PIYUSHKUMAR N. PATEL

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Research Interests

- Aerosol-cloud interactions and their climate feedbacks
- Role of dynamics in aerosol-cloud interaction
- Satellite remote sensing and process studies of clouds
- Aerosol direct and indirect effects
- Multiple satellite data analysis
- Vicarious calibration of optical satellite sensors

Professional Experience

- **NASA Postdoctoral Program (NPP) Fellow** **[Sep 2019 – Present]**
  Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA
- **Postdoctoral Research Fellow** **[Jan 2018 – Sep 2019]**
  Physical Research Laboratory, Ahmedabad, India
- **Research Fellow** **[Aug 2012 – Aug 2017]**
  Space Applications Centre, Indian Space Research Organization, Ahmedabad, India

Education

- **PhD in Physics (Atmospheric Science)** **[Mar 2014 – Feb 2019]**
  Gujarat University / Space Applications Centre, ISRO, Ahmedabad, India
- **PG Diploma in Remote Sensing (Atmospheric Science)** **[Aug 2011 – Jun 2012]**
  Indian Institute of Remote Sensing, ISRO, Dehradun, India
- **MSc in Physics (Condensed Matter Physics)** **[Jul 2009 – Jun 2011]**
  Department of Physics, Sardar Patel University, Vallabh Vidyanagar, India
- **BSc in Physics** **[Jul 2006 - May 2009]**
  Sir P. T. Sarvajanik College of Science, Veer Narmad South Gujarat University

Publications

Journals

- **Patel, P. N.**, & Jiang, J. H. (2021). Cloud condensation nuclei characteristics at the Southern Great Plains site: role of particle size distribution and aerosol hygroscopicity. *Environmental Research Communications*, *3*(7), 075002. https://doi.org/10.1088/2515-7620/AC0E0B
- **Patel, P. N.**, Gautam, R., Michibata, T., & Gadhavi, H. (2019). Strengthened Indian Summer Monsoon Precipitation Susceptibility Linked to Dust-Induced Ice Cloud Modification.

Geophysical Research Letters, *46*(14), 8431–8441. https://doi.org/10.1029/2018GL081634

- Babu, K. N., Mathur, A., Thompson, D. R., Green, R. O., **Patel, P. N.**, Prajapati, R. P., Bue, B. D., Geier, S., Eastwood, M. L., Helmlinger, M. C. (2019). An empirical comparison of calibration and validation methodologies for airborne imaging spectroscopy, *Current Science,* 116(7), 1101-1107.
- **Patel, P. N.**, Babu, K. N., Prajapati, R. P., Sitapara, V., & Mathur, A. K. (2018). Day-1 INSAT-3DR Vicarious Calibration Using Reflectance-Based Approach Over Great Rann of Kutch. *Journal of the Indian Society of Remote Sensing*, *46*, 885–894. https://doi.org/10.1007/s12524-017-0729-z
- **Patel, P. N.**, Dumka, U. C., Babu, K. N., & Mathur, A. K. (2017). Aerosol characterization and radiative properties over Kavaratti, a remote island in southern Arabian Sea from the period of observations. *Science of the Total Environment*, *599–600*, 165–180. https://doi.org/10.1016/j.scitotenv.2017.04.168
- **Patel, P. N.**, Quaas, J., & Kumar, R. (2017). A new statistical approach to improve the satellite-based estimation of the radiative forcing by aerosol–cloud interactions. *Atmospheric Chemistry and Physics*, *17*(5), 3687–3698. https://doi.org/10.5194/acp-17-3687-2017
- **Patel, P. N.**, Dumka, U. C., Kaskaoutis, D. G., Babu, K. N., & Mathur, A. K. (2017). Optical and radiative properties of aerosols over Desalpar, a remote site in western India: Source identification, modification processes and aerosol type discrimination. *Science of the Total Environment*, *575*, 612–627. https://doi.org/10.1016/j.scitotenv.2016.09.023
- **Patel, P. N.**, & Kumar, R. (2016). Dust Induced Changes in Ice Cloud and Cloud Radiative Forcing over a High Altitude Site. *Aerosol and Air Quality Research*, *16*(8), 1820–1831. https://doi.org/10.4209/aaqr.2015.05.0325
- **Patel, P. N.**, Bhatt, H., Mathur, A. K., Prajapati, R. P., & Tyagi, G. (2016). Reflectance-based vicarious calibration of INSAT-3D using high-reflectance ground target. *Remote Sensing Applications: Society and Environment*, *3*, 20–35. https://doi.org/10.1016/j.rsase.2015.12.001
- **Patel, P.N.**, & Kumar, R. (2015). Estimation of aerosol characteristics and radiative forcing during dust events over Dehradun. *Aerosol and Air Quality Research*, *15*(5), 2082–2093. https://doi.org/10.4209/aaqr.2015.02.0077
- **Patel, P.**, & Shukla, A. K. (2015). Aerosol optical properties over marine and continental sites of India during pre-monsoon season. *Current Science*, *108*(4), 666–676.
- Kant, Y., **Patel, P.**, Mishra, A. K., Dumka, U. C., & Dadhwal, V. K. (2012). Diurnal and Seasonal Aerosol Optical Depth and Black Carbon in the Shiwalik Hills of the North Western Himalayas: a Case Study of the Doon Valley, India. *International Journal of Geology, Earth and Environmental Sciences*, *2*(2), 173–192.

