GEO-C: Need for (land-based) carbon observations in support to the Paris Agreement

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Vision for WIGOS in 2040, GEO Week 2017, Washington D.C., 24/10/2017
PPT outline:

1- short intro on the Paris Agreement*
2- Emerging needs from the PA
3- GEO-C

* Not exhaustive overview, focus on the land sector
GEO-C: the Policy context

The Paris Agreement:

Article 4 and Article 13 – National Reporting
• Reported five-yearly by parties, successive reductions in emissions
• Using existing methods and guidance

Article 5 Mitigation
• Knowledge of evolution of sinks and sources

Article 7 Adaptation
• Best available science, research, systematic observation
• Strengthening cooperation

Article 10 Technology Transfer

Article 11 Capacity Development

Article 14 Global stocktaking
• in the light of equity and the best available science: 2023, 2028…

Article 15 Compliance
GEO-C: the Policy context

The Paris Agreement:

• recognizes the importance of scientific knowledge, including research and systematic observations, to support the commitment of reducing GHG emissions to keep global warming below 1.5-2.0°C

Systematic “carbon” observations, data and information can support:

• National reporting
• Mitigation (adaptation)
• Global stocktake
• Transparency process
• Technical experts review
• Public access to information
• Etc.

Policy makers and inventory agencies strongly need reliable GHG-related observations and knowledge
Data, scientific knowledge, research and observations needed to meet the expectations of the Paris Agreement and support decision making.

- who is taking the responsibility to develop such a global observing system for carbon and GHGs?
- who will support and coordinate it?

GEO-C: the Policy context

An integrated global observation system of carbon and GHGs

- IPCC AR
- National reporting

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Comprehensive approach (not only T and atmospheric CO$_2$)

Paris target is about temperature, however monitoring and meeting this target requires a broader range of climate indicators (Briggs et al., 2015)

Measuring CO$_2$ emissions in the atmosphere is not enough: decreasing anthropogenic emissions does not imply a direct slowdown in [CO$_2$]

Climate impacts on land → land surface could become a net C-source: e.g. permafrost melting, peatlands fires, forest drought/mortality, etc.

We need to study C-cycle on the whole and better understand (among others) climate-land feedbacks: we do not know if the current trends – e.g. land and ocean sinks – will remain the same in the future

Need for enhanced observations from an integrated approach: in situ / satellite / inventory, across scales (time & spatial), domains (atmosphere, land, ocean) systems and processes (ecophysiology, ecology, earth system).
Atmospheric CO₂ growth rate was a record high in 2015 in spite of no growth in fossil fuel and industry emissions because of a weaker CO₂ sink on land from hot & dry El Niño conditions.

The emissions (shown in black) include fossil fuels and industry and land-use change.

Real data: observations driven estimates

Move from the “residual” land sink to more observation-driven approaches

Global Observations (not only Annex 1)

All countries → NDCs

Need for a global integrated picture

However some regions (e.g. Africa) almost not covered by systematic in situ observations

Support needed by developing countries: large areas, inadequate observing systems, difficult to identify all the different land uses and related emissions vs removals estimates; high uncertainties.
Importance of the land sector (in NDCs)

Land sector (both emissions and sinks) represents 20% of the total global budget

High uncertainty!

Land sector mentioned in 73% of NDCs

Land use sector, mentioned for:

- mitigation (e.g. Ghana, India, China, Uganda)
- adaptation (e.g. Mexico with deforestation, Ghana with SFM)
- markets (e.g. Ghana, Chad with REDD+)
- means of implementation (e.g. Brazil and Uganda with REDD+).

Data from Anke Herold
Land use (particularly forests) is a key component of the Paris Agreement*, turning globally from a net anthropogenic source during 1990–2010 (1.3±1.1 GtCO2e yr$^{-1}$) to a net sink of carbon by 2030 (up to -1.1±0.5 GtCO2e yr$^{-1}$).

* assuming full implementation of NDCs

Grassi et al. 2017, Nature Climate Change
Issues in the land sector

Comparison of historical LULUCF net GHG flux: country reports to UNFCCC vs scientific studies (IPCC AR5).

