futureearth

Research. Innovation. Sustainability.

Future Earth's interdisciplinary research projects and networks

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Mission

Accelerate transformations to global sustainability through research and innovation

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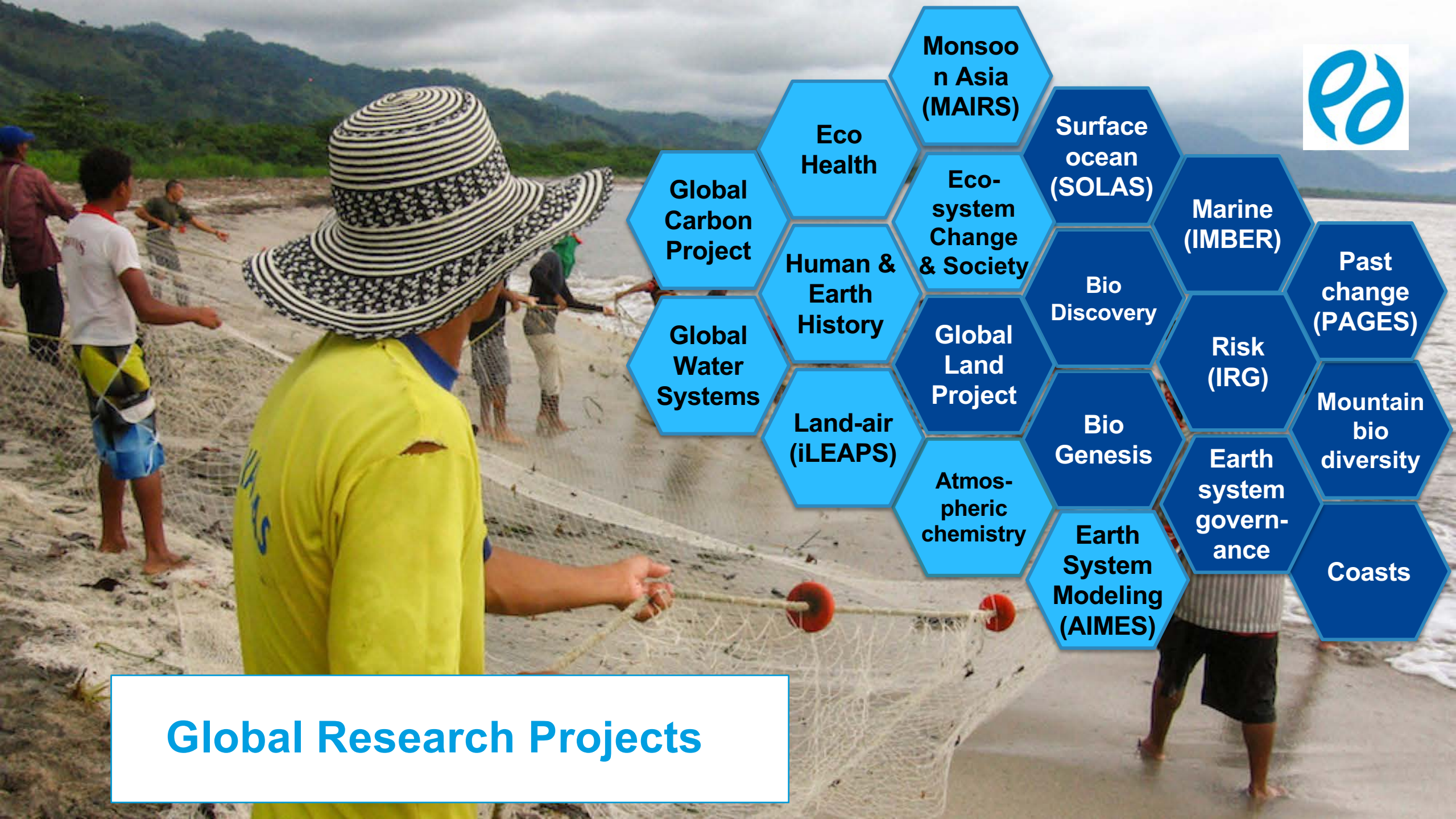


