

# Manoj Kumar Mishra

SCIENTIST - SE

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## Research Interests

1. Surface and Subsurface exploration of planetary bodies using microwave remote sensing.
2. Thermophysical studies of the Moon and planets using In-situ measurements.
3. Atmospheric Science (Aerosols, Cloud, Precipitation, Soil Moisture, Radiation Budget, Climate Change, Boundary Layer processes, Feedback processes and Hydrological Cycle).
4. Remote Sensing (SAR, Scatterometer, Ground and Space based Lidar and Radiometers, Inversion Techniques)
5. Gamma ray Astronomy, Infrared and Visible detectors.

## Important Responsibilities

1. **Co-PI**, ChaSTE (Chandra's Surface Thermophysical Experiment) payload onboard Lander of Chandrayaan-3 Mission.
2. **Science Team Member**, MSSERR Payload, ISRO's Mars Mission - 2
3. **Project Manager**, ChaSTE payload onboard Lander of Chandrayaan-2 Mission, Thermal probe development, Payload Characterization, Sensor Calibration & Co-ordination.
4. **Member, Expert Team and Task Team**, Integrated Rayleigh Lidar System, SPL.
5. **Co-Investigator**, Megha-Tropiques Utilization Project (MTUP): MT-ScaRaB.
6. **Investigator**, ScatSAT data analyses over continental region for soil moisture and vegetation.
7. **Focal Point**, GSAT-14 Ka band beacon receiver at VSSC, Thiruvananthapuram.
8. **Member**, Lunar Science working group-3, ISRO.

## Academic Qualifications

**M.Sc. (2001)** Physics; Dr. R. M. L. Avadh University, Faizabad, India

**Ph.D (2017)** Physics; SPL, VSSC (under University of Kerala, Thiruvananthapuram)

**Ph. D Thesis Title:** Studies on the Vertical Distribution of Atmospheric Aerosols and its Radiative Impact over a Tropical Coastal Station, Trivandrum

## Major Research and Experimental Accomplishments

1. Development and thermal characterization of ChaSTE payload for Chandrayaan-2 Lander.
2. Study of GSAT-14 satellite Ka-band microwave signal attenuation due to precipitation. [Radio Science, 2020]
3. Effect of Clouds on the Diurnal Evolution of Atmospheric Boundary Layer Height over a Tropical Coastal Station [Bound. lay. Meteo. 2020]
4. Direct observations of the diurnal variation of clear-sky aerosol radiative forcing at top-of-atmosphere using Megha Tropiques-ScaRaB (SW fluxes) and MODIS (AOD) and its comparison with CERES. [IEEE-TGRS 2017]
5. Direct observation of the clear-sky aerosol radiative forcing efficiency at surface using ground based shortwave flux measurements. [Meteo. Atmos. Phys. 2016]
6. Multi-year dual polarization Micro Pulse Lidar (MPL) observations and analysis to determine the vertical distribution and non-sphericity (depolarization) of aerosols, elevated aerosol layers and delineation of the effect of atmospheric transport. [Atmos. Environ. 2013]
7. Vertical distribution of tropical cirrus clouds and their properties derived from multiyear MPL data.
8. First quantification of the descending nature of tropical cirrus clouds and their potential radiative impact. [J. Geophys. Res. 2012]
9. Lidar Observation of mineral dust aerosols during the Asian summer monsoon seasons and its transport through Arabian Sea [J. Atmos. Sol. Terr. Phys. 2012]
10. Diurnal evolution of atmospheric boundary layer & thermal internal boundary layer over Trivandrum [J. Atmos. Sol. Terr. Phys. 2012]
11. First observation of the diurnal evolution of boundary layer clouds using lidar observations.
12. Numerical simulation of heat transfer into lunar regolith.
13. Thermophysical properties of Moon using LRO Diviner observations
14. Modelling of Microwave Thermal emission from surface of Moon and Titan.
15. Design of integrated Rayleigh Lidar system: Extensive simulations of lidar signal.
16. Design of Raman Lidar.
17. In-house development of CW bistatic Lidar.
18. Characterization of Visible and Infrared detectors for INSAT-3D satellite

