

डॉ. सिद्धार्थ शंकर दास

वैज्ञानिक-एसएफ

अंतरिक्ष भौतिकी प्रयोगशाला (एसपीएल)

विक्रम साराभाई अंतरिक्ष केंद्र (वीएसएससी)

भारतीय अंतरिक्ष अनुसंधान संगठन (इसरो)

अंतरिक्ष विभाग, सरकार भारत, तिरुवनंतपुरम-695022, भारत

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अनुसंधान क्षेत्र: मूल भाग : वायुमंडलीय गतिशीलता

वैज्ञानिक : ट्रोपोपॉज़ गतिकी, समताप मंडल-क्षोभमंडल परस्पर क्रिया, समताप मंडल जल वाष्प और ओजोन रसायन, ऊष्णकटिबंधी चक्रवात, वायुमंडलीय अशांति, वायुमंडलीय तरंग और दोलन, वायुमंडलीय परिसंचरण, रडार रिमोट सेंसिंग, पवन संसाधन आकलन.

तकनीकी और डाटा प्रोसेसिंग : रडार और सैटेलाइट रिमोट सेंसिंग (एमएसटी/एसटी रडार, डीडब्ल्यूआर, एमडब्ल्यूआर, एलएडब्ल्यूपी, सोडार, कॉस्मिक, इनसैट, एमएलएस, एयर्स, सेबर), वीएचएफ रडार के प्रयोग और डिजाइनिंग, रॉकेट परिज्ञापी प्रयोग

शैक्षणिक योग्यता

डिग्री	वर्ष	विवरण
• पी एचडी	2006	भौतिक विज्ञान (वायुमंडलीय विज्ञान में विशेषज्ञता) शोध का शीर्षक : "Studies on the characteristics of stable and turbulent layers using UHF/VHF radars and in-situ balloon measurements". अनुसंधान केंद्र: राष्ट्रीय वायुमंडलीय अनुसंधान प्रयोगशाला, गडंकी. विश्वविद्यालय: श्री वेंकटेश्वर विश्वविद्यालय, तिरुपति, AP, India. थीसिस : http://hdl.handle.net/10603/74451 थीसिस सलाहकार : डॉ। आत्मा राम जैन (पूर्व निदेशक, एनएआरएल / डीओएस) & प्रो डी नारायण राव (पूर्व निदेशक, एनएआरएल / डीओएस, और प्रो वाइस चांसलर, एसआरएम यूनिवर्सिटी).
• एम.एससी.	2002	भौतिक विज्ञान (डिजिटल और संचार इलेक्ट्रॉनिक्स में विशेषज्ञता), गुरु घासीदास विश्वविद्यालय, बिलासपुर, भारत
• बी.एससी	1998	भौतिकी, रसायन विज्ञान, गणित। गुरु घासीदास विश्वविद्यालय, बिलासपुर, भारत।

अतिरिक्त योग्यता

डिप्लोमा	वर्ष	विवरण
• वास्प इंजीनियरिंग में सर्टिफिकेट	2007	डेनमार्क तकनीकी विश्वविद्यालय, डेनमार्क
• आईएसओ 9001:2000 प्रमाणपत्र	2007	आईएसओ ऑडिटिंग। Det Norske Veritas, चेन्नई
• एप्लाइड पैथोलॉजी में डिप्लोमा	1999	गुरु घासीदास विश्वविद्यालय, बिलासपुर
• संगीत विसराड-II (डिप्लोमा)	1995	इंदिरा कला संगीत विश्वविद्यालय, खैरागढ़

प्रोफेशनल बैकग्राउंड

पद	समयांतराल	संस्थान
• वैज्ञानिक-एसएफ	2018- Cont.	अंतरिक्ष भौतिकी प्रयोगशाला, वीएसएससी, तिरुवनंतपुरम
• वैज्ञानिक -एसई	2013-2017	'ऊपरोक्त अनुसार
• वैज्ञानिक - एसडी	2008-2013	'ऊपरोक्त अनुसार
• वैज्ञानिक बी	2005-2008	राष्ट्रीय पवन ऊर्जा संस्थान
• सीनियर सर्चफैलो	2000-2002	राष्ट्रीय वायुमंडलीय अनुसंधान प्रयोगशाला, गडंकी
• विजिटिंग रिसर्च फेलो	2002-2005	'ऊपरोक्त अनुसार,

