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### Research Areas

Microwave remote sensing of surface and atmosphere, radiative transfer modelling surface/atmosphere of Earth and other planets, geo-physical parameter retrieval

### Responsibilities

- Co-Principal Investigator: Chandra's Surface Thermo-physical Experiment (ChaSTE)

### Research Activities

- Deep convective cloud studies using Megha-Tropiques (MT)/SAPHIR data
- Upper tropospheric humidity studies using MT/SAPHIR data
- Land surface studies using various satellite microwave imager data (MT-MADRAS, TRMM/TMI,SSM/I)
- Studies of microwave emission from planetary surface/sub-surface
- Studies of microwave ku-band propagation
- Microwave radiative transfer computations and geophysical parameter retrieval of Earth and planetary atmospheres

### Awards and Fellowships

- Best Paper Award, Tropmet-2011, Hydrabad
- European Union Post Doctoral Research Fellowship, 2009
- German Research Foundation Graduate Research Fellowship, 2003

## Education

Degree	Year	Details
Ph. D.	2007	Microwave Remote Sensing, 19 July 2007, Dissertation Topic: 'Retrieval of Surface Emissivity of Sea Ice and Temperature Profiles over Sea Ice from Passive Microwave Radiometers Advisors: Dr. Georg Heygster, Prof. Justus Notholt
Postgraduate Certificate	2003	University of Bremen, Bremen, Germany Environmental Physics University of Bremen, Bremen, Germany
M.Sc.	2001	Mahatma Gandhi University, Kottayam, Kerala, India
B.Sc.	1999	University of Kerala, Thiruvananthapuram, Kerala, India

## Publications

1. R. Renju, C. Suresh Raju, Manoj Kumar Mishra, N. V. P. Kiran Kumar, and **Nizy Mathew**, 'Attenuation characteristics of GSAT-14/Ka-band signals over the tropical coastal region, IEEE Transactions on Antennas and Propagation 10.1109/TAP.2021.3076506', 2021.
2. S. Samuel, **N. Mathew**, M. K. Mishra and R. Renju, 'Spatial and temporal variability of deep convective clouds over the tropics using multi-year Megha - Tropiques – Sondeur Atmosphérique du Profil d'Humidité Intertropicale par Radiométrie (SAPHIR) observations', International Journal of Remote Sensing, 42:13, 5176-5193, DOI: 10.1080/01431161.2021.1910368, 2021.
3. M. K. Mishra, R. Renju, **N. Mathew**, C. Suresh Raju, M. R. Sujimol and K. Shahana, "Characterization of GSAT-14 satellite Ka-band microwave signal attenuation due to pre-cipitation over a Tropical Coastal station over the southern peninsular region of the Indiansubcontinent", Radio Science, 10.1029/2019RS006910, 2019.
4. **N. Mathew**, S. Sahoo, Renju R. and C. Suresh Raju, "Millimeter-Wave Radiometric Information Content Analysis for Venus Atmospheric Constituents", Radio Science, DOI:10.1029/2019RS006913, 2019.

5. Tinu Antony, C. Suresh Raju, R. Renju, **Nizy Mathew** and K. Krishna Moorthy, “Microwave emissivity of arid regions at 10GHz potential for subsurface studies ”, *International Journal of Remote Sensing*, DOI: 10.1080/01431161.2018.1458345, 2018.
6. R. Renju, Suresh Raju C., M. K. Mishra, **N. Mathew**, K. Rajeev and K. Krishna Moorthy, “Atmospheric Boundary Layer Characterization using Multiyear Ground-Based Microwave Radiometer Observations Over a Tropical Coastal Station.”, *IEEE Transactions on Geo-science and Remote Sensing*, DOI:10.1109/TGRS.2016.2527099 (2017), 6877 – 6882 2017.
7. **Nizy Mathew**, Suresh Raju C., R. Renju, and Tinu Antony, “Distribution of Tropical Deep Convective Clouds from Megha-Tropiques SAPHIR Data ”, *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 54, No. 11, November 2016.
8. R. Renju, Suresh Raju C., **Nizy Mathew**, N. V. P. Kirankumar and K. Krishna Moorthy, “Tropical Convective Cloud Characterization Using Ground Based Microwave radiometer observations”, *IEEE Transactions on Geoscience and Remote Sensing* Vo.54, No. 7, 2016
9. R. Renju, Suresh Raju C., Tinu Antony, **Nizy Mathew** and K. Krishna Moorthy, “Inter-annual variability of water vapor over an equatorial coastal station using Microwave radiometer observations”, *J. Geophys. Res. (Atmosphere)*, DOI:10.1002/2014JD022838.2015.3., 20,4585 – 4599, 2015.
10. **Nizy Mathew**, Viju Oommen John, C. Suresh Raju, K. Krishna Moorthy, “Upper Tropospheric Humidity from SAPHIR on board Megha-Tropiques”, *Current Science*, Vol. 108, No. 10, 1915 – 1922, May, 2015.
11. Tinu Antony, Suresh Raju C., **Nizy Mathew**, Krishna Moorthy K., “Flood extent analysis over the major river basins in the Indian subcontinent using satellite microwave radiometric observations”, *IEEE J. of Selected Topics in Applied Earth Observation and Remote Sensing*, 2015, DOI:10.1109/JSTARS.2015.2390036.
12. Tinu Antony, Suresh Raju C., **Nizy Mathew**, KorakSaha and K. Krishna Moorthy, “Detailed Analyses on Microwave Land Surface Emissivity of Indian Subcontinent”, *IEEE Trans. Geosci. Rem. Sens.*, doi:10.1109/TGRS.2013.2274010., June, 2014.
13. Suresh Raju C., Renju. R, Tinu Antony, **Nizy Mathew** and K. Krishna Moorthy, “Microwave radiometric observation of an intense convective system that formed waterspout over the coastal Arabian Sea”, *IEEE Geosci. & Remote Sens. Letter*, 10, 1075 – 1079, doi:10.1109/LGRS.2012.2229960, 2013.
14. Suresh Raju, C., T. Antony, **N. Mathew**, K. N. Uma and K. Krishna Moorthy, “MTMADRAS brightness temperature analysis for terrain characterization land surface microwave estimation”, *Current science*, Special Issue on Megha-Tropiques, 104 (12), 1643 –1649, 2013.

