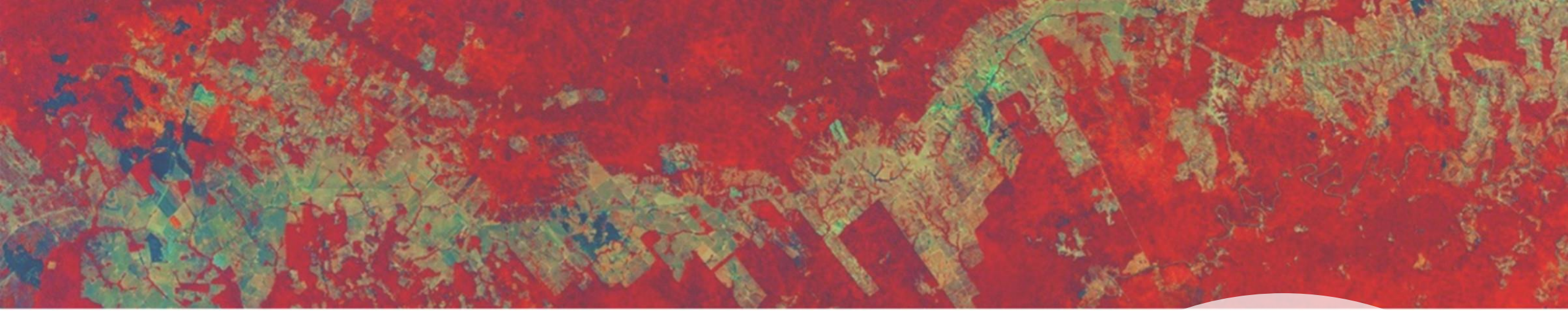


GEO CLIMATE WORKSHOP
POLICY + FINANCE

21-23 SEPTEMBER 2021

Welcome!

The meeting is starting soon

Since 2019 Dr Sara Venturini has been leading GEO's work to advance the use of Earth observations in support of climate action by UN member countries and partners. She has over 12 years' professional experience collaborating with UN bodies and advising governments and organisations on developing climate change adaptation policies, accessing climate finance, and participating in multilateral negotiations under the United Nations Framework Convention on Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (IPCC). As a climate change advisor, she has worked with countries in the Caribbean and Indian Ocean, the Western Balkans, Central Asia, the Middle East, and Europe. She put her scientific expertise at the service of art projects, including the film anthology "Interdependence" that premiered at the Film Festival of Rome in 2019. She holds a PhD in Climate Change Science and Management from Ca' Foscari University of Venice, Italy.

Sara Venturini
Climate Coordinator
GEO Secretariat

GEO Climate Policy + Finance Workshop

Structure

Day 2: EO for collective ambition on climate

Day 2: Earth observations for collective ambition on climate

Opening of Day 2		
15.00-15.05 (5 min)	Introduction Welcome and recap from Day 1	**Sara Venturini** Climate Coordinator, GEO Secretariat
Session 1: EO needs towards the global stocktake		
15.05-15.10 (5 min)	Setting the scene: Role of EO to support the assessment under the global stocktake	**Joanna Post** Programme Officer, UNFCCC Secretariat
15.10-15.15 (5 min)	IPCC assessments and EO gaps/needs in view of the global stocktake	**Thelma Krug** Vice-Chair, IPCC TOPC Chair, GCOS
15.15-15.20 (5 min)	Developing countries' needs for collective ambition within the REDD+ mechanism	**Federica Bietta** Managing Director, Coalition for Rainforest Nations

Day 2: Earth observations for collective ambition on climate

Session 2: EO capabilities to support the global stocktake		
15.20-15.30 (10 min)	Mapping of GHG monitoring capabilities from space	**Veronika Neumeier** Consultant, GEO Secretariat **Aaron Davitt** WattTime, ClimateTRACE **Barbara Ryan** Executive Director, WGIC
15.30-15.40 (10 min)	Linking EO and the Global Efforts on Emission Reduction and Climate Ambition	**David Crisp** Greenhouse Gas Lead for the CEOS Atmospheric Composition Virtual Constellation (AC-VC), NASA JPL
15.40-15.50 (10 min)	The relevance of high-frequency, global coverage for EO	**Andrew Zolli** Vice President of Global Impact Initiatives, Planet / Carbon Mapper
15.50-16.00 (10 min)	Accelerating methane mitigation from the energy sector through integration of data and beyond	**Giulia Ferrini** Programme Management Officer, Oil & Gas Methane Partnership, IMEO, UNEP **Manfredi Caltagirone** Acting Head, IMEO, UNEP
16.00-16.20 (20 min)	Q&A Open discussion: • How can the broader EO community involving public and private initiatives most effectively support the needs around the global stocktake? • Are there any immediate capabilities and how should these be exploited to support the global stocktake? What additional capabilities should be developed?	All speakers Moderator: **Mark Dowell** GEO CC-WG Co-Chair, EC JRC
Short break		

Day 2: Earth observations for collective ambition on climate

Session 3: GEO WP activities supporting the global stocktake		
16.30-16.40 (10 min)	GEO Blue Planet: global eutrophication indicators and tool	**Emily Smail** Co-chair, GEO Blue Planet, NOAA
16.40-16.50 (10 min)	GFOI: bridging top down and bottom up estimates to drive ambition • An update from GFOI Lead partner CEOS on the delivery of global AFOLU products to support for the GST • Summary remarks from the Chair of GFOI's Advisory Group on the importance of country engagement in the GST and reconciling differences with national GHG inventories	**Osamu Ochiai** CEOS Lead to GFOI, JAXA **María José Sanz Sanchez** Chair, GFOI's MGD Advisory Group, BC3
16.50-17.00 (10 min)	GWIS: providing EO data on wildfires for early warning systems at the regional and global scale	**Jesús San-Miguel Ayanz** Co-chair, GWIS, EC JRC
17.00-17.10 (10 min)	GEO Mountains: contributing to global climate impact assessments in mountain areas	**Carolina Adler** Co-Lead, GEO Mountains Executive Director, MRI
17.10-17.20 (10 min)	GEO BON: Essential Biodiversity Variables contributing to the global assessment of adaptation	**Gary Geller** Senior Science System Engineer, GEO BON, NASA JPL
17.20-17.30 (10 min)	GEO Human Planet: Essential Societal Variables contributing to the global assessment of adaptation	**Daniele Ehrlich** Co-Lead, GEO Human Planet, EC JRC
17.30-17.50 (20 min)	Q&A Open Discussion: • How can GEO support the global stocktake with targeted EO-based products? • Are there any perceived gaps/synergies in the GEO WP to address the global stocktake? If so, how should these be addressed / exploited?	All speakers Moderator: **Mark Dowell** GEO CC-WG Co-Chair / EC JRC
17.50-18.00 (10 min)	Wrap-up of Day 2	**Sara Venturini** Climate Coordinator, GEO Secretariat

Workshop protocol

- Change your name into ‘Organisation: Name Surname’
- Participants: use the Q&A box for questions
- Speakers: keep within time limits
- Be aware that the meeting will be recorded for workshop report
- Twitter **#EO4IMPACT** and follow @GEOSEC2025

Session 1

EO needs towards the Global Stocktake

Joanna is programme management officer for research and systematic observation and leads the negotiations on this SBSTA agenda item and liaison with the science community. She also leads secretariat support for strengthening ocean-related action and engagement.

Prior to joining the secretariat, she was communications manager for a number of national and international research and educational programmes in both the UK and Germany. She holds a Ph.D. in environmental science from the University of Newcastle Upon Tyne, UK.

Joanna Post
Programme Management Officer
UNFCCC secretariat

GEO CLIMATE POLICY AND FINANCE WORKSHOP

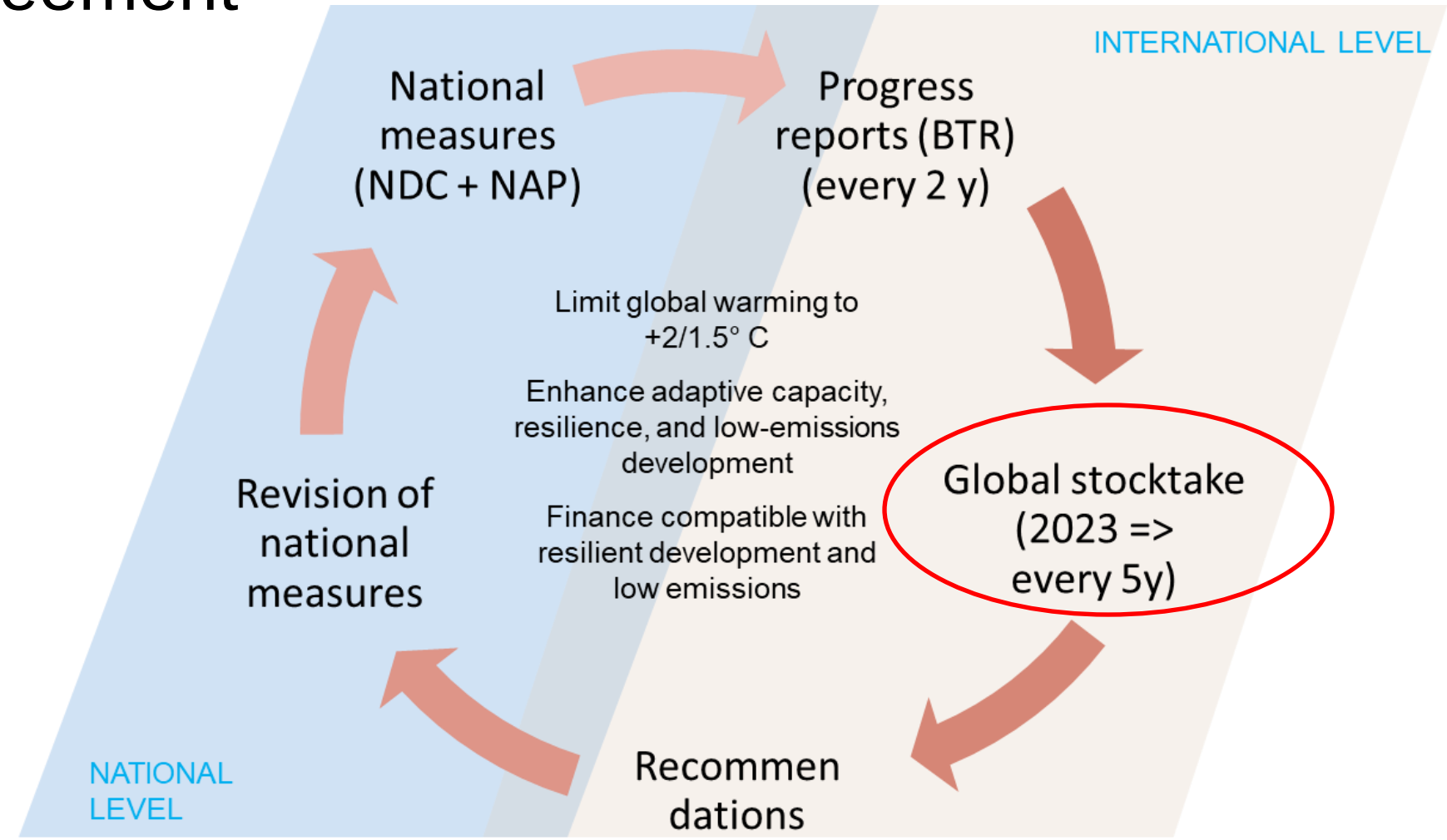
Setting the scene: Role of EO to support the assessment under the global stocktake

Joanna Post, UNFCCC Secretariat
22 September 2021

GROUP ON EARTH OBSERVATIONS

#EO4IMPACT

Paris Agreement



Global Stocktake - the What

Paris Agreement Article 14

- Take stock of the implementation of the Paris Agreement
- First GST in 2023 and then every 5 years
- Outcome shall inform Parties in updating and enhancing NDCs and international cooperation for climate action

Global Stocktake - the Themes

Mitigation

- Overall effect of NDCs
- State of GHG emissions and removals and mitigation efforts undertaken by Parties

Adaptation

- Observed and projected risks
- State of adaptation efforts, support, experiences and priorities

Finance flows and means of Implementation and support

- Finance flows and financial support
- Technology
- Capacity-Building

Cross cutting:

- Address the social and economic consequences and impacts of response measures;
- Avert, minimize and address loss and damage associated with the adverse effects of climate change
- Fairness consideration including equity as communicated by Parties in their NDCs

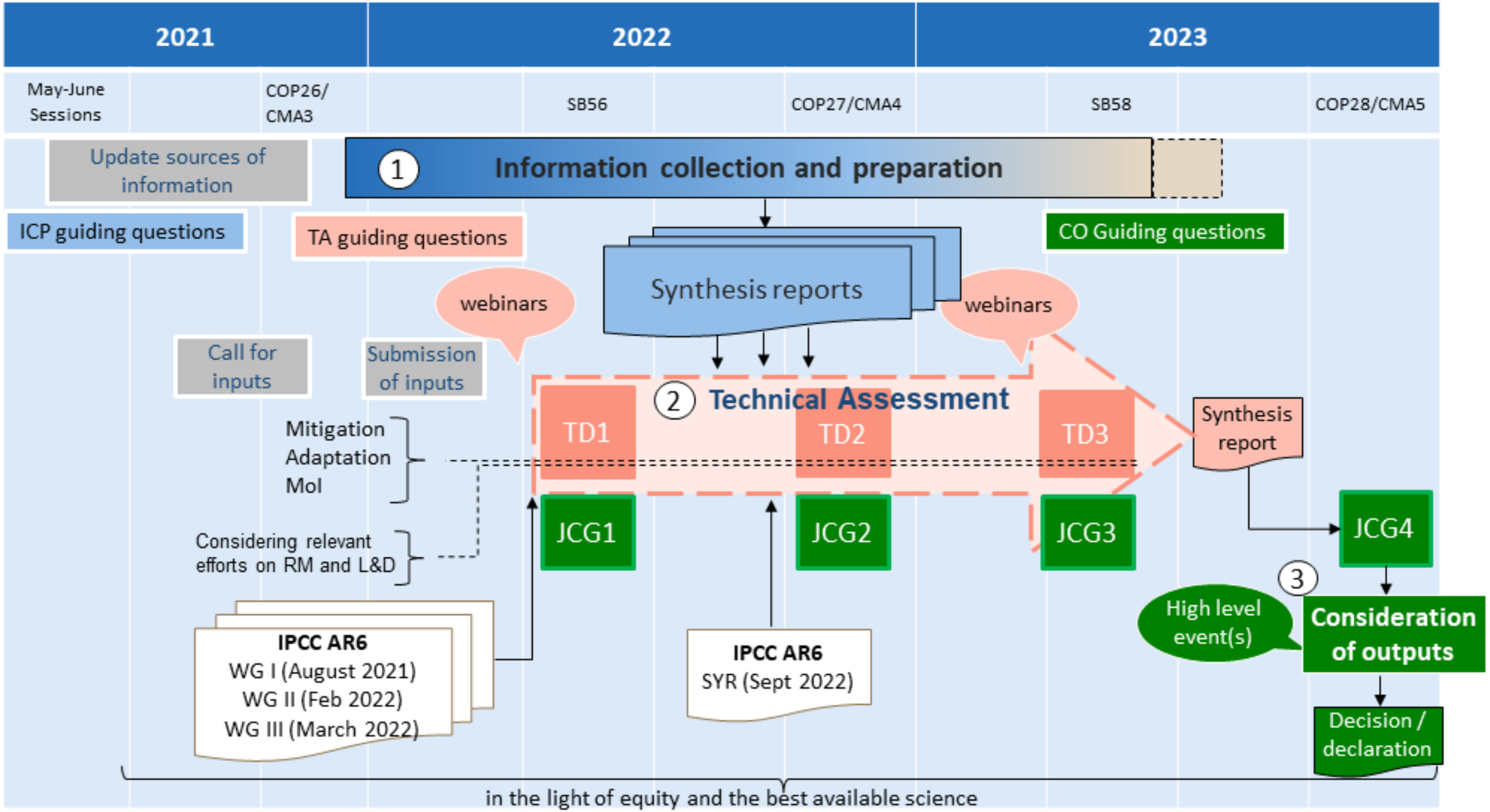
Global Stocktake - the How

Katowice climate package: Decision 19/CMA.1

1. Information collection and preparation
2. Technical assessment
3. Consideration of outputs

Guiding questions for each stage

Revised non-paper by the SB Chairs *(September 2021)*


2021
2022
2023
May-June Sessions
COP26/ CMA3
SB56
COP27/CMA4
SB58
COP28/CMA5
Update sources of information
1 Information collection and preparation
ICP guiding questions
TA guiding questions
CO Guiding questions
webinars
Synthesis reports
webinars
Call for inputs
Submission of inputs
2 Technical Assessment
TD1
TD2
TD3
Synthesis report
Mitigation
Adaptation
MoI
Considering relevant efforts on RM and L&D
JCG1
JCG2
JCG3
JCG4
3
High level event(s)
Consideration of outputs
Decision / declaration
IPCC AR6
WG I (August 2021)
WG II (Feb 2022)
WG III (March 2022)
IPCC AR6
SYR (Sept 2022)
in the light of equity and the best available science

Importance of the GST for the EO community and vice versa

- EO is the foundation for action on the Paris Agreement
- Provide input to the GST themes with a pledge and review approach in five year cycles
  - Mitigation – GHG and temperature trends/projections - support to Parties for their GHG monitoring and reporting
  - Adaptation – observed/ projected impacts and risks – information/indicators for and on adaptation to measure progress
  - MOI – state of progress to support developing countries
  - Cross- cutting – support to NDCs/NAPs – information on loss and damage (managing risk)
- Aggregation of information, preparation of a coordinated input – via a synthesis report
  - At Party-level to improve accuracy / detail / identification of how many/who/what
  - At global level to support understanding of where we are and what is possible in the future
  - EO has a large role to play moving forward
  - Deadline for inputs February 2022

Thank You!

Joanna Post / 22.09.2021
@drjpost / jpost@unfccc.int
https://unfccc.int/topics/global-stocktake

#EO4Impact

Thelma Krug is a former senior researcher at the National Institute for Space Research (INPE) in Brazil. She was elected Vice-Chair of the Intergovernmental Panel on Climate Change (IPCC) for the Sixth Cycle (October 2015 – October 2022), after having been co-chair of the IPCC Task Force on National GHG Inventories from 2002 until 2015.

Thelma is also the Chair of the Terrestrial Observation Panel for Climate (TOPC) of the Global Climate Observing System (GCOS), set up to develop a balanced and integrated system of in situ, air- and spaceborne observations of the terrestrial domain.

Throughout her career, she has held high-level positions at the Ministry of Science, Technology, Innovation and Communication (MCTIC) and at the Ministry of the Environment (MMA) in Brazil. For more than 15 years she represented Brazil in the negotiations at the United Nations Framework Convention on Climate Change (UNFCCC).

She holds a PhD on Spatial Statistics from the University of Sheffield, UK.

Thelma Krug

IPCC Vice-Chair

TOPC Chair, GCOS

GEO CLIMATE POLICY AND FINANCE WORKSHOP

IPCC assessments and EO gaps/needs in view of the global stocktake

Thelma Krug, IPCC Vice-Chair and GCOS TOPC Chair

22 September 2021

GROUP ON EARTH OBSERVATIONS

#EO4IMPACT

Thank You!

#EO4Impact

Ms. Federica Bietta is the Managing Director of the Coalition for Rainforest Nations. Ms. Bietta is an internationally recognized expert in the development of international agreements related to climate change and specific mechanisms that include emissions resulting from tropical deforestation.

She has held a leadership role in the Coalition's REDD Program since its inception in 2008. Previously, Ms. Bietta was actively involved in the design and implementation of both the Forest Carbon Partnership Facility of the World Bank and the UN-REDD programme. Until December 2012, she led CfRN's activities within the REDD+ Partnership, serving as this body's inaugural Co-Chair in 2010. Before joining the CfRN, Ms. Bietta worked for a major European bank and forged professional relationships with Fortune 500 Companies such as: Tyco, General Electric, ADP, AIG and IBM. Raised in Italy, Federica Bietta earned a Bachelor of Science degree in Economics and Finance from the University of Perugia. Ms. Bietta earned MBAs from Columbia Business School and the London Business School.

Federica Bietta
Managing Director
Coalition for Rainforest Nations

GEO CLIMATE POLICY AND FINANCE WORKSHOP

Developing countries' needs for collective ambition within the REDD+ mechanism

Federica Bietta, Managing Director of the Coalition for Rainforest Nations

22 September 2021

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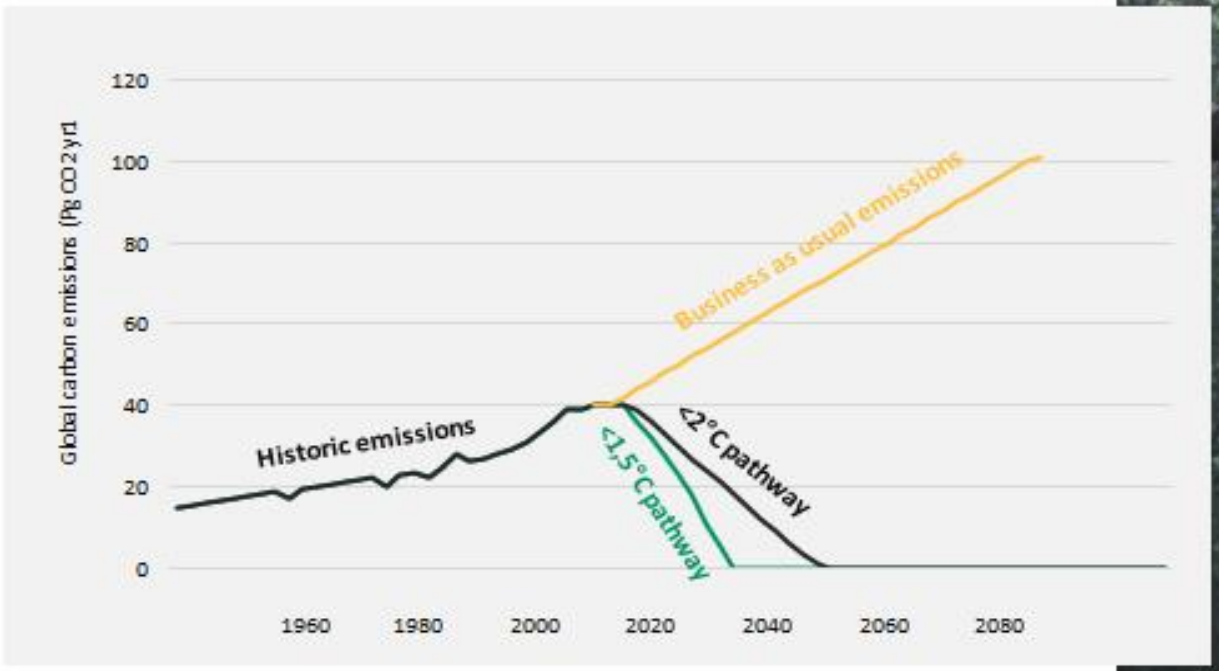
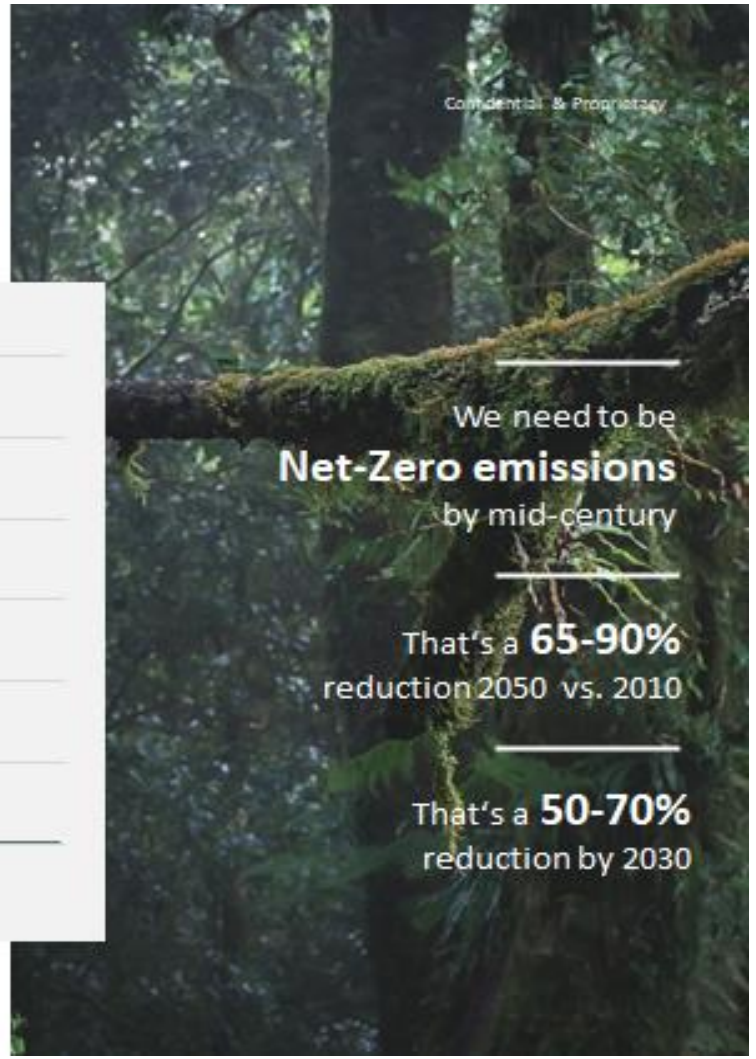
#EO4IMPACT

The Climate Emergency requires nothing short of an emissions nose-dive



Source: IPCC Special Report 2018



The REDD+ Mechanism has already reduced deforestation at scale

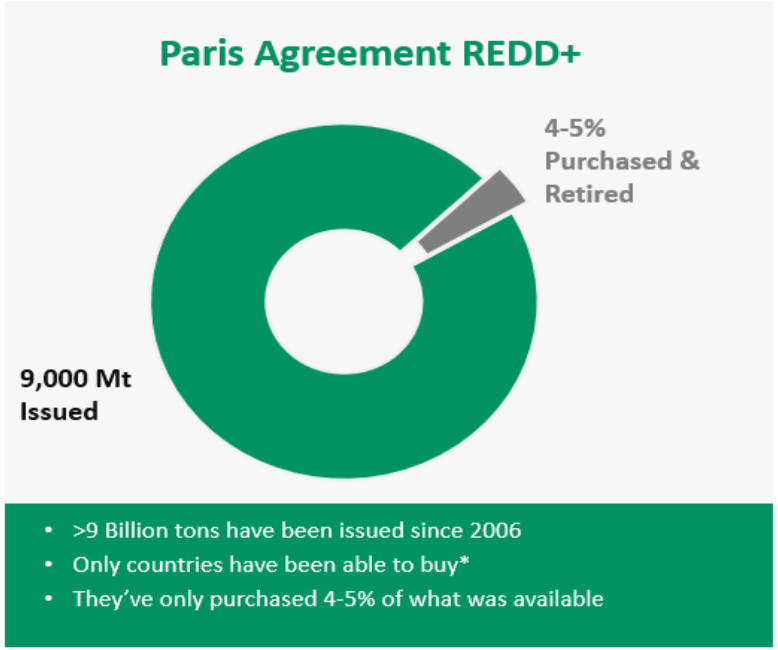
90% of the world's tropical forest is included in the **REDD+ Mechanism**

60+ countries are actively engaged in the **REDD+ Mechanism** submitting goals and updates to the UNFCCC

Results so far show that **9 bn** tons of carbon emissions were reduced by **REDD+** from 2010 to 2018

Source: UN REDD+ Information Hub

REDD+ Mechanism is not currently capitalized



* Purchasers to date have been EU and governments of Denmark, Japan, Luxembourg, Norway, Spain and Switzerland

Source: UNFCCC REDD+ Hub, Verra, Gold Standard, Plan-Vivo

Implementation challenges and needs

- **We have the Global REDD+ Mechanism which could provide necessary reduction at scale if capitalized**
- **The Global Stock take must have reliable data**
- **Countries must have transparent, reliable, consistent and as accurate estimates of their emissions and removals**
- **Systematic collection of field data to validate satellite information are time consuming and costly**
- **Enormous amount of Data to be stored for many years to allow comparability is costly**
- **International cooperation and capacity building is key**

CfRN – GEO – INPE - Mozambique Partnership

- CfRN has established a partnership with GEO to explore the use of big Earth Observation data
- Wall-to-Wall maps from 1990 until 2019 are being produced using the latest technology with spatial resolution of 30 meters
- In situ data with the point location references are necessary for the application of machine learning methods
- Preliminary results have been presented and currently Mozambique is using the Wall-to-Wall Method vs. Data Cubing for implementing an algorithm with the Collect Earth samples

Coalition for Rainforest Nations

Thank You!

For more info, please contact:
federica@cfrn.org

Coalition for Rainforest Nations

Session 2

EO capabilities to support the Global Stocktake

Veronika is a Sustainability Professional with over 7 years of work experience in the Caribbean, Asia and Europe, and focuses on Climate Policy, SDG action and public-private collaboration. Veronika is supporting the GEO Secretariat and the Climate Change Working Group as Climate Change Consultant.

She is the Founder of Vision Analytics.
She holds a MSc in Geography by FSU Jena, and a MSc in International Management by VU Amsterdam, and worked at the Helmholtz Association for Environmental Research (iDIV), and the World Business Council for Sustainable Development (WBCSD).

