

**Manoj M.G., Ph.D.**

Scientist - D  
Advanced Centre for Atmospheric Radar Research  
Cochin University of Science and Technology  
Cochin-682022, Kerala, India  
**E-mail:** [manoj.acarr@cusat.ac.in](mailto:manoj.acarr@cusat.ac.in)



+91-9497644055

## EDUCATION

Ph.D., 2012: Atmospheric and Space Science, IITM, University of Pune, India  
M.Sc., 2005: Meteorology, Cochin University of Science and Technology, India (CGPA=7.38)  
B.Sc., 2003: Physics, Kannur University, Kerala, India (Marks = 80.2%)  
Pre-Degree, 2000: Physics, Maths, Chemistry, University of Calicut, India (Marks = 74.5%)  
Matriculation, 1998: Board of Public Exams, Kerala, India (Marks = 91.3%)

## EMPLOYMENT HISTORY

Scientist - D, 2019-Present, ACARR, Cochin Univ. of Science & Tech., Kerala, India  
Research Scientist, 2015-2019, ACARR, Cochin Univ. of Science & Tech., Kerala, India  
Post-Doctoral Research Associate, 2013-2014, ESSIC, University of Maryland, USA  
Project Scientist, 2012-2013, Indian Institute of Tropical Meteorology, Pune, India  
Scientific Associate, 2010-2012, HPC, Indian Institute of Tropical Meteorology, India  
Senior Research Fellow-CSIR, 2006-2010, Indian Inst. of Tropical Meteorology, India  
Junior Research Fellow, 2005-2006, CAOS, Indian Institute of Science, Bangalore, India

## RESEARCH INTERESTS

Tropical Meteorology, Monsoon Dynamics and Thermodynamics, Aerosol and Cloud Physics, Air Pollution and Climate Change, Remote-Sensing, Atmospheric Models

I lead a dedicated research group on Atmospheric Processes Studies (APS) at ACARR, CUSAT. The APS team focusses on basic research related to the tropical atmospheric processes of varying spatio-temporal scales leading to improved understanding of the weather and climate. Various *in-situ* and remote sensing observational platforms together with atmospheric models of medium complexity are the backbone of data-driven research. The team consists of young, vibrant researchers including PhD students, Post-Doctoral Fellows and Internship students of Master Programs.

## TEACHING EXPERIENCE

Advanced Atmospheric Dynamics - MSc/MTech, CUSAT (Course Code: 20-433-0205; 20-302-0201)  
Physics of the Atmosphere and Ocean - MTech, CUSAT (Course Code: 20-433-0103)  
Aerosol and Climate - MTech, CUSAT (Course Code: 20-433-0207)  
Atmospheric Boundary Layer & Air-Sea Interaction - MPhil, Southern Naval Command, Indian Navy  
Marine Environment and Ocean Governance - Extra Master's Course (Course Code: EM301)

## PROFESSIONAL ACCOMPLISHMENTS

**Peer-Reviewed Publications:** International: **34** National: **03** Under Review: **03**  
**Research Guidance:** PhD: **04**; Post-Doc: **02**, MSc/MTech: **50**; BS-MS (IISER): **09**; MS (IIST): **01**  
**Conference/Workshop Attended:** International: **13** National: **28**  
**Referee for Research Journals:** International: **26** National: **03**  
**Professional Training:** Hands-on factory training in ST Radar operation and maintenance  
**Public Lectures:** 50 **Awareness Programs:** 62

## AWARDS AND RECOGNITIONS

- **CSIR-UGC Fellowship – CSIR-JRF & Lectureship** (UGC-NET), Govt. of India, 2005
- **Third Rank** – MSc Meteorology from Cochin University of Science and Technology, 2005
- **First Rank** – Comprehensive In-house Training in Atmospheric Science, Indian Institute of Tropical Meteorology, Pune, India, 2007
- **Best Scientist's Paper Award** – Indian Institute of Tropical Meteorology, Pune, India, 2011
- **Post-Doctoral Research Fellowship**- University of Maryland, USA, 2013-'14
- **Dev Raj Sikka Best Paper Award** – Monsoon Meteorology, Skymet Weather Services, New Delhi, February 2018
- **Best Poster Award** – International Symposium on Tropical Meteorology (INTROMET-'21), 2021

## PHD DETAILS

**Thesis:** Remote sensing and modelling investigations of atmospheric aerosols, clouds and their interaction with climate (Advisor: Dr. P.C.S. Devara)

**Place of Research:** Indian Institute of Tropical Meteorology, Pune, India (2012)

## EXTERNALLY FUNDED RESEARCH PROJECTS

- **CARS Project**, Naval Physical and Oceanographic Laboratory-DRDO, Govt. of India (Rs. 9.9 Lakhs) - Principal Investigator  
Project Title: "Study of diurnal, monthly and seasonal variability of upper atmospheric meteorological parameters with reference to refractive index structure parameter" (Contract No.: NPOL/19CR0006/NPL-241/241/LP dated: 02/01/2019; Status – Completed)
- **Thunder Project**, Ministry of Earth Sciences, Govt. of India (Rs. 43.45 Lakhs) - Principal Investigator  
Project Title: "Thunderstorm Understanding and Experimental Real-time Prediction" (Order No. MoES/16/09/2018-RDEAS/THUMP-6 dated: 28.06.2021; Status – Ongoing)

## MEMBERSHIPS IN PROFESSIONAL BODIES

- Associate Member, American Geophysical Union (AGU)
- Life Member, Indian Radar Meteorology Society (IRAD)
- Life Member & Treasurer (LM-1351), Indian Meteorological Society (IMS), Cochin Chapter
- Life Member, Indian Aerosol Science and Technology Association (IASTA)

## MEMBER IN ACADEMIC/ ADVISORY /TECHNICAL/ ORGANIZING COMMITTEES

- **Treasurer** – Organizing Committee of International Conference - INTROMET-2021 on Changing Climate: Consequences and Challenges (C4)
- **Member** – Technical Evaluation Committee for the procurement of Micro Rain Radar (MRR), National Centre for Earth Science Studies (NCESS), Govt. of India
- **Member** – Committee for evaluating the weather services and deriving a protocol for extreme weather alerts in the state, Kerala State Disaster Management Authority (SDMA), Govt. of Kerala.
- **Member** – Advisory Committee, Systems Strengthening for District Disaster Management Plans and State Policies, State Disaster Management Authority (SDMA), Govt. of Kerala
- **Member** – Technical Advisory Committee, Purchase and Installation of UV Radiation Sensor, State Disaster Management Authority (SDMA), Govt. of Kerala

- **Member** – Task Force for Mitigation of Dam/River Flood Inundation due to Extreme Weather Events, Kerala University of Fisheries and Ocean Studies (KUFOS), Kerala
- **Member** – Technical Evaluation Committee, Remote Sensing Enabled Online Chemical Emergency System (ROCERS), Department of Factories and Boilers, Govt. of Kerala
- **Chairperson** – Board of Question Paper Setters for BSc Physics (2022; 5D01PHY: Introduction to Climate and Climate Change Science), Kannur University, Kerala
- **Member** – External Expert for setting Question Paper for MSc Physical Oceanography (2021; POM 2203: Remote Sensing of Oceans), Kerala University of Fisheries and Ocean Studies (KUFOS), Kerala
- **External Examiner** – Adjudication of PhD Viva Voce (April 2022): Dept. of Physics, Erode Arts and Science College, Bharathiar University, Coimbatore
- **External Reviewer** – Various Research Projects of KSCSTE, Govt. of Kerala
- **Curriculum Development for Open Course** on Introduction to Climate and Climate Change Science, SES College, 2019, Kannur University, Kerala
- **Member** – Committee for Heatwave Stress reduction plans, Kerala State Disaster Management Authority, Govt. of Kerala
- **Member** – Committee for Lightning related disaster reduction plans, Kerala State Disaster Management Authority, Govt. of Kerala.
- **Member** – Technical Evaluation Committee for the Procurement of Optical Particle Sizer, Department of Atmospheric Sciences, CUSAT

#### POSITIONS HOLDING/HELD

- **Head** – Atmospheric Processes Studies, ACARR, CUSAT (*Present*)
- **Academic Coordinator** – ACARR, CUSAT (*2020-Present*)

#### RESEARCH COLLABORATION (INTERNATIONAL/NATIONAL)

- **Earth System Science Interdisciplinary Centre, University of Maryland, USA & Indian Institute of Tropical Meteorology (IITM), Pune** - Aerosol radiative and microphysical impacts on clouds
- **Cain Department of Chemical Engineering, Louisiana State University, USA** - Air Pollution Research on Health Impacts
- **Department of Atomic and Molecular Physics, Manipal Academy of Higher Education, Manipal, India** - Air Pollution Research on Health Impacts
- **National Atmospheric Research Laboratory - Tirupati (ISRO), University of Calcutta, Guwahati University, ARIES-Nainital** – Co-operative Research using ST/MST Radar Network of India on Atmospheric features and diurnal cycle during monsoon onset, northward progression, and intra-seasonal variation.
- **India Meteorological Department, Pune & Kochi (Ministry of Earth Sciences, Govt. of India)** – Exploring Monsoon Dynamics through observations
- **Indian Institute of Tropical Meteorology (IITM), Pune** – Monsoon Onset Experimental Campaign ‘MONSET’ by employing ST Radar and complementary remote sensing instruments during the monsoon season of 2017.

