# Prof. C. VAROTSOS
## *Extended CV*

**Curriculum Vitae**

HELLENIC REPUBLIC
National and Kapodistrian University of Athens

**Personal information**


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|---|---|
| *First name(s) / Surname(s)* | **Konstantinos (Costas) Varotsos** |
| *Address(es)* | University Campus, Bld Phys 5, Ilissia (Zografou) 157 84, Athens GR |
| *Telephone(s)* | +30 210 7276838 |
| *E-mail* | covar@phys.uoa.gr, covarots@yahoo.com |
| *Nationality* | Greek |
| Gender | Male |


**Work experience**

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|---|---|
| *Dates* | 1985 |
| *Occupation/position held* | **Visiting Research Assistant** Clarendon Laboratory Dept of Atmospheric Physics, Oxford University, UK. |
| Activities & responsibilities | Research on Atmospheric Physics and Climate Change |
| *Name/address of employer* | **Clarendon Laboratory Department of Atmospheric Physics, Oxford University, UK.** |
| *Type of business/ sector* | University |
| *Dates* | 1986-88 |
| *Occupation or position held* | **Asst. Professo**r |
| *Activities & responsibilities* | Teaching on Atmospheric Physics and Climate Change |
| *Name/address of employer* | **Hellenic Naval Academy** |
| *Type of business or sector* | Academy |
| *Dates* | 1989-98 |
| *Occupation or position held* | **Assistant Professor in Atmospheric Physics** |
| *Activities & responsibilities* | Research and Teaching on Atmospheric Physics and Climate Change |
| *Name/address of employer* | **Physics Dept. of the National and Kapodistrian University of Athens.** |
| *Type of business or sector* | University |
| *Dates* | 1993-94, 1995-96, 1998-99 |
| *Occupation or position held* | **Visiting Professor** |
| *Activities & responsibilities* | Research and Teaching in ARW and ASI |
| *Name/address of employer* | **University of Dundee, UK** |
| *Type of business or sector* | University |

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| *Dates* | 1989-today |
| *Occupation or position held* | **Director of the Laboratory of the Atmospheric Physics** |
| *Activities & responsibilities* | Research and Training on Atmospheric Physics and Climate Change |
| Name/address of employer | **Physics Dept. of the National and Kapodistrian University of Athens** |
| Type of business or sector | University |
| Dates | 1999-2008 |
| Occupation or position held | **Associate Professor in Atmospheric Physics** |
| *Activities & responsibilities* | Research and Teaching on Atmospheric Physics and Climate Change<br>***Coordinator of the Laboratory of Remote Sensing Observations***: |
| Name/address of employer | Physics Dept. of the **National and Kapodistrian University of Athens** |
| Type of business or sector | University |
| Dates | 2005 |
| Occupation or position held | **Visiting Professor** |
| *Activities & responsibilities* | Research on Atmospheric Physics and Climate Change |
| Name/address of employer | **University of Maryland, Dept. of Atmospheric and Oceanic Science, USA.** |
| Type of business or sector | University |
| Dates | 2008 |
| Occupation or position held | **Full Professor in Atmospheric Physics** |
| Main activities and responsibilities | Research and Teaching on Atmospheric Physics and Climate Change<br>***Coordinator of the Laboratory of Balloon Ascents*** |
| Name/address of employer | Laboratory of Meteorology of the Physics Dept. of the **National and Kapodistrian University of Athens**. |
| Type of business or sector | University |
| Dates | 2011-2013 |
| Main activities and responsibilities | **Head of the Dept. of Environmental Physics and Meteorology of the Athens University**<br>***Coordinator of the Laboratory of Climate Dynamics Research*** |
| Name/address of employer | Dept. of Environmental Physics and Meteorology of the **National and Kapodistrian University of Athens** |
| Type of business or sector | University |
| Dates | 2014 -today |
| Main activities and responsibilities | **Dean of the School of Science** of the **National and Kapodistrian University of Athens** |
| Name/address of employer | **National and Kapodistrian University of Athens (University of Athens)** |
| Type of business or sector | University |
| Dates | 2016 -2019 |
| Main activities and responsibilities | **Visiting Professor of the Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences** |
| Name/ address of employer<br>Type of business or sector | **Chinese Academy of Sciences**<br>**Academy** |

**Additional Information**

## 1. In Brief

**Professor Varotsos Costas** is a Full Professor in Atmospheric Physics at the Dept. of Environmental Physics and Meteorology of the Faculty of Physics and Dean of the School of Science of the National and Kapodistrian University of Athens (NKUA). Since 1989 he teaches Atmospheric and Environmental Physics and Chemistry, which are also the main topics of **his research interests (e.g., Remote Sensing, Climate Dynamics, Atmospheric Physics & Chemistry, Environmental Change, Non-linear Processes**).

He has established four international research Groups - Laboratories in the Department of Environmental Physics of NKUA and supervise the corresponding research groups, notably:

- ***Laboratory of Middle and Upper Atmosphere*** (The leading scientist is *Director).*
- ***Laboratory of Remote Sensing Observations***: e.g. columnar concentrations of various atmospheric constituents, operating under the auspices of the World Meteorological Organisation
- ***Laboratory of Balloon Ascents*** for observations of the vertical distribution of various atmospheric species content and meteorological parameters, operating under the auspices of the World Meteorol ogical Organisation (The leading scientist is *Co-ordinator).*
- ***Laboratory of Climate Dynamics Research*** (The leading scientist is *Coordinator).*

He has published **11 Books-monographs of SPRINGER, more than 300 research papers in refereed journals** and contributed with specific chapters to 6 more international books in the fields of Remote Sensing, Atmospheric Physics & Chemistry, and Environmental Change. Also, he has published **2 Books-monographs of CRC Taylor & Francis, Matrix Rom** and **5 university books** in Greek in the field of Atmospheric Physics and Chemistry.

**He is Honorary Professor of the Russian Academy of Natural Sciences, Fellow (elected) of the Royal Meteorological Society (Oxford, UK) and full Member (elected) of the European Academy of Natural Sciences (Hanover, Germany**).

He is a member or complimentary member of several scientific societies including the American Meteorological Society, the American Geophysical Union and the European Geophysical Union. He has been **invited from more than 50 International Conferences, Workshops and European Conferences to give talks** on the disciplines of his research activity. He has coordinated or participated in **more than 50 large international research competitive projects**, funded by International Organizations (e.g. European Commission, ESA, NATO, WMO). **In the last 20 years, he participated in 18 competitive Large Research Projects** funded by International and European Organizations (i.e., UN, EU, NATO, WMO), e.g.:

- Model for multi-pollutant impact and assessment of threshold levels for cultural heritage. Fifth Framework Programme, City of Tomorrow and Cultural Heritage within the Energy, 2001-2004.
- UN ECE ICP (Convention on Long-Range Transboundary Air Pollution) Materials (Trend Exposure) International co-operative Programme on Effects on Materials 2005-2018.
- ESA MOST China Dragon Cooperation: 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), Project Id.10529, (2013-2018).

