

# CURRICULUM VITAE

## In Brief

### **Prof. Sivakumar Venkataraman,**

Associate Professor,

School of Chemistry and Physics, University of Kwa-Zulu Natal,  
Westville, Durban 4000, South Africa

Extra-ordinary professor

at Department of geography, geoinformatics and meteorology, University of Pretoria,  
Pretoria, South Africa.

Established researcher - C2 (National Research Foundation :NRF South Africa-rating)

### **Research Experience**

12 years of research experience in atmosphere remote sensing

9 years of academic activity (teaching) (Physics, Electronic, Atmosphere remote Sensing)

4 years of Post-Doctoral Researcher at CNRS (France) laboratory.

5 years of project leader (100 % of involvement in writing/managing/leading the project) at  
CSIR-NLC (South Africa) and International projects (South Africa-France, South Africa-  
Ethiopia, South Africa-Reunion, Atmosphere research consortium)

Project leader/Principal investigator of 13 different national/international projects

Co-investigator of 10 different national/international projects

Student supervision : 2 Ph.D, 6 Master and 1 Honour degree students awarded and currently 3 Master, 5 Ph.D and  
1 Honour degree are registered under my supervision.

### **Publications**

3 Books (Editor of peer reviewed conference proceedings)

4 Chapters in a text book

(1 published by Wiley-VCH and 3 published by World Scientific Books)

45 Journal publications

52 Peer reviewed conference proceedings

87 Presentation in national/international conference

11 Invited talks at national/international level

10 Popular research articles (magazines)

H-factor of 8 and 190 citation records (Ref..ISI web of knowledge)

### **National and international scientific recognitions**

- Panel member of different National Research Foundation Programmes (South Africa)
- Science and Education and Technology ( SET ) – NLC CSIR Member
- Technical committee member of 2<sup>nd</sup> CSIR bi-annual conference (2008)
- Member Council of South Africa Atmosphere Science Society, since 2007
- Steering Committee member of South Africa – Space research
- Steering Committee member of South Africa – Solar Terrestrial Physics
- Organized South Africa – French Lidar workshop (2007) in Pretoria, South Africa
- Session convener – ‘Remote Sensing of the atmosphere’ in Asia Oceania Geosciences Society (AOGS)-  
2008 & 2010
- Journal reviewer of different international Journals

### **Research Focus**

- Studies on middle atmospheric thermal structure and wave dynamics
- Mesospheric temperature inversion
- Studies on atmospheric gravity waves, planetary waves, equatorial waves and etc.,
- Stratospheric warming and planetary waves
- Aerosols and clouds
- General characteristics of the tropopause and its relation to the ozone concentration
- Stratosphere-troposphere exchange

- Remote sensing techniques
- Atmospheric pollution measurements

### More Recent Project (Funded and ongoing) leader of

- 2011-2013 : Lidar Development for Atmosphere studies in South Africa and Algeria
- 2011-2013 : Development 2-T/4-R-Channel and 2-Dimensional lidar
- 2010-2013 : Atmosphere Research over South Africa and Indian Ocean (Research Consortium)
- 2009-2011 : Development and Characterization of 2-Channel and 2-Dimensional lidar
- 2010-2012 : Study on Lower atmosphere aerosol structure and dynamics using ground based measurements and model simulations
- 2008-2010 : Lidar and Atmosphere Remote Sensing (CSIR and University of Pretoria)
- 2008-2010 : South-African French LiDAR (SAFiR) network for study of upper troposphere and lower stratosphere aerosol distributions and dynamics
- 2008-2009 : Characterization and Optimization of LiDAR for field campaign measurement of aerosols (particulate matter) around South Africa.
- 2007-2009 : Lidar for atmosphere research over Africa

### More Recent Publications

- Mbatha N M, **Sivakumar V**, Bencherif H, Malinga S B, Pillay S R, Moorgawa A and Michaelis, M.M., Analyses of the Middle atmosphere thermal structure over Durban using a ground-base Rayleigh LIDAR system and satellite experiments (HALOE and SABER), *South Africa Journal of science*, 108(1/2), Art. #612, 2012.
- Botai O J., Combrinck L and **Sivakumar V.**, Inferences of  $\alpha$ -stable distribution of the underlying noise components in geodetic data, *South African J. of Geology, South Africa Journal of Geology*, 114, 541-548, 2011.
- Tesfaye M., **Sivakumar V**, Botai O. J., and Mengistu G., Aerosol climatology over South Africa based on 10 years of Multi-Angle Imaging SpectroRadiometer (MISR) data, *Journal of Geophys. Research*, D20216, doi:10.1029/2011JD016023, 2011.
- **Sivakumar, V.**, Vishnu Prasanth, P., Kishore, P., Bencherif H., and Keckhut. P., Rayleigh LIDAR and satellite (HALOE, SABER, GPS-CHAMP and COSMIC) measurements of Stratosphere-Mesosphere temperature over a southern sub-tropical site, Reunion (20.8°S; 55.5°E): Climatology and comparison study, *Annales Geophysicae*, 29, 649-662, 2011.
- **Sivakumar V**, Bencherif H, Begue N and Thompson A.M., Tropopause characteristics and variability from 11-year SHADOZ observations in the southern tropics and sub-tropics, *Journal of Applied Meteorology and Climatology*, 50, 1403-1416, 2011.
- Begue N, Bencherif H, **Sivakumar V**, Kirgis G, Mze N and Leclair de Bellevue J., Temperature variability and trends in the UT-LS over a sub-tropical site, Reunion (20.8 S, 55.5 E), *Atmos. Chem. Phys.*, 10, 8563-8574, 2010.
- **Sivakumar V**, Tefera D, Mengistu G and O.J. Botai, Mean Ozone and Water vapour height profiles for southern hemisphere region using Radiosonde / Ozonesonde and HALOE satellite data, *World Scientific books, Advances in Geosciences*, 16, Atmospheric Science, Chapter 23, 263-270, 2010.
- **Sivakumar V**, Tesfaye M, Alemu W, Sharma A, Bollig C and Mengistu G, Aerosol measurements over South Africa using LIDAR, Satellite and Sun Photometer, *World Scientific books, Advances in Geosciences*, 16, Atmospheric Science, Chapter 22, 253-262, 2010.
- Botai O J, **Sivakumar V**, Combrinck, L.W and Hannes C J, Multi-Scale organization of water vapour in the low- and mid- tropical Africa, *World Scientific books, Advances in Geosciences*, 16, Atmospheric Science, Chapter 21, 241-251, 2010.
- Mbatha, N, **Sivakumar V**, Malinga S B, Bencherif, H and Pillay S R., Study on the impact of sudden stratosphere warming in the upper mesosphere-lower thermosphere region using satellite and HF radar measurements, *Atmos. Chem. Phys.*, 10, 3397-3404, 2010.
- Begue N, Bencherif H, **Sivakumar V**, Kirgis G, Mze N and Leclair de Bellevue J., Temperature variability and trend estimates at tropopause and UT-LS over a sub-tropical site, Reunion (20.8 S, 55.5 E), *Atmos. Chem. Phys. Discuss.*, 10, 10113-10143, 2010.
- **Sivakumar V**, Tesfaye M, Alemu W, Moema D, Sharma A, Bollig C and Mengistu G, CSIR South Africa Mobile LIDAR – First scientific results : comparison with satellite, sun photometer and model simulations, *South African J. of Science*, 105, 449-455, 2009.

