

Dr. S. V. SUNILKUMAR

Scientist/Engineer SE,
Atmospheric Dynamics Branch
Space Physics Laboratory,
Vikram Sarabhai Space Centre,
Thiruvananthapuram 695022

Emails: [sv_sunilkumar at vssc dot gov dot in](mailto:sv_sunilkumar@vssc.gov.in); [sunilspl at yahoo dot co dot in](mailto:sunilspl@yahoo.co.in)

Date of Birth 22 May 1974

Academic Qualifications:

Ph. D (Physics), *University of Kerala, Thiruvananthapuram, India (2004)*
M. Phil (Physics), *University of Kerala, Thiruvananthapuram, India (1999)*
B. Ed (Physical Science), *M. S. University, Tirunelveli, India (1998)*
M. Sc (Physics), *M. S. University, Tirunelveli, India (1997)*
B. Sc (Physics), *M. S. University, Tirunelveli, India (1995)*

Professional Background:

Scientist SE, SPL, VSSC : July 2012 – present
Scientist SD, SPL, VSSC : February 2006 – June 2012
Scientist B, ARIES, Nainital : December 2004 – February 2006
Research Associate, SPL, VSSC : September 2004 – December 2004
Senior Research Fellow, SPL, VSSC : August 1999 – July 2004

Area of specialization & Research interests:

Troposphere-Stratosphere Processes & Coupling, Particulates (Aerosols and Cirrus Clouds) in Upper Troposphere and Lower Stratosphere (UTLS), Stratosphere-Troposphere Exchange (STE) Process, Remote Sensing of the Atmosphere using Lidar, Radar and Satellite

Scientific publications

Peer reviewed Publications in Journals/Proceedings : 32
Other Proceedings : 17
Chapters in Books : 01
Scientific Reports : 01
Symposium Presentations : 50

Responsibilities :

- *Group Leader & Principal Investigator: 'Tropical Tropopause Dynamics (TTD) Experiment' WG-1, Theme-III, CAWSES-India: (December 2010- March 2014)*
- *Principal Investigator:-'GARNETS' (GPS Aided Radiosonde Network Experiments for Troposphere-stratosphere Studies): (2014 - present)*
- *Principal Investigator:- Water vapour-Ozone Experiment using Frost-Point Hygrometer (FPH) and Ozonesondes: (2014 - present)*
- *"Integrated Lidar system (ILS) of SPL": Member, Science Team & Inter-Centre Experts Committee (ICEC)*

Scientific Field Experiments:

- Executed first-of-its kind measurement over India using the improved version of FPH
- *Monthly campaigns using FPH-Ozonesondes from Trivandrum and TIFR-Hyderabad (Dec2014-Dec2015)*
- Coordinated/ Executed 40 **campaigns** from Thumba and Gadanki as part of TTD experiment during Dec.2010-Mar.2014 using Balloons, Lidars, Radar

- Executed balloon borne experiments as part of from VSSC-Thumba, CUSAT-Cochin, Amrita college-Coimbatore
- Actively participated in ISRO's *Sooryagrahan-2010* program
- Actively involved in ISRO's *MIDAS program (2002-2007)*

Major Scientific Accomplishments:

- Initiated an integrated study to characterize the cirrus clouds & atmospheric particulates in Upper Troposphere-Lower Stratosphere (UTLS) region over the Indian region using Lidar, Radar and Satellites (*KALPANA-I, SAGE- II, CALIPSO*). [*JGR, 2009; JASTP, 2010a,b; JASTP 2011b; GRL, 2008; JGR, 2011*].
- Tropical tropopause over the Indian region showed significant inter-annual variations and are closely associated with QBO in stratospheric wind and global signal such as ENSO [Climate Dynamics, 2012].
- Extensive analysis of TTD data delineated: (i) Characteristics of tropopause; (ii) Characteristics of small-scale turbulence in the UTLS region; (iii) Deep convection modulating TTL; (iv) heterogeneity of tropical cirrus [*J. Atmos. Sol. Terres. Phy., 2014a; 2014b, 2015; Atmos. Res., 2015*].
- First results from FPH over India: (i) Water vapour in stratosphere is marginally high over Hyderabad (~6.5 ppmv) compared to that at Trivandrum (~5 ppmv), (ii) Comparison with Aura-MLS satellite instrument showed dry bias in the stratosphere (0.3-20%). [*J. Atmos. Sol. Terres. Phy., 2016*]

