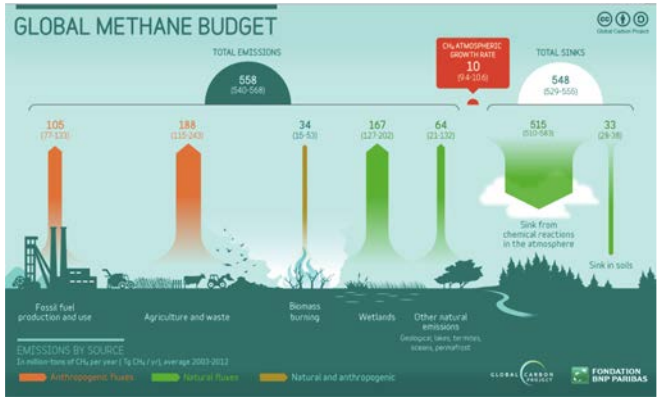
GLOBAL CARBON PROJECT

Activity Overview
2018

Slides from Pep Canadell
Kyoto, Japan; 25 Oct

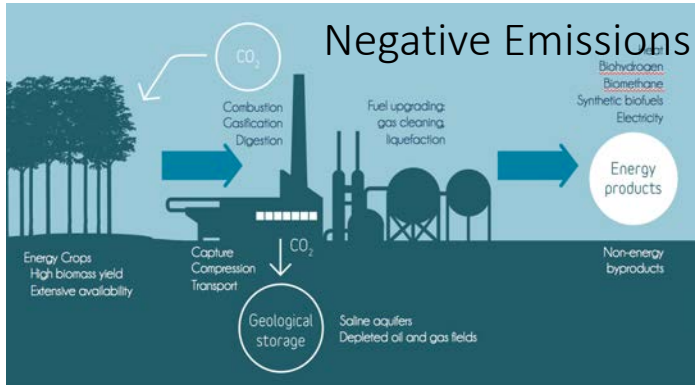
1-Slide GCP Activity Summary

Global Budgets & Trends CO_2, CH_4, N_2O

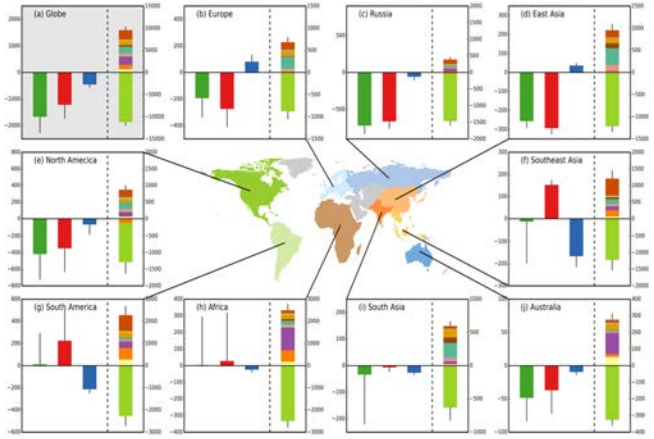


Urban Carbon

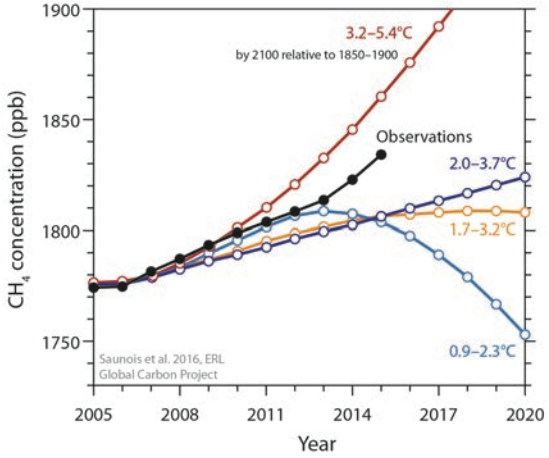
Negative Emissions



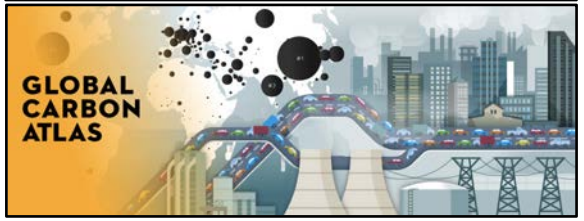
Regional Analyses (RECCAP)



