

M Santosh

Scientist

Space Physics Laboratory (SPL)

Vikram Sarabhai Space Centre (VSSC) Indian Space
Research Organisation (ISRO) Thiruvananthapuram,
Kerala, India



Research Area & Research interests

Experimental investigation of the Atmospheric Boundary Layer (ABL) and the Lower Troposphere over land and ocean, coupling between ABL and lower troposphere, satellite radio occultation based characterization of ABL, air-sea interaction, sea-breeze land-breeze circulation, effect of convection on marine ABL. This involves devising experimental field campaigns, carrying out the observations using different instruments like sonic anemometer, radiosonde, SODAR, etc. over land and the ocean surrounding the Indian subcontinent.

Academic Background

- **M.Tech – Laser & Electro-Optics, 2008**, Defense Institute of Advanced Technology (DIAT), Pune, India
- **M.Sc – Physics, 2006**, Sri Sathya Sai Institute of Higher Learning (SSSIHL), Prashanti Nilayam, Puttaparthi, Andhra Pradesh, India
- **B.Sc – Physics (Hons), 2004**, Sri Sathya Sai Institute of Higher Learning (SSSIHL), Whitefield, Bangalore, Karnataka, India

Member in Professional bodies

Life Member Indian Science Congress Association (ISCA)

Highlights

- 1) Contributed to the 36th Indian Scientific Expedition to Antarctica as a co-investigator and participant during southern hemispheric summer of November, 2016 to February 2017 conducting scientific observations of atmospheric boundary layer and upper atmosphere.
- 2) Co-ordinated and conducted the atmospheric measurements during the South West Tropical Indian Ocean (SWTIO) Expedition on-board *Oceanic Research Vessel Sagar Kanya* in the capacity of **Deputy Chief Scientist of Expedition** in Oct-Nov 2011.

- 3) Conducted ABL observations in 2 (other) ship based campaigns over the Indian Ocean and the Bay of Bengal as part of scientific team for investigating the atmospheric boundary layer and the lower troposphere namely
 - i) Tropical Indian Ocean cruise in July-August 2010 conducted by NCAOR, Goa.
 - ii) Continental Tropical Convergence Zone (CTCZ) campaign (oceanic segment) over Bay of Bengal during Asian Summer Monsoon 2009 conducted by Dept. of Science and Technology (DST), INDIA

Publications

- International Journals : 9
- Proceedings : 7
- Conference presentations : 17

Manpower Development Activities

- Supervision of student projects for M.Sc (06)
- Conducting lectures during orientation course for newly joined research scholars in different stations of NOBLE project in India
- Giving lectures as part of course work for newly joined research scholars in SPL, VSSC, ISRO, Thiruvananthapuram.

List of Publications

(a) International Journals

1. **Santosh, M.**, 2022a. Estimation of daytime planetary boundary layer height (PBLH) over the tropics and subtropics using COSMIC-2/FORMOSAT-7 GNSS-RO measurements. Atmospheric Research 279, 106361. <https://doi.org/10.1016/j.atmosres.2022.106361>
2. **Santosh, M.**, 2022b. Structure and development of the atmospheric boundary layer over a small island (Mahé Island, Seychelles) in the equatorial Indian Ocean. Meteorol Atmos Phys 134, 91. <https://doi.org/10.1007/s00703-022-00924-3>
3. Koushik, N., Kumar, K.K., Subrahmanyam, K.V., Ramkumar, G., Girach, I.A., **Santosh, M.**, Nalini, K., Nazeer, M., Shreedevi, P.R., 2019. Characterization of inertia gravity waves and associated dynamics in the lower stratosphere over the Indian Antarctic station, Bharati (69.4°S, 76.2°E) during austral summers. Clim Dyn 53, 2887–2903. <https://doi.org/10.1007/s00382-019-04665-9>
4. Anurose, T.J., Subrahmanyam, D.B., Dutt, C.B.S., Kumar, N.V.P.K., John, S.R., Nair, S.K., **Santosh, M.**, Mohan, M., Kunhikrishnan, P.K., Sijikumar, S., Prijith, S.S., 2012. Vertical structure of sea-breeze circulation over Thumba (8.5°N, 76.9°E, India) in

the winter months and a case study during W-ICARB field experiment. Meteorol Atmos Phys 115, 113–121. <https://doi.org/10.1007/s00703-011-0178-0>

