



UoAthens Climate Research Group

Group leader: [Professor Costas Varotsos](#)

*Laboratory of Upper Air, Faculty of Physics,
Division of Environmental Physics and Meteorology,
University of Athens*

1. About Us

The Climate Group is dedicated to advancing current understanding on climate change including: climate variability (e.g. non-linear climate dynamics), ozone dynamics (e.g. variability in columnar ozone and its profile), aerosol dynamics, radiation fields, natural disasters. This group has established and operates two WMO Stations (since 1989) and a UN Station (since 2002) publishing regularly the data obtained in international database

Main Team Members

- Varotsos Costas, Professor.
- Tzanis Chris, Lecturer.
- Efstathiou Maria, Post-Doctoral Researcher
- Christodoulakis John, Ph.D. candidate.
- 10 Students

We operate internationally (i.e., [IPY](#)) conducting research on the following thematic topics:

2. Research Topics

Climate variability studies

- **Climate variability (including natural oscillations)**
- **Non-linear dynamics of climate**
- **Biogeochemical Cycles in Globalization and Sustainable Development**
- **Modeling the interactive cycles of greenhouse gases and other chemicals**
- **Dynamical systems theory and stochastic processes in climate modelling**
- **The monitoring of chemical substances cycle in the environment**
- **Nature-Society system and climate as its interactive component**
- **Atmosphere-hydrosphere-cryosphere-lithosphere-biosphere coupled feedbacks**

Ozone dynamics studies

- **Variability of the global ozone column and vertical ozone profiles**
- **Tropospheric and Stratospheric ozone dynamics**
- **Variability of the solar ultraviolet radiation**
- **Ozone and climate**

Aerosol dynamics studies

- **Aerosol and chemical processes in the atmosphere**
- **Aerosol formation processes and evolution**
- **Interactions between aerosols and clouds**
- **Aerosol long-range transport and deposition**
- **Climatic impacts of atmospheric aerosols**

Natural Disasters studies

- **Natural disasters and survivability of ecological systems**
- **Biocomplexity as a predictor of natural disasters**
- **Natural disasters and mankind**
- **Monitoring of natural disasters**
- **Forecast of natural disasters**
- **Interactivity of climate and natural disasters**

3. Research Projects in the last 5 years

- *Non-linear Dynamics of the Remotely Sensed Atmospheric Data and Modelling; Implications to Climate & Earth System Science; Case studies for Athens (Greece) and Beijing (China). DRAGON 3, Project Id. 10529, University of Athens, 2013-2016, Dr. Yong Xue SMIEEE CPhys, Institute of Remote Sensing Applications, Chinese Academy of Sciences*

The objective of the project is to explore the temporal and spatial variability of aerosol optical depth and atmospheric ozone content as they are considered crucial atmospheric parameters for the dynamics of the Earth's climatic system. The investigation is performed by utilizing modern tools of non-linear analysis.

- *Elaboration of Technologies for Diagnosis of Tropical Hurricanes Beginning in Oceans with Remote Sensing Methods. ISTC (International Science and Technology Center) Project No.3827, University of Athens, 2007-2012, Russian Academy of Sciences/Institute of Radioengineering and Electronics/Fryazino Branch, Polytechnic University of Catalonia, Università di Roma "La Sapienza"/Dipartimento di Ingegneria Elettronica*

The main aim of the project is elaboration of technologies for diagnosis of the tropical hurricanes beginning in those oceanic areas, where the tropical hurricanes are observed most frequently, basing on the data of monitoring from: DMSP satellites, satellites METEOR 3M and EOS Aqua, measurements from vessels and buoys, mathematical modelling of the ocean-atmosphere system parameters.

- *UN ECE ICP, International co-operative Programme on Effects on Materials, including Historic and Cultural Monuments, University of Athens, 2005-on going. Few of the collaborators: Swerea KIMAB AB, Norwegian Institute for Air Research (NILU), CENIM – National Centre for Metallurgical Research.*

The primary objective is to collect information on corrosion, soiling and environmental data in order to evaluate dose/response functions and trend effects on various materials. The developed dose/response functions has several uses including calculation of acceptable corrosion rates and pollution levels, mapping areas of increase risk of corrosion, calculation of corrosion costs due to air pollution.

- *Atmospheric aerosol sources enquiry; Study of the impacts of aerosol loading on human, environment and materials. European Space Agency, 2014-2016, University of Athens – ESA.*

The goal of this study is the investigation of aerosol impacts on human, environment and materials. Satellite data are going to be used in order to identify and parameterize those impacts. In addition, aerosol loading changes are going to be studied in an effort to reveal unknown sources and/or mechanisms which contribute to these changes.

4. Our contribution to some outstanding research campaigns

- **SESAME (Newsletter 15) campaign: Ozone laminae in O₃ vertical profile.**
- **Match campaign: A Lagrangian approach for the assessment of the chemically induced ozone loss.**
- **ENVISAT data campaign: Validation of ENVISAT observations of greenhouse gases**
- **IPY campaign: 2007-2008**

5. Distinctive contributions to the Climate Science

Our publications that triggered a large interest of the international climate community are the following:

- Varotsos C.: The southern hemisphere ozone hole split in 2002, Environmental Science and Pollution Research, 9 (6), 375-376, Nov. 2002.**

It was thought, prior to September 2002 that a major stratospheric sudden warming could happen only in the Northern Hemisphere. This paper suggested that both the smaller-sized ozone hole over Antarctica and its splitting into two holes took place due to an unprecedented major stratospheric sudden warming caused by very strong planetary waves propagated in the Southern Hemisphere.

This paper was included (after invitation-permission) as the first highlight in **Highlights of United Nations Environmental Programme**: <http://www.unep.ch/ozone/pdf/the-southern-hemisphere-ozone-hole-split-2002.pdf>.

b. Varotsos C.: What is the lesson from the unprecedented event over Antarctica in 2002? Environmental Science and Pollution Research, 10 (2), 80-81, 2003.