He has been appointed as **Specialty Chief Editor of "Frontiers in Environmental Science" of the NATURE Publishing Group (since 2013), Editor of the "International Journal of Remote Sensing" of T&F (since 2006), Editor of the "Remote Sensing Letters" of T&F (since 2013), Editor of the "International Journal of Environmental Research and Public Health" - Section Environmental Engineering and Public Health of MDPI (since 2017), Editor of the "Big Earth Data", sister journal of "Int J Dig Earth" (Chinese Academy of Sciences) (T&F) (since 2017), Adviser of the "Environmental Science and Pollution Research" (2007-2009), Guest Editor of a number of refereed international Journals and member of the Editorial board in several International Journals indexed in Web of Science**.

He is also a reviewer of various Journals, EU, UN,US Scientific Proposals and Reports.

**His papers have received more than 16,000 citations, with H-index = 71 in Google Scholar.**

In particular, his contribution to the understanding of the Antarctic ozone hole split in 2002 has been (https://scholar.google.gr/scholar?start=0&hl=el&as_sdt=0,5&cluster=4718356445451568378) **highlighted by the United Nations Environmental Programme (UNEP)** and **by Thomson ISI as "Hot Paper" in the field of Ecology / Environment** (see the commentary at: http://archive.is/zXLhZ).

Additionally, his contribution to the exploration of the scaling dynamics in global atmospheric ozone and temperature has been identified **by Thomson-ISI as "Emerging Research Fronts Paper"** (see the interview at: http://archive.sciencewatch.com/sciencewatch/dr/erf/2011/11augerf/11augerfVaro/) **in the field of Geosciences** (August 1, 2011).
He has been **awarded the gold A.S. Popov medal of the Russian A.S. Popov Society**, the **RADI Award of Chinese Academy of Sciences** and the **MOST/ESA Award**.
He has also been **awarded the recognition of Outstanding Reviewer from Elsevier** (e.g. JQSRT: Sept 2017, Atmos. Env.: Feb 2018, JASTP: March 2018, ISPRS: April 2018) et al.

More details are given in:
http://www.researcherid.com/AuthorizeWorkspace.action
http://orcid.org/0000-0001-7215-3610
https://www.researchgate.net/profile/Costas_Varotsos/citations?sorting=citationCount
http://scholar.google.com/citations?user=hiPftWoAAAAJ&hl=en

# 2. In Detail

## 2.1. Research Publications

His research publications could be categorized as follows:

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| **Number of Papers** | |
| *In refereed Journals (reported by SCI-WoS)* | **247** |
| *In referred Proceedings of Conferences* | **202** |
| **Number of other Publications** | |
| *Review Articles, Editorials, Commentaries, Features (WoS)* | **20** |
| *Papers in refereed Journals (not reported by SCI)* | **29** |
| *Papers in refereed Russian Journals* | **26** |
| *Abstracts in Conferences* | **223** |
| *Reports, etc* | **102** |

**His *H--index* in Thomson-ISI (Web of Science) is 56, and in Google Scholar *H-index* = 71**

## 2.2. Review Articles, Editorials, Commentaries

1. Kondratyev K.Y. and Varotsos C.A.: **Global total ozone dynamics. Impact on surface solar ultraviolet radiation variability and ecosystems. Part I: Global ozone dynamics and environmental safety.** ESPR - Environ. Sci. & Pollut. Res., 3, No. 3, 153-157, 1996.
2. Kondratyev K.Y. and Varotsos C.A.: **Global total ozone dynamics, its impact on surface solar ultraviolet radiation variability and ecosystems. Part II: Dynamics of Atmospheric Chemical Composition: The Role of Remote Sensing.** ESPR - Environ. Sci. & Pollut. Res., 3, No. 4, 205-209, 1996.
3. Kondratyev K.Y. and Varotsos C.: **A Review on Greenhouse Effect and Ozone Dynamics over Greece.** NATO ASI Series, Vol. I, 53. Atmospheric Ozone Dynamics Observations in the Mediterranean Region. Springer-Verlag Berlin Heidelberg, 175-228, 1997.
4. Kondratyev K.Y. and Varotsos C.**: Global Tropospheric Ozone Dynamics, Part I: Tropospheric Ozone Precursors**. ESPR - Environ. Sci. & Pollut. Res, 8, No.1, 57-62, 2001.
5. Kondratyev K.Y. and Varotsos C.**: Global Tropospheric Ozone Dynamics, Part II: Numerical Modelling of Tropospheric Ozone Variability.** ESPR - Environ. Sci. & Pollut. Res, 8, No.2, 113-120, 2001.

6. Kondratyev K. Y. and Varotsos C.: **Remote sensing and global tropospheric ozone observed dynamics.** Int. J. of Remote Sensing, 23, N.1, 159-178, 2002.
7. Varotsos C.: **The Extraordinary Events of the Major, Sudden Stratospheric Warming, the Diminutive Antarctic Ozone Hole, and its Split in 2002**. Environ Sci & Pollut Res, 11 No.6, 405-411, 2004.
8. Varotsos C.: **News on the Antarctic Ozone Hole,** ESPR - Environ. Sci. & Pollut. Res., 12 (6), 322-322, 2005.
9. Cracknell A.P. and Varotsos C.A.: **Fifty years after the first artificial satellite: from Sputnik 1 to ENVISAT.** Int. J. of Remote Sensing, 28 Issue: 10, 2071-2072, 2007.
10. Cracknell A.P. and Varotsos C.A.: **The Antarctic 2006 ozone hole.** Int. J. Remote Sens. 28: 1-2, 2007.
11. Cracknell A.P. and Varotsos C.A.: **The IPCC Fourth Assessment Report and the fiftieth anniversary of Sputnik.** Environ Sci & Pollut Res., 14 Issue: 6, 384-387, 2007.
12. Varotsos C. A..: **The 20th anniversary of the Montreal Protocol and the unexplainable 60% of ozone loss.** Environ Sci & Pollut Res, 15, Issue: 6, 448-449, 2008.
13. Cracknell A.P. and Varotsos C.A.: **Editorial comment - the Montreal Protocol** International Journal of Remote Sensing 29 Issue: 19, 5455-5459, 2008.
14. Varotsos C., Tzanis C. and Cracknell A.P.: **The enhanced deterioration of the cultural heritage monuments due to air pollution.** ESPR - Environ. Sci. & Pollut. Res, 16 Issue: 5, 590-592, 2009.
15. Cracknell A.P. and Varotsos C.A.: **The contribution of remote sensing to the implementation of the Montreal Protocol and the monitoring of its success.** Int. J. Remote Sens., 30: 15-16, 3853-3873, 2009.
16. Tzanis, C.; Theodorakopoulou, K. Theodorakopoulos, P.and Varotsos C.: **Tsunamis among the natural disasters.** Fresenius Environmental Bulletin, 19 (8), 1385-1403, 2010.
17. Cracknell A.P. and Varotsos C.A.: **New aspects of global climate-dynamics research and remote sensing.** International Journal of Remote Sensing 32, Issue: 3, 579-600, 2011.
18. Varotsos C., Melnikova I. Efstathiou M. And Tzanis C.:**On the 1/f noise in the UV solar spectral irradiance** Theoretical and Applied Climatology 114, 3-4, 725-727, 2013.
19. Cracknell A.P. and Varotsos C.A.:**Satellite systems for atmospheric ozone observations.** International Journal of Remote Sensing 35, Issue: 15, 5566-5597, 2014.
20. Cracknell A.P. and Varotsos C.A.:**Remote sensing of atmospheric radiation and dynamics,** International Journal of Remote Sensing 35, Issue: 15, 5563-5565, 2014.