- Sharma A, **Sivakumar V.**, Bollig C, C. van der Westhuizen and D. Moema, System Description of the mobile LIDAR of the CSIR, South Africa, *South African J. of Science*, 105, 456-462, 2009.

**Detailed CV as follows**

## Contact Information

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### PRESENT OFFICE ADDRESS

**SIVAKUMAR VENKATARAMAN**

Associate Professor

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### PERMANENT HOME ADDRESS

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18 EAST STREET,

NEEDAMANGALAM - 614 404.

TIRUAVAVUR DISTRICT,

TAMIL NADU, INDIA.

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Web : [www.researcherid.com/rid/B-4570-2009](http://www.researcherid.com/rid/B-4570-2009)

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## Personal

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Given Name : **SIVAKUMAR**  
Sur/Family Name : **VENKATARAMAN**

Date of Birth : 26<sup>th</sup> July 1974

Nationality : Indian

Residential Status : **Permanent Resident - South Africa**  
(ID No: 740726 5906 180)

Marital status : Married

Note: The name in the journal publications are referred as **V. SIVAKUMAR**

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## Educational Qualification

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### **Ph.D (1999-2002), Physics**

Title of the thesis: "**Lidar studies of middle atmospheric temperature structure and tropospheric cirrus clouds over a low latitude**"

Sri Venkateswara University, Tirupati, Andhra Pradesh, India.

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### **P.G.D.C.A. (1996-1997), Computer Science and Applications**

Bharathidasan University, Tiruchirapalli, Tamil Nadu, India.

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### **M.Sc. (1994 -1996), Physics**

Specialization : **Electronics**

Bharathidasan University, Tiruchirapalli, Tamil Nadu, India.

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### **B.Ed. (1995-1996), Adult and Non Formal Education**

Specialization : **English and Physical Sciences**

Bharathidasan University, Tiruchirapalli, Tamil Nadu, India.

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### **B.Sc. (1991-1994), Physics**

Bharathidasan University, Tiruchirapalli, Tamil Nadu, India.

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## Awards/Fellowships

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**Post Doctoral Research Fellowship** (November-2002 to September-2006)

Laboratoire de l'Atmosphère et des Cyclones, CNRS – UMR 8105, Reunion University, FRANCE.

**Young Researcher Travel Grant** (2006)

Committee On Space Research (COSPAR) – CNES, FRANCE.

**Post Doctoral Research Fellowship** (January-March 2006)

National Laser Centre (NLC), Council for Scientific and Industrial Research (CSIR), SOUTH AFRICA.

**Young Researcher Travel Grant** (2004)

Stratospheric Processes And their Role in Climate (SPARC) – World Meteorological Organization, UN.

**Visiting Fellowship** (2004-2006)

National Sciences and Engineering Research Council of Canada, CANADA

**Post Doctoral Research Fellowship** (May-2002 to November-2002)

National Atmosphere Research Laboratory, Department of Space, Government of INDIA.

**Senior Research Fellowship** (January-2000 to May-2002)

National Atmosphere Research Laboratory, Department of Space, Government of INDIA.

**Junior Research Fellowship** (January-1998 to January-2000)

National Atmosphere Research Laboratory, Department of Space, Government of INDIA.

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## Professional Experience

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**Associate Professor** (Since December-2011) - School of Chemistry and Physics, University of KwaZulu Natal

(UKZN) Westville, Durban, South Africa. The primary roles are academic (course and supervision) and research

activities (integration and development of a lidar system for atmospheric measurements)

**Extra-Ordinary Professor** (Since January-2009) – University of Pretoria, Pretoria, South Africa

I am participating on Academic and Research activities at Geography, Geoinformatics and Meteorology department, especially on atmosphere remote sensing division.

**Established researcher – C2 (National Research Foundation :NRF South Africa-rating)**

**Honorary Professor** (January–November 2011) - University of KwaZulu Natal, Durban, South Africa

I am participating on Academic and Research activities at School of Physics, University of KwaZulu Natal,

especially on LIDAR related.

**Principal Researcher/Scientist (Grade-II)** (August-2008–December 2011) - National Laser Centre (NLC), Council for Scientific and Industrial Research (CSIR), SOUTH AFRICA.

The primary roles are integration and development of a new mobile lidar system for measuring atmospheric particulate matters and pollutants

**Invited Researcher and Professor** (November – December 2008, September-October 2009 & Apr-May 2010)- Laboratoire de l'Atmosphère et des Cyclones, CNRS – UMR 8105, Reunion University, FRANCE.

The research work involves study on sub-tropical tropopause variability using SHADOZ data and partly contributed towards middle atmosphere structure and dynamics. I have also provided serious of lectures on atmosphere remote sensing techniques for Master degree students.

**Principal Researcher/Scientist (Grade-I)** (August-2007-July 2008) – National Laser Centre (NLC), Council for Scientific and Industrial Research (CSIR), SOUTH AFRICA.

**Senior Researcher/Scientist (Grade-II)** (October-2006 to July-2007) – National Laser Centre (NLC), Council for Scientific and Industrial Research (CSIR), SOUTH AFRICA.

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**Post Doctoral Research Fellowship** (November-2002 to September-2006)

Laboratoire de Physique de l'Atmosphère, CNRS – UMR 8105, Reunion University, FRANCE.

I was at CNRS laboratory located at Reunion University for a period of about 4 years. I have continued my research towards middle atmospheric temperature structure and dynamics using Lidars, Satellites, Radiosonde / Ozonesonde and different models. In addition, a part of the research studies includes stratosphere-troposphere exchange and ozone measurements using DIAL techniques. The journal publications and conference proceeding provides more evidence and the result obtained.

**Post Doctoral Research Fellowship** (January-March 2006)

National Laser Centre (NLC), Council for Scientific and Industrial Research (CSIR), SOUTH AFRICA.

I was at CSIR - National Laser Centre on temporary basis for 3 months duration to work on mobile DIAL system. The experimental concept of the system and planning has been carried out.

**Post Doctoral Research Fellowship** (May-2002 to November-2002)

National Atmosphere Research Laboratory, Department of Space, Government of INDIA.

**Senior Research Fellowship** (January-2000 to May-2002)

National Atmosphere Research Laboratory, Department of Space, Government of INDIA.

**Junior Research Fellowship** (January-1998 to January-2000)

National Atmosphere Research Laboratory, Department of Space, Government of INDIA.

I pursued my doctoral studies at National Atmosphere Research Laboratory with financial support from Department of Space (India). My Doctoral research works are dealt mainly with middle atmospheric dynamics and cirrus cloud characteristics using lidar and radar systems at a tropical station, Gadanki (13.5°N; 79.2°E). The source, lidar system employs second harmonic of Nd:YAG laser with maximum energy of 550 mJ. The principle research work involves, studies on middle atmospheric thermal structure (30-80 km), Mesospheric Temperature Inversion, Studies on Gravity Waves, Stratospheric warming and planetary wave activity, cirrus clouds system, General characteristics of tropopause and its relation with ozone concentration and Stratosphere-troposphere exchange.