Global Research Projects

Knowledge Action Networks

Where we are: Europe

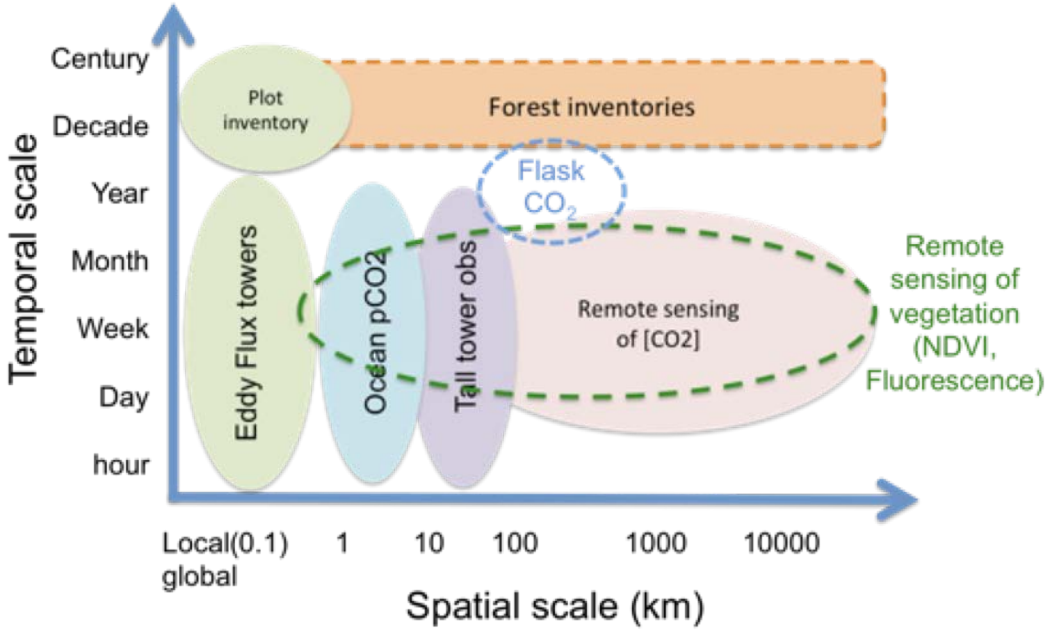
Active National Structures

Cyprus
Finland
France
Germany
Ireland
Romania
Slovakia
Spain
Sweden
Switzerland
United Kingdom

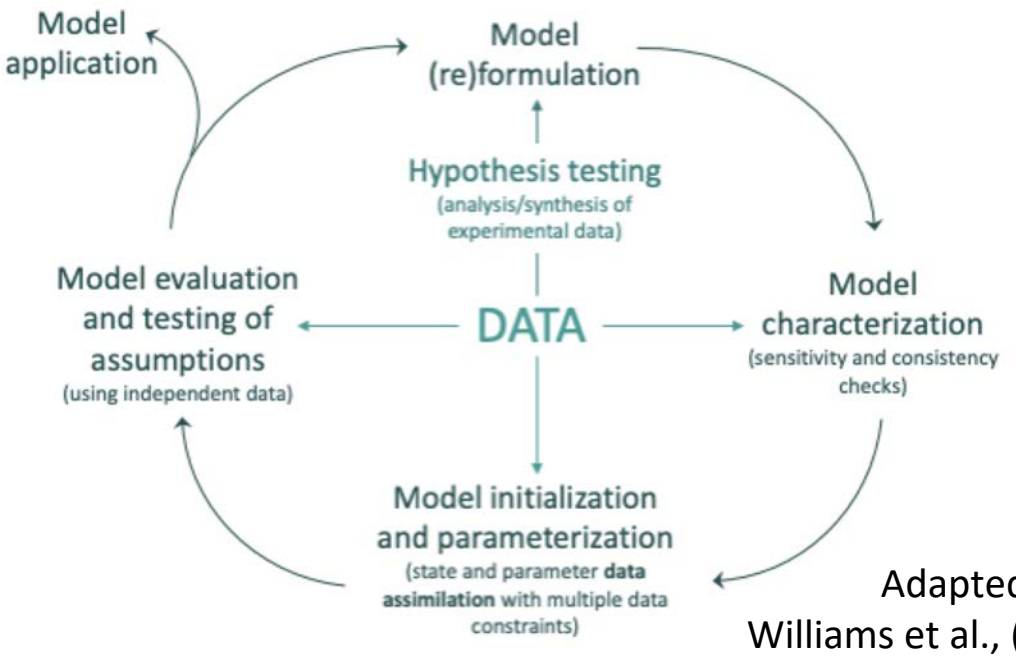
Analysis, Integration, and Modeling of the Earth System

Working Group: Land Data Assimilation Consortium

- ➔ Works closely with **data providers** to expand the number of **different types of observations** used to optimize land surface models within a DA framework



- ➔ Increase the number of modeling groups who are routinely using DA frameworks to **estimate/reduce model uncertainty**



Adapted from Williams et al., (2009)

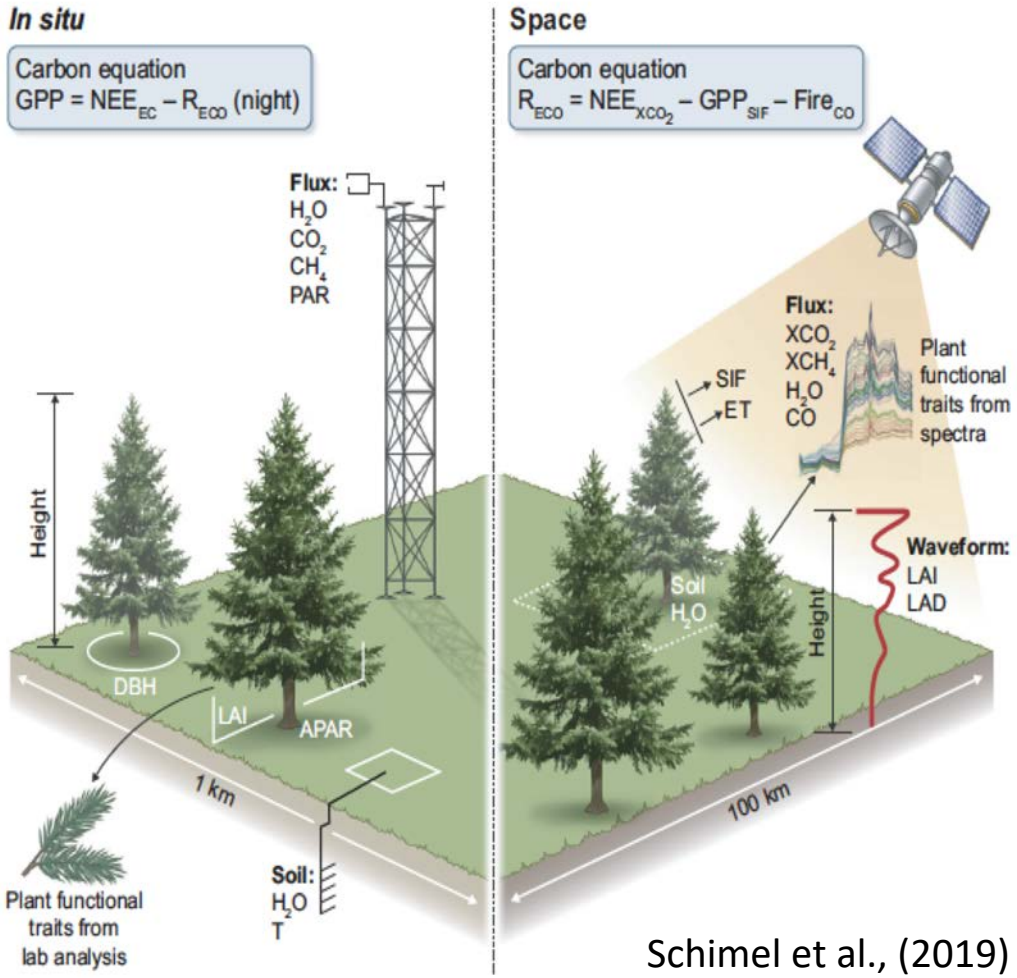
For more information, contact
aimes@futureearth.org