- **National Centre for Earth Sciences Studies (NCESS), Trivandrum** – Thunderstorm and Lightning Studies
- **Central University of Rajasthan (CU-RAJ)** – Dynamical influence of west-Pacific Typhoons on Indian summer monsoon variability
- **National Institute of Technology (NIT), Rourkela** – Satellite observation-based analysis of aerosol-cloud-precipitation interaction

#### LIST OF PEER-REVIEWED PUBLICATIONS (INTERNATIONAL/NATIONAL JOURNALS)

1. Rakesh V, Sreekumar Haridas, Sivan C., **M.G. Manoj**, Binu Paul, K. Unnikrishnan, Abhilash S., and K. Mohanakumar (2022) Impact of the Hunga Tonga-Hunga Ha'apai volcanic eruption on the changes observed over the Indian near-equatorial ionosphere. *Advances in Space Research*, <https://doi.org/10.1016/j.asr.2022.07.004>
2. **Manoj MG**, Satheesh Kumar MK, Valsaraj KT, Soumya K Vijayan, Nishanth T (2022) Exacerbation of COVID-19 fatality rates induced by poor air quality from open-air funeral pyre cremation during the second wave. *Toxics*, 10(6), 306: 1-10; <https://doi.org/10.3390/toxics10060306> (Impact Factor: 4.146)
3. Rakesh V, Sreekumar H., **M.G. Manoj**, Rejoy Rebello, Binu Paul, K. Unnikrishnan, Abhilash S., and K. Mohanakumar (2022) A study on the ionospheric nighttime F-region irregularities during geomagnetically quiet conditions using 205 MHz VHF Radar over an equatorial trough station, Cochin. *Journal of Geophysical Research-Space Physics*, 127(6), e2021JA030129. <https://doi.org/10.1029/2021JA030129> (Impact Factor: 2.811)
4. Sivan C., Rakesh V., **M.G. Manoj**, K. Satheesan, Abhilash S., K Mohanakumar (2022) Detection of the Impact of a Tropical Cyclonic System on the Dynamics and Energetics of the Atmosphere Using Wind Profiler Radar. *Journal of Atmospheric and Solar-Terrestrial Physics*, 235, 105896. <https://doi.org/10.1016/j.jastp.2022.105896>. (Impact Factor: 1.735)
5. Sowmya M.R., Santosh Kumar M.B., Sooraj K.A., Kannan B., **M.G. Manoj** (2022) An automated machine learning methodology for the improved prediction of reference evapotranspiration using minimal input parameters. *Hydrological Processes*, 36(5), e14571. <https://doi.org/10.1002/hyp.14571> (Impact Factor: 3.565)
6. **Manoj M.G.**, Sivan C., Rakesh V., Rejoy Rebello, Abhilash S., K. Mohankumar (2021) Atmospheric response to the annular solar eclipse of 26 December 2019 over Cochin, India. *Advances in Space Research*, 68(9), 3610-3621, <https://doi.org/10.1016/j.asr.2021.07.001> (Impact Factor: 2.152)
7. Lee, S.S., Ha K-J, **M.G. Manoj**, Kamruzzaman, M., Kim, H., Utsumi N., and Guo, J. (2021) Mid-latitude mixed-phase stratocumulus clouds and their interactions with aerosols: how ice processes affect microphysical, dynamic and thermodynamic development in those clouds and interactions? *Atmospheric Chemistry and Physics*, 21, 16843–16868, <https://doi.org/10.5194/acp-2020-1318>. (Impact Factor: 5.414)
8. Remya R, **Manoj MG**, Rakesh V, Mohanakumar K, Sivan C (2021) Influence of High Latitude Sudden Stratospheric Warming on Tropical Weather: Observations from a 205 MHz Stratosphere Troposphere Radar and Surface Meteorological Parameters. *Earth and Space Sciences*, 8(4): e2020EA001418, <https://doi.org/10.1029/2020EA001418> (Impact Factor: 2.31).
9. **Manoj MG**, Lee, S, Li, Z (2021) Competing aerosol effects in triggering deep convection over the Indian region, *Climate Dynamics*, 56(5), 1815-1835, DOI: 10.1007/s00382-020-05561-3 (Impact Factor: 4.486)

10. **Manoj MG**, Satheesh Kumar MK, Valsaraj KT, Sivan C, Soumya K Vijayan (2020) Potential link between compromised air quality and transmission of the novel corona virus (SARS-CoV-2) in affected areas, *Environmental Research*, 190, 110001, <https://doi.org/10.1016/j.envres.2020.110001> (Impact Factor: 5.715)
11. Thara A.M., Neelam Malap, **M.G. Manoj**, Jayarao Y., Kiran Todekar, Rakesh V, Rejoy Rebello, Mohankumar K, Thara P. (2021), Pre-monsoon convective events and thermodynamic features of southwest monsoon onset over Kerala, India – A case study, *Atmospheric Research*, 248, 105218, <https://doi.org/10.1016/j.atmosres.2020.105218> (Impact Factor: 4.676)
12. Resmi CT, Nishanth T, Satheesh Kumar MK, **Manoj MG**, Balachandramohan M, Valsaraj KT (2020) Air quality improvement during triple-lockdown in the coastal city of Kannur, Kerala to combat Covid-19 transmission, *PeerJ-Environmental Science*, 8:e9642, DOI: 10.7717/peerj.9642 (Impact Factor: 2.38)
13. Neethu M.M.C., Rakesh V., **M. G. Manoj**, Titu K. Samson, Rejoy Rebello, Binu Paul, K. Mohankumar, P. Mohanan (2020) Potential application of 205 MHz Stratosphere-Troposphere Wind Profiling Radar in Ionospheric Studies: Preliminary Results (IEEE Geoscience and Remote Sensing Letters, 17(6): 918-922, DOI: 10.1109/LGRS.2019.2938855 (IF: 3.833)
14. Rakesh V., **Manoj M.G.**, Mohankumar K, Neethu M., Titu K. Samson (2019) Detection of sub-metre scale irregularities in the low latitude Ionospheric E-layer using high VHF Radar at 205 MHz, *Journal of Geophysical Research-Space Physics*, 124(5):3752-3760, <https://doi.org/10.1029/2018JA026302> (Impact Factor: 2.80).
15. Kant, S., Panda, J., and **Manoj M.G.**, (2019) A Satellite Observation-based Analysis of Aerosol-cloud-precipitation Interaction during the February 2016 Unseasonal Heatwave Episode over Indian Region, *Aerosol and Air Quality Research*, 19(7):1508-1525, DOI: 10.4209/aaqr.2018.04.0144 (Impact Factor: 2.735)
16. Sivan K, **Manoj MG** (2019) Aerosol and cloud radiative forcing over the hot spot regions in India (*Advances in Space Research*, 64(8):1577-1591, <https://doi.org/10.1016/j.asr.2019.07.028>) (Impact Factor: 2.177)
17. K. Mohanakumar, Santosh K. R., P. Mohanan, K. Vasudevan, **M. G. Manoj**, Titu K. Samson, Ajil Kottayil, Rakesh V, Rejoy Rebello, Abhilash S., (2018) A Versatile 205 MHz Stratosphere Troposphere Radar at Cochin – Scientific Applications, *Current Science*, 114(12), 2459-2466 (Impact Factor: 0.756).
18. Mohankumar K, Ajil K, Anandan VK, Titu KS, Linto, T., Satheesan, K., Rejoy R, **Manoj MG**, Rakesh V, et al. (2017) Technical Details of a Novel Wind Profiler Radar at 205 MHz, *Journal of Atmospheric and Oceanic Technology*, 34: 2659-2671, DOI: 10.1175/JTECH-D-17-0051.1 (Impact Factor: 2.29)
19. **Manoj MG**, Jiji J, Satheesh Kumar MK, Sandeep S, Sreejith KA, Sunil KM, Mohankumar K (2016) On the unprecedented heat burst event and subsequent searing of foliage over the tropical monsoon region, *International Journal of Earth and Atmospheric Science*, 3(3):45-56 (Impact Factor: anticipated)
20. Nithya K., **M.G. Manoj**, K. Mohankumar (2017) Effect of El-Nino/La-Nina on Tropical Easterly Jet Stream during Asian summer monsoon season, *International Journal of Climatology*, 37:4994-5004, DOI: 10.1002/joc.5137 (Impact Factor: 3.76)
21. Anu Xavier., **M.G. Manoj**, K. Mohankumar (2017) On the dynamics of an extreme rainfall event in north India in 2013, *Journal of Earth System Science*, 127(30), 1-13 (Impact Factor: 1.423)