Veronika Neumeier
Climate Change Consultant
GEO Secretariat

Aaron is a remote sensing analyst at WattTime, where he identifies remote sensing datasets that can be used to monitor power plants emissions. As part of Climate TRACE, he supports the coalition members with incorporating remote sensing data into their monitoring efforts.

Previously, Aaron earned his Ph.D. degree at the City University of New York, New York, NY, USA. His primary research focused on combining optical-infrared, thermal and microwave satellite remote sensing to inform on crop water-use, stress, and growth of staple- and high-value crops. His other research topics included improved flood monitoring with passive microwave remote sensing and communicating science to the public.

Aaron Davitt
Principal Analyst, Remote Sensing

WattTime™

Under Ms. Ryan's leadership, millions of satellite images have been made publicly available, allowing policy makers to make better-informed decisions on a range of environmental issues. Barbara has held Senior positions with the USGS, WMO, GEO, and is now the Executive Director of the World Geospatial Industry Council (WGIC) – a not-for-profit trade association of private companies working in the geospatial and Earth observation sectors. She serves on several Boards, including the Jane Goodall Institute, Data4Development Insights (D4DInsights), the U.K.-based Ecological Sequestration Trust, the International Center for Remote Sensing and Environment (ISRSE), and chairs the SocioEconomic Data and Applications Center (SEDAC) Working Group and the START Board of Directors for training, education and research for sustainability challenges.

Barbara J. Ryan
Executive Director
World Geospatial Industry Council (WGIC)

GEO CLIMATE POLICY AND FINANCE WORKSHOP

Mapping of GHG Monitoring Capabilities from Space

Veronika Neumeier (GEO Consultant) / Aaron Davitt (WattTime) / Barbara J. Ryan (WGIC)

22 September 2021

GROUP ON EARTH OBSERVATIONS

#EO4IMPACT

Joint Report: GHG Monitoring from Space - a mapping of capabilities across public, private and hybrid missions

- **Outcome of the virtual** "**Forum on Innovation in Remote Sensing Technologies for accelerated Climate Action**" on 14 December 2020, supported by former U.S. Vice President Al Gore and the UK High-Level Climate Action Champion, Nigel Topping
- **Mapping:** To strengthen the understanding of **how Earth Observations can contribute to National GHG Inventories and Global Stocktake,** by providing **a full picture** of currently available and upcoming GHG monitoring capabilities from space, provided by **both public and commercial satellite missions**
- **Partners:** GEO, World Geospatial Industry Council (WGIC) and WattTime(Climate TRACE)
- **Target audience:** Climate Policy Makers (UNFCCC National Focal Points and delegates), and EO Community
- **Methodology:** Comprehensive database of relevant missions supporting GHG emission monitoring, including commercial efforts

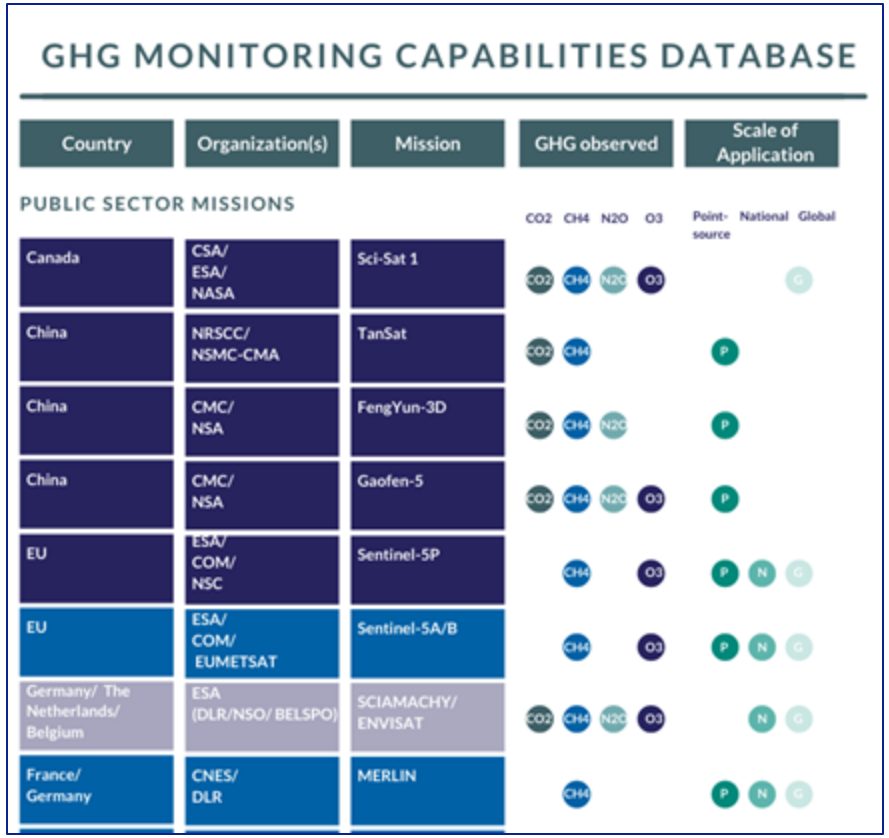
CLIMATE TRACE · GEO GROUP ON EARTH OBSERVATIONS · RACE TO ZERO · WGIC World Geospatial Industry Council

United Nations Climate Change

Development of the first systematic database - public, private & hybrid missions for GHG monitoring from Space

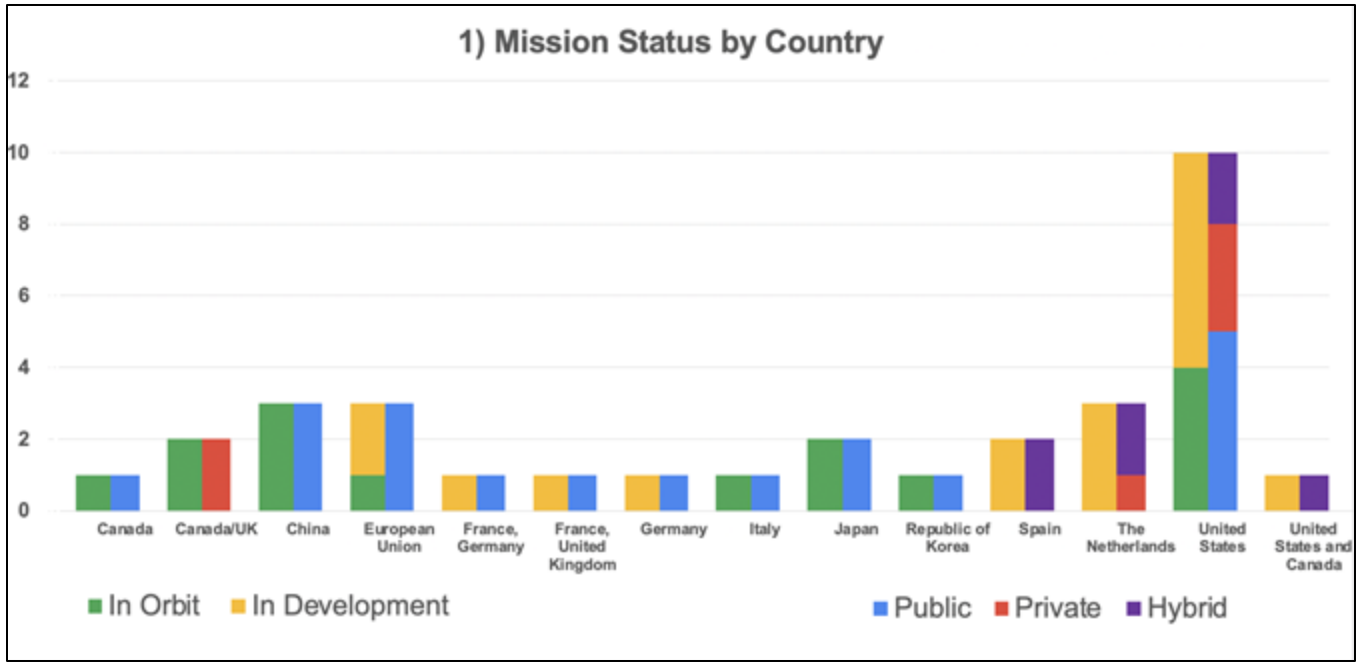
GHG Monitoring from Space - Public, Private and Hybrid Satellite Missions

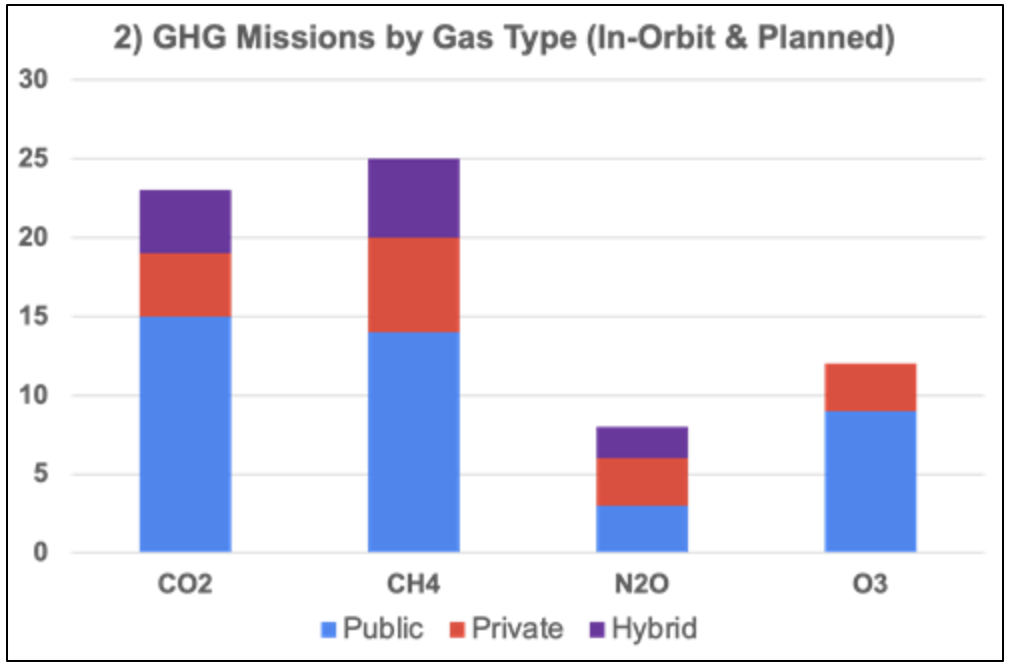
Country, Organization, Mission and Instrument					*GHG Observed*				*Scale of Application*			*Data Access*	*For more information*
Country	Organization	Mission	Status	Mission Goal	CO2	CH4	N2O	O3	Point-Source level	National level	Global level	Open source, Registration required, Paid subscription	Cross-reference for more information on the specific instrument
Public (TOTAL MISSIONS: 20)													
Canada	CSA/ESA/NASA	SciSat-1	In Orbit	The overall objective is to monitor and analyze the chemical processes that control the distribution of ozone in the upper troposphere and stratosphere. In particular, ACE is focussing on one important and serious aspect of the atmospheric ozone problem - the decline of stratospheric ozone at northern mid-latitudes and in the Arctic. A comprehensive set of simultaneous measurements of trace gases, thin clouds, aerosols and temperature are being collected by solar occultation from low earth orbit.	X	X	X	X			X	Registration required	https://earth.esa.int/eogateway/missions/scisat-1; http://database.eohandbook.com/database/missionsummary.aspx?missionID=394; https://directory.eoportal.org/web/eoportal/satellite-missions/s/scisat-1
China	NRSCC, NSMC-CMA	TanSat	In Orbit	The main objective of the TanSat mission is to retrieve the atmosphere column-averaged CO2 dry air mole fraction (XCO2) with precisions of 1% on national and global scales.	X	X			X			Registration required	https://earth.esa.int/web/eoportal/satellite-missions/t/tansat
China	CMC/NSA	FengYun-3D	In Orbit	Main mission: operational meteorology. Substantial contribution to ocean and ice monitoring, climate monitoring, atmospheric chemistry and space weather.	X	X	X		X			Registration required	https://fy4.nsmc.org.cn/nsmc/en/satellite/index.html;
China	CNSA	Gaofen-5	In Orbit	Hyperspectral observation of Earth's environments to track environmental impacts, water quality, and atmospheric change	X	X	X	X	X			Registration required	https://nssdc.gsfc.nasa.gov/nmc/spacecraft/display.action?id=2018-043A; CEOS 2018 https://ieeexplore.ieee.org/document/9115237; https://www.nasaspaceflight.com/2021/09/gaofen-5-02/
EU	ESA, EUMETSAT/ ECMWF.	CO2M	In Development	The Copernicus Carbon Dioxide Monitoring mission (CO2M) will focus on measuring carbon dioxide and methane esmissions, which are released into the atmosphere specifically through human activity. This CO2-MVS is part of the next Copernicus program component, collecting atmospheric CO2 measurements obtained from dedicated space-borne sensors, and complemented by in-situ networks and ancillary observations	X	X			X	X			https://www.esa.int/ESA_Multimedia/Images/2021/02/CO2M; https://www.eumetsat.int/copernicus-co2m-science-support https://www.eumetsat.int/copernicus-co2m-science-support; https://www.spiedigitallibrary.org/conference-proceedings-of-spie/11852/118523M/The-Copernicus-CO2M-mission-for-monitoring-anthropogenic-carbon-dioxide-emissions/10.1117/12.2599613.full?SSO=1
EU	ESA/COM/NSC	Sentinel-5P	In Orbit	The Copernicus Sentinel 5 Precursor (S5P) is the first of the European Sentinel satellite dedicated to monitoring of atmospheric		X		X	X	X	X	Open Source	https://sentinel.esa.int/web/sentinel/missions/sentinel-5p; CEOS 2018



**We are presenting preliminary findings, informing the final report.*

Findings





**We are presenting preliminary findings, informing the final report.*

EO Key Message and Inputs

Key messages for review until 1 October 2021: Link

1. **EO from space reduce uncertainty in GHG emission monitoring result**
2. **Public space agencies are collecting national and global baseline data**
3. **Private sector companies are increasingly entering the market with point-source monitoring**
4. **Hybrid models are increasingly emerging and leveraging strengths**
5. **Collaboration, innovation and financing are key levers for GHG monitoring from space**
6. **Open data, open science and open knowledge are essential to drive on-the-ground solutions**

Thank You!

Veronika Neumeier/ Aaron Davitt / Barbara J Ryan

veronika.neumeier@outlook.com/ aaron@watttime.org / barbara.ryan@wgicouncil.org

#EO4Impact

Dr. David Crisp is an atmospheric physicist at the NASA Jet Propulsion Laboratory (JPL), California Institute of Technology.

Dave was the Principal Investigator of the Orbiting Carbon Observatory (OCO), NASA's first mission designed to measure atmospheric carbon dioxide (CO_2) with the sensitivity, accuracy, resolution and coverage needed to quantify emissions and removals on regional scales. He is currently serving as the Science Team Leader for NASA's OCO-2 and OCO-3 missions. He is also a member of the Science Team for the NASA Earth Ventures Geostationary Carbon Cycle Observatory (GeoCarb) and a member of the European Copernicus CO_2 Monitoring (CO2M) Mission Advisory Group.

Dave is serving as the Greenhouse Gas Lead for the Committee on Earth Observation Satellites (CEOS) Atmospheric Composition - Virtual Constellation and a member of the Working Group on Climate Greenhouse Gas Task Team.

David Crisp

Senior Research Scientist

Jet Propulsion Laboratory/California Institute of Technology

GEO CLIMATE POLICY AND FINANCE WORKSHOP

Linking EO and the Global Efforts on Emission Reduction and Climate Ambition

David Crisp for the CEOS Atmospheric Composition Virtual Constellation (AC-VC) /Jet Propulsion Laboratory, California Institute of Technology

22 September 2021

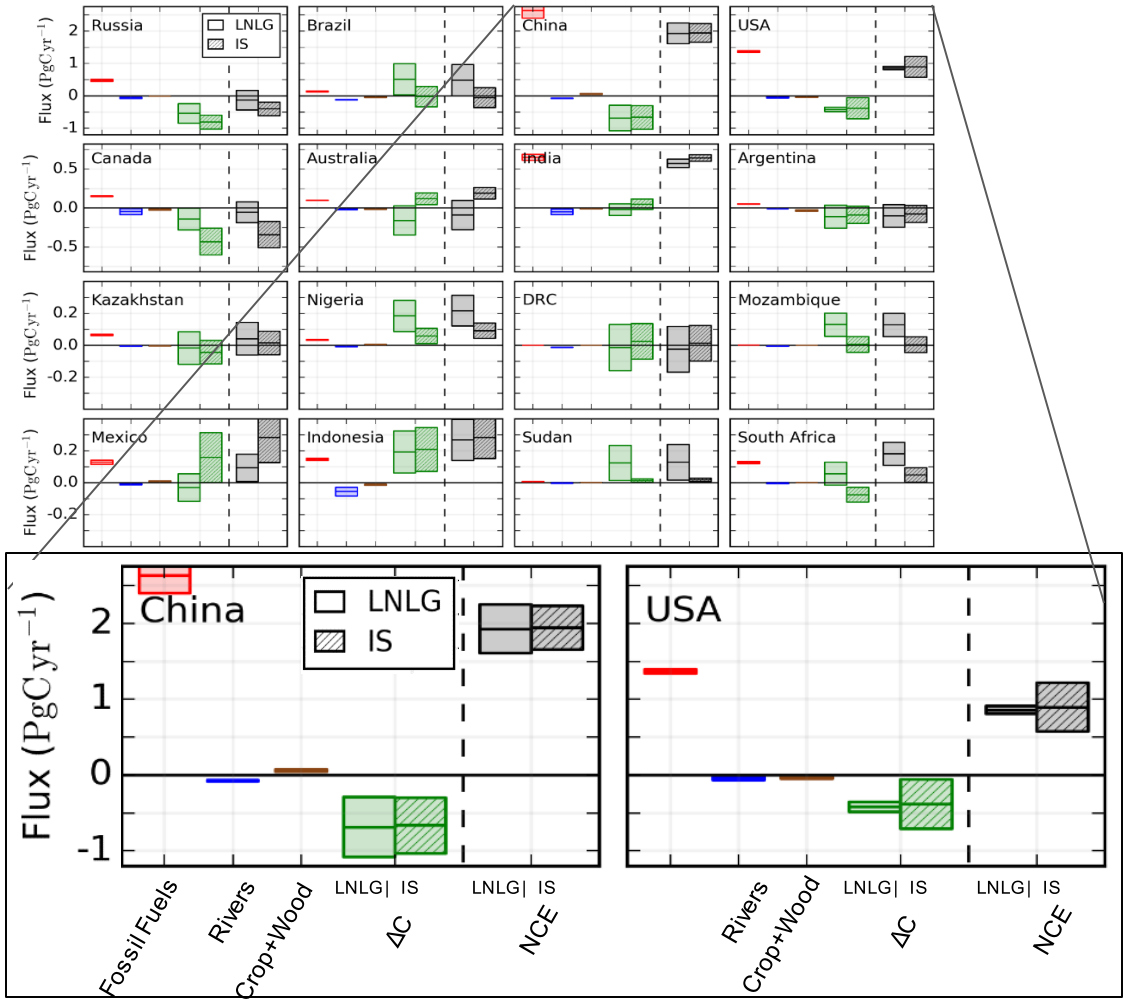
GROUP ON EARTH OBSERVATIONS

#EO4IMPACT

Top-down and Bottom-up Methods for Tracking GHGs

- To support the 2023 Global Stocktake (GST), Parties to the Paris Agreement are compiling inventories of greenhouse gas (GHG) emissions and removals to assess progress toward their Nationally Determined Contributions (NDCs) to emission reductions.
  - Bottom-up inventories estimate emissions and removals of GHGs using methods specified in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
- GHG emissions and removals can also be estimated from top-down measurements of their concentrations using atmospheric inverse methods.
  - These methods are not as process-specific as bottom-up inventories
  - Complement bottom-up methods by providing a transparent, integrated constraint on fluxes from all processes on sub-national to global scales.

Carbon stock changes from CO_2 Emissions/Removals



Plots by Brendan Byrne (NASA/JPL) and the OCO-2 Flux MIP

In situ (IS) and OCO-2 (LNLG) CO_2 data inform the **Net Carbon Exchange (NCE)** between surface and atmosphere.

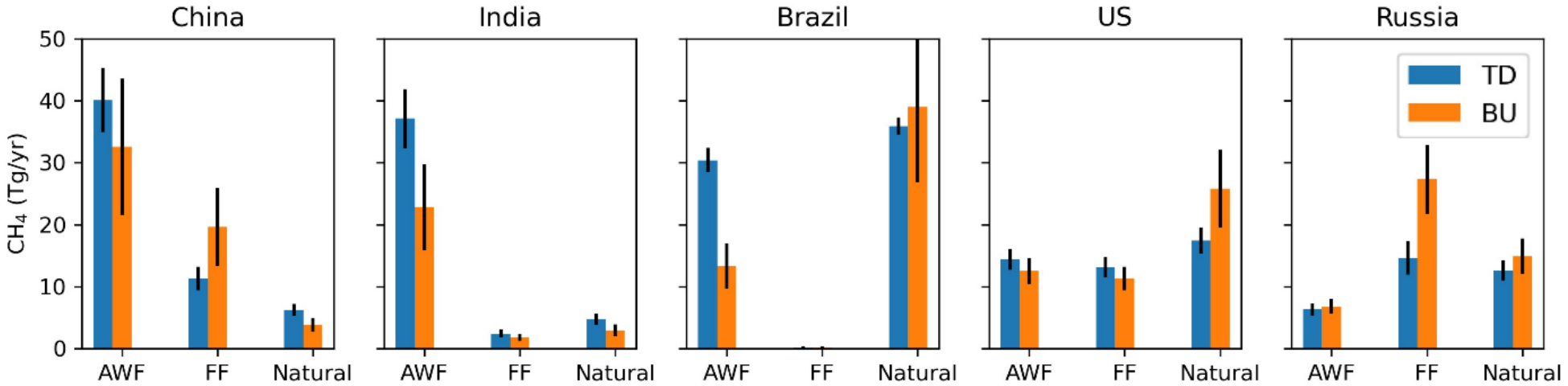
- NCE can be further subdivided into fossil fuel emissions (FF), lateral carbon fluxes due to rivers, crop, and wood, and **changes in carbon land carbon (ΔC):**

$$NCE = FF + River_{lateral} + Crop{+}Wood_{lateral} + \Delta C$$

- **ΔC can be compared with bottom-up estimates of carbon stock changes**

CH_4 Emissions by Sector and Country

- Satellite based top-down observations can resolve CH_4 emissions by sector & Country:
  - Can resolve total emissions for about 58 countries
- Top 5 emitting countries emit about half of all anthropogenic CH_4 emissions
  - Consistent with bottom-up inventory data
- Most emissions are from the agricultural sector, primarily livestock

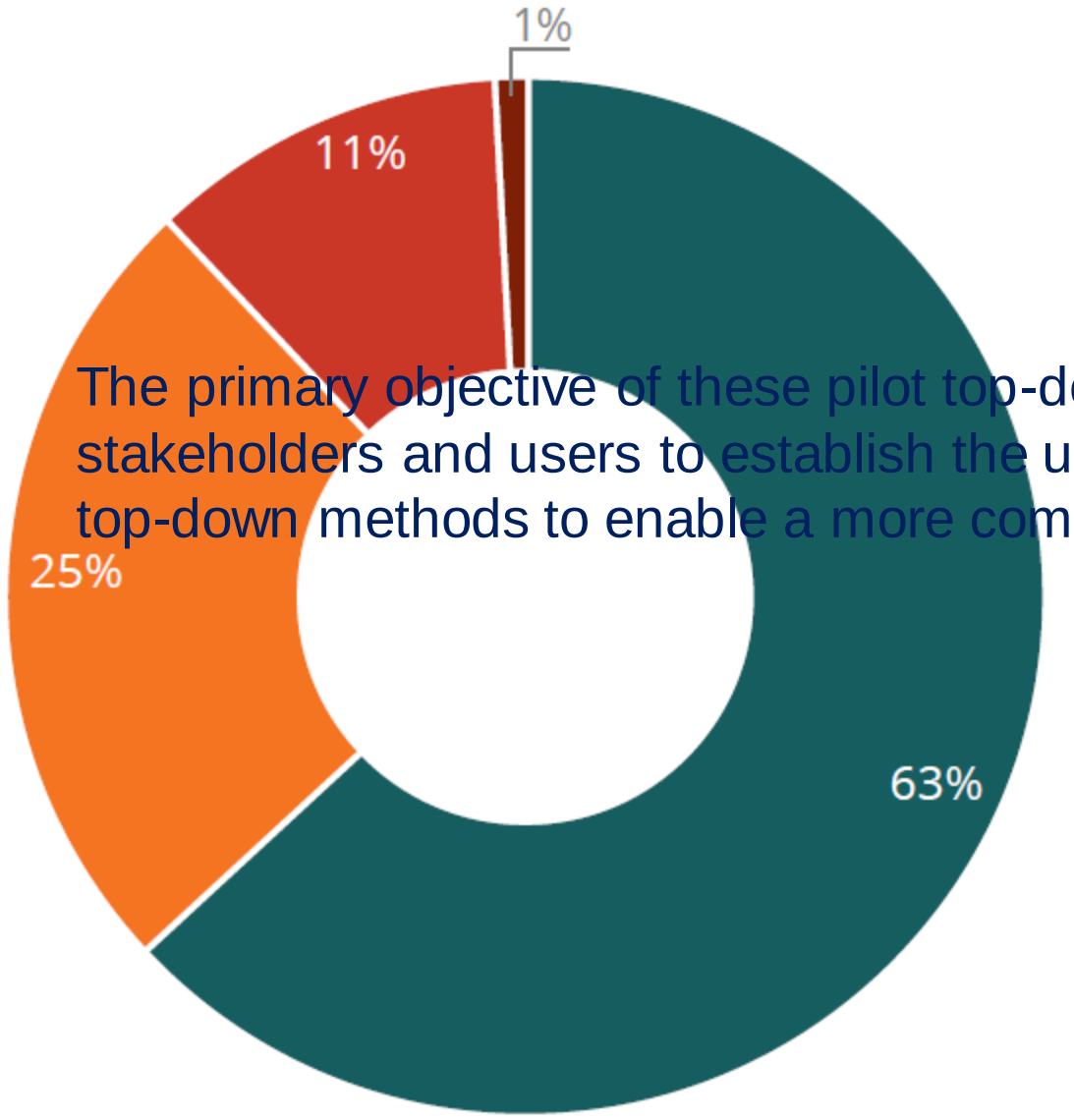


AWF = Agriculture, Waste, and Fires

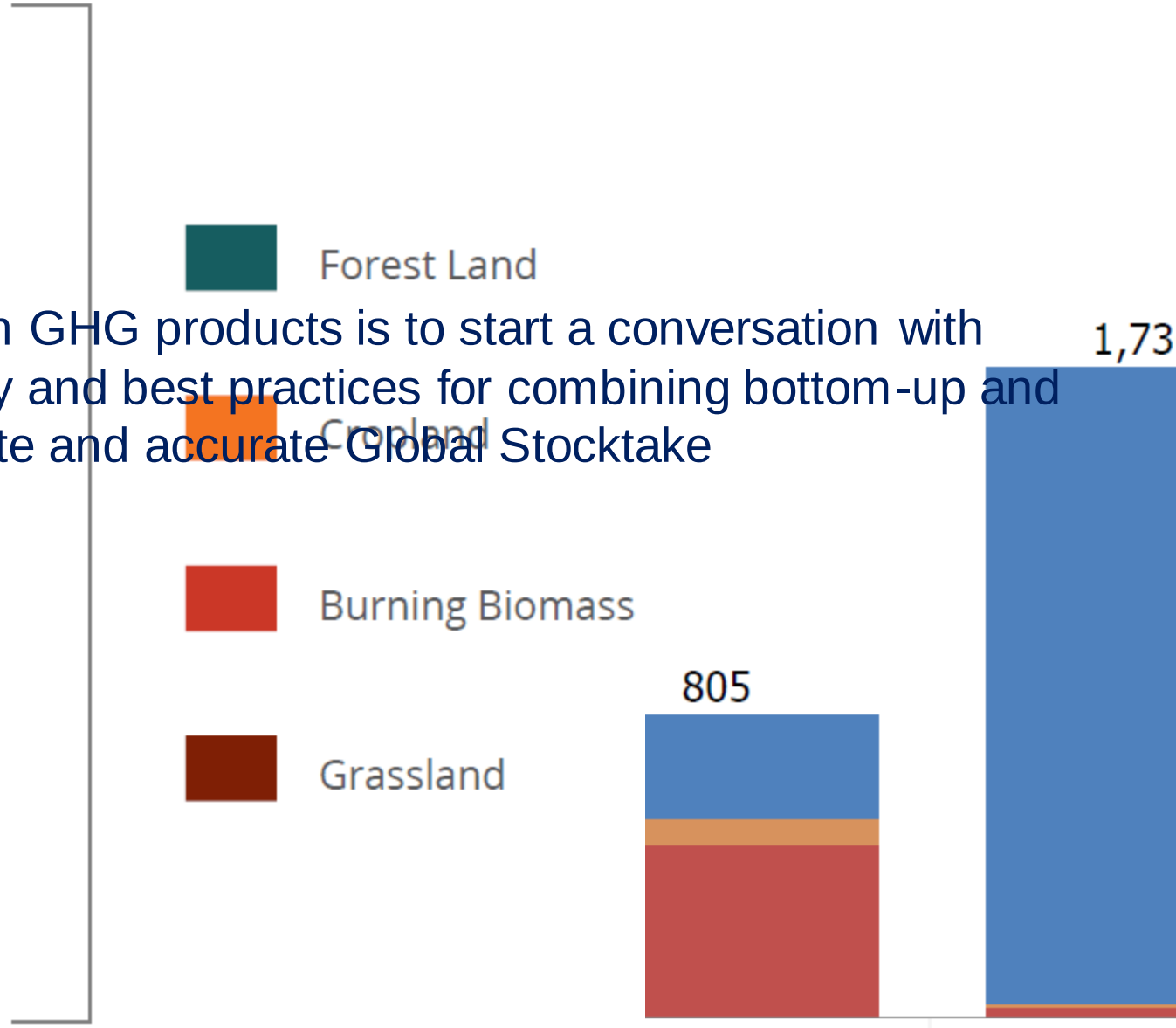
FF = Fossil fuels (coal, oil, gas)

N = Natural (Wetlands and seeps)

Plots by John Worden and the CMS-Flux Team (NASA/JPL)



The primary objective of these pilot top-down GHG products is to start a conversation with stakeholders and users to establish the utility and best practices for combining bottom-up and top-down methods to enable a more complete and accurate Global Stocktake



Thank You!