Future Earth - ESA Joint Programme

Workshop: Understanding Vegetation Change in the Anthropocene

Summer 2021, AGCI, Colorado, United States

- ➔ Bring together an **interdisciplinary** team to discuss and combine the latest process-based knowledge of **plant responses to stress**, remote-sensing insights, and next generation Dynamic Global Vegetation Models.



Schimel et al., (2019)

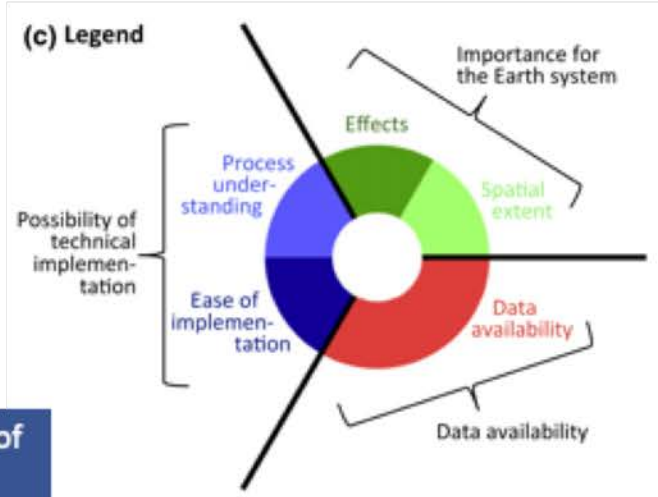
Lenton et al.,Nature, 2019/ GLobaïa

27-29 January 2021, ISSI, Bern, Switzerland

Clarify **satellite data requirements** to monitor the climate system's resilience to **tipping points**, constrain models, and build on the ESA CCI programme for a future abrupt change **early warning system**.