## Professional Background

- Scientific Officer B** : May 2005 – Mar 2006; Tata Institute of Fundamental Research (TIFR), India. (posted at High Energy Gamma Ray Observatory, India.)
- Junior Research Fellow** : July 2003 – May 2005; Sensor Focal Plane System Division, Electro Optical System Group, Space Applications Centre, ISRO, India

## Publications

- Peer-reviewed International Journals : 13
- Proceedings and Abstracts : 16
- Conference/Symposium/Presentations : 37

## Membership in Professional Bodies

- URSI Senior Member (2017–)
- Indian Radio Science Society (2017)
- COSPAR Associate (2012–2018)
- Indian Aerosol Science and Technology Association (IASTA) - Life Member

## Courses Taught

1. CW Bistatic Lidar, Indian Institute of Space Science and Technology (IIST), Thiruvananthapuram - 2007, 2008
2. Scattering of Light, Space Physics Laboratory, VSSC, Thiruvananthapuram (as part of JRF course work) - 2013
3. Satellite Remote Sensing, Space Physics Laboratory, VSSC, Thiruvananthapuram (as part of JRF course work) - 2018

## Manpower Development

1. M. Sc. Project Supervision: 13

## Academic Upgradation

1. Structured Training Programme (STP) on New trends in Remote sensing and GIS applications: Global perspective and Indian scenario, 28-31 May 2019, Indian Institute of Remote Sensing (IIRS), Dehradun.
2. SMART training programme on Introduction to Satellite Scatterometry with special emphasis on ScatSat-1 at Space Applications Centre, Ahmedabad, 19-21 October 2016
3. Aerosol Cloud Interactions and Microphysical Processes, 07-15 March 2009, Indian Institute of Technology, Kanpur (Sponsored by Department of Science and Technology)
4. Training on Image Processing for Planetary Missions: Chandrayaan-2 Imaging Payloads, 11 -13 October, 2018, ISTRAC-ISRO, Bengaluru.
5. Mathematical Methods in Engineering and Science, 27 Feb - 17 Mar 2007, Indian Institute of Technology, Kanpur.
6. AGNI-2018, Colloquium on Advances in Heat and Mass transfer, Organized by Indian Society of Heat and Mass Transfer (ISHMT) regional chapter, Trivandrum, and Liquid Propulsion Systems Centre, Trivandrum, 27th April 2018, LPSC, Valiamala, Thiruvananthapuram.
7. Real Time Systems, 21-23 May 2007, HRDD, VSSC, Thiruvananthapuram.

## Deputations

1. 40th COSPAR Scientific Assembly, August 04-10, 2014, Moscow, Russia

## Participation in Experiments/Observations

1. CW Bistatic Lidar Observations at SPL
2. MPL Observations
3. Spectroradiometer Observations
4. TTD experiment under CAWSES India program.
5. Sooryagrahan 2010, SPL, ISRO.
6. Celestial High Energy Gamma Ray Observation, TIFR (at HEGRO, Pachmarhi)

## — List of Publications in Peer-reviewed Journals

**Manoj Kumar Mishra**, R. Renju, N. Mathew, C. Suresh Raju, M. R. Sujimol, K. Shahana (2020), Characterization of GSAT-14 satellite Ka-band microwave signal attenuation due to precipitation over a Tropical Coastal station in the southern peninsular region of the Indian subcontinent, *Radio Science*, 55, e2019RS006910.  
<https://doi.org/10.1029/2019RS006910>.

**Manoj Kumar Mishra**, Ashok Kumar Gupta and K. Rajeev, (2017), Spaceborne Observations of the Diurnal Variation of Shortwave Aerosol Direct Radiative Effect at Top of Atmosphere Over the Dust-Dominated Arabian Sea and the Atlantic Ocean, *IEEE Transactions on Geoscience and Remote Sensing (IEEE-TGRS)*, 10.1109/TGRS.2017.2730758

**Manoj Kumar Mishra** and K. Rajeev, (2016), Direct observations of shortwave aerosol radiative forcing at surface and its diurnal variation during the Asian dry season at southwest Indian peninsula, *Meteorology and Atmospheric Physics*, DOI 10.1007/s00703-015-0427-8

**Manoj Kumar Mishra** , K. Rajeev, B. V. Thampi, A. K. M. Nair (2013), Annual variations of the altitude distribution of aerosols and effect of long-range transport over the southwest Indian Peninsula, *Atmospheric Environment*, 81, pp. 51-59, doi:10.1016/j.atmosenv.2013.08.066.