David Crisp / 22 September 2021
David.Crisp@jpl.nasa.gov

#EO4Impact

Andrew Zolli oversees sustainable development and global humanitarian efforts at Planet, an Earth Observation and AI organization that has deployed the largest constellation of Earth-observing satellites in history. He also chairs the company's global AI and data ethics program.

Andrew has served as one of the Exploration Fellows of the National Geographic Society, serves on the International Board of Directors of Human Rights Watch, and is the author of *Resilience: Why Things Bounce Back,* which has been published in more than a dozen languages worldwide.

Andrew Zolli
VP of Sustainability and Global Impact Initiatives
Planet

GEO CLIMATE POLICY AND FINANCE WORKSHOP

The Relevance of High-Frequency, Global Coverage for EO

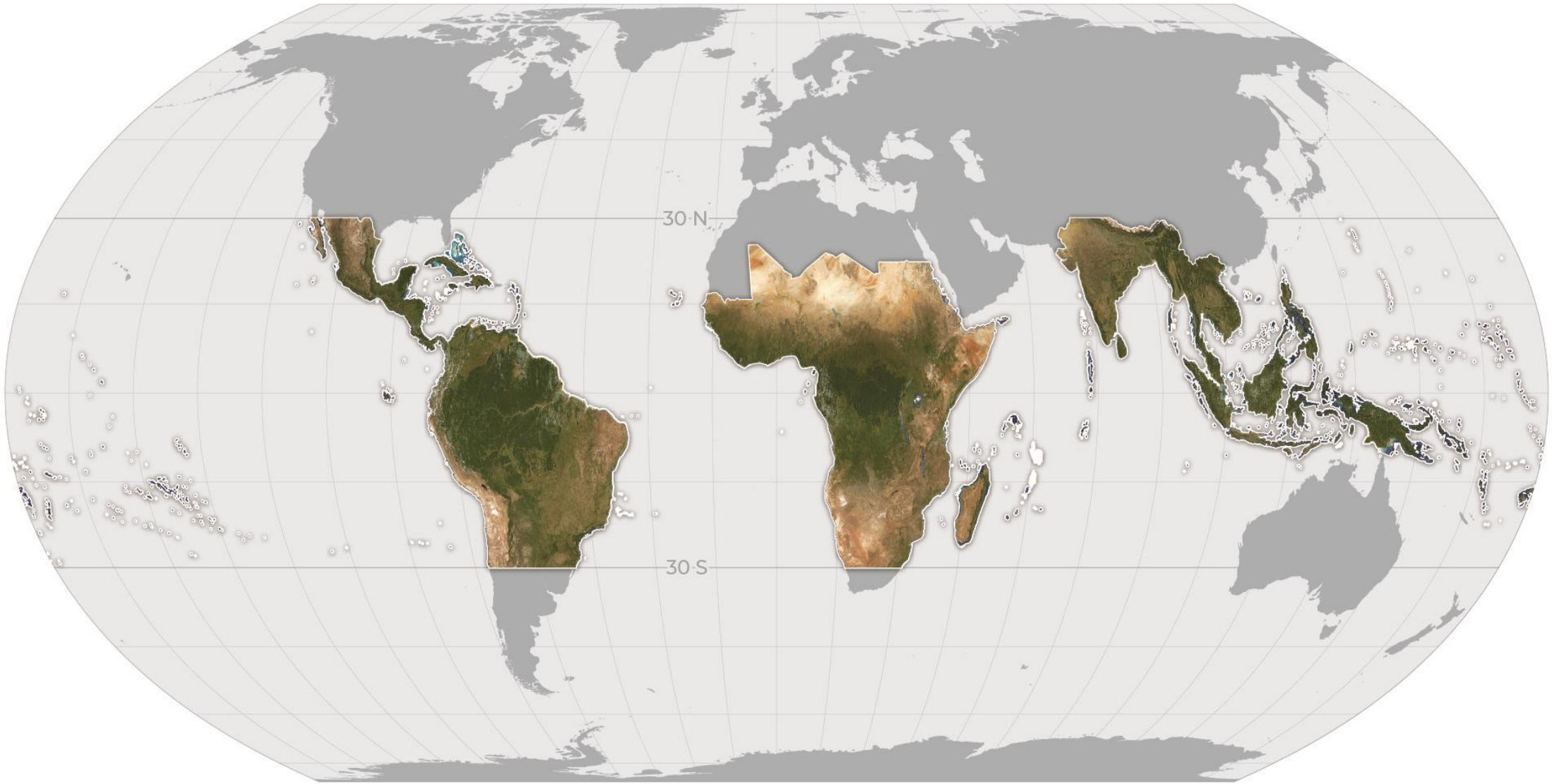
Andrew Zolli
VP Sustainability and Global Impact
Planet
September 22, 2021

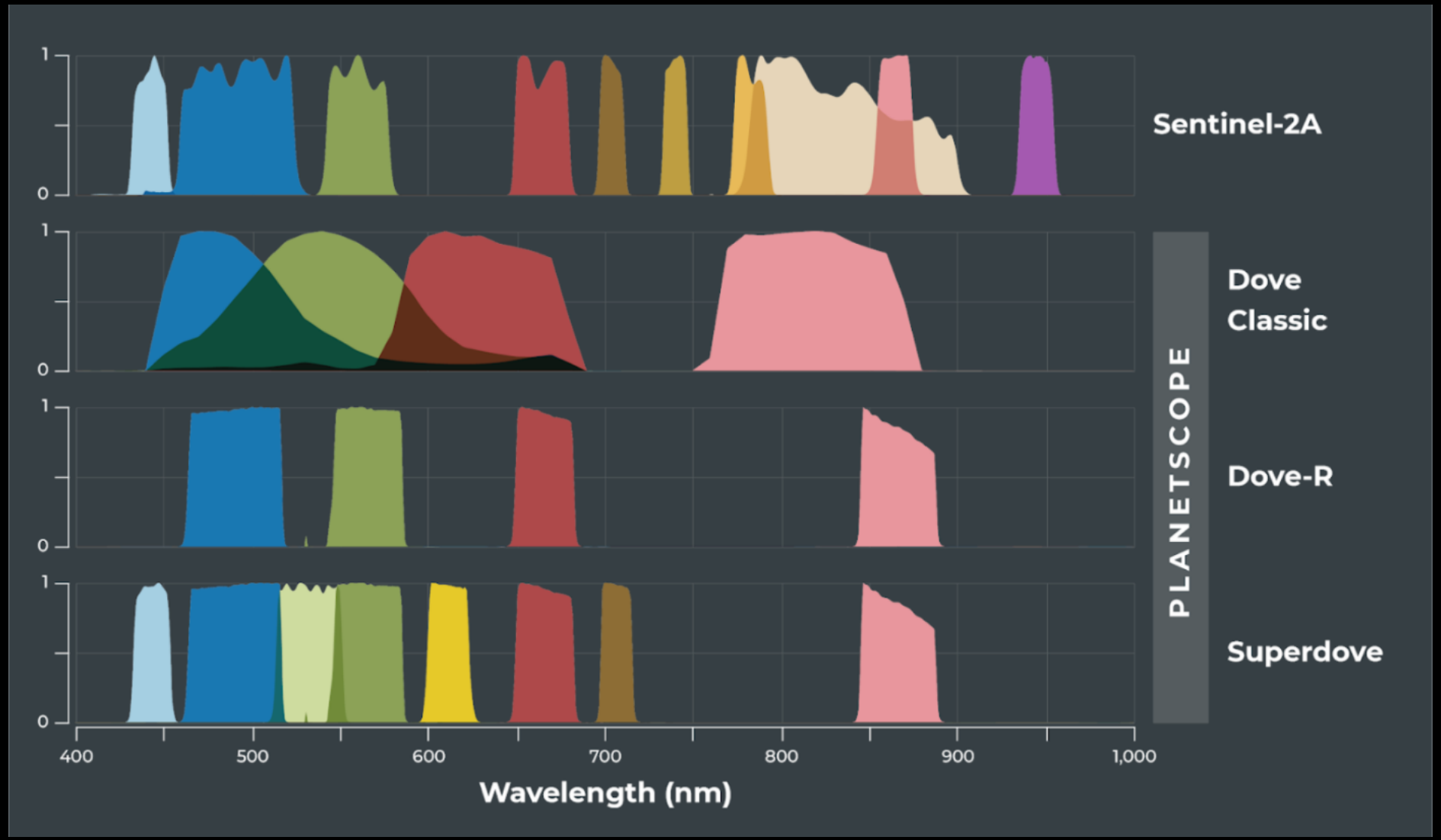
GROUP ON EARTH OBSERVATIONS

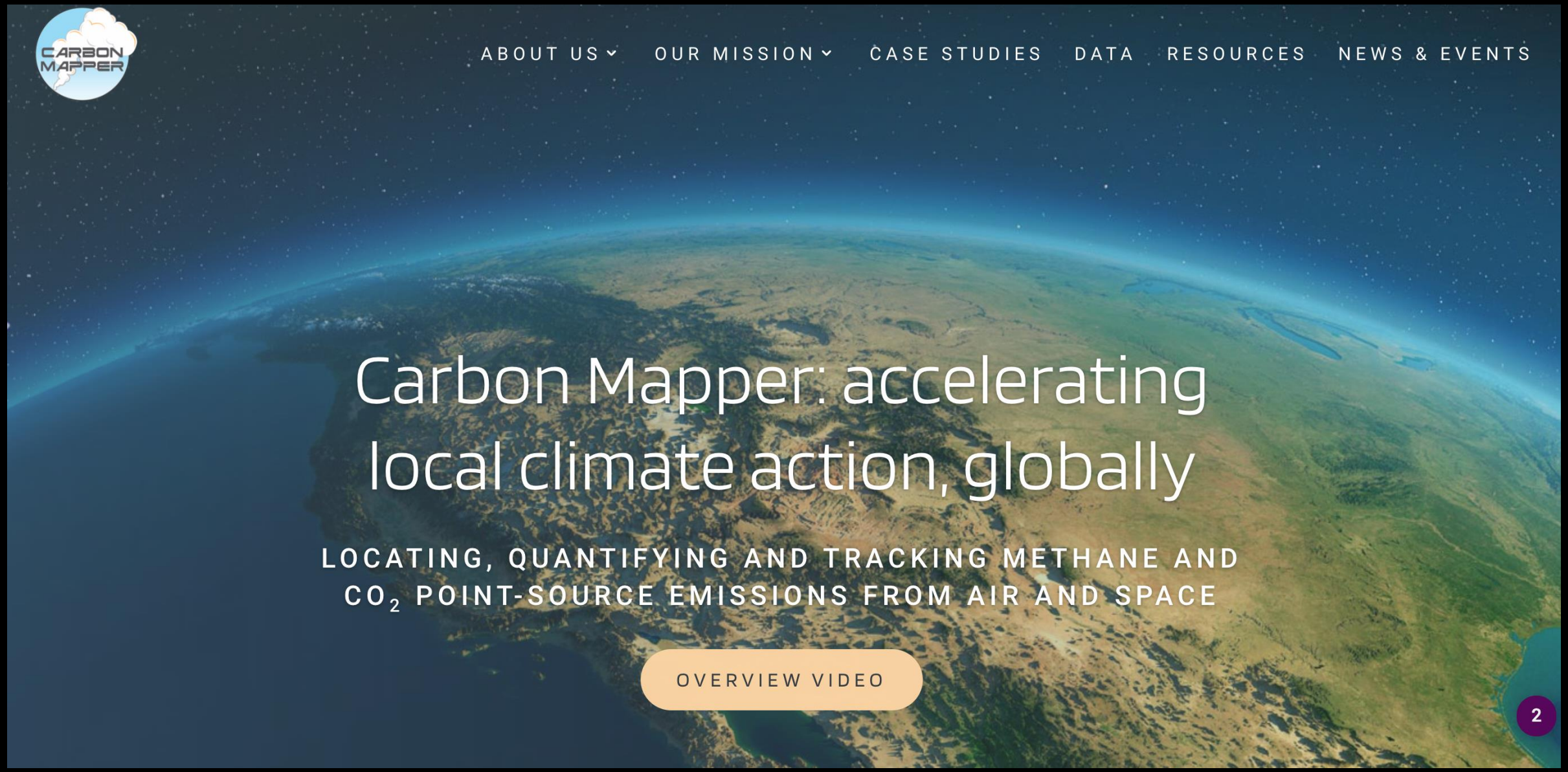
#EO4IMPACT

NICFI

Norway's International Climate and Forest Initiative




1
0
Sentinel-2A
Dove
Classic
Dove-R
Superdove
PLANETSCOPE
400
500
600
700
800
900
1,000
Wavelength (nm)


CARBON MAPPER
ABOUT US
OUR MISSION
CASE STUDIES
DATA
RESOURCES
NEWS & EVENTS
Carbon Mapper: accelerating local climate action, globally
LOCATING, QUANTIFYING AND TRACKING METHANE AND CO_2 POINT-SOURCE EMISSIONS FROM AIR AND SPACE
OVERVIEW VIDEO
2

Thank you!

andrew@planet.com

Manfredi Caltagirone leads UNEP work on methane emissions in the energy sector and is acting Head of the International Methane Emissions Observatory (IMEO). In UNEP, he was previously engaged in the establishment and operations of the Climate Technology Centre and Network under the UNFCCC. Prior to joining the UN Environment Programme, Manfredi worked as policy advisor on climate technologies at the Italian Ministry for the Environment. He has been a Research Fellow at the United Nations Foundation and at the Belfer Center for Science and International Affairs at Harvard.

Manfredi holds a J.D. from the II University of Rome, and a Master in Public Administration from the Harvard Kennedy School.

Manfredi Caltagirone
acting Head of IMEO

GEO CLIMATE POLICY AND FINANCE WORKSHOP

Accelerating methane mitigation from the energy sector through integration of data and beyond International Methane Emissions Observatory – IMEO

Manfredi Caltagirone, UN Environment Programme

22 September 2021

GROUP ON EARTH OBSERVATIONS

#EO4IMPACT

Accelerating methane emissions reductions requires knowing

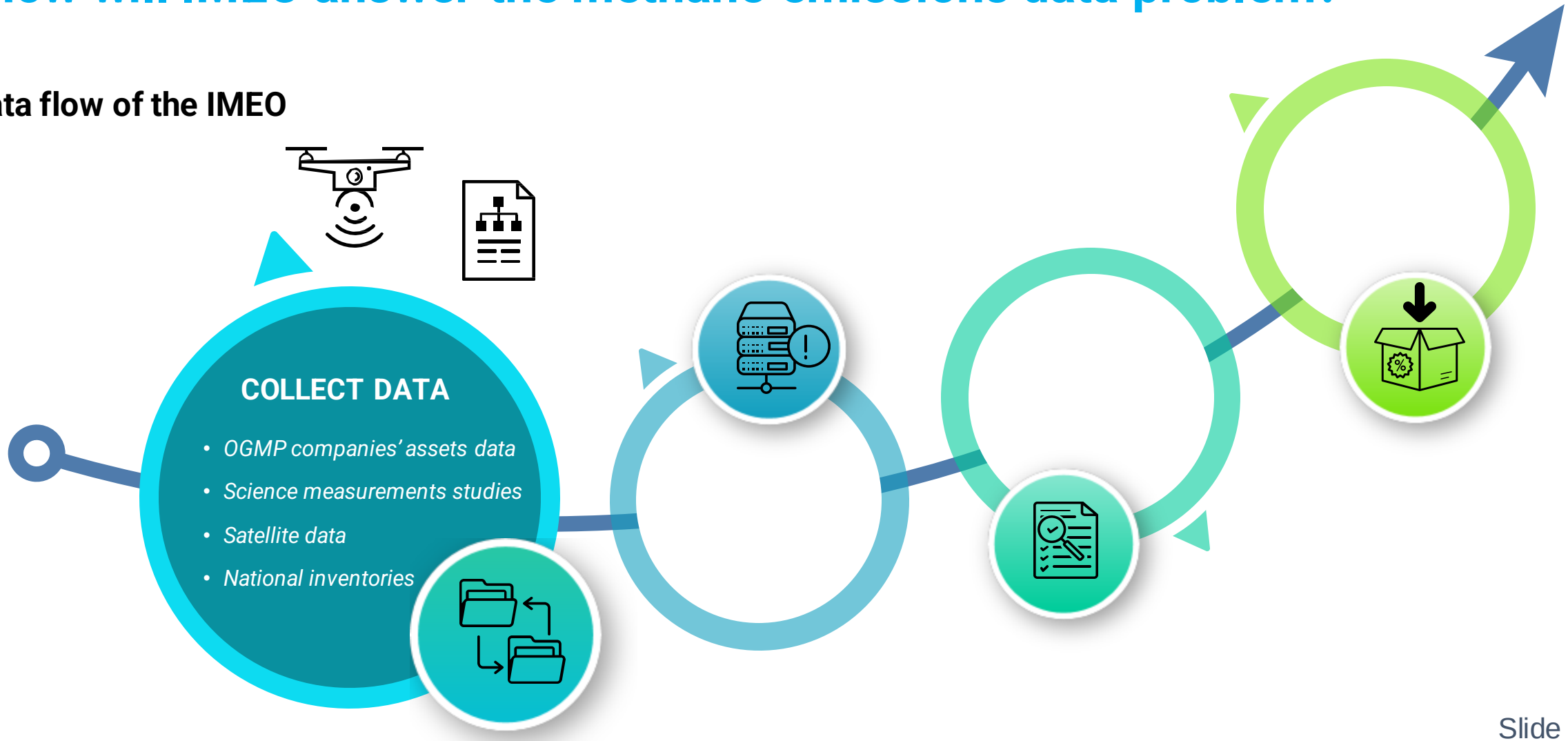
1. What
2. Where
3. How much

is being emitted

This is the role of IMEO

How will IMEO answer the methane emissions data problem?

Data flow of the IMEO



OGMP Timeline

The Oil & Gas Methane Partnership was launched at the UN Secretary General's Climate Summit in New York in September 2014

6 companies

USA

Norway and UK joined

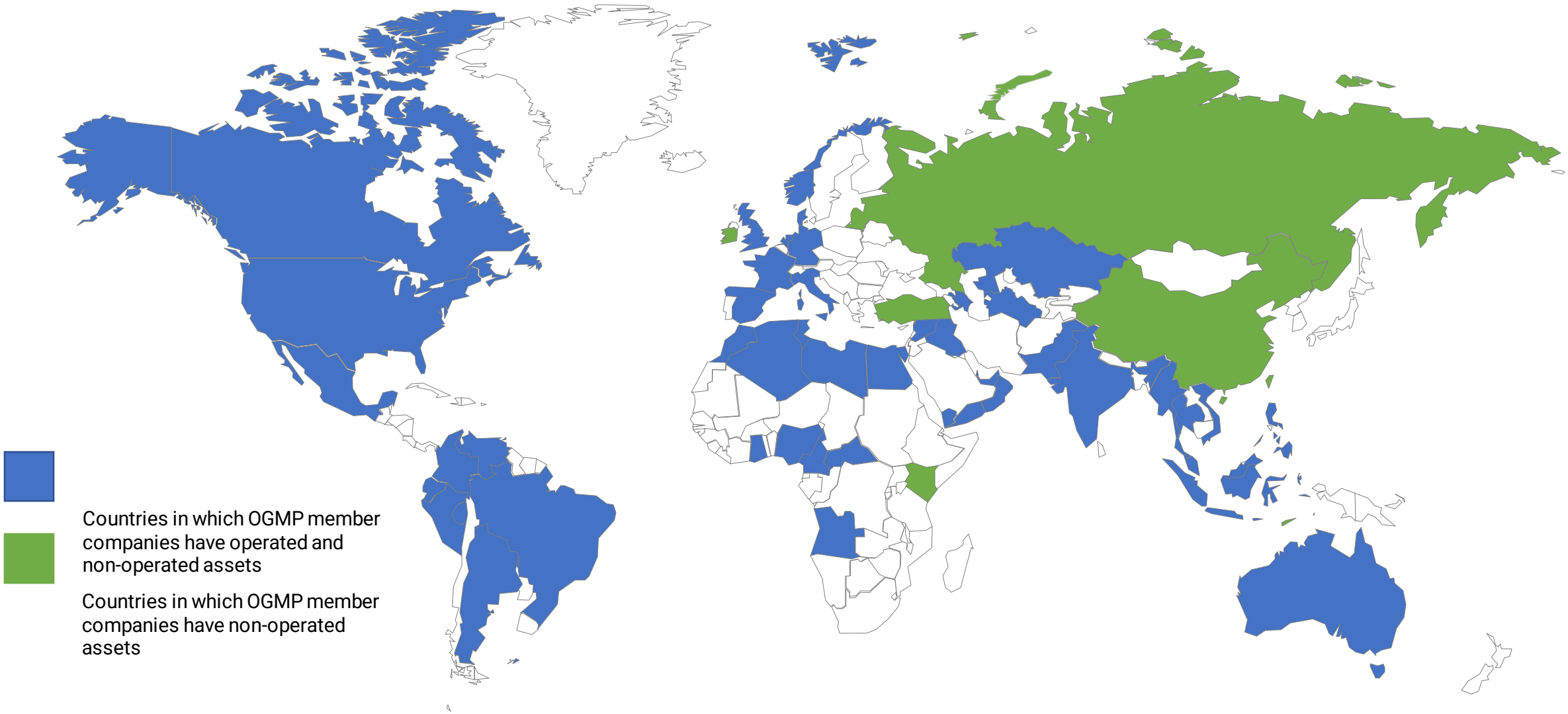
European Commission joined

74 companies

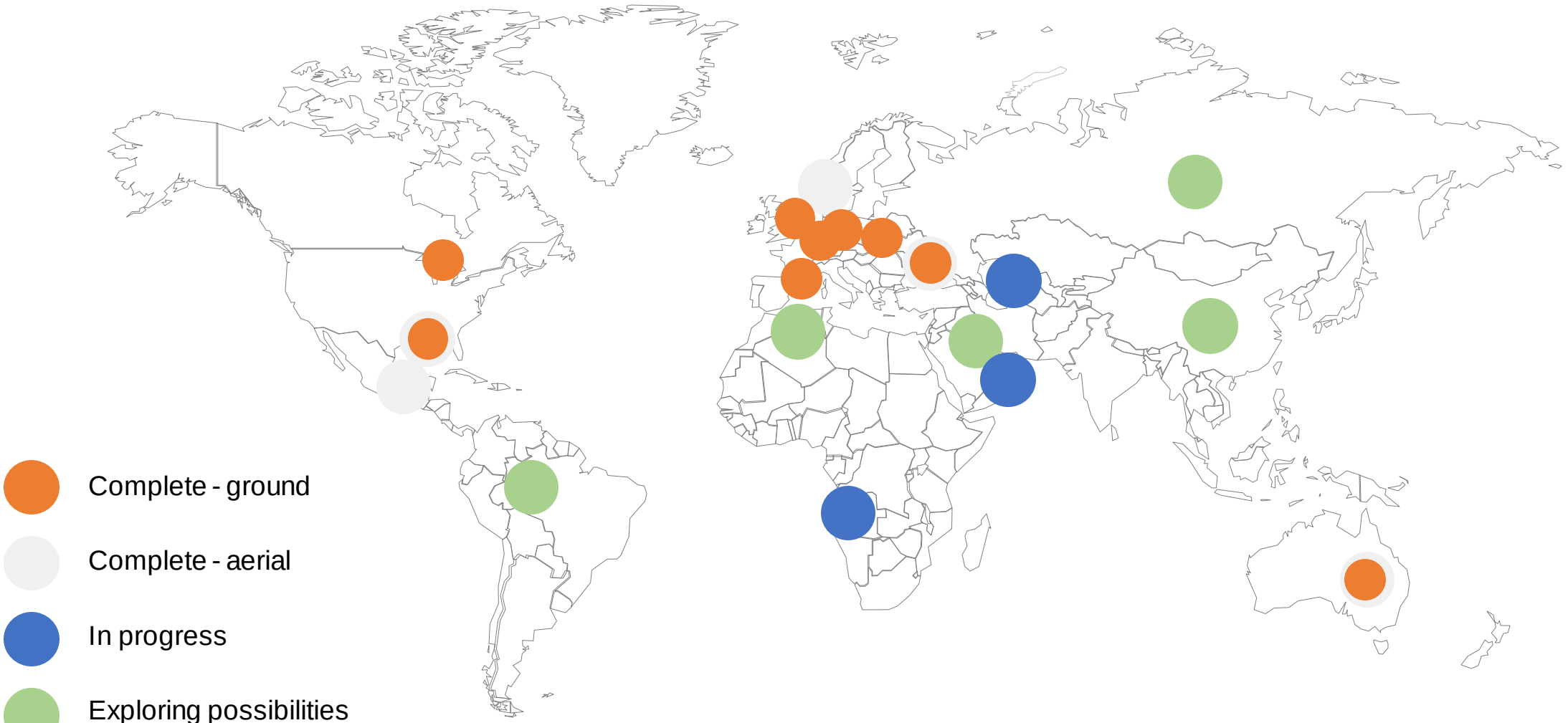
OGMP 2.0 launched on 23 November 2020

OGMP Oil And Gas Methane Partnership 2.0

OGMP 2.0 will improve methane reporting around the world



Direct measurement studies help better understand where and how much methane is leaking



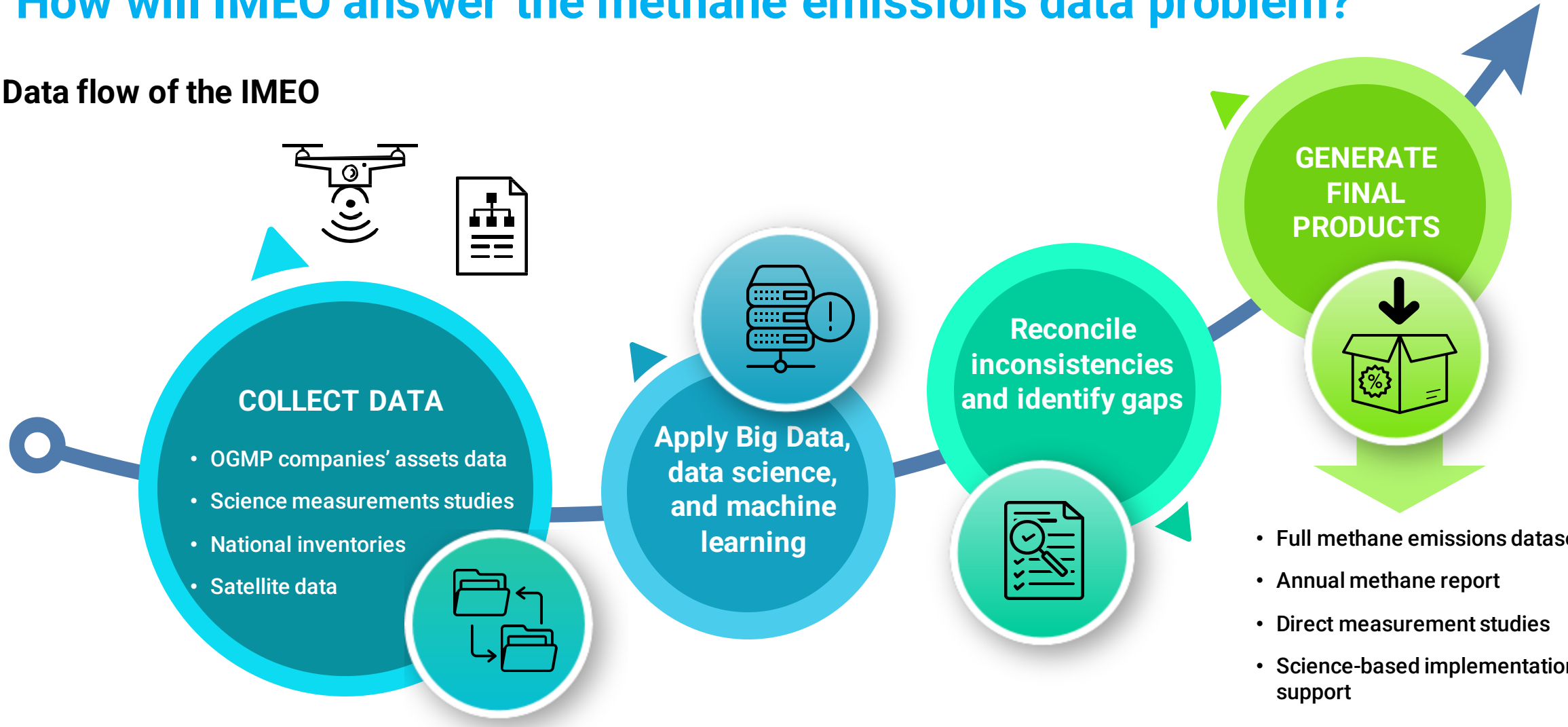
Satellites Are Complementary For Tackling Global Methane Emissions

Instrument	Dates operational	Grid size (subgrid pixel) (km2)	Swath (km)	Precision (ppbv)
GOSAT	2009	10 km dia., single	Sparse	~8
GHGSat	2016	0.05 x 0.05	12 x 12	~50
TROPOMI	2017	7 × 7	2600	~11
GOSAT-2	2018	10 km dia., single	Sparse	~8
MethaneSAT	2022	1.4 × 1.4 (< 1 km raw)	200±	2-3*
GeoCARB	2022	3 × 6	2800	~18
Carbon Mapper	2023	0.03 x 0.03	18km	~30

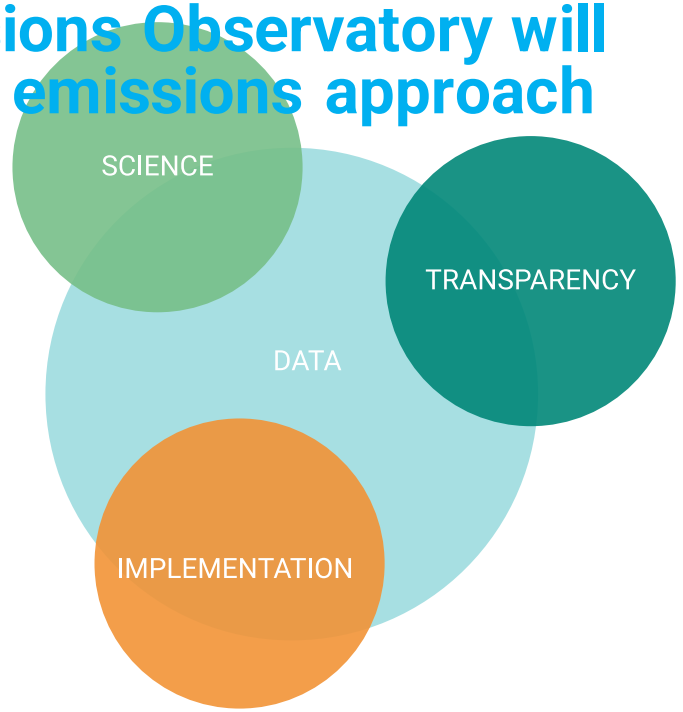
* Gradient measured over 10 – 100 km length scales.

