



Assessment of Innovative Technologies and Their Readiness for Remote Sensing-Based Estimation of Forest Carbon Stocks and Dynamics

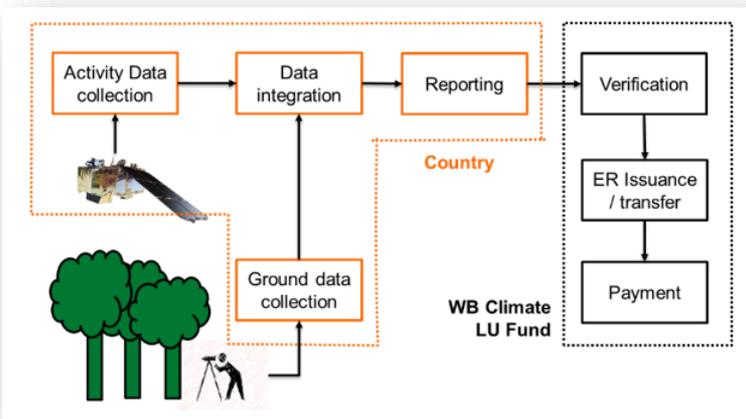
GFOI Plenary 2021 - Side Event: **Estimating Carbon
Stocks from Space: Importance of in-situ data**

Andres Espejo, World Bank

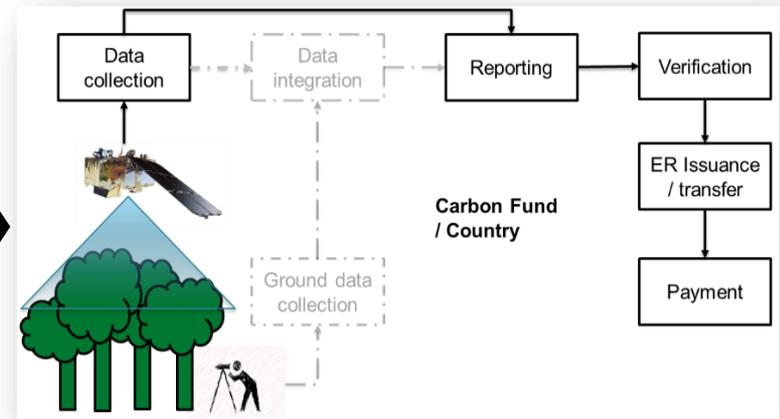


WHAT IS THE ISSUE AND THE SOLUTION?

MRV systems are complex and human-dependent → not efficient, i.e. 6-22 months



EO combined with innovative technologies could enable a more automatized system → more efficient, i.e. 3-6 months



HOW CAN WE GET TO THE SOLUTION?

- The WB published in June 2021 a [study](#) on the readiness of **innovative technologies for RS-based estimation of carbon stock dynamics**
- Result from in-depth bibliography review and the participation of more than 200 international experts
- Conclusions served to define the [policy pathways](#) for an MRV 2.0
- The analytical study assessed **the status and gaps** of technologies in four different domains:
 - **Remote sensing;**
 - **Artificial Intelligence (AI);**
 - **Geostatistics (GS); and**
 - **Cloud Computing**



POLICY BRIEF June 2021

Policy Paths towards Second-Generation Measurement, Reporting and Verification (MRV 2.0)

Actions needed for an MRV 2.0:

- Access to a centralized cloud service with decentralized multipurpose platforms and databases should be secured in the long-term (a minimum five-year time frame).
- A Global Forest Biomass Reference System for in-situ data collection should be supported and promoted.
- New standardized methods using Remote Sensing, Geostatistics, and Artificial Intelligence on the Cloud should be enhanced and promoted.
- Coordination and partnerships should be promoted among agencies, institutions, communities, and research groups to improve data and the sharing of know-how.
- A proof of concept should be developed to facilitate investigation of the technical viability and desirability of MRV 2.0 prior to scaling up.