22. Li Z, Lau WKM, Ramanathan V, Wu G, Ding Y, **Manoj MG** et al (2016) Aerosol and monsoon climate Interactions over Asia *Reviews of Geophysics*,54(4):866-929, doi:10.1002/2015RG000500 (*Impact Factor: 22*)
23. Titu KS, Kottayil A, **Manoj MG**, Rakesh V, Rejoy R, Vasudevan K, Santosh KR, Mohanan P, Mohankumar K (2016) Technical aspects of 205 MHz VHF Mini Wind Profiler Radar for Tropospheric Probing, *IEEE Transactions on Geo-science and Remote Sensing Letters*, 99:1-5, doi: 10.1109/LGRS.2016.2561965 (*Impact Factor: 4.942*)
24. Ajil Kottayil, Mohankumar K, Titu Samson, Rejoy Rebello, **Manoj MG**, Rakesh V, Santhosh KR, Mohanan P, Vasudevan K (2016) Validation of 205 MHz Mini Wind Profiler Radar Located at Cochin, India Using Radiosonde Wind Measurements, *Radio Science*, 51:106-117, doi:10.1002/2015RS005836 (*Impact Factor: 1.581*)
25. Sanap SD, Pandithurai G, **Manoj MG** (2015) On the response of Indian summer monsoon to aerosol forcing in CMIP5 model simulations, *Climate Dynamics*, 45:2949–2961, DOI 10.1007/s00382-015-2516-2 (*Impact Factor: 4.708*)
26. **Manoj MG**, Devara PCS, Taraphdar S (2013) Lidar investigation of tropical nocturnal boundary layer aerosols and cloud macrophysics. *Atmospheric Research*, 132-133:65-75, DOI: 10.1016/j.atmosres.2013.05.007 (*Impact Factor: 2.421*)
27. **Manoj MG**, Devara PCS, Rao YJ, Sonbawne SM (2013) Lidar investigation of aerosol-cloud-precipitation interactions over a tropical monsoon environment: Recharging of atmosphere. *Journal of Atmospheric and Solar-Terrestrial Physics*, 93:80-86, DOI: 10.1016/j.jastp.2012.10.009 (*Impact Factor: 1.751*)
28. **Manoj MG**, Devara PCS, Joseph S, Sahai AK (2012) Aerosol indirect effect during the aberrant Indian summer monsoon breaks of 2009. *Atmospheric Environment* 60:153-163, DOI: 10.1016/j.atmosenv.2012.06.007 (*Impact Factor: 3.11*)
29. Kumar S, Devara PCS, **Manoj MG** (2012) Multi-site Characterization of Tropical Aerosols: Implications for Regional Radiative Forcing. *20121* 106:71-85, DOI: 10.1016/j.atmosres.2011.11.009 (*Impact Factor: 2.2*)
30. **Manoj MG**, Devara PCS (2011) Quasi-periodic oscillations of aerosol backscatter profiles and surface meteorological parameters during winter nights over a tropical station. *Annales Geophysicae* 29:455-465. DOI: 10.5194/angeo-29-455-2011 (*Impact Factor: 1.88*)
31. **Manoj MG**, Devara PCS, Safai PD, Goswami BN (2011) Absorbing aerosols facilitate transition of Indian monsoon breaks to active spells. *Climate Dynamics* 37:2181–2198, DOI: 10.1007/s00382-010-0971-3 (*Impact Factor: 4.602*)
32. Devara PCS, **Manoj MG** (2013) Aerosol–cloud–precipitation interactions: A challenging problem in regional environment and climate research. *Particuology*, 11:25-33, DOI: 10.1016/j.partic.2012.07.006 (*Impact Factor: 3.251*)
33. Devara PCS, Rao YJ, Sonbawne SM, **Manoj MG**, Dani KK, Saha SK (2015) First results of compact coherent Doppler wind lidar and its validation at IITM, Pune, India. *Meteorological Applications*, 22:156-164, DOI: 10.1002/met.1428 (*Impact Factor: 2.119*)
34. Divya ES, Ghude SD, Kulkarni SH, Beig G, **Manoj MG**, Panicker AS (2013) Radiative effect of black carbon over Delhi. *International Journal of Photoenergy*, Article ID: 313652, <http://dx.doi.org/10.1155/2013/313652> (*Impact Factor: 2.113*)

35. Meena GS, Patil SD, **Manoj MG**, Devara PCS (2013) Tropospheric NO<sub>2</sub> variability over the metropolitan cities and hill stations of India. *Natural Hazards*, 65:723-737, DOI: 10.1007/s11069-012-0392-1 (*Impact Factor: 3.158*)
36. Kumar S, Devara PCS, **Manoj MG**, Safai PD (2011) Winter aerosol and trace gas characteristics over a high-altitude station in the Western Ghats, India. *Atmosfera* 24(3):311-328 (*Impact Factor: 1.083*)
37. Devara PCS, **Manoj MG**, Rao YJ (2009) Role of aerosols in monsoon clouds and precipitation: An observational perspective. *Mausam* (Diamond Jubilee Volume, 2009), 155-162 (*Impact Factor: 0.906*)

#### Manuscript Submitted/Under Review

38. **Manoj MG**, Rakesh V, Rejoy Rebello, Titu Samson & K. Mohankumar (2022) A method of estimating air vertical velocity from ascending Radiosondes and its comparison with Radar measurements (Under Review in *Journal of Geophysical Research-Atmospheres*)
39. **Manoj M.G.**, Musaid P.P., Panda S, Das S, and Mohankumar K (2021) Investigation of Influence of West Pacific Typhoons on the 2018 Historic Flood of Kerala using WRF Model (*Climate Dynamics, in preparation*)
40. Rakesh V, **Manoj MG**, Rajeswari JR, Titu KS, Ajil K, Rejoy R, Mohankumar K, Santosh KR (2021) On the vertical characteristics of turbulence over Cochin, a tropical coastal urban station using 205 MHz Stratosphere-Troposphere Wind Profiler Radar (*Journal of Atmospheric and Solar Terrestrial Physics, under review*) (*Impact Factor: 1.474*)
41. Sreekumar Haridas, Rakesh V., **M.G. Manoj**, K. Unnikrishnan, Binu Paul, and K. Mohanakumar (2022) A multi-instrumental observation on the modulations of ionospheric irregularities due to geomagnetic storms over the near-equatorial stations Cochin & Changanacherry– A case study 2022 (*under review*)
42. Nithya K., **M.G. Manoj**, Ajil Kottayil, K. Mohankumar (2022) On the Zonal Oscillation of Tropical Easterly Jet stream During the Active and Break Spells of Indian Summer Monsoon, *International Journal of Climatology*, (under review) (*Impact Factor: 3.76*)

#### PRESENTATIONS IN CONFERENCE/WORKSHOP/WEBINAR

1. Sreekumar Haridas, Rakesh V., **M.G. Manoj**, K. Unnikrishnan, and Binu Paul (2022) A Study on the Potential Application of 205 MHz VHF Radar at Cochin in the Observation of Ionospheric Irregularities during Geomagnetic Storms. 15th Quadrennial Solar Terrestrial Physics Symposium (STP-15) organized by The Scientific Committee on Solar-Terrestrial Physics (SCOSTEP), held at the Indian Institute of Geomagnetism (IIG), Navi Mumbai, India during 21-25<sup>th</sup> February 2022 (Abstract ID: STP15-ABS-032)
2. Rakesh V., Sreekumar Haridas, **M.G. Manoj**, Binu Paul, and K. Unnikrishnan (2022) Validation of the VHF Radar Observation of Nocturnal F-region Ionospheric Irregularity at Cochin with SWARM Bravo Satellite. 15th Quadrennial Solar Terrestrial Physics Symposium (STP-15) organized by The Scientific Committee on Solar-Terrestrial Physics (SCOSTEP), held at the Indian Institute of Geomagnetism (IIG), Navi Mumbai, India during 21-25<sup>th</sup> February 2022 (Abstract ID: STP15-ABS-031)
3. **M.G. Manoj**, Seoung-Soo Lee, and Zhanqing Li. (2021) How is Deep convection favored under heavily polluted environment? AGU Fall Meeting, New Orleans, USA, December 16, 2021.
4. Seoung-Soo Lee, Ha K-J, **M.G. Manoj** (2021) Mid-latitude mixed-phase stratocumulus clouds and their interactions with aerosols: how ice processes affect microphysical, dynamic and

thermodynamic development in those clouds and interactions? AGU Fall Meeting, New Orleans, USA, December 2021.