## 2.3. Invited Papers in International Journals

1. Varotsos C.: **Climate Change problems and carbon Dioxide Emisions**: **Expecting 'Rio+10'**. Editorial in ESPR - Environ Sci & Pollut Res 9 (2), 97-98, 2002. **("Feature").**
2. Varotsos C.: **Why did a "no-ozone-hole" episode occur in Antarctica?** *EOS Transactions*, 84(19), 183, 2003 **("Section News, Atmospheric Sciences").** (EOS Transactions is the high peer-review and official journal of the American Geophysical Union).
3. Varotsos C.: **Major sudden warming and strange twist of the ozone hole over Antarctica in 2002**. Europhysics News 34/2, 66-67, 2003 **("Feature").**
4. Varotsos C.: **On the unprecedented event of the Antarctic ozone hole split in 2002.** World Resource Review 15:2, 176-184, 2003.
5. Varotsos C: **News on the Antarctic Ozone Hole**. ESPR - Environ. Sci. & Pollut. Res 12 (6): 322-322 NOV 2005 **(Commentary).**

**Note:** The invitations to write the above-mentioned articles 2, 3, 4, 5 reached him after the publication of the first article of the next paragraph. The article 5 was recently accommodated in EU News Alert (DG Environment).

## 2.4. Distinctive contributions to the Atmospheric Science

**His publications that triggered a large interest of the international community are the following**:

1. Varotsos C.: **The southern hemisphere ozone hole split in 2002** ENVIRONMENTAL SCIENCE AND POLLUTION RES 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 .

2. Varotsos C.: **What is the lesson from the unprecedented event over Antarctica in 2002?** ENVIRONMENTAL SCIENCE AND POLLUTION RES 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)

3. Varotsos C.: **The extraordinary events of the major, sudden stratospheric warming, the diminutive Antarctic ozone hole, and its split in 2002** ENVIRON SCIENCE & POLLUT RES 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://archive.is/zXLhZ)

4. Varotsos C.: **Power-law correlations in column ozone over Antarctica**. International Journal of Remote Sensing, 26, pp. 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

5. Varotsos C., Ondov J., Efstathiou M.: **Scaling properties of air pollution in Athens, Greece and Baltimore, Maryland**. Atmos. Environ. 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.

6. Varotsos, C., Kirk-Davidoff, D.: **Long-memory processes in ozone and temperature variations at the region 60 S–60 N.** Atmospheric Chemistry and Physics, 6(12), 4093-4100, 2006.

The columnar ozone and tropospheric temperature fluctuations in small time-intervals were found in this pape positively correlated to those in larger time-intervals in a power-law fashion.
This paper has been identified by Thomson-ISI to be "Emerging Research Front paper in the field of Geosc (see the interview at: http://archive.sciencewatch.com/sciencewatch/dr/erf/2011/11augerf/11augerfVaro/)

7. ***"Weather" (journal of the Royal Meteorological Society) commented on the papers:***

- *Cracknell A.P., Varotsos C.A.: **New aspects of global climate-dynamics research and remote sensing**. International Journal of Remote Sensing, Vol. 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. ("New tools for global climate-dynamics research", Weather – October 2011, Vol. 66, No. 10, doi:10.1002/wea.712).

- *Varotsos, C.A., Tzanis, 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. ("A new time domain for prediction of impending major climate events", Weather – February 2012, Vol. 67, No. 2, doi:10.1002/wea.1848).

**In addition, among his other publications, the following papers have mostly attracted the interest of the international community:**

