

## Curriculum Vitae

Dr. Vinu K. Valsala,  
Scientist-F and Project Director,  
Development of Skilled Manpower in Earth System Sciences (DESK),  
Indian Institute of Tropical Meteorology (IITM),  
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### Educational background

PhD (2006), in Ocean and Atmospheric Sciences, Hokkaido University, Sapporo, Japan.

Thesis: Pathways and effects of Indonesian Throughflow water in the Indian Ocean: A model study using lagrangian trajectories and passive tracers.

Advisor: Prof. Ikeda Motoyoshi, EES, Hokkaido University, Japan.

M.Sc. (2002), in Physical Oceanography, Cochin University of Science and Technology, India.

Thesis: Application of Weibull model for significant wave height forecast and wave height statistics.

Advisor: Dr. Muraleedharan G.

B.Sc. (1999), in Physics, University of Kerala, Kerala, India.

### Positions held

- Scientist-F, 2020-Present, Project Director, Development of Skilled Manpower in Earth System Sciences (DESK), Indian Institute of Tropical Meteorology, Pune, India.
- Scientist-E, 2015-2020, Project Director, Development of Skilled Manpower in Earth System Sciences (DESK), Indian Institute of Tropical Meteorology, Pune, India.
- Scientist-D, 2011-2015, Center for Advanced Training in Earth System Science and Climate (CAT-ESSC), Indian Institute of Tropical Meteorology, Pune, India.
- NIES Postdoctoral fellow, 2009-2011, CGER, National Institute for Environmental Studies (NIES), Tsukuba, Japan.
- JSPS Postdoctoral fellow, 2007-2009, CGER, National Institute for Environmental Studies (NIES), Tsukuba, Japan.
- NIES Postdoctoral fellow, 2006-2007, CGER, National Institute for Environmental Studies (NIES), Tsukuba, Japan.
- Research Assistant (also PhD candidate), 2003-2006, Graduate School of Earth System Sciences, Hokkaido University, Sapporo, Japan.
- Project Assistant, 2002-2003, Center for Atmospheric and Oceanic Sciences, Indian Institute of Science, Bangalore, India.

## Awards and Honors

- Certificate of Merit Award, 2018, Ministry of Earth Sciences, India, for the outstanding contributions in the field of Atmospheric Sciences and Technology.
- Fellow of Indian National Young Academy of Sciences (IN-YAS), Indian National Science Academy (INSA), India. (2015-2020)
- JSPS Postdoctoral Fellow, 2007-2009, Japan: Prestigious award from the Japanese Society for the Promotion of Science for 2-year research in postdoctoral level.
- Center of Excellence (COE) Research Assistant Fellowship, 2003-2006, Earth System Sciences, Hokkaido University, Sapporo, Japan.
- Mitsubishi UFJ Trust Scholarship Foundation, Scholarships for selected PhD candidates, 2004-2006, Tokyo, Japan.
- Summer Fellowship Trainee award, 2001-Summer, National Academy of Science, Bangalore, India.
- Merit Scholarship Award for best Master course student, 1999-2002, CUSAT, Cochin, India.

## Research Interests

Oceanic Tracers, Ocean Carbon Cycle, Ocean Tracer Transport Modeling (**OTTM**), application of tracer techniques to detect interannual to interdecadal climate variability of ocean circulations, Numerical Ocean modeling, air-sea CO<sub>2</sub> flux and ocean pCO<sub>2</sub>, Biogeochemical modeling and data assimilation, Ocean-atmosphere interaction, Ocean Dynamic-Thermodynamic Model (**ODTM**), Pathways of water masses, Tropical Ocean dynamics, Ocean Modeling, Reduced gravity models, Tropical Indian Ocean climate variability and Indonesian Throughflow.