I was actively involved in various scientific campaigns and group meetings related to Lidar and Radar studies. The involvements of various research groups are in the turbulence studies, middle atmospheric thermal structure, stratospheric dynamics, tropospheric circulation, atmospheric wave characteristics (Gravity waves, Tides and Planetary waves) and Stratosphere-Troposphere Exchange (STE). In addition, I participated to support the various Indian satellite launches (PSLV-C1, PSLV-C2 and GSLV) for analyzing and interpreting the radar data. I have a good exposure on the various remote sensing systems and its development. I have familiarity in analyzing and interpreting the satellite data (HALOE & TOMS).

**Research Supervision / Academic activity****Ph.D / Master Degree Students Supervision**

Name of the student	Race	Degree Awarded	Month of Registration	Expected period of completion / Completed	University/Institute registered	Role of myself
Mr. MARIE Louis Jean Noël Pascal	BLACK MALE	Master ( Course + Project )	September – 2004	August - 2006	Reunion University, Reunion	Co-supervisor & Co-ordinator
Mr. Desalegne Tefera	BLACK MALE	Master( Course + Project )	January – 2006	December- 2007	Addis Ababa University, Ethiopia	Co-supervisor & Co-ordinator
Mr. Samuel Takele	BLACK MALE	Master ( Course + Project )	January – 2006	December- 2007	Addis Ababa University, Ethiopia	Co-supervisor & Co-ordinator

Mr. Vidyanaya Charyulu	BLACK MALE	Ph.D	October - 2004	May - 2008	Reunion University, Reunion	Co-Supervisor
Ms. Elodie Feld	WHITE FEMALE	Master ( Course + Project )	January – 2007	July 2008	Reunion University, Reunion ( France )	Co-supervisor
Mr. Wondimu Alemu	BLACK MALE	Master ( Course + Project )	January - 2007	December-2008	Addis Ababa University, Ethiopia	Co-supervisor
Mr. Melaku Tesfaye	BLACK MALE	Master( Course + Project )	January – 2007	December-2008	Addis Ababa University, Ethiopia	Co-supervisor
Ms. Natasha Anne Greese	WHITE FEMALE	Honour	April – 2010	December-2010	University of Pretoria	Supervisor
Mr. Ondego Joel Botai	BLACK MALE	Ph.D	January – 2005	May– 2011	University of Pretoria	Co-Supervisor
Mr. Nkanyiso Bongumusa Mbatha	BLACK MALE	Ph.D	June - 2007	April - 2012	University of KwaZulu Natal, Durban	Co-Supervisor
Mr. Philbert Modest Luhungha	BLACK MALE	Master	June - 2009	April - 2012	University of Pretoria	Co-Supervisor
Mr. Melaku Tesfaye Yigiletu	BLACK MALE	Ph.D	July – 2009	December-2012	University of Pretoria	Supervisor
Mr. Lucky Dlamini	BLACK MALE	Master	March - 2011	December - 2012	University of Pretoria	Supervisor
Mr. Azwitamisi Mudau	BLACK MALE	Ph.D	March - 2011	December - 2013	University of Pretoria	Supervisor
Mr. Raven Jimmy	BLACK MALE	Ph.D	March - 2012	February - 2014	University of KwaZulu Natal, Durban	Supervisor
Mr. Ravhutsi Steven Mauba	BLACK MALE	Honour	April - 2011	March - 2012	University of Pretoria	Supervisor
Ms. Lee Ann Simpson	WHITE FEMALE	Master	April – 2011	March – 2013	University of Pretoria	Co-Supervisor

### Teaching

- Secondary Grade Teacher in a Matriculation School from July 1996 to March 1997.  
Subjects: Physics, Chemistry and Mathematics.
- Teaching Assistant in a English Medium High School from June 1998 to November 2002.  
Subjects: English, Physics, Chemistry and Mathematics.
- Remote sensing techniques (3<sup>rd</sup> Year Applied Physics) at University of Kwa-Zulu Natal, Durban (Year 2007).
- Lidar and Atmosphere Remote Sensing – University of Pretoria, Pretoria (on going)
- Atmosphere Remote Sensing Technique (Master Degree Students) – Universite de la Reunion, Reunion (France) during November – December 2008, September 2009, May 2010 and April-May 2011 based on an Invited position.

### Membership / Associateship

- Committee on Space Research (COSPAR - France), Research Associate-ship – Since July 2004.
- European Geophysical Union – Membership for 2006
- Society of Photo-Optical Instrumentation Engineers (SPIE) – Member 2007-08.
- South Africa Atmosphere Science Society – Member since 2007

- Senior Member of IEEE International Geosciences and Remote Sensing

### Journal Reviewer

- Journal of Geophysical Research
- Geophysical Research Letter
- Canadian Journal of Physics
- Earth, Planet and Space
- Procedia Environmental Sciences
- Editorial chair of the South Africa Society for Atmosphere Science conference proceedings (2009 & 2010)
- International Geoscience and Remote Sensing Symposium (IGARSS) for 2009, 2010 & 2011.

### Advisory/ Adjudication panel member

- Adjudication panel member of South African National Antarctic Programme (SANAP), South Africa-Germany Bilateral and High Educational research programme
- Science and Education and Technology (SET) - NLC CSIR Member (2008 - 2010)
- Technical committee member of CSIR conference (2008)
- Organizing Committee member of South Africa Institute of Physics (2010)
- Member Council of South Africa Society for Atmosphere Science
- Steering Committee member of South Africa - Space research
- Steering Committee member of South Africa - Solar Terrestrial Physics

### International Role

- Organized South Africa - French Lidar workshop (2007) in Pretoria, South Africa
- Session convener - 'Remote Sensing of the atmosphere' in Asia Oceania Geosciences Society (AOGS)-2008
- Session convener - 'Remote Sensing of the atmosphere' in Asia Oceania Geosciences Society (AOGS)-2011
- Program committee member of Lidar Remote Sensing for Environmental Monitoring XI – SPIE (ASIA-PACIFIC remote Sensing, 2010, 2011)
- Atmosphere Research Consortium between South Africa and France
- Bi-lateral project co-ordinator / principal Investigator (South Africa - France)
- Bi-lateral project co-ordinator / principal Investigator (South Africa - Ethiopia)

### Scientific project leader/involvements

(More detailed contribution is given in the last two pages of CV)

	<b>Title of the project proposal</b>	<b>Role</b>
1.	LIDAR developments for atmosphere studies in South Africa and Algeria (LISAA)	Principal Investigator / Project Leader
2.	Development of 2-T:4-R:2-D LIDAR for atmospheric remote sensing	Principal Investigator / Project Leader
3.	Atmosphere Research over South Africa and Indian Ocean - An International Research Consortium ( CNRS -France and NRF - South Africa)	Principal Investigator / Project Leader
4.	Measurements and Optimization of 2-Channel (532 nm and 355 nm) and X-Y mobile scanning LIDAR for mapping particulate matter in the atmosphere	Principal Investigator / Project Leader
5.	Study on Lower atmosphere aerosol structure and dynamics using ground based measurements and model simulations	Principal Investigator / Project Leader
6.	Development of 2-Channel (532 nm and 355 nm) and X-Y mobile scanning LIDAR for mapping particulate matter in the atmosphere	Principal Investigator / Project Leader
7.	Lidar and Atmosphere Remote Sensing (CSIR and University of Pretoria)	Principal Investigator / Project Leader
8.	South-African French LiDAR (SAFiR) network for study of upper troposphere and lower stratosphere aerosol distributions and dynamics	Principal Investigator / Project Leader
9.	Characterization and Optimization of LiDAR for field campaign measurement of aerosols (particulate matter) around South Africa.	Principal Investigator / Project Leader
10.	Lidar backscatter measurements in the free atmosphere to characterize the aerosol/cloud and particulate matter	Principal Investigator / Project Leader