Academic Responsibilities:

- **PhD Research Supervisor:** Currently supervising two students; one in final stage
- **Research supervision for Post-Graduate Science Project:** 9 MSc (Physics) & 2 Mphil students
- **Academic Activities:**
 - Member, Academic Committee; Member, Doctoral committees of Research Fellows at SPL
 - Member, CUSAT Research/Doctoral Committees for Research fellows registered at CUSAT.
 - Reviewer of Journals: *J. Atmos. Solar and Terr. Phys; Indian J. of Radio Space Physics (IJRSP), Journal of the Atmospheric Sciences, Radio Science, Journal of Earth System Science (JESS)*
 - Co-chair, National Space Science Symposium-2016, PS2 section
 - Rappoteur, NSSS-2010, International Conference on Climate Change, i3CDM, Trivandrum, 26-28 Feb 2015

Membership in National and International bodies

Member, SPARC capacity development (CD) group in Asia (2015-)
Executive member, India Meteorological Society (IMS), Thiruvananthapuram Chapter (2014-)
COSPAR Associate (2008 -)
Member, Asia Oceania Geosciences Society (2008-)

Organized:

National workshop on “Tropical Tropopause Dynamics” during 24-25 January 2012 at VSSC.

Most popular scientific paper in American Geophysical Union,

Sunilkumar et al., Journal of Geophysical Research-Atmospheres, July-August 2011 [*S.No:2*].

Title: *Variability in background stratospheric aerosols over the tropics and its association with atmospheric dynamics*

Best Paper award:

National Space Science Symposium, Ooty, February, 2008

Title: *Thin semitransparent cirrus clouds observed using KALPANA-I VHRR and its inter-comparison with the Lidar TROPMET-2011*

Title: *Mean structure and variability of tropical tropopause over the Indian region and its role in particulate transport*