## Refereed Publications

### 2021

53. Halder, S., Tiwari, Y. K., **Valsala, V.**, Sreeush, M. G., Sijikumar, S., Janardanan, R., & Maksyutov, S. (2021). Quantification of enhancement in atmospheric CO<sub>2</sub> background due to Indian biospheric fluxes and fossil fuel emissions. *Journal of Geophysical Research: Atmospheres*, 126, e2021JD034545. <https://doi.org/10.1029/2021JD034545>
52. **Valsala V.**, M. G. Sreeush, M. Anju, S. Pentakota, Y. Tiwari, K. Chakraborty and S. Sijikumar (2021), An Observing System Simulation Experiment for Indian Ocean surface pCO<sub>2</sub> measurements, *Progress in Oceanography*, 194, doi.org/10.1016/j.pocean.2021.102570
51. Maksyutov, S., T. Oda, M. Saito, R., Janardanan, D. Belikov, J. W Kaiser, R. Zhuravlev, A. Ganshin, **V. Valsala**, A. Andrews, L. Chmura, E. Dlugokencky, L. Haszpra, R. L. Langenfelds, T. Machida, T. Nakazawa, M. Ramonet, C. Sweeney, D. Worthy A high-resolution inverse modelling technique for estimating surface CO<sub>2</sub> fluxes based on the NIES-TM-FLEXPART coupled transport model and its adjoint 2021 *Atmos. Chem. Phys.*, 21, 1245-1266

50. **Valsala, V.**, M. G. Sreeush, and K. Chakraborty, IOD impacts on Indian the Ocean Carbon Cycle, Journal of Geophysical Research, <https://doi.org/10.1029/2020JC016485>

## **2020**

49. Hamza F., **V. Valsala**, M. Anju and G. George, (2020), Climate impacts on the landings of oil sardine (*Sardinella longiceps*) over the south-eastern Arabian Sea, Fish and Fisheries, <https://doi/10.1111/faf>.

48. M. Anju, M. G. Sreeush, **V. Valsala**, B. R. Smitha, Faseela Hamza, G. Bharathi, C. V. Naidu, (2020), Understanding the role of nutrient limitation on plankton biomass over the Arabian Sea via 1-D coupled biogeochemical model and Bio-Argo observations, Journal of Geophysical Res., <https://doi.org/10.1029/2019JC015502>

47. Janardanan R., Maksyutov S., Tsuruta A., Wang F., Tiwari Y.K., **Valsala V.**, Ito A., Yoshida Y., Kaiser J.W., Janssens-Maenhout G., Arshinov M., Sasakawa M., Tohjima Y., Worthy D.E.J., Dlugokencky E.J., Ramonet M., Arduini J., Lavric J.V., Piacentino S., Krummel P.B., Langenfelds R.L., Mammarella I., Matsunaga T., Country-scale analysis of methane emissions with a high-resolution inverse model using GOSAT and surface observations, Remote Sensing, 12:375, February 2020, DOI:10.3390/rs12030375, 1-24

46. Praveen V., **V. Valsala**, R. S. Ajayamohan and S. Balasubramanian, (2019), Oceanic mixing over northern Arabian Sea in a warming scenario: Tug of 2 war between wind and buoyancy forces, Journal of Physical Oceanography, 50, 945–964, <https://doi.org/10.1175/JPO-D-19-0173.1>

45. Tiwari, Y. K., T. Guha, **V. Valsala**, A. S. Lopez, C. Cuevas, R. P. Fernandez, A. S. Mahajan, (2019), Understanding atmospheric methane sub-seasonal variability over India, Atmospheric Environment, (in press)

## **2019**

44. Singh, S., **V. Valsala**, A. G. Prajeesh, S. Balasubramanian, (2019). On the variability of Arabian Sea mixing and its energetics. Journal of Geophysical Research: Oceans,124. <https://doi.org/10.1029/2019JC015334>

43. Sreeush, M. G. **V. Valsala**, H. Santanu, S. Pentakota, K.V.S.R. Prasad, C.V. Naidu, R. Murtugudde, (2019) Biological production in the Indian Ocean upwelling zones - Part 2: Data based estimates of variable compensation depth for ocean carbon models via cyclo-stationary Bayesian Inversion., Deep Sea Research Part II, [doi.org/10.1016/j.dsr2.2019.07.007](https://doi.org/10.1016/j.dsr2.2019.07.007)