पुरस्कार/सम्मान/स्वीकरण/अभिनंदन

- भारतीय राष्ट्रीय विज्ञान अकादमी (INSA) द्वारा युवा वैज्ञानिक के लिए INSA पदक - 2012
 - लेक्ट्रॉनिक्स और दूरसंचार इंजीनियर्स संस्थान द्वारा IETE यंग साइंटिस्ट अवार्ड-2012
 - भारतीय मौसम विज्ञान सोसायटी द्वारा उष्णकटिबंधीय मौसम विज्ञान-2018 पर आईएमएस युवा वैज्ञानिक पुरस्कार
 - यूआरएसआई एशिया-पैसिफिक रेडियो साइंस, जापान द्वारा एपी-आरएससी यूआरएसआई यंग साइंटिस्ट अवार्ड-2010
 - इंटरनेशनल यूनिन ऑफ रेडियो द्वारा यूआरएसआई यंग साइंटिस्ट अवार्ड-2005
- विज्ञान
- एमएससी के लिए विश्वविद्यालय रैंक प्रमाण पत्र। गुरु घासीदास विश्वविद्यालय द्वारा रैंक -2000
 - भारतीय उष्णकटिबंधीय मौसम विज्ञान संस्थान द्वारा OCHAMP बेस्ट पेपर अवार्ड-2012 (सह-लेखक)
 - भारतीय विज्ञान संस्थान द्वारा TWAS बेस्ट पेपर अवार्ड-2016
 - विक्रम साराभाई अंतरिक्ष केंद्र द्वारा तकनीकी हिंदी संगोष्ठी-2016 में प्रथम पुरस्कार
 - विक्रम साराभाई अंतरिक्ष केंद्र द्वारा तकनीकी हिंदी संगोष्ठी-2017 में तीसरा मूल्य
 - अंतरिक्ष अनुप्रयोग केंद्र द्वारा तकनीकी संगोष्ठी-2002 के लिए पुरस्कार
 - इसरो डॉक्टरेट अनुसंधान फेलोशिप

प्रधान अन्वेषक (पीआई) और सह-पीआई

- भारतीय पवन एटलस (2007-10), नवीन और नवीकरणीय ऊर्जा मंत्रालय
- फोर्सिंग एंड रिस्पांस (सफर) (2010-12), डॉस / एनएआरएल
- समताप मंडल-क्षोभमंडल विनिमय - चक्रवात (STE-C) (2010-13), ISRO / CAUSES-II
- वायुमंडलीय संवहन प्रयोग (आरओएनएसी), इसरो का पुनर्गठन
- सूर्यग्रहण-२०१० कुंडलाकार सूर्य ग्रहण, इसरो पर
- वलयकार सूर्य ग्रहण, इसरो पर सूर्यग्रह-2019
- ट्रॉपिकल साइक्लोन मोशन (DynTCM) (2017-जारी) की गतिशीलता,

फील्ड अभियानों में भागीदारी

- ट्रॉपिकल ट्रोपोपॉज डायनेमिक्स एक्सपेरिमेंट (TTD) (2011-2015), ISRO
- मानसून ट्रैकिंग प्रयोग (मॉन्टरेक्स) -2016, इसरो

प्रमुख अतिरिक्त जिम्मेदारियां

- सदस्य, एसपीएल अकादमिक समिति
- सदस्य, कोचीन विज्ञान और प्रौद्योगिकी विश्वविद्यालय के लिए अनुसंधान समिति

-
- फोकल प्वाइंट, एसपीएल पुस्तकालय और प्रलेखन
 - सदस्य, शार वीएचएफ रडार (बालासोर) को अंतिम रूप देने के लिए विशेषज्ञ समिति
 - टास्क टीम सदस्य, एसपीएल लिडार
 - टास्क टीम सदस्य, एसपीएल वीएचएफ रडार
 - सदस्य, डॉक्टरेट समिति, एसआरएम विश्वविद्यालय, चेन्नई
 - सदस्य, एसपीएल इंटरनेट / इंटरनेट वेबसाइट (जनवरी 2021 तक)
 - अंतर्राष्ट्रीय पत्रिकाओं के समीक्षक: GRL, JGR, RS, CD, JASTP, ACP, AMT, MAP, ASR, IEEE, AG, ESS, JESS, IJRSP, JAMC
-

