

GREENHOUSE GAS MODELLING AND APPLICATIONS (GMA)

group at IISER Bhopal is looking for a motivated candidate to work in the field of agricultural emissions and satellite remote sensing.

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Agricultural crop residue burning (CRB) negatively impacts the air quality and climate due to its contributions to air pollutants and greenhouse gases. Conservation agriculture practices (CA) can potentially reduce CRB-related emissions and improve soil health. However, improved CRB detection and the associated emission quantification are essential for decision-makers to devise CA-related management policies more effectively. This PhD work aims to exploit the temporal characteristics of sequential multispectral satellite (e.g. SENTINEL 2) images to conduct a thorough comparative analysis and establish a standardized framework to improve agricultural burned area detection and quantification. Simultaneously, machine learning (ML) and deep learning for burned scar detection can be tested, and algorithms can be refined. Advanced models such as convolutional neural networks (CNN) may be explored.

Eligibility criteria

- Master's (M.Sc.)/M.Tech or integrated master Degrees in any of the disciplines of Geophysics/Atmospheric Science/ Oceanography/Geoinformatics/Remote Sensing/ Chemistry/Mathematics/Physics with a minimum of 60% marks or CGPA/CPI of 7.0 on a 10-point scale (overall percentage/CGPA/CPI; not only in majoring subject). Exceptionally brilliant students with B.Tech in Chemical, Computer, Civil, Electronic and Communication, and Environmental Engineering, with a strong motivation towards Earth and Environmental Sciences, may also apply for Ph.D. programme. The candidate should have a CSIR-JRF/UGC-JRF Fellowship or NET-LS.
- B.Tech. from IITs or BS-MS from IISERs with CGPA/CPI over 8.0 on a 10-point scale.
- Proven experience in GIS (e.g. ArcGIS, ArcMap, ArcCatalog, QGIS) and cloud platforms.
- Strong research aptitude and desire to do a PhD.

Our previous work in the related area can be found here:

- Deshpande, M., Kumar, N., Pillai, D., Krishna, V and Jain, M.: Greenhouse gas emissions from agricultural residue burning have increased by 75% since 2011 across India, *Science of The Total Environment*, Volume 904,2023, <https://doi.org/10.1016/j.scitotenv.2023.166944>.
- Deshpande, M., Pillai, D., and Jain, M.: Agricultural burned area detection using an integrated approach utilizing multi spectral instrument based fire and vegetation indices from Sentinel-2 satellite, *MethodsX* 9 (2022), 101741
- Deshpande, M., Pillai, D., and Jain, M.: Detecting and quantifying residue burning in smallholder systems: An integrated approach using Sentinel-2 data, *International Journal of Applied Earth Observation and Geoinformation*, Volume 108,102761,2022



HOW TO APPLY

Please send your CV and statement of research interest (maximum 1 page) to dhanya@iiserb.ac.in.

IMPORTANT DATE

The position will be available until filled, but no later than **March 25, 2024**



Since 2017, the GMA team has concentrated on observing and using atmospheric composition to understand the Carbon Cycle and Climate better, with the goal of reducing the adverse impacts of Climate Change. Our research backs climate treaties such as the Paris Agreement | UNFCC by tackling intricate climate change challenges, improving observation and modeling methods, and achieving results in line with the UN Sustainable Development Goals.