

Safe Landing Climates

Development Team:

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Explores routes to safe landing spaces for Human and natural system; explore present-to-future “pathways” for achievement of key Sustainable Development Goals (SDGs).
Time scale: multi-decadal to millennial.

Status: Science plan draft submitted; we are developing transition strategy and have contacted potential partners.

Activities so far: AGU session proposed; Webinar series on tail risks; virtual discussions on safe landings; workshops planned 2022+ on; and developing towards OSC

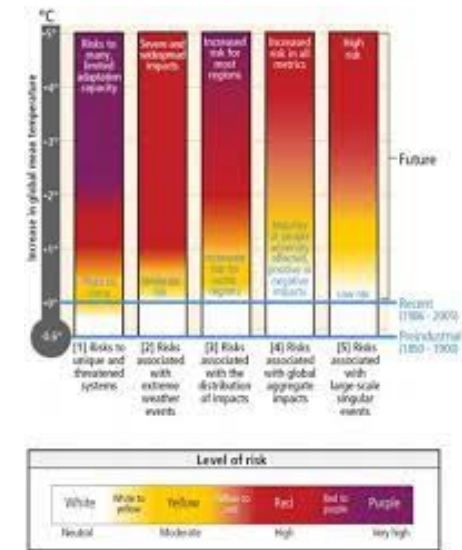
1. Draft Science Plan: 5 Main scientific themes

1. Safe Landing Pathways

- What climate trajectories and destinations are safe/unsafe, and for whom? Bring together inclusive and interdisciplinary group with the goal of defining safe landing climate pathways and landings; preserve habitability and food security; identify adaptation limits.
- Draws on theme 2-5 results.
- Understanding and constraining risks associated with different potential future pathways
- Adaptation and resilience strategies.

Goal is to arrive at modelling and model/data fusion tools to enable representing and estimating large-scale climate risks; including cross system feedbacks (climate/biosphere/society)

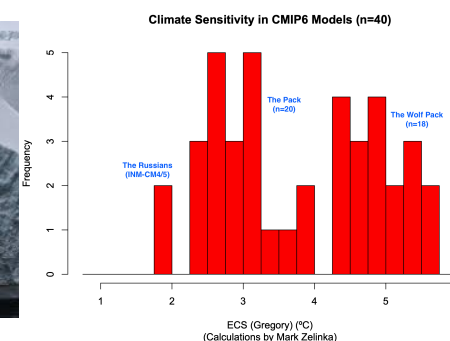
Broad consultation 2021 in virtual meetings; followed by workshops.



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2. Understanding High-Risk Events

- Identify and characterise risks from low-probability high-impact possibility with global impact. (“tipping points,” risk of large carbon release, ice shelf/sheet collapse, regime shifts, multiplicative compound hazards, high ECS, large-scale extreme events, biome collapse (e.g. Amazon) etc.)
- Facilitate incorporation of uncertain risks into future projections, cost/benefit analysis and adaptation planning. Foster Earth System models that can represent them probabilistically.
- Identify adaptation limits and examine how, or if, tail risks can be mitigated or avoided (or caused) by climate mitigation or geoengineering efforts.



Webinar series on high risk events, followed by workshop. Foster inclusion of risks in modelling tools



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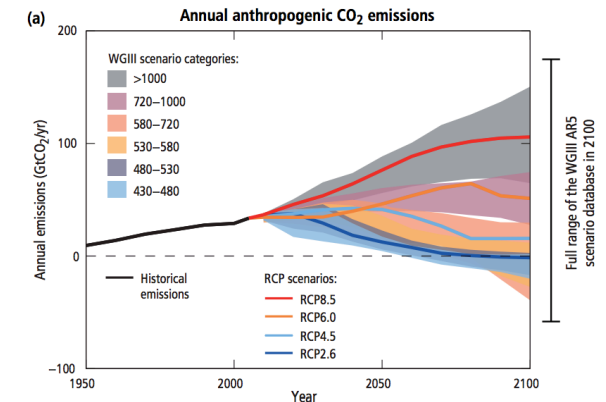
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3. Perturbed Carbon cycle

- Acceptability and Climate implications of carbon dioxide removal (CDR) systems (including BECCS) while maintaining food and water supply, preserving biodiversity, and limiting ocean acidification.
- Assess possible contribution to mitigation by CH₄, N₂O etc.
- Assess risk of surprises/rapid change in greenhouse gases due to land sources; implications for allowable GHG emissions under Paris Agreement.