1. Von der Gathen P., et al: **Observational evidence for chemical ozone depletion over the Arctic in winter 1991-92.** Nature, Vol. 375, 131-134, 1995.
2. Chandra S., Varotsos C. and Flynn L.E.: **The mid-latitude total ozone trends in the northern hemisphere.** Geophysical Research Letters, Vol. 23, No. 5, 555-558, 1996.
3. M. Rex, P., et al: **In-situ measurements of stratospheric ozone depletion rates in the Arctic Winter 1991/92: A Lagrangian Approach.** J. Geophys. Res., V 103, D5, 5843-5853, 1998.
4. Ziemke J.R., Chandra S., Herman J. and Varotsos C.: **Erythemally weighted UV trends over northern latitudes derived from Nimbus 7 TOMS measurements.** J. Geophys. Res., 105, D6, 7373-7382, 2000.
5. Schulz A., et al: **Match observations in the Arctic winter 1996/97: High stratospheric ozone loss rates correlate with low temperatures deep inside the polar vortex.** Geophys. Res. Let., Vol. 27, No 02, p.205-208, 2000.
6. Schulz A., et al: **Arctic ozone loss in threshold conditions: Match observations in 97/98 and 98/99.** J. Geophys. Res. 106, D 7495-7503, 2001.
7. Varotsos C., Kondratyev K.Y. and Efstathiou M.: **On the seasonal variation of the surface ozone in Athens, Greece**. Atmospheric Environment, Vol. 35, 315-320, 2001.
8. Varotsos C., Cartalis C., Vlamakis A., Tzanis C. and Keramitsoglou I.: **The long-term coupling between column ozone and tropopause properties.** J Climate 17 (19): 3843-3854, 2004.
9. Varotsos C.: **Atmospheric pollution and remote sensing: implications for the Southern hemishere ozone hole split in 2002 and the Northern mid-lattitude ozone trend.** Adv. Space Res. 33 249-253 2004.
10. Varotsos C.and Kirk-Davidoff D.: **Long-memory processes in ozone and temperature variations at the region 60 degrees S-60 degrees N**. Atmospheric Chemistry and Physics, 6: 4093-4100, 2006.
11. Varotsos, C.; Ondov, J.; Tzanis, C.; et al.**An observational study of the atmospheric ultra-fine particle dynamics (vol 59, pg 312, 2012),** ATMOSPHERIC ENVIRONMENT Volume: 94: 817-817 2014.
12. Varotsos, C. A.; Lovejoy, S.; Sarlis, N. V.; et al. **On the scaling of the solar incident flux,** ATMOSPHERIC CHEMISTRY AND PHYSICS Volume: 15 Issue: 13 Pages: 7301-7306 Published: 2015.
13. Varotsos, C. A.; Efstathiou, M. N.; Cracknell, A. P. **Sharp rise in hurricane and cyclone count during the last century,** THEORETICAL AND APPLIED CLIMATOLOGY, 119 (3-4),: 629-638, 2015.
14. Varotsos, Costas A.; Efstathiou, Maria N. **Symmetric scaling properties in global surface air temperature anomalies,** THEORETICAL AND APPLIED CLIMATOLOGY, 121(3-4), 767-773, 2015.
15. Varotsos, C A.; Tzanis, C G.; Sarlis, N V. **On the progress of the 2015-2016 El Nino event,** ATMOSPHERIC CHEMISTRY AND PHYSICS Volume: 16 Issue: 4 Pages: 2007-2011, 2016

## 2.5. Participation in Large Research Projects

1. **Tropospheric Ozone Research (TOR) - EUROTRAC I** (PI), 1989-1995
2. **Vertical ozone profile over Athens.** (Project leader) Athens, Greece - Julich, Germany 1990-1992
3. **Stratosphere-Troposphere Ozone Exchange (TOASTE I).** (Member) EU , 1990-1992
4. **Intercomparison of Dobson ozone spectrophotometers.** (Member) World Meteorological Organisation, Arosa, Switzerland 7-8/1990
5. **Global Atmosphere Watch (World Ozone Data Centre)** (Member) Canada 1990-2000
6. **Remote Sensing and Global Climate Change.** (Member), NATO, 1991-1995
7. **European Arctic Stratospheric Ozone Experiment (EASOE).** (Member) EU, 1991-1992
8. **Remote Sensing and Global Climate Change.** (Member), NATO, Dundee, Scotland 1991-1995
9. **CFC's and ozone depletion.** (Project leader) EU, Athens, 1992-1994
10. **Second European Stratospheric Arctic and Mid-latitude Experiment (SESAME).** (PI), EU, 1993-95
11. **Transport of ozone and Stratosphere-Troposphere exchange at the south Europe.** (PI), Greece - Italy 1994-1995
12. **Special Evaluation of the vertical ozone distribution.** (PI) Greece (UoA)-Germany (AWI) Bilateral Research Programme, 1994-1995.
13. **Remote Sensing, Image Processing and Applications.** (Member), EU, 1993-1995
14. **Surface ultraviolet radiation and ozone content as indicators of environmental quality: case studies of Athens, Hamburg, Dundee and St. Petersburg.** (Project leader), INTAS, EU, 1995-1998.
15. **OSDOC (Quality Control and Homogeneous Ozonesonde Database),** (Member) 1996-1999

16. **STAAARTE** (Member) Athens 1997
17. **Radiation Field in the Troposphere (RAFT). EU** (Project leader) Athens 1997-1998
18. **WMO Int. Intercomparison of the Dobson Spectrophotometers.** (Project leader) Greece 1997
19. **MATCH** (PI) EU, 1994-2006.
20. **THESEO-$O_3$LOSS** (PI), EU, 1997-2000
21. **Tropospheric Ozone Research (TOR-2, EUROTRAC),** (PI) 1998-2002.
22. **EURASER-EUFAR** project (EUropean Fleet for Airborne Research) Infrastructure Cooperation Network of the **European Commission HPRI programme** under FP5/FP6 (2000-2005)
23. **Bio-dosimeter and biologically- effective solar ultraviolet radiation.** Bilateral Research Programme (Greece-Ukrane), 2001-2003 (Project leader).
24. **Model for multi-pollutant impact and assessment of threshold levels for cultural heritage** (**MULTI-ASSESS).** Fifth Framework Programme Key Action City of Tomorrow and Cultural Heritage within the Energy, Environment and Sustainable Development 2001-2004 (PI)
25. **Quantitative Understanding of Ozone losses by Bipolar Investigations (QUOBI),** funded by the European Commission as part of the Stratospheric Ozone LOss (SOLO) cluster coordinated by the European Ozone Research Coordinating Unit (EORCU), 2002-2004 (PI)
26. **Validation of International Satellites and Study of Ozone Loss (VINTERSOL)** funded by the European Commission 2002-2004 (PI).
27. **Stratospheric-Climate Links with Emphasis on the Upper Troposphere and Lower Stratosphere (SCOUT-O3).** EU (PI)
28. **ENVISAT/ SCIAMACHY/ SCIAVAL** EU, (PI), 2001-2007
29. **International Polar Year 2007-2008 (Ozone Layer and UVB Radiation) (ORACLE–O3 )** (PI).
30. **UN ECE ICP (Convention on Long-Range Transboundary Air Pollution) Materials (Trend Exposure) International co-operative Programme on Effects on Materials, including Historic and Cultural Monuments,** (PI), 2005-2011.