How will IMEO answer the methane emissions data problem?

Data flow of the IMEO



The International Methane Emissions Observatory will revolutionize the global methane emissions approach



Each element is necessary, but not sufficient to drive change

IMEO interconnects activities across the methane ecosystem

Thank You!

Manfredi Caltagirone / September 22, 2021
@mnfrdcltgrn/ manfredi.caltagirone@un.org

#EO4Impact

Mark Dowell is Senior Scientific Officer and Project Leader for Scientific and Technical Support to the Copernicus Programme at the European Commission's Joint Research Centre.

His current efforts include incentivizing a scientifically sound and traceable uptake of Copernicus products and Services in European Policy and in the context of International commitments and is a co-chair of the Task Force for the proposed Copernicus Anthropogenic CO2 emission initiative. Mark has a Ph.D. in Oceanography and Earth Science from the University of Southampton (UK) in 1998. He has been engaged for many years with issues at the international level on Earth Observation, firstly as co-lead of a Virtual Constellation in CEOS then as the first Chair on the Working Group on Climate, in this context he also led the initiative established between CEOS, CGMS and WMO on the definition of a global Climate Monitoring Architecture, and currently leads CEOS activities on the CEOS Carbon Strategy and the Greenhouse Gas monitoring Task Team.

Since 2020, Mark is a Co-chair of the GEO Climate Change Working Group.

Mark Dowell
Senior Scientific Officer, Project Leader
European Commission JRC

Open discussion

Guiding questions:

1. How can the broader EO community involving public and private initiatives most effectively support the needs around the global stocktake?
2. Are there any immediate capabilities and how should these be exploited to support the global stocktake? What additional capabilities should be developed?

Short break

See you in 0 minutes

Session 3

GEO Work Programme activities supporting the Global Stocktake

Emily Smail is the Executive Director of the GEO Blue Planet Initiative and a Senior Faculty Specialist at the NOAA-University of Maryland Cooperative Institute for Satellite Earth System Studies.

She specializes in utilizing marine science to support informed decision-making and has 15 years of experience building long-term collaborations with diverse stakeholders, including policymakers, government agencies, and local leaders.

She holds a PhD in marine environmental biology from the University of Southern California and a BS in biology from the Pennsylvania State University.

Contact information: emily.smail@noaa.gov, esmail@geoblueplanet.org

Emily Smail
Executive Director
GEO Blue Planet Initiative

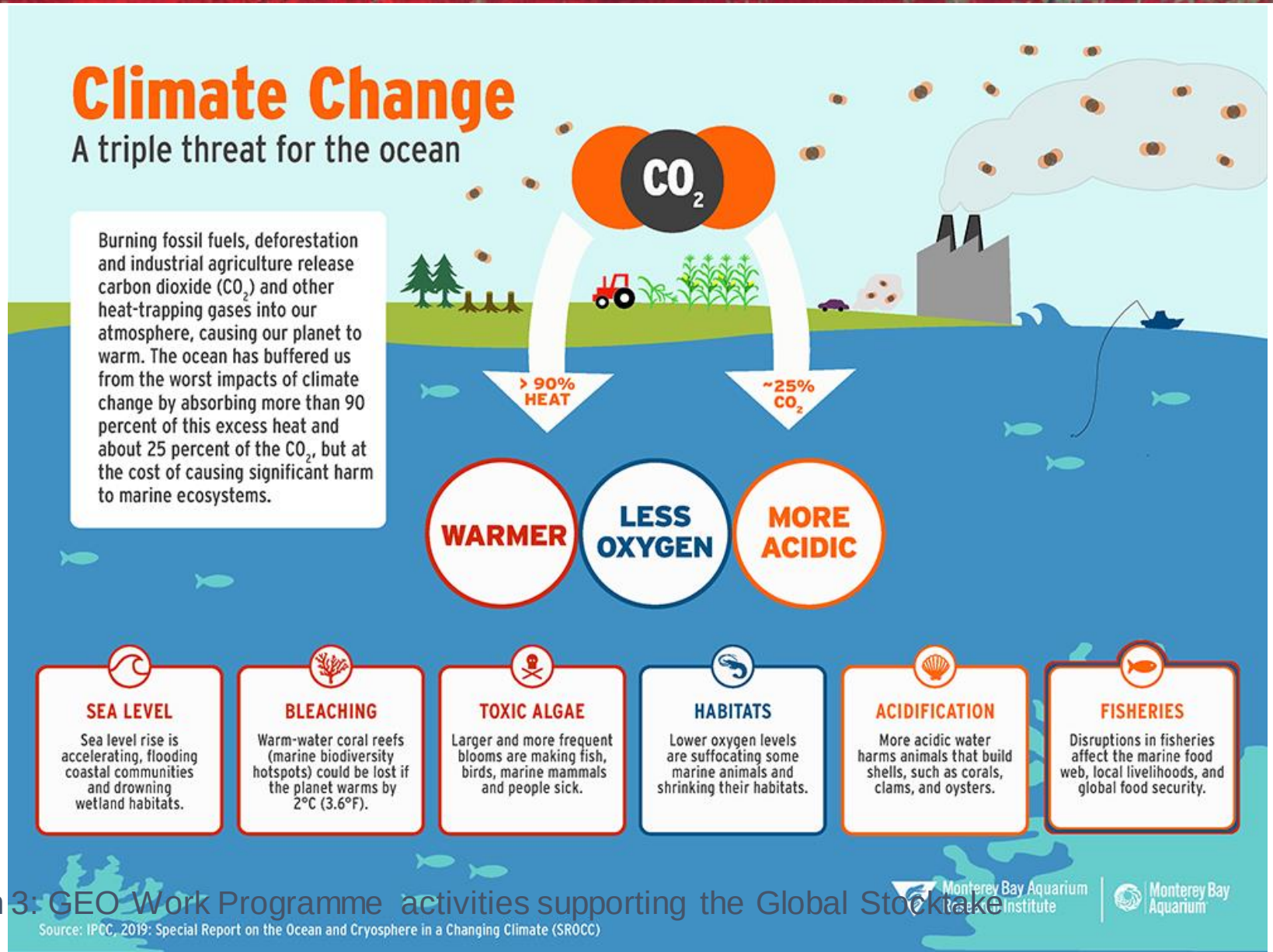
GEO CLIMATE POLICY AND FINANCE WORKSHOP

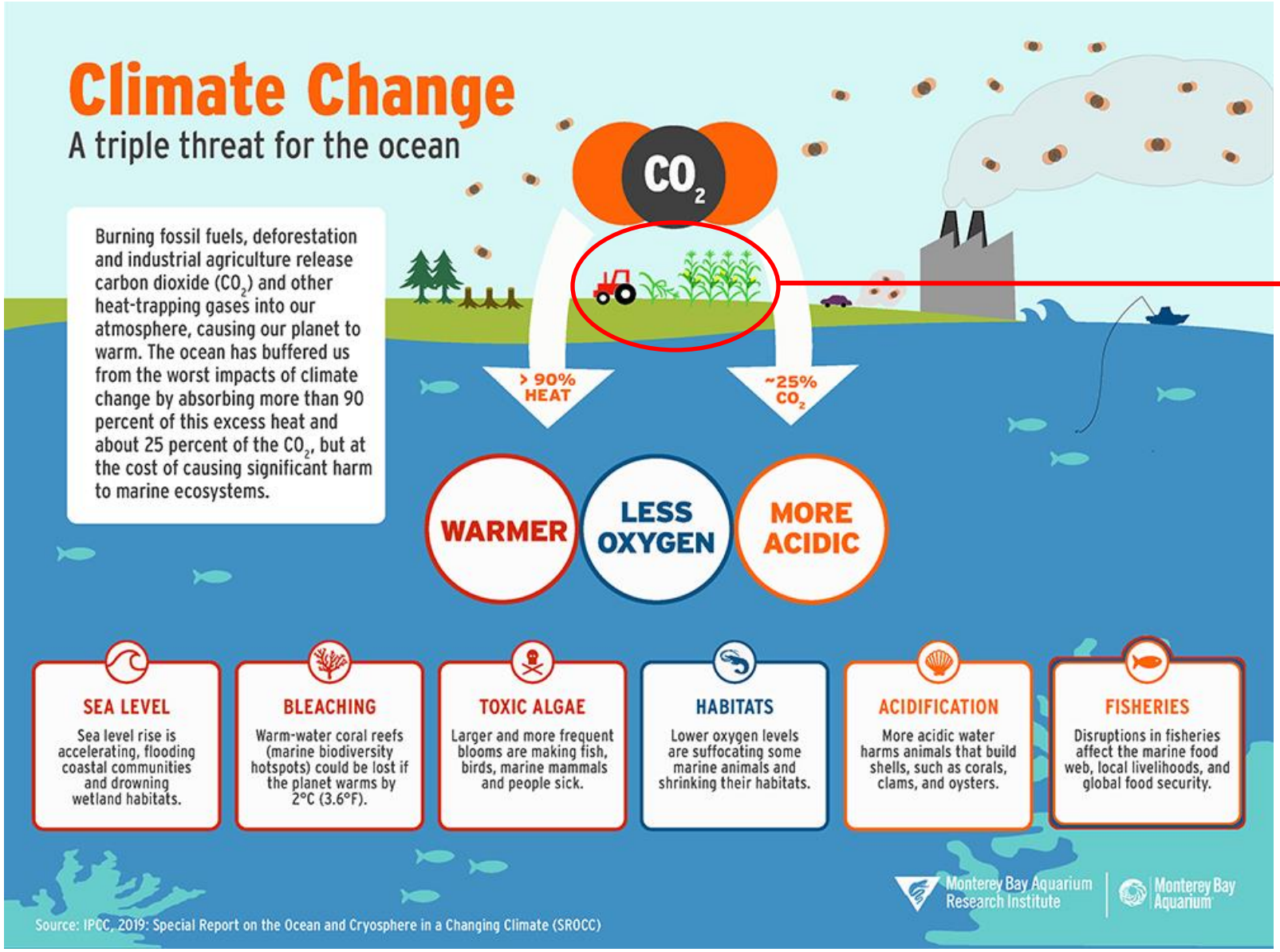
GEO Blue Planet: eutrophication indicators and tools

Emily Smail
GEO Blue Planet/UMD/NOAA/UMD
22 September 2021

GROUP ON EARTH OBSERVATIONS

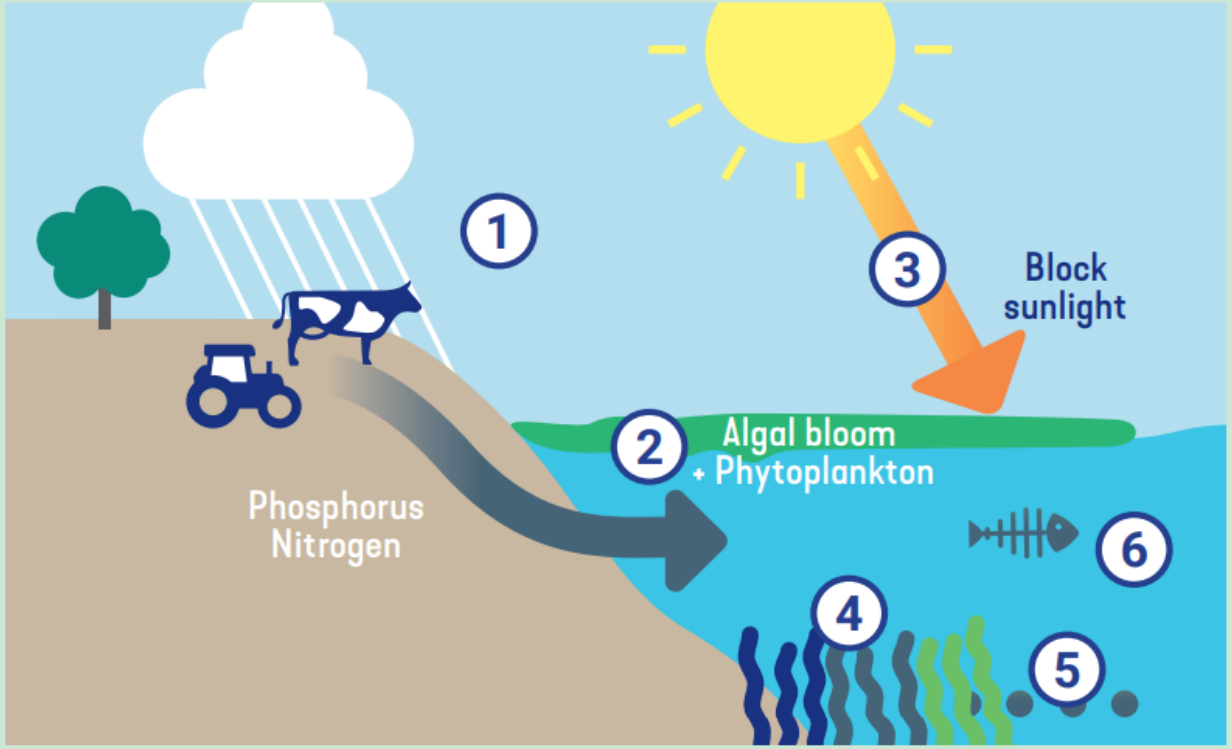
#EO4IMPACT


Climate Change
A triple threat for the ocean
Burning fossil fuels, deforestation and industrial agriculture release carbon dioxide (CO_2) and other heat-trapping gases into our atmosphere, causing our planet to warm. The ocean has buffered us from the worst impacts of climate change by absorbing more than 90 percent of this excess heat and about 25 percent of the CO_2, but at the cost of causing significant harm to marine ecosystems.
CO_2
> 90% HEAT
~25% CO_2
WARMER
LESS OXYGEN
MORE ACIDIC
SEA LEVEL
Sea level rise is accelerating, flooding coastal communities and drowning wetland habitats.
BLEACHING
Warm-water coral reefs (marine biodiversity hotspots) could be lost if the planet warms by 2°C (3.6°F).
TOXIC ALGAE
Larger and more frequent blooms are making fish, birds, marine mammals and people sick.
HABITATS
Lower oxygen levels are suffocating some marine animals and shrinking their habitats.
ACIDIFICATION
More acidic water harms animals that build shells, such as corals, clams, and oysters.
FISHERIES
Disruptions in fisheries affect the marine food web, local livelihoods, and global food security.
Source: IPCC, 2019: Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC)
Monterey Bay Aquarium Research Institute
Monterey Bay Aquarium



Eutrophication

EUTROPHICATION



Eutrophication

① Agricultural run-off and other pollutants (which contain nutrients) are flushed into the ocean by rains or drainage.

② These nutrients can cause phytoplankton and algae to grow rapidly on the surface and reduce water quality.

Coastal Hypoxia

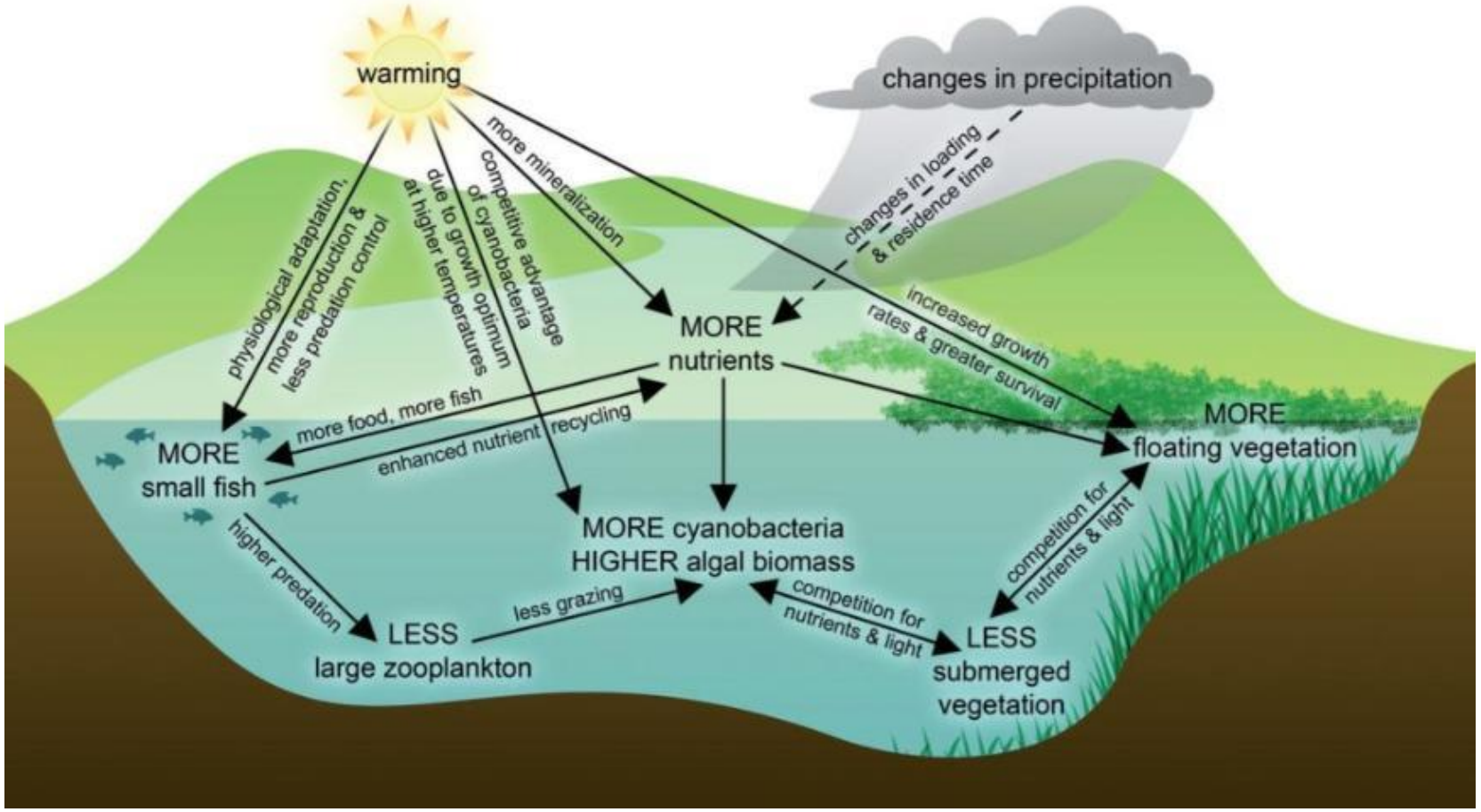
③ This bloom can block sunlight from penetrating into the water

④ This inhibits photosynthesis of the phytoplankton and other plant life below, killing them.

⑤ The algae bloom dies and sinks to the bottom of the shallow ocean. Bacteria decompose this dead organic matter, a process that consumes oxygen.

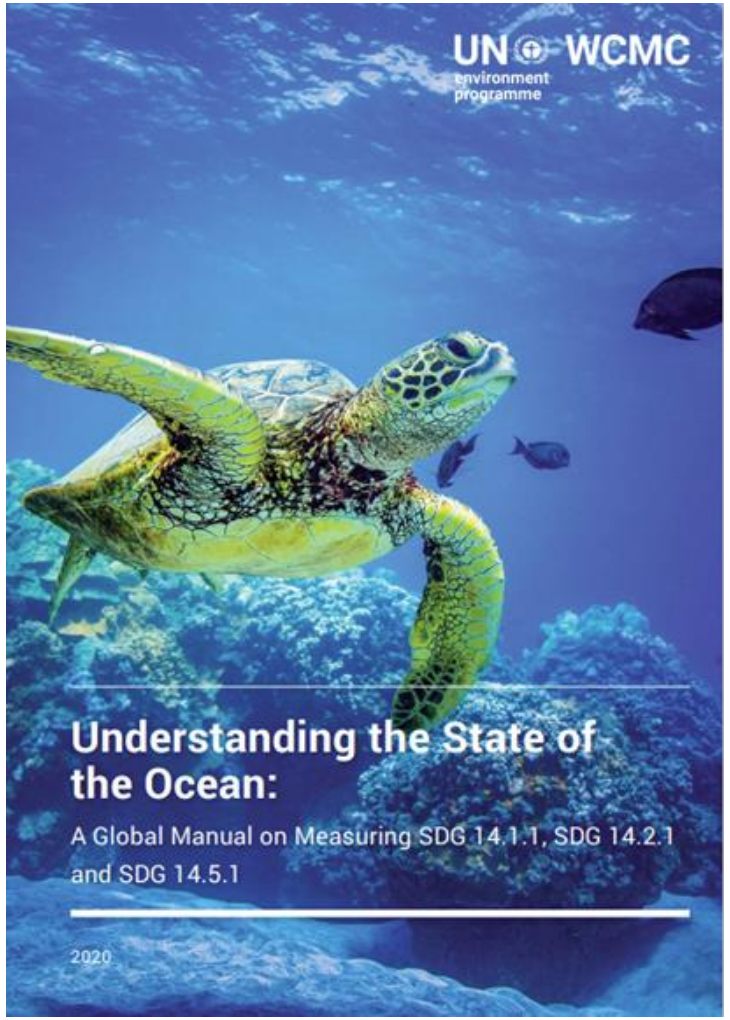
⑥ This process leaves the shallow water layer with very little oxygen (a state of hypoxia). **This is devastating to the ecosystem and in some cases the zones can become nearly lifeless.**

Eutrophication and Climate Change



https://edis.ifas.ufl.edu/publication/sg127

Indicator 14.1.1a - Coastal Eutrophication Potential



Global low resolution data

Level 1
Global Data Products

- National contribution to the Index of Coastal Eutrophication Potential
- Chlorophyll-a deviations and anomalies

Level 2
Regional & National Data

- Chlorophyll-a concentrations
- National modelling of coastal eutrophication potential
- *In-situ* concentration of nitrogen, phosphate, and silica

Local high resolution

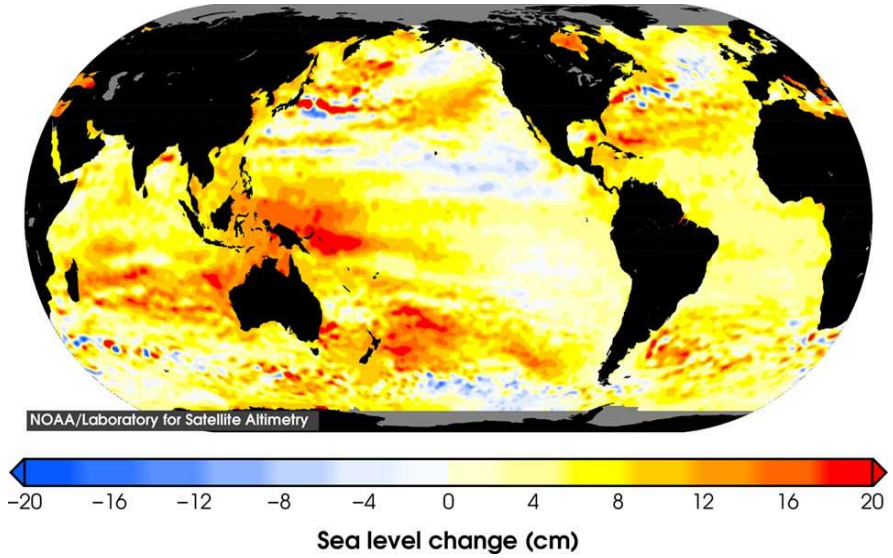
Level 3
Supplementary Data

- Other indicators

GEO Blue Planet & Climate Action

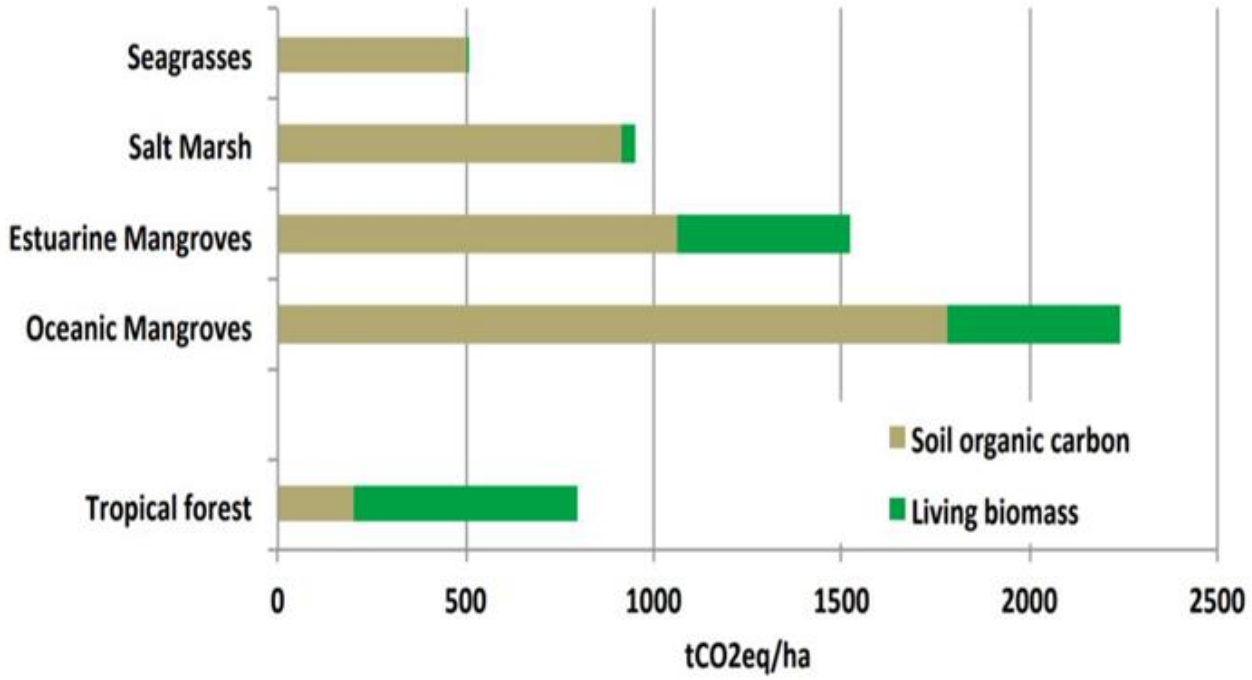
- Additional SDG 14 & 13 Interactions
- NDCs & Blue Carbon
- Adaptation Indicators

https://phys.org/news/2020-03-mangrove.html



National Determined Contributions & Blue Carbon

- **Coastal wetlands** (mangroves, tidal marshes and seagrass meadows) hold large reservoirs of **carbon in biomass** and especially in soils
- **Blue carbon** can be included as part of the NDCs to **reduce GHG emissions**
- **EO** can be used for detection and **mapping** of coastal vegetation



Total carbon sequestered per hectare habitat (Murray et al. 2011).