प्रोफेशनल बोर्डिंग में अधेतावृत्ति

-
- फेलो, द सोसाइटी ऑफ अर्थ साइंटिस्ट-इंडिया
 - आजीवन सदस्य, भारतीय मौसम विज्ञान सोसायटी (आईएमएस)
 - आजीवन सदस्य, इसरो अंतरिक्ष वैज्ञानिक संघ (आईएसएसए)
 - आजीवन सदस्य, केरल विज्ञान अकादमी
 - सदस्य, अंतर्राष्ट्रीय रेडियो विज्ञान संघ (URSI)
 - सदस्य, भारतीय रेडियो विज्ञान सोसायटी
 - एसोसिएट सदस्य, अंतरिक्ष अनुसंधान समिति (COSPAR)
 - सदस्य, भारतीय विज्ञान कांग्रेस
-

सम्मेलनों/संगोष्ठियों/कार्यशालाओं का आयोजन

-
- राष्ट्रीय अंतरिक्ष विज्ञान संगोष्ठी 2016
 - ट्रॉपिकल ट्रोपोपॉज़ डायनेमिक्स वर्कशॉप
-

अनुसंधान मार्गदर्शन

पीएचडी (3)

- **के वी सुनीति** (2019): शीर्षक: Studies on the variability of tropical tropopause and its implication in stratosphere-troposphere exchange, कोचीन विज्ञान और प्रौद्योगिकी विश्वविद्यालय द्वारा प्रदान की गई डिग्री
- **वीनस वेणुगोपाल** (चल रही है): केरल विश्वविद्यालय में पंजीकृत
- **नबरुन पोद्दार** (चल रही है)

एम.फिल (3)

- **बिनीशा, वी.एन.** (2014), A comprehensive study on intercomparison of the global reanalysis data sets with radiosonde and rocket sounding in the tropical atmosphere, Manonmaniam Sundararaman University.
- **सुहेला, एस.** (2011), Seasonal characteristics of Kelvin-waves in the Mesosphere and Lower Thermosphere (MLT) over an equatorial station Thumba using Meteor wind Radar, University of Kerala.
- **अनु कृष्णा पी.जी.** (2011) Stratosphere-Troposphere Exchange in the tropical and subtropical regions, University of Kerala.

एमएससी/बीएससी/बीटेक (8)

-
- **जूनिडा एस.** (2022), A study on the long-term trend in stratospheric water vapour over the Asian Summer Monsoon region, University of Kerala.
 - **आर्य एस.** (2021), Study on the impact of COVID-19 lockdown on the upper tropospheric ozone over Indian region, Kannur University.
 - **शिल्पा के.** (2019), Study on the influence of Tropical cyclone-Phailin on the humidity distribution over the Indian region, University of Kerala.
 - **शिल्पा के.** (2017), Study on diurnal variability of temperature over India using INSAT-3DR satellite measurements, Kerala University.
 - **अपर्णा, डी. पी** (2016), Seasonal characteristics of water vapour in the middle atmosphere over the equatorial station Thumba, University of Calicut.
 - **निखिल, ए.सी.** (2015), A detailed study on wind energy resource assessment in and around Thumba Equatorial Rocket Launching Station (TERLS) using tower observations, University of Calicut.
 - **शिहाबुधिन, के.** (2015), A detailed study on wind power production in and around Vizhinjam Port, Trivandrum using tower observations, University of Calicut.
 - **समीर और गौतम, वी.के.** (2009), Study on the Thermal Structure of Middle Atmosphere using SABER/TIMED, Indian Institute of Space Science and Technology, Trivandrum.

अकादमिक (INSA / NASI / IAS) ग्रीष्मकालीन फेलोशिप (3)

- **नायर रोग** (2018), Study on the three dimensional structure of winds and precipitation during Cyclone "Ockhi, University of Hyderabad.
- **शिबाशी गुरु** (2016), Thermal structure of the Martian atmosphere, Ravenshaw University.
- **गिरीश, वी.** (2013), Study of cyclone generated short-period gravity waves and tidal oscillation in the mesosphere and lower thermosphere (MLT) region using SKiYMET meteor wind radar, Anna University.