Under Review/Preparation

- Gautam, R., **Patel, P. N.,** Singh, M., Liu., T, Mickley, L., Jethva, H., DeFries, R., Extreme smog challenge of northern India intensified by increasing lower tropospheric stability, *under review*.
- **Patel, P. N.**, Bighnaraj, S., & Jiang., J. H., Contribution of atmospheric nucleation events to cloud condensation nuclei number concentrations: role of transported particles, *under preparation*.
- **Patel, P. N.**, Jiang, J. H., A novel approach to estimate vertically-resolved cloud condensation nuclei concentrations using spaceborne lidar measurements, *under preparation*.

- Dayanandan, B., **Patel, P. N.**, Tiwari, P., Al-Amri, I., Thakadiyil, S., Al-Badi, H., Al-Riyami, K., Changes in aerosol optical depth and associated direct radiative forcing over Middle-East using long-term satellite observations, *under preparation*.

Conferences

- Dayanandan, B., **Patel, P. N.**, Tiwari, P., Al-Amri, I., Thakadiyil, S., Al-Badi, H., Al-Riyami, K., Long-term changes in aerosol loading and observed impacts on radiative budget over Middle-East, *ECAS 2021, doi:*10.3390/ecas2021-10695
- **Patel, P. N.**, Jiang, J. H., Atmospheric nucleation and its effect on cloud condensation nuclei abundance at the US DOE Southern Great Plains field site, AGU Fall Meeting 2020, USA.
- **Patel., P.N.,** Gautam, R., (2019). A Satellite-based Assessment of Long-term Trends in Extreme Smog and Haze and Their Radiative Impacts over the Indo-Gangetic Plains, AGU Fall Meeting 2019, USA.
- **Patel., P.N.**, Gautam, R., Michibata, T., Gadhavi, H., (2019). Response of Indian Summer Monsoon to Dust-Induced Modification in Ice-Clouds, ACAM 2019, June 24-25, 2019, UKM, Malaysia.
- Gautam, R., **Patel., P.N.**, et al., (2019). Extreme smog over northern India during post-monsoon crop burning season: quantifying long-term changes in aerosol loading and radiative effects using satellite data, ACAM 2019, June 24-25, 2019, UKM, Malaysia.
- **Patel., P.N.**, Gautam, R., Michibata, T., Gadhavi, H., (2018). Impacts of Dust-Ice cloud Interactions on Precipitation Susceptibility, *IASTA 2018*, December 28-30, 2018, IIT-Delhi.
- Babu, K.N., Prajapati, R.P., **Patel, P.N.**, and Mathur, A. K., (2017). Calibration of AVIRIS-NG hyperspectral imager over natural targets, *Science results from a phase-I airborne hyperspectral campaign with AVIRIS-NG over India*, SAC, ISRO, Ahmedabad.
- **Patel, P. N.**, Babu, K. N., Prajapati, R. P., Sitapara, V., and Mathur, A. K., (2016). Day-1 INSAT-3DR vicarious calibration using reflectance-based approach over Great Rann of Kutch, *ISRS-ISG National Symposium*, December 7-9, 2016, Dehradun, India.
- Babu, K.N., Suthar, N. M., **Patel, P.N.**, and Mathur, A. K., (2016). Aerosol measurements and validation of satellite-derived optical depth over the Kavaratti Cal-Val site, *SPIE Asia-Pacific Remote Sensing*, June-2016, New-Delhi, doi:10.1117/12.2228046.
- **Patel, P.N.**, (2015). Aerosol-Cloud-Climate Interaction, *science workshop on Nanosatellite for Earth Monitoring and Observation-Aerosol Monitoring (NEMO-AM)*, 28th April 2015, Space Applications Centre, Ahmedabad, India.