**Manoj Kumar Mishra** , K. Rajeev, A. K. M. Nair, K. K. Moorthy, K. Parameswaran (2012), Impact of a noon-time annular solar eclipse on the mixing layer height and vertical distribution of aerosols in the atmospheric boundary layer, *Journal of Atmospheric and Solar-Terrestrial Physics*, 74, pp. 232 – 237, DOI: 10.1016/j.jastp.2011.10.012.

**Manoj Kumar Mishra** , K. Rajeev, B. V. Thampi, K. Parameswaran, A. K. M. Nair (2010), Micro pulse lidar observations of mineral dust layer in the lower troposphere over the southwest coast of Peninsular India during the Asian summer monsoon season, *Journal of Atmospheric and Solar-Terrestrial Physics*, 72, 17, pp. 1251-1259, DOI: 10.1016/j.jastp.2010.08.012.

Davis, E. V., K. Rajeev, **Manoj Kumar Mishra**, (2020), Effect of Clouds on the Diurnal Evolution of Atmospheric Boundary Layer Height over a Tropical Coastal Station, *Boundary-Layer Meteorology*, <https://doi.org/10.1007/s10546-019-00497-6>.

Renju R., Suresh Raju C., **Manoj Kumar Mishra** , Nizy Mathew, K. Rajeev , K. Krisnamoorthy (2017), Atmospheric Boundary Layer Characterization Using Multiyear Ground-Based Microwave Radiometric Observations Over a Tropical Coastal Station, *IEEE Transactions on Geoscience and Remote Sensing (IEEE-TGRS)*, 55, 12, pp. 6877-6882, DOI: 10.1109/TGRS.2017.2735626.

Venkat Ratnam, S.V. Sunilkumar, K. Parameswaran, B.V. Krishna Murthy, Geetha Ramkumar, K. Rajeev, Ghouse Basha, S. Ravindra Babu, M. Muhsin, **Manoj Kumar Mishra**, A. Hemanth Kumar, S.T. Akhil Raj, M. Pramitha (2014), Tropical tropopause dynamics (TTD) campaigns over Indian region: An overview, *Journal of Atmospheric and Solar-Terrestrial Physics*, ISSN 1364-6826, <http://dx.doi.org/10.1016/j.jastp.2014.05.007>.

A. K. M. Nair, K. Rajeev, **Manoj Kumar Mishra**, B. V. Thampi, K. Parameswaran (2012), Multiyear lidar observations of the descending nature of tropical cirrus clouds, *Journal of Geophysical Research D: Atmospheres*, 117, D17, DOI: 10.1029/2011JD017406.

Girach, I. A., P. R. Nair, L. M. David, P. Hegde, **Manoj Kumar Mishra**, G. M. Kumar, S. M. Das, N. Ojha, M. Naja (2012), The changes in near-surface ozone and precursors at two nearby tropical sites during annular solar eclipse of 15 January 2010, *Journal of Geophysical Research*, 117, D1, D01303, DOI: 10.1029/2011JD016521.

Rajeev, K., K. Parameswaran, B. V. Thampi, **Manoj Kumar Mishra**, A. K. M. Nair, S. Meenu, (2010), Altitude distribution of aerosols over Southeast Arabian Sea coast during pre-monsoon season: Elevated layers, long-range transport and atmospheric radiative heating, *Atmospheric Environment*, 44, 21, pp. 2597-2604, DOI: 10.1016/j.atmosenv.2010.04.014

Thampi, B. V., K. Rajeev, K. Parameswaran, **Manoj Kumar Mishra**, (2009), Spatial distribution of the Southeast Asian smoke plume over the Indian Ocean and its radiative heating in the atmosphere during the major fire event of 2006, *Geophysical Research Letters*, 36, 16, DOI: 10.1029/2009GL039316.

## — List of Publications in Proceedings

**Manoj Kumar Mishra**, K. Rajeev (2016), Spectral dependence of aerosol radiative forcing at surface over a tropical coastal station. *Proc. SPIE 9880, Multispectral, Hyperspectral, and Ultraspectral Remote Sensing Technology, Techniques and Applications VI*, 98800A (April 30, 2016); doi:10.1117/12.2228078.

