

PhD Thesis Topic:

Enhancing Atmospheric GHG Estimation through Machine Learning and Satellite Spectral Analysis

Introduction. This thesis focuses on improving greenhouse gas (GHG) estimation methods to address climate change challenges. By applying machine learning to satellite spectral data, the research aims to significantly enhance the resolution and accuracy of current GHG monitoring techniques.

Objectives. The main objective is to develop advanced machine-learning models for more precise estimation of atmospheric GHG concentrations, enhancing current models for better resolution and enabling real-time monitoring.

Methodology.

- **Data Collection:** The research will utilize radiance spectrum data from the Greenhouse gases Observing SATellite (GOSAT), provided by the supervisor's collaborators in Japan, along with other relevant satellite and ground-based measurements.
- **Machine-Learning Techniques:** The project will employ methods like neural networks and regression models, focusing on developing robust models that can accurately interpret complex atmospheric data.
- **Challenges and Integration:** Addressing computational challenges and integrating various data sources are essential components of the research approach.

Expected Outcomes. The thesis is anticipated to significantly improve GHG monitoring, offering more accurate and higher-resolution estimates. These advancements will be valuable for climate science research and effective policy-making in climate change mitigation.

Conclusion. This research seeks to advance environmental monitoring and our understanding of climate change through innovative use of machine learning on satellite data, contributing new insights and methodologies to the field.