42. Nalini K., Sijikumar S., **Valsala V.**, Tiwari Y.K., Ramachandran R.(2019), Designing surface CO2 monitoring network to constrain the Indian land fluxes, Atmospheric Environment, [DOI:10.1016/j.atmosenv.2019.117003](https://doi.org/10.1016/j.atmosenv.2019.117003)

## **2018**

41. Sreeush M. G., R. Saran, **V. Valsala**, S. Pentakota, K.V. S.R. Prasad, R. Murtugudde (2018): Variability, trend and controlling factors of Ocean acidification over Western Arabian Sea upwelling region, Marine Chemistry, 2018, [doi.org/10.1016/j.marchem.2018.12.002](https://doi.org/10.1016/j.marchem.2018.12.002).

40. Singh S. and **V. Valsala**, (2018): Role of Subsurface ocean bias in coupled models in simulated interannual variability: A case study for Indian Ocean, Dynamics of Atmosphere and Ocean, [doi.org/10.1016/j.dynatmoce.2018.10.001](https://doi.org/10.1016/j.dynatmoce.2018.10.001)

39. Chakraborty, K., **V. Valsala**, G. V. M. Gupta and V. V. S. S. Sarma, (2018): Dominant biological control over upwelling on pCO<sub>2</sub> in sea east of Sri Lanka, *J. Geophysical Res.*, doi.org/10.1029/2018JG004446

38. **Valsala, V.**, Singh S., & Balasubramanian, S. (2018), A modeling study of interannual variability of Bay of Bengal Mixing and Barrier Layer Formation. *Journal of Geophysical Research*, 123, doi.org/10.1029/2017JC013637

37. Guha T., Tiwari Y.K., **Valsala V.**, Lin X., Ramonet M., Mahajan A., Datye A., Ravi Kumar K. (2018), What controls the atmospheric methane seasonal variability over India? *Atmospheric Environment*, 175, DOI:10.1016/j.atmosenv.2017.11.042, 83-91

36. Sreesh, M. G., **Valsala, V.**, Pentakota, S., Prasad, K. V. S. R., and Murtugudde, R (2018), Biological production in the Indian Ocean upwelling zones – Part 1: refined estimation via the use of a variable compensation depth in ocean carbon models, *Biogeosciences*, 15, 1895-1918, <https://doi.org/10.5194/bg-15-1895-2018>

## **2017**

35. Shirai T., M. Ishizawa, R. Zhuravlev, A. Ganshin, D. Belikov, M. Saito, T. Oda, **V. Valsala**, A. J. Gounez-Pelaez, R. Langenfelds and S. Maksyutov, (2017), A decadal inversion of CO<sub>2</sub> using the Global Eulerian-Lagrangian Coupled Atmospheric model (GELCA): sensitivity to the ground-based observation network, *Tellus - B*, 69, April 2017, DOI:10.1080/16000889.2017.1291158, 1-24

## **2016**

34. **Valsala, V.** and R. R. Rao (2016), Coastal Kelvin waves and dynamics of Gulf of Aden eddies, *Deep Sea Research Part I*: **116**, 174-186.

33. Ravi Kumar, K., **V. Valsala**, Y. K. Tiwari, J.V. Revadekar, P. Pillai, S. Chakraborty, R. Murtugudde, (2016), Intra-seasonal variability of atmospheric CO<sub>2</sub> concentrations over India during summer monsoons, *Atmospheric Environment*, Vol. 142, 229–237.

32. Praveen, V., R. S. Ajayamohan, **V. Valsala**, and S. Sandeep, (2016), Intensification of upwelling along Oman coast in a warming scenario, *Geophys. Res. Lett.*, 43, doi:10.1002/2016GL069638.

31. Roxy, M. K., A. Modi, R. Murtugudde, **V. Valsala**, S. Panickal, S. Prasanna Kumar, M Ravichandran, M. Vichi and M. Lévy, (2016), A reduction in marine primary productivity driven by rapid warming over the tropical Indian Ocean, *Geophysical Res. Letters*, 43 (2), 826-833.

