

Regional Carbon Cycle Assessment and Processes-2 (RECCAP2) 2019-2021

The Paris Agreement on Climate sets the international objective to keep climate warming well below two degrees, and “...to reach global peaking of greenhouse gas emissions as soon as possible ... and to undertake rapid reductions thereafter in accordance with best available science...to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century”.

This extraordinary challenge requires a dramatic improvement of current scientific capabilities to estimate GHG budgets and their trends at regional scale, and how they link up to the global growth rates of the major GHGs.

Key policy-relevant challenges for the scientific community and objectives of RECCAP2 are:

- 1) to quantify anthropogenic greenhouse gas emissions,
- 2) to develop robust observation-based estimates of changes in carbon storage and greenhouse gas emissions and sinks by the oceans and terrestrial ecosystems, distinguishing whenever possible anthropogenic vs. natural fluxes and their driving processes,
- 3) to gain science-based evidence of the response of marine and terrestrial regional GHG budgets to climate change and direct anthropogenic drivers.

To address these objectives, RECCAP2 will design and perform a set of global syntheses and regional GHG budgets of all lands and oceans, and explore mechanisms by which to deliver regular updates of these regional assessments based on scientific evidence, considering uncertainties, understanding of drivers, and retrospective analysis of recent trends.

Initial topics:

- Regional budgets and drivers. Focus on the last decade (2009-2018) and redo previous decades for trends in light of better understanding of sub-decadal/decadal variability. 10-14 regions globally for land; 5 for oceans divided as interest/data availability. Large countries to have their own GHG budget (eg, Australia, China, EU, India, Russia, USA) given its higher policy relevance.
- Regional hotspots and drivers (including acceleration of change, tipping points).
- Trends (multi-decadal) and variability (annual to decadal) of change of major GHG fluxes.
- Improve incorporation of freshwater and coastal zone fluxes in both land and ocean budgets.
- Global stocktake and tracking towards net zero emissions (anthropogenic versus all fluxes).
- Reconcile and constrain the global GHGs budget with the aggregation of regional budgets (eg, resolving tropical vs. NH carbon net sink).

Approaches and Data:

- Dual constraints from using bottom-up (eg, inventories, land and ocean models) and top-down approaches (atmospheric and ocean inversions).
- GHG budgets including CO₂, CH₄ and N₂O.
- New global and regional observations, including new remotely sensed products (eg, land cover, biomass, column CO₂ and CH₄)

Sponsors:

- RECCAP2 is an activity of the Global Carbon Project with a number of partners.
- The European Space Agency is supporting the compilation and generation of global products in support of the land regional GHG budgets and supports the First All-RECCAP2 workshop in Gotemba, Japan.
- The National Institute for Environmental Studies hosts and supports the First All-RECCAP2 workshop in Gotemba, Japan.
- The International Carbon Coordination Project is a sponsor of the RECCAP2 Ocean component.