REFEREED PUBLICATIONS

1. **Sunilkumar, S V**, Muhsin M, Maria Emmanuel, Geetha Ramkumar, K Rajeev, S Sijikumar, Balloon-borne Cryogenic Frost-point Hygrometer (FPH) observations of water vapour in the tropical upper troposphere and lower stratosphere (UTLS) over India: First results, *J. Atmos. Sol.-Terr. Phys.*, 140, 86-93, 2016.
2. Hemanth Kumar A., M. Venkat Ratnam, **S.V. Sunilkumar**, K. Parameswaran, B.V. Krishna Murthy, Role of deep convection on the tropical tropopause characteristics at sub-daily scales over the South India monsoon region, *Atmospheric Research* 161–162, 14–24, 2015.
3. **Sunilkumar S V**, M. Muhsin, K. Parameswaran, M. Venkat Ratnam, Geetha Ramkumar, K. Rajeev, B. V. Krishna Murthy, K.V. Sambhu Namboodiri, K.V. Subrahmanyam, K. Kishore Kumar, Siddarth Sankar Das, Characteristics of Turbulence in the Troposphere and Lower Stratosphere over the Indian Peninsula, *J. Atmos. Sol.-Terr. Phys.* 133, 26-53, 2015, doi:10.1016/j.jastp.2015.07.015.
4. Ratnam, M.V, **S.V. Sunilkumar**, K.Parameswaran, B.V.KrishnaMurthy, Geetha Ramkumar, K. Rajeev, Ghouse Basha, S.Ravindra Babu, M.Muhsin, Manoj Kumar Mishra, A.Hemanth Kumar, S.T.Akhil Raj, M. Pramitha, Tropical Tropopause Dynamics (TTD) Campaigns over Indian region:an over-view. *J. Atmos. Sol.-Terr. Phys.* 121,229–239, 2014.
5. S. Ravindra Babu, Ratnam, M.V, **S.V. Sunilkumar**, K.Parameswaran, B.V.KrishnaMurthy, Detection of tropopause altitude using Indian MST radar data and comparison with simultaneous radiosonde observations. *J. Atmos. Sol -Terr. Phys.* 121,240–247, 2014.
6. **Sunilkumar, S.V.**, K. Parameswaran, and Asha Babu, Mean structure of the tropical tropopause and its variability over the Indian longitude sector, *Climate Dynamics*, DOI 10.1007/s00382-012-1496-8, 1125-1140, 2013.
7. Geetha Ramkumar, K.V. Subrahmanyam, K.K.Kumar, S.S Das, D. Swain, **S.V. Sunilkumar**, K.V.S. Namboodiri, K.N.Uma, V.S. Babu, S.R. John and Asha Babu, First observational study of eclipse induced variations in the horizontal winds simultaneously in the troposphere-stratosphere-mesosphere-lower thermosphere region over the equatorial station Thumba (8.5° N, 77° E), *Earth Planet & Space*, doi:10.5047/eps.2012.12.007., 2013.
8. Bijoy V Thampi, K. Parameswaran, **S.V. Sunilkumar**, Semitransparent cirrus clouds in the upper troposphere and their contribution to the particulate scattering in the Tropical UTLS region, *J. Atmos. Sol. Terres. Phy.*, doi:10.1016/j.jastp.2011.09.005, 74, 1–10, 2012.
9. **Sunilkumar, S. V.**, K. Parameswaran, B. V. Thampi, and G. Ramkumar, Variability in background stratospheric aerosols over the tropics and its association with atmospheric dynamics, *J. Geophys. Res.*, 116, D13204, doi:10.1029/2010JD015213, 2011.
10. Subrahmanyam, K.V., Geetha Ramkumar, K.K. Kumar, D. Swain, **S.V. Sunilkumar**, S. S. Das and K.V.S. Namboodiri, Temperature perturbation in the troposphere-Stratosphere at Trivandrum during the Solar Eclipse 2009/2010, *Annales Geophysicae*, 29, 275-282, 2011.
11. Parameswaran, K., B. V Thampi, **S. V. Sunilkumar**, Latitudinal dependence of the seasonal variation of particulate extinction in the UTLS over the Indian longitude sector during volcanically quiescent period based on Lidar and SAGE-II observations, *J. Atmos. Sol. Terres. Phy.*, doi:10.1016/j.jastp.2010.06.004, 72, 1024-1035,2010b.
12. **Sunilkumar, S. V.**, K. Parameswaran, K. Rajeev, B. V. Krishna Murthy, S. Meenu, Sanjay Mehta, and Asha Babu Semitransparent Cirrus clouds in the Tropical Tropopause Layer during two contrasting seasons, *J. Atmos. Sol. Terres. Phy.*, doi:10.1016/j.jastp.2010.03.020, 72, 745-762, 2010a.
13. Thampi B.V., **S.V. Sunilkumar**, K. Parameswaran, Lidar studies of particulates in the UTLS region at a tropical station over the Indian Subcontinent, *J. Geophys. Res.*, 114, D08204, doi:10.1029/2008JD010556, 2009.
14. Antonita, T. M., G. Ramkumar, K.K.Kumar and **S.V. Sunilkumar**, Quantification of gravity wave forcing in driving the stratospheric Quasi-biennial Oscillation, *Geophys. Res. Lett.*, L09805, doi:10.1029/2008GL033960, 2008.
15. Rajeev, K., K. Parameswaran, S. Meenu, **S. V. Sunilkumar**, Bijoy V Thampi, C. Suresh Raju, B. V. Krishna Murthy, K. S. Jagannath, S. K. Mehta, D. N. Rao, and K. G. Rao, Observational assessment of the potential of satellite-based water vapour and thermal IR brightness temperatures in detecting semitransparent cirrus, *Geophys. Res. Lett.*, 35, L08808, doi:10.1029/2008GL033393, 2008.