WHAT IS THE ISSUE?

Limiting global warming to 1.5°C, in line with the Paris Agreement (PA), requires that global annual greenhouse gas emissions are cut by 50 percent of current levels by 2030, and reduced to net zero by 2050. This represents a net reduction target of 23 GtCO₂e/year by 2030 (Blaufelder et al., 2021). In order to reach this target, 5 GtCO₂e/year of Emission Reductions (ER) will have to come from reduced deforestation with 2 GtCO₂e/year of enhanced carbon sequestration (Taskforce on scaling voluntary carbon markets, 2021).

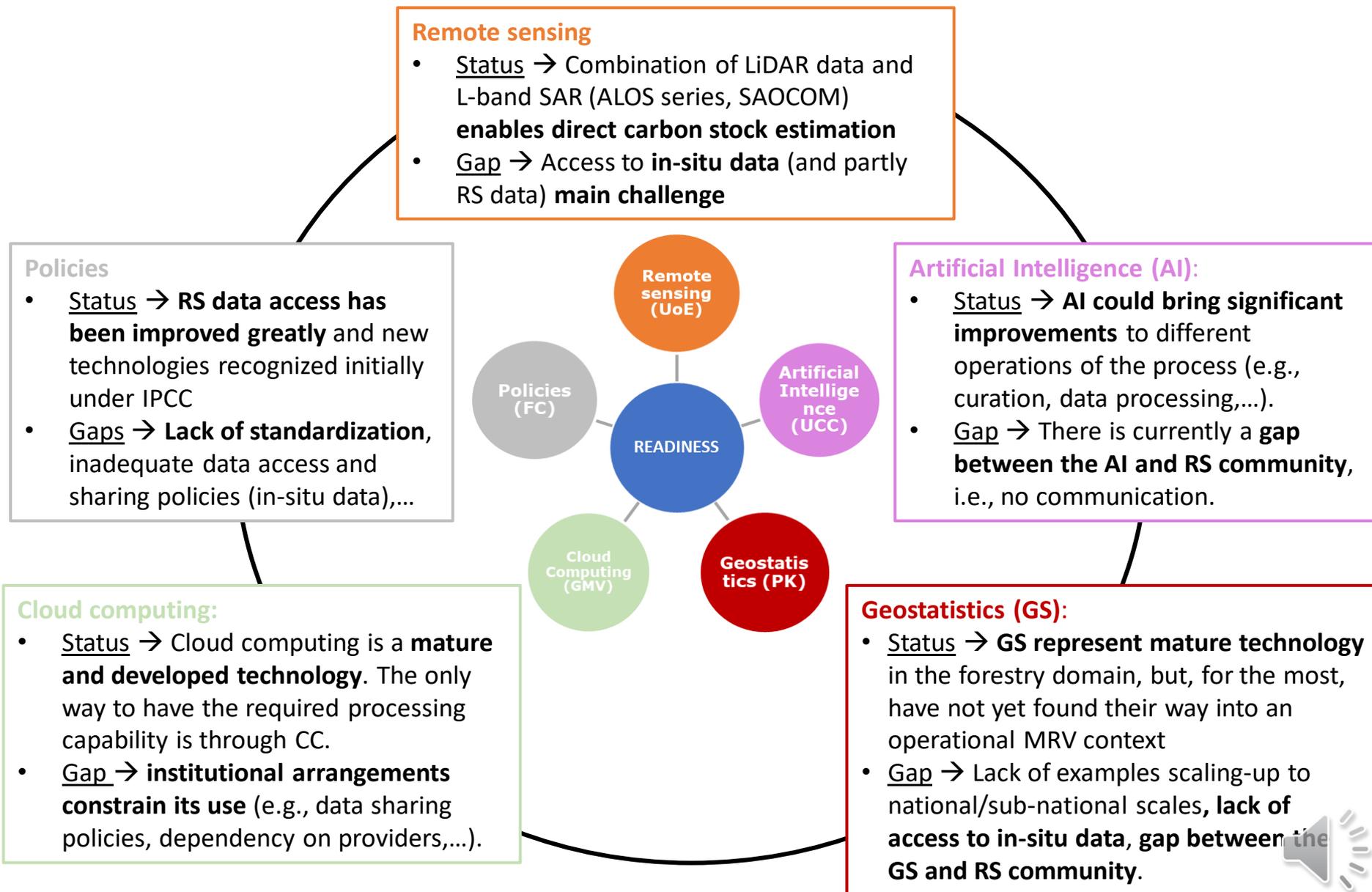
The importance of forests is recognized by the parties to the PA, 75 percent of whom have included forest sector targets in their first Nationally Determined Contributions (NDCs) (IUCN and Climate Focus, 2018). Forest sector targets are estimated

