EO for UNFCCC Paris

Breakout 3b: Assessing GHG stocks, sources & sinks from observations of the terrestrial C-cycle.

e.g. EO-based monitoring of AFOLU, wetlands, etc and land surface modelling to estimate emissions (i.e. bottom-up/land)
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Questions:

1. Identify case studies based on existing work that illustrate how EO can already support the Paris agreement.

2. Are there R&D case studies that may in the next 5-10 years lead to new types of actionable information supporting Paris Agreement goals?

3. How can the CCI community contribute to the first Global Stocktake in 2023? (i.e., ideas for projects in CCI+ Phase 2)

Current CCI contribution to ECVs relevant to AFOLU and the Carbon Cycle

Land biosphere: albedo, land cover (including hi-res LC in the Amazon, Sahel and Siberia), above-ground biomass, fire, land surface temperature (but not vegetation activity or photosynthesis: fAPAR, LAI or solar-induced fluorescence)

Hydrology: soil moisture

Cryosphere: snow, permafrost

Atmospheric GHG composition: CO2, CH4

Integration top down bottom up: RECCAP

GCOS-222: Systematic Observations and the Paris Agreement

GCOS needs to strengthen the implementation of the actions on land cover, above-ground biomass, soils, fires and permafrost

Necessary improvements:

- Forest monitoring for REDD+

- Adaptation observations including Land Use/Cover changes in agriculture; forest health; urban greening; changes in heat loss from groups of buildings

- Land footprint of renewables

- Atmospheric composition to support national inventories

- Identify and attribute extreme events

- Understand adaptation needs

European Space Agency

Atmospheric GHG budgets at national and sub-national scale
CCI RECCAP2 - CCI GHG

Case studies based on existing work that illustrate how EO can already support the Paris Agreement

- Users: inventory agencies
- Estimate national budgets ➔ Match users needs for sectors definition
- Separate anthropogenic from natural fluxes for CO2
    - using combustion tracers NO2 & CO
- Separate sectors for CH4
- Produce relevant information for improving inventories such as emission factors

Are there R&D case studies that may in the next 5-10 years lead to new types of actionable information supporting Paris Agreement goals?

- Near real time bottom-up emissions (activity from space)
- Cities emissions
- Higher resolution GHG imagers (for point sources and urban emissions)
- Combined thermic IR and SWIR for facility level emissions

European Space Agency

AFOLU carbon emissions and removals
CCI Biomass – CCI Land Cover – CCI Fire – CCI Soil Moisture – CCI RECCAP2 - CCI Permafrost

Case studies based on existing work that illustrate how EO can already support the Paris Agreement

- Users: inventory agencies & companies with land compensation actions
- Forest C offset projects: Monitor additionality and permanence
- Land use change fluxes (deforestation, degradation, forest management)
- Fire emissions

Are there R&D case studies that may in the next 5-10 years lead to new types of actionable information supporting Paris Agreement goals?

- Accurate direct biomass change estimates
- Land footprint of bioenergy production
- Use EO to support forest Verified Carbon Standards (Verra VCS) from project to jurisdiction scale
- Separate climate and human induced forest disturbances and legacy effects at (very) high resolution
- Agricultural practices and agricultural soil carbon monitoring
- Green areas in cities

Summary of the discussion (AFOLU)

1. **Focus on change:** The necessity to link between causes and impacts pushes CCI projects towards integration and (a bit) less for consistency

2. **Integration across land CCI ECV projects** especially biomass, fires and land cover and uptake of data by national inventories and international global products (e.g. CCI land cover change already used by FAO (FAOstat) and global products from the Emission Database for Global Atmospheric Research (EDGAR))

3. **Focus on case studies in developing countries** where land use data are of poor quality (e.g. this is partly piloted in CCI RECCAP2 for Brazil and Columbia, but more are needed)

4. **Higher resolution data for better attribution of change:** high resolution data ate more recent, thus challenge to connect them with longer time series of coarse or medium resolution for change attributions

5. **New directions: forest project based Carbon monitoring** (e.g. define new standards within VCS framework and anthropogenic activity data down to facility and city level. Near real time data is feasible in some sectors like traffic, industrial sites activities in the post-COVID era that will impact emissions in a fast but largely unknown manner

6. **Enhanced collaboration with end users:** institutional (inventory agencies, UNFCCC, organizations providing global inventories) and sub-national (cities GHG neutrality ambitions, large afforestation projects, non forest tree plantings e.g. in drylands and ecosystem restoration)