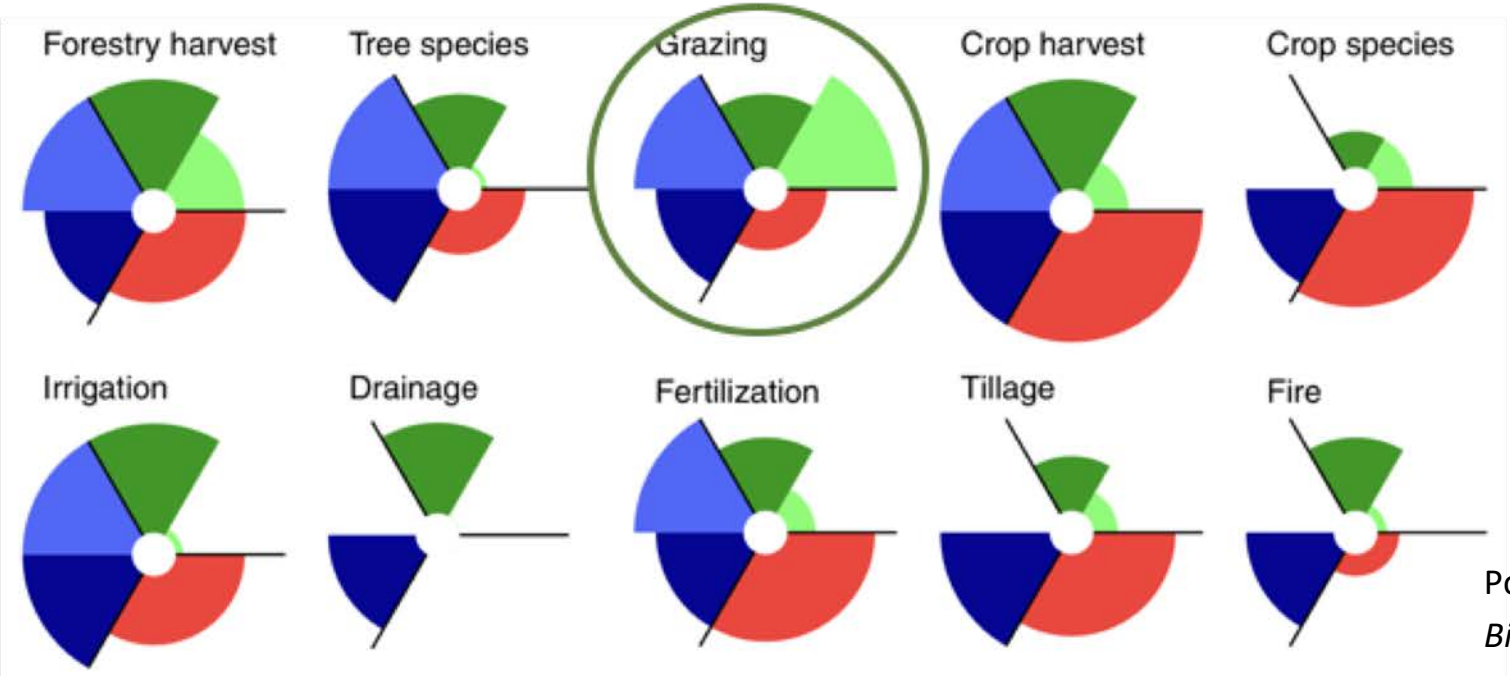
Opportunity: EO needs for modelling

Models meet data



Should be high priority for observational community!

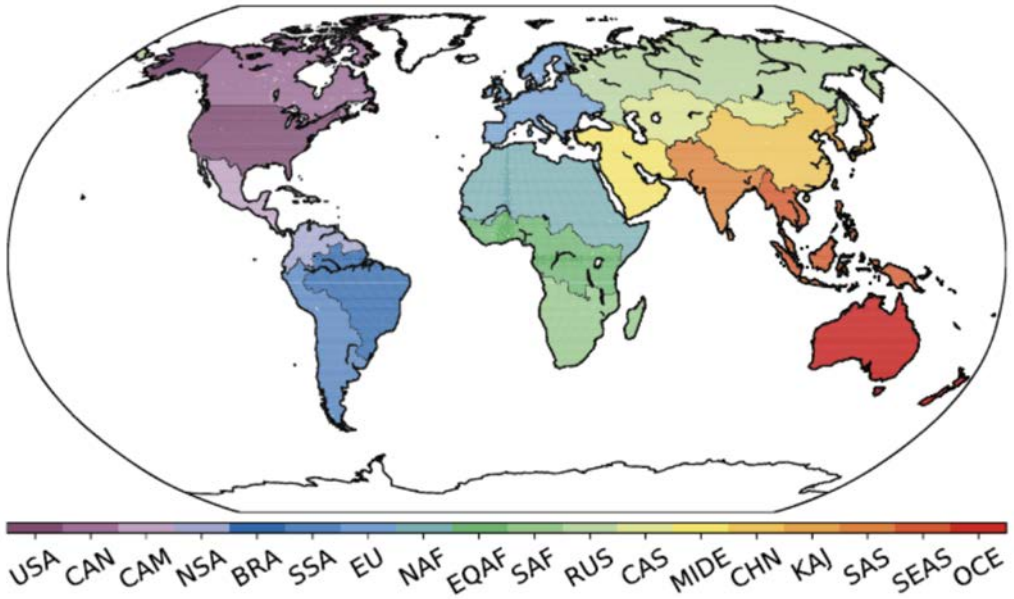
Assessment of readiness of model structures and availability of observational data