Build Understanding of coupled carbon-energy-water cycle

Timeline: Workshop 2022 on land based mitigation, preceded by consultation



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4. Water Resources

- Long-term redistribution of water in land-based natural systems/reservoirs, including glaciers and tropical rainforests, incl. impacts from climate change and direct human activity (e.g., deforestation, agriculture, aerosol darkening of glaciers)
- thresholds of tolerance / risk of collapse, and consequences. Integrate physical/climate, social sciences, local / indigenous knowledge
- assess implications of mitigation and adaptation scenarios including SRM/geoengineering => prioritize science needs.



Timeline: Webinar series followed by workshop



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5. Sea Level



- Habitable coasts: Quantify “acceptable” sea level rise, rate of SLR, and its irreversibility on time scales ranging from multiple decades to millennia.
- Estimate impact on low elevation lands communities and ecosystems, storm surges, hurricanes, ...
- Assess potential for adaptation.
- Facilitate interaction of modelling efforts across spatial scales from global to coastal
- Foster interaction and co-production between sea-level experts and coastal planners worldwide.

Timeline: Coordinate with workshops organized by partners and take advantage of already planned workshops



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4. Draft Timeline and Roadmap: Science Plans and LHA Launch

Theme	Other LHAs	WCRP	other
1: Safe Landing Pathways	Digital Earths	WGCM, RifS, CLIVAR, SPARC, GEWEX.	IPCC WGI, WGII and WGIII (burning embers), AIMES, Surface Ocean Lower Atmosphere (SOLAS), Earth Commission
2. Understanding High-Risk Events	Prediction and attribution, My Climate Risk	ESMO, WGCM, GEWEX, CLIVAR, SPARC, GC on Weather and Climate Extremes and on Regional Sea-level Change and Coastal Impacts (+ follow-up)	AIMES and Integrated Assessment Models (IAMs)/ (ESMs). PAGES, Future Earth (Global Land Programme (GLP), Integrated Land Ecosystem-Atmosphere Processes Study (iLEAPS), (ISIMIP), Risk KAN
3. Perturbed Carbon Cycle	My Climate Risk	ESMO, GC on Carbon Feedbacks in the Climate System, GEWEX, CLIVAR, SPARC and CLiC	Future Earth, iLEAPS, AIMES, Global Carbon Project, CDRMIP, ISIMIP, Impact community
4. Water Resources	My Climate Risk, Explaining and Predicting Earth System Change, Digital Earths, Academy	WCRP Climate Research Forums, GEWEX, CLIVAR, CLiC	ISIMIP, International Centre for Integrated Mountain Development (ICIMOD), Future Earth SOLAS, iLEAPS
5. Sea Level Rise	My Climate Risk, Digital Earths	GC on Regional Sea-level Change and Coastal Impacts (+ follow-up), ESMO, CLIVAR, CLiC	AIMES, Future Earth, PAGES including (PALSEA) WG, Scientific Committee on Antarctic Research (SCAR) INSTabilities & Thresholds in ANTArctica (INSTANT), ISMIP

Next steps

- Flesh out 5 Topics and determine scientific team of teach topic
- Identify overall oversight team across topics (Sherwood, Hegerl and???)
- Flesh out workshops and determine synergies between workshops and link to existing meetings that are relevant
- First step: webinars and consultations in 2021.
- Aim at fully developed plan by OSC
- Requirements: Logistical support for planning and conducting activities; support of workshops.
- Enough time to develop activities and for thoughtful input; avoid risk of duplication by connecting with other relevant activities.



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