Mapping Assets

ENVIRONMENTAL RESEARCH
LETTERS

LETTER • OPEN ACCESS

The global distribution of seagrass meadows

To cite this article: Len J McKenzie *et al* 2020 *Environ. Res. Lett.* **15** 074041

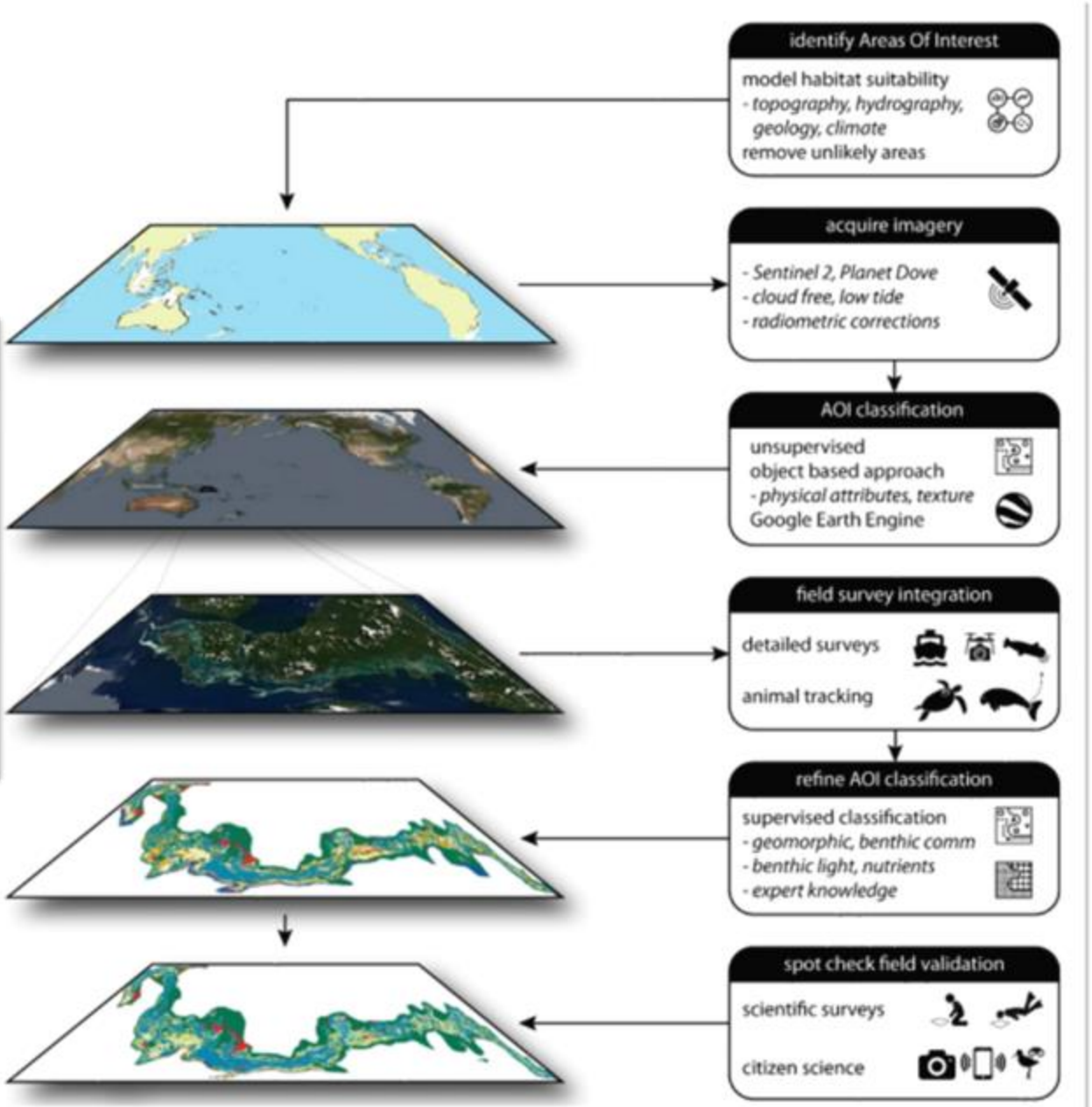


Figure 6. Hypothetical example for mapping the world's seagrass using hierarchical approach.

Mapping Assets

ENVIRONMENTAL RESEARCH LETTERS

LETTER • OPEN ACCESS

The global distribution of seagrass meadows

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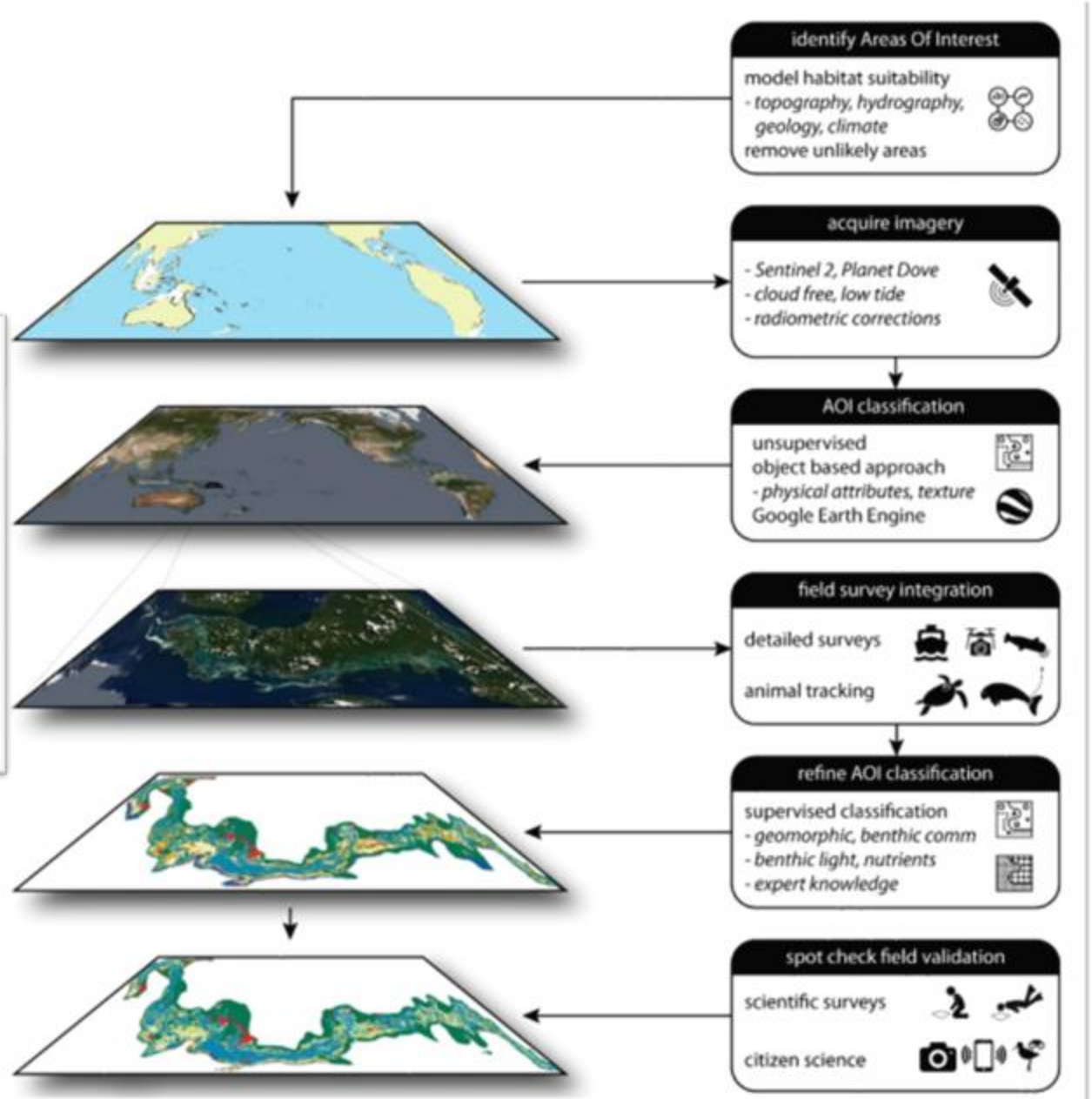


Figure 6. Hypothetical example for mapping the world's seagrass using hierarchical approach.

Linkage with Eutrophication:

Seagrasses, mangroves, coral reefs, saltmarshes, etc. are negatively impacted by eutrophication

Eutrophication is bad but Blue Carbon is good – huh?

Blue Carbon

Carbon captured by the world's ocean and coastal ecosystems

Eutrophication

Algal growth driven by enrichment by an overabundance of nutrients

Earth Observations can be used to monitor both and other ocean/climate relationships

Thank You!

Emily Smail / 22 September 2021
@geoblueplanet / esmail@geoblueplanet.org

#EO4Impact

Osamu has experienced for more than 25 years to develop Earth observation satellite data and information system and possesses scientific and technical expertise in JAXA. He has advocated throughout his career the use of satellite EO data in various stakeholders in Japan and internationally.

He had been seconded to the GEO Secretariat totally 7 years as an EO Architecture and Data Expert. He served a co-chair of GEO Programme Board during 2018 and 2019. He also serves the CEOS Lead role for Global Forest Observation Initiative (GFOI) as one of GEO Flagships and a co-Lead for EO4SDG as one of GEO Initiatives.

Osamu is Senior Engineer in Satellite Applications and Operation Center (SAOC), Japan Aerospace Exploration Agency (JAXA), Japan. He also serving Technical Advisor of Ministry Education, Culture, Sports and Science, Technology (MEXT), Japan.

Osamu Ochiai

CEOS Lead to GFOI

Japan Aerospace Exploration Agency

GEO CLIMATE POLICY AND FINANCE WORKSHOP

An update from GFOI Lead partner CEOS on the delivery of global AFOLU products to support for the GST

Osamu Ochiai
CEOS Lead for GFOI
Japan Aerospace Exploration Agency (JAXA)
22 September 2021

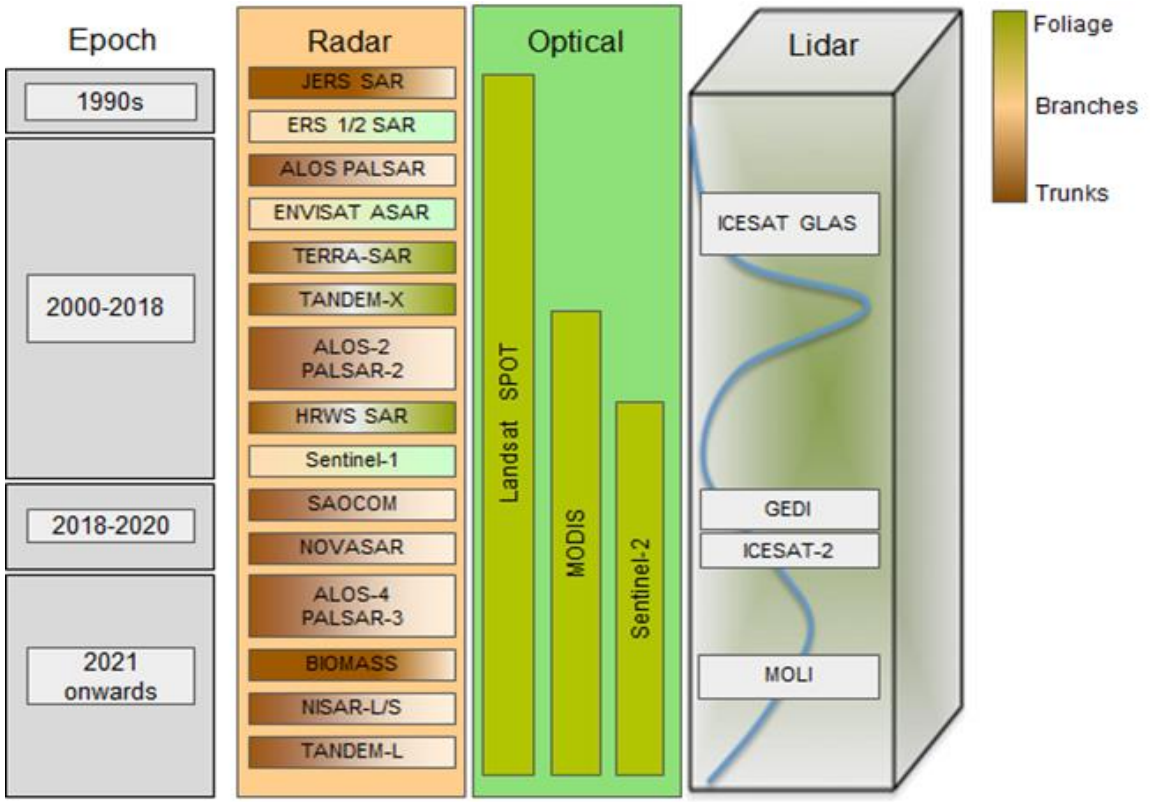
GROUP ON EARTH OBSERVATIONS

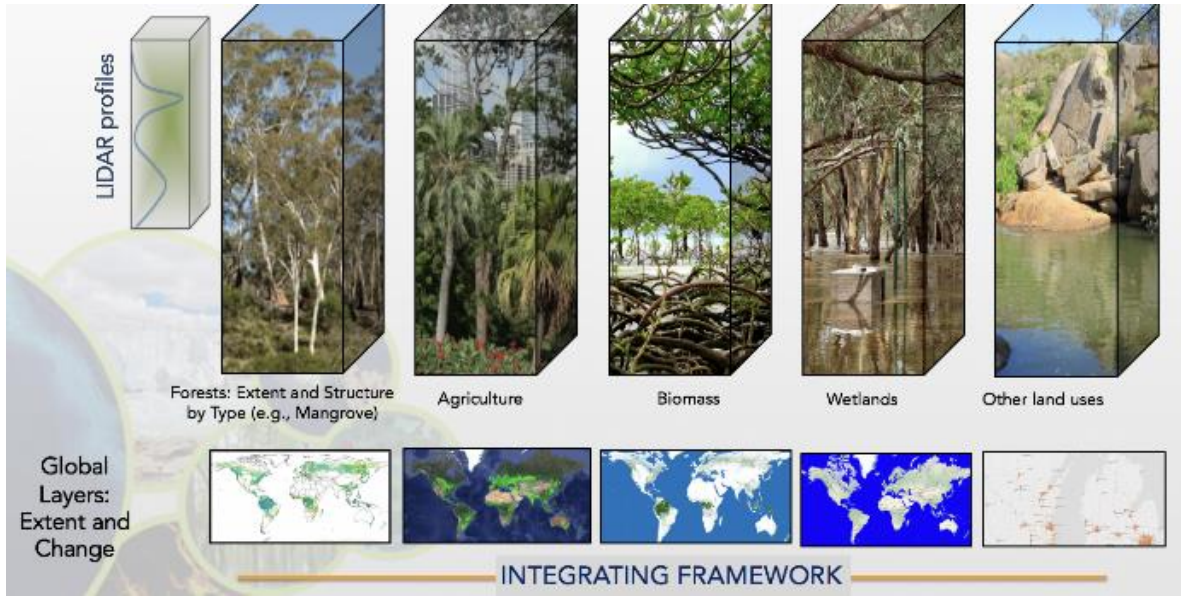
#EO4IMPACT

GFOI and CEOS full support of Climate Actions

- **GFOI**, as a GEO Flagship, to coordinate international support to developing countries on forest monitoring and GHG accounting for the purposes of REDD+ and related forums.
- **CEOS**, as a co-lead for GFOI, to provide Space-based data to meet the needs of GFOI providing consistent satellite observations and Analysis Ready Data and Tools.
- CEOS new challenge to support Paris Global Stocktake process have started with GHG and AFOLU areas.

EO Land Monitoring Satellites





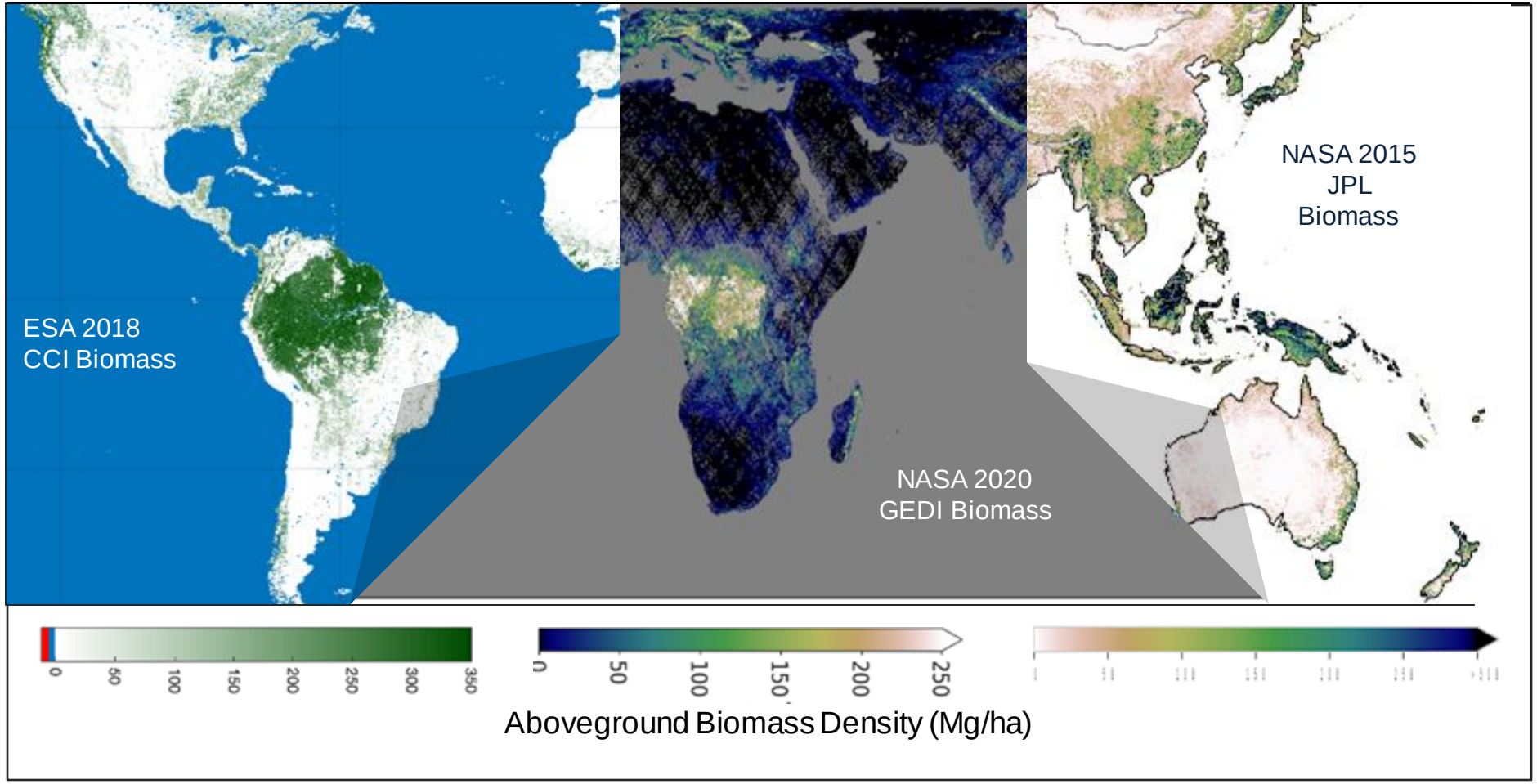
Many Upcoming Missions will Provide Data Used to Map Biomass

Product	Data Type	Missions	Years represented	Spatial Resolution	Spatial Domain	Availability
GLOBIOMASS	SAR, lidar	ALOS, ENVISAT, ICESat GLAS	2010	100-m	Global	Available now
GEOCARBON	Fusion of other products	Inputs to other products (lidar, SAR, Optical)	~2010	0.01°	Global	Available now
NASA JPL	Lidar, SAR	GLAS, ALOS	2015	10-km	Global	Available now
CCI Biomass	SAR and Optical	ALOS, Sentinel-1	2017, 2018	100-m	Global	Available now
NASA JPL	Lidar, SAR and optical	GEDI, ALOS-2	2020	10-km	Global	Available Q4 2021
NCEO Africa	Lidar, SAR, Optical	GEDI, ALOS-2, Landsat	2007 - 2017	100-m	Africa	Available now
CCI Biomass	Lidar, SAR and Optical	ALOS, Sentinel-1, GEDI, ICESat-2	2020	100-m	Global	Available Q4 2021
NASA GEDI mission Product	Lidar	GEDI	2019-2021	1-km	+/- ~51.6° latitude	Available Q4 2021
NASA ICESat-2 boreal product	Lidar	ICESat-2, Landsat	2019-2021	30-m	Boreal (50-75° N)	Available Q4 2021

Past Products

Inputs to Biomass Harmonization Activity

Biomass Product Harmonization Activity for the UNFCCC GST



Intercomparison, validation and harmonization of these products to increase product improvement and uptake. Open science activity using new 2020 products and **available reference data.**

CEOS Biomass Protocol Supporting New Activities

Committee on Earth Observation Satellites

CEOS Working Group on Calibration and Validation
Land Product Validation Subgroup

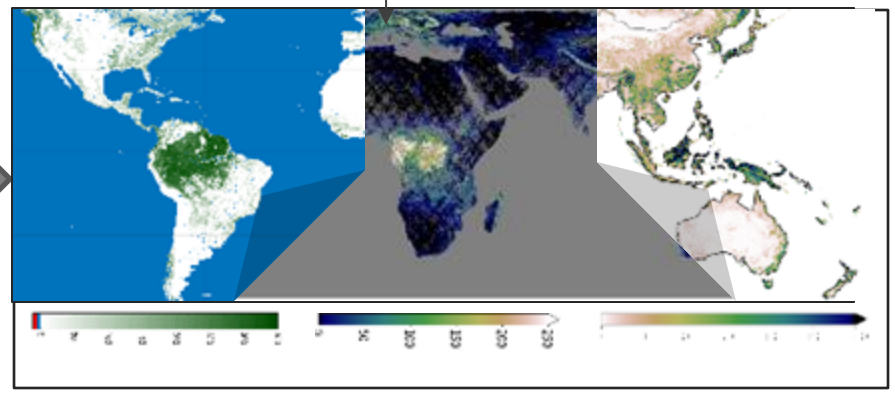
Aboveground Woody Biomass Product Validation

Good Practices Protocol

Version 1.0 – 2021

Editors: Laura Duncanson, Mat Disney, John Armston, David Minor, Fernando Camacho, Jaime Nickeson

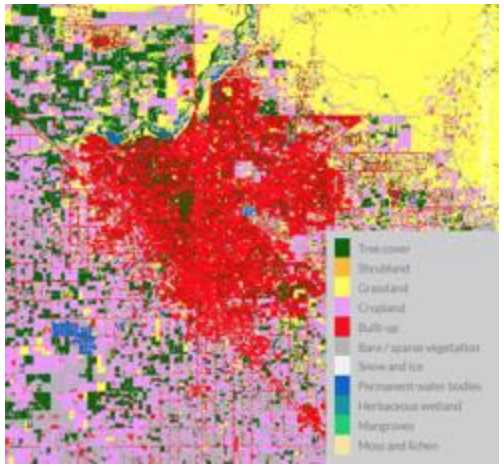
Linked, complementary activities



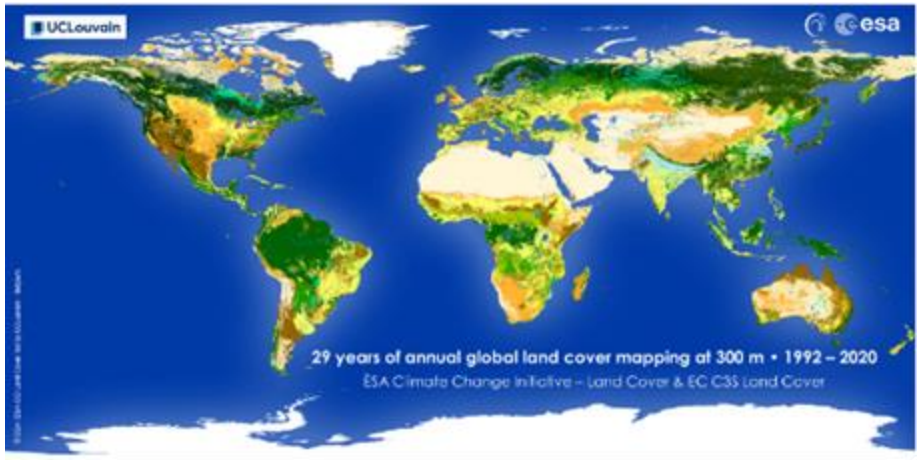
CEOS AFOLU Biomass Harmonization

Land Cover Datasets

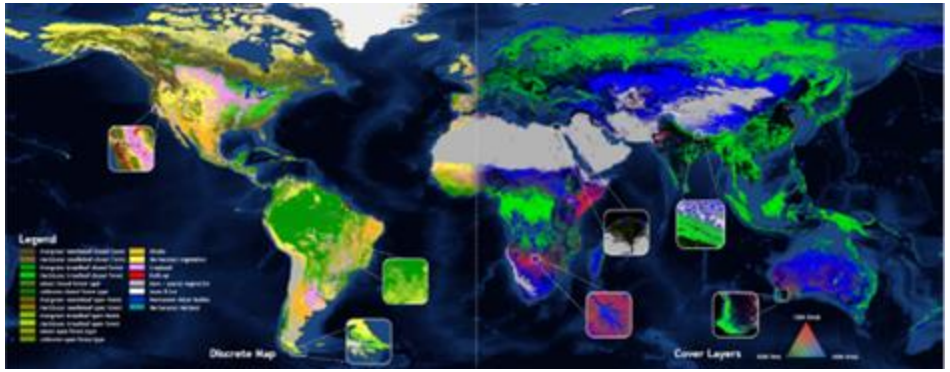
ESA WorldCover



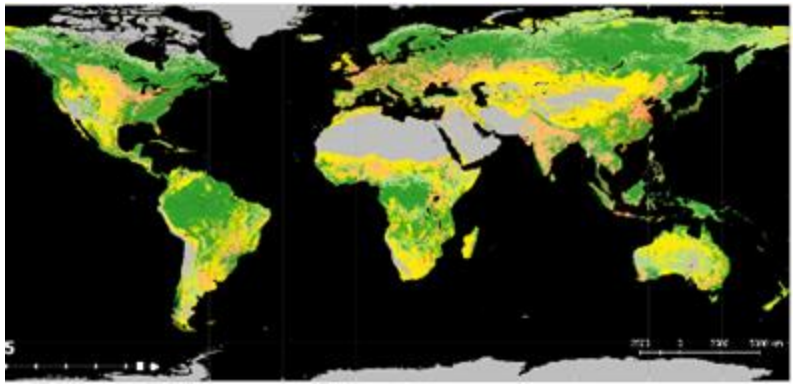
CCI



Copernicus



HILDA+



OLU – Mangroves & Wetlands

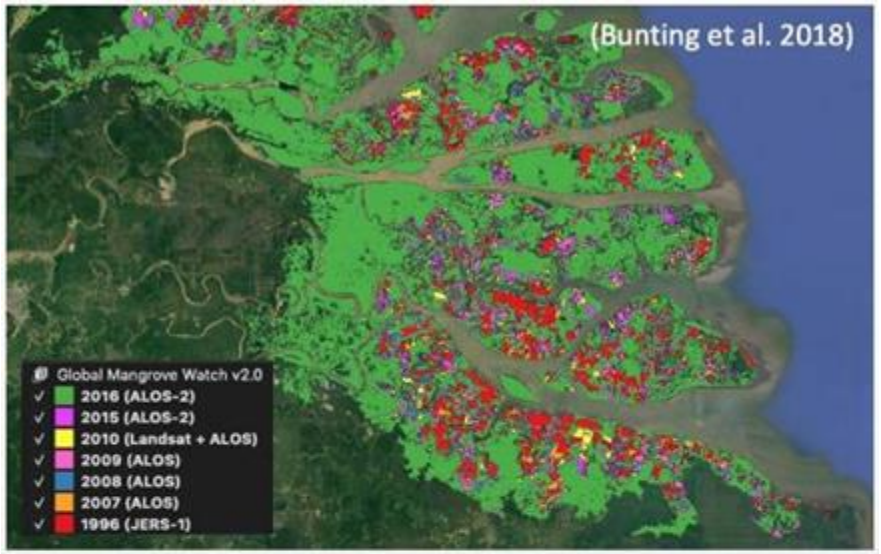
Mangroves (Forest / OLU-Wetlands)

Activity Data – Global Mangrove Watch (JAXA K&C)

Global maps of mangrove area and annual changes at 25 m derived from L-band SAR and optical data. Open access in public domain.

1996–2018 available for COP-26. 2019-2021 for GST1.

Official UNEP SDG 6.6.1 mangrove dataset.

