

SEACRIFOG PROJECT - WP 4

Improving technical harmonization and data quality in environmental monitoring and experimentation.



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SAEON/EFTEON Carbon Connections Workshop,
12 September 2018
South Africa

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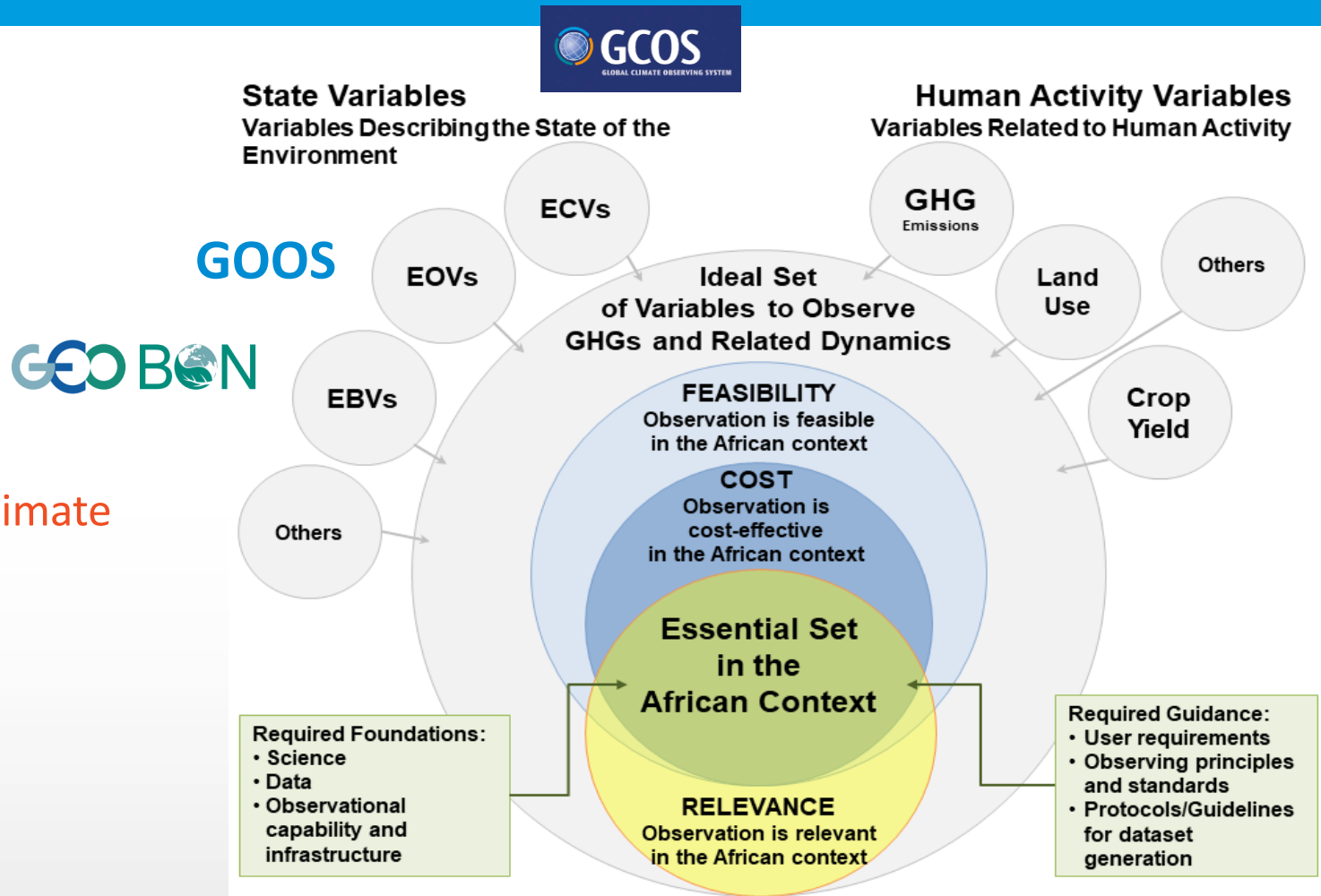
WP4 Overview of tasks

1. Identify a minimal set of essential variables to be measured → “ideal” set
2. Assess current available data products related to essential variables
3. Collate/develop protocols to assure standardization
4. Communication & training

Task 1. Essential variables

**Bottom-up
Approach:**
consultation

**Top-down
Approach:**
Anthropogenic climate
forcing



Task 1. Essential variables

58

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 (48) Biomass and Diversity
- Marine turtle, bird and mammal abundance (47)
- Marine Habitat Properties (57)

Essential Climate Variables

- Land Cover (81)
- Ecosystem Function - Net Primary Production (48)
- Ecosystem Structure (45)

