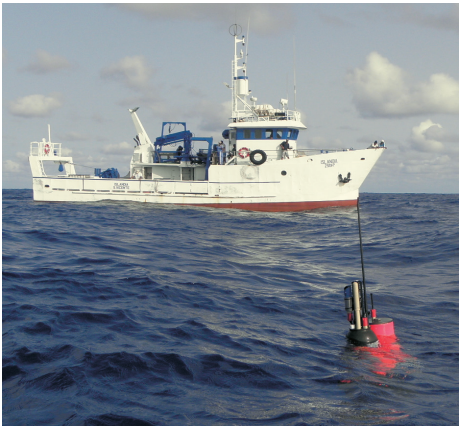
Greenhouse Gas Observation
& Climate-Smart Agriculture



Designing a Pan-African Greenhouse Gas Observation System

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Global Change Risks in Africa

It is estimated that the African continent is responsible for less than 4% of the global fossil fuel emissions. Most emissions on the continent are caused by land-use, land-use change and agriculture. Rapid population growth combined with the inevitable expansion of settlements and demand for agricultural land is placing additional pressures on terrestrial ecosystems leading to greater emissions.

In addition, climate change threatens environmental security, both locally (e.g. ecosystem services), regionally (e.g. sustainable development options) and internationally (e.g. carbon atmospheric GHG concentrations).

Initiatives that can address these challenges in an integrated and multidisciplinary way are urgently needed in many places in Africa, where there is a close relationship between societal well-being and environmental condition.

Mitigation and Adaptation: a Food Security Issue

In some regions of Africa, food production and supply is vulnerable and climate stressors exacerbate the situation.

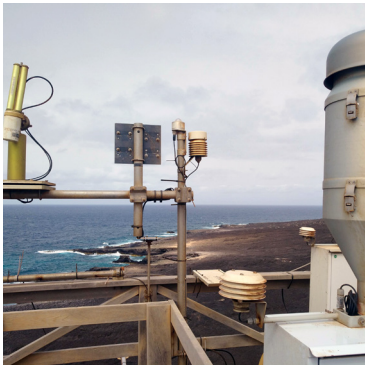
In the long-term, food security can only be achieved when agricultural production systems can both adapt to and also mitigate climate change. The concept of climate-smart agriculture encompasses all these aspects, adaptation, mitigation and food security. Scientific sound options are urgently required to address the needs of the rural population in sub-Saharan Africa.

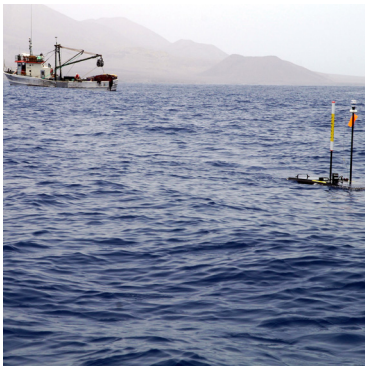
Smallscale farming systems in Vale do Paul/Cape Verde © Johannes Beck

The focus of SEACRIFOG

The project focuses on the design of an adaptive concept for a pan-African observational system of climate parameters and greenhouse gases (GHG). Special emphasis will be put on land-use, land-use change and climate-smart agriculture. To be prepared for the future climate scenarios and potential emission trajectories, other aspects such as industrial development, and the transport and energy sectors will also be considered.

Access to and interoperability of emission data are crucial elements to the project, as these data are fundamental to the development of future climate-smart mitigation options. The design study SEACRIFOG will connect three major groups of stakeholders at the national/international level: the data providers (research organizations, infrastructures, networks, statistical offices, private sector), the users of these data (scientific organizations, climate modellers, CORDEX-type downscaling communities, bodies in charge of greenhouse gas inventory reporting, NGOs) and possible funders of the proposed project recommendations.





Athmospheric Station on Cape Verde, Flux tower in South Africa, Wavegilder taking ocean flux samples close to Cape Verde

Atmosphere, Ocean and Ecosystems; three important observational domains

Comprehensive studies on the atmosphere, ecosystem and ocean are essential for an effective environmental observation system.

Atmospheric greenhouse gas concentrations can be monitored using a combination of measuring stations and satellite data; when the quality of data is good enough it can provide proxies for the estimation of fossil fuel emission rates.

In Africa, most greenhouse gas emissions result from land-use change, driven by the extension of agricultural areas. At the same time, the performance of near-natural or natural ecosystems are affected due to changes of the climate, or atmospheric composition. An effective observation system delivers data from both, disturbed and undisturbed areas. Data are taken from measurement stations, jointly modelled with satellite images to detect for example land use, management intensity and the resulting impacts on GHG dynamics.

Oceans are important carbon sinks, as carbon dioxide (CO_2) is dissolved in the ocean waters and carbon is stored in the deep-sea sediments. However, oceans can also act as a source of GHGs when for example the ecological balance is disturbed or the temperature of water changes. In order to adequately monitor oceanic carbon and GHG dynamics, measurements by ships or buoys are important, in addition to the use of near-earth and remote sensing information.

The Observation System needed

The European approach for greenhouse gas observation cannot be transferred to the specific situation in Africa. The cooperation between the research infrastructures in Africa and Europe has to be guided by existing local knowledge and by a definition of the local political, societal and environmental needs.

Data provided by the proposed observation system needs to meet the highest quality control standards, in order to be internationally comparable. To date, the data collected on greenhouse gas emissions in Africa is fragmented with regards to both spatial and temporal dynamics. Moreover, the data collected is generally not harmonized, for example evaluation methods are not standardized.

In order to fulfil national reporting demands under the UNFCCC framework, greater data resolution is needed and those data available need to be integrated. SEACRIFOG will address the UNFCCC reporting demands and the overarching Sustainable Development Goals adopted by the United Nations in the observational network design.

The optimal observation system needs to be an extensively spatially distributed network. Furthermore, in order to ensure long-term observations (optimal 30 years and longer), the system needs to be both financially and legally secure.

Countries involved in SEACRIFOG

SEACRIFOG in a nutshell

Team: Our interdisciplinary African-European working team comprises experts in atmospheric, terrestrial (agricultural) and ocean observation.

Research: We identify the needs for science-based concepts to improve food security and the GHG budget. We focus on the details necessary to harmonise and improve GHG data and establish routines of data sharing across EU and African countries.

Capacity-building: We work on a linkage between research and regional capacity-building. Trainings and workshops on data processing and data collection are central to our implementation.

Sustainability: Our aim is to create a long-lasting impact by giving optimal advice, for the establishment of a pan-African greenhouse gas observation system, including a funding concept.

Learn more about SEACRIFOG

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