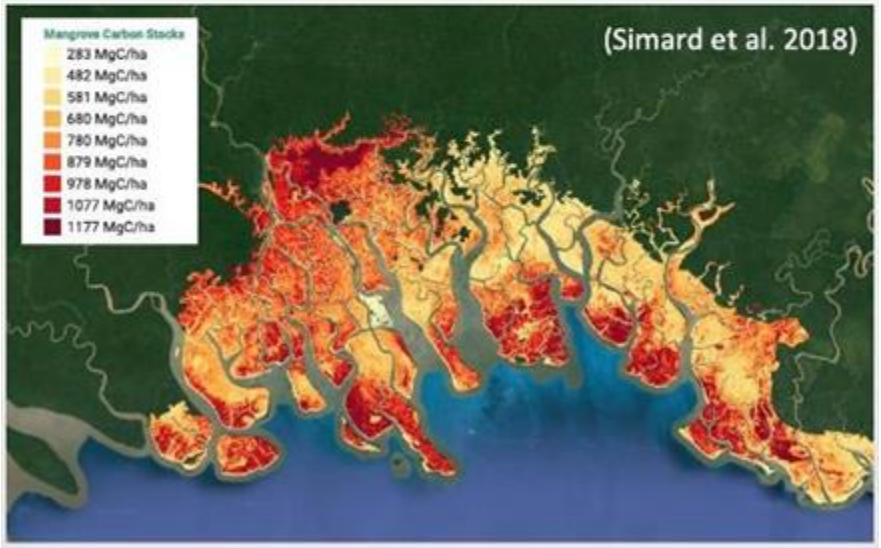


Emission Factors - LCLUC Global Mangrove Mapping (NASA JPL/GSFC)

Global maps of mangrove Height, AGB and Total Biomass at 30 m. Open access in public domain.

Baseline year 2000 derived from SRTM DEM.

New 2015 baseline at 12 m from TanDEM-X DEM available for GST1.

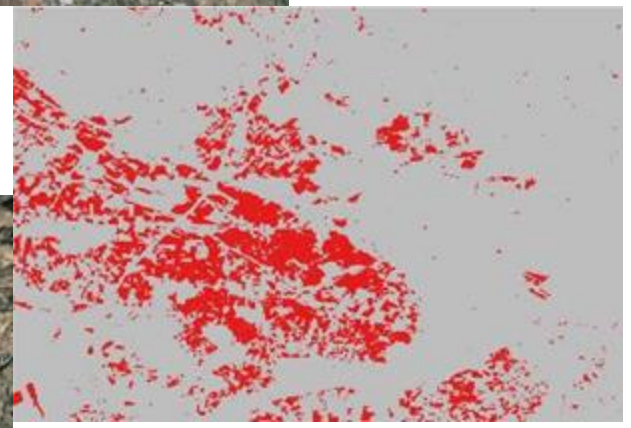


GEOGLAM Global Agricultural Monitoring

Agriculture

WorldCereal

esa



Available for COP26:

- All maps for 1 year for 5 countries
  - Argentina, Spain, France, Ukraine and Tanzania
  - Spatial resolution: 10 m

Available for Q3 2022:

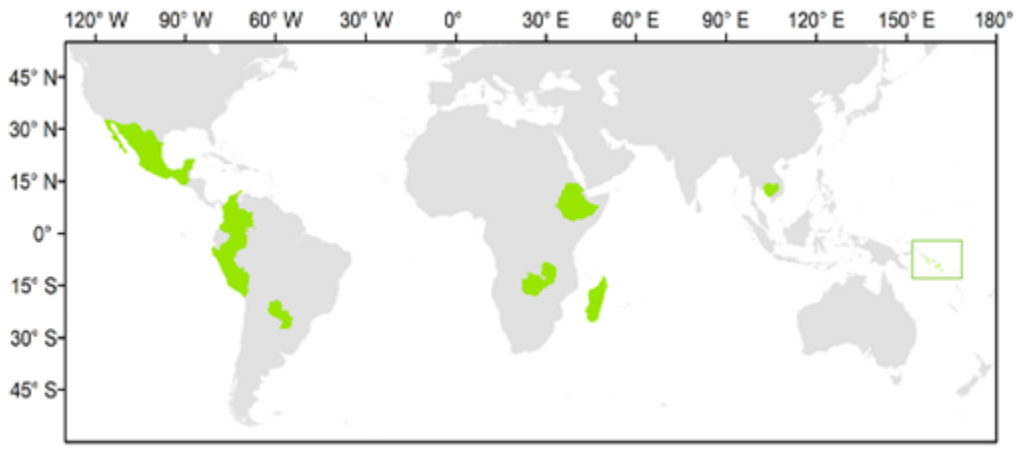
- Global products
- Global system to produce the maps

Space based datasets for AFOLU

	COP-26 (Nov 2021)	**GST1** (2021-23?)	**Beyond** (2024+)	**Notes**
Forest - Above Ground Biomass	**Synthesised biomass product providing estimates at a jurisdictional level globally** **Fall back is individual existing datasets**	Synthesized, jurisdictional level biomass, emission factors (and prototype biomass change)	Synthesized spatially explicit, annual biomass, emission factors and biomass change	Work plan and schedule provided
Land Cover & Forest (Area)	**- Copernicus annual global land cover** **- C3S/CCI Land Cover** **- WorldCover, HILDA+** **- Global Forest Watch tree cover loss and forest fluxes**	Synthesised map products and estimates of land cover and change at regional, and global levels Global tree cover and forest emissions and removals	Statistically robust activity data estimates (6 IPCC classes) at national and global levels Global annual forest emissions and removals at 30-100 m resolution.	GOFC-GOLD coordination proposed
OLU - Mangroves & Wetlands	**- Global Mangrove Watch cover and change (1996-2016)** **- Global Mangrove biomass (2000)**	**Global mangrove cover and change at 25 m (2019+)** **Global mangrove biomass at 12 m (2015)**	Global annual mangrove emissions and removals at 10-25 m resolution.	In coordination with GMW
Agriculture	**Demonstration WorldCereal products for at least 5 countries (Argentina, Spain, France, Ukraine and Tanzania)**	**Initial WorldCereal map and analytical system.** On-going seasonal analysis products	Continual system improvement and production of seasonal state and change products	In coordination with GEOGLAM

Indicates off the shelf datasets possible. **Indicates additional resources needed.**

National Inventory Test User Group



Country engagement: Improve understanding and uptake of EO data: AFOLU and Biomass

- Two objectives:

  i) demonstrations of earth observations uptake

  ii) contribution of NFI data for product validation
- Update on the CEOS AFOLU engagement with countries
- Demonstrate how earth observations and global datasets (land cover and biomass) are used by countries for monitoring and reporting purposes at the COP-26
- Dialogue with 10 countries has been initiated: **Cambodia, Colombia, Ethiopia, Guatemala, Madagascar, Mexico, Paraguay, Peru, Solomon Islands, Zambia**

Discussion

- Links with GFOI and GEO-GLAM are already strong
- Country engagement with GFOI/SilvaCarbon
- Potential linkage with other Land related Initiatives e.g., GEO-BON, GEO-Wetland, GEO-LDN, ... and the GEO Climate WG.
  - Interesting to use/develop the space based AFOLU datasets?
  - Interesting to engage with your stakeholders with the datasets?

Thank You!

Osamu Ochiai / 22 September 2021
Ochiai.osamu@jaxa.jp

#EO4Impact

María J Sanz has more than 25 years of experience on climate change and land use sector. She was Senior Programme Officer and Team Leader, Sectoral Issues Unit of the Methods, Data and Analysis Programme, UNFCCC Secretariat and Coordinator of the UNREDD Programme MRV team at the Forestry Department in FAO; at present Scientific Director of the Basque Centre for Climate Change (BC3).

She was Lead Author of the IPCC 5ARs; Review Editor of the IPCC SR Climate Change and Land; Lead Author of the 2003 IPCC GPG, the 2006 IPCC GL and the 2014 IPCC Kyoto Supplement, Review Editor of the IPCC 2014 Wetland Supplement, and Coordinating Lead Author for the IPCC 2019 Refinement of the 2006 GL for GHG Inventories. Member of the Emission Factor Database of the IPCC Task Force GHG Inventories (2006-2007, 2016-present).

At present, she is the Chair of the Advisory Group of the MDG of the Global Forest Observation Initiative (GFOI) and co-Chair of the Transdisciplinary Advisory Board of the EU Joint Programme Initiative (JPI) on Climate.

María J. Sanz
Chair of the AG of the MDG, GFOI
Basque Centre for Climate Change

GEO CLIMATE POLICY AND FINANCE WORKSHOP

Importance of country engagement

María J. Sanz, Basque Centre for Climate Change (BC3)
Advisory Group of MGD Component, GFOI
22 September 2021

GEO GROUP ON EARTH OBSERVATIONS

#EO4IMPACT

Information to be p

countries in ND

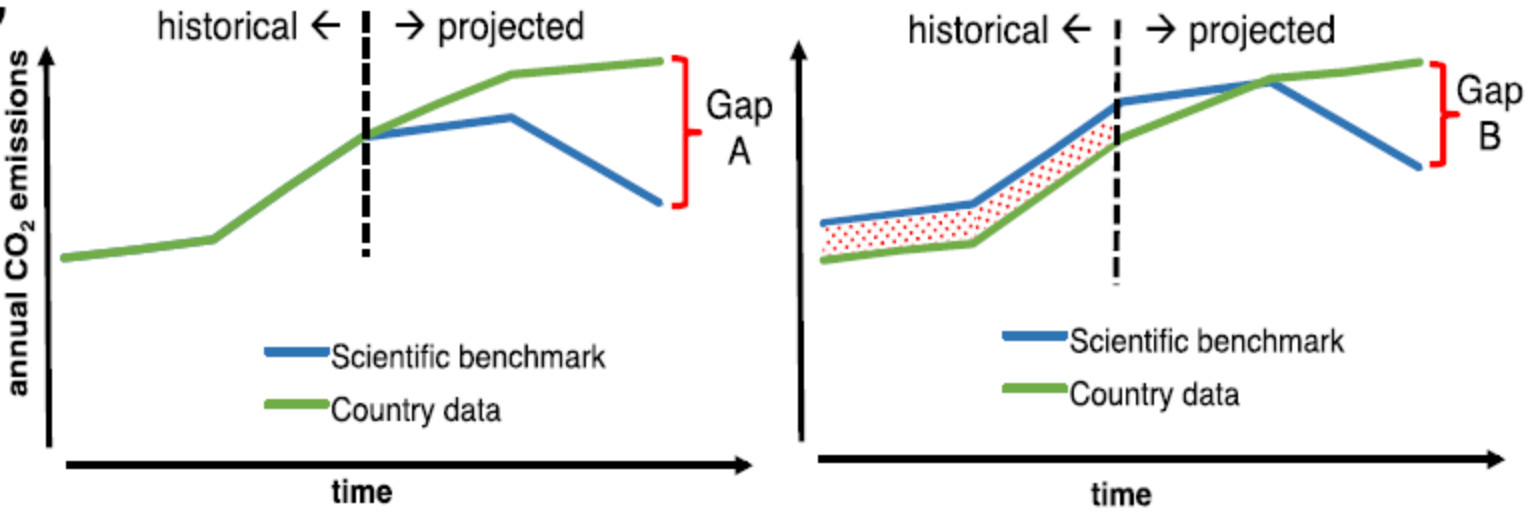
communication and

Inputs to the Global Stocktake (GST):

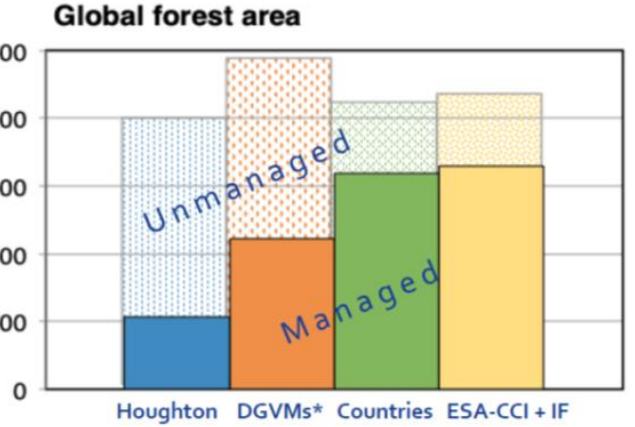
a) **Aggregated countries' GHG data**, including GHG inventories (for the historical part) and NDCs (for the forward-looking part)

b) **IPCC AR6 and other scientific data**

These inputs will be compared to assess the "gap" toward the 2°C trajectory:



The GS **comp**



3

European

Some times is a matter of **transparency** and **definitions**

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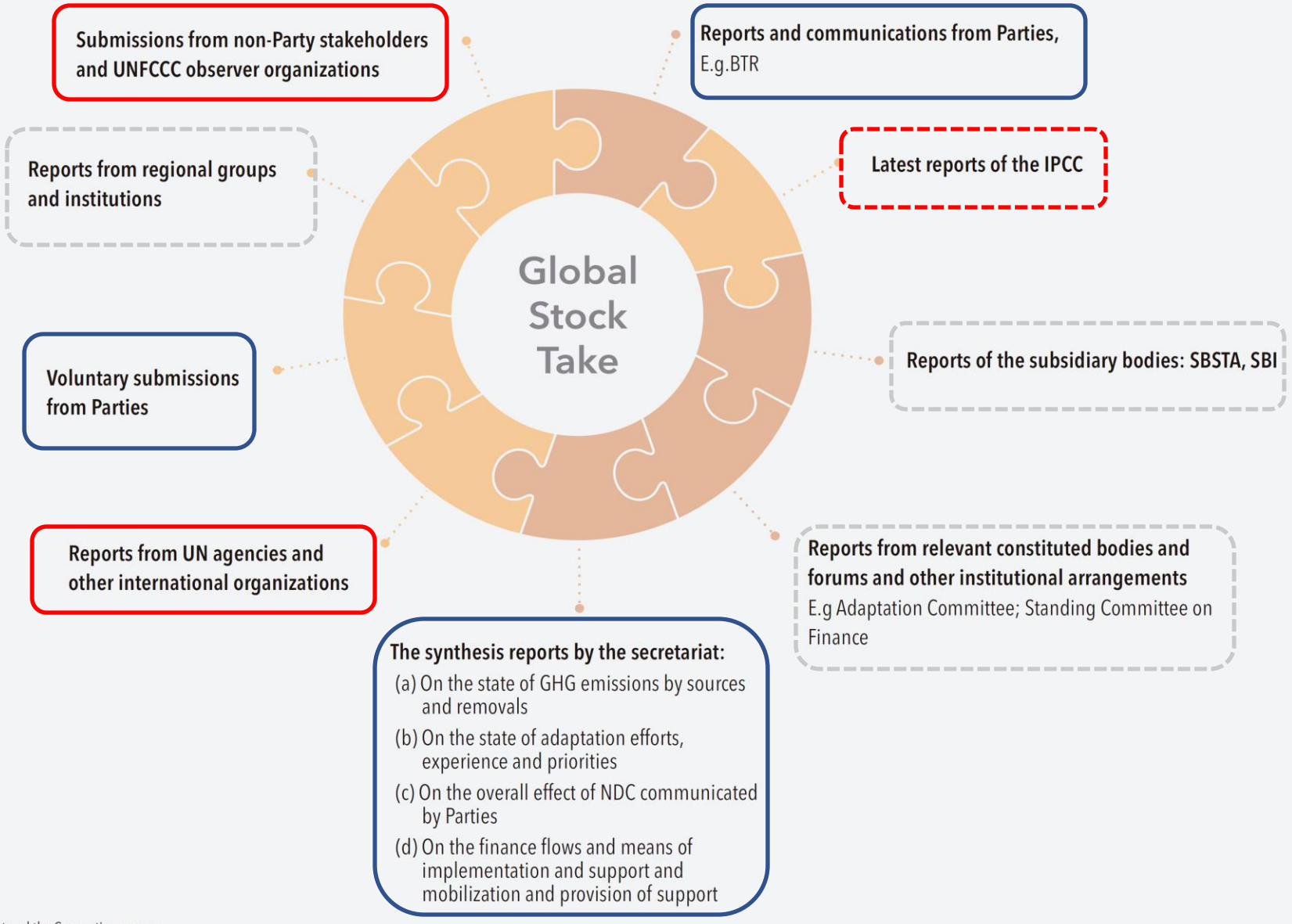
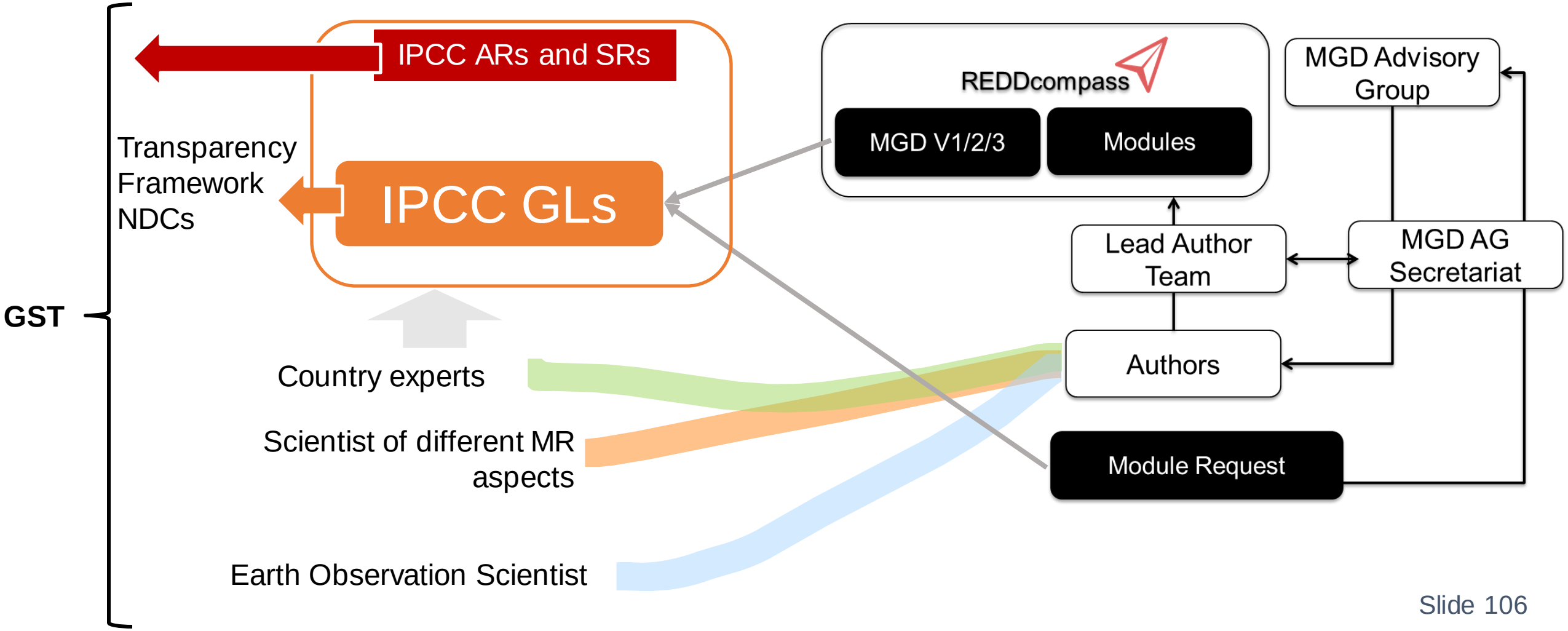
Multiple inputs…
….Not necessary comparable

Inputs for the global stocktake:



Harmonization is happening naturally …. But needs to be reinforced



Towards constructive GST

- Clarify what forest-related emissions and removals are (and are not) included in national reporting, in particular through GHGIs;
- Compare national reporting to independent scientific studies, and provide an explanation of why and how they differ;
- Additional transparency could improve understanding of the role of forests in the global carbon budget, both from bottom up and top down.

In summary

A better collective understanding of the forest-related information available to assess progress toward delivering on the goals of the Paris Agreement, as well as potential improvements in country-level reporting.

Thank You!

Jesus San-Miguel-Ayanz is a senior researcher at the Joint Research Centre of the European Commission in Ispra, Italy. He received his PhD (1993) and MSc (1989) by the University of California-Berkeley, Berkeley, California, U.S.A. and his Forest Engineering Degree (1987) by Polytechnic University, Madrid, Spain. His research focuses on the use of remote sensing and geographic information systems in forestry and the development of early warning and monitoring systems for wildfires.

He leads the operation and further development of the European Forest Fire Information System (EFFIS) in pan-European region and the development of the Global Wildfire Information System (GWIS), under the umbrella of the Group on Earth Observations (GEO) and the EU Copernicus Programs. He has a long record of scientific research and policy support publications, some of them available at: https://www.researchgate.net/profile/J_San-Miguel-Ayanz

Jesús San-Miguel-Ayanz
Senior Researcher
European Commission JRC
GWIS Lead

GEO CLIMATE POLICY AND FINANCE WORKSHOP

Global Wildfire Information System (GWIS)

providing EO data on wildfires for early warning systems at the regional and global scale

Jesús San-Miguel, Tomas Artes & Duarte Oom
European Commission Joint Research Centre
22 September 2021

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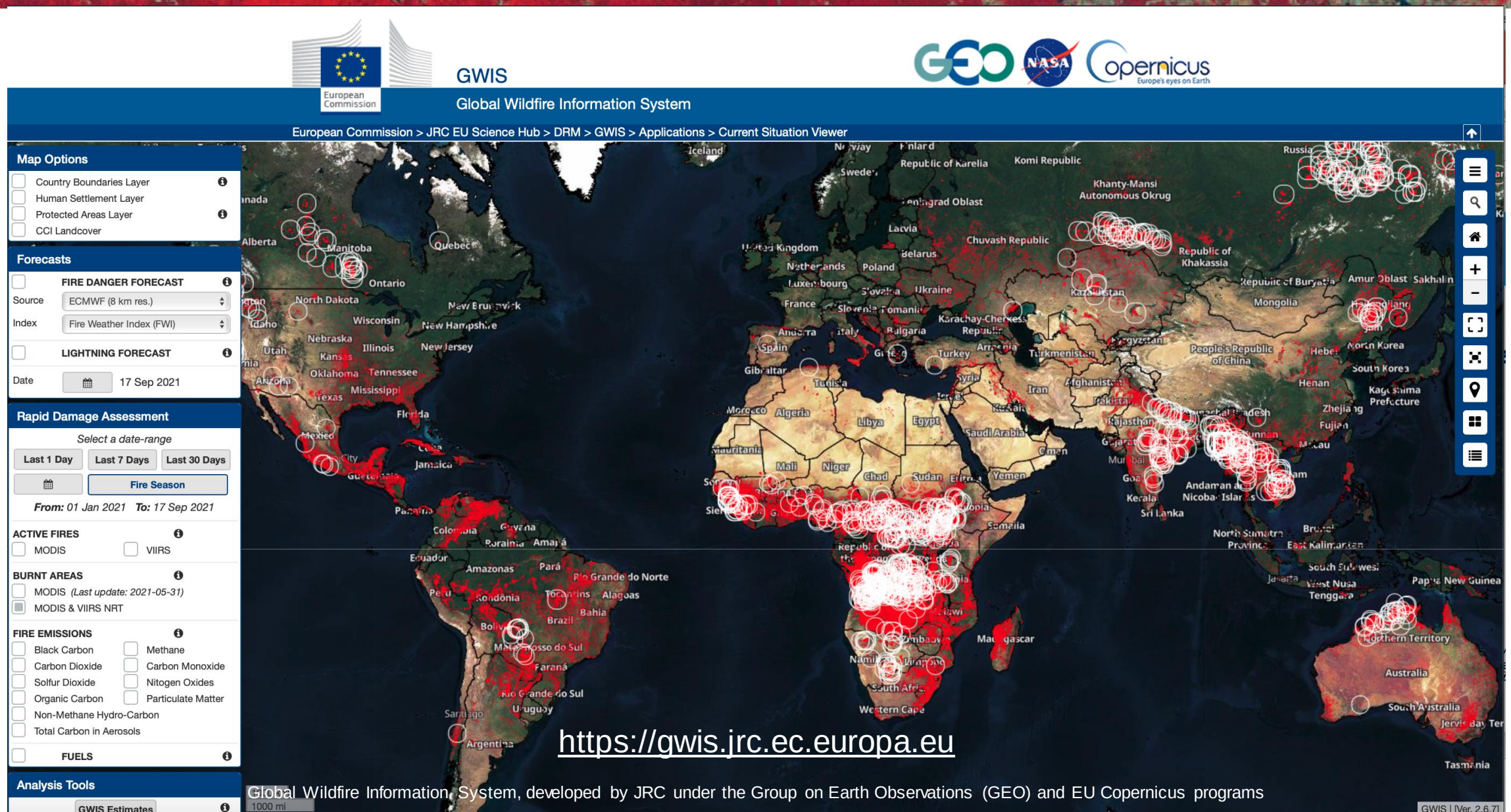
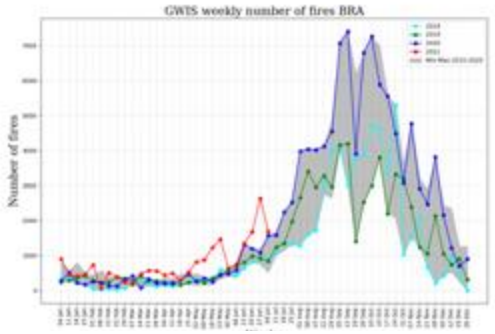
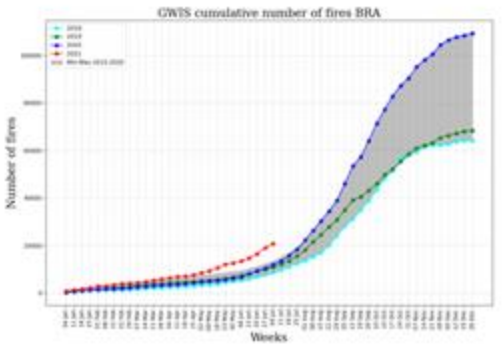
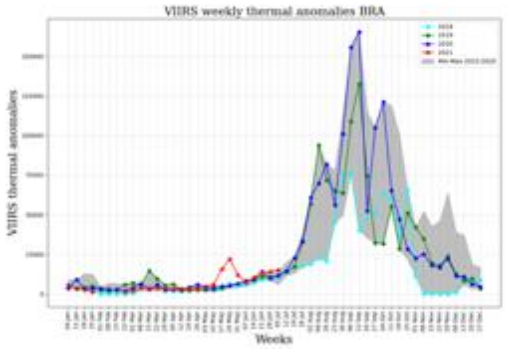
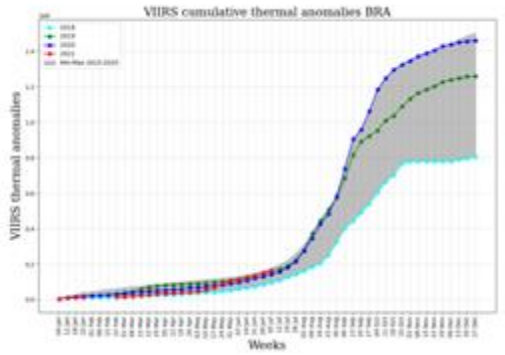


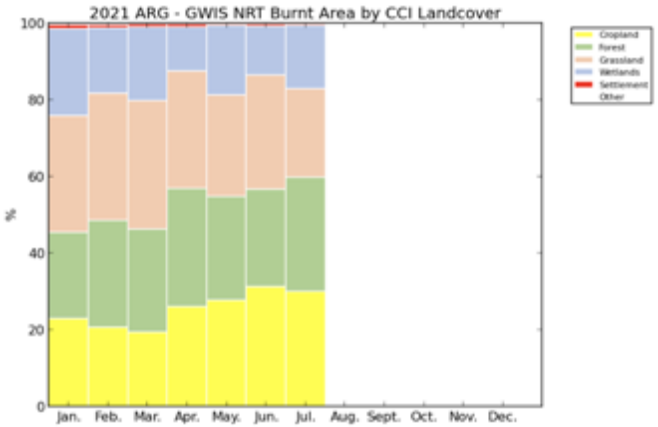
Seasonal Trends – Brazil: Weekly analysis of damage to landcover, protected areas, burnt areas, active fires, fire danger, fire emissions