5. Bala Subrahmanyam, D., Anurose, T.J., Mohan, M., **Santosh, M.**, Kiran Kumar, N.V.P., Sijikumar, S., 2012. Impact of Annular Solar Eclipse of 15 January 2010 on the Atmospheric Boundary Layer Characteristics Over Thumba: A Case Study. Pure Appl. Geophys. 169, 741–753. <https://doi.org/10.1007/s00024-011-0336-9>
6. Bala Subrahmanyam, D., Anurose, T.J., Mohan, M., **Santosh, M.**, Kiran Kumar, N.V.P., Sijikumar, S., Prijith, S.S., Aloysius, M., 2011. Atmospheric Surface-Layer Response to the Annular Solar Eclipse of 15 January 2010 over Thiruvananthapuram, India. Boundary-Layer Meteorol 141, 325–332. <https://doi.org/10.1007/s10546-011-9627-z>
7. KiranKumar, N.V.P., Purushothaman, N., **Santosh, M.**, 2013. Response of spectral characteristics of wind and temperature of atmospheric surface layer to the noontime annular solar eclipse. Journal of Atmospheric and Solar-Terrestrial Physics 97, 91–98. <https://doi.org/10.1016/j.jastp.2013.02.017>
8. Nair, S.K., Anurose, T.J., Subrahmanyam, D.B., Kumar, N.V.P.K., **Santosh, M.**, Sijikumar, S., Mohan, M., Namboodiri, K.V.S., 2011. Characterization of the Vertical Structure of Coastal Atmospheric Boundary Layer over Thumba () during Different Seasons. Advances in Meteorology 2011, 1–9. <https://doi.org/10.1155/2011/390826>
9. Nair, S.K., Prabha, T.V., Purushothaman, N., Sijikumar, S., **Muralidharan, S.**, Kirankumar, N.V.P., Subrahmanyam, D.B., Anurose, T.J., Prijith, S.S., Namboodiri, K.V.S., 2015. Diurnal variations of the low-level jet over peninsular India during the onset of Asian summer monsoon. Theor Appl Climatol 120, 287–298. <https://doi.org/10.1007/s00704-014-1168-1>

(b) Proceedings:

1. **M.Santosh** and K.Rajeev, “Improved estimation of atmospheric boundary layer height from simulations of atmospheric refractivity over the tropical oceans - a study using DYNAMO-2011 radiosonde data”, International Conference on Climate Change and Disaster Management, Thiruvananthapuram, India, Feb 26-28, 2015.
2. **M. Santosh**, S.S. Prijith, and N.V.P. Kirankumar, “MABL and Upper Air Observations using GPS sonde ascents during CTCZ campaign over Northern Bay of Bengal”, Workshop on Continental Tropical Convergence Zone (CTCZ)-Initial Results organised by DST at IITM Pune on 29-30 April 2010
3. G. S. Bhat, Tarun Verma, Deepesh Jain, **Santosh Muralidharan** , S.S.Prijith, “Intercomparison of Vaisala and Pisharoty derived atmospheric boundary layer properties over Bay of Bengal during CTCZ pilot”, Workshop on Continental Tropical Convergence Zone (CTCZ)-Initial results organised by DST at IITM Pune on 29-30 April 2010

