Ajil Kottayil

Curriculum vitae

Personal information

Date of Birth	1980-11-27
Place of Birth	Kerala, India
Nationality	INDIA

Education

PhD

Date	2013-05-30
Title	Representation and Diurnal Variation of Upper Tropospheric Humidity in Observations and Models
Supervisor	Prof. Dr. Stefan A. Buehler, Meteorological Institute, University of Hamburg, Hamburg, Germany
Opponent	Prof. Dr. B. J. Sohn, School of Earth and Environmental Science, Seoul National University, Seoul
Description	One of the most important roles of water vapor is in the upper troposphere where despite its low concentration it amplifies the radiative forcing due to increasing CO 2 concentrations. Understanding the variability and distribution is thus important from a climate point of view. My PhD was on studying the distribution and the diurnal variations of upper tropospheric humidity in climate models and satellite observations with the main aim of creating a climate quality dataset. Satellite observations of infrared and microwave were used.

PhD studies

2008/12–2013/05	**PhD in Space Technology / Atmospheric Remote Sensing**, *Lulea University of Technology, Kiruna, Sweden*.
2008/12–2012/05	**Licentiate of Engg in Space Technology**, *Lulea University of Technology, Kiruna, Sweden*.

Graduation and post-graduation

2002–2004	**Msc**, *Mahatma Gandhi University, Kerala, INDIA, Masters in Physics*.
1999–2001	**Bsc**, *Mahatma Gandhi University, Kerala, INDIA, Bachelors in Physics Minored in Mathematics and Electronics*.

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Research interests

The area of my PhD research was on the study of distribution and diurnal variation of upper tropospheric humidity in microwave observations and climate models. A short summary of my research interests are as follows:

- Infrared and Microwave remote sensing of Earth's atmosphere
- Radiative transfer modeling
- Inversion algorithms
- Quality assessment of radiosonde upper tropospheric humidity measurements
- Diurnal cycle of tropospheric humidity in observations and models
- Orbital drift error correction on NOAA and MetOp-A satellite microwave humidity measurements
- Inter-satellite calibration on microwave humidity measurements
- Satellite humidity data homogenization for climate applications
- Radar wind profiler data for monsoon studies, atmospheric waves, turbulence, structure and dynamics of tropical tropopause
- Understanding the convective sources of air at tropopause region using Lagrangian back trajectory modelling

Experience

Research

2019/12-present **Scientist–C**, *Advanced Centre for Atmospheric Radar Research (ACARR), Cochin University of Science and Technology, Kerala, India*.

2015/05–2019/11 **Research Scientist**, *Advanced Centre for Atmospheric Radar Research (ACARR), Cochin University of Science and Technology, Kerala, India*, Research focusing on the use of radar wind profiler data for studying atmospheric turbulence, Atmospheric waves, cloud micro-physical properties and characteristics of the Indian summer monsoon. Hands-on experience on radar signal processing.

2019/05–2019/06 **Visiting Scientist**, *LMD, France, Paris*, Simulations using Lagrangian back trajectory analysis model to understand the convective sources of cirrus clouds over the Asian summer monsoon region.

2013-(06-09) **Researcher**, *Luleå University of Technology, Kiruna, Sweden*.

2012-(03-04) **Visiting Scientist**, *UK Met office, Exeter, UK*.

2006–2008) **Junior Research Fellow**, *Space Application Centre, Indian Space Research Organization (ISRO)*, Development of retrieval algorithm for temperature and humidity profile from infrared sounder on INSAT-3D, which is currently operational.

Teaching

2011 **Course Assistant**, *Luleå University of Technology, Kiruna, Sweden*, Chairing tutorials and grading exercises.

2011–2012 **Laboratory teaching: Spectrometry**, *Luleå University of Technology, Kiruna, Sweden*, Overseeing and grading student lab reports.

Paper review

2011– **Peer reviewer of journals**, *Journals: IEEE-Geoscience and Remote Sensing, IEEE Trans. Systems, Man, Cybernetics:Systems, Remote Sensing of Environment, Advances in Space Research, Geographical Research, Atmospheric Measurement Techniques, Atmosphere-Ocean, journal of solar terrestrial and atmospheric physics, Meteorological Applications, GRL*.