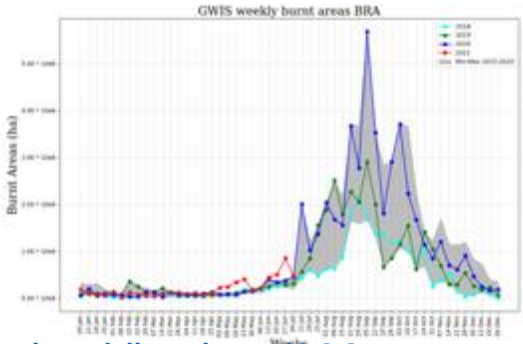


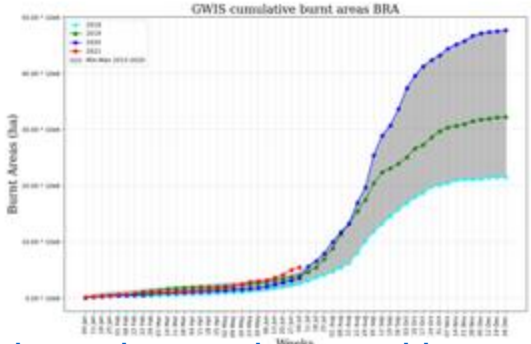






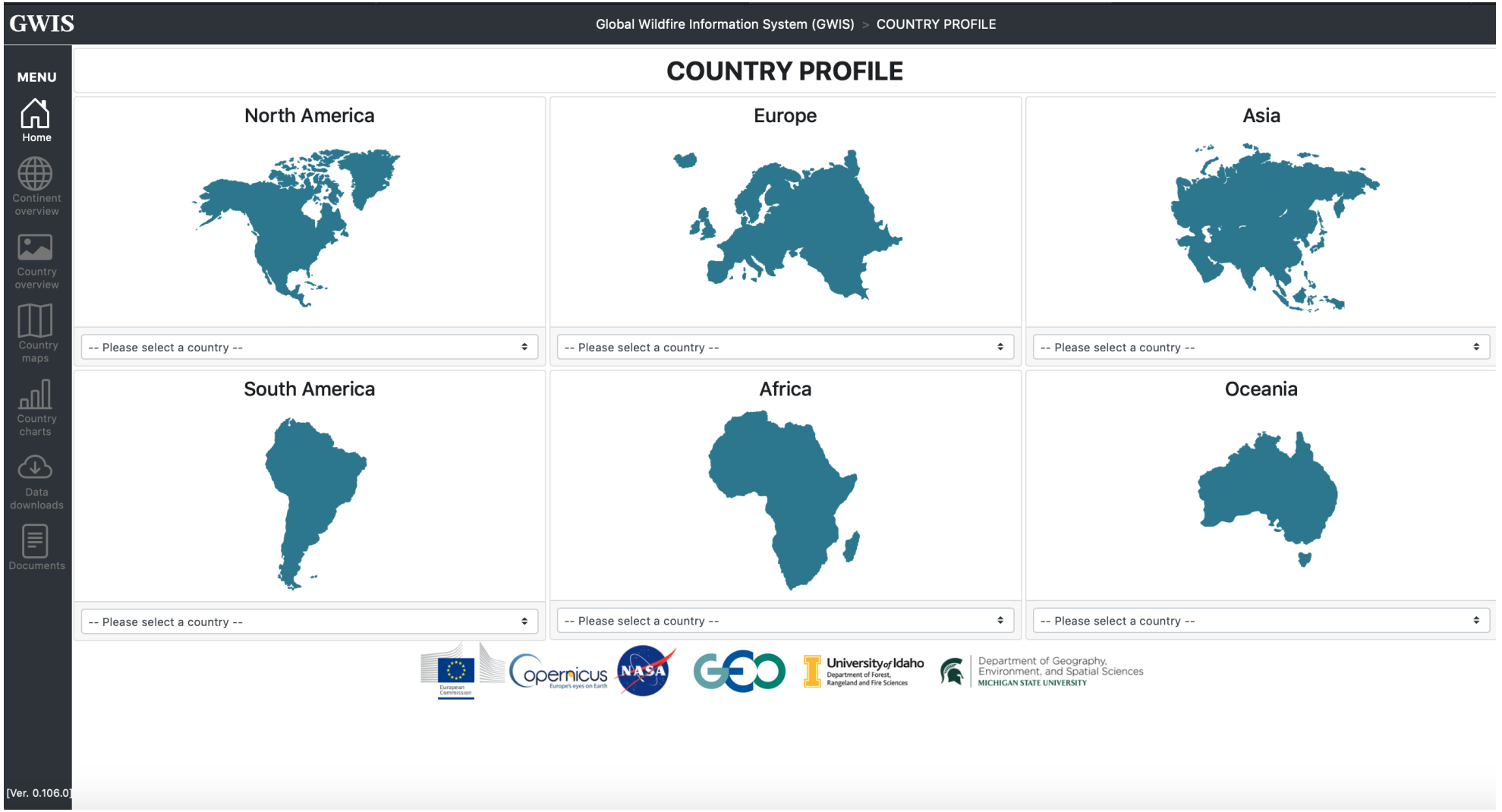






https://gwis.jrc.ec.europa.eu/reports-and-publications/2021-amazon-and-south-america-weekly-reports

GWIS: Historical analysis of wildfire regimes and impact: Analysis of burnt areas, number of fires, fire size, seasonality, fire emissions, damage to protected areas, land cover damage (e.g. Australia)



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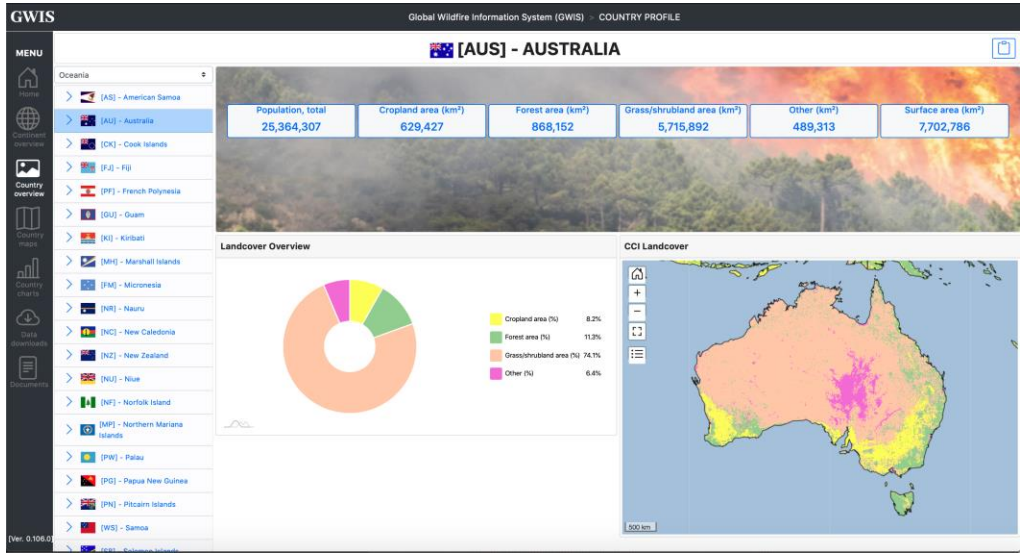
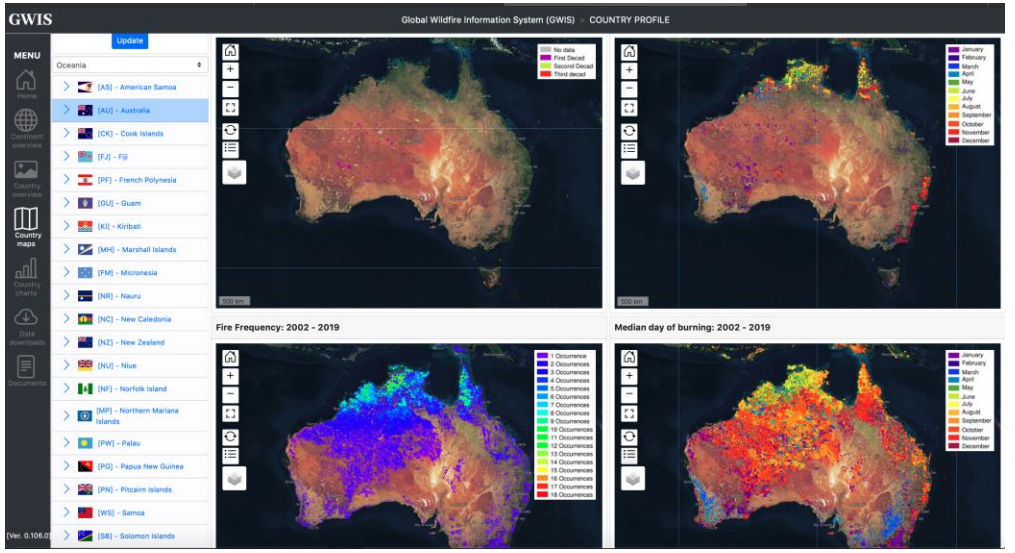
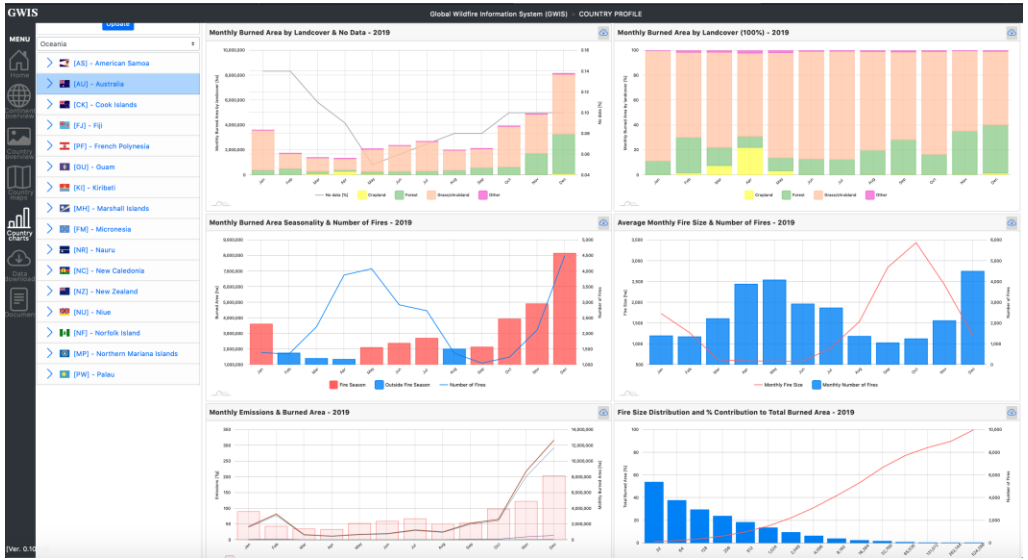
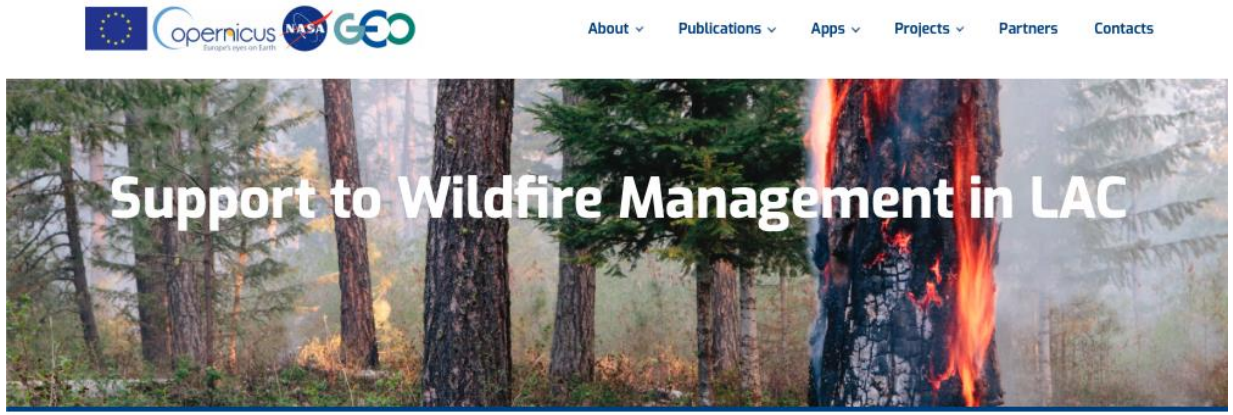


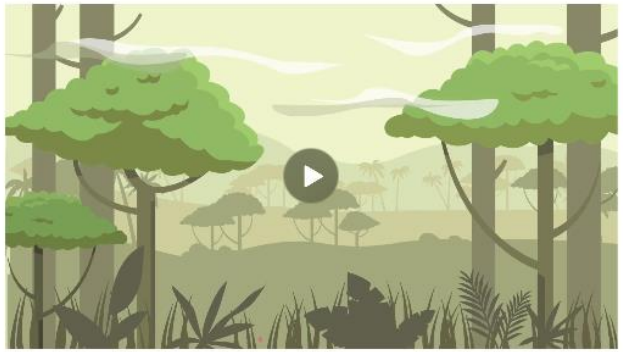






The European Union (EU) and Latin America and the Caribbean (LAC) have a longstanding relationship based on common values and established on a legal framework with most of the 33 countries through association and trade agreements, and political and cooperation dialogues.

Both regions collaborate in numerous international fora to tackle global challenges, such as the United Nations (UN) in the context of the 2030 Agenda for Sustainable Development cooperation, or the fight against climate change through the Paris Agreement.



Collaboration on wildfire mangement between the EU and Latin America and the Caribbean region

Regional Achievements

In the pan-European region, the EU, through its Joint Research Centre (JRC) - a science and knowledge centre that provides scientific advice and supports EU policies-, has a wide long-term expertise on facing global challenges, such as wildfires. JRC, in collaboration with other services

https://gwis.jrc.ec.europa.eu/projects/support-wildfire-management-lac

General Objectives

- (1) Reduce the impact of wildfires in the the Amazon region and neighboring countries through cooperation with LAC countries and regional organizations (ACTO, Leticia Pact, UNEP, FAO, UNDRR, etc.) by providing evidence for policies.
- (2) Share the experience of the EC on the establishment of the Expert Group on Forest Fires (EGFF)[1] and the development of wildfire early warning and monitoring systems in the pan-European region (i.e. European Forest Fire Information System)2 using the **Global Wildfire Information System in the LAC region**
- (3) Establish a common base of information on wildfires using GWIS and support data harmonization in the region to support cooperation with fire management services in the countries and organizations operating in the region, e.g. FAO, ACTO, Leticia Pact, UNEP, etc.

[1] Group made of fire managers from Ministries of Environment, Agriculture or Civil Protection from 43 countries in Europe, Middle East and North Africa
[2] European Forest Fire Information System (EFFIS), developed by JRC and currently operating under the EU Copernicus Regulation

Thank You!

Jesús San-Miguel-Ayanz / 22 September 2021
jrc-effis@jrc.ec.europa.eu

#EO4Impact

Additional info at:

https://gwis.jrc.ec.europa.eu

https://gwis.jrc.ec.europa.eu/projects/support-wildfire-management-lac

Carolina Adler is an Environmental Scientist and Geographer with an international career spanning over 25 years in both research and practice in the public and private sectors. As the current Executive Director of the Mountain Research Initiative (MRI), a GEO Participating Organization, she is tasked with overseeing the work of the MRI Coordination Office, as well as connecting, coordinating, and promoting global change research and supporting regional and thematic networked collaborations in mountains worldwide. Adler is also Co-Lead for the GEO Work Programme Initiative "Global Network on Observations and Information in Mountain Environments" (GEO Mountains).

Adler is a Lead Author for the chapter "High Mountain Areas" of the Intergovernmental Panel on Climate Change (IPCC) Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC), approved in September 2019, as well as Lead Author for the IPCC Working Group (WG) II contribution on Impacts, Vulnerability, and Adaptation and Co-Lead for the Cross-Chapter Paper on Mountains for the Sixth Assessment Report (AR6), expected in February 2022 at the WGII contribution to AR6 approval session by the Panel.

Dr Carolina Adler
Executive Director
Mountain Research Initiative &
Co-Lead GEO Mountains

GEO CLIMATE POLICY AND FINANCE WORKSHOP

GEO Mountains: contributing to global climate impact assessments in mountain areas

Carolina Adler
Mountain Research Initiative & GEO Mountains
22 September 2021

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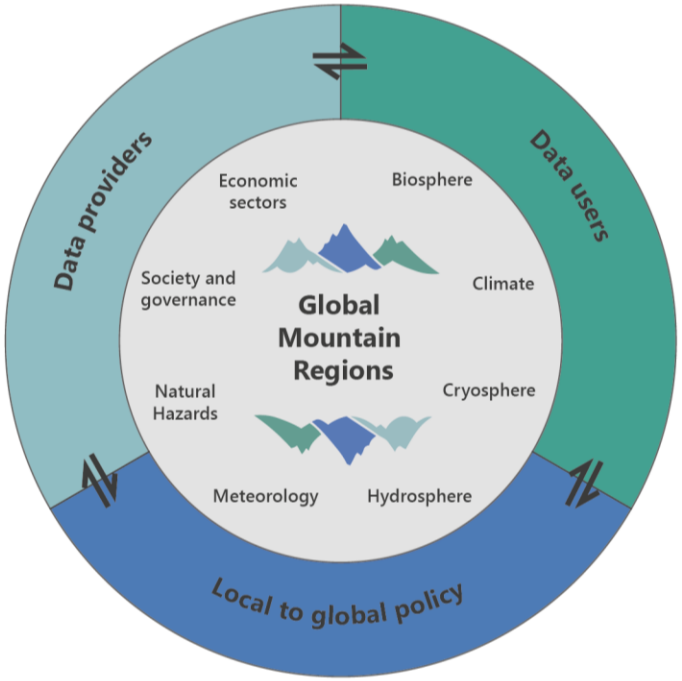
GEO Mountains seeks to connect, collect, and make accessible transboundary and inter- and transdisciplinary data and information – from a variety of providers, including research and mountain observation networks – pertaining to environmental, ecological, and societal change in mountainous regions globally. In so doing, the ease with which the scientific research community, local, national, and regional decision makers, and other interested parties can access and use such data and information will be greatly enhanced.



www.geomountains.org/

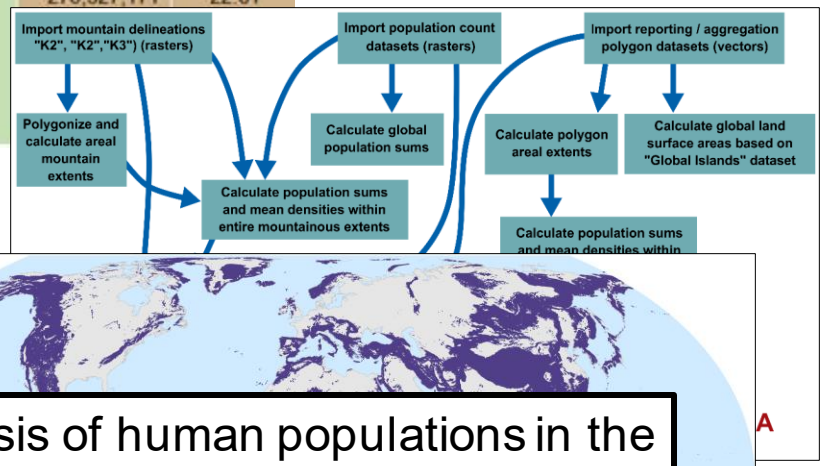
IPCC Reports in the Sixth Assessment Cycle

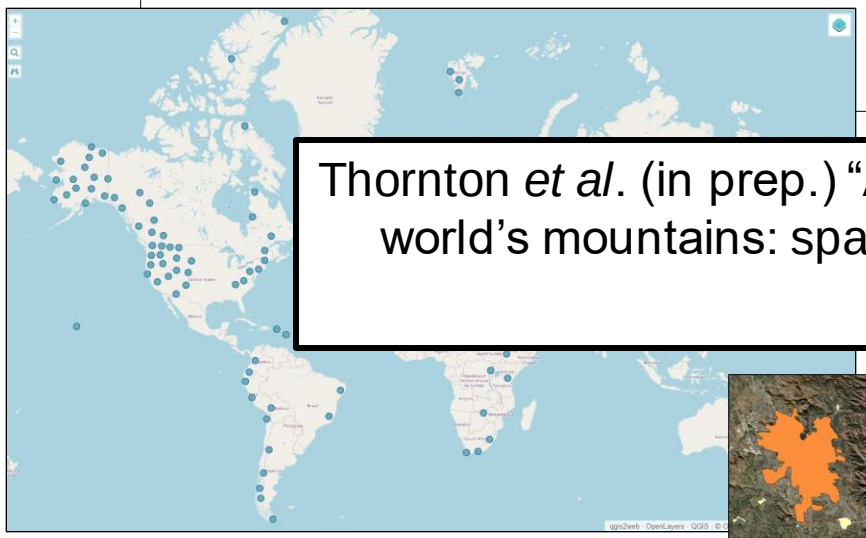
NEW: Cross-Chapter Papers (CCP)

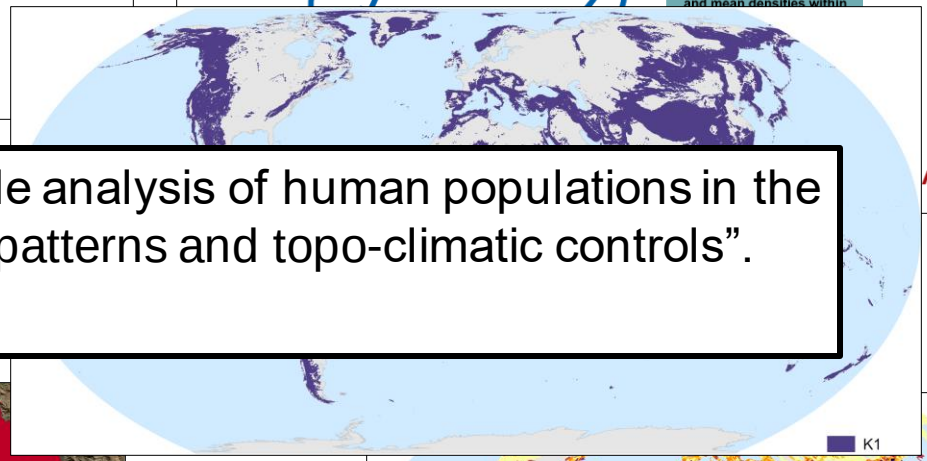
- Biodiversity hotspots (land, coasts and oceans)
- Cities and settlements by the sea
- Deserts, semi-arid areas, and desertification
- Mediterranean region
- Mountains
- Polar regions
- Tropical forests

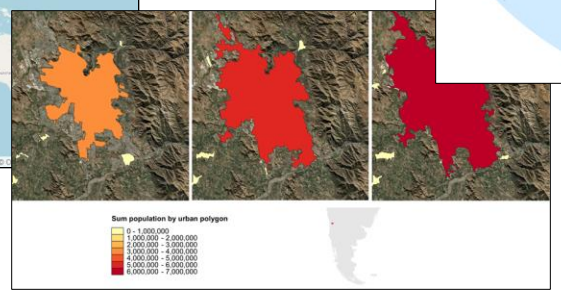
- Expanded treatment of particular systems or regions
- Integrative across chapters
- Allow updates since the Special Reports
- Follow broad scheme and structure of chapters
- Same audience as chapters
- Need to develop high level policy-relevant messages

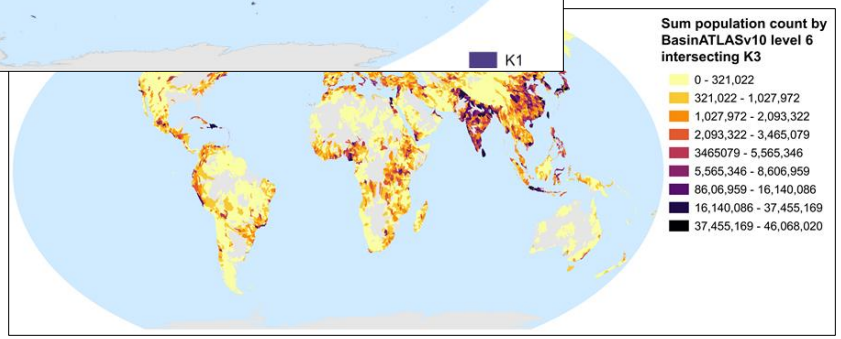
			Global urban area (km²)		Global urban population		Mountain urban population					
							K1		K2		K3	
Year	Urban extent delineation	Population data source	km²	% of total land surface area (excluding Antarctica)	Sum	% of global population	Sum	% of global urban sum	Sum	% of global urban sum	Sum	% of global urban sum
1975	GHS-SMOD	GHS-POP	305,391	0.23	1,504,875,604	37.05	136,293,337	9.06	43,603,453	2.90	366,753,770	24.37
1990	GHS-SMOD	GHS-POP	428,016	0.32	2,196,689,230	41.37	204,826,903	9.32	49,879,819	2.27	524,838,068	23.89
2000	GHS-SMOD	GHS-POP	531,457	0.39	2,704,125,652	44.14	258,562,671	9.56	56,010,690	2.07	638,930,475	23.63
2015	GHS-SMOD	GHS-POP	663,545	0.49	3,522,599,171	47.93	350,774,246	9.96	75,052,035	2.13	825,284,963	23.43
2015	GHS-SMOD	WorldPop	663,545	0.49	2,545,311,972	34.63	210,918,122	8.29	47,621,189	1.87	584,086,040	22.95
1990	GUB	GHS-POP	300,345	0.22	1,255,699,640	30.92	98,498,672	7.84	17,741,278	1.41	276,327,171	22.01
2000	GUB	GHS-POP	447,880	0.33	1,905,271,214	35.88	159,727,391	8.38	27,357,503	1.44		
2010	GUB	N/A	590,132	0.44	N/A	N/A	N/A	N/A	N/A	N/A		
2015	GUB	GHS-POP	636,568	0.47	2,693,086,812	36.64	227,651,552	8.45	38,315,433	1.42		
2015	GUB	WorldPop	636,568	0.47	2,204,922,828	30.00	169,465,867	7.69	30,359,802	1.38		
2018	GUB	N/A	809,366	0.60	N/A	N/A	N/A	N/A	N/A	N/A		











Thornton *et al*. (in prep.) "A reproducible analysis of human populations in the world's mountains: spatio-temporal patterns and topo-climatic controls".

Reflections based on experiences in AR6

***EO needs that should be prioritized and addressed by specific EO products in view of the Global Stocktake*:**

- **Focus not only on the products as ends in themselves, but also on the key processes and 'facilitators' that help bring about those products**. Recognise the valuable function that (coordinating) networks fulfil in connecting individuals, initiatives, data, and information that may otherwise remain scattered and underutilised, and for helping to translate and turn these 'products' into actionable knowledge.
- **Credibility in the substance.** Assessment relevant inputs need to be based on data, information, and analyses that are transparent and reproducible in their methods – including data dissaggregated/aggregated at the relevant scales. Consistent with GEO Open EO Data statement, it is important to support open and reproducible research that follow FAIR principles (findable, accessible, interoperable, and reusable), and that allow for understanding, verification, and reuse by others in new contexts. The same applies for important inputs that are to be compiled to inform the Global Stocktake.

Thank You!

Carolina Adler / 22 September 2021
@GEO_Mountains #EO4Mountains / carolina.adler@unibe.ch

#EO4Impact

Gary has a Ph.D. in biology from the University of California, Los Angeles, where his research focused on the interaction of plants with their environment by modeling plant architectures. At NASA/JPL he combines that experience with system engineering principles and applications.

He has worked with the NASA Ecological Forecasting program for the last 15 years, including two years seconded to the Group on Earth Observations in Geneva as the Expert in Biodiversity and Ecosystem Sustainability. He has been closely involved with GEO BON since its beginning around 2008 as a member of the Steering and Management Committees and as co-lead for the Ecosystem Structure Working Group.

Gary N Geller
Senior Science System Engineer
NASA Jet propulsion Laboratory
California Institute of Technology
GEO BON member

GEO CLIMATE POLICY AND FINANCE WORKSHOP

GEO BON Essential Biodiversity Variables

Gary Geller
NASA Jet Propulsion Laboratory
California Institute of Technology
22 September 2021

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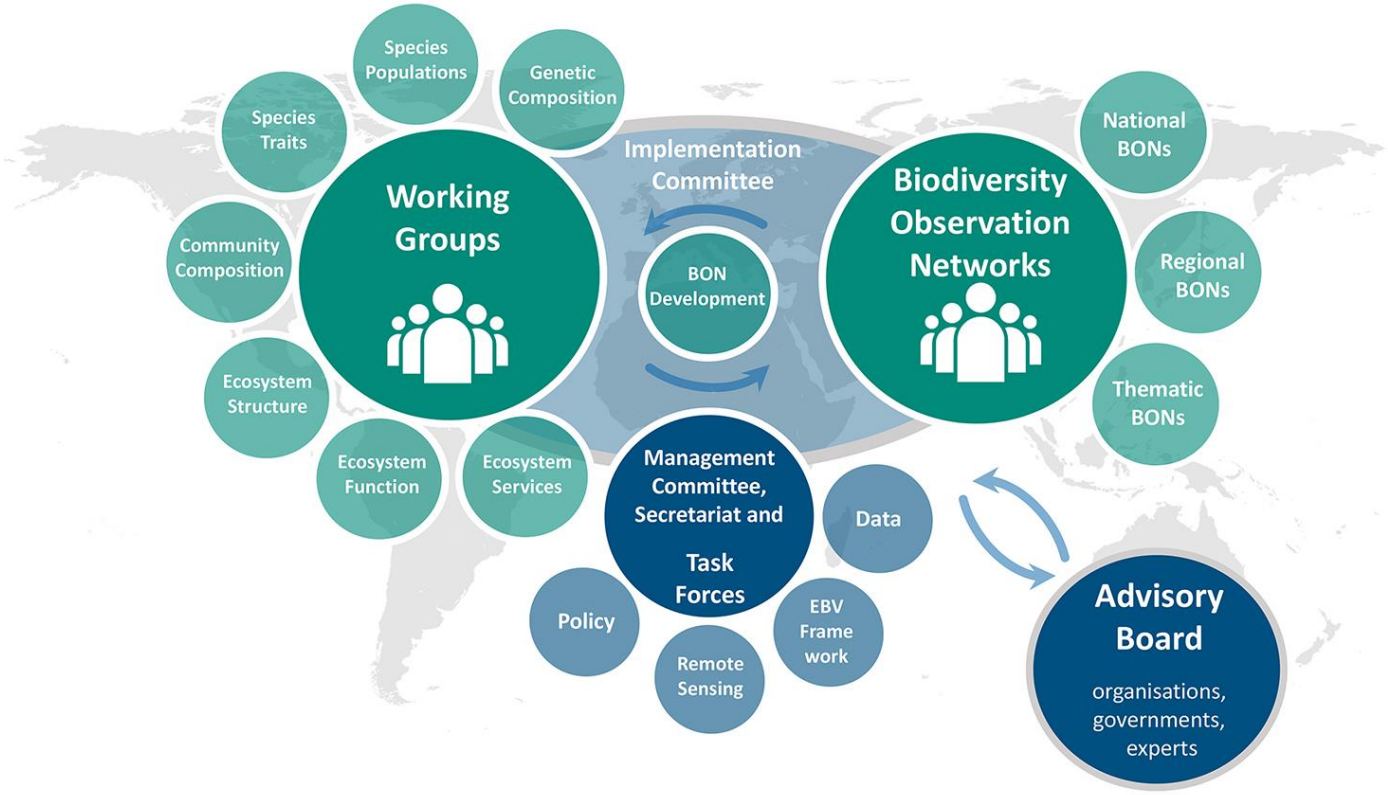
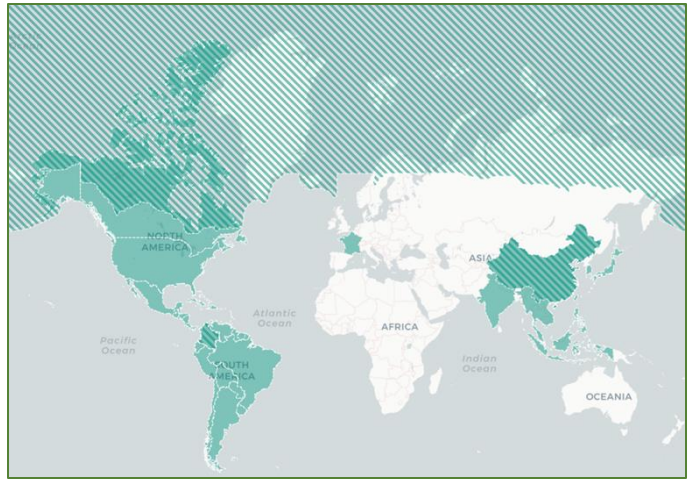
#EO4IMPACT

GEO BON Overview

Improve the acquisition, coordination and delivery of biodiversity observations and related services to decision makers and the scientific community.