15. **Mathew, N.**, Heygster, G., Melsheimer, C, 2009: “Surface emissivity of Arctic sea ice at AMSR-E frequencies”, IEEE Trans. Geosci. Rem. Sens., Vol. 47, No. 12, December, 4115–4124, 2009, DOI:10.1109/TGRS.2009.2023667.
16. **Mathew, N.**, Heygster, G., Melsheimer, C. and Kaleschke, L., 2008: “Surface emissivity of Arctic sea ice at AMSU window frequencies”, IEEE Trans. Geosci. Rem. Sens. 46 (2008), No. 8, 2298 – 2306, FOREX=J.
17. G. Heygster, C. Melsheimer, **N. Mathew**, L. Toudal, R. Saldo, S. Andersen, R. Tonboe, H. Schyberg, F.T. Tvetter, V. Thyne, N. Gustafsson, T. Landelius, and P. Dahlgren, 2008: “IOMASA - integrated observation and modeling of the arctic sea ice and atmosphere”, American Meteorological Society, DOI: 10.1175/2008BAMS2202.1.
18. C. Melsheimer, G. Heygster, **N. Mathew**, and L. Toudal Pedersen, “Retrieval of sea ice emissivity and integrated retrieval of surface and atmospheric parameters over the arctic from AMSR-E data”, J. of the Remote Sens. Soc. of Japan (2008).
19. **Mathew, N.**, 2007: “Retrieval of Surface Emissivity of Sea Ice and Temperature Profiles Over Sea Ice from Passive Microwave Radiometers”, Ph.D thesis, University of Bremen, ISBN 978-3-8325-1701-4.
20. **Mathew, N.**, Heygster, G. and Rosenkranz, P. W., 2006: “Retrieval of emissivity and temperature profile in polar regions”. In Proc. IGARSS 2006.

डॉ. निजी माथ्यू

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केरला, भारत

### अनुसंधान क्षेत्र

सतह और वायुमंडल के माइक्रोवेव रिमोट सेंसिंग, पृथ्वी और अन्य ग्रहों के सतह/वायुमंडल की विकिरण हस्तांतरण मॉडलिंग, भू-भौतिक पैरामीटर पुनर्प्राप्ति

### जिम्मेदारियां

सह-प्रमुख अन्वेषक: चंद्रा का भूतल थर्मो-भौतिक प्रयोग (ChaSTE)

### अनुसंधान काम

- मेघा-ट्रॉपिक्स (एमटी)/सफ़ीर डेटा का उपयोग करते हुए डीप कन्वेक्टिव क्लाउड स्टडीज
- ऊपरी क्षोभमंडलीय आर्द्रता अध्ययन MT/SAPHIR डेटा का उपयोग कर
- विभिन्न उपग्रह माइक्रोवेव इमेजर डेटा (एमटी-मद्रास, टीआरएमएम/टीएमआई,एसएसएम/आई)
- ग्रहों की सतह/उप-सतह से माइक्रोवेव उत्सर्जन का अध्ययन
- माइक्रोवेव केयू-बैंड प्रसार का एक्स अध्ययन
- माइक्रोवेव रेडिएटिव ट्रांसफर कंप्यूटेशंस और भूभौतिकीय पैरामीटर की पुनर्प्राप्ति (पृथ्वी और ग्रहों का वातावरण)