30. Revadekar, J. V. K. Ravi Kumar, Yogesh K. Tiwari, **V. Valsala**, (2016), Variability in AIRS CO<sub>2</sub> during active and break phases of Indian summer monsoon, *Science of The Total Environment*, Volume 541, 15, 1200–1207

## **2015**

29. **Valsala, V.**, and R. Murtugudde, (2015), Mesoscale and Intraseasonal Air-Sea CO<sub>2</sub> Exchanges in the Western Arabian Sea during Boreal Summer, *Deep Sea Research-I*, doi:10.1016/j.dsr.2015.06.001

28. Rödenbeck, C., Bakker, D. C. E., Gruber, N., Iida, Y., Jacobson, A. R., Jones, S., Landschützer, P., Metzl, N., Nakaoka, S., Olsen, A., Park, G.-H., Peylin, P., Rodgers, K. B., Sasse, T. P., Schuster, U., Shutler, J. D., **Valsala, V.**, Wanninkhof, R., and Zeng, J.: Data-based estimates of the ocean carbon sink variability – first results of the Surface Ocean pCO<sub>2</sub> Mapping intercomparison (SOCOM), (2015), *Biogeosciences*, 12, 7251-7278, doi:10.5194/bg-12-7251-2015.

27. Sabu, P., J. V. George, N. Anilkumar, R. Chacko, **V. Valsala**, C.T. Achuthankutty, (2015), Observations of watermass modification by mesoscale eddies in the subtropical frontal region of the Indian ocean sector of southern ocean, *Deep Sea Research-II*, doi:10.1016/j.dsr2.2015.04.010

## **2014**

26. **Valsala, V.**, M. Roxy, K. Ashok and R. Murtugudde, Spatio-temporal characteristics of seasonal to multidecadal variability of pCO<sub>2</sub> and air-sea CO<sub>2</sub> fluxes in the equatorial Pacific Ocean, (2014), *Journal of Geophysical Research*, 119, DOI:10.1002/2014JC010212, 8987-9012.

25. Takagi, H., Houweling, S., Andres, R. J., Belikov, D., Bril, A., Boesch, H., Butz, A., Guerlet, S., Hasekamp, O., Maksyutov, S., Morino, I., Oda, T., O'Dell, C. W., Oshchepkov, S., Parker, R., Saito, M., Uchino, O., Yokota, T., Yoshida, Y., and **Valsala, V.** (2014), Influence of differences in current GOSAT XCO<sub>2</sub> retrievals on surface flux estimation, *Geophys. Res. Lett.*, 41, 2598-2605, doi:10.1002/2013GL059174.

24. Ishii, M., Feely, R. A., Rodgers, K. B., Park, G.-H., Wanninkhof, R., Sasano, D., Sugimoto, H., Cosca, C. E., Nakaoka, S., Telszewski, M., Nojiri, Y., Mikaloff Fletcher, S. E., Niwa, Y., Patra, P. K., **Valsala, V.**, Nakano, H., Lima, I., Doney, S. C., Buitenhuis, E. T., Aumont, O., Dunne, J. P., Lenton, A., and Takahashi, T. (2014), Air–sea CO<sub>2</sub> flux in the Pacific Ocean for the period 1990–2009, *Biogeosciences*, 11, 709-734, doi:10.5194/bg-11-709-2014.

## **2013**

23. **Valsala, V.**, Y. K. Tiwari, P. Pillai, M. Roxy, S. Maksyutov and R. Murtugudde, (2013), Intraseasonal variability of terrestrial biospheric CO<sub>2</sub> fluxes over India during summer monsoons, *J. Geophys. Res.*, doi: 10.1002/jgrg.20037.