Current BON coverage

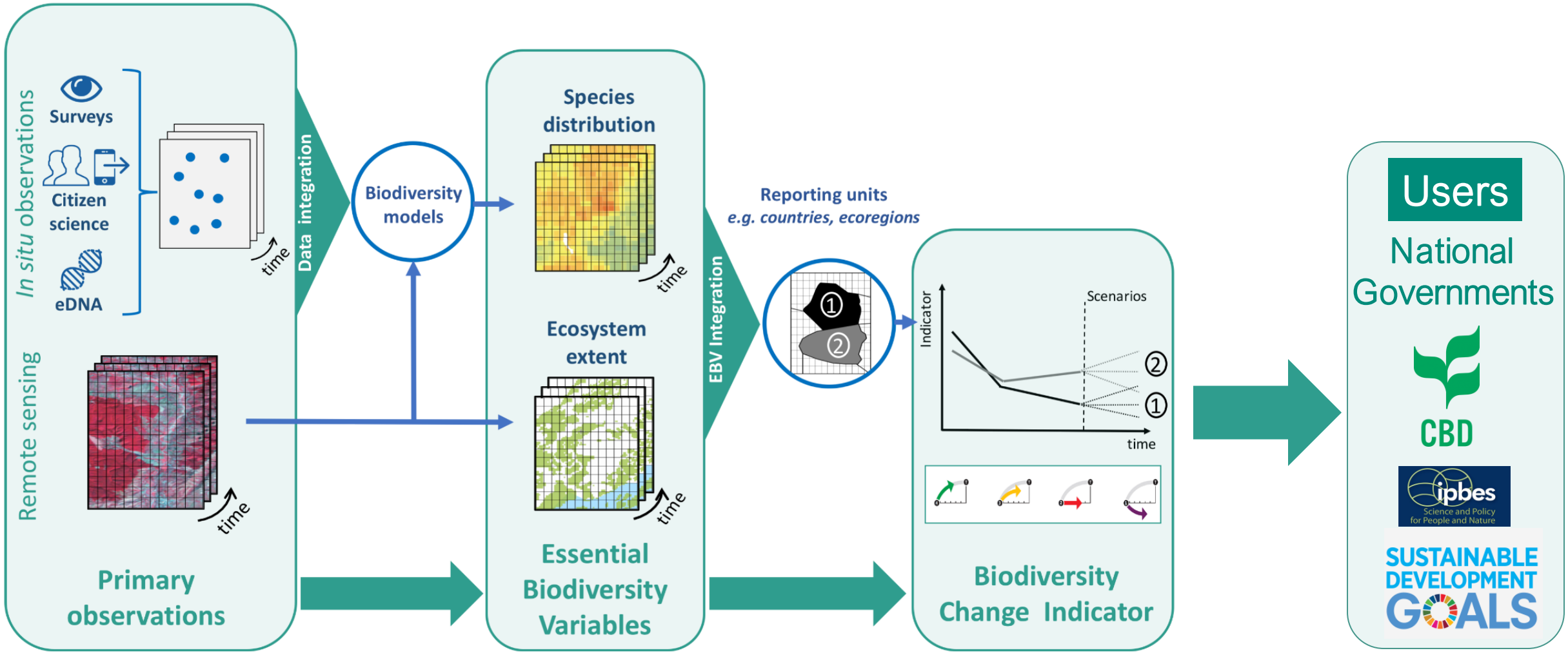
What are Essential Biodiversity Variables?

Set of measurements to capture the major dimensions of biodiversity and how it is changing

EBVs are:

- Biological
- State variables
- Sensitive to change
- Scalable
- Feasible
- Ecosystem agnostic

EBV Workflow



Navarro et al. 2017

Example EBVs

Class	Example EBV
Genetic Composition	Genetic diversity
Species Populations	**Species distribution** **Species abundance**
Species Traits	Phenology
Community Composition	Taxonomic diversity
Ecosystem Structure	**Ecosystem distribution**
Ecosystem Function	**Primary productivity** **Functional Diversity**

Note: Essential Ecosystem Service Variables have also been identified

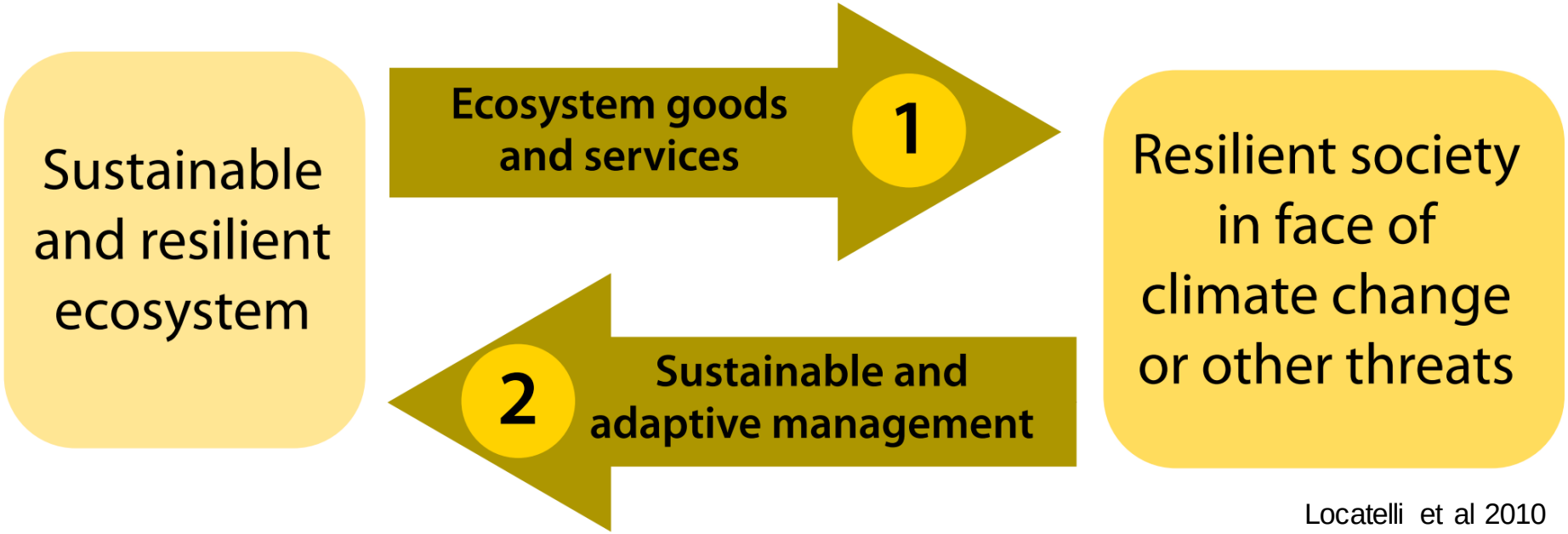
Adaptation

How do we moderate harm to ecosystems and the biodiversity they support?

1) Active management
2) Reduce other stressors, e.g.,
   - Land conversion
   - Invasive species
   - Resource extraction
   - Pollution

Adaptation: A two-way street

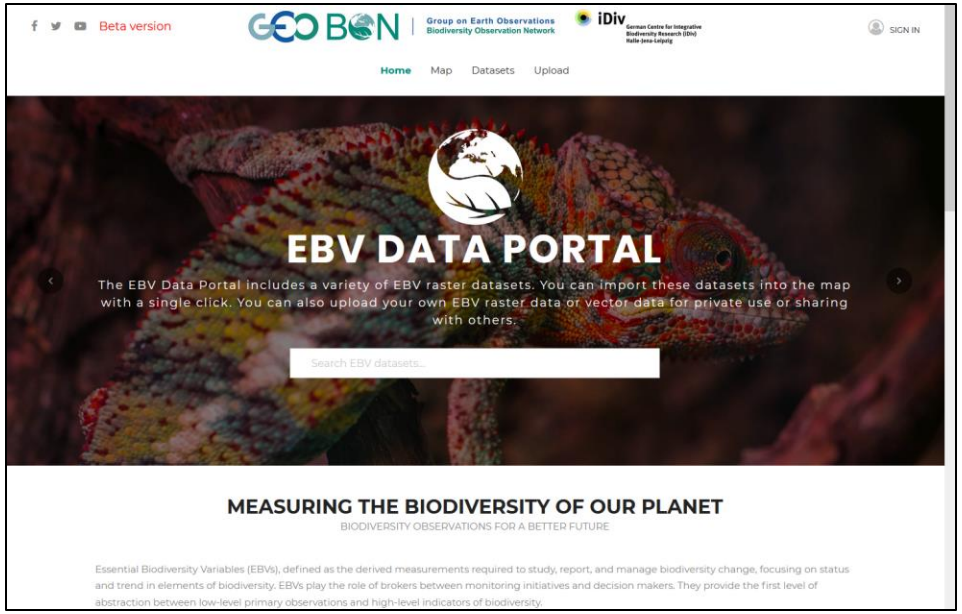
Adaptation for biodiversity…or biodiversity for societal adaptation?



Locatelli et al 2010

Current EBV Status

- Not fully “operationalized”
- EBV definitions
  - Completed last year
- “Production”
  - Ad hoc: no central facility
  - Workflows under development
- Downloads
  - https://portal.geobon.org/



Thank You!

We welcome your thoughts & feedback

Gary Geller / 22 September 2021
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https://geobon.org/

#EO4Impact

Daniele Ehrlich is a Project Officer with the Joint Research Centre (JRC) and member of the Global Human Settlement Project. He co-ordinates activities within the GEO Human Planet Initiative (HPI). He focuses on analyzing spatial urbanization patterns for use in local, regional and global sustainability assessments, in disaster risk assessments and climate adaptation. He promotes HPI data across thematic areas, targeting the scientific community as well as the community of practitioners. He is also a member of the GEO Disaster Risk Working Group.

The GEO Human Planet Initiative (HPI) generates datasets, knowledge and indicators used by practitioners, decision makers and scientists. The Initiative focuses on **essential societal variables** (ESV)- including population and settlements. ESV datasets are used to monitor urbanization, respond to crises, measure progress towards the Sustainable Development Goals (SDGs), and **design adaptation strategies for climate change**.

Daniele Ehrlich
Project Officer
European Commission JRC

GEO CLIMATE POLICY AND FINANCE WORKSHOP

GEO Human Planet: Essential Societal Variables contributing to the global assessment of adaptation

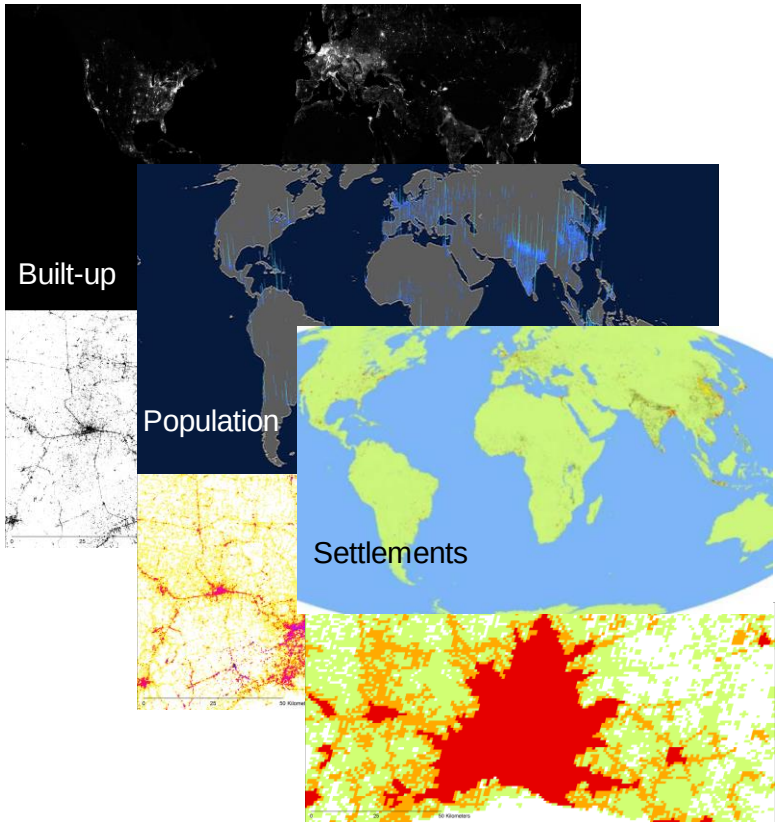
Daniele Ehrlich on behalf of Human Planet Initiative
European Commission, Joint Research Centre
22 September 2021

GROUP ON EARTH OBSERVATIONS

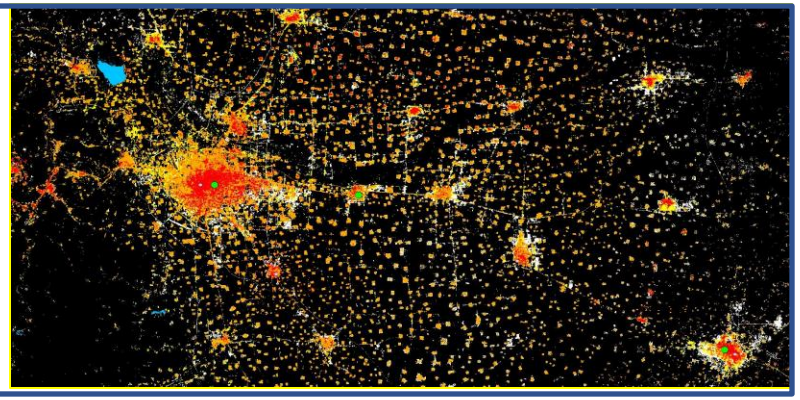
#EO4IMPACT

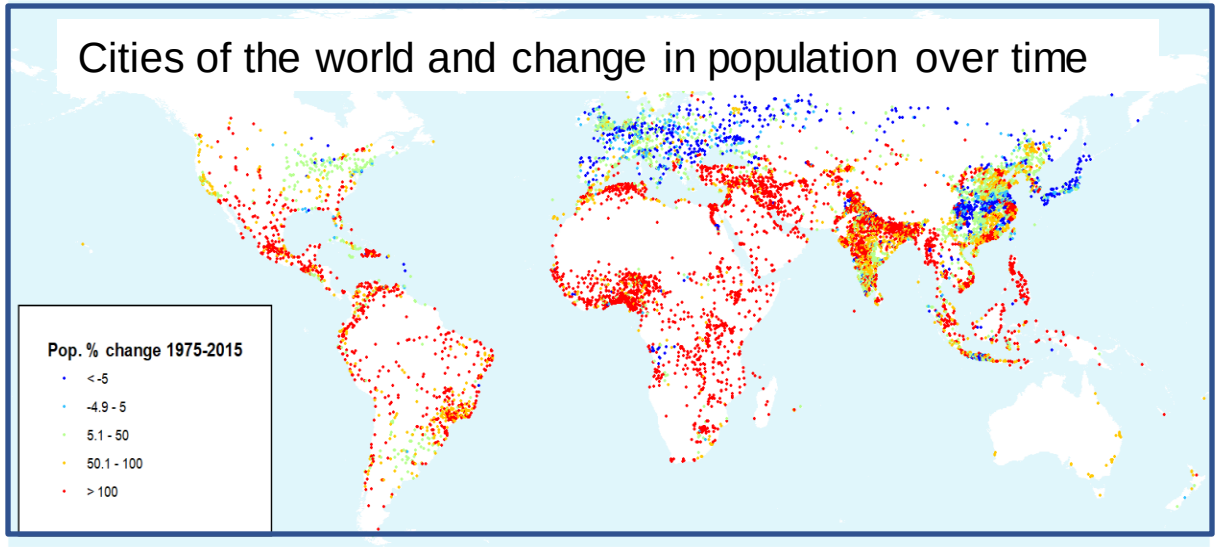
Essential societal variables

Global, Open, Consistent

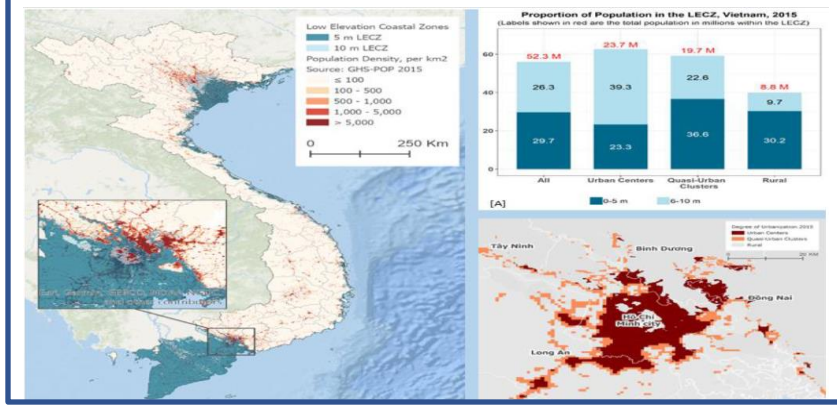


Global enumeration of **cities and settlements** and their growth

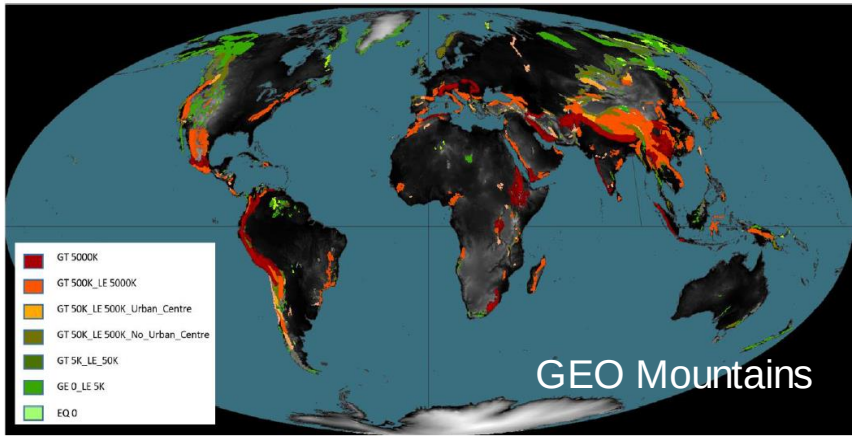




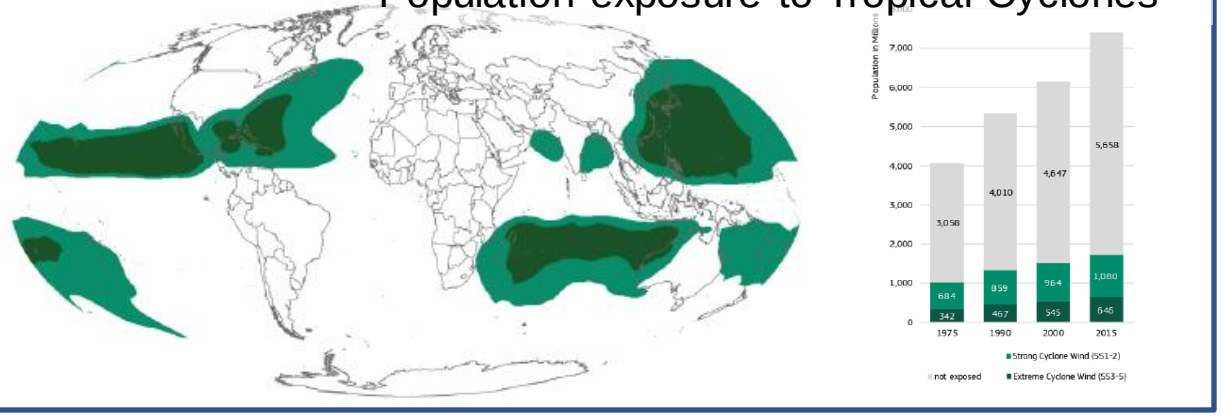
Exposure and Vulnerable communities

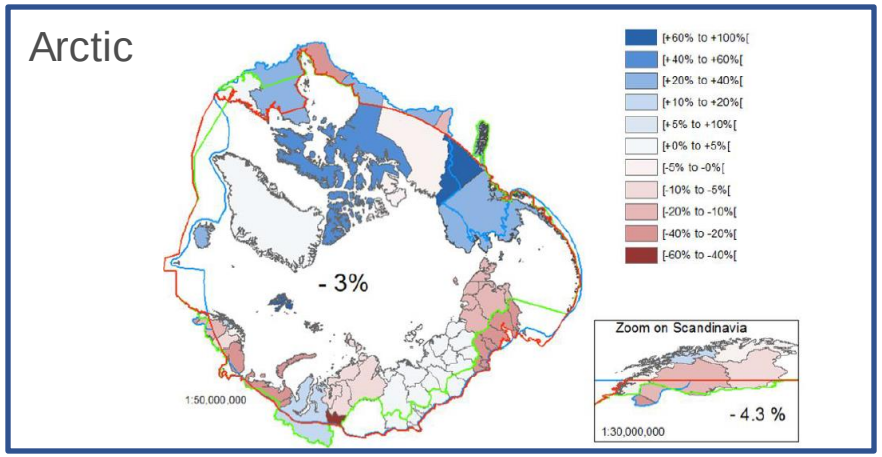


Settlements in low elevated coastal areas



Population exposure to Tropical Cyclones





Stocks and flows

In-flow

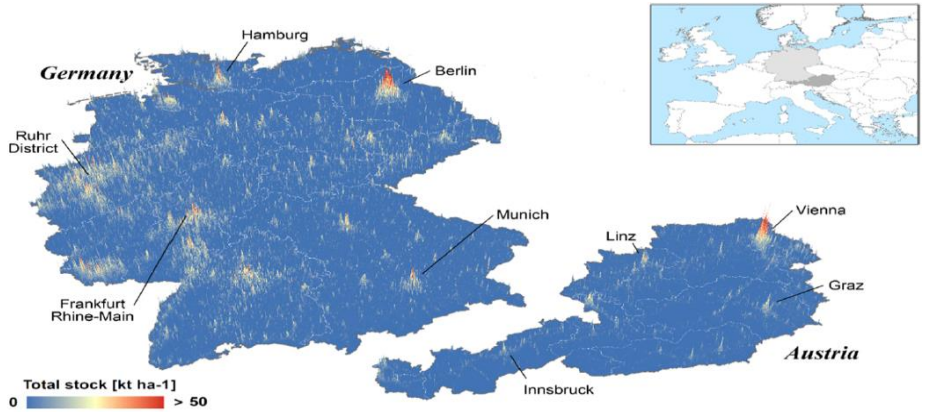
Energy
Materials
Food
…

Stocks

Out-flow

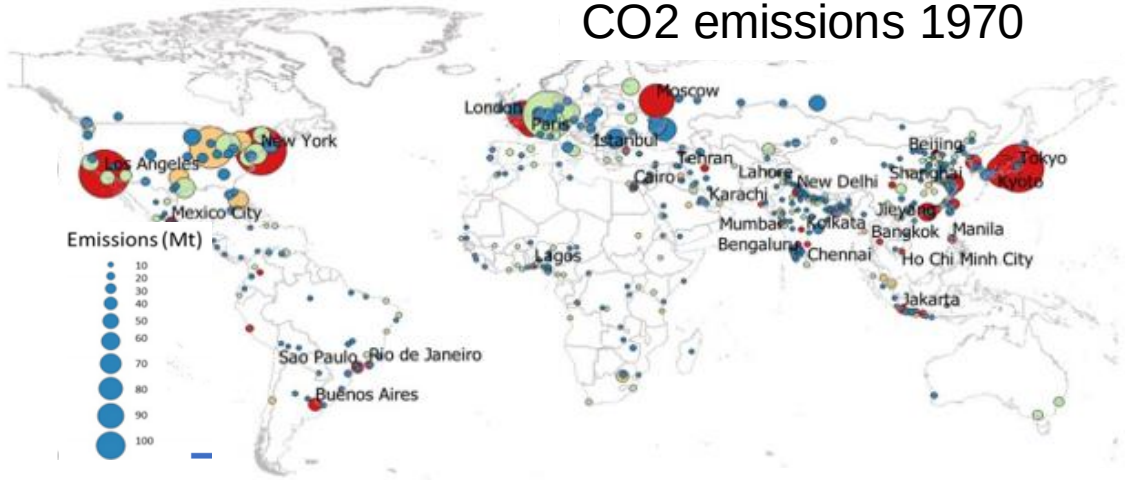
Waste
Emissions
…

Stocks - Materials

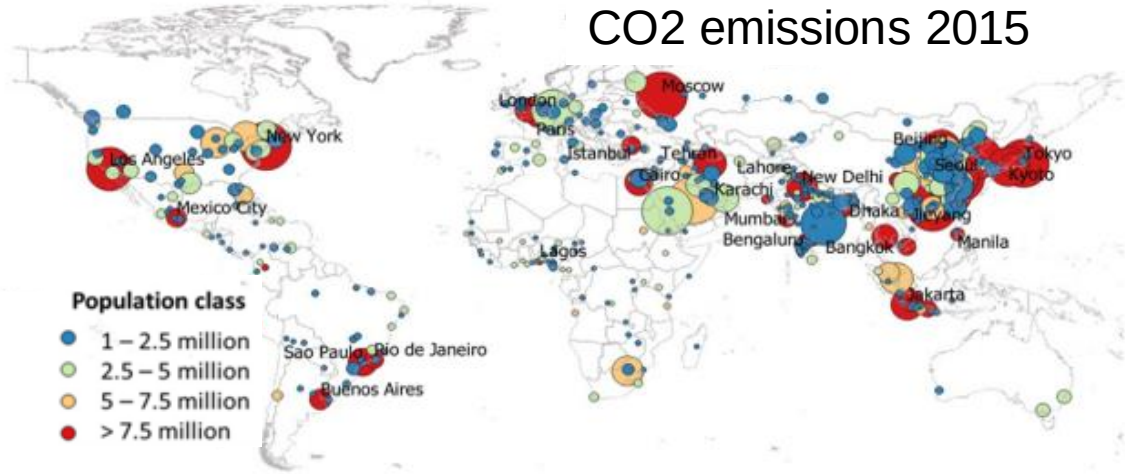


Flows: Emissions

CO2 emissions 1970



CO2 emissions 2015



Projections

HPI works and continues to develop key societal and demographic variables that are essential to understand and model future societies and the climate

Future population	Demographics (Education, fertility, consumption patterns)
Impact Future Climates	Exposure Vulnerabilities
Socio-economic pathways	Regional Pathways Urbanization

Thank You!

Daniele Ehrlich / 22 September 2021
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#EO4Impact

Mark Dowell is Senior Scientific Officer and Project Leader for Scientific and Technical Support to the Copernicus Programme at the European Commission's Joint Research Centre.

His current efforts include incentivizing a scientifically sound and traceable uptake of Copernicus products and Services in European Policy and in the context of International commitments and is a co-chair of the Task Force for the proposed Copernicus Anthropogenic CO2 emission initiative. Mark has a Ph.D. in Oceanography and Earth Science from the University of Southampton (UK) in 1998. He has been engaged for many years with issues at the international level on Earth Observation, firstly as co-lead of a Virtual Constellation in CEOS then as the first Chair on the Working Group on Climate, in this context he also led the initiative established between CEOS, CGMS and WMO on the definition of a global Climate Monitoring Architecture, and currently leads CEOS activities on the CEOS Carbon Strategy and the Greenhouse Gas monitoring Task Team.

Since 2020, Mark is a Co-chair of the GEO Climate Change Working Group.

Mark Dowell

Senior Scientific Officer, Project Leader

European Commission JRC

Open discussion

Guiding questions:

1. How can GEO support the global stocktake with targeted EO-based products?
2. Are there any perceived gaps/synergies in the GEO WP to address the global stocktake? If so, how should these be addressed / exploited?

Wrap-up

End of Day 2