5. Anagha P.S., **MG Manoj**, Abhilash S., and Vijaykumar P. (2021) Aerosol Radiative forcing during the pre-monsoon to monsoon transition over the Indian monsoon region, International Symposium on Tropical Meteorology (INTROMET-'21) on the theme "Changing Climate: Consequences and Challenges" held at Cochin University of Science and Technology, Cochin, India during 23 – 26 November 2021.
6. Sruthi K.P., Anagha P.S., **MG Manoj** (2021) Investigation of pre-monsoon to monsoon transition of atmospheric conditions as observed with a 205 MHz wind profiling Radar over Cochin, International Symposium on Tropical Meteorology (INTROMET-'21) on the theme "Changing Climate: Consequences and Challenges" held at Cochin University of Science and Technology, Cochin, India during 23 – 26 November 2021.
7. Sreekumar H., Rakesh V., **MG Manoj**, K. Unnikrishnan, and Binu Paul (2021) A case study on the response of the observed ionospheric irregularities due to a geomagnetic storm event using 205 MHz VHF radar at Cochin, International Symposium on Tropical Meteorology (INTROMET-'21) on the theme "Changing Climate: Consequences and Challenges" held at Cochin University of Science and Technology, Cochin, India during 23 – 26 November 2021.
8. Rakesh V., Sreekumar H., **MG Manoj**, Rejoy Rebello, Binu Paul and K. Unnikrishnan (2021) A statistical study of nocturnal F-region irregularities during geomagnetically quiescent conditions using 205 MHz VHF radar at Cochin, International Symposium on Tropical Meteorology (INTROMET-'21) on the theme "Changing Climate: Consequences and Challenges" held at Cochin University of Science and Technology, Cochin, India during 23 – 26 November 2021.
9. Rejoy Rebello, Titu K. Samson, Rakesh V., Sreekumar H., **M. G. Manoj**, Abhilash S., Mohanan P. and K. Mohanakumar (2021) Meteor Trail Induced Backscattered Echoes observed with 205 MHz Stratosphere Troposphere (ST) Radar at CUSAT, Kochi, International Symposium on Tropical Meteorology (INTROMET-'21) on the theme "Changing Climate: Consequences and Challenges" held at Cochin University of Science and Technology, Cochin, India during 23 – 26 November 2021.
10. **Manoj MG**, Neelam Malap, Thara Prabhakaran, K. Mohankumar (2021) Aerosol effects on monsoon cloud microphysics using data from CAIPEEX - Phase II and CERES observations, International Commission on Clouds and Precipitation (ICCP) held at the Indian Institute of Tropical Meteorology, Pune Aug 03, 2021.
11. P.C.S. Devara, K. Vijayakumar, P.R.C. Reddy and **M.G. Manoj** (2021) Aerosol-Cloud-Precipitation-Climate Feedbacks and Pathways: Urban Versus Rural Locations, ICCP, Aug 02, 2021.
12. Thara Anna Mathew, Neelam Malap, **M.G. Manoj**, Jayarao Y, Kiran Todekar, K. Mohankumar, Thara V Prabhakaran (2021) Thermodynamic Features of Southwest Monsoon Onset over Kerala – A Case Study, International Commission on Clouds and Precipitation (ICCP) held at the Indian Institute of Tropical Meteorology, Pune Aug 02, 2021.
13. Someshwar Das, Subrat Kumar Panda, Merlin Jestice, P.P. Musaid and **M.G. Manoj** (2021) Numerical Simulation of Heavy Rainfall events over Kerala and its relationship with the West Pacific Typhoons Asia Oceania Geosciences Society (AOGS-2021) Virtual Conference (section AS-63 related to AsiaPEX), August 06, 2021.
14. **M.G. Manoj**, Seoung-Soo Lee, and Zhanqing Li (2021) Contrasting Aerosol Effects in Triggering Deep Convection: Result from GVAX Campaign, in Aerosols, Clouds, Precipitation and Climate (ACPC) Workshop, a joint initiative of the International Geosphere–Biosphere Programme (IGBP) and the World Climate Research Programme (WCRP), Virtual meeting, 24–27 May, 2021.



15. **M.G. Manoj** (2021) Potential role of aerosols in altering the dynamics of monsoon and convection - Invited Talk during the Webinar-athon organized by the India Meteorological Society (IMS), Pune during 25-26 March 2021.
16. **Manoj M.G.**, Rakesh V., Rejoy Rebello, Titu Samson and K. Mohankumar (2021) *Estimating air vertical velocity from ascending radiosondes*, in the session on Advances in Quantitative Remote Sensing and Application for Global Terrestrial Ecosystems, 43rd COSPAR Scientific Assembly held at Sydney Australia during 28 Jan-04 February, 2021.
17. **Manoj M.G.**, Mohankumar K, Rakesh V, Rebello R, Samson T, Features of low-level winds over Cochin during the deluge of Monsoon-2018 using 205 MHz wind Profiler Radar, 2019 URSI Asia-Pacific Radio Science Conference (AP-RASC 2019) held in New Delhi, India from 09 – 15 March, 2019.
18. **Manoj M.G.**, Samson T, Rakesh V, Rebello R, and Mohankumar K, Vertical eddy diffusivity in relatively stable condition derived from a 205 MHz Stratosphere-Troposphere Wind Profiler Radar, 15<sup>th</sup> International Workshop on Technical and Scientific Aspects of MST Radar held at the National Institute of Polar Research, Tachikawa, Tokyo, Japan during May 26- 31, 2017.
19. Rakesh V, Samson TK, **Manoj M.G.**, Kottayil A, Rebello R, Mohankumar K, Mohanan P, Vasudevan K, and Santosh KR., A study on aspect sensitivity with 205MHz ST Wind Profiler Radar at Cochin coastal region, 15<sup>th</sup> International Workshop on Technical and Scientific Aspects of MST Radar held at the National Institute of Polar Research, Tachikawa, Tokyo, Japan during May 26- 31, 2017 (Poster).
20. Samson T, Mohankumar K, **Manoj M.G.**, Kottayil A, Rakesh V, Rebello R, Mohanan P, Vasudevan K, and Santosh KR, Technical Description of 205MHz Wind Profiler Radar for Stratosphere Troposphere Probing, 15<sup>th</sup> International Workshop on Technical and Scientific Aspects of MST Radar held at the National Institute of Polar Research, Tachikawa, Tokyo, Japan during May 26- 31, 2017 (Poster).
21. **Manoj M.G.**, Krishnakumar A.P., Titu Samson, Rakesh V., Rejoy Rebello, Ajil Kottayil and K. Mohankumar: Estimation of temperature profile from a VHF wind profiler Radar, India Conference on Radar Meteorology, January 8 —11, 2017.
22. **Manoj M.G.**, K. Mohankumar, Titu Samson, Rakesh V., Rejoy Rebello, and Ajil Kottayil, Identifying Onset Date of Indian Summer Monsoon with VHF Radar and complementary data, 3rd regional Conference on Radio Science, (URSI-RCRS), National Atmospheric Research Laboratory, Tirupati, India, March 01-04, 2017.
23. **Manoj MG**, Li Z., “Competing aerosol effects on deep convection over the Indian region during ARM GVAX Campaign”, AGU Fall Meeting, San Francisco, USA, December 09-13, 2013.
24. **Manoj MG**, Li Z., “Aerosol effects on deep convection over the Indian region during ARM GVAX Campaign”, 6th International Conference on Atmosphere, Ocean and Climate Change at Hong Kong, China, August 19-21, 2013.
25. **Manoj MG**, Devara PCS, Safai PD, Goswami BN, “Potential role of absorbing aerosols in the transition of Indian monsoon breaks to active spells”, Extended Abstract, International conference on "Opportunities and Challenges in Monsoon Prediction in a Changing Climate" (OCHAMP-2012), Pune, India, 21-25 February 2012.
26. **Manoj MG**, Devara PCS, Rao YJ, Dani KK, Sonbawne SM, Raj PE, “Aerosol effects on monsoon clouds in an unstable atmosphere during CTCZ-Pilot program”, Extended Abstracts of the Workshop on Continental Tropical Convergence Zone (CTCZ)-Pilot: Initial Results, held at Pune, India, April 29-30, 2010, 49-56.