**Note:** The new findings derived from the SCOUT-O3 Project have been commented on by NATURE in section "News" (NATURE|VOL 435, p6 | 5 MAY 2005 |www.nature.com/nature)

## 2.6. International scientific positions of responsibility

- ***Specialty Chief Editor*** of the *international journal "Frontiers in Environmental Science" - NATURE Publishing Group (since 2013).*
- ***Editor*** of the *"International Journal of Remote Sensing"* (Taylor & Francis) (2006 - today).
- ***Editor*** of the *international journal* "*Remote Sensing Letters"* (Taylor & Francis) (2010 - today).
- ***Editor*** of the *"International Journal of Environmental Research and Public Health" - Section Environmenta Engineering and Public Health* (MDPI) (2017-2020).
- ***Editor*** of the *Big EarthData* (T&F)
- ***Adviser*** of the *international journal "Environmental Science and Pollution Research"* (2007-2009),
- ***Member of the Editorial boards*** of several International Journals with peer-reviewing system (WoS).
- ***Guest Editor in 5 Special Issues*** of peer-reviewing International Journals indexed in Web of Science.
- ***Visiting Research Assistance* at the Clarendon Lab**, Dept. Atmospheric Physics, Oxford University, UK
- ***Visiting Professor at the University of Dundee*,** Dundee, UK
- ***Visiting Professor* at the University of Maryland,** Dept. of Atmospheric and Oceanic Science, USA.
- ***Visiting Professor at the Inst. Remote Sens. & Digital Earth, Chinese Academy of Sciences*** (Beijing)
- ***Visiting Professor at the Lomonosov Moscow State University***, Moscow, Russian Federation
- ***Convener and co-Convener in International Conferences (e.g. European Geosciences Union Assembly*** in 2015: Scale, scaling and uncertainty in the climate, climate & climate models, in the ocean, atmosphere & hydrosphere).
- ***Personal invitations for talks-seminars*** from more than ***40*** International Conferences.
- ***Coordination or participation in more than 45 large research competitive projects***, funded by UN, EU, NATO, WMO, etc.
- ***Member of International Scientific Societies, Groups and Panels*** (e.g., IGBP, EGU, AGU, AAAS, RSS, GAW, RMS, MATCH)
- ***Organizer of several International Symposia, Conferences, Advanced Study Institutes, Advanced Research Workshops*** delivering lectures on the topics of Remote Sensing, Climate Change, Atmospheric Physics & Chemistry and Global Change

## 2.7. Books - Monographs

### 2.7.1. *International Monographs published by SPRINGER*

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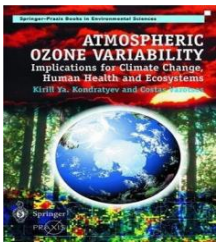
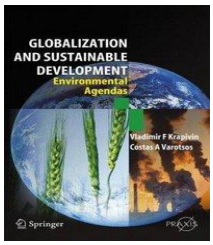
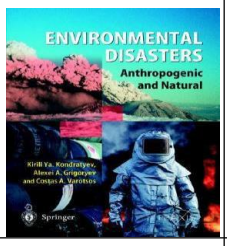
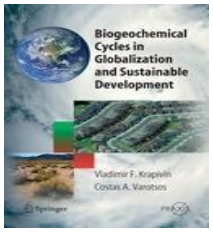
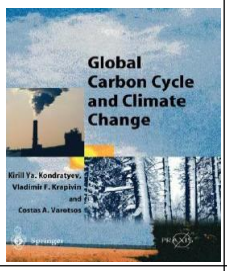
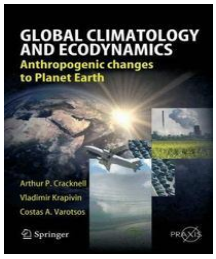
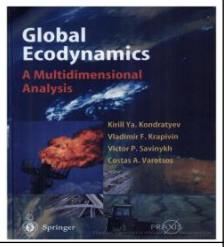
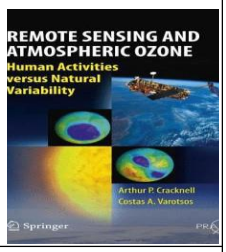
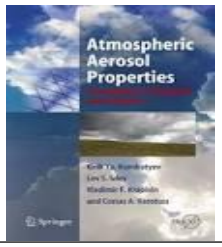
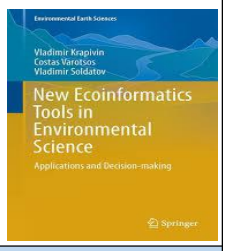
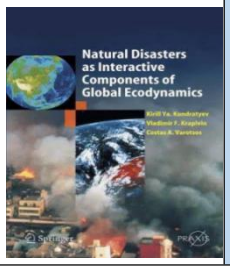
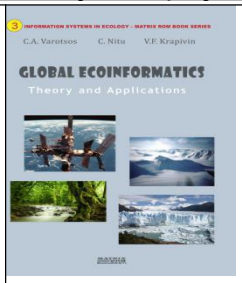
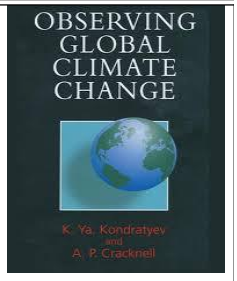
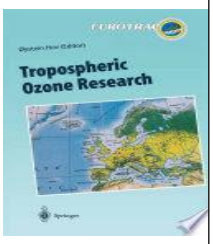
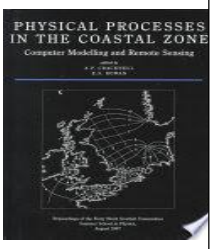
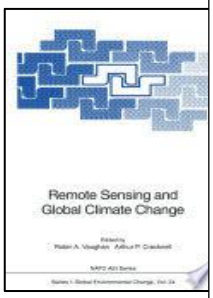
| **1.** Kondratyev, K.Ya. & Varotsos, C.A. (2000). ***Atmospheric ozone variability: implications for climate change, human health and ecosystems***. Springer **624 pages**, ISBN: 1-85233 635-8 (*9 editions* held by 183 libraries worldwide) |  | **7.**Krapivin, V.F. & Varotsos, C.A. (2007). ***Globalisation and sustainable development: environmental agendas***. Springer **336 pages**, ISBN: 978-3-540-70661-8 (*21 editions* held by 504 WorldCat libraries worldwide) |  |
| **2.** Kondratyev, K.Ya., Grigoryev, A.A. & Varotsos, C.A. (2002). ***Environmental disasters: anthropogenic and natural***. Chichester: Springer **528 pages**, ISBN: 3-54043-303-1 (*8 editions* published in English and held by 260 WorldCat member libraries worldwide) |  | **8.**Krapivin, V.F. & Varotsos, C.A. (2008). ***Biogeochemical cycles in globalization and sustainable development.*** Springer. **600 pages**, ISBN: 978-3-540-75439-8 (*16 editions* and held by 445 WorldCat libraries worldwide) |  |
| **3.** Kondratyev, K.Ya., Krapivin, V.F. & Varotsos, C.A. (2003). ***Global carbon cycle and climate change***. Springer **392 pages**, ISBN: 3-540-00809-8 (*10 editions* held by 275 WorldCat member libraries worldwide) |  | **9.** Cracknell, A.P., Krapivin, V.F. & Varotsos, C.A. (2008). ***Global climatology and ecodynamics: anthropogenic driven changes to planet Earth.*** Springer, **566 pages**, ISBN: 978-3-540-78208-7 (*18 editions* held by 449 WorldCatlibraries worldwide) |  |
| **4.** Kondratyev, K.Ya., Krapivin, V.F., Savinykh, P. & Varotsos, C.A. (2004). ***Global ecodynamics: a multidimensional analysis***. Springer **723 pages**, ISBN: 3-540-20476-8 (*2 editions* held by 59 WorldCat member libraries worldwide) |  | **10.**Cracknell, A.P. & Varotsos, C.A. (2012). ***Remote sensing and atmospheric ozone: human activities versus natural variability.*** Springer **662 pages**, ISBN: 978-3-642-10334-6 (*14 editions* held by 405 WorldCat libraries worldwide) |  |
| **5.**Kondratyev, K.Ya., Ivlev, L.S., Krapivin, V.F. & Varotsos, C.A. (2005). ***Atmospheric aerosol properties: formation processes, and impacts.*** Springer **608 pages**, ISBN: 3-540-26263-6 *(20 editions)* |  | **11.**Krapivin, V.F., Varotsos, C.A. & Soldatov, V.Yu. (2015). ***New ecoinformatics tools in environmental science.*** Springer, **924 pages**, ISBN: 978-3-319-13977-7 (*10 editions* held by 262 WorldCat member libraries worldwide) |  |
| **6.**Kondratyev, K.Ya., Krapivin, V.F. & Varotsos, C.A. (2006). ***Natural disasters as interactive components of global ecodynamics.*** Springer **616 pages**, ISBN: 978-3-540-31344-1 (*18 editions* held by 557 WorldCat member libraries worldwide) |  | ***NOTE:**<br>**Each of the aforementioned international books (SPRINGER Monographs) was published after peer-review of 6 reviewers.** | |