22. **Valsala, V.**, S. Maksyutov, (2013), Interannual variability of the air–sea CO<sub>2</sub> flux in the north Indian Ocean, *Ocean Dynamics*, DOI:10.1007/s10236-012-0588-7, 1-14

21. Sarma, V. V. S. S., Lenton, A., Law, R. M., Metzl, N., Patra, P. K., Doney, S., Lima, I. D., Dlugokencky, E., Ramonet, M., and **Valsala, V.**, (2013), Sea–air CO<sub>2</sub> fluxes in the Indian Ocean between 1990 and 2009, (2013): *Biogeosciences*, 10, 7035-7052, doi:10.5194/bg-10-7035-2013.

20. Maksyutov, S., Takagi, H., **Valsala, V.**, Saito, M., Oda, T., Saeki, T., Belikov, D. A., Saito, R., Ito, A., Yoshida, Y., Morino, I., Uchino, O., Andres, R. J., and Yokota, T., (2013), Regional CO<sub>2</sub> flux estimates for 2009–2010 based on GOSAT and ground-based CO<sub>2</sub> observations, *Atmos. Chem. Phys.*, 13, 9351-9373, doi:10.5194/acp-13-9351-2013

19. Saeki, T., S. Maksyutov, M. Sasakawa, T. Machida, M. Arshinov, P. Tans, T. J. Conway, M. Saito, **V. Valsala**, T. Oda, R. J. Andres, D. Belikov: (2013), Carbon flux estimation for Siberia by inverse modeling constrained by aircraft and tower CO<sub>2</sub> measurements, *J. Geophys. Res. Atmos.*, 118, doi:10.1002/jgrd.50127.

18. Saeki T., Maksyutov S., Saito M., **Valsala V.**, Oda T., Andres R. J., Belikov D., Tans P., Dlugokencky E., Yoshida Y., Morino I., Uchino O., Yokota T., (2013), Inverse modeling of CO<sub>2</sub> fluxes using GOSAT data

and multi-year ground-based observations, SOLA, 9, DOI:10.2151/sola.2013-011, 45-50

17. Tiwari Y.K., **Valsala V.**, Vellore R.K., Kunchal R.K., (2013), Effectiveness of surface monitoring stations in representing regional CO<sub>2</sub> emissions over India, Climate Research, 56, DOI:10.3354/cr01149, 121-129

16. Ravi Kumar K., Y. K. Tiwari, **V. Valsala**, R. Murtugudde, (2013), On understanding of land-ocean CO<sub>2</sub> contrast over Bay of Bengal: A case study during 2009 summer monsoon, Environmental Science and Pollution Research, DOI: 10.1007/s11356-013-2386-2

## **2012**

15. Ganshin, A., Oda, T., Saito, M., Maksyutov, S., **Valsala, V.**, Andres, R. J., Fisher, R. E., Lowry, D., Lukyanov, A., Matsueda, H., Nisbet, E. G., Rigby, M., Sawa, Y., Toumi, R., Tsuboi, K., Varlagin, A., and Zhuravlev, R. (2012): A global coupled Eulerian-Lagrangian model and 1 × 1 km CO<sub>2</sub> surface flux dataset for high-resolution atmospheric CO<sub>2</sub> transport simulations, Geosci. Model Dev., 5, 231-243, doi:10.5194/gmd-5-231-2012.

14. **Valsala, V.**, S. Maksyutov, and R. G. Murtugudde, (2012), A window for carbon uptake in the southern subtropical Indian Ocean, Geophys. Res. Lett., doi:10.1029/2012GL052857

13. **Valsala, V.**, Maksyutov, S., Telszewski, M., Nakaoka, S.-I., Nojiri, Y., Ikeda, M., and Murtugudde, R. (2012), Climate impacts on the structures of the North Pacific air-sea CO<sub>2</sub> flux variability, Biogeosciences, 9, 477-492.

## **2011**

12. **Valsala, V.**, S. Maksyutov and R. Murtugudde, (2011), Interannual to Interdecadal Variabilities of the Indonesian Throughflow Source Water Pathways in the Pacific Ocean. Journal of Physical Oceanography., 41, 1921–1940.