11.	Lidar for atmosphere research over Africa ( DST, NRF, ALC , CSIR – South Africa and CNRS-France)	Principal Investigator / Project Leader
12.	Ground-based light detection and ranging (lidar) sensor integration for system structural assessment (G-LID)	Principal Collaborator
13.	An exploratory proposal for atmospheric ozone, CO and SO <sub>2</sub> detection in Ethiopia and South Africa using FTIR spectrometer, Ozone and SO <sub>2</sub> detection in South Africa using lidar as well as for inter-comparing measurement and investigating transport processes	Principal Collaborator
14.	Studies on middle atmospheric gravity wave structure including saturations process at a low latitude	Principal Investigator
15.	<i>Ozone Research Project, southern Indian Ocean and Africa regions to investigate Upper Troposphere - Stratosphere ozone budget, variability and change over southern Africa and austral Indian Ocean region</i>	Co-Investigator
16.	Observation and Survey of Air-Mass Exchange at the edge of the Southern Subtropical Barrier: <b>SCOUT-TROPICS</b>	Co-Investigator
17.	Climatologie et dynamique de l'atmosphère tropicale : CLIMAT	Co-Investigator
18.	Indian Ocean Exchange Programme	Co-Investigator
19.	Establishment of collaboration between India and Reunion (France)	Co-Ordinator
20.	Measurements of the intensity of atmospheric turbulence using the dual beam width method at the Gadanki (India) MST Radar	Co-Investigator
21.	Study of upper stratospheric and lower mesospheric temperature field and its variability at Equatorial, Low and Mid latitude regions using Rayleigh lidar systems of SPL,NMRF and PRL	Co-Investigator
22.	Study of tropical troposphere and stratosphere aerosol layers/clouds latitudinal spread, its dynamics, extinction and depolarization characteristics to understand its formation and its dependence on local meteorological conditions	Co-Investigator
23.	The response of Middle Atmospheric Temperature	Co-Investigator
24.	The Equatorial wave experiment	Co-Investigator
25.	Cirrus cloud observations using Indian MST Radar and Lidar	Co-Investigator

## Other Experiences

### Technical

Possesses very good knowledge on the functioning and electronics of the Lidar and MST Radar. Has a good knowledge on Lidar, MST Radar, LAWP, Radio-sonde, Ozone-sonde, to conduct the experiments and data analysis.

### Computational

Programming Languages : FORTRAN-44/77, PASCAL, COBOL and C.  
 Operating Environments : DOS, WINDOWS 95/98/Me/XP, WINDOWS-NT/2000/XP and UNIX  
 Software : Familiar with all PC word processing and Internet tools  
 Graphics Exposure : MATLAB, MICROCAL-ORIGIN, WIN-SURFER AND EXCEL

### Research Interest

Middle atmospheric temperature structure  
 Gravity wave / Tides / Planetary wave  
 Remote Sensing (Radar, Lidar, Satellite and Radiosonde)  
 Pollutant measurements  
 Cirrus cloud dynamics  
 Stratosphere-Troposphere Exchange (STE)  
 Tropopause characteristics  
 Aerosol characteristics  
 Turbulence studies

## Publications

### Book / Book Chapters

1. **“THE INTERDEPENDENT ATMOSPHERE, LAND and OCEAN” - - 27<sup>th</sup> Annual conference proceedings of South African Society for atmosphere Science**  
Sivakumar V (Ed.)  
Electronic publication, [http://www.sasas.org.za/downloads/SASAS\\_proceedings.pdf](http://www.sasas.org.za/downloads/SASAS_proceedings.pdf), ISBN 978-0-620-50849-0, 2011.
2. **‘NOT A DAM CONFERENCE’ - 26<sup>th</sup> Annual conference proceedings of South African Society for atmosphere Science**  
Sivakumar V (Ed.)  
Electronic publication, [http://www.sasas.org.za/downloads/SASAS\\_proceedings.pdf](http://www.sasas.org.za/downloads/SASAS_proceedings.pdf), ISBN 978-0-620-47333-0, 2010.
3. **Mean Ozone and Water vapour height profiles for southern hemisphere region using Radiosonde / Ozonesonde and HALOE satellite data**  
Sivakumar V, Tefera D, Mengistu G and O.J. Botai  
*World Scientific books, Advances in Geosciences*, 16, Atmospheric Science, Chapter 23, 263-270, ISSN : 1680-7340& ISBN : 978-981-283-809-4, 2010.
4. **Aerosol measurements over South Africa using LIDAR, Satellite and Sun Photometer**  
Sivakumar V, Tesfaye M, Alemu W, Sharma A, Bollig C and Mengistu G  
*World Scientific books, Advances in Geosciences*, 16, Atmospheric Science, Chapter 22, 253-262, ISSN : 1680-7340& ISBN : 978-981-283-809-4, 2010.
5. **Multi-Scale organization of water vapour in the low- and mid- tropical Africa**  
Botai O J, Sivakumar V, Combrinck, L.W and Hannes C J  
*World Scientific books, Advances in Geosciences*, 16, Atmospheric Science, Chapter 21, 241-251, ISSN : 1680-7340& ISBN : 978-981-283-809-4, 2010.
6. **‘Beyond the Box’ - 25<sup>th</sup> Annual conference proceedings of South African Society for atmosphere Science**  
Sivakumar V (Ed.)  
Electronic publication, [http://www.sasas.org.za/downloads/2009\\_SASAS\\_conference\\_proceeding.pdf](http://www.sasas.org.za/downloads/2009_SASAS_conference_proceeding.pdf), ISBN 978-0-620-44218-3, 2009.
7. **LiDAR for ground- and airborne trace gas detection**  
Střížik M , Zelinger Z and Sivakumar V and Pavel E  
*Chapter-6 in a text book, ‘Lasers in Chemistry’, Wiley-VCH publications, ISBN-10: 3-527-31997-2; -13: 978-3-527-31997-8, Germany, 2008.*

### Journal Papers

8. **Analyses of the Middle atmosphere thermal structure over Durban using a ground-base Rayleigh LIDAR system and satellite experiments (HALOE and SABER)**  
Mbatha N M, Sivakumar V, Bencherif H, Malinga S B, Pillay S R, Moorgawa A and Michaelis, M.M.  
*South Africa Journal of science*, 108(1/2), Art.#612, 2012.
9. **Aerosol climatology over South Africa based on 10 years of Multi-Angle Imaging SpectroRadiometer (MISR) data**  
Tesfaye M., Sivakumar V, Botai O.J., and Mengistu G.  
*Journal of Geophys. Research*, D20216, doi:10.1029/2011JD016023, 2011.
10. **Inferences of  $\alpha$ -stable distribution of the underlying noise components in geodetic data**  
Botai O J., Combrinck L and Sivakumar V,  
*South Africa Journal of Geology*, 114, 541-548, 2011.
11. **Tropopause characteristics and variability from 11-year SHADOZ observations in the southern tropics and sub-tropics**  
Sivakumar V, Bencherif H, Begue N and Thompson A.M.  
*Journal of Applied Meteorology and Climatology*, 50, 1403-1416, 2011.

