature, which also differ from site to site. At most sites the differences in phenology among species are forecast to become greater with warmer temperatures. Our results challenge the assertion that trends in one geographic region can be extrapolated to others, and emphasize the idiosyncratic nature of the species response to global warming.



Marco Deriu

Researcher in "Sociology of cultural and administrative processes" and visiting Professor of Sociology and Geography in several Italian universities

Author or curator of 9 books and 32 essays in national journals and collective books, and of 9 papers in national journals

His research interests are the studies on genders and generations, cultural and communicative dimensions in international processes, globalization, post-development, wars, solidarity practices, international collaborations

2004-2005: Specialization in "Ethics, Politics, Economy, Conflicts and Intersections", University of Parma

2000-2002: Ph.D. in Sociology, University of Parma

1996: graduated in Political Sciences, University of Bologna

2006-present: Researcher in "Sociology of cultural and administrative processes", University of Parma

2005-present: founding member of the "Association for the decrease"

2004-present: redactor for the four-monthly Italian Journal "The society of the individuals"

2003-present: contract Professor of Sociology and Geography at several Universities

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The Times of the Nature and the Times of the Politics: The Democracy in Front of the Environmental Crisis

Marco Deriu

Nowadays, in the Western societies, democracy represents the horizon of the political glance. But this glance is showing its limits in front of the need to set an ecological sustainability and a social equity. Maybe, in order to understand something new and different, we should concentrate on the limits of democracy. Issues like the ecological crisis, or the limits of development, are quite new fields for the democratic thinkers, and not only for the politicians. The democratic theory has considered nature and its resources as an un-thought and endless assumption, but when facing problems like the depletion of some key resources, the climatic change, the large-scale extinction of some living species, we can't but undertake a deep discussion about democracy. Any program of change needs to confront with the necessity to study the possible transformation of the democratic theory, and of the ways how the contemporary political systems are organized and how they do work. As far as ecological crisis is concerned, the democratic societies face today at least four different problems:

- 1) the consensus-consumption nexus, that is the implicit link between socio-political balance and the maintenance of a growth society, both at a material and at a symbolic level;
- 2) the effective conditions and possibility for a democratic participation, in a period when the political institutions lose their power, in front of external decisional arenas;
- 3) the ties of democratic power, that is the relation between democratic legitimacy, and environmental, social and generational limits;
- 4) the temporal coordinates of the democratic politics, that is the time frames on which the democratic discussion and decision system are based.

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