4. KiranKumar N. V. P, [M. Santosh](#), D. Bala Subrahmanyam, T. J. Anurose, S. S. Prijith, Marina Aloysius, S. Sijikumar, Mannil Mohan, “Response of Atmospheric Surface Layer to Annular Solar Eclipse Event on January 15, 2010”, Proceedings of the National Workshop: Results on the Solar Eclipse, *NaWRoSE*, 162 – 165, 2011
5. Bala Subrahmanyam, D., T. J. Anurose, Mannil Mohan, [M. Santosh](#), N. V. P. KiranKumar, S. Sijikumar, “Impacts of Annular Solar Eclipse of 15 January 2010 on the Atmospheric Boundary Layer Characteristics over Thumba: A Case Study”, Proceedings of the National Workshop: Results on the Solar Eclipse, *NaWRoSE*, 158 – 162, 2011
6. Kiran Kumar N.V.P., P. K. Kunhikrishnan, D. Bala Subrahmanyam, Mannil Mohan, C. B. S. Dutt, [M.Santosh](#), S. S. Prijith, S. Indira Rani, S. Sijikumar, Sandhya K. Nair, Denny P. Alappattu, Marina Aloysius, S. Satyanarayana and R. Gopakumar, “Structure of Thermal Internal Boundary Layer over Thumba during W-ICARB campaign: A case study”, *Proceedings of the Project Review Meeting, ARFI & ICARB Scientific Progress Report – 2010*, Thiruvananthapuram, 9-10 June 2010., 161-167, 2010
7. D. Bala Subrahmanyam, N. V. P. Kiran Kumar, C. B. S. Dutt, T. J. Anurose, P. K. Kunhikrishnan, Mannil Mohan, Sherine Rachael John, S. S. Prijith, S. Indira Rani, S. Sijikumar, Sandhya K. Nair, [M.Santosh](#), Denny P. Alappattu, Marina Aloysius, S. Satyanarayana and R. Gopakumar, “Marine Atmospheric Boundary Layer (MABL) Characteristics over the Bay of Bengal during W-ICARB Field Experiment”, *Proceedings of the Project Review Meeting, ARFI & ICARB Scientific Progress Report – 2010*, Thiruvananthapuram, 9-10 June 2010., 120-133, 2010

(c) Presentations in Symposia /Conferences :

1. [M.Santosh](#), “Atmospheric Boundary Layer over a tiny island (Mahe, Seychelles) in the Equatorial Indian Ocean”, National Symposium on Land, Ocean and Atmosphere Interactive Processes in the Context of Weather and Climate, TROPMET-2019 organized by the Indian Meteorological Society (IMS) in Andhra University, Vishakhapatnam during 11-14 Dec, 2019.
2. [M.Santosh](#), N.Koushik, K.Nalini, Observations of vertical structure of diurnal variability in the atmospheric boundary layer over the Indian station Bharati (69°S, 76°E) a coastal station in East Antarctica during austral summer of 2016-17, National Conference for Polar Sciences (NCPS-2017), 16th-17th May 2017, National Centre for Antarctic and Oceanic Research (NCAOR), Goa, India
3. [M.Santosh](#), Seasonal and diurnal variability of atmospheric boundary layer height over the tropical oceans – A study using in situ and satellite data, *National Space Science Symposium 9-12 February, 2016, Vikram Sarabhai Space Centre, Trivandrum*.
4. [M.Santosh](#) and K.Rajeev, “Improved estimation of atmospheric boundary layer height from simulations of atmospheric refractivity over the tropical oceans - a study using DYNAMO-2011 radiosonde data”, International Conference on Climate Change and Disaster Management, Thiruvananthapuram, India, Feb 26-28, 2015.
5. [M.Santosh](#) and K. Rajeev, “Characteristics of the Marine Atmospheric Boundary Layer (MABL) over the Bay of Bengal, the Arabian Sea and the Tropical Indian Ocean under contrasting cloudiness and convective conditions”, Proceedings of the ARFI, ICARB, RAWEX and NOBLE project review meeting, 8-9 January 2014, 269-272.
6. [M.Santosh](#), K.Rajeev “Role of convection and clouds in regulating the structure of marine atmospheric boundary layer”, INTROMET-2014, Chennai, Feb 21-24, 2014,