- Ocean Surface Heat Flux (50)
- Sea Level (84)
- **Sea Surface Temperature (85)**
- Sea State (55)
- **Sea Surface Salinity (66)**
- Sea Ice (49)
- **Stable Carbon Isotopes (25)**
- Subsurface Currents (32)
- Subsurface Salinity (52)
- Subsurface Temperature (57)
- Surface Stress (47)
- **Inorganic Carbon (54)**
- **Nitrous Oxide (45)**
- **Nutrients (56)**
- **Ocean Color (65)**
- **Oxygen (68)**
- Transient Tracers (18)

- Above-ground biomass (82) incl. litter (36)
- 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 (46)
- **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) (33)**

- **Reported Anthropogenic GHG emissions (55)**
- Anthropogenic water use (54)

Anthropic Factors

- Land use/land use change (84)
- Human population (93)
- **Economic development (81)**
- **Livestock population (73)**
- **Crop yield (78) by type**
- **Agricultural management (58)**
 - Area of Ploughed Land
 - Manure Management
 - Fertilizer Application
 - Irrigation

- **Net radiation (SW/LW) at surface (73)**
- **Below-ground biomass (44)**
- **Dimethyl Sulfide (Oceanic)**
- **Atmospheric /Planetary Boundary Layer (21)**
- **Biosphere-Atmosphere GHG flux**
 - CO₂ (55) – Net Ecosystem Exchange
 - N₂O (48)
 - CH₄ (51)

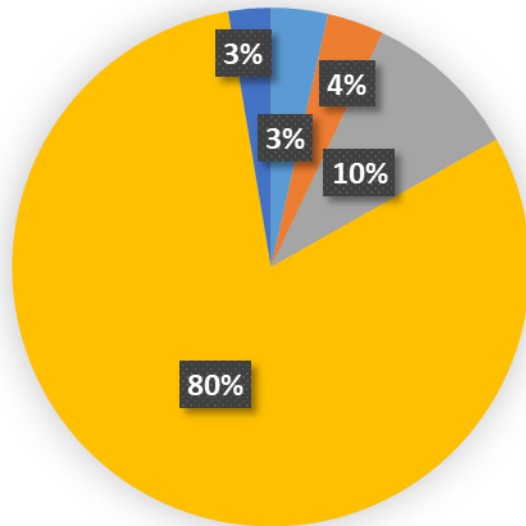
Ancillary/Other Variables

- Topography (84)
- **Surface roughness (60)**
- Ground/soil heat flux (48)
- **Soil type (75)**
- Soil quality/health (58)
- Dissolved organic (30) and inorganic (26) carbon (terrestrial)
- Atmospheric nitrogen deposition (39)
- **Infiltration (45) and Runoff (54)**
- **Evapotranspiration**
- **Wild herbivores**

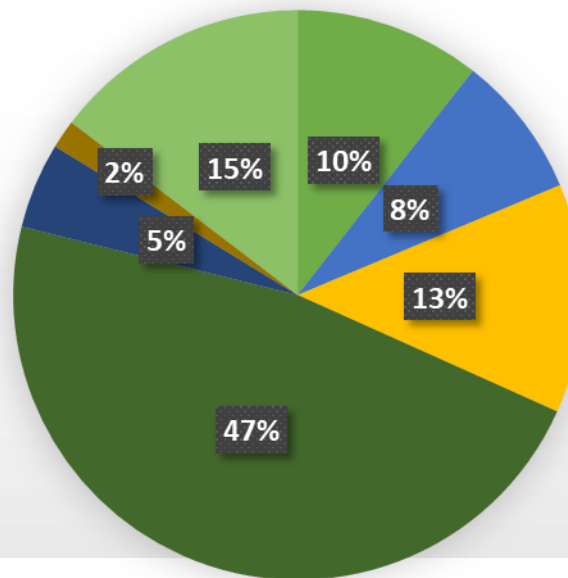
Task 3. Protocols

- N > 100 protocols
- Open-access
- Protocols metadata
 - Citation metadata (DOI, Author(s), Publisher, Title, Year of publication)
 - Discoverability: spatial coverage (applicability, adoption) & temporal coverage (continuous vs discrete)
 - Keywords: variables, global change ontologies (CC, urban areas, land use, biodiversity), domain, purpose (data processing, observation, management)
 - Re-usability: abstract, language(s), sustainability, URL, scale/resolution, cost/availability