12. **Global distribution of water vapour observed by COSMIC GPS RO: Comparison with GPS radiosonde, NCEP and JRA-25 reanalysis data sets**  
Kishore P., Ratnam M.V., Namboothiri, S.P., Velicogna I, Basha G, Jiang J.H. Igarashi K., Rao, S.V.B., and Sivakumar V.,  
*Journal of Atmosphere Solar and Terrestrial Physics*, 73, 1849-1860, 2011.
13. **Rayleigh LIDAR and satellite (HALOE, SABER, GPS-CHAMP and COSMIC) measurements of Stratosphere-Mesosphere temperature over a southern sub-tropical site, Reunion (20.8°S; 55.5°E): Climatology and comparison study**  
Sivakumar V., Vishnu Prasanth, P., Kishore, P., Bencherif H., and Keckhut. P.,  
*Annales Geophysicae*, 29, 649-662, 2011.
14. **Temperature variability and trends in the UT-LS over a sub-tropical site, Reunion (20.8 S, 55.5 E)**  
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Patra A K, Sripathi S, Sivakumar V and Rao P B  
*5<sup>th</sup> User scientists workshop on MST Radars, National MST Radar Facility, Tirupati (INDIA), 10 March 2001.*

73. **Quasi Periodic echoes as observed in an extended height range from 80-150 km over Gadanki**  
Patra A K, Sripathi S, Sivakumar V and Rao P B  
*5<sup>th</sup> User scientists workshop on MST Radars, National MST Radar Facility, Tirupati (INDIA), 10 March 2001.*
74. **Equatorial wave experiment of 1999 winter**  
Krishna Murthy B V, Prabhakaran Nayar S R, Revathy K, Mrudula G, Satheesan K, Parameswaran K, Sasi M N, Prabha R Nair, Geetha Ramkumar, , Deepa V, Bhavanikumar Y, Sivakumar V, Rangunath K and Krishnaiah M  
*5<sup>th</sup> User scientists workshop on MST Radars, National MST Radar Facility, Tirupati (INDIA), 10 March 2001.*
75. **Lidar Observations of Tropical Cirrus Clouds**  
Sivakumar V, Bhavanikumar Y, Rao P B, Krishnaiah M, Mizutani K, Aoki T, Yasui M and Itabe T  
*9<sup>th</sup> International Workshop on Technical and Scientific Aspects of MST Radar, Toulouse (FRANCE), 2000.*
76. **Lidar measurements of mesospheric temperature inversion at a low latitude**  
Sivakumar V, Bhavanikumar Y, Rao P B, Krishnaiah M, Mizutani K, Aoki T, Yasui M and Itabe T  
*9<sup>th</sup> International Workshop on Technical and Scientific Aspects of MST Radar, Toulouse (FRANCE), 2000.*
77. **Observations of cirrus clouds using Indian MST radar and polarization diversity lidar**  
Bhavanikumar Y, Sivakumar V, Jain A R and Rao P B  
*9<sup>th</sup> International Workshop on Technical and Scientific Aspects of MST Radar, Toulouse (FRANCE), 2000.*
78. **Lidar observations of gravity wave activity over a tropical station**  
Bhavanikumar Y, Sivakumar V, Rao P B, Krishnaiah M, Mizutani K, Aoki T, Yasui M and Itabe T  
*9<sup>th</sup> International Workshop on Technical and Scientific Aspects of MST Radar, Toulouse (FRANCE), 2000.*
79. **VHF Radar observation of atmospheric winds, associated shears and Cn<sup>2</sup> at a tropical location: Interdependence and seasonal pattern**  
Ghosh A K, Sivakumar V, Jain A R and Reddi K M C  
*9<sup>th</sup> International Workshop on Technical and Scientific Aspects of MST Radar, Toulouse (FRANCE), 2000.*
80. **VHF Radar Observations of field-aligned irregularities at 85-95 km altitude over Gadanki**  
Patra A K, Sripathi S, Sivakumar V and Rao P B  
*9<sup>th</sup> International Workshop on Technical and Scientific Aspects of MST Radar, Toulouse (FRANCE), 2000.*
81. **Integrated Winds and associated turbulence measurements using Indian MST Radar and Lower Atmospheric Wind Profiler (LAWP)**  
Reddi K M C, Ghosh A K, Sivakumar V and Jain A R  
*9<sup>th</sup> International Workshop on Technical and Scientific Aspects of MST Radar, Toulouse (FRANCE), 2000.*
82. **Climatology of temperature profiles of middle atmosphere observed over a tropical site**  
Krishnaiah M, Bhavanikumar Y, Sivakumar V, Rangunath K, Rao P B, Mizutani K, Aoki T, Yasui M and Itabe T  
*9<sup>th</sup> International Workshop on Technical and Scientific Aspects of MST Radar, Toulouse (FRANCE), 2000.*
83. **Characteristics of atmospheric turbulence and radar back scatterers: Simultaneous MST radar and Radiosonde observation over Gadanki**  
Jain A R, Ghosh A K, Sivakumar V and Kishorekumar K  
*9<sup>th</sup> International Workshop on Technical and Scientific Aspects of MST Radar, Toulouse (FRANCE), 2000.*
84. **Indo-Japanese Lidar system: Part 1 - System Description and Data Processing**  
Bhavanikumar Y, Rangunath K, Sivakumar V, Rao P B, Jain A R, Mizutani K, Aoki T, Yasui M and Itabe T  
*Radar Symposium, India (IRSI), Bangalore (INDIA), 14-17 December 1999.*
85. **Indo-Japanese Lidar Studies of Tropical Atmosphere**  
Rao P B, Rangunath K, Bhavanikumar Y, Sivakumar V, Jain A R, Mizutani K, Aoki T, Yasui M and Itabe T  
*International Laser Sensing Symposium, Fukui (JAPAN), 1999.*
86. **Gravity Wave Activity in the Equatorial Middle Atmosphere observed with a Rayleigh Lidar in India**  
Sawai Y, Nakumara T, Tsuda T, Mizutani K, Itabe T, Rao P B, Rangunath K, Bhavanikumar Y and Sivakumar V  
*International Laser Sensing Symposium, Fukui (JAPAN), 1999.*
87. **Convection in Asian Mon soon system - 1998 (CAMS-98) : A Special Experiment under GAME with Indian MST Radar and Lower Atmospheric Wind Profiler**  
Kusuma G Rao P B, Jain A R, Chakravarthy S C, Sivakumar V and Suman B R  
*Symposium on the precipitation observation from Non-Sun Synchronous orbit, Nagoya University, Nagoya (JAPAN), 1998.*

**Invited / Oral presentations presented in the international conferences / Institutes**



**CSIR-NLC mobile LIDAR for atmospheric Remote Sensing,**

Presented at School of Chemistry, North West University, Mafikeng (South Africa), 27 September 2011. **INVITED**

**Lidar for atmospheric studies**

Presented at School of Chemistry, North West University, Mafikeng (South Africa), 27 September 2011 **INVITED**

**Introduction to the Atmosphere Remote Sensing**

Presented at School of Chemistry, North West University, Mafikeng (South Africa), 26 September 2011 **INVITED**