16. **Sunilkumar, S. V.**, K. Parameswaran, Bijoy V Thampi, Interdependence of tropical cirrus properties and its variability, *Annales Geophys.*, 26, 413-429, 2008.
17. K. Parameswaran, **S. V. Sunilkumar**, K. Rajeev, C. Suresh Raju, K. S. Jagannath, Tropical cirrus and Tropospheric turbulence, Proc. of the Conference of the International Tropical Atmospheric Radar (INTAR) Colloquium, 110-121, 2007.
18. Moorthy, K. K., S. S. Babu, K.V.S. Badarinath, **S. V. Sunilkumar**, T.R. Kiranchand, Y. Nazeer Ahmed, Latitudinal distributions of aerosol black carbon and its mass fraction to composite aerosols over peninsular India during winter season, *Geophys. Res. Lett.*, 34, L08802, doi:10.1029/2006GL029150, 2007.
19. Nair, P R., George, S K., **Sunilkumar, S V.**, Parameswaran, K., Jacob, S., Abraham, A., Chemical composition of aerosols over peninsular India during winter, *Atmos. Environ.*, 40, 6477-6493, 2006.
20. Parameswaran, K., **S.V. Sunilkumar**, K. Rajeev, C. Suresh Raju, D Narayana Rao, Sanjay K Mehta, B. V. Krishna Murthy, S.C. Chakravarthy, Kusuma G. Rao and K. S. Jaganath, Cirrus clouds in the Tropical Tropopause Layer, Proc. on 'Technical and Scientific Aspects of MST Radar (MST11)', Macmillan Advanced Research Series, 552-558, 2006
21. **Sunilkumar, S. V.** and K. Parameswaran, Temperature dependence of tropical cirrus properties and radiative effects, *J. Geophys. Res.*, 110, D13205, doi:10.1029/2004JD005426, 2005.
22. Moorthy, K. K., **S. V. Sunilkumar**, Preetha S Pillai, K Parameswaran, Prabha Nair, Y Nazeer Ahmed, K Ramgopal, K. Narasimhulu, Rajuru Reddy, V Vinoj, S.K. Satheesh, Kandula Niranjana, B Rao, BS Brahmanandam, Auromeet Saha, K.V.S. Badarinath, T.R. Kiranchand and K Lata, Wintertime spatial characteristics of boundary layer aerosols over peninsular India, *J. Geophys. Res.*, **110**, D08207, doi:10.1029/2004JD005520, 2005.
23. **Sunilkumar, S. V.**, K. Parameswaran, Prabha R Nair, Aerosol properties observed over Arabian Sea during the ARMEX II Experiment, *Mausam*, **56**, 321-326, 2005.
24. Moorthy, K. K., S. S. Babu, **S. V. Sunilkumar**, P. K. Gupta, and B. S. Gera, Altitude profiles of aerosol BC, derived from aircraft measurements over an inland urban location in India, *Geophys. Res. Lett.*, **31**, L22103, doi:10.1029/2004GL021336, 2004.
25. Parameswaran K, **S. V. Sunilkumar**, B. V. Krishna Murthy and K. Satheesan, Lidar observations of high altitude cirrus near the tropical tropopause, *Adv. Space Res.*, **34**, 845-850, doi 10.1016/j.asr.2003.08.64, 2004.
26. Parameswaran K, **S. V. Sunilkumar**, K. Rajeev, Prabha R Nair and K. Krishna Moorthy, Boundary layer aerosols at Trivandrum tropical coast, *Adv. Space Res.*, **34**, 838-844, doi 10.1016/j.asr.2003.08.059, 2004.
27. Nair P. R, K. Parameswaran, **S. V. Sunilkumar**, A. Abraham and S. Jacob, Chemical composition of Atmospheric aerosols over the Indian Ocean: Impact of continental advection, *Adv. Space Res.*, **34**, 828-832, doi:10.1016/j.asr.2003.08.061, 2004.
28. Nair P. R, K. Parameswaran, **S. V. Sunilkumar** and Rekha Rajan, Continental influence on the spatial distribution of particulate loading over the Indian Ocean during winter season, *J. Atmos. Solar and Terr. Phys.*, **66**, 27-38, doi: 10.1016/j.jastp.2003.06.002, 2004.
29. **Sunilkumar, S. V.**, K. Parameswaran, B. V. Krishna Murthy, Lidar Observations of cirrus cloud near the tropical tropopause: General features, *Atmos. Res.*, **66**, 203-227, doi: 10.1016/S0169-8095 (02) 00159-x, 2003.
30. Parameswaran, K., **S. V. Sunilkumar**, B. V. Krishna Murthy, K. Satheesan, and P. R. Nair, Lidar Observations of cirrus cloud near the tropical tropopause: Temporal variations and association with tropospheric turbulence, *Atmos. Res.*, **69**, 29-49, doi: 10.1016/J.atmosres.2003.08.02, 2003.
31. Sasi, M. N, B.V. Krishna Murthy, Geetha Ramkumar, K. Satheesan, K. Parameswaran, K. Rajeev, **S. V. Sunilkumar**, Prabha R. Nair, K. Krishna Moorthy, Y. Bhavanikumar, K. Raghunath, A. R. Jain, P. B. Rao, M. Krishnaiah, S.R. Prabhakaran Nayar, K. Revathy, and S. Devanarayanan, A study of Equatorial wave characteristics using Rockets, Balloons, Lidar and Radar, *Adv. Space Res.*, vol. 32(5), pp 813-818, doi 10.1016/S0273-1177 (03) 00412-5, 2003.
32. Parameswaran K., **S. V. Sunilkumar**, B.V. Krishna Murthy and K. Satheesan, Optical properties of cirrus clouds observed below the tropical tropopause, Proc. of SPIE's International Symposium on Optical Science and Technology, *Lidar remote sensing for Industry and Environment Monitoring II*, Vol. **4484**, 186-197, 2002.