Project:Principal investigator

Project 1

Starting date 2022-11-01

Title Variability of the upper-level ASIAN monsoon anticyclone and mechanisms of its coupling with tropospheric monsoon convection

Funding agency Indo-French Centre for the Promotion of Advanced Research-CEFIPRA

Collaborative Institutions Cochin University of Science and Technology & LMD France

Project 2

Starting date 2021, July–2022, July

Title Validation of Aeolus wind profiles over a tropical region using Stratosphere-Troposphere wind profiler radar, Radiosonde and High-resolution regional model outputs

Agency European Space Agency

Project:Co-Principal investigator

Project 1

Starting date 2016-11-01

Title Impact of the Indian Monsoon Convection on the Tropical tropopause layer and Climate

Funding agency Indo-French Centre for the Promotion of Advanced Research-CEFIPRA

Collaborative Institutions Cochin University of Science and Technology & LMD France

Project 2

Starting date 2016–2019

Title Diurnal Variation of Deep Convective Clouds over Indian Region and its Association with Monsoon Rainfall

Funding agency Science and Engineering Research Board, India

Key skills

Satellite data analyis Experienced using a large volume of satellite data for climate applications and satellite geophysical parameter retrieval

Modelling	Microwave and Infra-red radiative transfer modellin, Lagrangian back trajectory analysis and climate model evaluation
Radar	Radar wind profiler data processing and analysis
Programming	FORTRAN, MATLAB, C++, NCAR Command Language, Python
Computers	Experienced working in Linux and Microsoft environment
Others	Experienced working in Linux and Microsoft environment

Languages

Malayalam	Excellent
Hindi	Very good
English	Very good
Swedish	Basic

References

Reference 1

Prof. Dr. Stefan Buehler
University of Hamburg Meteorological Institute
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Reference 2

Dr. Viju Oommen John
Climate Product Evaluation Scientist
EUMETSAT, Darmstadt
Tele: +496151 807 7226
Email:vijuojohn@gmail.com

Publications

[1] K. S. Ajil, P. K. Thapliyal, M. V. Shukla, P. K. Pal, P. C. Joshi, and R. R. Navalgund. A new technique for temperature and humidity profile retrieval from infrared-sounder observations using the adaptive neuro-fuzzy inference system. *IEEE Transactions on Geoscience and Remote Sensing*, 48(4):1650–1659, April 2010.

[2] S. A. Buehler, V. O. John, A. Kottayil, M. Milz, and P. Eriksson. Efficient radiative transfer simulations for a broadband infrared radiometer—Combining a weighted mean of representative frequencies approach with frequency selection by simulated annealing. , 111:602–615, Mar 2010.

[3] F. Cairo, M. De Muro, M. Snels, L. Di Liberto, S. Bucci, B. Legras, A. Kottayil, A. Scoccione, and S. Ghisu. Lidar observations of cirrus clouds at palau island (7°33′ n, 134°48′ e). *Atmospheric Chemistry and Physic*, 2021:1–32, 2020.

[4] G. Holl, S. A. Buehler, J. Mendrok, and A. Kottayil. Optimised frequency grids for infrared radiative transfer simulations in cloudy conditions. , 113(16):2124–2134, Nov 2012.

[5] Viju O. John, Richard P. Allan, William Bell, Stefan A. Buehler, and Ajil Kottayil. Assessment of intercalibration methods for satellite microwave humidity sounders. *Journal of Geophysical Research (Atmospheres)*, 118(10):4906–4918, May 2013.

[6] Ajil Kottayil, Stefan A. Buehler, Viju O. John, Larry M. Miloshevich, M. Milz, and G. Holl. On the Importance of Vaisala RS92 Radiosonde Humidity Corrections for a Better Agreement between Measured and Modeled Satellite Radiances. *Journal of Atmospheric and Oceanic Technology*, 29(2):248–259, Feb 2012.

[7] Ajil Kottayil, Viju John, Stefan Buehler, and Kesavapillai Mohanakumar. Evaluating the Diurnal Cycle of Upper Tropospheric Humidity in Two Different Climate Models Using Satellite Observations. *Remote Sensing*, 8(4):325, Apr 2016.

[8] Ajil Kottayil, Viju O. John, and Stefan A. Buehler. Correcting diurnal cycle aliasing in satellite microwave humidity sounder measurements. *Journal of Geophysical Research (Atmospheres)*, 118(1):101–113, Jan 2013.