Task 3. Protocols



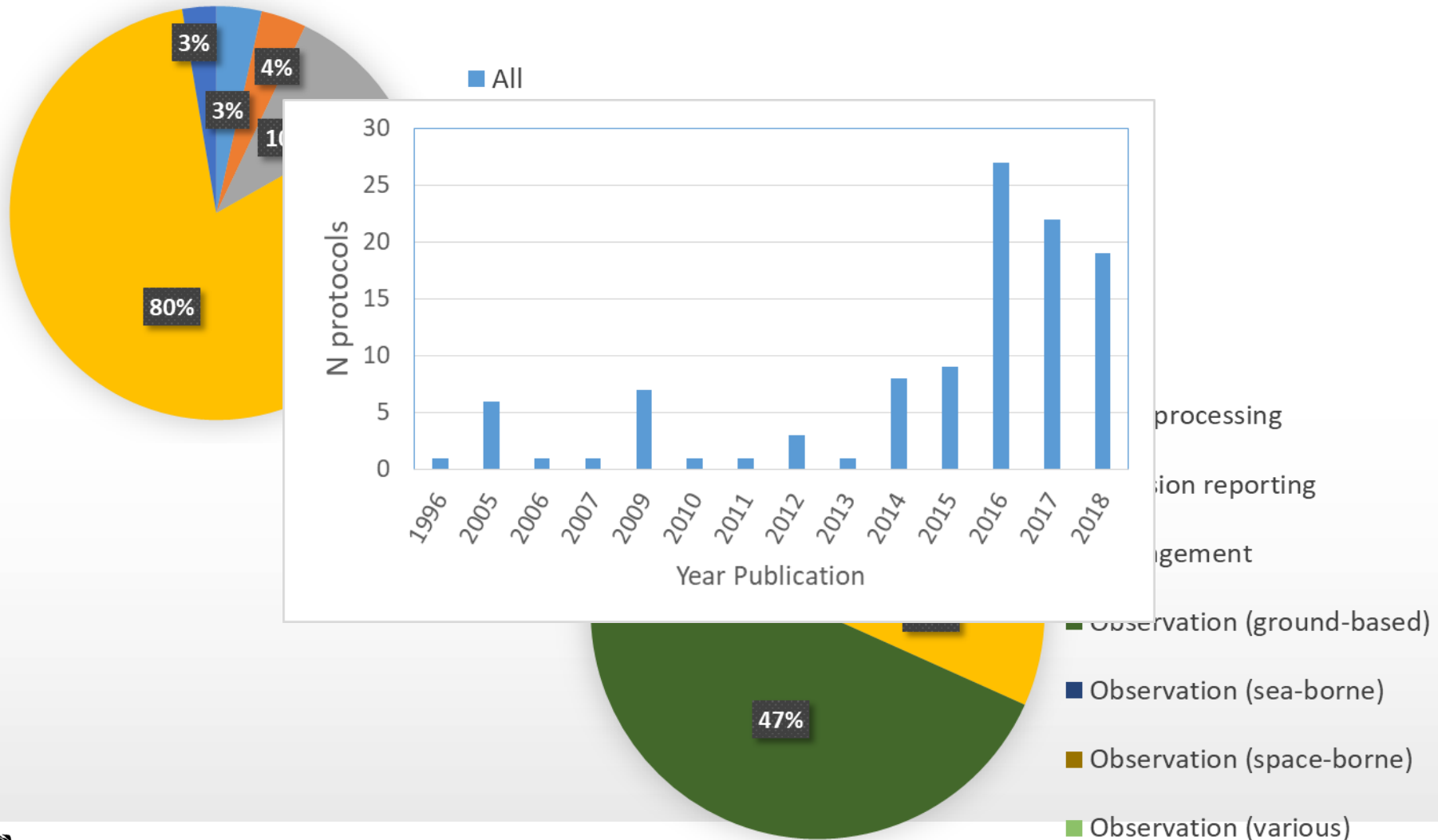
- All
- Atmospheric
- Oceanic
- Terrestrial
- Terrestrial/Oceanic/Freshwater



- Data processing
- Emission reporting
- Management
- Observation (ground-based)
- Observation (sea-borne)
- Observation (space-borne)
- Observation (various)



Task 3. Protocols

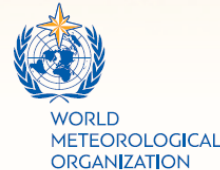


Task 3. Protocols

All domains

Basic principles RI development

WIGOS (WMO Integrated Observing System)



Min requirements ECVs
(land/atmospheric/oceanic domains)

Terrestrial



International Co-operative
Programme on Assessment
and Monitoring of Air
Pollution Effects on Forests



RESEARCH PROGRAM ON
Climate Change,
Agriculture and
Food Security



Group of Earth Observations Biodiversity
Observation Network

AfriTRON

African Tropical Rainforests
Observation Network

RECCAP (GCP)

REGional Carbon Cycle Assessment and
Processes



GREENHOUSE
GAS PROTOCOL

World Resources Institute & World
Business Council for Sustainable
Development



NutNet

Nutrient Network (US, Canada & EU)



United Nations
Framework Convention on
Climate Change



Task 3. Protocols

All domains



Task 3. Protocols

Atmospheric



WMO - Low-cost
sensors for atm
composition



Oceanic



International Ocean
Carbon Coordination
Project (IOCCP)





Greenhouse Gas Observation
& Climate-Smart Agriculture

Thank you!

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Feedback is very welcome!



Funded by the
European Commission
under the Horizon 2020
Work Programme