Chapter in Book

1. Sunilkumar, S.V., Parameswaran, K., Thampi, B.V., Distribution of particulates in the tropical UTLS over the Asian Summer Monsoon region and its association with Atmospheric dynamics, Chapter in Book titled "Atmospheric Aerosols: Regional Characteristics - Chemistry and Physics" (ISBN 979-953-307-897-6) Edited by Hayder Abdul-Razzak; Published by Intech, <http://dx.doi.org/10.5772/50552>, PP 114-162, 2012.

Scientific reports

1. **Sunilkumar, S.V.**, and Rajeev, K., Report on the performance of the First Balloon- borne LIDAR Experiment, SPL:SR:001:2009, May 2009.

OTHER PROCEEDINGS

1. Bijoy V. Thampi, K. Rajeev, K. Parameswaran, Manoj Kumar Mishra, S. V. Sunilkumar, Three-dimensional structure and radiative impact of the Southeast Asian smoke aerosols over the Equatorial Indian Ocean during the 2006 fire event, Proc. International Conference on Megha-Tropiques, Bangalore, 95-96, 23-25 March, 2009.
2. K.Rajeev, S.Meenu, K.Parameswaran, Anish Kumar M. Nair, C.Suresh Raju, S.V.Sunilkumar, KALPANA-1-VHRR and CALIPSO observations of semi-transparent cirrus clouds over the Indian subcontinent and surrounding oceans, Proc. International Conference on Megha-Tropiques, Bangalore, 35-36, 23-25 March, 2009.
3. Rajeev, K., K. Parameswaran, S. Meenu, **S.V. Sunilkumar**, Bijoy V. Thampi, C. Suresh Raju, B.V. Krishna Murthy, K.S. Jagannath, S.K Mehta, D N. Rao, and K.G. Rao, Thin semitransparent cirrus clouds observed using KALPANA-1 VHRR and its intercomparison with the Lidar-derived cirrus optical depth, Proc. of CAWSES-India - 2007.
4. Parameswaran, K., **S.V. Sunilkumar**, Bijoy V Thampi, K. Rajeev, C. Suresh Raju, B.V. Krishna Murthy, S.K Mehta, D.N. Rao and K.G Rao, Properties of cirrus clouds in the Tropical Tropopause Layer, Proc. of CAWSES-India - 2007.
5. Bijoy V Thampi, **S.V. Sunilkumar** and K. Parameswaran, Aerosols in the UTLS region at Tropics, Proceedings of conference on Emerging trends in Aerosols: Technology and Applications, *Bulletin of Indian Aerosol Science and Technology Association (IASTA)*, vol. 18, 272-275, November, 2007.
6. K. Parameswaran and **S.V. Sunilkumar**, Climate Sensitivity and Radiative forcing of tropical cirrus, *Proceedings of the 4th Asian Aerosol Conference AAC-2005, Bulletin of Indian Aerosol Science and Technology Association (IASTA)*, Vol. 17, 498-499, December 2005.
7. Prabha R Nair, Susan George, K. Parameswaran, **S.V. Sunilkumar**, Salu Jacob, Annamma Abraham, Chemical composition of aerosols at geographically distinct locations over India, *Proceedings of the 4th Asian Aerosol Conference AAC-2005, Bulletin of Indian Aerosol Science and Technology Association (IASTA)*, Vol. 17, 107-108, December 2005.