27. **Manoj MG**, Devara PCS, Rao YJ, "A Lidar Study of Boundary-Layer Clouds and their Relationship with Meteorological Parameters during Monsoon 2009", Indian Aerosol Science and Technology Association Conference, held at Darjeeling, India, March 24-26, 2010.
28. **Manoj MG**, Devara PCS, "Gravity wave activity in the boundary layer aerosol variations observed with high space-time resolution micro pulse lidar", Proc. of 6th Asian Aerosol Conference, Tawatchai C. and Sirikalaya S. Ed., 2009, 40-43.
29. Devara PCS, **Manoj MG**, Rao YJ, Dani KK, Raj PE, "Aerosol-Cloud Precipitation Relationship: Dual Polarization Micro Pulse Lidar Observations of Recharging of Atmosphere", Proc. of International Laser-Radar Conference, 605-608, Boulder, Colorado, USA, 23-27 June, 2008.
30. Devara PCS, **Manoj MG**, Bhawar RL, Rao YJ, Raj PE, Dani KK, Sonbawne SM, Saha SK, "Aerosol-Cloud-Climate interaction studies using LIDAR and satellite data", Abstract Volume, PS1-O-33, 15<sup>th</sup> National Space Sciences Symposium held at Radio Astronomy Centre, NCRA-TIFR, Ooty, India, February 26 – 29, 2008.
31. Kumar S, Devara PCS, **Manoj MG**, Safai PD, Kewat S, "Winter Aerosol Characteristics over High-Altitude Station in the Western Ghats" Abstract Volume, Session II-69, International Symposium on Aerosol-Chemistry-CLimate INTERactions (ACCLINT-2007) held at PRL Ahmedabad, India, 20-22 November 2007.
32. Kumar S, **Manoj MG**, Devara PCS, Pandithurai G, Safai PD, "Aerosol Characteristics Variations in Different Environments over Indian Regions", Abstract Volume, IASTA-2007 held at National Physical Laboratory, New Delhi, India, November 14-16, 2007.
33. Devara PCS, Rao YJ, **Manoj MG**, Dani KK, Raj PE, Reddy MC, "First in-Asia DPMPL investigations of CLAIM", Abstract Volume IASTA-2007 held at National Physical Laboratory, New Delhi, India, during November 14-16, 2007.
34. Devara PCS, Kumar S, **Manoj MG**, Pandithurai G, Safai PD, Kewat S, "High-altitude aerosol optical, microphysical and radiative characteristics at Sinhgad, India" Proceedings of International Union of Geodesy and Geophysics (IUGG) XXIV-2007 held at Perugia, Italy, July 2-13, 2007.
35. Devara PCS, Rao YJ, Sonbawne SM, Manoj MG, Dani KK, 2012: Early results of compact coherent Doppler lidar at IITM, Pune, India. Text Book entitled "Reviewed and Revised Papers Presented at the 26th International Laser Radar Conference (Eds. Papayannis A, Balis D, and Amitidis V), pp. 779-782, 2012.
36. Devara PCS, **Manoj MG**, Jaya Rao Y, "Aerosol-Cloud-Monsoon Interactions: Evidence from Studies Undertaken at IITM, Pune, India", APCC Newsletter, 5 (3) 5-6, 2010.
37. Rao YJ, Devara PCS, **Manoj MG**, "DPMPL Evaluation of Boundary-Layer Aerosol and Cloud Structures", Indian Aerosol Science and Technology Association Conference, held at Darjeeling, India, March 24-26, 2010.
38. Devara PCS, Rao YJ, **Manoj MG**, "Ultra High-Resolution Measurements of 3-Dimensional Winds using Doppler Lidar at Pune: First Results", Indian Aerosol Science and Technology Association Conference, held at Darjeeling, India, March 24-26, 2010.
39. Devara PCS, **Manoj MG**, Murthy BS, Gopalkrishnan VS, Safai PD, "Poly-Sensor Multi-parameter measurements of atmospheric boundary layer under monsoon environment over Pune and Delhi during CTCZ-Pilot Program", CTCZ-SSG meeting, DST, New Delhi, December 16, 2009.
40. Devara PCS, Rao YJ, **Manoj MG**, "Dual polarization micro pulse lidar view of tropical aerosols and cloud structures for climate studies", Proc. of 6th Asian Aerosol Conference, Tawatchai C. and Sirikalaya S., Ed., 2009, 38-41.

41. Devara PCS, **Manoj MG**, Rao YJ, “Interplay between aerosol, cloud and precipitation: Evidence from dual polarization micro pulse lidar profile observations”, Proc. of 8th International Symposium on Tropospheric Profiling, Apituley A., Russchenburg H.W.J., Monna W.A.A. Ed., 2009, 1-4.

#### RESEARCH HIGHLIGHTS

- The contrasting effect of aerosols in the development of deep convection over the Indian regions is revealed through analysis of the direct effects. A seminal role of aerosols in increasing the moist static energy (MSE) through enhancement of both internal and latent energy is identified as a primary feature that increases the convection potential of the lower atmosphere as opposed through a possible stabilization of the PBL (Manoj et al, 2020).
- Unraveled the physical mechanism behind the scorching wind (heat burst) event and associated wilting of plant leaves occurred along the monsoon-dominated west-coast of Indian sub-continent. Associated with the weak monsoon condition, this rare phenomenon had created panic and attracted wide interest of the common public (Manoj et al., 2016).
- The thermodynamic characteristics of the atmosphere that facilitates the development of pre-monsoon thunderstorms and the transition phase from pre-monsoon to monsoon period over the gateway of Indian summer monsoon is explored (Thara, Neelam, Manoj et al., 2021).
- A potential link between compromised air quality and transmission of the novel corona virus (SARS-CoV-2) in polluted areas is proposed which received wide scientific recognition in the context of airborne-transmission of Corona Virus (Manoj et al., 2020).
- Proposed an unexplored physical mechanism by which absorbing aerosols facilitate the transition of Indian monsoon breaks to active spells through their direct radiative effects and which explains the observed aperiodicity of the monsoon intra-seasonal oscillations (MISOs) (Manoj et al., 2011).
- Unravelled the seminal role of aerosol-cloud interaction in the evolutionary phase of breaks on the aberrant behaviour of the Indian Summer Monsoon drought in 2009 (Manoj et al., 2012).
- The remote influence of the Hunga Tonga-Hunga Ha'apai volcanic eruption on the changes observed in the lower atmosphere and over the Indian near-equatorial ionosphere is revealed through a set of observations, thus shedding light in to lower atmosphere-ionosphere coupling processes (Rakesh V, Sreekumar Haridas, Sivan C., M.G. Manoj et al., 2022)
- Devised a computationally-inexpensive method to estimate the air vertical velocity, which is among the most difficult atmospheric parameter to measure due to its small magnitude, from ascending Radiosondes (Manoj et al., 2022).

#### RESEARCH PAPERS REFEREED FOR

1. *Advances in Atmospheric Sciences, Springer Publishers*
2. *Advances in Meteorology, Hindawi Publishing Corporation*
3. *AIP Advances, American Institute of Physics (AIP) Publishing Academy*
4. *Asia-Pacific Journal of Atmospheric Sciences, Springer Publishers*
5. *Atmospheric Chemistry and Physics, Copernicus Publications*
6. *Atmospheric Environment, Elsevier Science Publishers*
7. *Atmospheric Research, Elsevier Science Publishers*
8. *Atmospheric Science Letters, Wiley Online Publishers*

9. *Climate Dynamics, Springer Publishers*
10. *Current Science, Indian Academy of Sciences*
11. *Dynamics of Atmospheres and Oceans, Elsevier Science Publishers*
12. *Earth Systems and Environment, Springer Publishers*
13. *Geophysical Research Letters, American Geophysical Union*
14. *IEEE Transactions on Geoscience and Remote Sensing, IEEE Xplore Publishers*
15. *Indian Journal of Science and Technology, Open Access Journal*
16. *International Journal of Climatology, Wiley Online Publishers*
17. *International Journal of Earth and Atmospheric Science, Open Access Journal*
18. *International Journal of Environmental Science and Technology, Springer Publishers*
19. *International Journal of Remote Sensing and Remote Sensing Letters, Taylor and Francis Online*
20. *Journal of Atmospheric and Solar-Terrestrial Physics, Elsevier Publishers*
21. *Journal of Climate, American Meteorological Society*
22. *Journal of Earth System Science, Springer Publishers*
23. *Journal of Environmental Sciences, Elsevier Publishers*
24. *Journal of Geophysical Research (Atmospheres), American Geophysical Union*
25. *Journal of Geophysical Research (Oceans), American Geophysical Union*
26. *Meteorology and Atmospheric Physics, Springer Publishers*
27. *Nature Communications, Nature Portfolio*
28. *Quarterly Journal of the Royal Meteorological Society, Wiley Online Publishers*
29. *Rubber Science, Rubber Research Institute, Ministry of Commerce and Industry, Govt. of India*
30. *Thalassas (International Journal of Marine Sciences), Springer Publishers*