**CSIR NLC-Mobile LIDAR observation of cirrus cloud**

27<sup>th</sup> Annual conference of South African society for atmosphere science, Hartbeespoort, (South Africa), 22-23 September 2011

**A study of stable atmospheric boundary layer characterization over Highveld region of South Africa**

27<sup>th</sup> Annual conference of South African society for atmosphere science, Hartbeespoort, (South Africa), 22-23 September 2011

**Retrieval of atmospheric boundary layer height by CSIR-NLC Mobile LIDAR, Pretoria (25.5° S; 28.2° E), SOUTH AFRICA**

IEEE International Geosciences and Remote Sensing Symposium, Vancouver (CANADA) 24-29 July, 2011

**CSIR-NLC mobile LIDAR for atmospheric Remote Sensing**

56<sup>th</sup> annual conference of South Africa Institute of Physics, Pretoria, 11-15 July 2011

**CSIR-NLC mobile LIDAR for atmospheric Remote Sensing,**

Changing chemistry in climate Change – South Africa research perspective, 31 May – 03 June, 2011, Midrand (South Africa), **INVITED**

**Lidar for atmospheric studies**

Presented at School of Physics, University of Kwa-Zulu Natal (Durban, South Africa), 17 February 2011

**Development of 2-Channel (532 nm and 355 nm) Mobile LIDAR for Mapping Particulate Matter in the Atmosphere**

26<sup>th</sup> Annual conference of South African society for atmosphere science, South Africa, 20-22 September 2010.

**Latitudinal Variations of Aerosol Optical Parameters over South Africa Based on MISR Satellite Data**

26<sup>th</sup> Annual conference of South African society for atmosphere science, South Africa, 20-22 September 2010.

**Atmospheric Research in Southern Africa and Indian Ocean (ARSAIO): A South Africa – France Bilateral collaborative programme**

26<sup>th</sup> Annual conference of South African society for atmosphere science, South Africa, 20-22 September 2010.

**CSIR-NLC Mobile LiDAR for atmospheric research – Public Lecture**

Presented at University of Malaysia on 18 August 2009, **INVITED**.

**Aerosol measurements over Southern Africa using LIDAR, Satellite and Sun Photometer**

Presented at Asia Oceanic GeoScience Society-2009, 10-16 August 2009, Singapore.

**CSIR NLC Mobile LIDAR – First Scientific Results**

Presented at International Geoscience and Remote Sensing Symposium, Cape Town, 13-17 July 2009.

**CSIR NLC Mobile LIDAR for Atmosphere studies**

Presented at 54<sup>th</sup> annual conference of South Africa Institute of Physics, Durban, 06 -11 July 2009.

**LIDAR and Atmosphere research at University of Pretoria / CSIR – NLC**

Remote Sensing a tool for sustainable development in South Africa and Indian Ocean, Durban, 08-09 May 2009.

**Middle atmosphere structure and its dynamics**

University of Svalbard, Longyearbyen (Norway), 20 March 2009, **INVITED**.

**CSIR-NLC Mobile LiDAR for lower atmospheric research**

Presented at CSIR-Remote sensing forum on 26 August 2008.

**LiDAR research and collaborative activity at NLC-CSIR**

Department of Physics, Addis Ababa University, 18 March 2008, Ethiopia.

**Light Detection and Ranging – An active atmosphere probe**

Department of Physics, Addis Ababa University, 18 March 2008, Ethiopia.

**Light Detection and Ranging – A state of the art**

Environmental and Biological applications of Lasers – 2008, Cairo, 19-28 January 2008, **INVITED**.

**LiDAR for Atmosphere Research over Africa (LARA)**

Environmental and Biological applications of Lasers – 2008, Cairo, 19-28 January 2008.

**Introduction to Light Detection and Ranging ( LiDAR )**

South Africa - French Lidar workshop (2007) in Pretoria, South Africa, 21-22 November 2007, **INVITED**.

**Overview of NLC mobile LiDAR system**

South Africa - French Lidar workshop (2007) in Pretoria, South Africa, 21-22 November 2007.

**LiDAR for Atmosphere Research over Africa (LARA)**

South Africa Atmosphere Science Society conference, held at University of Witswatrand, Johannesburg, 13-14 September, 2007.

**De-noising LiDAR signal using wavelet technique**

Lidar Remote Sensing for Environmental Monitoring VIII, SPIE Symposium on Optical Engineering + Applications, held in 26-30 August 2007, San Diego, 2007.

**Rayleigh lidar investigation of sudden stratospheric warming observed over Northern and Southern hemisphere stations**

Western Pacific Geo-physical Meeting – American Geophysical Union, held at Beijing, CHINA, during 24-27 July 2006 - **INVITED**

**Middle atmospheric temperature structure and its dynamics**

National Astronomy and Ionosphere Centre, Arecibo Observatory (Cornell University, New York, USA), Puerto Rico (2 December 2004) - **INVITED**

**Lidar observations of tropical cirrus clouds**

Presented at NLC-CSIR colloquium on 05 January 2007.

**LiDAR for atmospheric studies**

Presented at CSIR-Remote sensing forum on 05 December 2006.

**Laser Remote Measurements of atmospheric pollutants (Las-R-Map): UV-Visible Laser system description and data processing**

36<sup>th</sup> COSPAR Scientific Assembly, Beijing (CHINA), 16-23 July 2006.

**LIDAR observation of middle atmospheric gravity wave activity over a southern sub-tropical station, Reunion Island (21°S; 55°E)**

36<sup>th</sup> COSPAR Scientific Assembly, Beijing (CHINA), 16-23 July 2006.

**Network On Middle Atmosphere Dynamics (NOMAD) and the usage of Megha-Tropique data-products**

Megha-Tropique workshop held at Bangalore (INDIA) during 10-15 July 2006.

**The Earth Atmosphere and Ozone**

INTROMET-2004, International Symposium on Natural Hazards and Climate Change, Hyderabad (INDIA), 23-27 February 2004.

**Ozone and Thermal tropopause characteristics observed over Reunion Island (21°S; 55°E)**

Tropospheric ozone workshop, University of Natal, Durban (SOUTH AFRICA), 26-28 January 2004.

**Troposphere-Stratosphere ozone measurements from Reunion Island (21°S; 55°E): Climatological study using Insitu (Lidar and Ozone) and Satellite data (TOMS and HALOE)**

Tropospheric ozone workshop, University of Natal, Durban (SOUTH AFRICA), 26-28 January 2004.

**Rayleigh lidar observations of sudden stratospheric warming over a low latitude**

EGS - AGU - EUG Joint Assembly, Nice (FRANCE) 06-11 April 2003.

**Lidar studies of stratosphere-mesosphere thermal structure over a low latitude**

5<sup>th</sup> User scientists workshop on MST Radars, National MST Radar Facility, Tirupati (INDIA), 10 March 2001.

**Workshops / Conferences Participated and Presented**

- ★ 27<sup>th</sup> Annual conference of South African society for atmosphere science, **SOUTH AFRICA**, 22-23 September 2011.
- ★ 56<sup>th</sup> annual conference of South Africa Institute of Physics, Pretoria, **SOUTH AFRICA**, 11-15 July 2011.