7. [M.Santosh](#), S.Meenu, K.Rajeev, N.V.P.KiranKumar, S. Sijikumar, D.B.Subrahmanyam, Sandhya K Nair, S.V.Sunilkumar, “Contrasting behaviour of tropical tropopause within and outside ITCZ over the Indian Ocean”, 7th National Space Science Symposium, S.V,University, Tirupati, February 14-17, 2012
8. [M. Santosh](#) and N.V.P. KiranKumar, “Surface and upper air observations during the Tropical Indian Ocean Campaign”, 7th National Space Science Symposium, S.V,University, Tirupati, February 14-17, 2012
9. [M.Santosh](#), S.Meenu, K.Rajeev, N.V.P.KiranKumar, S. Sijikumar, D.B.Subrahmanyam, Sandhya K Nair, S.V.Sunilkumar, “Contrasting behaviour of tropical tropopause within and outside ITCZ over the Indian Ocean”, National Workshop on Tropical Tropopause Dynamics, VSSC Trivandrum, January 24-25, 2012
10. [M. Santosh](#), N. V. P. KiranKumar, Mannil Mohan and Denny P. Alappattu, “Atmospheric boundary layer characteristics during the Tropical Indian Ocean (TIO) Campaign”, National Conference on Advances in Atmospheric Remote Sensing, Weather Prediction and Climate Change, ARWPCC – 2011, Gadanki, March 10–11, 2011.
11. [M.Santosh](#), S.S. Prijith, and N.V.P. KiranKumar, “MABL and Upper Air Observations using GPS sonde ascents during CTCZ campaign over Northern Bay of Bengal” 6th National Space Science Symposium, Saurashtra University, Rajkot, February 24-27, 2010.
12. [M.Santosh](#), S.S. Prijith, and N.V.P. Kirankumar , “MABL and Upper Air Observations using GPS sonde ascents during CTCZ campaign over Northern Bay of Bengal” , Workshop on Continental Tropical Convergence Zone (CTCZ)-Initial Results organised by DST at IITM Pune on 29-30 April 2010.
13. G.S.Bhat, T. Verma, D. Jain, [M. Santosh](#), S. S. Prijith, “Intercomparison of Vaisala and Pisharoty derived atmospheric boundary layer properties over Bay of Bengal during CTCZ pilot”, Workshop on Continental Tropical Convergence Zone (CTCZ)-Initial Results organised by DST at IITM Pune on 29-30 April 2010.
14. Kirankumar N.V.P, Neethu Purushottaman, [M.Santosh](#), Anurose, D.Bala Subrahmanyam , Sandhya.K.Nair, “Response of spectral characteristics of surface meteorological parameters to the Annular Solar Eclipse of 15 January 2010 over a coastal station Thumba”, Scientific Progress Report, Proceedings of the Project Review Meeting 20-21 June 2012, Trivandrum
15. Neethu Purushottaman, Kirankumar.N.V.P, [M.Santosh](#), Sandhya.K.Nair, ”Spectral characteristics of surface layer turbulence at coastal station Thumba” Scientific Progress Report, Proceedings of the Project Review Meeting 20-21 June 2012, Trivandrum
16. T.J.Anurose, D.Bala Subrahmanyam, Sandhya.K.Nair, S.Sijikumar, [M.Santosh](#), ”Characterization of Sea Breeze Circulation over Thumba Coast during Winter Monsoon”, Scientific Progress Report, Proceedings of the Project Review Meeting 20-21 June 2012, Trivandrum

एम संतोष

वैज्ञानिक

अन्तरिक्ष भौतिकी प्रयोगशाला, विक्रम
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अनुसंधान क्षेत्र

भूमी और समुद्र की वायुमंडलीय सीमा परत एवं निम्नतर क्षोभमंडल की प्रायोगिक जांच, सैटिलाइट रेडियो आकाश्लेशन पे आधारित वायुमंडलीय सीमा परत की चरित्र चित्रण, वायु एवं समुद्र की अन्तरक्रिया, जल-समीर व स्थल-समीर का परिसंचरण, समुद्रीय वायुमंडलीय सीमा परत पर संवहन का प्रभाव। इसमें प्रायोगिक क्षेत्र अभियान की रचना करना व सोनिक अनेमोमीटर, रडोसोण्डे, सोडार ऑटोमैटिक वेथर स्टेशन, सीलोमीटर जैसे विभिन्न उपकरणों के उपयोग से प्रेक्षकों को अंजाम देना शामिल है। भारतीय उपमहाद्वीप एवं पास-पड़ोस का समुद्र मुख्य अध्ययन क्षेत्र है।