विशिष्ट वैज्ञानिक/तकनीकी योगदान

- Detection of tropopause height using Indian MST Radar (RS)
 - Isotropic and anisotropic turbulence associated with convective systems (JGR)
 - Stratospheric ozone intrusion during the passage of tropical cyclone (GRL, QJRMS, ACP, AR)
 - Diurnal variability of global tropical tropopause (CD)
 - First observation of Quasi-120 days oscillation in the mesosphere (RS)
 - Role of QBO, ENSO and BDC on stratospheric water vapour (CD, JASTP)
 - Zonal asymmetry of tropical tropopause (CD)
 - Effect of aerosol on precipitation during the passage of tropical cyclone (AR)
 - Ozone climatology over India (CD)
 - Assessment of reanalysis winds over the Indian region (ACP)
 - Long and short periods convective generated gravity waves (RS, JASTP)
 - Designing of antenna array for Thumba VHF Radar (SPL Report)
 - First Indian Wind Atlas (Govt. of India)
-

Dr. Siddarth Shankar Das

Scientist- SF

Space Physics Laboratory (SPL)

Vikram Sarabhai Space Centre (VSSC)

Indian Space Research Organisation (ISRO)

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Research Area: Core area : Atmospheric dynamics

Scientific : Tropopause dynamics, Stratosphere-Troposphere interactions, stratospheric water vapour and ozone chemistry, Tropical cyclones, Atmospheric turbulence, atmospheric wave and oscillation, atmospheric circulation, Radar remote sensing, wind Resource Assessments.

Technical and data processing : Radar and satellite remote sensing (MST/ST radar, DWR, MWR, LAWP, SODAR, COSMIC, INSAT, MLS, AIRS, SABER), experiments and designing of VHF radar, rocket sounding experiments

Academic Qualification

Degree	Year	Details
• Ph.D.	2006	Physics (specialization in Atmospheric Science) Thesis Title: "Studies on the characteristics of stable and turbulent layers using UHF/VHF radars and in-situ balloon measurements". Research centre : National Atmospheric Research Laboratory, Gadanki, AP, India University : Sri Venkateshwara University, Tirupati, AP, India. Thesis: http://hdl.handle.net/10603/74451 Thesis advisors : Dr. Atma Ram Jain (Former Director, NARL/DoS) & Prof. D. Narayana Rao (Former Director, NARL/DoS, and Pro Vice Chancellor, SRM University).
• M. Sc.	2002	Physics (Specialization in Digital and Communication Electronics), Guru Ghasidas University, Bilaspur, India.
• B. Sc.	1998	Physics, Chemistry, Mathematics, Guru Ghasidas University, Bilaspur, India.

Additional Qualification

Diploma	Year	Details
• Certificate in WASP Engineering	2007	Denmark Technical University, Denmark
• ISO 9001:2000 Certificate	2007	ISO Auditing. Det Norske Veritas (DNV), Chennai
• Diploma in Applied Pathology	1999	Guru Ghasidas University, Bilaspur
• Sangeet Visarad-II (Diploma)	1995	Indira Kala Sangit Vishwavidyalaya, Khairagarh

Professional Background

Designation	Duration	Institution
• Scientist-SF	2018– Cont.	Space Physics Laboratory, VSSC, Thiruvananthapuram
• Scientist-SE	2013-2017	'As above'
• Scientist-SD	2008-2013	'As above'
• Scientist B	2005-2008	National Institute of Wind Energy, Chennai
• Sr. Research Fellow	2000-2002	National Atmospheric Research Laboratory, Gadanki
• Visiting Research Fellow	2002-2005	'As above'

Awards/Honors/Recognitions/Acclamations

-
- **INSA Medal for Young Scientist - 2012** by the Indian National Science Academy (INSA)
 - **IETE Young Scientist Award-2012** by The Institution of Electronics and Telecommunication Engineers
 - **IMS Young Scientist Award on Tropical Meteorology-2018** by Indian Meteorological Society
 - **AP-RASC URSI Young Scientist Award-2010** by URSI Asia-Pacific Radio Science, Japan
 - **URSI Young Scientist Award-2005** by International Union of Radio Science
 - **University Rank Certificate** for M.Sc. Rank-2000 by Guru Ghasidas University
 - **OCHAMP Best Paper Award-2012** (Co-authored) by Indian Institute of Tropical Meteorology
 - **TWAS Best paper Award-2016** by Indian Institute of Science
 - **First prize** in technical Hindi Seminar-2016 by Vikram Sarabhai Space Centre
 - **Third Price** in technical Hindi Seminar-2017 by Vikram Sarabhai Space Centre
 - **Award** for Technical Seminar-2002 by Space Application Centre
 - ISRO Doctoral Research Fellowship
-