#### CONFERENCE/WORKSHOP ATTENDED

1. American Geophysical Union (AGU) Fall Meeting, New Orleans, USA, December 16, 2021
2. International Symposium on Tropical Meteorology (INTROMET-21), Cochin university of Science and Technology, India, Aug 23-26, 2021.
3. International Commission on Clouds and Precipitation (ICCP), held at the Indian Institute of Tropical Meteorology, Pune, Aug 01-06, 2021.
4. Awareness Workshop on Lightning and Thunderstorms, organized by Indian Meteorological Society and MoES Institutions, Jun 28, 2021.
5. Webinar on 'Invited Lectures on Recent Advances in Atmospheric Sciences' held at the National Centre for Earth Science Studies, Trivandrum on April 30, 2021
6. Aerosols, Clouds, Precipitation and Climate (ACPC) Workshop, a joint initiative of the International Geosphere-Biosphere Programme (IGBP) and the World Climate Research Programme (WCRP), Virtual meeting (BNL, New York, USA), 24-27 May, 2021
7. Workshop on Tutorial of ST/MST Radar and applications, organized by the National Atmospheric Research laboratory, ISRO, Govt. of India during 25-31 March 2021.
8. 43rd COSPAR Scientific Assembly, Sydney, Australia during 28 Jan-04 February, 2021
9. URSI-APRASC-2019 Radio Science International Conference, India Habitat Centre, New Delhi during March 09-15, 2019.
10. SERB Training School on 'Numerical Modelling and Forecasting of Dust Storm and Cloud Burst (NUMCLOUDS)' held at the Central University of Rajasthan, India during 11 - 23 February, 2019.

11. Training Workshop on “Cloud Physics and Dynamics: Observations to Models” at Indian Institute of Tropical Meteorology, Pune during January 29-February 01, 2018.
12. IRAD-2018, National Atmospheric Research Laboratory, Tirupati during January 09-11, 2018.
13. 15<sup>th</sup> International Workshop on Technical and Scientific Aspects of MST Radar, held at the National Institute of Polar Research, Tachikawa, Tokyo, Japan during May 26- 31, 2017.
14. URSI-RCRS-2017, 3<sup>rd</sup> Regional Radio Science Conference, National Atmospheric Research Laboratory, Tirupati during March 01-04, 2017.
15. IRAD-2017, Indian Institute of Technology, Kharagpur during January 08-11, 2017
16. Kerala Science Congress-2016, University of Calicut, Kerala during January 28-30, 2016.
17. American Geophysical Union Fall Meeting, San Francisco, USA, December 09-13, 2013.
18. Atmospheric System Research (ASR) Fall Working Group Meeting-2013 of the U.S. Department of Energy, Rockville, Maryland, USA, November 04-08, 2013.
19. 6<sup>th</sup> International Conference on Atmosphere, Ocean and Climate Change, Hong Kong, China, August 19-21, 2013.
20. 4<sup>th</sup> Atmospheric System Research (ASR-CONF-2013) Science Team Meeting of the U.S. Department of Energy, Potomac, Maryland, USA, March 18-21, 2013.
21. Companion Workshops for CAIPEEX Phase II data of radar and aircraft observations, Indian Institute of Tropical Meteorology, Pune, India, March 26- April 02 & September 24-29, 2012.
22. International Conference on “Celebrating the Monsoon”, Indian Institute of Science, Bangalore, India, July 24-28, 2007.
23. Induction Program for Staffs in CUSAT, Cochin University of Science and Technology, 17 March - 14 April, 2021.

#### EXTENSION ACTIVITIES

- **Member**, Organizing Committee: User Scientist Workshop on ST Radar Data
- **Treasurer**, Organizing Committee: International Conference - INTROMET-2021
- **Chairperson/Member**, Board of Question Paper Setters for various Universities in Kerala
- **Adjudication of PhD Viva Voce**: Dept. of Physics, Erode Arts and Science College, Bharathiar University, Coimbatore
- **Human Resource Training** in the field of Atmospheric Science and Radar remote sensing
- **Resource Person**: Faculty Induction Programme (UGC refresher Course)- UGC Human Resource Development Centre, Kannur University, Kerala.
- **Consulting Expert**: Various State/National Government bodies
- **Public Awareness Program**: Weather/climate related matters in Kerala

#### COUNTRIES VISITED AS PART OF PROFESSIONAL CAREER

- University of Maryland, USA (Post-Doctoral Research, 2013-14)
- San Francisco, USA (AGU Fall Meeting – December, 2013)
- Hong Kong, China (6<sup>th</sup> International Conference - COAA, 2013)
- National Institute of Polar Research, Tokyo, Japan (15<sup>th</sup> International Workshop on MST Radar, 2017)

#### INVITED TALKS IN CONFERENCES/ SEMINARS/ WORKSHOPS

1. ‘*Climate, Climate Change and Disaster Management*’ – Short-term Course Lectures delivered in the Faculty Induction Program organized by the UGC – Human Resource Development Centre, Kannur University, Kerala on July 26, 2022.

2. *'Early Warning and Early Action for Disaster Risk Reduction'* -Invited lecture on the occasion of 'World Meteorological Day -2022' organized by the Kerala Forest Research Institute (KFRI), Thrissur, Govt. of Kerala on 23<sup>rd</sup> March 2022.
3. *'Climate Change as a Disaster Risk Driver'* -Invited lecture in the 5-day Training Programme on Climate Change data analysis sponsored by the Directorate of Environment & Climate Change, Govt. of Kerala organized by the SCMS School of Engineering & Technology, Karukutty, Ernakulam, Kerala on 16<sup>th</sup> March 2022.
4. *'Climate Change and Disaster Management'* -Invited lecture in the one-day seminar on 'Climate Awareness Program - Climate Vision' sponsored by the ICAR-Tribal Development Project conducted by the College of Climate Change and Environmental Science, Kerala Agricultural University, Mannuthy on 26<sup>th</sup> February 2022.
5. *'Application of Radar Remote Sensing in tracking cyclones'* – Short-term invited Course Lectures delivered in the Faculty Induction Program organized by the UGC – Human Resource Development Centre, Kannur University, Kerala on January 07, 2022.
6. *'Application of Radar Remote Sensing in Agriculture'* – Invited Lecture delivered in the in the course on 'climate resilient agriculture' organized by the State Agriculture Management & Extension Training Institute (SAMETI), Department of Agriculture, Government of Kerala on January 06, 2022.
7. *'Aerosol radiative effects on deep convection'* – Invited Lecture in the International Symposium 'INTROMET-2021' conducted by Cochin university of Science and Technology & Indian Meteorological Society (IMS), Nov 23-26, 2021.
8. *'Disaster Management plans for preventing coastal erosion of Vypin Island, Cochin, Kerala'* – Invited Talk delivered in the Developmental Seminar conducted by the Vypin Block Panchayath, Cochin, Kerala (Coastal Protection and Sustainable Development) on November 14, 2021.
9. *'Climate Change and Disaster Management'* – Short-term Course Lectures delivered in the Faculty Induction Program organized by the UGC – Human Resource Development Centre, Kannur University, Kerala on November 13, 2021.
10. *'Application of Radar Remote Sensing in tracking cyclones'* – Short-term Course Lectures delivered in the Faculty Induction Program organized by the UGC – Human Resource Development Centre, Kannur University, Kerala on November 05, 2021.
11. *'Radar: Principles & Applications in Weather and Climate'*-Invited Lecture in 'WRMTP Training Program on rainfall and weather parameter using geospatial technologies' conducted by the Centre for Water Resources Development and Management (CWRDM), Kozhikode during October 25-27, 2021.
12. *'Monsoon in a changing climate'*, Invited Talk at the Meeting of Kerala Gazetted Officers Association, Payyannur, Kerala on 27<sup>th</sup> June 2021.
13. *'Earth's uncertain future in the backdrop of changing climate'* Invited Talk on the occasion of World Environment Day organized by Mary Matha Arts and Science College, Alakode, Kannur, Kerala on 06<sup>th</sup> June 2021.
14. *'Potential Impact of Aerosol on Precipitation, Severe Weather, and Lightning'* Symposium on Aerosol - Cloud - Climate Interactions - Aerosol Impacts on Weather Systems in the 101<sup>st</sup> Annual Meeting of the American Meteorological Society (AMS) held during 10-15 January 2021 (Co-Author).
15. *'Changing Climate and Disaster Risk Reduction'*, Invited Talk in the Session on Climate Change and Extreme Events organized by the Kerala State Disaster Management Authority, Govt. of Kerala on 17<sup>th</sup> October 2020