**Note:** The above-mentioned books - monographs are available in National Libraries of several countries, like: ***Library of Congress/NACO Washington, DC, USA*** ,***German National Library***, ***National Library of France*** , ***National Library of the Netherlands***, ***National Library of the Czech Republic***, ***National Library of Poland***

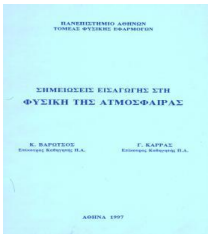
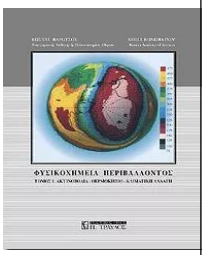
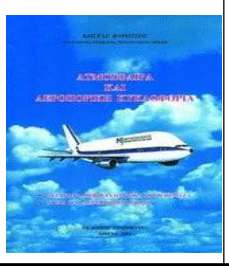
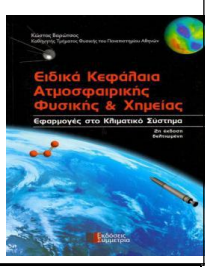
## 2.7.2 Monographs published by CRC (Taylor & Francis), etc

| | | | |
|---|---|---|---|
| **1.**Varotsos, C.A., Nitu, K., Krapivin, V.F., (2018). ***Global Ecoinformatics; Theory and Applications.*** MATRIX ROM, 062510 (https://www.matrixrom.ro/wp-content/uploads/2018/07/GE4.pdf) |  | **2.**Cracknell, A.P. & Varotsos, C.A., (2019). ***Observing Global Climate Change*** (Second Edition). Taylor & Francis Ltd, London UK, USA. (First Edition by K.Ya. Kondratyev & Cracknell A.P. |  |

## 2.7.3. Contributions with chapters to other International Books

| | | | |
|---|---|---|---|
| **1.*Tropospheric Ozone Research: Tropospheric Ozone in the Regional and Sub-regional Context. Spatial and temporal variability of tropospheric ozone over Europe,*** Berlin, Springer-Verlag, Oystein H. (Ed), 1997. |  | **2. *The determination of geophysical parameters from Space*** (pp. 261-282), 24. Bristol: **Institute of Physics Publ**. N.E. Fancey, I.D. Gardiner & R.A. Vaughan (Eds.), 1997 |  |
| **3.*Physical processes in the coastal zone: computer modeling and remote sensing:*** (pp. 199-220) CRC Press, A.P. Cracknell & E.S. Rowan, 1999. |  | **4. *Atmospheric ozone dynamics: observations in the Mediterranean region.*** NATO ASI Series, Series I: Global Environmental Change, vol. 53, Berlin,: Springer-Verlag & NATO Scientific Affairs Division Varotsos C (Ed), 2013. (see also, **New Scientist,** 145, p 49) |  |
| **5. *Remote sensing and global climate change*** (pp. 253-268). NATO ASI Series, Series I: Global Environmental Change, vol. 24. Berlin: **Springer-Verlag** & NATO Scientific Affairs Division, R.A. Vaughan & A.P. Cracknell (Eds.), 2013. |  | **6.*Atmospheric ozone : modelling and validation with satellite data*** FW Taylor, M Vardavas, KY Kondratyev,CVarotsos P Barge P Ehrenfreund H Kochan **Series: Physics and chemistry of the earth., Part C,, Solar-terrestrial and planetary science 24, 5** EGS Publ. Oxford : Pergamon, 1999 | **https://catalog.umd.edu/docno=002555251** |

## 2.7.4. Monographs Published in Greek

| | | | |
|---|---|---|---|
| **1.** Varotsos C. & Karras G. (1997). ***Introductory Notes on the Physics of the Atmosphere,*** Athens, **210 pages**, EKPA Publ. |  | **2.** Kondratyev, K.Ya. & Varotsos C. (1999). ***Environmental Physics and Chemistry. Vol.1: Radiation - Greenhouse - Climate Change,*** **190 pages**, Travlos Publ. |  |
| **3.**Varotsos C. (2008). ***Second Edition: Atmosphere and Aviation.*** **444 pages**, Symmetria Publ. ***First Edition (2001): Atmosphere and Aviation. Current environmental Problems. Health and Flight*** |  | **4.**Varotsos C. (2011). ***Specific Chapters on Atmospheric Physics and Chemistry: Applications to the Climate System,*** Athens. **580 pages**, Symmetria Publ. |  |