C Global stocktake to be based on both country reporting and IPCC reports → need for reconciliation → need to use more real observations than statistics and models.
Need for Coordination of research and observations

Very diverse scientific domains that need specialized approaches

Ecosystems  Oceans  Atmosphere  Gases  Aerosols  Human activities  Natural

NEON  eLTER  GOOS  SOCAT  IG³IS  IAGOS  TCCON  ACTRIS  AnaEE
Blue Planet  ARGO  GAW  ICOS  FLUXNET

(this is not an exhaustive list, it is just for example)
Need for Coordination of research and observations

Carbon Cycle

Climate Change

GOOS
IG³IS
IAGOS
ICOS
CEOS
ACTRiS
AnaEE
FLUXNET
eLTER
Blue Planet
TCCON
ARGO
SOCAt
NEON
GAW
Blue Planet

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Some Emerging needs from the PA
(focus on land)

summary

- Comprehensive approach (not only T and atmospheric CO₂)
- Global observation (not only annex 1)
- Real data (observations driven estimates – not only statistics, models, etc.)
- Issues in the land sector (methods, definitions, attribution, etc.)
- Coordination of research and observations
- others…
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GEO Engagement Priorities 2017-2019

2030 Agenda for Sustainable Development

Climate Change and Greenhouse Gas Monitoring

Disaster Risk Reduction
GEO SBAs - Societal Benefit Areas

- Biodiversity and Ecosystem Sustainability
- Disaster Resilience
- Energy and Mineral Resources Management
- Food Security and Sustainable Agriculture
- Infrastructure and Transport Management
- Public Health Surveillance
- Sustainable Urban Development
- Water Resources Management
- CLIMATE

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The approach: a global joint effort / a common platform
build on existing initiatives and networks,
support their continuity and coherence,
promote the interoperability of their data and systems
plan joint strategies and implement joint activities
fill in the missing pieces to obtain a comprehensive, globally coordinated C & GHG observation and analysis system

Monitor changes in the carbon and GHG cycles, and GHG emissions as they relate to human activities and global change
Support UNFCCC and policy: support the UNFCCC process and provide decision makers with timely and reliable policy-relevant information
GEO-C: Tasks

GEO-C Tasks

• Task 1: User needs and policy interface
• Task 2: Data access and availability
• Task 3: Optimization of observational networks
• Task 4: Carbon and GHG budget calculations
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**GEO-C: from Observations to Decisions**

**Communication**

1. **SBSTA**
   - Framework Convention on Climate Change

**Observations**

- SOCAT
- CEOS
- WMO
- UNEP
- IPCC
- GEO Group on Earth Observations
- GAW
- GEO Earth Observation System

**Services**

- AMERIFlux
- NeA
- TERN
- ICOS
- NOAA
- GCOS

**Knowledge**

- Data sharing management (incl. metadata)
- Improve data harmonization
- Improve inter-operability
- Improve data accessibility
- Data Citation
- From data to knowledge

**Decisions**

- From observations to services
- From services to knowledge
- From knowledge to decisions

**Capacity building**

Identifying observational gaps

Model-Data Fusions

Sustainability

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GEO-C was conceived right here in Washington, 8 years ago!
- Presentations during the Plenary (17 Nov 2009)
- Side Event (18 Nov 2009)
- Key note talk at the Smithsonian (19 Nov 2017)

17 November 2009

Integrated Global Carbon Observations

18 November 2009

Side Event to establish the GEO CCoP, Carbon Community of Practice

19 November 2009

The need for carbon observations: Yesterday, today and tomorrow

Philippe Ciais
Antonio Bombelli
Roger Dargaville
Han Dolman

and IGGO community of practice

GEO IGOS Symposium Washington DC, Nov 19, 2009
Baird Auditorium, Smithsonian National Museum of Natural History
Announcement

GEO Workshop to address the needs emerging from the Paris Agreement

Where: probably Geneva
When: 1st half of 2018
THANKS

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