- ✧ Changing chemistry in climate Change – South Africa research perspective, **SOUTH AFRICA, SOUTH AFRICA** 31 May – 03 June, 2011.
- ✧ International Geoscience and Remote Sensing Symposium, Vancouver, **CANADA**, 24-29 July 2011.
- ✧ 26<sup>th</sup> Annual conference of South African society for atmosphere science, **SOUTH AFRICA**, 20-22 September 2010.
- ✧ Asia Oceanic GeoScience Society-2009, **SINGAPORE** 10-16 August 2009.
- ✧ International Geoscience and Remote Sensing Symposium, Cape Town, **SOUTH AFRICA**, 13-17 July 2009.
- ✧ 54<sup>th</sup> annual conference of South Africa Institute of Physics, Durban, **SOUTH AFRICA**, 06-11 July 2009.
- ✧ 24<sup>th</sup> International Laser Radar Conference, Boulder, Colorado, **USA**, 23-28 June 2008.
- ✧ Environmental and Biological applications of Lasers – 2008, Cairo, **EGYPT** 19-28 January 2008.
- ✧ South Africa - French Lidar workshop (2007) in Pretoria, **SOUTH AFRICA**, 21-22 November 2007.
- ✧ South Africa Atmosphere Science Society conference, held at University of Witwatersrand, Johannesburg, **SOUTH AFRICA**, 13-14 September, 2007.
- ✧ Lidar Remote Sensing for Environmental Monitoring VIII, SPIE Symposium on Optical Engineering + Applications, held in 26-30 August 2007, San Diego, **USA**, 2007.
- ✧ WPGM – AGU meeting, held at Beijing, **CHINA**, during 24-27 July 2006.
- ✧ COSPAR 36<sup>th</sup> General Assembly, held at Beijing, **CHINA**, during 16-23 July 2006.
- ✧ MEGHA-TROPIQUE workshop, held at Bangalore, **INDIA**, during 10-15 July 2006.
- ✧ EUG 1<sup>st</sup> General Assembly, held at Vienna, **AUSTRIA**, during 24-29, April 2005.
- ✧ INTAR – International Radar symposium held at National MST Radar Facility, Tirupati, **INDIA**, January, 20-24, 2005.
- ✧ SPARC – 3<sup>rd</sup> Assembly, held at Victoria, **CANADA**, during 01-06 August 2004.
- ✧ COSPAR 35<sup>th</sup> General Assembly, held at Paris, **FRANCE**, during 18-26 July 2004.
- ✧ INTROMET-2004; International Symposium on Natural Hazards, held at Hyderabad, **INDIA**, during 23-26 February 2004.
- ✧ Tropospheric Ozone workshop, held at University of Natal, Durban, **SOUTH AFRICA**, during 26 - 28 January 2004.
- ✧ EGS - AGU - EUG Joint Assembly, held at Nice, **FRANCE**, during 06-11, April 2003.
- ✧ Aerosols, clouds and climate Interactions held at Indian Institute of Science, Bangalore, **INDIA**, July 04-10, 2001.
- ✧ National workshop on recent developments in atmospheric and space physics, held at University of Roorkee, Roorkee, **INDIA**, March, 19-21, 2001
- ✧ Fifth user scientists workshop on MST radar, held at National MST Radar Facility, Tirupati

- INDIA, March, 10, 2001.
- ✧ Third winter school on Indian MST radar held at Sri Venkateswara University, Tirupati,  
INDIA, March, 05-09, 2001.
- ✧ TROPMET – 2000, held at Cochin, INDIA.
- ✧ Fourth user scientists workshop on MST radar, held at National MST Radar Facility, Tirupati,  
INDIA, April, 03-07, 1999.
- ✧ TROPMET – 1998, held at Chennai, INDIA.

### **Ph.D thesis abstract**

The thesis entitled ‘Lidar studies of the middle atmospheric temperature structure and tropospheric cirrus clouds over a low latitude’ presents the thermal structure of the stratosphere and mesosphere (30-80 km) using Rayleigh backscatter and the cloud characteristics over the height range of 8-20 km using Mie Backscatter. Using the Rayleigh lidar data, a comprehensive study has been made on low latitude temperature structure over the height range of 30-80 km. The results present a detailed account of the significant seasonal and annual variations seen in the low latitude middle atmospheric thermal structure. The height of stratopause and its temperature variation is discussed with mid- and high-latitude observations. Then, a statistical study of the various characteristics of the mesospheric temperature inversion is presented for the first time for low latitude using the lidar observations made on 119 nights over the period of March 1998 to February 2000. The results include the seasonal dependence of the occurrence frequency, the height of the inversion layer and the magnitude of the temperature deviation. The observed characteristics of the inversion layer are compared with that of the mid-latitudes and discussed in the light of the current understanding source mechanisms (gravity wave breaking and chemical heating). Using the high-resolution temperature data, the study on basic characteristics of gravity wave activity is delineated. The study also covers the various aspects of the gravity waves, including its saturation, growth and breaking processes. Using lidar as a source, the study on tropical cirrus cloud system is also carried out and presented at the end of the thesis. The cirrus cloud systems are classified into optically thick and thin based on their optical depth and their detailed characteristics in terms of their measured scattering-ratio, linear depolarization ratio, height of occurrence, thickness and optical depth. The source mechanisms for the formation of thick and thin cirrus are also described.

Referees

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### More detailed table: - Role in major scientific campaign / projects

Title of the project/proposal	Time-period	Role	Funding organization	Fund Granted	Purpose of funds	Funds to Parental Institute/University where I am / was employed
LIDAR developments for atmosphere studies in South Africa and Algeria (LISAA)	2011-2013	PI	NRF & Algeria	500,000.00 Rands	Costs related to exchange programme	500,000.00 Rands
Development of 2-T:4-R:2-D LIDAR for atmospheric remote sensing	2011-2014	PI	CSIR-NLC (Under Parliament Grand)	850,000.00 Rands (100000.00 – Running cost)	Costs related to man power and consumables	850,000.00 Rands (100,000.00 – Running cost) ( NLC – CSIR )
Atmosphere Research over South Africa and Indian Ocean (An international Research group Consortium between South Africa and France)	2010-2014	PI	NRF & CNRS	1,588,000.00 Rands	Costs related to exchange programme	794,000.00 (South Africa part)
Measurements and Optimization of 2-Channel (532 nm and 355 nm) and X-Y mobile scanning LIDAR for mapping particulate matter in the atmosphere	2010-2011	PI	CSIR-NLC (Under Parliament Grand)	812,000.00 Rands (11000.00 – Running cost)	Costs related to man power and consumables	812,000.00 Rands (110,000.00 – Running cost) ( NLC – CSIR )
Study on Lower atmosphere aerosol structure and dynamics using ground based measurements and model simulations	2010-2012	PI	ALC	208,000.00	Costs related to Researcher/Student bursary/exchange and Consumables	208,000.00 ( NLC – CSIR & AAU)
Development of 2-Channel (532 nm and 355 nm) and X-Y mobile scanning LIDAR for mapping particulate matter in the atmosphere	2009-2010	PI	CSIR-NLC (Under Parliament Grand)	1,443,960.00 Rands (250000.00 – Running cost)	Costs related to man power and consumables	1,493,960.00 Rands (250,000.00 – Running cost) ( NLC – CSIR )
Lidar and Atmosphere Remote Sensing	2008-2012	PI/PC	CSIR and U.P	160,000.00 (Running)	Costs related to consumables and exchange programme	160,000.00 ( NLC- CSIR & U.P )
South-African French LiDAR (SAFiR) network for study of upper troposphere and lower stratosphere aerosol distributions and dynamics	2008-2010	PI	NRF & FRENCH EMBASSY	400,000.00 ( Running )	Costs related to exchange programme	200,000.00 ( NLC – CSIR )
Lidar for atmosphere research over Africa – A trilateral research programme ( between South Africa and Ethiopia )	2008-2009	PI	ALC	208,000.00	Costs related to Researcher/Student bursary/exchange and Consumables	208,000.00 ( NLC – CSIR & AAU)
Characterization and Optimization of LiDAR for field campaign measurement of aerosols (particulate matter) around South Africa.	2008-2009	PI	CSIR-NLC (Under Parliament Grand)	1,443,960.00 Rands (100000.00 – Running cost)	Costs related to man power and consumables	1,443,960.00 Rands (300,000.00 – Running cost) ( NLC – CSIR )
Lidar backscatter measurements in the free atmosphere to characterize the aerosol/cloud and particulate matter	2007-2008	PI	CSIR-NLC (Under Parliament Grand)	1260000.00 Rands (300000.00 – Running cost)	Costs related to man power and consumables	1,260,000.00 Rands (300,000.00 – Running cost) ( NLC – CSIR )
Ground-based light detection and ranging (lidar) sensor integration for system structural assessment (G-LID)	2007-2008	PC	CSIR (Under SRP pilot project)	150000.00 Rands	Human Resource	30000.00 Rands ( NLC – CSIR )