[9] Ajil Kottayil, K. Mohanakumar, Titu Samson, Rejoy Rebello, M. G. Manoj, Rakesh Varadarajan, K. R. Santosh, P. Mohanan, and K. Vasudevan. Validation of 205 MHz wind profiler radar located at Cochin, India, using radiosonde wind measurements. *Radio Science*, 51(3):106–117, Mar 2016.

[10] Ajil Kottayil, K Prajwal, M V Devika, S Abhilash, K Satheesan, Roshny Antony, Viju O. John, and K Mohanakumar. Assessing the quality of aeolus wind over a tropical location (10.04 n, 76.9 e) using 205 mhz wind profiler radar. *International Journal of Remote Sensing*, 43(9):3320–3335, 2022.

[11] Ajil Kottayil and K. Satheesan. Enhancement in the upper tropospheric humidity associated with aerosol loading over tropical Pacific. *Atmospheric Environment*, 122:148–153, Dec 2015.

[12] Ajil Kottayil, K. Satheesan, Viju O. John, and Roshny Antony. Diurnal variation of deep convective clouds over indian monsoon region and its association with rainfall. *Atmospheric Research*, 255:105540, 2021.

[13] Ajil Kottayil, Karathazhiyath Satheesan, Kesavapillai Mohankumar, Sivan Chandran, and Titu Samson. An investigation into the characteristics of inertia gravity waves in the upper troposphere/lower stratosphere using a 205 mhz wind profiling radar. *Remote Sensing Letters*, 9(3):284–293, 2018.

[14] Ajil Kottayil, Anu Xavier, Prince Xavier, Prajwal Koovekkallu, and Kesavapillai Mohanakumar. Evolution of large-scale factors influencing extreme rainfall over south western coast of india. *International Journal of Climatology*, 42(8):4164–4178, 2022.

[15] Ajil Kottayil, Prince Xavier, Karathazhiyath Satheesan, and Kesavapillai Mohankumar. Vertical Structure and Evolution of Monsoon Circulation as Observed by a 205 MHz Wind Profiler Radar. *Meteorology and Atmospheric Physics*, 2019.

[16] K. Mohanakumar, Ajil Kottayil, V. K. Anandan, Titu Samson, Linto Thomas, K. Satheesan, Rejoy Rebello, M. G. Manoj, Rakesh Varadarajan, K. R. Santosh, P. Mohanan, and K. Vasudevan. Technical details of a novel wind profiler radar at 205 mhz. *Journal of Atmospheric and Oceanic Technology*, 34(12):2659–2671, 2017.

[17] K. Mohanakumar, Titu Samson, Rejoy Rebello, M. G. Manoj, Ajil Kottayil, Rakesh Varadarajan, K. R. Santosh, P. Mohanan, and K. Vasudevan. A versatile 205 MHz stratosphere-troposphere radar at Cochin - scientific applications. *Current Science*, 114, June 2018.

[18] Suresh Narayanan, Ajil Kottayil, and K. Mohanakumar. Monsoon low-level jet over the gateway of indian summer monsoon: a comparative study for two distinct monsoon years. *Meteorology and Atmospheric Physics*, 128(6):689–696, Dec 2016.

[19] K. Nithya, Ajil Kottayil, and K. Mohanakumar. Determining the tropopause height from 205mhz stratosphere troposphere wind profiler radar and study the factors affecting its variability during monsoon. *Journal of Atmospheric and Solar-Terrestrial Physics*, 182:79 – 84, 2019.

[20] K. Prajwal, Ajil Kottayil, and Prince Xavier. Impact of madden julian oscillation on the diurnal cycle of precipitation over the west coast of india. *Atmospheric Research*, 278:106343, 2022.

[21] R. Remya, Ajil Kottayil, and K. Mohanakumar. Influence of sudden stratospheric warming and quasi biennial oscillation on western disturbance over north India. *Journal of Atmospheric and Solar-Terrestrial Physics*, 160:1–10, Jul 2017.

[22] Titu K. Samson, Ajil Kottayil, G. Manoj M., B. Binoy Babu, V. Rakesh, Rejoy Rebello, K. Vasudevan, P. Mohanan, R. Santosh K., and K. Mohankumar. Technical Aspects of 205 MHz VHF Mini Wind Profiler Radar for Tropospheric Probing. *IEEE Geoscience and Remote Sensing Letters*, 13(7):1027–1031, Jul 2016.