Increased ambition will be needed in order to achieve current NDCs and bridge the existing gap. The relatively protracted nature of MRV processes (up to 21 months) translates into significant delays in finance mobilization. Moreover, MRV approaches may lead to estimates that incorporate significant uncertainties (Yanai et al., 2020) and these may erode confidence in the quality of Emission Reductions. Furthermore, MRV approaches vary across countries and markets, creating challenges for the fungibility and comparability of claims at different scales (Taskforce on scaling voluntary carbon markets, 2021; Streck et al., 2021). This lack of standardization, and the absence of spatially explicit estimates, tend to complicate the reconciliation of claims, not only at the level of programs and projects, but also at the national level. The consequence—when it is so difficult to attribute ERs or create an accounting framework

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INNOVATIVE TECHNOLOGIES – STATUS AND GAPS



HOW CAN WE GET TO THE SOLUTION?

- The report describes **technological challenges**, and **recommendations** for overcoming them related to five areas:
 - data availability and access;
 - processing and computational performance;
 - uncertainty management;
 - standardization and protocols; and
 - Enabling environments



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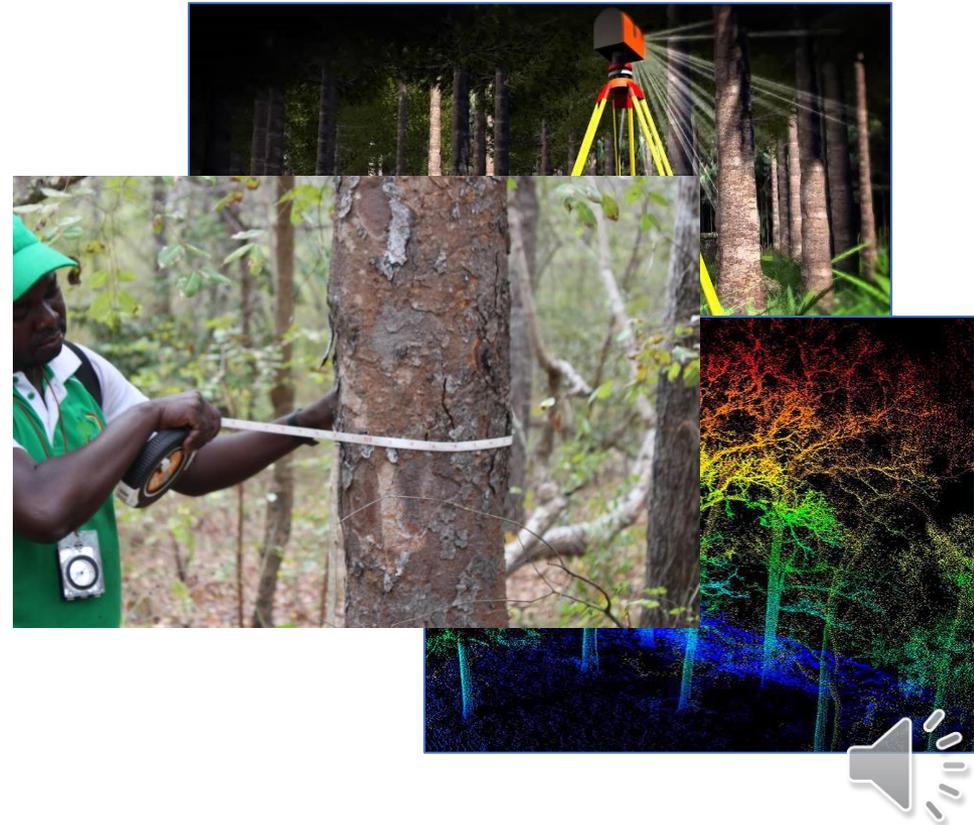
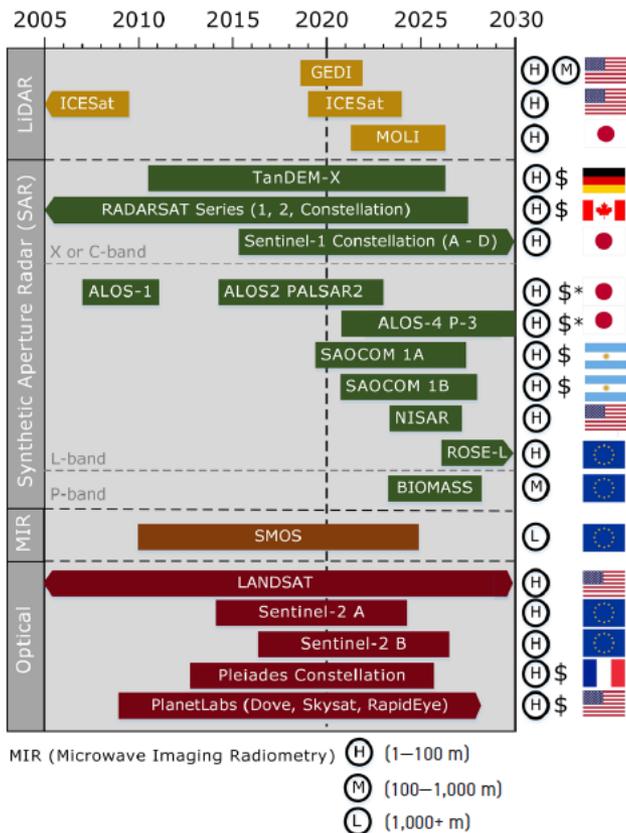
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CHALLENGES

The golden age of Remote Sensing, with a plethora of spaceborne sensors, however....