11. Takagi H., T. Saeki, T. Oda, M. Saito, **V. Valsala**, D. Belikov, R. Saito, Y. Yoshida, (2011), On the Benefit of GOSAT Observations to the Estimation of Regional CO<sub>2</sub> Fluxes, SOLA, 2011, Vol. 7, 161–164, doi:10.2151/sola.2011-041.

## **2010**

10. **Valsala V.** and S. Maksyutov, (2010), A Short Surface Pathway of the Subsurface Indonesian Throughflow Water from the Java Coast Associated with Upwelling, Ekman Transport, and Subduction, International Journal of Oceanography, Vol. 2010, doi:10.1155/2010/540783

09. **Valsala V.**, H. M. Alsibai, M. Ikeda and S. Maksyutov, (2010), Interannual variability of CFC-11 absorption by the ocean: an offline model study, Climate Dynamics , doi:10.1007/s00382-010-0784-4.

08. **Valsala V.**, S. Maksyutov and R. Murtugudde, (2010), Possible Interannual to Interdecadal variabilities of the Indonesian Throughflow (ITF) water pathways in the Indian Ocean, J. Geophysical Research , doi:10.1029/2009JC005735.

07. **Valsala V.** and S. Maksyutov, (2010), Simulation and assimilation of global ocean pCO<sub>2</sub> and air-sea CO<sub>2</sub> fluxes using ship observations of surface ocean pCO<sub>2</sub> in a simplified Biogeochemical offline model., Tellus-B, doi:10.1111/j.1600-0889.2010.00495.x.

06. Kurien, P., M. Ikeda, and **V. Valsala**, (2010), Mesoscale Variability along the East Coast of India in

Spring as revealed from Satellite and OGCM simulations, J. Oceanography, Vol. 66, 273-289.

## **2009-2005**

05. **Valsala V.**, (2009), Different spreading of Somali and Arabian coastal upwelled waters in the northern Indian Ocean: A case study, J. Oceanography, Vol.65, Page 803-816.

04. **Valsala V.**, (2008), The first and second baroclinic mode responses of tropical Indian Ocean to interannual equatorial wind anomalies, J. Oceanography Vol. 64 (No. 4), 479-494.

03. **Valsala V.**, S. Maksyutov and M. Ikeda, (2008), Design and validation of an offline Oceanic Tracer Transport Model for Carbon Cycle Study, J. Climate , 21, 2752-2769.

02. **Valsala V.** and M. Ikeda, (2007), Pathways and effects of the Indonesian Throughflow water in the Indian Ocean using Particle trajectory and Tracers in an OGCM. J. Climate., 20, 2994-3017.

01. **Valsala V.** and M. Ikeda, (2005), An extreme drought event in the 2002 summer Monsoon Rainfall and its mechanisms proved with a moisture flux analysis, Scientific Online Letters on the Atmosphere, Vol.1, 173-176.

## **Students Guided**

### **PhD**

1	Mr. Sreesh M. G., SRF, IITM	Completed (2020)	Forward and Inverse modeling of Indian Ocean Carbon Cycle
2	Ms. Shikha Singh, Scientsti-C, IITM	Ongoing	Possible role of oceanic biases in coupled climate models
3	Ms. Anju, M., SRF, IITM	Ongoing	Modeling of Ecosystems of Indian Ocean
4	Mr. Santanu Halder, JRF, IITM (co-guide)	Ongoing	Forward and Inverse modeling of CO2 fluxes
5	Mr. Rakesh	Ongoing	High resolution City based GHG inversion in Indian Megacities

### **M.Tec/M.Sc (completed)**

1	Ms. Ann Ouseph, M.Sc	Role of Pacific winds during ENSO on ITF variability
2	Mr. Saran R., M.Sc	Western Indian Ocean acidification, controlling factors
3	Ms. Swathy A., M.Sc	Subduction of watermasses in the south Indian Ocean
4	Ms. Aswathy M., M.Sc	Role of internal waves in vertical mixing in a hybrid coordinate ocean model
5	Mr. Ramu P., MTech	Optimal estimates of mixing parameterization using Bayesian Inversion
6	Mr. Kunal, MTech	North Indian Ocean Acidification and trends