Pongratz et al, *Global Change Biology,* 2017

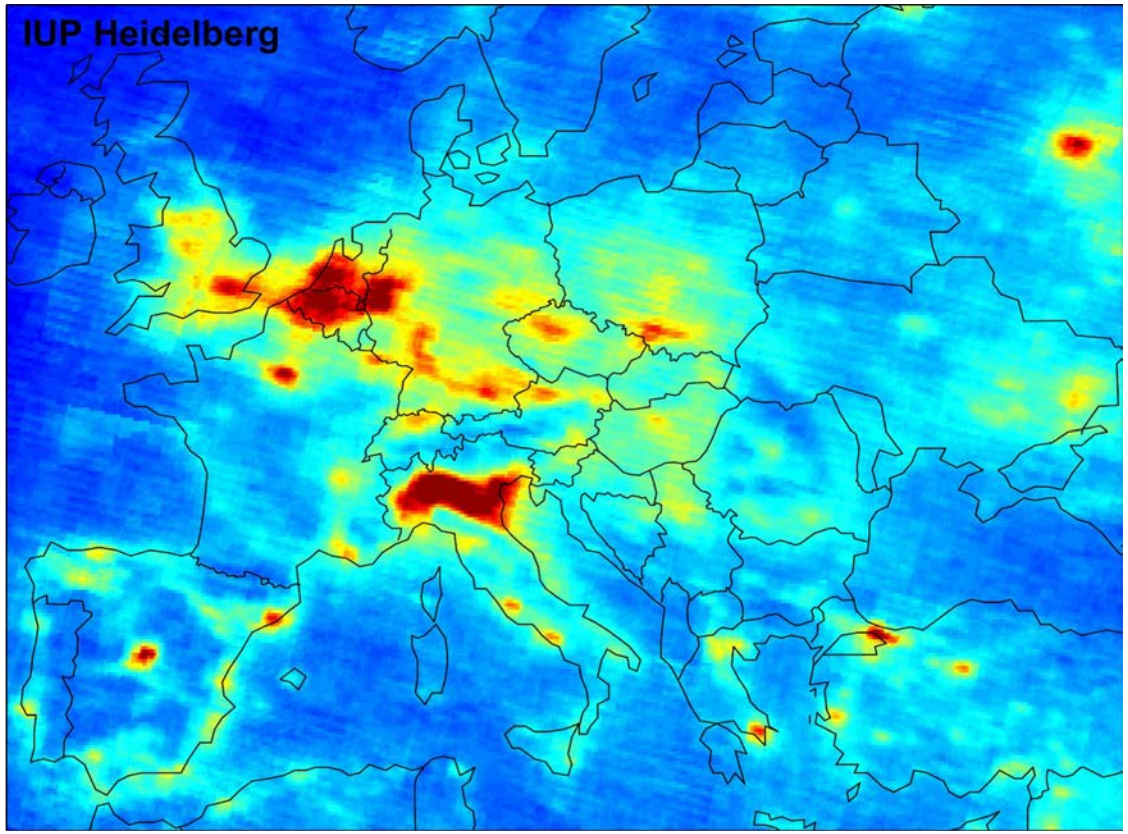
RECCAP-2 Regional models

Coordinated by GCP, RECCAP-2 collects and synthesises regional data for 14 large regions of the globe for harmonisation sufficient to scale to the globe and compare different regions: **aims to overcome the regional Carbon budget uncertainties.**



Bastos, A., et al., 2020

Earth Observations for ”live” emission tracking under COVID-19



bioDISCOVERY

- SUPPORTING ASSESSMENT BODIES: linking biodiversity & climate change community on different biomes to address scenarios & modelling and assessment & policies (IPBES Task Force)

  IPCC/IPBES co-sponsored workshop due 2020 (postponed).

- OBSERVATIONS AND INDICATORS: Use of EO to obtain measures of taxonomic, functional and structural diversity at various spatial and temporal scales.

  GlobDiversity project on Essential Biodiversity Variables – higher spatial resolution & longer time series needed. Bottom-up development and open, flexible algorithms essential (requires agency engagement with GEOBON, identification of gaps)

- On ECVs: e.g. use of CCI Land Cover for species distribution modelling.
- Arctic as a fast-changing region: importance of new ESA missions (Siberia project).

PAGES PAST GLOBAL CHANGES CELEBRATING 30 YEARS

Our mission

The PAGES project is an international effort to coordinate and promote past global change research

PAGES and satellite data → Calibration and validation

2k NETWORK

Calibrate seasonally resolved coral proxy records of tropical and subtropical climate variability with modern data

GLOBAL PALEOFIRE

Calibrate fire parameters (number, intensity and area) to the charcoal signal in surface lake sediments by MODIS sensors

LAND COVER 6K

Use ESA data (GPP, land cover, LAI, albedo, soil moisture etc) for calibration of reconstruction models

PAGES' and ESA's ECV datasets → Global Climate Indicators (GCI) – 12k

Develop key large-scale metrics of climate and environmental changes, in particular for the Holocene (past 12,000 years)

D. Kaufman

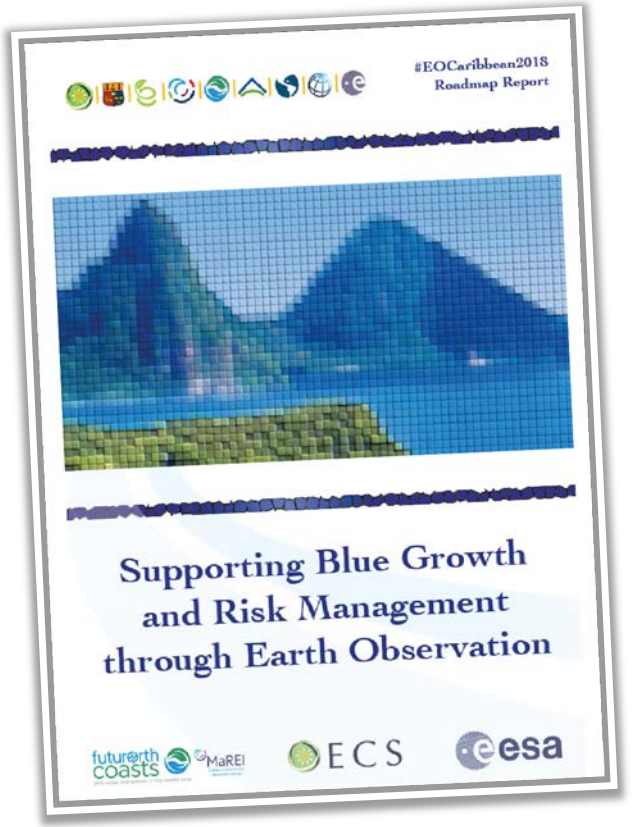
Min Pre-Industrial Max
Low/neg High/pos

	Atmosphere CO_2 (ppm)	CO_2 rate of change (ppm/Century)	Temperature relative to pre-industrial (°C)	Cyrosphere Glacier extent relative to pre-industrial Inverted colour scale	Biosphere Northern tree line relative to pre-industrial (lat)	Ocean Sea level relative to 1900 (m)	Sea level rate of change (mm/yr or m/1000 yr)
Little Ice Age (1450–1850 CE)	277 – 285	2.7 ± 0.01	−0.3 +0.09, −0.27		−0.5 ± 1	−0.01 ± 0.06	0.0 ± 0.2
Medieval Warm Period (950–1250 CE)	280 – 286	2 ± 0.01	0.14 +0.12, −0.19		0.5 ± 1	−0.05 ± 0.10	−0.4 ± 0.4
Mid-Holocene (6.5–5.5 ka)	264 ± 5	0.5 ± 0.01	0.5 ± 0.3		2 ± 1	−3 ± 0.5	1.2 ± 0.1