16. *'Mitigation and Adaptation in Climate Change: Sustainable Solutions'*, Invited Talk for the Faculty Development Program in Climate Science by School of Environmental Studies, Cochin University of Science and Technology, held during 09-13 November, 2020 (sponsored by AICTE).
17. *'Floods and Climate Change'*, Invited Talk in the Workshop in 'Utilizing the Potential of Bamboo and other Bioengineering Methods for Landslide Risk Reduction and Stream bank stabilization' held at Kerala Forest Research Institute (KFRI), Thrissur on 26<sup>th</sup> January 2021.
18. *'Tropical Cyclones and changing climate'* Invited talk at the Gifted Children Programme of Kanhangad Educational District, Kasaragod, Kerala held on 19 December 2020.
19. Monsoon Climate Variability and Extremes of Kerala  
Kerala University of Fisheries and Ocean Studies, March 28, 2019
20. Science of Air Pollution  
School of Environmental Studies, CUSAT, June 06, 2019
21. Climate Extremes: Is Kerala nearing a point of no-return?  
School of Environmental Studies, CUSAT, February 06, 2019
22. Changing Climate & Disaster Risk Reduction  
Department of Geography, Kalady University, March 28, 2019
23. Stratosphere-Troposphere (ST) Wind Profiler Radar at CUSAT  
Department of Atmospheric Sciences, Central University of Rajasthan, February 22, 2019
24. Climate Change and Kerala: Challenges and Opportunities  
School of Environmental Science, Mahatma Gandhi University, September 07, 2018

#### PUBLIC LECTURES/DEBATES AND POPULAR ARTICLES IN PRINT/AUDIO/VISUAL MEDIA

1. **Title:** Ozone Layer: The life protective cover of the Earth  
**Date:** September 16, 2022  
**Venue:** St. Thomas High School, Karikkottakkary, Kannur, Kerala
2. **Title:** World Ozone Day celebrations in the context of the recent IPCC Report  
**Date:** September 18, 2021  
**Venue:** NSS College, Manjeri, Kerala
3. **Dr. A.P.J. Abdul Kalam Memorial Speech**, Reader's Centre affiliated to Kerala State Library Council, Vayalalam, Thalassery, Kannur on 27 July 2021
4. **Panelist**, debate on 'Ecosystem Restoration' during World Environment Day, organized by Malayala Manorama daily, Kerala on 05<sup>th</sup> June 2021.
5. **Title:** Climate and Climate Change  
**Date:** June 22, 2018  
**Venue:** MS Swaminathan Research Foundation, Kalpetta, Wayanad  
**Program:** Automatic Weather Station Portal Installation
6. **Title: Awareness Program on Launching of GPS Radiosonde**  
**Date:** June 08, 2018  
**Venue:** Academy of Climate Change Education and Research, Kerala Agricultural University, Thrissur  
**Program:** Invited Lecture for the Master Students of Disaster Management
7. **Title:** Climate Change related Disasters and Role of Media  
**Date:** December 09, 2017  
**Venue:** Press Club, Pathanamthitta, Kerala
8. **Title:** The Ozone Layer- between YOU and UV.

- Date:** September 20, 2017 (World Ozone Day)  
**Venue:** NSS College, Ottapalam, Palakkad, Calicut University
9. **Title:** Climate Change: How and Why?  
**Date:** March 23, 2016 (World Meteorological Day)  
**Venue:** Kerala Agriculture University, Thrissur
10. **Title:** Challenges of Climate Change  
**Date:** May 04, 2016  
**Venue:** Institute for Climate Change Studies, Kottayam Dist., Kerala
11. **Title:** An Introduction to Atmospheric Science: Fundamentals and Prospects  
**Date:** May 16, 2016  
**Venue:** M.S. Swaminathan Research Foundation, Kalpetta, Wayanad, Kerala
12. **Title:** Changing climate in Kerala  
**Date:** May 23, 2016  
**Venue:** Malayala Manorama Office, Kochi
13. **Title:** Climate Change related Disasters and Disaster Risk Reduction  
**Date:** August 31, 2016  
**Venue:** Kaloor, Ernakulam  
**Program:** Training Programme on Climate Change for Panchayat Presidents at Idukki and Ernakulam Districts
14. **Role:** Rapporteur for debate on climate variability in Kerala  
**Date:** November 21, 2016  
**Venue:** Trivandrum, Kerala  
**Program:** Workshop on Climate Variability in Kerala: Climate Change Perspectives
15. **Title:** Climate Change related Disasters and Disaster Risk Reduction  
**Date:** August 31, 2016  
**Venue:** Kaloor, Ernakulam  
**Program:** Training Programme on Climate Change for Panchayat Presidents at Idukki and Ernakulam Districts
16. **Role:** Rapporteur for debate on climate variability in Kerala  
**Date:** November 21, 2016  
**Venue:** Trivandrum, Kerala  
**Program:** Workshop on Climate Variability in Kerala: Climate Change Perspectives
17. **Title:** Climate Change induced Disasters and Disaster Risk Reduction  
**Date:** August 31, 2016  
**Venue:** Kaloor, Ernakulam  
**Program:** Training Programme on Climate Change for School Teachers in Ernakulam and Kannur District
18. **Title:** Climate Change related Disasters and Disaster Risk Reduction  
**Date:** August 31, 2016  
**Venue:** Kaloor, Ernakulam  
**Program:** Training Programme on Climate Change for Panchayat Presidents at Idukki and Ernakulam Districts
19. **Role:** Rapporteur for debate on climate variability in Kerala  
**Date:** November 21, 2016  
**Venue:** Trivandrum, Kerala  
**Program:** Workshop on Climate Variability in Kerala: Climate Change Perspectives

## Popular Articles (Print Media)

1. രാജ്യത്തിന് അഭിമാനമായി കൊച്ചി സർവകലാശാല റഡാർ ഗവേഷണ കേന്ദ്രം (Cochin University Radar Centre under Make in India Program), Yojana- A monthly journal of the Ministry of Information and Broadcasting, Government of India, January, 2016.



2. “ക്ലൗഡ് സീഡിംഗ്: ഫലം അനിശ്ചിതം (Cloud Seeding: Facts and challenges)” Editorial - Malayala Manorama Daily- (March 16, 2017)
3. “തീക്കാറ്റിന് കാരണം താപവിസ്ഫോടനം (Heat burst behind the scorching wind and searing of leaves)” -Editorial Page, Mathrubhumi Daily, March 21, 2017.
4. “കൃത്രിമ മഴയെ വിളിക്കേണ്ടി വരുമോ? (Artificial Rain Making: A Review)” Editorial Page - Madhyamam Daily (March 22, 2017)
5. “ചുഴലിക്കൊടുങ്കാറ്റുകൾ 5 തരം (Categories of Tropical Cyclones)”: Malayala Manorama Daily-Padippura (September 09, 2017)
6. **The Flood: Facts and Factors in Kerala Calling**, A magazine of the Information and Public Relations Department, Govt. of Kerala, September 2018
7. “കുതിച്ചുയരുന്ന വേനൽച്ചൂട്: ശാസ്ത്രം, പ്രത്യാഘാതം, പരിഹാരമാർഗങ്ങൾ” (The Scientific reason and solutions for enhanced warming (April, 2018). Magazine: ‘Saasthragathi’- (a monthly magazine by Kerala Saasthra Saahithya Parishad, dedicated to highlighting socio-economic and science issues)
8. ‘ഈ ദുരിതപ്പെയ്ത്ത് കേരളത്തോട് പറയുന്നതെന്ത്?’ (What is the take-home message of this catastrophic flood?), Deshabhimani Daily Editorial, August 13, 2018
9. “എന്തുകൊണ്ട് ഇത്ര തണുപ്പ്? (On the unprecedented cold weather over Kerala - Deshabhimani Kilivathil (January 17, 2019)
10. “ഗസ്റ്റ്നാഡോയെ വരുത്തിയത് മഴയുടെ പിന്മാറ്റം (On the Gustnado development and damage in Kerala): Deshabhimani Daily – August 05, 2019.
11. “ചൂട് കുറയ്ക്കാൻ റോഡിൻറെ നിറം മാറ്റം (Let’s make roads look light, beat heat” Malayala Manorama Daily-Editorial (August 28, 2019)
12. ‘When Heat Comes in Waves’ in **Kerala Calling** - A Magazine of the Department of Information and Public Relations, Government of Kerala, March 2019 - *Dr. M.G. Manoj*
13. **Why is Kerala flooding again?** in **Kerala Calling** - A magazine of the Information and Public Relations Department, Govt. of Kerala, August 2019.
14. ‘ചൂടിലാണ് ചൂട്’ (The Ravaging Heat): Kilivathil Science Column, **Deshabhimani** Daily, 20 Feb 2020. - *Dr. M.G. Manoj*
15. ‘മൺസൂൺ വരവായ്’ (On the Monsoon Onset over Kerala): Kilivathil Science Section, **Deshabhimani** Daily, 28 May 2020. - *Dr. M.G. Manoj*
16. ‘പെയ്യുന്ന മഴയും പെയ്യാത്ത മഴയും പ്രത്യാഘാതങ്ങളും’ (Impacts of the Extremes of the Monsoon Rain), in **Saasthra Keralam**, a monthly Science magazine of the Kerala Saasthra Sahithya Parishad. May 2021 - *Dr. M.G. Manoj*
17. ‘മൺസൂണിൻറെ ശാസ്ത്രം: കയ്യിലൊതുങ്ങിയതും ഒതുങ്ങാത്തതും’ (The Monsoon: Knowns and Unknowns) in **Saasthragathi**, a monthly Science magazine of the Kerala Saasthra Sahithya Parishad. Jun 2021.
18. ‘മൺസൂൺ: മഴയോ കാറ്റോ?’ (The Monsoon: Rain or Wind?) in **Eureka**, a monthly Science magazine for Children by the Kerala Saasthra Sahithya Parishad. Jun 2021. - *Dr. M.G. Manoj*
19. ‘കേരളത്തിൻറെ കാലാവസ്ഥ: ശാസ്ത്രവും ഭാവിയും’ (The Science and future of Kerala’s climate)-Saasthrarangam (A magazine of the Department of Public Education, Govt. of Kerala), August 2021
20. ‘ഭൂമിക്ക് മനുഷ്യൻറെ മരണഗീതം’ (A requiem to the mother Earth)-Editorial Page, Deshabhimani Daily (13 Aug 2021)