- **Patel, P.N.**, Babu, K. N., and Kumar, R., (2015). Contribution of sea-salt aerosol and the impact of cloud microphysics over the Arabian Sea using satellite measurements, *National symposium on weather and climate extremes, TROPMET-2015*, February- 2015, Punjab University, Chandigarh, India.
- **Patel, P.N.**, and Kumar, R., (2015). Aerosol-Cloud interaction over India and surrounding ocean using satellite data, *International workshop on Assessing the Impact of Aerosols & Changing Climate on Monsoon & Extreme Events*, January-2015, Ansal University, Gurgaon, India.
- **Patel, P.N.**, Bhatt, H., and Shukla, A.K., (2014). Absolute vicarious calibration of recently launched Indian meteorological satellite: INSAT-3D Imager, *The international archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, ISPRS Technical Commission VIII symposium*, Vol. XL-8, 09-12 December 2014, Hyderabad, India, doi:10.5194/isprsarchives-XL-8-2912014.

- **Patel, P.N.**, and Kant, Y., (2012). Influence of episodic dust event on the aerosol optical properties over Dehradun, *IASTA-2012*, BARC, Mumbai.

Invited Presentation

- "*Role of Atmospheric Pollution in Climate Change*" Training Program on Air pollution: sources, Control and Modelling, Department of Civil Engineering, S. V. National Institute of Technology, Surat, India, February 17, 2021.
- "*How Human-Caused Air Pollution Changing Our Climate?*" P. P. Savani University, Surat, India, June 25, 2020.
- "*Strengthened Indian summer monsoon precipitation susceptibility linked to dust-induced ice cloud modifications*", Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA, October 30, 2018.

Fellowship, Honor and Awards

- **NASA Postdoctoral Program Fellowship** at Jet Propulsion Laboratory
- **Postdoctoral Research Fellowship** at *Physical Research Laboratory (PRL)*
- **Senior Research Fellowship** at *Space Applications Centre (SAC), ISRO*
- **Junior Research Fellowship** at *Space Applications Centre (SAC), ISRO*
- **Best Poster Prize** in *International workshop in Ansal University, Gurgaon, India*
- **Travel Grants** from various sources ICTP (Italy), *Department of Science and Technology (India), IIT-Delhi.*

Skills

Research skills

- Experience in working/handling/reprocessing various satellite datasets with HDF and NetCDF formats.
- Modelling experience [radiative transfer models (6S, SBDART), OPAC, HYSPLIT]
- Experience in working with various ground-based observations and airborne datasets
- Experience of several land-based and ocean-based field campaigns both independently and in collaboration with the team.

Technical skills

- **Operating Systems:** Windows and Linux
- **Programming Language and Tools:** Fortran, Python, Generic Mapping Tool (GMT), Julia, CDO, Scripting (Shell & Batch), HDF and NetCDF libraries, OriginLab, LaTeX, MS Office
- Experience to work on supercomputing platform, Parallel Programming

Professional Memberships & Activities

- American Geophysical Union, European Geophysical Union
- Journal Reviewer: *Geophysical Research Letters, Remote Sensing of Environment, Remote Sensing, Atmosphere, Journal of Earth System Science*