The analysis performed in this paper showed that the ozone hole split in 2002 occurred not only in the stratosphere but that it has also been extended into the lower altitudes (upper troposphere)

c. Varotsos C.: The extraordinary events of the major, sudden stratospheric warming, the diminutive Antarctic ozone hole, and its split in 2002, Environmental Science and Pollution Research, 11 (6), 405-411, 2004.

This follow-up paper on this subject has been recently identified by Thomson-ISI to be one of the most cited recent papers in the field of Environment/Ecology (see his commentary at: <http://esi-topics.com/> and <http://esi-topics.com/nhp/2006/march-06-CostasVarotsos.html>).

d. Varotsos C.: Power-law correlations in column ozone over Antarctica, International Journal of Remote Sensing, 26, 3333–3342, 2005.

This paper shows that processes based on the nonlinear nature of the atmospheric dynamics could probably address the question “What caused the southern hemisphere to exhibit very strong planetary waves in 2002?” The evidence is based on the new finding that the fluctuations of the total ozone content over Antarctica exhibit long-range correlations

e. Varotsos C., Ondov J., and Efstathiou M.: Scaling properties of air pollution in Athens, Greece and Baltimore, Maryland, Atmospheric Environment, 39 (22), 4041-4047, 2005.

This paper suggests that air pollution exhibits scaling effect. More precisely, persistent long-range power-law correlations in the fluctuations of daytime and nighttime ozone and nitrogen oxide concentrations with lag times ranging from 4 days to 5 years were detected with more intense correlations (“stronger memory”) during daytime. In addition, persistent long-range power-law correlations were also detected for PM10 and PM2.5 fluctuations in Athens and East Baltimore

f. Varotsos C, and Kirk-Davidoff D.: Long-memory processes in ozone and temperature variations at the region 60°S-60°N, Atmospheric Chemistry and Physics, 6, 4093-4100, 2006.

This paper contributes to the exploration of the scaling dynamics in global atmospheric ozone and temperature. It has been identified by Thomson-ISI to be one of the most cited papers

in the field of Geosciences (Thomson Reuters ScienceWatch® website on Monday, August 1, 2011, at the link: <http://sciencewatch.com/dr/erf/2011/11augerf/11augerfVaro/>).

g. Cracknell A.P., Varotsos C.A.: New aspects of global climate-dynamics research and remote sensing. International Journal of Remote Sensing, 32, 579-600, 2011.

This paper describes how new research tools in physics may be used to achieve a better understanding of the variability of the climate system.

The “Weather” (journal of the Royal Meteorological Society) commented on this paper: “New tools for global climate-dynamics research”, Weather – October 2011, Vol. 66, No. 10, doi:10.1002/wea.712.

h. Varotsos, C.A., Tzani, C.: A new tool for the study of the ozone hole dynamics over Antarctica. Atmospheric Environment, 47, 428-434, 2012.

This paper has tackled what is described as the truism that time poses one of the greatest challenges to climate evolution. It suggests that rather than analyzing various climate parameters in the conventional time domain, a new not-continuous time domain termed natural time should be used. Then novel dynamical features hidden behind time series can emerge and impending major events in climate system can be predicted.

The “Weather” (journal of the Royal Meteorological Society) commented on this paper: “A new time domain for prediction of impending major climate events”, Weather – February 2012, Vol. 67, No. 2, doi:10.1002/wea.1848.

