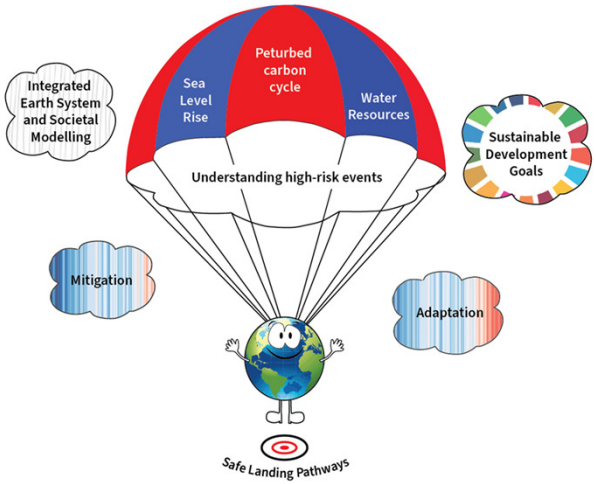
World Climate Research Programme

Safe Landing Climates Lighthouse Activity

Lighthouse Activity Goal:

- Risk-based assessment of future climates
- Identify how to avoid impacts beyond the capability to adapt



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Theme 1: Safe landing pathways
What climate trajectories and destinations are safe/unsafe, and for whom?

- Define safe landing climate pathways and landings; preserve habitability and food security; identify adaptation limits.
- Foster analytic and modelling and model/data fusion tools that enable representing and estimating large-scale climate risks; including cross system feedbacks (climate/biosphere/society).

Theme 2: Understanding high risk events
What are the risks from low-probability high-impact events?

- "tipping points," risk of large carbon release, ice shelf/sheet collapse, high ECS, regime shifts, multiplicative compound hazards, large-scale extreme events, fireball earth, biome collapse
- Facilitate incorporation of uncertain risks into future projections. Identify adaptation limits;
- can risks be avoided (or caused) by climate mitigation or geoengineering efforts.

Theme 3: Perturbed carbon cycle
What are the climate implications of carbon dioxide removal (including BECCS) while maintaining food and water supply, preserving biodiversity, and limiting ocean acidification?

- Assess possible contribution to mitigation by CH_4, N_2O 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.

Theme 4: Water resources
Long-term redistribution of water in land-based natural systems/reservoirs, including glaciers and tropical rainforests, due to climate change and direct human activity (e.g., deforestation, agriculture)

- Thresholds of tolerance / risk of collapse, Integrate physical/climate, social sciences, local / indigenous knowledge
- Assess implications of mitigation and adaptation scenarios including SRM/geoengineering.

Theme 5: Sea level
Habitable coasts: Quantify "acceptable" sea level rise, and its irreversibility.

- 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.