Principal Investigator (PI) & Co-PI

-
- Indian Wind Atlas (2007-10), Ministry of New and Renewable Energy
 - Study of Atmospheric Forcing and Response (SAFAR) (2010-12), DOS/NARL
 - Stratosphere-Troposphere Exchange – Cyclone (STE-C) (2010-13), ISRO/CAWSES-II
 - Re-Organisation of Atmospheric Convection Experiment (RONAC), ISRO
 - Suryagrahan-2010 on Annular Solar Eclipse, ISRO
 - Suryagrahan-2019 on Annular Solar Eclipse, ISRO
 - Dynamics of Tropical Cyclone Motion (DynTCM) (2017-Cont.),
Participation in Field Campaigns
 - Tropical Tropopause Dynamics Experiment (TTD) (2011-2015), ISRO
 - MONsoon TRacking Experiment (MONTREX) -2016, ISRO
-

Major additional responsibilities

-
- **Member**, SPL Academic Committee
 - **Member**, Research Committee for Cochin University of Science and Technology
 - **Focal Point**, SPL Library and Documentation
 - **Member**, Expert Committee for finalizing SHAR VHF radar (Balasore)
 - **Task team Member**, SPL Lidar
 - **Task team Member**, SPL VHF radar
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- **Member**, Doctoral Committee, SRM University, Chennai
 - **Member**, SPL Intranet/Internet Website (till January 2021)
 - **Reviewer of International journals**: GRL, JGR, RS, CD, JASTP, ACP, AMT, MAP, ASR, IEEE, AG, ESS, JESS, IJRSP, JAMC, AR
-

Fellowship/Membership in professional bodies

- Fellow, The Society of Earth Scientist-India
 - Life member, Indian Meteorological Society (IMS)
 - Life member, ISRO Space Scientist Association (ISSA)
 - Life member, Kerala Academy of Sciences
 - Member, International Union of Radio Science (URSI)
 - Member, Indian Radio Science Society
 - Associate member, Committee on Space Research (COSPAR)
 - Member, Indian Science Congress
-

Organization of Conferences/Symposia/workshop

- National Space Science Symposium 2016
 - Tropical Tropopause Dynamics workshop
-

Research Guidance

PhD (3)

- **K. V. Suneeth** (2019): Title : Studies on the variability of tropical tropopause and its implication in stratosphere-troposphere exchange, Degree awarded by Cochin University of Science and Technology.
- **Veenus Venugopal** (Ongoing) : Registered at University of Kerala.
- **Nabarun Poddar** (Ongoing)

M.Phil (3)

- **Bineesha,V.N.** (2014), A comprehensive study on intercomparison of the global reanalysis data sets with radiosonde and rocket sounding in the tropical atmosphere, Manonmaniam Sunngaranar University.
- **Suheela, S.** (2011), Seasonal characteristics of Kelvin-waves in the Mesosphere and Lower Thermosphere (MLT) over an equatorial station Thumba using Meteor wind Radar, University of Kerala.
- **Anu Krishna P.G.** (2011), Stratosphere-Troposphere Exchange in the tropical and subtropical regions, University of Kerala.

M.Sc./B.Sc./B.Tech. (8)

- **Junida S.** (2022), A study on the long-term trend in stratospheric water vapour over the Asian Summer Monsoon region, University of Kerala.
 - **Arya S.** (2021), Study on the impact of COVID-19 lockdown on the upper tropospheric ozone over Indian region, Kannur University.
 - **Shilpa K.** (2019), Study on the influence of Tropical cyclone-Phailin on the humidity
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distribution over the Indian region, University of Kerala.

- **Jubie Raju** (2017), Study on diurnal variability of temperature over India using INSAT-3DR satellite measurements, Kerala University.
- **Aparna, D. P** (2016), Seasonal characteristics of water vapour in the middle atmosphere over the equatorial station Thumba, University of Calicut.
- **Nikhil, A.C.** (2015), A detailed study on wind energy resource assessment in and around Thumba Equatorial Rocket Launching Station (TERLS) using tower observations, University of Calicut.
- **Shihabudheen, K.** (2015), A detailed study on wind power production in and around Vizhinjam Port, Trivandrum using tower observations, University of Calicut.
- **Sameer and Gautam, V.K.** (2009), Study on the Thermal Structure of Middle Atmosphere using SABER/TIMED, Indian Institute of Space Science and Technology, Trivandrum.