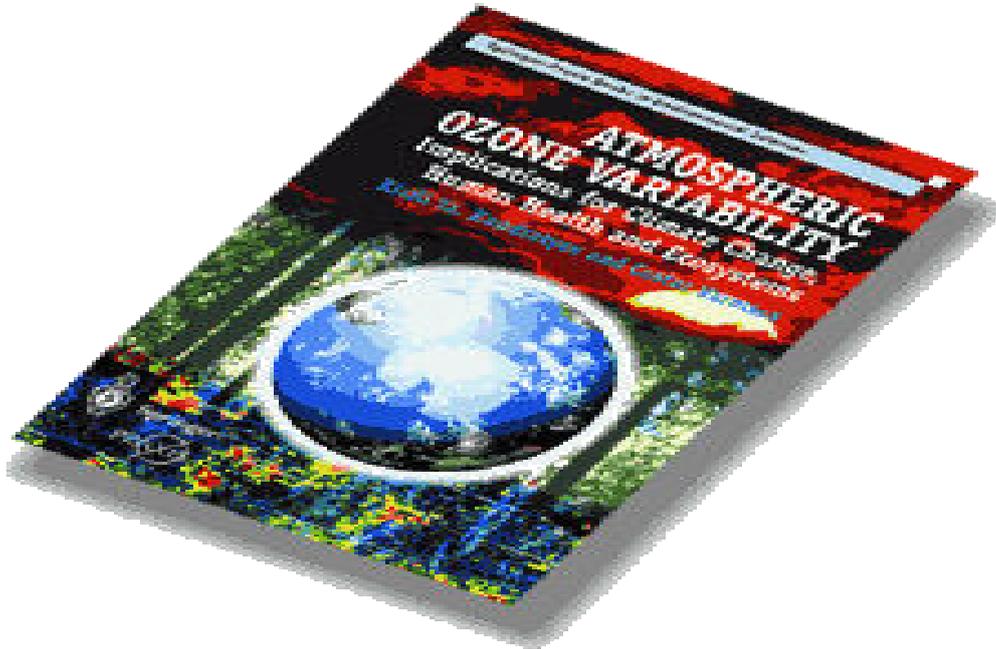
6. Recent publications of our group

- Varotsos C.A., Cracknell A.P., and Tzani C.: **Major atmospheric events monitored by deep underground muon data** Remote Sensing Letters, 1, 169-178, 2010.
- Efstathiou M.N., and Varotsos C.: **On the altitude dependence of the temperature scaling behaviour at the global troposphere**, International Journal of Remote Sensing, 31, 343-349, 2010.
- Varotsos C., and Zellner R.: **A new modeling tool for the diffusion of gases in ice or amorphous binary mixture in the polar stratosphere and the upper troposphere**, Atmospheric Chemistry and Physics, 10, 3099-3105, 2010.
- Tzani C., Theodorakopoulou K., Theodorakopoulos P., and Varotsos C.: **Tsunamis among the natural disasters**, Fresenius Environmental Bulletin, 19, 1385-1403, 2010.
- Eleftheratos K.; Zerefos C. S.; Varotsos C.; et al.: **Interannual variability of cirrus clouds in the tropics in El Nino Southern Oscillation (ENSO) regions based on International Satellite Cloud Climatology Project (ISCCP) satellite data**, International Journal of Remote Sensing 32, 6395-6405, 2011.
- Eleftheratos K.; Zerefos C. S.; Gerasopoulos E., Isaksen, I.S.A., Rognerud, B., Dalsoren, S. Varotsos C.: **A note on the comparison between total ozone from Oslo CTM2 and SBUV satellite data**, International Journal of Remote Sensing 32, 2535-2545, 2011.
- Cracknell A.P., Varotsos C.A.: **New aspects of global climate-dynamics research and remote sensing Preface** International Journal of Remote Sensing 32, 579-600, 2011.

- Efstathiou M.N.; Tzanis C. Cracknell A.P., Varotsos C.A.: **New features of land and sea surface temperature anomalies** International Journal of Remote Sensing 32, 3231, 2011.
- Tzanis C.; Varotsos C.; Christodoulakis J., Tidblad, J., Ferm, M., Ionescu, A., Lefevre, R.-A., Theodorakopoulou, K., Kreislova, K., **On the corrosion and soiling effects on materials by air pollution in Athens, Greece** Atmospheric Chemistry and Physics: 11, 12039-12048, 2011.
- Varotsos, C., Efstathiou, M., Tzanis, C., Deligiorgi, D.: **On the limits of the air pollution predictability: The case of the surface ozone at Athens, Greece**, Environmental Science and Pollution Research 19 (1), 295-300, 2012.
- Efstathiou, M.N., Varotsos, C.A.: **On the 11 year solar cycle signature in global total ozone dynamics**, Meteorological Applications doi:10.1002/met.1287, 2012.
- Varotsos, C.A., Tzanis, C.: **A new tool for the study of the ozone hole dynamics over Antarctica**, Atmospheric Environment 47, 428-434, 2012.
- Efstathiou, M., Tzanis, C., Varotsos, C., Deligiorgi, D.: **The Gutenberg-Richter law for earthquakes in air pollution episodes: A case study for Athens, Greece**, Acta Geophysica 60 (1), 280-290, 2012.
- Varotsos, C.A., Cracknell, A.P., Tzanis, C.: **The exceptional ozone depletion over the Arctic in January-March 2011**, Remote Sensing Letters 3 (4), 343-352, 2012.
- Efstathiou, M.N., Varotsos, C.A.: **Intrinsic properties of Sahel precipitation anomalies and rainfall**, Theoretical and Applied Climatology, doi:10.1007/s00704-012-0605-2, 2012.
- Varotsos, C.A., Melnikova, I., Efstathiou, M.N., Tzanis, C.: **1/f noise in the UV solar spectral irradiance**, Theoretical and Applied Climatology, doi:10.1007/s00704-012-0697-8, 2012.
- Tidblad, J., Kucera, V., Ferm, M., Kreislova, K., Brüggerhoff, S., Doytchinov, S., Screpanti, A., Grøntoft, T., Yates, T., de la Fuente, D., Roots, O., Lombardo, T., Simon, S., Faller, M., Kwiatkowski, L., Kobus, J., Varotsos, C., Tzanis, C., Krage, L., Schreiner, M., Melcher, M., Grancharov, I., Karmanova, N.: **Effects of Air Pollution on Materials and Cultural Heritage: ICP Materials Celebrates 25 Years of Research**, International Journal of Corrosion, 496321, doi:10.1155/2012/496321, 2012.
- Varotsos, C., Ondov, J., Tzanis, C., Öztürk, F., Nelson, M., Ke, H., Christodoulakis, J.: **An observational study of the atmospheric ultra-fine particle dynamics**. Atmospheric Environment, 59, 312-319, 2012.
- Varotsos C.A., Tzanis C.: **A new El Niño Southern Oscillation forecasting tool based on Southern Oscillation Index**. Atmospheric Chemistry and Physics Discussions, 12, 17443-17463, 2012.
- Krapivin, V.F., Soldatov, V.Yu., Varotsos, C.A., Cracknell, A.P.: **An adaptive information technology for the operative diagnostics of the tropical cyclones; solar-terrestrial coupling mechanisms**, Journal of Atmospheric and Solar-Terrestrial Physics, 89, 83-89, 2013.
- Varotsos, C.A., Efstathiou, M.N.: **On the scaling effect in global surface air temperature anomalies**, Atmospheric Chemistry and Physics, 13, 5243-5253, 2013.
- Varotsos, C.A., Melnikova, I., Efstathiou, M.N., Tzanis, C.: **1/f noise in the UV solar spectral irradiance**, Theoretical and Applied Climatology, 111 (3-4), 641-648, 2013.
- Efstathiou, M.N., Varotsos, C.A.: **On the 11 year solar cycle signature in global total ozone dynamics**, Meteorological Applications, 20, 72-79, 2013.
- Varotsos, C.A., Melnikova, I., Efstathiou, M.N., Tzanis, C.: **On the 1/f noise in the UV solar spectral irradiance**, Theoretical and Applied Climatology, 114, 725-727, doi: 10.1007/s00704-013-0850-z, 2013.