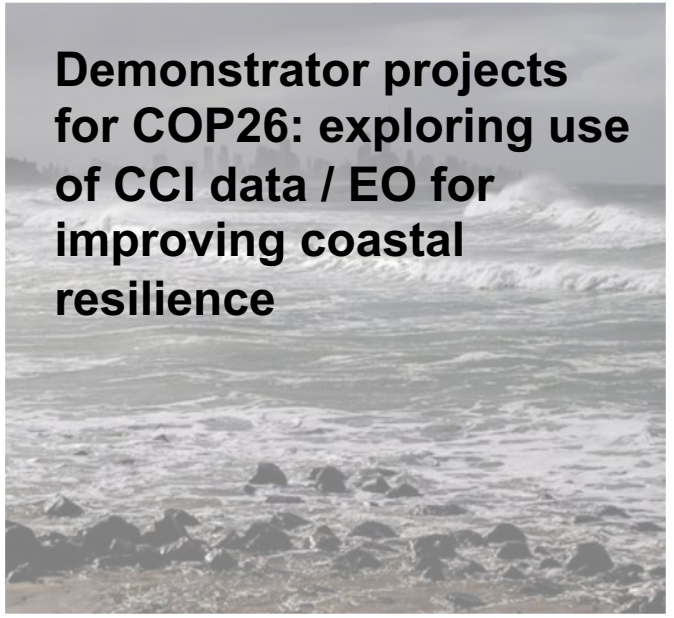
Four hotspots of change

- Linking researchers, practitioners & other stakeholders around use of EO/CCI data:

Lagoons for LIFE



- Providing feedback on relevance of EO data projects to the wider community/different stakeholders:



Relevant CCI datasets and needs: Ocean data, ice sheets, (HR) land cover (coastal urbanization, habitat conversion, vulnerable infrastructure)

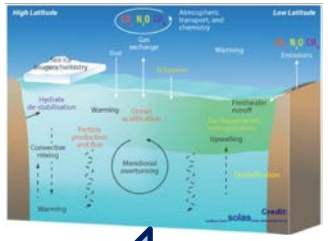
Science-policy-society nexus: data for decision-making, co-design of indicators for coastal status and resilience, work on identifying policy drivers related to coastal resilience (e.g. EU-mandated planning directives on sea-level rise, fisheries management, cargo emission regulations, ecosystem protection policies etc.)