8. **Sunilkumar S. V.**, K. Parameswaran and P. R. Nair, Physical properties of near surface aerosols at Trivandrum coast inferred from direct sampling, *Proceedings of the Conference on Aerosol Remote Sensing in Global Change and Atmospheric pollution, Bulletin of Indian Aerosol Science and Technology Association (IASTA)*, Vol. 14, 63-66, September 2002.
9. **Sunilkumar S. V.**, K. Parameswaran, B. V. Krishna Murthy and K. Satheesan, Tropical cirrus properties and its association with turbulence, Proceedings of the Conference on Aerosol Remote Sensing in Global Change and Atmospheric pollution, IASTA Bulletin, Vol. 14, 67-70, September 2002.
10. Nair P. R, K. Parameswaran, **S. V. Sunilkumar**, A. Abraham and S. Jacob, Chemical composition of aerosols over the Indian Ocean during winter, *Proceedings of the Conference on Aerosol Remote Sensing in Global Change and Atmospheric pollution, Bulletin of Indian Aerosol Science and Technology Association (IASTA)*, Vol. 14, 162-166, September 2002.
11. **Sunilkumar S. V.**, K. Parameswaran, B.V. Krishna Murthy and K. Satheesan: Scattering properties of cirrus cloud observed near the tropical tropopause, *Proc. of TROPMET-2001*, 603-610, 2001.
12. Parameswaran K., **S.V. Sunilkumar**, P. R. Nair and R. Rajan, Trends in boundary layer aerosol loading at Trivandrum during last one decade, *Proc. of TROPMET-2001*, 569-576, 2001.
13. **Sunilkumar S. V.**, K. Parameswaran, B. V. Krishna Murthy, K. Satheesan, P. R. Nair, Y. Bhavanikumar and M. Krishnaiah, General features of cirrus clouds observed near the tropical tropopause, *Proc. of Fifth user scientists workshop on MST radar results*, 131-142, 2001.
14. Sasi M. N., B. V. Krishna Murthy, Geetha Ram Kumar, K. Satheesan, K. Parameswaran, K. Rajeev, **S. V. Sunilkumar**, P. R. Nair, K. K. Moorthy, Y. Bhavanikumar, K. Raghunath, A. R. Jain, P. B. Rao, M. Krishnaiah, S. R. P. Nayar, K. Revathy and S. Devanarayanan, A study of equatorial waves in tropospheric, stratospheric and mesospheric winds and temperatures, *Proc. of Fifth user scientists workshop on MST radar results*, 63-70, 2001.
15. Parameswaran K., **S.V. Sunilkumar**, P. R. Nair, B.V. Krishna Murthy, S.R. Prabhakaran Nayar, K. Revathy, G. Mrudula, P.B. Rao, Y. Bhavani Kumar, K. Raghunath, and M. Krishnaiah: Atmospheric temperature and aerosol back scatter profiles from simultaneous observations using Lidar and MST Radar, *Bulletin of Indian Aerosol Science and Technology Association (IASTA)*, vol.13, 171-173, Feb 2000.
16. Parameswaran K., **S.V. Sunilkumar**, P. R. Nair, K. K. Moorthy, B.V. Krishna Murthy, S. R. P. Nayar, K. Satheesan, K. Revathy, P.B. Rao, Y. Bhavanikumar, K. Raghunath, and M. Krishnaiah, On the structure of clouds below the tropical tropopause, *Bulletin of Indian Aerosol Science and Technology Association (IASTA)*, vol.13, 174-176, Feb 2000.
17. Parameswaran K., P. R. Nair, Rekha Rajan and **S.V. Sunilkumar**, Surface aerosol characteristics at Trivandrum coast, *Proc. of National Workshop on Atmospheric Chemistry (NWAC-99)*, 111-118, 1999.