- Varotsos, C.A., Efstathiou, M.N.: **Is there any long-term memory effect in the tropical cyclones?** Theoretical and Applied Climatology, 114, 643-650, doi:10.1007/s00704-013-0875-3, 2013.
- Varotsos, C.A.: **The global signature of the ENSO and SST-like fields**, Theoretical and Applied Climatology, 113, 197-204, 2013.
- Varotsos C.A., Efstathiou M.N., Cracknell A.P.: **Plausible reasons for the inconsistencies between the modelled and observed temperatures in the tropical troposphere**, Geophysical Research Letters, 40, 4906-4910, DOI: 10.1002/grl.50646, 2013.
- Varotsos, C.A., Efstathiou, M.N., Cracknell, A.P. **Sharp rise in hurricane and cyclone count during the last century**, Theoretical and Applied Climatology, DOI: 10.1007/s00704-014-1136-9, 2014.
- Varotsos, C.A., Franzke, C.L.E., Efstathiou, M.N., Degermendzhi, A.G.: **Evidence for two abrupt warming events of SST in the last century**, Theoretical and Applied Climatology, DOI: 10.1007/s00704-013-0935-8, 116 (1-2), 51-60, 2014.
- Varotsos, C., Christodoulakis, J., Tzani, C., Cracknell, A.P.: **Signature of tropospheric ozone and nitrogen dioxide from space: A case study for Athens, Greece**, Atmospheric Environment, 89, 721-730, 2014.
- Varotsos, C.A.; Melnikova, I.N.; Cracknell, A.P.; Tzani, C.; Vasilyev, A.V.: **New spectral functions of the near-ground albedo derived from aircraft diffraction spectrometer observations**, Atmospheric Chemistry and Physics, 14, 6953-6965, 2014.

7. Books co-authored by Prof. C. VAROTSOS discussing the key issues of Climate Change (Published by Springer-Praxis)



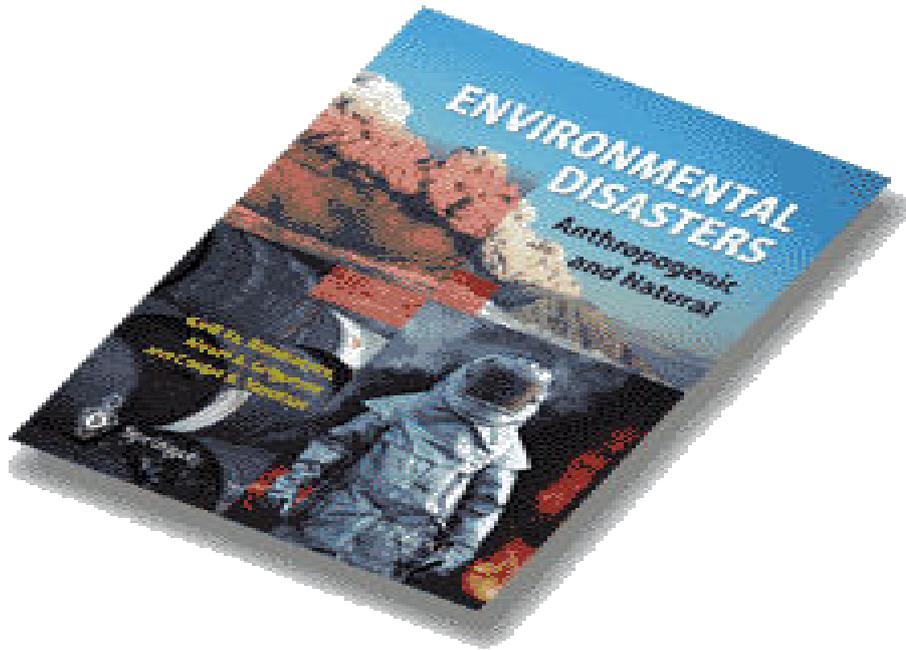
by Kirill Ya. Kondratyev and Costas A. Varotsos
ISBN-13: 978-1852336356617, 758 pages, 2000

Editorial Review

It is well known that the ozone layer protects the Earth and its life from the harmful ultraviolet (UV) radiation of the sun. It has also been discovered that this layer was being depleted to the extent that holes were appearing in it by several substances (such as CFCs) which have since been banned. Despite this action recent studies have shown that the ozone layer is still being depleted at a rapid rate and that holes are now beginning to appear over areas which are quite densely populated. Atmospheric Ozone Variability examines the potential problems that depletion of ozone causes in relation to climate change, human health and the ecosystem. It also examines the ways in which ozone is formed and depleted as being fundamental to the debate.

CONTENTS

Observed variability of total ozone column and vertical ozone profiles
Stratospheric ozone formation processes
Surface ultraviolet radiation changes due to total ozone variations
Tropospheric ozone
Ozone and climate



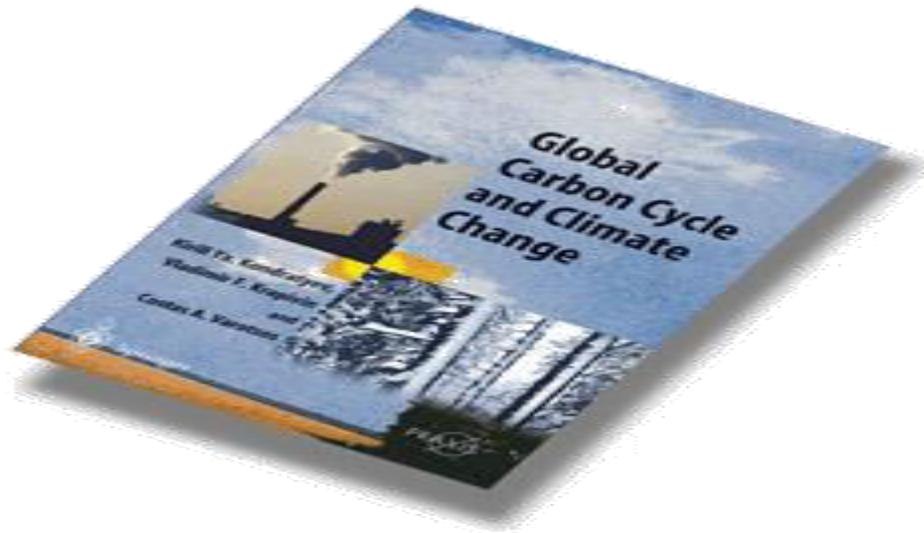
by Kirill Ya. Kondratyev, Alexei A. Grigoryev, Costas A. Varotsos
ISBN-13: 978-3540433033, 400 pages, 2002