SOLAS 2015-2025:
Core Themes and Cross-Cutting Themes

surface ocean solas lower atmosphere study

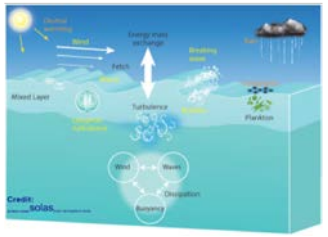
Theme 1

Greenhouse gases and the oceans



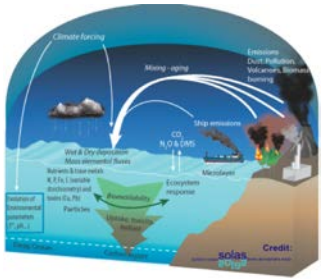
Theme 2

Air-sea interface and fluxes of mass and energy



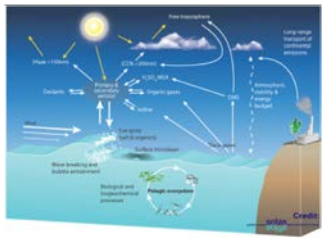
Theme 3

Atmospheric deposition and ocean biogeochemistry



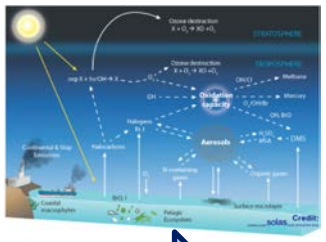
Theme 4

Interconnections between aerosols, clouds, and marine ecosystems



Theme 5

Ocean biogeochemical control of atmospheric chemistry



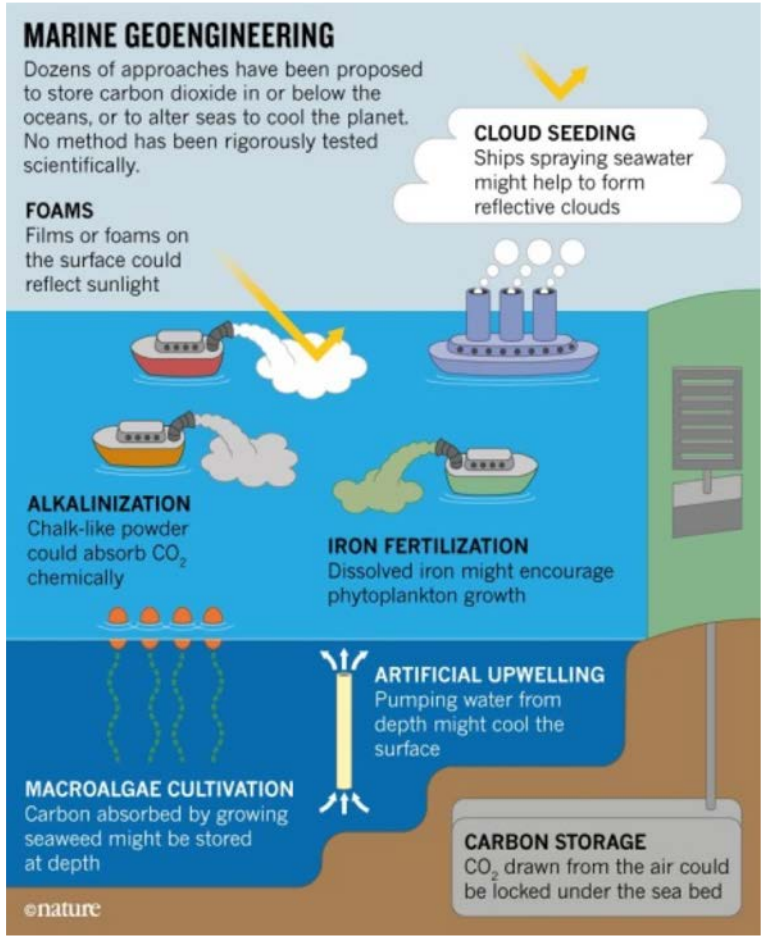
- Integrated topics (e.g., upwelling systems, polar oceans, Indian Ocean)
- Evaluating the environmental efficacy and impacts of climate intervention
- Science & Society: ship-plumes, blue carbon, open-ocean stewardship

"to achieve quantitative understanding of the key biogeochemical-physical interactions and feedbacks between the ocean and atmosphere, and of how this coupled system affects and is affected by climate and global change."

URL: www.solas-int.org; E-Mail: solas@geomar.de; Twitter: @SOLAS_IPO

Highlights of some recent foci

Climate Intervention



Boyd & Vivian, 2019

Global network of time series stations for studying air-sea interactions

Cape Verde, UK, Korea, Italy, Canada, Bermuda, Sweden, Finland, Ireland, Iceland, Svalbard

- Formalised endorsement process in development

SOLAS Indian Ocean Meeting

30 September 2020

https://solas.tropmet.res.in/

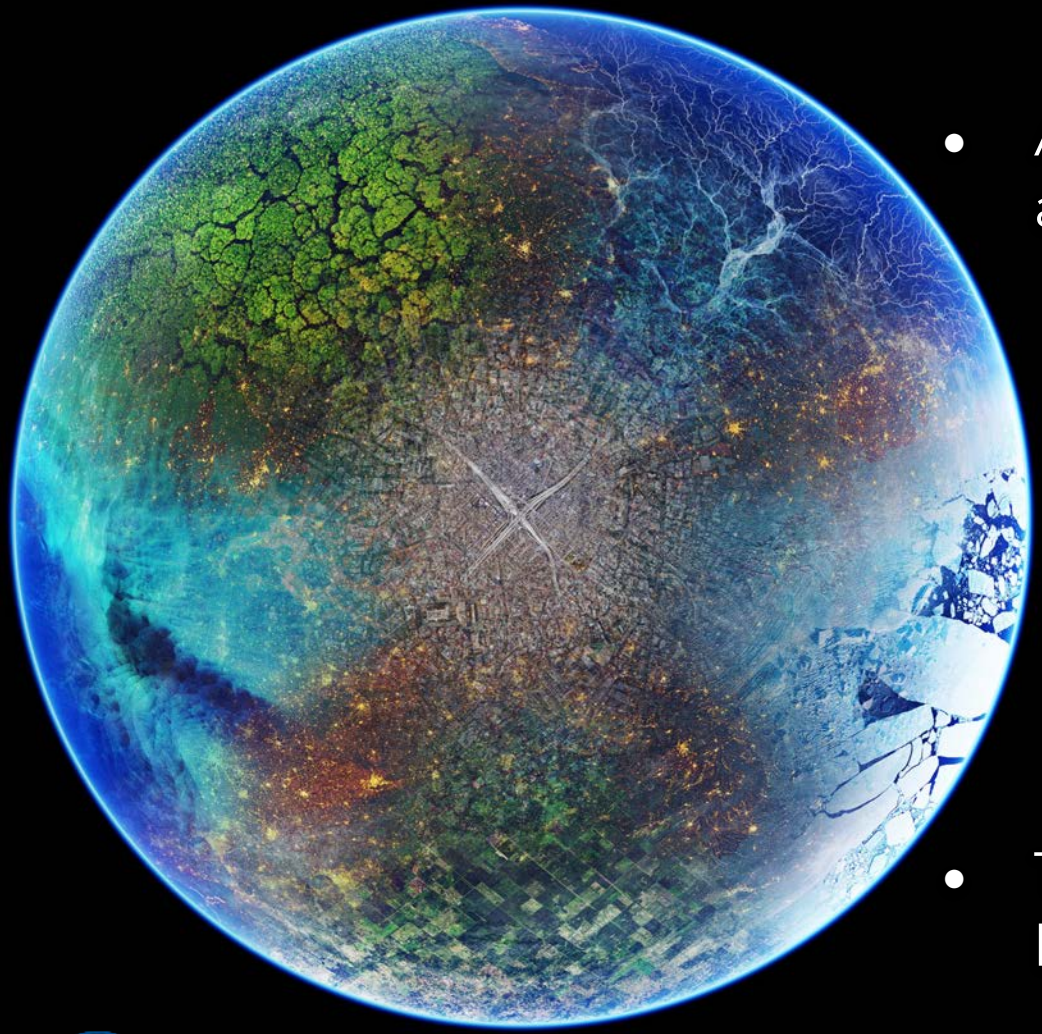
Mountain Research Initiative (MRI) – strategic partner of Future Earth

Mountain Observatories Working Group
Building a global network of observatories with shared protocols for in-situ-measurements.