...there are many challenges, but the main challenge to enable an EO-based system is the lack of appropriate high quality *in-situ* data



RECOMMENDATIONS

- **Data availability and access**
 - Seek international partnerships to **facilitate access to data**, i.e., in-situ data, RS data,...
 - Supporting existing efforts in **in-situ data collection** (i.e. Global Forest Biomass Reference).
- **Processing and computational performance**
 - Support the integration of new approaches (i.e. AI, GS) in traditional ones
 - Support the **convergence of techniques between research groups**
 - Build a centralized cloud computing system to enable accessibility, new algorithms,...
- **Uncertainty management**
 - Pilot the implementation of GS / AI through **demonstration activities**
 - Include estimates of error propagation from the input data to the final output in MRV sys
- **Standardization and protocols**
 - Develop standards and protocols for data collection and development of components
 - Promote **data protection and security**.
- **Enabling environments**
 - **Support data policies** (in-situ and RS data): access and sharing.
 - Create incentivization mechanisms for data sharing, communication, etc.
 - Creation of a perceived neutral entity that coordinates these actions (similar to WMO).
 - Establish cross-communication among experts and users.
 - Invest in **research, training, and knowledge transfer**.
 - Create the necessary **financial public and private support** mechanisms
 - Engage stakeholders to build confidence on new approaches





WORLD BANK GROUP
Climate Change

THANK YOU!