Editorial Review

As the impacts of environmental disasters on populations and their economic activity increase, the assessment of risk from such catastrophic events becomes more urgent not only for humankind, but also for other living organisms. This book details the problems caused by such environmental disasters and discusses possible mitigation methods, including risk mapping using satellite monitoring data.

CONTENTS

Natural and anthropogenic environmental disasters: The problem of risk;
Natural and anthropogenic disasters in the history of civilization;
Natural disasters and their consequences;
Some anthropogenic disasters and their consequences;
Global and regional 'slow' disasters;
Satellite monitoring of natural and anthropogenic disasters.



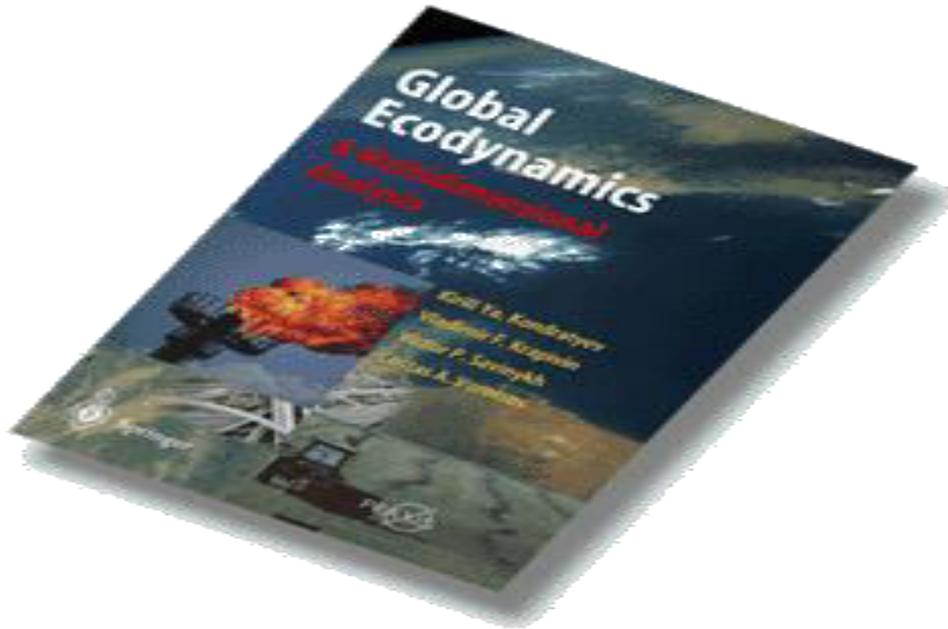
by **Kirill Ya. Kondratyev, Vladimir F. Krapivin, Costas A. Varotsos,**
ISBN-13: 978-3540008095, 400 pages, 2003

Editorial Review

Professor Kondratyev and his team consider the concept of global warming due to the greenhouse effect and put forward a new approach to the problem of assessing the impact of anthropogenic processes. Considering data on both sources and sinks for atmospheric carbon and various conceptual schemes of the global carbon dioxide cycle, they suggest a new approach to studies of the problem of the greenhouse effect. They assess the role of different types of soil and vegetation in the assimilation of carbon dioxide from the atmosphere, and discuss models of the atmosphere ocean gas exchange and its role in the carbon dioxide cycle, paying special attention to the role of the Arctic Basin. The authors also consider models of other global atmospheric cycles for a range of atmospheric constituents, and conclude by drawing together a range of scenarios on modelling the global carbon cycle.

CONTENTS

Global climate and carbon cycle
The biogeochemical carbon cycle in nature
Surface ecosystems and carbon cycle
Carbon cycle in the ocean
Modelling the interactive cycles of carbon and other chemicals
Modelling the global carbon cycle



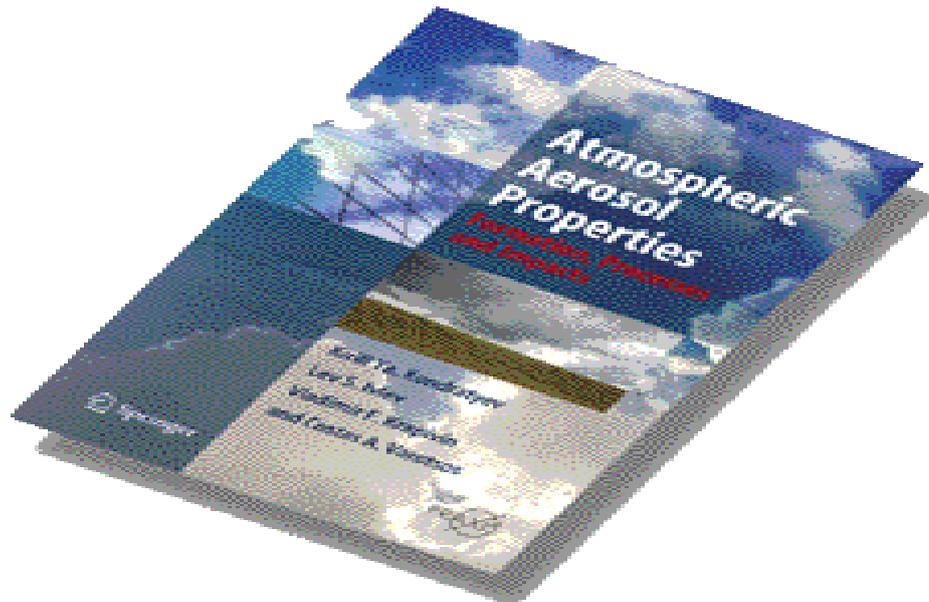
by Kirill Y. Kondratyev, V. F. Krapivin, V. P. Savinykh, and Costas A. Varotsos
ISBN-13: 978-3540204763 , 723 pages, 2004