## शैक्षणिक योग्यता

डिग्री	वर्ष	विवरण
• पीएचडी (‘मैग्ना-कम-लॉड’)	2007	• शोध प्रबंध विषय: ‘पैसिव माइक्रोवेव रेडियोमीटर से समुद्री बर्फ और तापमान प्रोफाइल की सतह उत्सर्जन की पुनर्प्राप्ति’ • सलाहकार: डॉ. जॉर्ज हेगस्टर, प्रो. जस्टस नोथोल्ड ब्रेमेन विश्वविद्यालय, ब्रेमेन, जर्मनी
• स्नातकोत्तर प्रमाणपत्र	2003	ब्रेमेन विश्वविद्यालय, ब्रेमेन, जर्मनी
• एमएससी	2001	महात्मा गांधी विश्वविद्यालय, कोट्टायम, केरल, भारत एमएससी, एप्लाइड फिजिक्स
• बी एससी	1999	केरल विश्वविद्यालय, तिरुवनंतपुरम, केरल, भारत भौतिकी

## पुरस्कार एवं अधिष्ठावृत्ति

बेस्ट पेपर अवार्ड, ट्रॉपमेट-२०११, हैदराबाद

यूरोपियन यूनियन पोस्ट डॉक्टरल रिसर्च फेलोशिप, 2009

जर्मन रिसर्च फाउंडेशन ग्रेजुएट रिसर्च फेलोशिप, 2003

## प्रकाशन

1. R. Renju, C. Suresh Raju, Manoj Kumar Mishra, N. V. P. Kiran Kumar, and **Nizy Mathew**, ‘Attenuation characteristics of GSAT-14/Ka-band signals over the tropical coastal region, IEEE Transactions on Antennas and Propagation 10.1109/TAP.2021.3076506’, 2021.
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observations', *International Journal of Remote Sensing*, 42:13, 5176-5193, DOI: 10.1080/01431161.2021.1910368, 2021.

3. M. K. Mishra, R. Renju, **N. Mathew**, C. Suresh Raju, M. R. Sujimol and K. Shahana, "Characterization of GSAT-14 satellite Ka-band microwave signal attenuation due to precipitation over a Tropical Coastal station over the southern peninsular region of the Indian subcontinent", *Radio Science*, 10.1029/2019RS006910, 2020.
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6. R. Renju, Suresh Raju C., M. K. Mishra, **N. Mathew**, K. Rajeev and K. Krishna Moorthy, "Atmospheric Boundary Layer Characterization using Multiyear Ground-Based Microwave Radiometer Observations Over a Tropical Coastal Station.", *IEEE Transactions on Geo-science and Remote Sensing*, DOI:10.1109/TGRS.2016.2527099 (2017), 6877 – 6882 2017.
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8. R. Renju, Suresh Raju C., **Nizy Mathew**, N. V. P. Kirankumar and K. Krishna Moorthy, "Tropical Convective Cloud Characterization Using Ground Based Microwave radiometer observations", *IEEE Transactions on Geoscience and Remote Sensing* Vo.54, No. 7, 2016
9. R. Renju, Suresh Raju C., Tinu Antony, **Nizy Mathew** and K. Krishna Moorthy, "Inter-annual variability of water vapor over an equatorial coastal station using Microwave radiometer observations", *J. Geophys. Res. (Atmosphere)*, DOI:10.1002/2014JD022838.2015.3., 20,4585 – 4599, 2015.
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11. Tinu Antony, Suresh Raju C., **Nizy Mathew**, Krishna Moorthy K., "Flood extent analysis over the major river basins in the Indian subcontinent using satellite microwave radiometric observations", *IEEE J. of Selected Topics in Applied Earth Observation and Remote Sensing*, 2015, DOI:10.1109/JSTARS.2015.2390036.

12. Tinu Antony, Suresh Raju C., **Nizy Mathew**, Korak Saha and K. Krishna Moorthy, “Detailed Analyses on Microwave Land Surface Emissivity of Indian Subcontinent”, IEEE Trans. Geosci. Rem. Sens., doi:10.1109/TGRS.2013.2274010., June, 2014.
13. Suresh Raju C., Renju. R, Tinu Antony, **Nizy Mathew** and K. Krishna Moorthy, “Microwave radiometric observation of an intense convective system that formed waterspout over the coastal Arabian Sea”, IEEE Geosci. & Remote Sens. Letter, 10, 1075 – 1079, doi:10.1109/LGRS.2012.2229960, 2013.
14. Suresh Raju, C., T. Antony, **N. Mathew**, K. N. Uma and K. Krishna Moorthy, “MTMADRAS brightness temperature analysis for terrain characterization land surface microwave estimation”, Current science, Special Issue on Megha-Tropiques, 104 (12), 1643 –1649, 2013.
15. **Mathew, N.**, Heygster, G., Melsheimer, C, 2009: “Surface emissivity of Arctic sea ice at AMSR-E frequencies”, IEEE Trans. Geosci. Rem. Sens., Vol. 47, No. 12, December, 4115 –4124, 2009, DOI:10.1109/TGRS.2009.2023667.
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17. G. Heygster, C. Melsheimer, **N. Mathew**, L. Toudal, R. Saldo, S. Andersen, R. Tonboe, H. Schyberg, F.T. Tveter, V. Thyness, N. Gustafsson, T. Landeli-us, and P. Dahlgren, 2008: “IOMASA - integrated observation and modeling of the arctic sea ice and atmosphere”, American Meteorological Society, DOI: 10.1175/2008BAMS2202.1.
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