Concept for a coordinated activity to provide forest/land cover/wetland and change data and estimates in support of the UNFCCC Global Stocktake

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Space-based forest, land cover, wetland and change datasets are an essential input to national GHG inventories for estimating activity data, and to global AFOLU assessments and GHG/Earth System modeling approaches. At present, there are series of ongoing relevant projects and programs by various CEOS agencies and partners producing forest/land cover and change datasets relevant to the UNFCCC Paris Agreement and specifically its Global Stocktake (GST). These include the work with countries to use Landsat and Sentinel-type observations for deriving IPCC category-related activity data (i.e. work of GFOI partners), operational programs providing continuous, annual global forest and land cover change data (i.e. EC Copernicus global climate and land monitoring services and UMD/WRI's Global Forest Watch annual/weekly tree cover loss), synthesis long-term land cover change datasets (i.e. HILDA+, LUHv2), and a series of next generation product demonstrations for global 10 m resolution land cover (i.e. ESA-WorldCover), Global mangrove cover and change (i.e. JAXA Global Mangrove Watch) and AGB and total biomass (NASA JPL/GSFC LCLUC Global Mangrove Mapping), high resolution fire/burnt area (GFED with Sentinel, EC Copernicus Global Land Service) and land degradation analysis using both optical and Radar data (i.e. using ALOS; also linking the SDG 6.6.1 and 15.3.1). There are also a series of efforts to advance how land cover change, fire, biomass and other datasets can provide forest/AFOLU flux products becoming available (i.e. recent NCC paper lead by Nancy Harris/WRI).

These efforts represent a set of experiences working with countries on improving their GHG inventories, operational activity data provision and next generation data demonstrators. While these are ongoing, there is a need to synthesize and coordinate the derivation and presentation of those as a dedicated contribution to policy processes like the UNFCCC Global Stocktake. There is also a need to maintain consistency between remote-sensing approaches and the criteria used in National Greenhouse Gas Inventories, particularly in how managed and unmanaged lands are distinguished, and the accounting of natural versus anthropogenic impacts. A forest and land cover change synthesis would include an analysis of the suitability of the available datasets and efforts towards the various aspects of the GST; including:

1. the support of national GHG inventories for improved activity data estimation for forest/land cover/use change following the IPCC GPG
2. to provide improved global land change data for AFOLU assessments, and input to GHG estimations and modeling products
3. to enhance the consistency and comparability of national GHG inventory data and global GHG analysis by providing consistent best available global land cover/change data related and harmonized with national GHG inventories

To make a joined and dedicated forest/land cover observation community contribution to the UNFCCC Global Stocktake, the aim for the first GST in 2023 is to

come up with a “best available” analysis, and synthesis for the three GST areas noted above. The fundamental idea is to go beyond presenting a list of individual products but rather a dedicated, community-consensus demonstration on how they contribute to the GST following the IPCC GPG (i.e., land use categories, the time period represented, distinguishing managed and unmanaged lands, and categorizing forest/land area gain and loss based on drivers). More specifically the following activities are planned:

- Support of national GHG estimation and reporting (using IPCC GPG):
  - Synthesize experiences in using satellite-derived forest/land cover/change data for AFOLU activity data estimation in countries;
  - Demonstrate progress in novel data and information products related to land use change, wetlands, forest/land degradation and regrowth, and fire/burnt area for national-level estimation
- Improved land change data for global analysis and modeling:
  - Synthesize global land cover change data and products in support of Earth System modeling and AFOLU assessments
  - Present opportunities for novel, next generation global land cover/change products at higher spatial and temporal resolutions and more thematic detail
- Harmonization of national GHG inventories and global AFOLU assessments:
  - Process and statistical analysis available global land change datasets and estimates for comparing with nationally reported data including an analysis on consistency with FAO reporting and the national GHG inventories
  - Demonstrate the combination of forest/land cover change, biomass, fire and other EO-data source for GHG estimation at global and national levels

The following products are proposed as the most suitable choices to present the dedicated CEOS agency support for the GST by UNFCCC COP26 in Nov. 2021:

1) Useful for countries and national reporting:
   a. Copernicus annual global land cover service with 23 classes and additional 9 fractional layers for base classes like trees, agriculture etc. (100 m, 2015-onwards, EC)
   b. WorldCover (10 m global land cover for 2020, ESA)
   c. Global Forest Watch tree cover loss (30 m annual and 250 m weekly from 2015 onwards, UMD)
   d. Global Mangrove Watch data on cover and change (JAXA)
   e. Global Mangrove Height and Biomass (NASA)
2) Useful for (longer-term) global modeling and GHG assessments:
   a. LC CCI annual 1992-2015 (now continued under Copernicus Climate Change Service C3S until today, 1 km change, ESA/EC)
   b. HILDA+ 1960-2019 global, annual land cover change harmonized with FAO statistics (synthesis product for modeling community)
3) For linking national reporting with global estimation (in a statistical sense)
   a. Nancy Harris/GFW forest fluxes data 2000-2019 (NASA)
   b. Copernicus annual global land cover service and derived regional land cover change statistics for 6 IPCC classes (using sample/reference data for estimation, EC)

The set of activities are addressing both the use and analysis of readily available EO contributions to the 2023 GST and include the presentation of novel approaches that will become relevant for the second GST in 2028. Beside of CEOS entities the coordination of such an effort will make use of established mechanisms for such purposes like the land cover team of the Global Observations of Forest Cover and Land Dynamics panel (https://gofcgold.umd.edu/, http://www.gofcgold.wur.nl) that will provide the leadership for

- Organizing a series of expert meetings throughout 2021
- Coordinate the activities from the various CEOS partners contributing to the effort
- Lead the synthesis and summary towards a presentation at UNFCCC COP26 in November 2021.

Some resources and support will be required for participation of various product teams as this activity would fall outside the scope of funded activities, and therefore relevant CEOS member agencies should be engaged in a discussion of their interest to support this work.