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Designing an integrative concept for long-term greenhouse gas observations in Africa

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Ecosystems and societies on the African continent are threatened by the consequences of climate change. Similarly, the continuing trend of population growth jointly occurring with rapid land-use change, increased energy demand and the development of industry and transport infrastructure contribute to increasing greenhouse gas (GHG) emissions and subsequently climate change. It is estimated that the majority of GHG emissions in Africa at present occur due to land-use change. Land-use change is partly a consequence of the extension of agricultural production and deforestation in order to cope with increasing land, food and energy demands. Scientific advice on GHG emissions with regard to agricultural production techniques is important for African countries to improve LULUCF and GHG inventories, the reporting of their National Determined Contributions (NDCs), and their decision-making processes for public and private climate and land use policies. The availability of sufficient qualitative and quantitative data about GHG emissions and their respective sources and sinks is essential for subsequent scientific analysis and the formulation of appropriate advice. Currently, a comprehensive GHG observation system is lacking for the whole African continent. To fill that gap, the H2020 funded project SEACRIFOG is undertaking a design study for a pan-African observation system on GHGs and aerosols, by building on existing approaches and extending them to an integrative concept.

The primary objective of the project is to formulate a roadmap towards fully interoperable and accessible research infrastructures in agricultural and GHG observation research in the EU and Africa that match the needs of scientists, policy makers and end users such as farmers.

A preliminary assessment on currently operating stations reveals an uneven distribution of monitoring platforms, since most of them are located in South and West Africa. Similarly, not all African biomes are equally represented. Meteorological stations measuring variables such as ground temperature and precipitation are the most widespread observational systems across the continent, while explicit GHG measurements are limited short-term campaign studies often funded by scientific projects or to African countries with more sufficient available economic resources (i.e. South Africa).

As part of the design of a pan-African research infrastructure, a set of essential variables is being defined in order to assure the measurement of key processes describing the effects of biotic, abiotic and anthropogenic factors on GHG emissions. Since this project ultimately aims at contributing to climate change mitigation and adaptation strategies in Africa, attention is given to the land use change and management techniques applied in natural landscapes and well as anthropogenically disturbed ecosystems such as agricultural and mixed-livestock systems.