New Master Thesis Topic

Title: High-Resolution Analysis of Volcanic Emissions Using Drone Data and Atmospheric Modelling

Short description (with picture if possible):

Volcanic eruptions release significant amounts of particulate matter (PM) and sulfur dioxide (SO_2) into the atmosphere, impacting air quality, weather, and climate. Understanding the characteristics of these emissions is crucial for improving forecasting and mitigation strategies. This project leverages state-of-the-art drone measurements of meteorological variables, PM, and SO_2 to study the spatial and temporal distribution of volcanic emissions.

As part of the project you will analyze drone data to identify patterns in meteorological profiles and emission concentrations. A high-resolution atmospheric model (WRF) will be employed to simulate local and regional atmospheric dynamics. The project will also involve using a transport model in inverse mode (FLEXPART-WRF) to estimate the characteristics of volcanic emissions, including source strength and distribution. This integrated approach will provide valuable insights into the behaviour of volcanic emissions and their atmospheric interactions.

Skills needed:
Good understanding of meteorology and atmospheric chemistry
Experience with data analysis and programming (e.g. Python)
Familiarity with numerical modelling, good understanding of the fundamentals
Ability to process and analyze large datasets
Strong problem-solving and analytical skills

Name of the IUP research group incl. two-line description of the research area
The Laboratory for Modeling and Observation of the Earth System (LAMOS; AG Vrekoussis) focuses on understanding the emission, transport, transformation, and deposition of atmospheric pollutants. Our research emphasizes the impact

of anthropogenic and natural emissions on air quality and the quantification of sources and sinks of various atmospheric species using atmospheric chemistry models and satellite observations.

Topic for students of
☒ M.Sc. Environmental Physics
☒ M.Sc. Space Sciences and Technologies

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