

## Dr. Maria Emmanuel

Research Associate II

**Phone:** +91-471-2562759

**Email:** maria\_emmanuel[at]vssc[dot]gov[dot]in

**Research Area:** Atmospheric dynamics. Variability of water vapour, ozone and cirrus clouds in the troposphere and lower stratosphere over Indian region based on in-situ and satellite observations and modeling.

### Academic Qualification

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Degree	Year	Details
• Ph.D.	2020	Physics, Thesis Title: “Spatio-temporal Variabilities of Water Vapour in the Troposphere and Lower Stratosphere over the Indian Monsoon Region”, University of Kerala, Trivandrum, India. Thesis advisor: Dr. S. V. Sunilkumar.
• M. Sc.	2011	Physics, University of Calicut, Kozhikode, India.
• B.Sc.	2009	Physics, University of Calicut, Kozhikode, India.

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### Professional Background

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Designation	Duration	Institution
• Research Associate	June 2020– Present	Space Physics Laboratory, VSSC, ISRO, India
• Research Fellow	Jan 2014– Jan 2019	Space Physics Laboratory, VSSC, ISRO, India

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### Awards/Honors/Recognitions/Aclamations

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- GATE 2013
  - GATE 2014
  - JEST 2014
  - ISRO Research Fellowship 2014-2019
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### Specific Scientific/Technical contributions

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- Validation of iMet-1 radiosonde, satellite instruments SAPHIR, MLS and two global re-analysis MERRA and ERA-Interim over Indian region using CFH observations (IEEE-TGRS, 2018).
  - Diurnal variability of tropospheric water vapour over Indian region and surrounding oceanic region are delineated highlighting the land and ocean contrast and causative mechanisms using in situ observations from radiosonde (JASTP, 2018).
  - The role of deep convection and Asian summer monsoon dynamics on the variability of water vapour in the upper troposphere and lower stratosphere over Indian region studied using in situ observations (AR, 2020).
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## Publications – 9+2

1. Sunilkumar. S. V, M. Muhsin, **M. Emmanuel**, G. Ramkumar, K. Rajeev, S. Sijkumar., “Balloon-borne cryogenic frost-point hygrometer observations of water vapour in the tropical upper troposphere and lower stratosphere over India: First results”, *J. Atmos. Sol.-Terr. Phys.*, 140, 86–93, 2016.
2. Sunilkumar. S. V, M. Muhsin, M. Venkat Ratnam, K. Parameswaran, B. V. Krishna Murthy, **M. Emmanuel**, “Boundaries of Tropical Tropopause layer (TTL): A new perspective based on thermal and stability profiles”, *J. Geophys. Res. Atmos.*, 122, 2017. doi: 10.1002/2016JD025217.
3. Muhsin. M, S. V. Sunilkumar, M. Venkat Ratnam, K. Parameswaran, B. V. Krishna Murthy, **M. Emmanuel**, “Effect of Convection on the thermal structure of the Troposphere and Lower Stratosphere including the Tropical Tropopause Layer in the South Asian Monsoon Region”, *J. Atmos. Sol.-Terr. Phys.*, 169, 52-65, 2018. <https://doi.org/10.1016/j.jastp.2018.01.016>.
4. **Emmanuel. M**, S. V. Sunilkumar, M. Muhsin, B. Suneel Kumar, N. Nagendra, P. R. Satheesh Chandran, G. Ramkumar, K. Rajeev, “Inter-comparison of Cryogenic Frost-point Hygrometer observations with SAPHIR, MLS, COSMIC, radiosonde and reanalysis datasets over Indian Peninsula”, *IEEE-Transactions on Geoscience and Remote Sensing*, 2018. doi: 10.1109/TGRS.2018.2834154.
5. **Emmanuel. M**, S. V. Sunilkumar, M. Venkat Ratnam, M. Muhsin, K. Parameswaran, B. V. Krishna Murthy, “Diurnal variation of the tropospheric water vapour over a coastal and an inland station in Southern Indian Peninsula”, *J. Atmos. Sol.-Terr. Phys.*, 179, 11-21, 2018. doi: 10.1016/j.jastp.2018.06.007.
6. **Emmanuel. M**, S. V. Sunilkumar, M. Muhsin., B. Suneel Kumar, N. Nagendra, G. Ramkumar, Rajeev. K, Parameswaran. K, “Annual cycle of water vapour in the lower stratosphere over the Indian Peninsula derived from Cryogenic Frost-point Hygrometer observations”. *Atmos. Chem. & Phy. Diss.*, 2018. doi: <https://doi.org/10.5194/acp-2018-630>.
7. Muhsin. M, S. V. Sunilkumar, M. Venkat Ratnam, K. Parameswaran, K. Mohanakumar, S. Mahadevan, K. Murugadass, P. M. Muraleedharan, B. Suneel Kumar, N. Nagendra, **M. Emmanuel**, P. R. Satheesh Chandran, N. Koushik, G. Ramkumar, B. V. Krishna Murthy, “Contrasting features of tropospheric turbulence over the Indian peninsula”, *J. Atmos. Sol.-Terr. Phys.*, 2019. doi: <https://doi.org/10.1016/j.jastp.2019.105179>.
8. **Emmanuel. M**, S. V. Sunilkumar, M. Muhsin, K. Parameswaran, P. R. Satheesh Chandran, B. Suneel Kumar, A. Maitra, A. N. V. Satyanarayana, N. Nagendra, “Effect of monsoon dynamics and deep convection on the upper troposphere lower stratosphere water vapour over Indian monsoon region”, *Atmos. Res.*, 2020. doi: <https://doi.org/10.1016/j.atmosres.2020.105336>.
9. Satheesh Chandran. P. R, S. V. Sunilkumar, M. Muhsin, **M. Emmanuel**, Geetha Ramkumar, Prabha R Nair, “Effect of meteorology on the variability of ozone in the troposphere and lower