### *2.7.5. Comments from highly-regarded magazines to our research*

***1. EOS Transactions*** (American Geophysical Union), *84(19)*: 183, 2003 (Section *News*, Atmos. Sci.)

***2. Europhysics News*** (European Physical Society, EDP Sciences), 34 (2), 66-67 March-April 2003

**3. *Nature*, News,** *435: 6* (May 5, 2005) (www.nature.com/nature).

**4. *Weather: Journal of the Royal Meteorological Society,*** *66(10),* (Oct. 2011) doi:10.1002/wea.712.

**5. *Weather: Journal of the Royal Meteorological Society,*** *67(2)*, (Feb. 2012), doi:10.1002/wea.1848

## 2.8. Teaching experience

| № | Name of the university / Institute | Job title | Name of the course taught by the leading scientist | Period of employment |
|---|---|---|---|---|
| **1.** | Greek Naval Academy | Professor | ● Dynamics of Meteorology<br>● Selective Chapters in Physics | 1986-1988 |
| **2.** | University of Athens | Professor | ● Physical Climatology | 1989-1993<br>1996-1998 |
| **3.** | University of Athens | Professor | ● Physical Meteorology | 1989-1998<br>2008 - today |
| **4.** | University of Athens | Professor | ● Physics of the Upper Atmosphere | 1989-today |
| **5.** | European Association for Environmental. Management & Education Master's Degree | Professor | ● The Physics of the Atmospheric Ozone<br>● Remote Sensing and Climate | 1992-1994 |
| **6.** | Dundee University UK | Visiting Professor | ● Remote Sensing and Global Climate Change | 1993-1994 |
| **7.** | Dundee University UK | Visiting Professor | ● The determination of Geophysical Parameters from Space | 1995-1996 |
| **8.** | Dundee University UK | Visiting Professor | ● Dynamics of Trace Gases, Solar Radiation and the Earth's Radiation Budget | 1998-1999 |
| **9.** | University of Athens Master's Degree | Professor | ● Environmental Chemistry | 1996-1998<br>2000-2003 |
| **10.** | University of Athens Master's Degree | Professor | ● Physico-Chemistry of the Atmosphere | 1997-2003 |
| **11.** | University of Athens | Professor | ● Introduction to Atmospheric. Physics | 1997-2013 |

He has also participated in several *Advanced Study Institutes, Seminars* etc. delivering lectures on the topics of Atmospheric Physics, Atmospheric Chemistry & Environmental Physics and Chemistry

## 2.8. Research Publications

### *2.8.1. Research Papers in refereed Journals reported by SCI*

1. Zerefos C., Varotsos C. and Repapis C.: **A note on the intercomparison between monthly mean radiance equivalent and rocketsonde temperatures,** Arch. Meteorol. Geoph. Biocl. A, 32, 129-134, 1983.
2. Lazaridou M. and Varotsos C.: **Comments on the ionic conduction in KBr - KI mixed crystals,** J. Phys. Chem. Solids, 46, 5, 643, 1985.
3. Varotsos C., Lazaridou M., Alexopoulos K. and Varotsos P.: **Point defect entropies and enthalpies in KCl,** Phys. Stat. Sol. (b), 130, K105-107, 1985.
4. Varotsos C. and Lazaridou M.: **Comment on the elastic constants of $CaF_2$ - $SrF_2$ mixed crystals,** Phys. Stat. Sol. (b), 129, K95-97, 1985.
5. Varotsos C., Lazaridou M. and Varotsos P.: **Migration and activation defect volumes in $CdF_2$,** Physical Review B, 32, 4, 2634-2635, 1985.

6. Varotsos C., Lazaridou M., Alexopoulos K. and Varotsos P.: **Comments on "the temperature and pressure dependence of disaccommodation in a Manganese Zinc Ferrite single crystal",** J. Appl. Phys., 24, 6, 781, 1985.
7. Varotsos P., Alexopoulos K., Varotsos C. and Lazaridou M.: **Interconnection of point defect parameters in $BaF_2$,** Physica Status Solidi A-Applied Research, 88, K137-K140, 1985.
8. Lazaridou M., Varotsos C., Alexopoulos K. and Varotsos P.: **Point defect parameters of LiF,** J. Phys: C. Solid State Phys., 18, 3891-3895, 1985.
9. Varotsos P., Varotsos C., Hadjicontis V. and Lazaridou M.: **On a plausible explanation of the connection of point defect parameters with the melting point** J Phys Chem Sol. *47,* 1, 79-82, 1986.
10. Varotsos C. and Eftaxias K.: **Connection of activation volume and activation enthalpy with the bulk properties in olivine, LiBr and CsCl,** Solid State Ionics, 20, 291-293, 1986.
11. Varotsos C., Lazaridou M. and Varotsos P.: **On the connection of the formation enthalpy of a Schottky defect in insulators with the Debye temperature,** Radiation Effects, vol 2, 669-673, 1986.
12. Varotsos P., Grammatikakis J., Eftaxias K. and Varotsos C.: **Electrical properties of non-irradiated and X-irradiated LiH and LiD,** Radiation Effects, 3, 599-604, 1986.
13. Varotsos C. and Repapis C.C.: **Seasonal variation of upper stratospheric and lower mesospheric temperature,** Arch. Met. Geoph. Biocl. Ser. B-Theor. App. Phys., 36, 229-238, 1986.
14. Varotsos C.: **Further evidence of the 11-year solar cycle in Stratospheric - lower Mesospheric Ozone and Temperatures,** Theor. Appl. Climatol., 38, 103-106, 1987.
15. Varotsos C.: **Notes on the design and operation of aerospace vehicles,** Astrophysics and Space Science, 134, 205-208, 1987.
16. Varotsos C.: **Periodic variations in Stratospheric and low Mesospheric Zonal Wind in the two Hemispheres,** Theor. Appl. Climatol., 38, 167-173, 1987.
17. Varotsos C.: **Quasi-stationary planetary waves and temperature reference atmosphere,** Meteorol. Atmos. Phys., 37, 297-299, 1987.
18. Varotsos C.: **Temperature trends in the stratosphere and lower mesosphere of the Northern Hemisphere,** Earth, Moon, and Planets, 39, 93-99, 1987.
19. Eftaxias K., Varotsos C.and Hadjicontis V.: **Migration volumes of $PbF_2$ from recent elastic and expansivity data,** Physical Review B, 37, 16, 9820-9823, 1988.
20. Varotsos C., Hadjicontis V. and Eftaxias K.: **Interconnection of the individual vacancy formation and pinning thermodynamic parameters in KCl,** Solid State Ionics, 26, 11-13, 1988.
21. Lazaridou M. and Varotsos C.: **Defect formation and migration entropies in alkaline earth fluorides,** Physica Status Solidi A-Applied Research, 105, K13, 1988.
22. Hadjicontis V., Varotsos C. and Eftaxias K.: **Comments on the diffusion of Ni and Ge in nickel,** Journal of Physics F: Metal Physics, 18, 1635-1640, 1988.
23. Hadjicontis V., Varotsos C. and Eftaxias K.: **Elastic moduli of BCC V-Ti, Mo-Nb and W-Ta alloys,** Journal of Physics F: Metal Physics, 18, 1133-1136, 1988.
24. Varotsos C.: **The temperature variations in the troposphere, stratosphere, and mesosphere of the Northern Hemisphere, 1965-1981,** Earth, Moon, and Planets, 41, 315-317, 1988.
25. Varotsos C.: **New results on the strato-mesospheric cooling of Northern hemisphere (1969-1978),** Earth, Moon, and Planets, 41, 191-196, 1988.
26. Eftaxias K., Varotsos C. and Hadjicontis V.: **Cation vacancy migration entropy in alkali halides,** Physica Status Solidi B-Basic Research, 147, 83-88, 1988.
27. Varotsos C., Eftaxias K. and Hadjicontis V.: **Correlation of the diffusion coefficients of various elements diffusing in ferromagnetic and paramagnetic a-Fe,** Phys Stat Sol(a) *107* K109-114, 1988
28. Varotsos C.: **Ozone and temperature fluctuations in the strato-mesosphere with solar activity,** Astrophysics and Space Science, 146, 339-345, 1988.