21. ‘ലഘു മേഘ വിസ്ഫോടനം സംഭവിക്കുമ്പോൾ’ (On the mini cloud-burst events)- Editorial Page, Deshabhimani Daily (18 Oct 2021)
22. ‘മാറുന്ന കാലാവസ്ഥയും മാറേണ്ട കേരളവും’ (Kerala in the context of Changing climate), in **Saasthra Keralam**, a monthly Science magazine of the Kerala Saasthra Sahithya Parishad. March 2022
23. ‘പൊള്ളുന്ന ചൂട്, പെയ്യാത്ത മഴ’ (On the sweltering Heat in Kerala)-Editorial Page, Deshabhimani Daily (17 Mar 2022)
24. “ഉരുൾ പൊട്ടൽ: ഇടപെടൽ വിവേകത്തോടെ” (On the recent rain extremes, land-slides and mitigation strategies), Editorial Page - Kerala Kaumudi Daily, August 29, 2022.
25. “ഉഷ്ണതരംഗം: 240% അധിക മഴ; ഗതിമാറി ജെറ്റ് സ്ട്രീം, ഒടുക്കം നൂറ്റാണ്ടിലെ വലിയ പ്രളയം” (On the causative factors of the historic flood in Pakistan)- Malayala Manorama Daily-Online Interview (September 19, 2022)
26. “ആവാസവ്യവസ്ഥയിലെ ഭൗതികശാസ്ത്ര നിയമങ്ങൾ: കാലാവസ്ഥ പരിപ്രേക്ഷ്യത്തിന്റെ പശ്ചാത്തലത്തിൽ (Physical concepts of eco-system with special reference to the climatic conditions), in **Yojana** - A monthly journal of the Ministry of Information and Broadcasting, Government of India, October, 2022.

**Debates in Visual Media**

1. **News Channel:** Manorama News  
**Program:** Counter Point – On soaring heat conditions in Kerala  
**Date:** March 01, 2018
2. **News Channel:** Asianet News  
**Program:** News Hour Debate –On Ockhi Cyclone  
**Date:** December 07, 2017
3. **News Channel:** Media One  
**Program:** News Hour Debate –Discussion on Ockhi Cyclone  
**Date:** December 05, 2017
4. **News Channel:** Media One  
**Program:** News Hour Debate –On impact of Ockhi Cyclone  
**Date:** December 03, 2017
5. **News Channel:** Manorama News  
**Program:** Counter Point –Victims of Ockhi Cyclone  
**Date:** December 02, 2017
6. **News Channel:** Asianet News  
**Program:** News Hour Debate –On Ockhi Cyclone Warning  
**Date:** December 01, 2017
7. **News Channel:** Manorama News  
**Program:** Counter Point –How prepared are we to face Ockhi Cyclone?  
**Date:** November 30, 2017
8. **News Channel:** Surya TV  
**Program:** Vaarthakkappuram (Beyond the News)-On ST Radar at Cochin  
**Date:** November 08, 2015
9. **News Channel:** Manorama News  
**Title:** Lessons from Chennai Flood Disaster  
**Program:** Counter Point

**Date:** December 04, 2015 (Friday)

10. **News Channel:** Asianet  
**Program:** News Hour Debate  
**Title:** On heat stroke deaths in Kerala  
**Date:** April 30, 2016
11. **News Channel:** Manorama News  
**Program:** Counter Point  
**Title:** On the disastrous 'Vardah' Cyclone near Chennai  
**Date:** December 12, 2016
12. **News Channel:** Manorama News  
**Title:** Climate Change and its Impact on Kerala  
**Program:** Niyantharana Rekha (Line of Control)  
**Date:** December 09, 2015 (Wednesday)

### Debates in Audio Media (FM Radio-Aakashvani)

1. Aakashvani-Kochi:  
Samakaalikam: *Impact of Air Pollution in Kochi*  
February 15, 2018
2. Aakashvani-Kochi:  
Samakaalikam: *On the Science of Cloud Seeding*  
September 15, 2017
3. Aakashvani-Kochi:  
Kisaanvaani: *Climate related issues in the domain of agriculture*  
January 23, 2016

### COMPUTER PROFICIENCY

Operating systems	: Microsoft DOS, WINDOWS, LINUX
Programming Languages	: C, C++, FORTRAN, Matlab, Python
Softwares/Packages/Utilities	: NCL, GrADS, Origin, Surfer, XmGrace, Xconv, Adobe Photoshop etc.

### PROFESSIONAL TRAINING/SCIENTIFIC FIELD CAMPAIGNS

- Advanced hands-on training in the working principle, operation, and maintenance of the world's first **205 MHz Stratosphere-Troposphere Radar** at the Cochin University of Science and Technology (2015-2017).
- SERB Training School on '**Numerical Modelling and Forecasting of Dust Storm and Cloud Burst (NUMCLOUDS)**' held at the Central University of Rajasthan, India during 11 – 23 February, 2019.
- Training Workshop on '**Cloud Physics and Dynamics: Observations to Models**' at Indian Institute of Tropical Meteorology, Pune during January 29-February 01, 2018.
- Completed a short-term course in **Satellite Meteorology** from **School of Naval Oceanology and Meteorology (SNOM)**, Southern Naval Command, Cochin, Kerala during November 21 – December 03, 2005.
- Participated in the **Ship Cruise Campaign onboard ORV 'Sagar Kanya' (SK- 223A: 18 March 2006 - 13 April 2006)** of ICARB -Integrated Campaign for Aerosols, gases and Radiation Budget- by the Indian Space Research Organization's Geosphere Biosphere Program (ISRO-GBP). Onboard

the vessel carried out scientific measurements of aerosol and atmospheric parameters over the Bay of Bengal, Indian Ocean and Arabian Sea.

- Participated in several **National Field Campaigns** related to multi-site characterization of aerosol radiative properties over Indian region (2006-2009).
- Joint experimental campaign **MONSET** (MONsoon onSET) at the Advanced Centre for Atmospheric Radar Research (ACARR), Cochin University of Science and Technology, Kerala during the period 16 May -15 October, 2017 in collaboration with the Indian Institute of Tropical Meteorology (IITM), Pune and National Centre for Earth Science Studies (NCESS), Trivandrum.

## PERSONAL DETAILS

Permanent Address	: Manguttathil H, Kudianmala P.O., Kannur District, Kerala, INDIA, Postal Code - 670 582
Date of Birth	: May 24, 1982
Gender	: Male
Marital Status	: Married
Father's Name	: Mr. T.N. Gopalakrishnan
Mother's Name	: Mrs. K.N. Kamala
Nationality	: Indian
Passport No.	: K3598018
Languages Known	: English, Hindi, Malayalam
Alternate E-mail	: mgatmos@gmail.com