[23] C. Sivan, Ajil Kottayil, Bernard Legras, Silvia Bucci, K. Mohanakumar, and K. Satheesan. Tracing the convective sources of air at tropical tropopause during the active and break phases of Indian summer monsoon. *Climate Dynamics*, March 2022.

[24] S. P. Sujithlal, K. Satheesan, Ajil Kottayil, and K. Mohanakumar. Observation of stratosphere-troposphere exchange during a pre-monsoon thunderstorm activity over Kochi, India. *Meteorology and Atmospheric Physics*, 134(3):53, June 2022.

[25] Baazil P. Thampy, S. Shailesh, M. V. Judy, and Ajil Kottayil. A convolution neural network approach to Doppler spectra classification of 205 MHz radar. *Theoretical and Applied Climatology*, 149(3-4):1769–1783, August 2022.

[26] Pradeep K. Thapliyal, Munn V. Shukla, Shivani Shah, P. C. Joshi, P. K. Pal, and K. S. Ajil. An algorithm for the estimation of upper tropospheric humidity from Kalpana observations: Methodology and validation. *Journal of Geophysical Research (Atmospheres)*, 116(D1):D01108, Jan 2011.

[27] Anu Xavier, Ajil Kottayil, K. Mohanakumar, and Prince K. Xavier. The role of monsoon low-level jet in modulating heavy rainfall events. *International Journal of Climatology*, 38:e569–e576, Apr 2018.

Conference proceedings

P. K. Thapliyal ; M. Vinayak ; K. S. Ajil; S. Shah ; P. K. Pal ; P. C. Joshi; Estimation of upper tropospheric humidity from water vapour channel of very high-resolution radiometer onboard INSAT-3A and Kalpana satellites. Proc. SPIE 6408, Remote Sensing of the Atmosphere and Clouds, 640807 (November 28, 2006); doi:10.1117/12.693982.

Intercomparison of three microwave/infrared high resolution line-by-line radiative transfer codes Schreier, F. and Garcia, S. Gimeno and Milz, M. and Kottayil, A. and Höpfner, M. and von Clarmann, T. and Stiller, G., AIP Conference Proceedings, 1531, 119-122 (2013), DOI:http://dx.doi.org/10.1063/1.4804722.

PhD Thesis

Kottayil. A (2013), Representation and Diurnal Variation of Upper Tropospheric Humidity in Obser- vations and Models, Luleå University of Technology, Department of Computer Science, Electrical and Space Engineering Division of Space Technology, ISBN 978-91-7439-380-4 ISSN: 1402-1757. Weblink: http://pure.ltu.se/portal/en/publications/representation-and-diurnal-variation-of-upper-tropospheric-humidity- in-observations-and-models(7e681f63-3256-4930-b66d-793029ebc80c).html

Licentiate Thesis

Kottayil. A (2012), Satellite and Radiosonde Measurements of Atmospheric Humidity, Luleå University of Technology, Department of Computer Science, Electrical and Space Engineering Division of Space Technology, ISBN 978-91-7439-380-4 ISSN: 1402-1757. Weblink: http://pure.ltu.se/portal/en/publications/satellite-and-radiosonde-measurements-of-atmospheric-humidity(537832ae-e320-4544-be25-4d2820f2a16f).html

Conference contributions

2019 **StratoClim Final Meeting, Potsdam, Germany**, *Understanding the Sources and the Factors Behind the Variability of Cirrus Clouds over the Asian Summer Monsoon Region*.

2017 **The 15 International Workshop on Technical and Scientific Aspects of MST Radar, Tokyo, Japan during May 27-31, 2017**, *Inertia-Gravity Waves at Upper Tro- posphere/ Lower Stratosphere Region: An Observational Study from 205 MHz Wind Profiler Radar*.

2017 **INDIA CONFERENCE ON RADAR METEOROLOGY,kharagpur, India,**, *A Novel Wind Profiler Radar at 205 MHz: Technical and Scientific Aspects*.

2013 **EUMETSAT conference, Vienna, Austria**, *Characterization of SAPHIR data using collocated satellite observations*.

2013 **EUMETSAT conference, Vienna, Austria**, *Diurnal variability of tropical upper tropo- spheric humidity*.

2010 **EGU conference, Vienna, Austria**, *Validation of radiative transfer model ARTS through model inter-comparison and Radiosonde profiles: An overview for infrared fre- quency*.