Lidar for atmosphere research over Africa – A trilateral research programme ( between South Africa, France and Ethiopia )	2007-2010	PI	NLC-CSIR, DST(SA),CNRS, ALC & NRF	Requested over all 8000000.00 including the equipment cost. 732000.00 – DST has awarded and ALC/CNRS has formally agreed	Costs related to Researcher/Student bursary/exchange, scientific workshop and network	732000.00 Rands (DST-SA) + CNRS and ALC has agreed to fund Application for NRF – equipment programme will be decided by next year ( NLC – CSIR )
An exploratory proposal for atmospheric ozone, CO and SO <sub>2</sub> detection in Ethiopia and South Africa using FTIR spectrometer, Ozone and SO <sub>2</sub> detection in South Africa using lidar as well as for inter-comparing measurement and investigating transport processes	2007-2008	PC	ALC	180040.00 Rands	Researchers/student exchange Travel, S&T and Accommodation cost	90000.00 Rands ( NLC – CSIR )
Colloquium on Upper troposphere Lower stratosphere region at Reunion	2006 / 2007	OC	UR	22280 Euros	International Conference	22280.00 Euros (Reunion University)
<i>Ozone Research Project, southern Indian Ocean and Africa regions to investigate Upper Troposphere - Stratosphere ozone budget, variability and change over southern Africa and austral Indian Ocean region</i>	Network (for ever)	CI	NRF, CNRS, UR, Conseil Régional, Réunion and FEDER	Submitted	Research network 50000.00 Euros ( Requested per year )	8000.00 Euros ( per year – to be negotiated for NLC)
Observation and Survey of Air-Mass Exchange at the edge of the Southern Subtropical Barrier: SCOUT: TROPICS	2004-2008	CI	FEDER	41900.00 Euros	Cost related to research programme	419000.00 Euros (Reunion University)
Atmospheric chemistry transport and exchange between the latitudes : LEFE-CHAT	2006-2008	CI	INSU	15000.00 Euros	Cost related to research programme	15000.00 Euros (Reunion University)
Water vapour transport and climate change Cycl'EAU	2004-2006	CI	Conseil Régional, Réunion and FEDER	80000.00 Euros	Research programme + Post doctoral support	80000.00 Euros (Reunion University)
Climatologie et dynamique de l'atmosphère tropicale : CLIMAT	2004-2006	CI & CO	Conseil Régional, Réunion	100000.00 Euros	Research programme + Post doctoral support	100000.00 Euros (Reunion University)
Stratosphere dynamics and transport : PNCA	2005-2006	CI	INSU, France	4000.00 Euros	Research Travel + Post doctoral support	4000.00 Euros (Reunion University)
Studies on middle atmospheric gravity wave structure including saturations process at a low latitude	2002-2006	PI	NARL, ISRO and DOS, India	Internal support	Research Programme	Internal support NARL, ISRO and DOS, India
Establishment of Collaboration between India and Reunion (France)	Since 2004	CO	UR, DOS, India and IFCPAR	Internal support + 96000.00 Euros (exp. IFCPAR)	Student Exchange and tropical network programme	Internal support received ( Reunion University and CNRS)
Measurements of the Intensity of Atmospheric turbulence using the Dual-Beamwidth Method at the Gadanki (India) MST Radar	April-May 2002	CI	Department of Earth Sciences, St. Cloud State University, USA	60000.00 USD	Cost related to S&T and Research programme	Internal support from NARL, ISRO and DOS, India
Study of upper stratospheric and lower mesospheric temperature field and its variability at Equatorial, Low and Mid latitude regions using Rayleigh lidar systems of SPL,NMRF and PRL”	2000-2002	CI	NARL, ISRO and DOS, India	Internal support	Scientific Research collaboration and common study	Internal support from NARL, ISRO and DOS, India
Study of tropical troposphere and stratosphere aerosol layers/clouds latitudinal spread, its dynamics, extinction and depolarization characteristics to understand its formation and its dependence on local meteorological conditions	2000-2002	CI	NARL, ISRO and DOS, India	Internal support	Scientific Research collaboration and common study	Internal support from NARL, ISRO and DOS, India
The response of Middle Atmospheric Temperature	1999-2002	CI	ISRO – RESPOND	100000.00 USD	Scientific research programme and Ph.D	100000.00 USD

			project		student support	( S.V. University, India)
The Equatorial Wave experiment : Phase-1 (conducted from January 18, 1999 to March 5, 1999 with Lidar at Gadanki )	Jan-Mar 1999	CI	ISRO – RESPOND project	80000.00 USD	Pilot-Scientific research programme	80000.00 USD (NARL-ISRO, India)
Cirrus cloud observations using Indian MST Radar and Lidar	2000-2001	CI	NARL, ISRO and DOS, India	Internal support	Scientific research programme	Internal support from NARL, ISRO and DOS, India



NARL : National Atmospheric Research Laboratory  
DST : Department of Science and Technology  
IFCPAR : Indo-French centre for advanced research  
INSU : Institute National des Sciences de l'univers, France  
FEDER : Funds Européen de développement Régional, Europe  
CNRS : Centre Nationale Research de la Scientifique, France.  
PI : Principle Investigator  
PC : Principle Research Collaborator  
CO : Co-ordinator  
ALC : African Laser Centre

DOS : Department of Space  
ISRO : India space Research Organisation  
UR : Universite de la Reunion, Reunion, France.  
  
CI : Co-Investigator  
U.P : University of Pretoria  
OC : Organization Committees  
NRF : National Research Foundation

**Details of the role in the project ( Refer to high-lighted colours )**

Role			
Project Preparation	100 %	30 %	10 %
Project Management	100 %	30 %	10 %
Project Leader	100 %	20 %	10 %
Contribution by result outcome	100 %	70 %	30 %
Participation in various activities (experiments, meeting/discussion and assistance)	100 %	80 %	20 %