GEO-GNOME workshop:
- Identified most important ECVs for mountain processes: land surface temperature, precipitation, albedo, snow cover, wind and water vapor.
- Developed ECV data collection protocols & frameworks in mountain environments, & criteria for data quality (spatial and temporal resolutions) for key processes.

Workshop lead: C. Adler

EARTH COMMISSION



- An **independent scientific assessment** to define a **safe and just corridor** for people and planet
  - Synthesize scientific knowledge on the biophysical conditions for a stable and resilient planet
  - Integrate socio-economic and well-being issues with biophysical conditions
  - Synthesize and assess knowledge about the social levers of transformation

- The synthesis underpins the **setting of science based targets** for business, nations and cities

GLOBAL COMMONS ALLIANCE
A PLAN FOR THE PLANET

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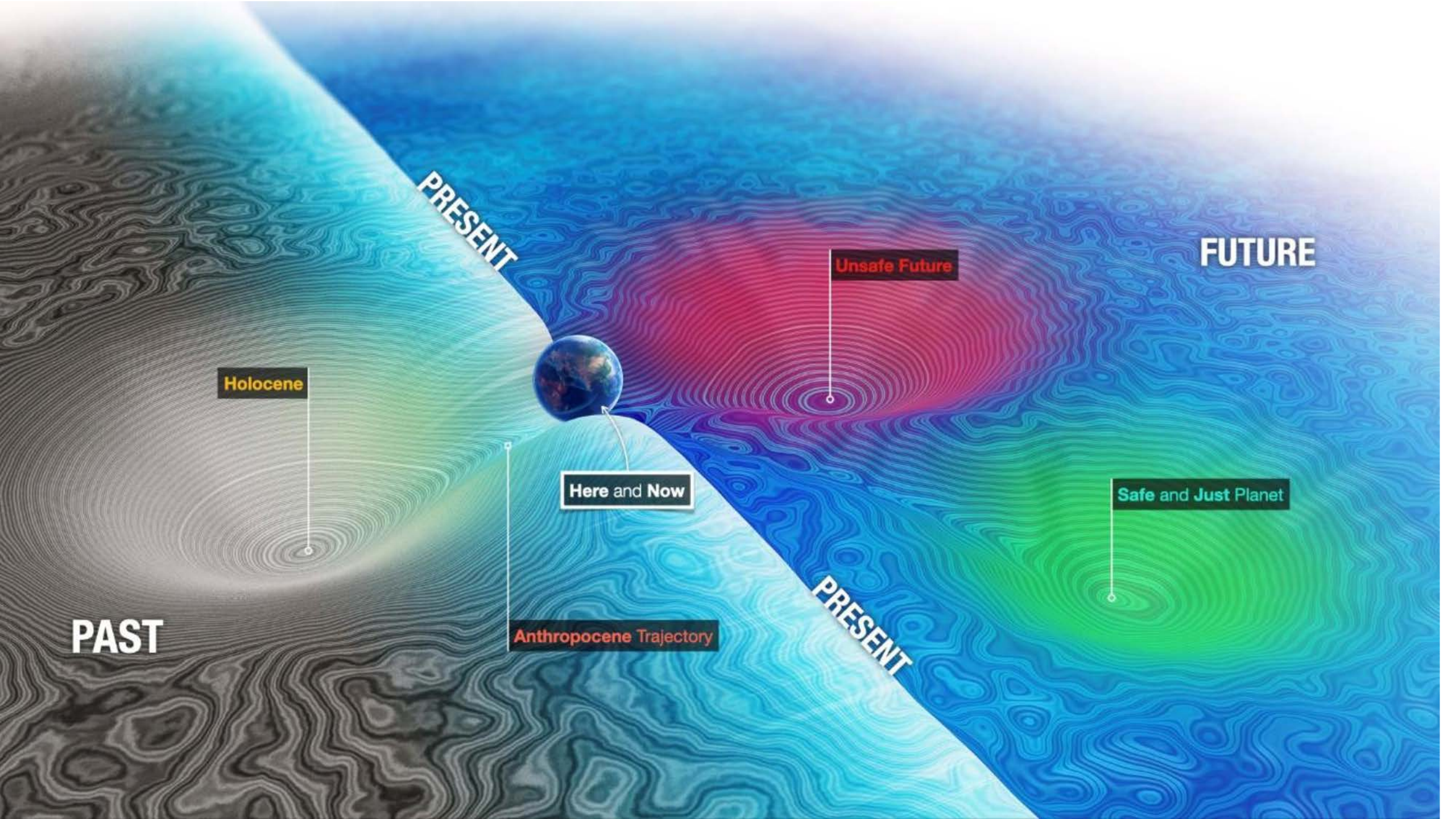
PRESENT
FUTURE
Unsafe Future
Holocene
Here and Now
Safe and Just Planet
PRESENT
PAST
Anthropocene Trajectory

Sustainability Research + Innovation

SRI 2021

June 12–15, 2021 in Brisbane, Australia

SRI2021: Opportunities

- A special session / event
- Exhibition booth
- Virtual engagement between now and June 2021 (webinars, blogs, events)

SRI2021.org

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