VERBE - Towards a greenhouse gas emission monitoring and Verification system for Belgium

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Like most countries, Belgium's national greenhouse gas inventory report to the United Nations Framework Convention on Climate Change is based on a bottom-up approach which combines statistical data about economic activities with activity-specific emission factors to calculate the total emissions. It has been shown that it is possible to improve the understanding of the national reporting by adding complementary information obtained using a top-down approach, combining atmospheric greenhouse gas observations with an inverse modelling framework.

VERBE (https://verbe.aeronomie.be) aims to develop such a system tailored for Belgium, and will combine satellite and ground-based infrared remote-sensing and ICOS in-situ observations with inverse modelling. Such in-situ and FTIR observations will be established in Belgium. The universities of Antwerp and Liège share their ecosystem (vegetation and soil) exchange modelling experience to provide biogenic fluxes, that will be combined with anthropogenic emission inventories to provide a-priori emissions. Those will be used with atmospheric transport and inversion models running at BIRA-IASB to provide a-posteriori emissions.

The VERBE project (01/09/2022 – 01/12/2026) supports the FED-tWIN research BE-MVS (A BElgian greenhouse gas emissions Monitoring and Verification System), and collaborates with colleagues developing similar systems in Germany and the Netherlands. The approaches of the UK and Switzerland, which have published top-down emission estimates for hydrofluorocarbons, CH4, N2O and CO2 (UK) in the annexes of their latest reports, are also studied.

This poster gives an overview of the objectives of VERBE, and shows preliminary results of an FTIR measurement campaign around the city and port of Antwerp in April 2024.