Prototyping an Earth Observation (EO)-enabled kit supporting greenhouse gas reporting – GHG-Kit

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The Paris Agreement adopted in 2015 requires all nations to report on their national anthropogenic GHG emissions and removals. GHG budgets have to be of concern since increased greenhouse gas concentrations are known to increase the risk of severe weather events.

Earth observation (EO) data can be a useful tool to deliver independent and comprehensive input data for GHG emission verification. Satellite data with high accuracy, spatio-temporal coverage and resolution can improve an independent quantification of emissions. These data are supportive in two ways: 1) Biogenic a priori fluxes can be modelled based on satellite land surface properties. 2) Inverse modelling is based amongst others on biogenic a priori fluxes and – currently mostly on global and continental scales – can be based on satellite total column observations of GHGs. Inverse modelling enables computing a posteriori emissions linking a priori fluxes and observations via atmospheric transport modelling.

The ASAP18 flagship project GHG-KIT (2022-2025, https://ghg-kit.at/) aimed at developing an overall system, together with the main stakeholder Umweltbundesamt (UBA), to support the integrated GHG accounting and monitoring using EO-based information. Efforts undertaken on the side of GeoSphere Austria during the project lifetime to 1) prepare a priori flux estimates and 2) develop a framework for greenhouse gas inversion on urban scales (with Vienna as example) will be presented. Emphasis will be on the biogenic emissions modelled with the Vegetation Photosynthesis and Respiration Model (VPRM) driven by highly resolved Sentinel-2 satellite data and the requirements of an inversion system for a limited area domain using ground-based total column measurements.