Academic (INSA/NASI/IAS) Summer Fellowship (3)

- **Arun Nair** (2018), Study on the three dimensional structure of winds and precipitation during Cyclone "Ockhi, University of Hyderabad.
 - **Shibashis Guru** (2016), Thermal structure of the Martian atmosphere, Ravenshaw University.
 - **Girish, V.** (2013), Study of cyclone generated short-period gravity waves and tidal oscillation in the mesosphere and lower thermosphere (MLT) region using SKiYMET meteor wind radar, Anna University.
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Specific Scientific/Technical contributions

- Detection of tropopause height using Indian MST Radar (RS)
 - Isotropic and anisotropic turbulence associated with convective systems (JGR)
 - Stratospheric ozone intrusion during the passage of tropical cyclone (GRL, QJRMS, ACP, AR)
 - Diurnal variability of global tropical tropopause (CD)
 - **First observation** of Quasi-120 days oscillation in the mesosphere (RS)
 - Role of QBO, ENSO and BDC on stratospheric water vapour (CD, JASTP)
 - Zonal asymmetry of tropical tropopause (CD)
 - Effect of aerosol on precipitation during the passage of tropical cyclone (AR)
 - Ozone climatology over India (CD)
 - Assessment of reanalysis winds over the Indian region (ACP)
 - Long and short periods convective generated gravity waves (RS, JASTP)
 - Designing of antenna array for Thumba VHF Radar (SPL Report)
 - **First Indian Wind Atlas** (Govt. of India)
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1. Veenus, V., **S. S. Das**, and L. M. David (2023), Ozone changes due to sudden stratospheric warming-induced variations in the intensity of Brewer-Dobson Circulation: A composite analysis using observations and chemical-transport model, *Geophysical Research Letters*, 50, e2023GL103353, <https://doi.org/10.1029/2023GL103353>.
2. **Das, S.S.**, K. N. Uma, K. V. Suneeth and V. Veenus (2022), Diurnal variability of lower and middle atmospheric water vapour over the Asian summer monsoon region: first results from COSMIC-1 and TIMED-SABER measurements, *Climate Dynamics*, doi: 10.1007/s00382-022-06282-5.
3. **Das, S.S.**, M.Venkat Ratnam, M. Durga Rao, and K.N.Uma (2022), Volume imaging of aspect sensitivity in VHF radar backscatters: First results inferred from the Advanced Indian MST radar (AIR), *International Journal of Remote Sensing*, 4517-4540, 43 (12), doi : 10.1080/01431161.2022.2111667.
4. Veenus, V., **S. S. Das**, Bukya Sama, and K. N. Uma (2022), A comparison of temperature and relative humidity measurements derived from COSMIC-2 radio occultations with radiosonde observations made over the Asian summer monsoon region, *Remote Sensing Letters*, 13 (4), 394–405, doi:10.1080/2150704X.2022.2033345.
5. Uma, K N., **S. S. Das**, and Bukya Sama (2022), Evaluation of the relation between the convection and the upper tropospheric humidity: A perspective from Indian Geostationary satellite 'Kalpana-1' observations, *Journal of Atmospheric and Solar-Terrestrial Physics*, 232, 105866, doi:10.1016/j.jastp.2022.105866.
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7. Uma, K. N., **S. S. Das**, M.V.Ratnam, and K.V. Suneeth (2021), Assessment of vertical air motion among reanalyses and qualitative comparison with direct VHF radar measurements over the two tropical stations, *Atmospheric Chemistry and Physics*, 21, 2083-2103, <https://doi.org/10.5194/acp-21-2083-2021>
8. **Das, S.S.**, G. Ramkumar, N. Koushik, D. J. Murphy, I. A. Girach, K. V. Suneeth, K.V. Subrahmanyam, V. K. Soni, Vivek Kumar, and M. Nazeer (2020), Multiplatform observations of stratosphere-troposphere exchange over the Bharati (69.41°S, 76°E), Antarctica during ISEA-35, *Journal of Atmospheric and Solar-Terrestrial Physics*, 211, 105455, <https://doi.org/10.1016/j.jastp.2020.105455>
9. **Das, S.S.**, K. V. Suneeth, M. V. Ratnam, K. N. Uma, M. D. Rao, and A. N. Babu (2020), Long-term observations of stratosphere-troposphere exchange using MST Radar and Aura MLS measurements over a tropical station Gadanki, *Radio Science*, 55(6), e2019RS006969, <https://doi.org/10.1029/2019RS006969>
10. Suneeth, K.V., **S. S. Das** (2020), Zonally resolved water vapour coupling with tropical tropopause temperature: Seasonal and interannual variability, and influence of the Walker

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