Designing a feasible and representative research infrastructure network for GHG observations in Africa (SEACRIFOG)
SEACRIFOG: The partners

7 European countries
14 African countries

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SEACRIFOGR: The rationale

- EU & Africa
- Research Infrastructures
- Food Security
- GHG Emissions

Also keep in mind
- Urbanization
- Biodiversity
- Partnership
SEACRIFOG: The starting point

Global observation of climate-relevant variables

→ Major gaps in Africa → Large uncertainty of GHG fluxes and budget → Need for long-term, RI-type solution

Worldwide distribution of stations listed in the Observing Systems Capability Analysis and Review tool (OSCAR) of WMO (April 2018)
SEACRIFOG: The main questions

What needs to / can be observed across the African continent to serve the purpose of food security?
→ Ideal and mandatory set of observational variables

What are the gaps & needs in terms of infrastructure?
→ Inventory of existing and planned networks

What are the gaps & needs in terms of data?
→ Assessment of available data (spatial & temporal coverage, quality, sustainability...)

What are the relevant methodological protocols?
→ Interoperability and harmonization
→ Define minimum requirements
→ Adopt existing protocols where possible, modify where necessary

Design of a continental observational network, tailored to African requirements and addressing food security issues

→ The SEACRIFOG Tool
SEACRIFOG: The Essential Variables 1/2

Top-down approach:
Drivers of anthropogenic climate forcing

Bottom-up approach:
Consultation & ranking
## SEACRIFOG: The Essential Variables 2/2

### Essential Climate Variables
- Above-ground biomass (82)
  - Incl. litter (38)
- Albedo (66)
- Fire (79)
- FAPAR (67)
- Glaciers (32)
- Groundwater (56)
- Ice sheets and ice shelves (41)
- Inland water extent (69)
- Land surface temperature (72)
- Latent and sensible heat fluxes (45)
- Leaf Area Index (74)
- Permafrost (15)
- River Discharge (55)
- Snow (49)
- Soil Organic Carbon (56)
- Soil moisture (65)
- Precipitation (surface) (84)
- Pressure (surface) (67)
- Surface wind speed and direction (72)
- Atmospheric temperature at surface (88)
- Water vapor (surface) (71)
- Earth radiation budget (upper air) (54)
- Lightning (36)
- Temperature (upper air) (44)
- Water vapor (upper air) (49)
- Wind speed and direction (upper air) (42)
- Aerosols properties (50)
- Carbon dioxide, methane and nitrous oxide tropospheric mixing ratio (63)
- Cloud cover fraction (38)
- Ozone (47)
- Precursors (supporting the Aerosol and Ozone ECVs) (53)

### Essential Biodiversity Variables
- Genetic Composition (10)
- Species Populations (47)
- Plant Species Traits (36)
- Community Composition (41)

### Essential Ocean Variables
- Particulate Matter (38)
- Dissolved Organic Carbon (39)
- Fish Abundance and Distribution (53)
- Zoo- (44) and Phytoplankton (45) biomass and diversity
- Marine turtle, bird and mammal abundance (47)
- Marine Habitat Properties (57)

### Human Use/Anthropic Factors
- Land use/land use change (84)
- Human population (53)
- Economic development (81)
- Livestock population (73)
- Crop yield (78)
- Agricultural management (58)
  - Area of Ploughed Land
  - Manure Management
  - Fertilizer Application
  - Irrigation

### Ancillary/Other Variables
- Topography (84)
- Surface roughness (60)
- Ground/soil heat flux (49)
- Soil type (75)
- Soil quality/health (58)
- Dissolved organic (30) and inorganic (28) carbon (terrestrial)
- Atmospheric nitrogen deposition (29)
- Infiltration (48) and Runoff (64)
- Evapotranspiration
- Wild herbivores

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### Deliverable 4.1

Dr. Emmanuel SALMON, ICOS

GEO-XV – Kyoto 京都 – 29.10.2018
SEACRIFOG: The existing networks

Observational stations of selected networks and their relative density for (a) ground-based atmospheric and greenhouse gas, (b) ground-based meteorological observation on the African continent (from López Ballesteros et al., 2018).

Deliverable 3.1
SEACRIFOGER Stakeholder engagement

3 Regional Stakeholder Consultation Workshops: 72 participants, 33 organizations, 16 countries
→ Nairobi, Eastern Africa, 31.5.2017
→ Sunyani, Western Africa, 16.6.2017
→ Lusaka, Southern Africa, 18.4.2018

Concern about data and metadata... availability, accessibility, usability, interoperability, resolution, format and quality
... need for a comprehensive and collaborative approach: considering not only scientific, technological and ecological issues, but also socio-economic dynamics
... to support the success and the long-term sustainability of a RI network.
SEACRIFOG: Already available

Environmental Research Letters

https://doi.org/10.1088/1748-9326/aad66c

Towards a feasible and representative pan-African research infrastructure network for GHG observations


http://seacrifog-tool.sasscal.org

• Report on users’ needs (Elisa Grieco, elisa.grieco@cmcc.it)
• Literature analysis (Adéyèmi Chabi, chabi.a@wascal.org)
• Improved emission factors (Lutz Merbold, l.merbold@cgiar.org)
• Workshop Cabo Verde (Arne Körtzinger, akoertzinger@geomar.de)
SEACRIFOG: Under development / Next to come

• Further improvement of SEACRIFOG tool
  → assessment of data products (coverage & quality)
  → inventory / development of standardized protocols
  → diagnosis and planning tool for future RIs in Africa

• Network design based on spatial optimization
  → inverse modeling

• SEACRIFOG Dialog Platform
  → implementation, use, capacity-building...
ありがとうございます

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Greenhouse Gas Observation & Climate-Smart Agriculture

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