**29.** Eftaxias K., Varotsos C. and Hadjicontis V.: **Correlation of the individual vacancy-formation parameters in NaCl,** Physical Review B, Vol. 38, 1548-1549, 1988.

**30.** Hadjicontis V., Eftaxias K. and Varotsos C.: **Connection between the Birch equation of state and the Schottky formation volume in NaCl,** J. Phys. Chem. Solids, 50, 11, 1193-1194, 1989.

**31.** Varotsos C.: **Comment on connections between the 11-year solar cycle, the Q.B.O. and total ozone,** Journal of Atmospheric and Terrestrial Physics, 51, 5, 367-370, 1989.

**32.** Eftaxias K., Hadjicontis V. and Varotsos C.: **Calculation of diffusion coefficients of Nitrogen in Vanadium,** J. Phys. Chem. Solids, Vol. 52, No. 3, 523-525, 1991.

**33.** Varotsos C.A. and Deligiorgi D.G.: **Connections between the U.S. National Temperature, the 10.7 cm Solar Flux and the Equatorial QBO,** Theor. and Applied Clim., 43, N3, 159-60, 1991.

**34.** Varotsos C.A. and Deligiorgi D.G.: **Sea surface temperature and Southern Oscillation signal in the upper Stratosphere- Lower Mesosphere,** International Journal of Climatology, 11, 77-83, 1991.

**35.** Varotsos C. and Cartalis C.: **Re-evaluation of surface ozone over Athens, Greece, for the period 1901-1940,** Atmospheric Research, 26, 303-310, 1991.

**36.** Varotsos C. and Cartalis C.: **The role of quasi-stationary planetary waves in the retrieval of concentrations from satellite measurements,** Geophysical Research Letters, Vol. 18, No. 4, 681-684, 1991.

**37.** Katsambas A., Ch. Antoniou, J. Stratigos, I. Arvanitis, F. Zolota, C. Varotsos, C. Cartalis and D.N. Asimakopoulos: **A simple algorithm for simulating the solar ultraviolet radiation at the earth's surface: An application in determining the minimum erythema dose,** Earth, Moon, and Planets, 53, 191-204, 1991.

**38.** Varotsos C., Dris N. and Asimakopoulos D.: **Terannual wave in the ozone and temperature in the Strato-Mesosphere as deduced from satellite measurements,** Journal of Climate, 5, 2, 181-185, 1992.

**39.** Asimakopoulos D., Deligiorgi D., Drakopoulos C., Helmis C., Kokkori K., Lalas D., Sikiotis D. and Varotsos C.: **An experimental study of nighttime air-pollutant transport over complex terrain in Athens,** Atmospheric Environment, 26B, 1, 59-71, 1992.

**40.** Varotsos C. and Helmis C.G.: **Deviations of the temperature models derived by remote and in situ sensing techniques for the global middle atmosphere,** IJRS, 13, 16, 3127-3133, 1992.

**41.** Varotsos C., Cartalis C., Feidas H., Gerasi E. and Asimakopoulos D.N.: **Relationship of ozone and its precursors in the west coast air basin of Athens: a statistical model for the assessment of air quality in an urban area,** Atmospheric Research, 28, 41-47, 1992.

**42.** Varotsos C., Helmis C. and Cartalis C.: **Annual and semi-annual waves in ozone as derived from SBUV vertical global ozone profiles,** Geophysical Research Letters, 19 (9), 925-928, 1992.

**43.** Varotsos C.A., Dris N.A., Asimakopoulos D.N. and Cartalis C.: **On the Relationship between the 10.7 cm Solar Flux, Surface Pressure and air temperature over Greece,** Theor. and Applied Climatol., 46, N1, 27-32, 1992.

**44.** Cartalis C., Varotsos C., Feidas H. and Katsambas A.: **The impact of air pollution in an urban area on the amount of solar ultraviolet radiation at the surface,** Toxicological and Environmental Chemistry, 36, N 3-4, 195-203, 1992.

**45.** Varotsos C.A and Cracknell A.P.: **Ozone depletion over Greece as deduced from Nimbus-7 TOMS measurements,** International Journal of Remote Sensing, 14, 11, 2053-2059, 1993.

**46.** Varotsos C., Varinou M. & Kalabokas P.: **Atmospheric ozone concentration at Athens, Greece. Part I:Surface ozone & its relationship with meteorological parameters,** Atmos Res, 30, 143-149, 1993.

**47.** Varotsos C., Kalabokas P. and Chronopoulos G.: **Atmospheric ozone concentration at Athens, Greece. Part II: Vertical ozone distribution in the troposphere,** Atmos Res, 30, 151-155, 1993.

**48.** Vlassi A., Varotsos C. and Kalabokas P.: **Oscillation des quatre mois de l'ozone total en Europe Centrale,** Publications de l'Association Internationale de Climatologie, Vol. 6, 467-474, 1993.

**49.** Kalabokas P., Vlassi A. and Varotsos C.: **Serie historique des donnes d'ozone au niveau du sol pour la region d' Athens, Grece (1931-1940),** Publications de l' Association Internationale de Climatologie, Vol. 6, 631-638, 1993.

**50.** Sakellariou N., Asimakopoulos D., Varotsos C. and Capsocha O.: **Prevailing Cloud Types in Athens,** Theor. Applied Climatol., 48, 89-100, 1993.

**51.** Varotsos C.: **Thermodynamic properties of defects in $H_2O$-ice, NaCl, NaBr crystals on the basis of bulk elastic data for atmospheric implications,** Tox & Environ Chem, 38, N3-4, 157-162, 1993.

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