Rajeev, K., **Manoj Kumar Mishra**, S. V. Sunilkumar, S. Sijikumar (2016), Dual polarization micropulse lidar observations of the diurnal evolution of atmospheric boundary layer over a tropical coastal station. *Proc. SPIE 9879, Lidar Remote Sensing for Environmental Monitoring XV*, 98790V (May 5, 2016); doi:10.1117/12.2228049.

**Manoj Kumar Mishra**, R. Renju, N. Mathew, C. Suresh Raju, M. Sujimol and K. Shahana, (2019), Rain attenuation of Ka-band signal over a Tropical station, *IEEEExplore proceedings of URSI Asia-Pacific Radio Science Conference (AP-RASC), New Delhi, India, 2019*, pp. 1-3. doi: 10.23919/URSIAP-RASC.2019.8738301.

Gupta, A. K., K. Rajeev and **Manoj Kumar Mishra**, (2019), ScaRaB onboard Megha Tropiques (MT) observations of seasonal mean diurnal variations of cloud radiative forcing (CRF) at top-of-atmosphere over tropics and the impact of El Nino periods (November 2014-February 2016) on CRF, *IEEEExplore proceedings of URSI Asia-Pacific Radio Science Conference (AP-RASC), New Delhi, India, 2019*, pp.1-4., doi: 10.23919/URSIAP-RASC.2019.8738716.

**Manoj Kumar Mishra**, B. V. Thampi, A. K. M. Nair, K. Rajeev, K. Parameswaran (2010), Lidar Observations of contrasting Aerosol layers over Trivandrum (8:5N, 77E) during pre- monsoon and summer monsoon season, *Proceedings of Conference of Indian Aerosol Science & Technology Association IASTA-2010, on Aerosols & Clouds: Climate change perspectives*, 187-190, Vol. 19, ISSN: 0971-4570.

**Manoj Kumar Mishra**, K. Rajeev, A. K. M Nair, B. V. Thampi, K. Krishnamoorthy and K. Parameswaran, Impact of noon-time annular Solar Eclipse on the vertical distribution of aerosols and mixing height over Thumba, Proc. Of National Workshop: Results on Solar Eclipse, Trivandrum, 27-28 Jan. 2011, pages 134-137.

Nair, A. K. M., B. V. Thampi, **Manoj Kumar Mishra**, S. Meenu, K. Rajeev, K.

Parmeswaran (2010), Lidar Observations of the descending nature of tropical cirrus clouds, *Proceedings of Conference of Indian Aerosol Science & Technology Association IASTA-2010, on Aerosols & Clouds: Climate change perspectives*, 264-267, Vol. 19, ISSN: 0971-4570.

Thampi, B. V., **Manoj Kumar Mishra**, K. Parmeswaran, K. Saha, C. S. Raju, K. Rajeev, Vertical distribution of atmospheric aerosols in the lower troposphere over Trivandrum, *Emerging trends in Aerosols: Technology Applications*, 18, Nos 12, 33-35, IASTA Bulletin, November, 2007.

Thampi, B. V., K. Rajeev, K. Parmeswaran, **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, 23-25 March 2009, Pages 95-96, 2009.

Nair, A. K. M., B. V. Thampi, **Manoj Kumar Mishra**, S. Meenu, K. Rajeev, K. Parmeswaran, Lidar observations of the descending nature of tropical cirrus clouds, *IASTA Bulletin*, Vol. 19, Nos 12, ISSN: 0971-4570, pp.261-263, 2010

**Manoj Kumar Mishra**, B. V. Thampi, A. K. M. Nair, K. Rajeev, K. Parmeswaran, Lidar observations of contrasting aerosol layers over Trivandrum (8.5N, 77E) during pre-monsoon and summer monsoon seasons, *IASTA Bulletin*, Vol. 19, Nos 12, ISSN: 0971-4570, 187-190, 2010.

Suresh Raju C., Anil Bhardwaj, **Manoj Kumar Mishra**, and ChaSTE team, (2016), Development of indigenous mechanism for deploying thermal probe into Lunar Regolith, 10th National Symposium and Exhibition on Aerospace and Related Mechanisms (ARMS 2016), Thiruvananthapuram, Kerala, 18-19 Nov., 2016, ARMS-2016-128