शैक्षणिक पृष्ठभूमि

- M.Tech – लेसर एवं एलक्ट्रो-ओपटिक्स, २००८, डिफेंस इंस्टीट्यूट ऑफ एडवांस्ड टेक्नोलोजी (DIAT) पुणे, भारत
- M.Sc – भौतिक विज्ञान, २००६, श्री सत्य साई इंस्टीट्यूट ऑफ हाइयर लर्निंग (SSSIHL), प्रशांति निलयम, पुट्टपर्थी भारत
- B.Sc – भौतिक विज्ञान (Hons), २००४, श्री सत्य साई इंस्टीट्यूट ऑफ हाइयर लर्निंग (SSSIHL) व्हाइटफील्ड, बेंगलुरु, भारत

प्राॅफेश्नल संगठन का सदस्य

आजीवन सदस्य, भारतीय विज्ञान काॅंग्रेस संगठन (ISCA)

प्रमुखताएँ

- १) अंततत्त्विका में ३६वा भारतीय वैज्ञानिक अभियान में सह-अन्वेषक के रूप में योगदान दिया तथा नवंबर २०१६ से फरवरी २०१७ तक अंटार्कटिक वायुमंडलीय सीमा परत एवं निम्नतर क्षोभमंडल की प्रायोगिक जांच में भाग लिया।

- २) साउथ वेस्ट ट्रोपिकल इंडियन ओशन क्रूज (अक्टूबर- नवम्बर २०११) में उप-मुख्य वैज्ञानिक के तौर में समुद्रीय सीमा परत के अनवेशन से जुड़े मापों में योगदान दिया। यह अभियान NCAOR Goa द्वारा ओकेयनिक रिसर्च वेससेल सागर कन्या में आयोजित किया गया था।
- ३) दो और जहाज पर आधारित समुद्रीय वायुमंडलीय सीमा परत की प्रयोगिक जांच से जुड़े अभियान में योगदान दिया जो भारतीय महासागर एवं बंगाल की खाड़ी में संचलित किए गए थे:
- ट्रोपिकल इंडियन ओशन क्रूज (जुलाई-अगस्त २०१०) एनसीएओआर, गोवा द्वारा आयोजित
 - CTCZ क्रूज - बंगाल की खाड़ी में विज्ञान एवं प्रद्यौगिकी मंत्रालय द्वारा आयोजित अभियान में योगदान दिया (जुलाई-अगस्त २००९)

Publications / प्रकाशनें

- अंतर्राष्ट्रीय जर्नल : ७
- कार्यवाही : ७
- राष्ट्रीय व अंतर-राष्ट्रीय सम्मेलनों में प्रस्तुतीकरण : १६

जनबल संबन्धित कार्यक्रम

- M.Sc विद्यार्थियों की परियोजना पर्यवेक्षक (०५ छात्र)
- NOBLE परियोजना से जुड़े भारत के विभिन्न प्रान्तों से आए रिसर्च श्रोलर्स के अनुस्थापन पाठ्यक्रम में व्याख्यान देना
- एसपीएल, वीएसएससी, इसरो में शामिल हुए नए रिसर्च श्रोलर्स के पाठ्यक्रम में व्याख्यान देना

