Spatio-Temporal forecasting of Methane Super-emitters using heterogeneous data streams

Mots clés : Array

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Résumé du projet de recherche (Langue 1)

Methane is a critical short-lived climate pollutant with a global warming potential over 80 times that of CO2 on a 20 year timescale. It is responsible for ~25% of the warming that we experience today, and reducing methane emissions is a critical part of achieving 1.5 and 2 degree pathways with minimal or no overshoot as described in Intergovernmental Panel on Climate Change Reports. However, uncertainty in the amount of methane emissions from sources such as wetlands, agriculture, and different parts of the oil and gas supply chain make it challenging to prioritize mitigation actions. The Mineral Methane Initiative (MMI) of the Climate and Clean Air Coalition (launched by the United Nations Environment Programme) is currently focused on emissions from the oil and gas industry as the most promising opportunity since, in contrast to agriculture and wetlands: the oil and gas industry has experience with reducing methane emissions due to safety concerns and methane can be sold as natural gas so there is a financial benefit to reducing emissions. The MMI is currently collecting data from oil and gas company internal reports and is performing direct measurements of methane emissions from oil and gas facilities around the world. In addition to these data streams, the MMI is exploring integrating satellite data of methane concentrations, national inventories, and others to build a more complete picture. Machine learning algorithms and more especially computer vision and deep learning are well-suited to analyzing these data sets and supporting the reduction of methane emissions. It has been shown in some regions of the world that over 80% of methane emissions originate from 20% of sources. However, identifying these super-emitters is a significant challenge, as they can be intermittent, and at different locations at different times. Assessing the current data and characteristics of super-emitters and identifying the probability of a site becoming a super-emitter, or in some way predicting the location and time of super-emitter events would be an enormous contribution to reducing methane emissions. The current data on super-emitters is sparse, or localized to a region where the characteristics cannot be generalized to the rest of the world. The research topic is about “Deep Spatio-temporal Forecasting”, and requires skills in Data Streaming, Computer Vision and Deep Learning.

Informations complémentaires (Langue 1)

This work will be done in collaboration with the United Nations Environment Program (UNEP) to take advantage of their expertise and available data.