stratosphere region over a tropical station Thumba (8.5°N, 76.9°E)", J. Atmos. Sol.-Terr. Phys., 215, 105567, 2021. doi: <https://doi.org/10.1016/j.jastp.2021.105567>.

10. **Emmanuel. M**, S.V. Sunilkumar, P. R. Satheesh Chandran, M. Muhsin (2021), Spatio-temporal variations of water vapour in the troposphere over Arabian Sea and Equatorial Indian Ocean during boreal winter (*Under Review*).
11. P. Nandakumar, D. Jana, S.V. Sunilkumar, Satheesh Chandran P. R, Vishnu R, T. Das, **M. Emmanuel**, G. Singh, S. Majumder, J.Y. Siddiqui, A. Paul (2021), Validation of wind measurements from a 53MHz Pilot ST radar located at University of Calcutta with collocated radiosonde launches (*Under Review*).

## डॉ. मरिया इम्मानुवेल

अनुसंधान सहयोगी II

फ़ोन : +९१ ४७१ २५६२७५९

ईमेल : maria\_emmanuel[at]vssc[dot]gov[dot]in

### अनुसंधान क्षेत्र

वायुमंडलीय गतिकी। भारतीय मणसून क्षेत्र के क्षोभमंडल और निचले समताप मंडल में जल वाष्प, ओजोन और सिरस बादलों की परिवर्तनशीलता के स्वस्थानी मापन, उपग्रह अवलोकन और मॉडलिंग के आधारित अन्वेषण।

### शैक्षणिक योग्यता

डिग्री	वर्ष	विवरण
• पी एचडी	२०२०	भौतिक विज्ञान; शोधग्रंथ का शीर्षक: "भारतीय मानसून क्षेत्र के क्षोभमंडल और निचले समताप मंडल में जल वाष्प की स्थानिक-अस्थायी परिवर्तनशीलता"; केरल विश्वविद्यालय, तिरुवनन्तपुरम, भारत
• एम एससी	२०११	भौतिक विज्ञान, कालिकट विश्वविद्यालय, कालिकट, भारत
• बी एससी	२००९	भौतिक विज्ञान, कालिकट विश्वविद्यालय, कालिकट, भारत