Editorial Review

The authors open with a general survey of contemporary global ecodynamics, including its basic components. They then discuss the greenhouse effect problems in the context of global carbon cycle dynamics, moving on to a detailed consideration of land ecosystem changes which considers a general global cycle model. The next chapters comprise a further generalisation of air-sea exchange models and their use in the context of the global carbon cycle, providing an analysis of high-latitude environmental dynamics in the context of global scale processes, and discuss basic aspects of global environmental changes modelling and relevant monitoring systems. The authors close with society systems with particular emphasis on the problems of sustainable development.

CONTENTS

Global ecodynamics
Greenhouse effect problems
Land ecosystems and global ecodynamics
Global environmental change and the World Ocean
High-latitude environment and global ecodynamics
Biogeochemical cycles of pollutants in the environment
Modelling the global changes of the environment
Global climate change and geoinformation monitoring
Problems and functions of the environmental monitoring systems



by Kirill Ya. Kondratyev, Lev S. Ivlev, Vladimir F. Krapivin and Costas Varotsos
ISBN: 3-540-26263-6, 608 pages, 2005

Editorial Review

Atmospheric Aerosol Properties focuses on the impact of aerosols on climatic processes in the atmosphere, manifested both directly through the Earth's albedo and indirectly by influencing cloud particles' size distribution. The book analyses the latest results of research into radiative forcing effects, with particular attention given to the properties of aerosols, the processes of aerosol formation and interaction of aerosols with clouds, and aerosols as a component of the climate, including the problem of long-range transport.

CONTENTS

Part One: The field observational experiments

Programmes of atmospheric aerosol experiments: The history of studies
Field observational experiments in America and western Europe
Field observational experiments in Eurasia and on the African continent

Part Two: Aerosol formation processes and evolution. Cloud cover dynamics

Aerosol formation processes
Aerosol and chemical processes in the atmosphere
Interactions between aerosols and clouds

Part Three: Numerical modelling of the processes and properties of atmospheric aerosol

The optical properties of atmospheric aerosol and clouds
Aerosol long-range transport and deposition
Aerosol radiative forcing and climate



by **Kirill Ya. Kondratyev, Vladimir F. Krapivin and Costas Varotsos**

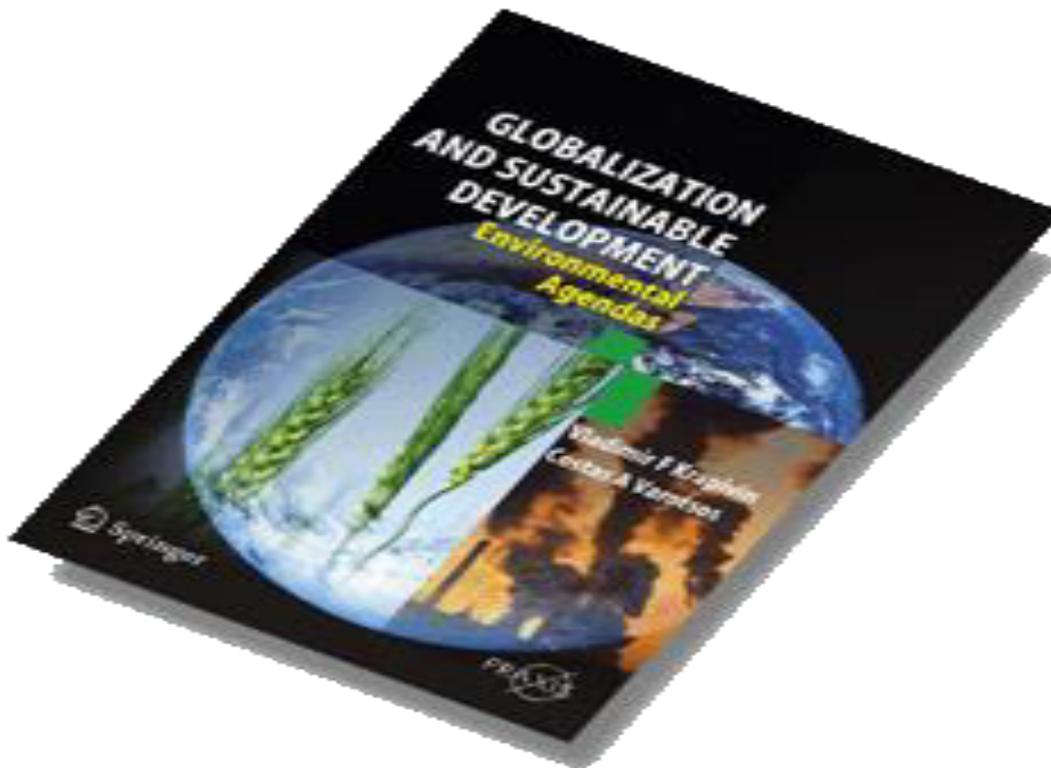
ISBN: 3-540-31344-3 , 616 pages, 2006

Editorial Review

This comprehensive survey of our present-day understanding of large-scale natural catastrophes and their relation to interactive global ecodynamics provides a new approach to the study of global environmental changes. For the first time, all the information available from a wide range of differing disciplines is brought together. The theory of catastrophes is well developed in mathematics, but its application to the description of events and processes in the real environment requires the use of methods of system analysis, and it is this technique that is demonstrated in this book.