प्रकाशनों की सूची

(क) अंतर राष्ट्रीय जर्नल

1. **Santosh, M.**, 2022a. Estimation of daytime planetary boundary layer height (PBLH) over the tropics and subtropics using COSMIC-2/FORMOSAT-7 GNSS-RO measurements. Atmospheric Research 279, 106361. <https://doi.org/10.1016/j.atmosres.2022.106361>
2. **Santosh, M.**, 2022b. Structure and development of the atmospheric boundary layer over a small island (Mahé Island, Seychelles) in the equatorial Indian Ocean. Meteorol Atmos Phys 134, 91. <https://doi.org/10.1007/s00703-022-00924-3>
3. Koushik, N., Kumar, K.K., Subrahmanyam, K.V., Ramkumar, G., Girach, I.A., **Santosh, M.**, Nalini, K., Nazeer, M., Shreedevi, P.R., 2019. Characterization of inertia gravity

waves and associated dynamics in the lower stratosphere over the Indian Antarctic station, Bharati (69.4°S, 76.2°E) during austral summers. *Clim Dyn* 53, 2887–2903. <https://doi.org/10.1007/s00382-019-04665-9>

4. Anurose, T.J., Subrahmanyam, D.B., Dutt, C.B.S., Kumar, N.V.P.K., John, S.R., Nair, S.K., **Santosh, M.**, Mohan, M., Kunhikrishnan, P.K., Sijikumar, S., Prijith, S.S., 2012. Vertical structure of sea-breeze circulation over Thumba (8.5°N, 76.9°E, India) in the winter months and a case study during W-ICARB field experiment. *Meteorol Atmos Phys* 115, 113–121. <https://doi.org/10.1007/s00703-011-0178-0>
5. Bala Subrahmanyam, D., Anurose, T.J., Mohan, M., **Santosh, M.**, Kiran Kumar, N.V.P., Sijikumar, S., 2012. Impact of Annular Solar Eclipse of 15 January 2010 on the Atmospheric Boundary Layer Characteristics Over Thumba: A Case Study. *Pure Appl. Geophys.* 169, 741–753. <https://doi.org/10.1007/s00024-011-0336-9>
6. Bala Subrahmanyam, D., Anurose, T.J., Mohan, M., **Santosh, M.**, Kiran Kumar, N.V.P., Sijikumar, S., Prijith, S.S., Aloysius, M., 2011. Atmospheric Surface-Layer Response to the Annular Solar Eclipse of 15 January 2010 over Thiruvananthapuram, India. *Boundary-Layer Meteorol* 141, 325–332. <https://doi.org/10.1007/s10546-011-9627-z>
7. KiranKumar, N.V.P., Purushothaman, N., **Santosh, M.**, 2013. Response of spectral characteristics of wind and temperature of atmospheric surface layer to the noontime annular solar eclipse. *Journal of Atmospheric and Solar-Terrestrial Physics* 97, 91–98. <https://doi.org/10.1016/j.jastp.2013.02.017>
8. Nair, S.K., Anurose, T.J., Subrahmanyam, D.B., Kumar, N.V.P.K., **Santosh, M.**, Sijikumar, S., Mohan, M., Namboodiri, K.V.S., 2011. Characterization of the Vertical Structure of Coastal Atmospheric Boundary Layer over Thumba () during Different Seasons. *Advances in Meteorology* 2011, 1–9. <https://doi.org/10.1155/2011/390826>
9. Nair, S.K., Prabha, T.V., Purushothaman, N., Sijikumar, S., **Muralidharan, S.**, Kirankumar, N.V.P., Subrahmanyam, D.B., Anurose, T.J., Prijith, S.S., Namboodiri, K.V.S., 2015. Diurnal variations of the low-level jet over peninsular India during the onset of Asian summer monsoon. *Theor Appl Climatol* 120, 287–298. <https://doi.org/10.1007/s00704-014-1168-1>

(ब) कार्यवाही/पुस्तक

- १) **M.Santosh** and K.Rajeev, “Improved estimation of atmospheric boundary layer height from simulations of atmospheric refractivity over the tropical oceans - a study using DYNAMO-2011 radiosonde data”, International Conference on Climate Change and Disaster Management, Thiruvananthapuram, India, Feb 26-28, 2015.
- २) **M. Santosh**, S.S. Prijith, and N.V.P. Kirankumar, “MABL and Upper Air Observations using GPS sonde ascents during CTCZ campaign over Northern Bay of Bengal”, Workshop

on Continental Tropical Convergence Zone (CTCZ)-Initial Results organised by DST at IITM Pune on 29-30 April 2010

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