### प्रोफेशनल बैकग्राउंड

पद	समयांतराल	संस्थान
• अनुसंधान सहयोगी	जून २०२०- वर्तमान	अंतरिक्ष भौतिकी प्रयोगशाला, वीएसएससी, इसरो, भारत
• अध्यक्षता	जनवरी २०१४- जनवरी २०१९	अंतरिक्ष भौतिकी प्रयोगशाला, वीएसएससी, इसरो, भारत

### पुरस्कार/सम्मान/स्वीकरण/अभिनंदन

- गेट्ट २०१३
- गेट्ट २०१४
- जेस्ट २०१४
- इसरो रिसर्च फेल्लोशिप, २०१४- २०१९

### विशिष्ट वैज्ञानिक/तकनीकी योगदान

- भारतीय क्षेत्र में एमेट रेडियोसोडे, उपग्रह उपकरणों सफ़ीर और एमएलएस और रीअनालिसिस डेट्टा मेरा और एरा-इतरिम माप किया आरद्रता की सीएफएच अवलोकनों का उपयोग करते हुए सत्यापन (IEEE-TGRS, 2018).
- भारतीय क्षेत्र और आसपास के महासागरीय क्षेत्र में क्षोभमंडलीय जल वाष्प की दैनिक परिवर्तनशीलता को रेडियोसोडे से स्वस्थानी प्रेक्षणों का उपयोग करते हुए भूमि और महासागर के विपरीत और प्रेरक तंत्र पर प्रकाश डाला गया (JASTP, 2018)
- भारतीय क्षेत्र में ऊपरी क्षोभमंडल और निचले समताप मंडल में जल वाष्प की परिवर्तनशीलता पर गहरे संवहन और मानसून गतिकी की भूमिका का सीएफएच अवलोकनों का उपयोग करते हुए अध्ययन (AR, 2020).

1. Sunilkumar. S. V, M. Muhsin, **M. Emmanuel**, G. Ramkumar, K. Rajeev, S. Sijkumar., "Balloon-borne cryogenic frost-point hygrometer observations of water vapour in the tropical upper troposphere and lower stratosphere over India: First results", J. Atmos. Sol.-Terr. Phys., 140, 86–93, 2016.
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7. Muhsin. M, S. V. Sunilkumar, M. Venkat Ratnam, K. Parameswaran, K. Mohanakumar, S. Mahadevan, K. Murugadass, P. M. Muraleedharan, B. Suneel Kumar, N. Nagendra, **M. Emmanuel**, P. R. Satheesh Chandran, N. Koushik, G. Ramkumar, B. V. Krishna Murthy, "Contrasting features of tropospheric turbulence over the Indian peninsula", J. Atmos. Sol.-Terr. Phys., 2019. doi: <https://doi.org/10.1016/j.jastp.2019.105179>.
8. **Emmanuel. M**, S. V. Sunilkumar, M. Muhsin, K. Parameswaran, P. R. Satheesh Chandran, B. Suneel Kumar, A. Maitra, A. N. V. Satyanarayana, N. Nagendra, "Effect of monsoon dynamics and deep convection on the upper troposphere lower stratosphere water vapour over Indian monsoon region", Atmos. Res., 2020. doi: <https://doi.org/10.1016/j.atmosres.2020.105336>.
9. Satheesh Chandran. P. R, S. V. Sunilkumar, M. Muhsin, **M. Emmanuel**, Geetha Ramkumar, Prabha R Nair, "Effect of meteorology on the variability of ozone in the troposphere and lower

stratosphere region over a tropical station Thumba (8.5°N, 76.9°E)", J. Atmos. Sol.-Terr. Phys., 215, 105567, 2021. doi: <https://doi.org/10.1016/j.jastp.2021.105567>.

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11. P. Nandakumar, D. Jana, S.V. Sunilkumar, Satheesh Chandran P. R, Vishnu R, T. Das, **M. Emmanuel**, G. Singh, S. Majumder, J.Y. Siddiqui, A. Paul (2021), Validation of wind measurements from a 53MHz Pilot ST radar located at University of Calcutta with collocated radiosonde launches (*Under Review*).