CONTENTS

Statistics of natural disasters
Natural disasters and the survivability of ecological systems
Biocomplexity as a predictor of natural disasters
Natural disasters and humankind
The monitoring of natural disasters
Prediction of natural disasters
The natural catastrophe in the Aral Sea region
Natural disasters as components of global ecodynamics
Interactivity of climate and natural disasters



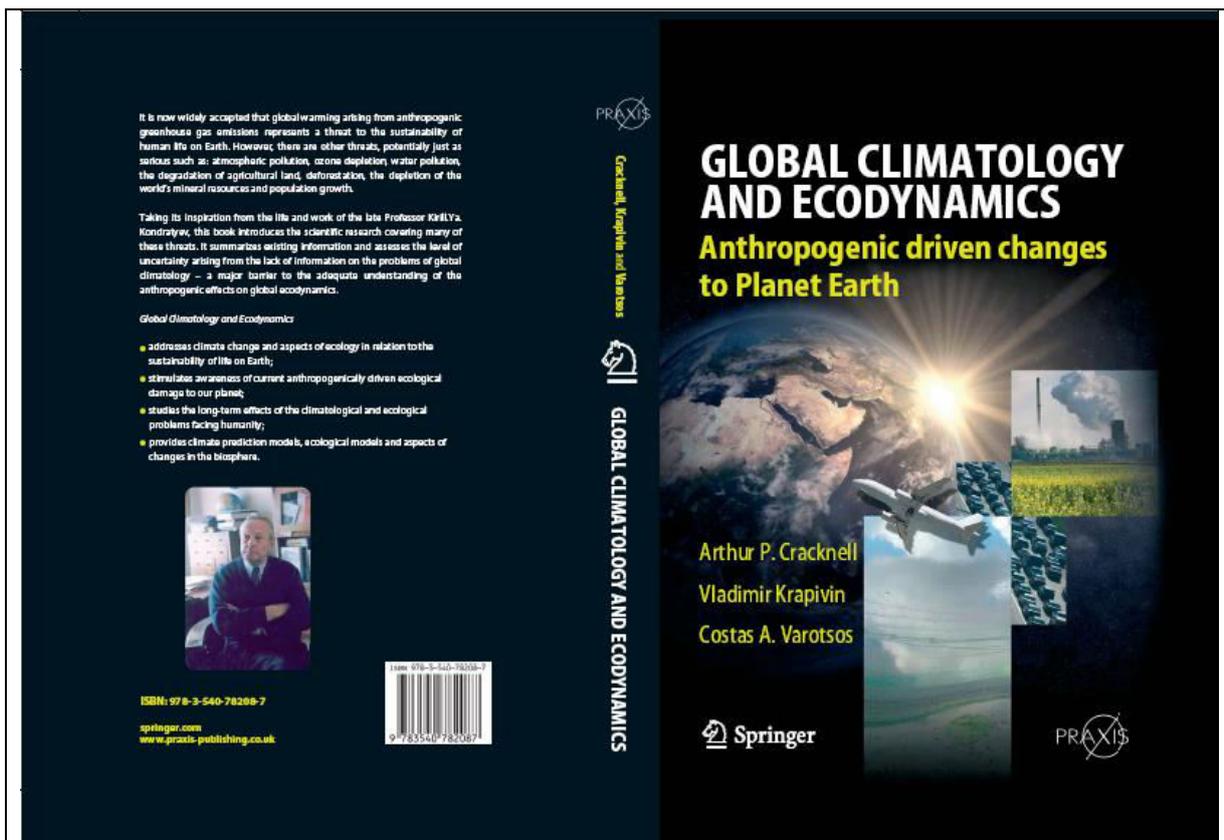
by **Vladimir F. Krapivin and Costas Varotsos**
ISBN-13: 978-3540706618 , 308 pages, 2007

Editorial Review

This book accumulates the knowledge from different sciences to parametrize the global ecodynamic process. The basic global problems of the Nature-Society-System (NSS) dynamics have been considered and the key problems of ensuring its sustainable development have been discussed. An analysis has been made of the present trend in changing ecological systems and characteristics of the present global ecodynamics have been estimated. Emphasis has been placed on the accomplishment of global geoinformation monitoring, which could provide reliable control of the environmental processes development by thus obtaining prognostic estimates of the consequences of anthropogenic projects. A new approach to the NSS numerical modelling has been proposed and demonstrative results have been given of modelling the dynamics of this system's characteristics in cases of some scenarios of anthropogenic impact on the environment.

CONTENTS

Problems of globalization and sustainable development
Globalization and biogeochemical cycles in the environment
Numerical modeling of the nature/society system
Global change and geoinformation monitoring
Decision-making risks in global ecodynamics

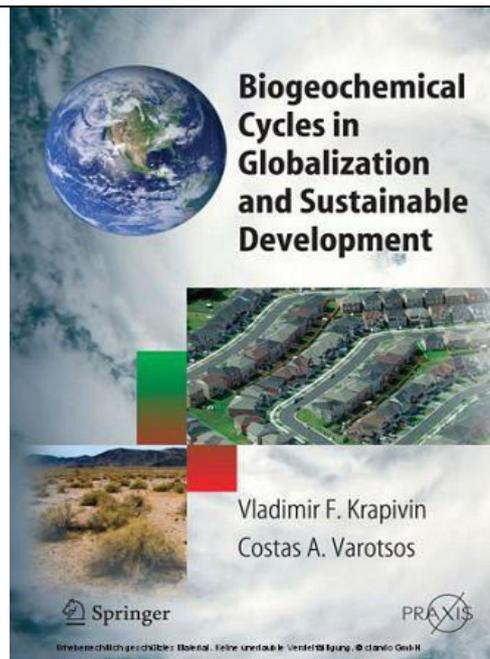


by Arthur Philip Cracknell, Vladimir F. Krapivin, and Costas Varotsos
ISBN-13: 978-3540782087, 400 pages, 2008

Editorial Review

The exclusive role of natural ecosystems is a key factor in the maintenance of the biospheric equilibrium. The current global crisis is largely caused by their dramatic decline by 43% in the past hundred years. Ignoring the immutable laws and limitations which determine the existence of all living things in the biosphere could lead humanity to an ecological catastrophe. This book presents the ecological, demographic, economic and socio-psychological manifestations of the global crisis and outlines the immutable laws and limitations which determine the existence of all living things in the biosphere.

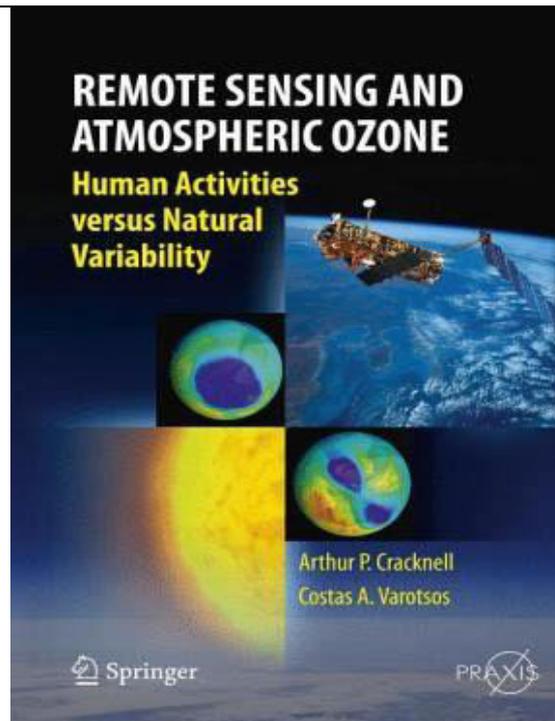
The authors are eminently qualified to write about the problems associated with the global crisis and consider the causes behind humanity's conflict with its environment. V. Danilov-Danilian, Associate of the Russian Academy of Sciences and Russia's former Minister of the Environment, and K. Losev, professor at Moscow State university, are leading Russian ecologists and I. Reyf is a journalist who specializes in ecology and global development. Dr. Danilov-Danilian works on the economics of nature management, economic and mathematical model building, sustainable development theory and ecology. Dr Losev is the chief researcher and head of the division of the VINITI. All the authors have published numerous papers, articles and books on such subjects as glaciology, hydrology, environment studies, global change and sustainable development.



by **Vladimir F. Krapivin and Costas Varotsos**
ISBN-13: 978-3540754398, 562 pages, 2008

Editorial Review

This book opens new approach to the study of global environmental changes having unfavourable character for peoples and other living systems. Main advantage of this book consists in the accumulation of knowledge from different sciences to parameterize global biogeochemical cycles in the context of globalization and sustainable development. Basic global problems of the nature-society system dynamics have been considered and the key problems of ensuring its sustainable development have been discussed. An analysis has been made of the present trend in changing ecological systems and characteristics of the present global ecodynamics have been estimated. The emphasis has been placed on the accomplishment of global geoinformation monitoring, which could provide a reliable control of the environmental processes development with further obtaining prognostic estimates of consequences of realization of anthropogenic projects. A new approach to the nature-society system numerical modelling has been proposed and demonstrative results have been given of modelling the dynamics of this system's characteristics in cases of realization of some scenarios of anthropogenic impact on the biogeochemical cycles. The importance and the need has been emphasized of development of adaptive algorithms of monitoring data processing which make it possible to reduce the economic expenses on its accomplishment and raise the reliability of the obtained estimates of the global ecodynamics characteristics. Perspective approaches have been suggested for the development of technology to estimate the risk of realization of decisions on ecosystems' management. The realization of this approach allows integration within a complex structure of all international and national means of environmental monitoring and provides a tool for objective evaluation of the environmental quality. The main purpose of this book is to develop a universal information technology to estimate the state of environmental subsystems functioning under various climatic and anthropogenic conditions and to assess the dependence of global biogeochemical cycles on the globalization processes. Applied mathematicians, geophysicists, hydrologists, socio-economists, and other researchers of global change will find a wealth of information and ideas in this book.



by **Arthur P. Cracknell and Costas A. Varotsos**
ISBN-13: 9783642103339, 416 pages, 2012

Editorial Review

This book examines the effect of human activities on atmospheric ozone. It details the role of remote sensing techniques in understanding the effects of human activities on atmospheric ozone as well as in the development of social and political awareness. The destruction of the ozone layer, together with global warming, is one of the hot environmental topics of today. This book examines the effect of human activities on atmospheric ozone, namely the increase of tropospheric ozone and the general diminution of stratospheric ozone and the production of the Antarctic ozone hole. Also discussed is the role of remote sensing techniques in the understanding of the effects of human activities on atmospheric ozone as well as in the development of social and political awareness of the damage to the ozone layer by man-made chemicals, principally CFCs. This led to the formulation and ratification in 1989 of the Montreal Protocol on controlling/banning the manufacture and use of chemicals that damage the ozone layer. Since then, remote sensing has played a key role in monitoring atmospheric ozone concentration and determining the success of the Montreal Protocol in protecting the ozone layer from further damage. In this book, the renowned authors discuss the sophisticated instruments that have been launched into space to study not only ozone but also other trace gases in the atmosphere, some of which play a key role in the generation and destruction of ozone in the atmosphere. Professors Cracknell and Varotsos also examine the satellite-flown instruments which are involved in monitoring the absorption of solar ultraviolet light in the atmosphere in relation both to the generation and destruction of ozone and consequently to human health. This scholarly book, written by the foremost experts in the field, looks at remote sensing and its employment in the various aspects of ozone science. It is widely acknowledged that global warming, due to anthropogenic greenhouse gases emissions, represents a threat to the sustainability of human life on Earth.