Tracking Scenarios



Data Release

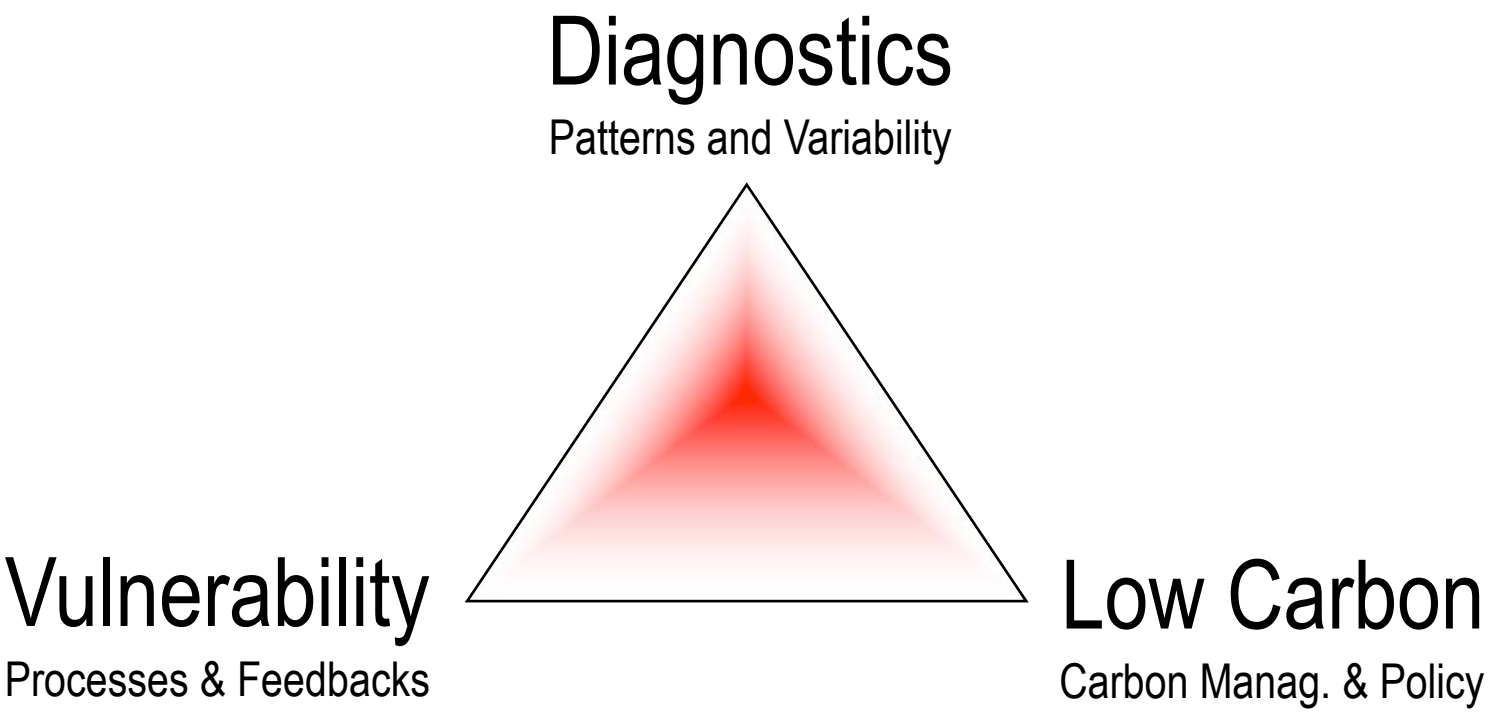


Outreach

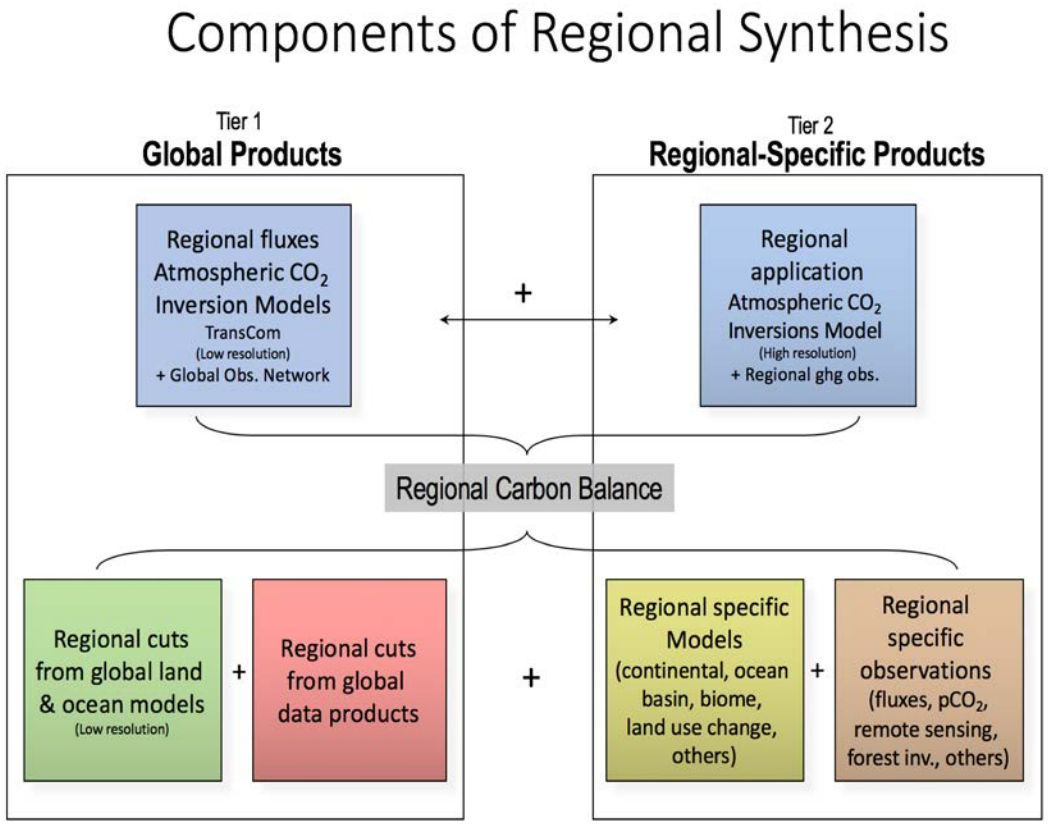
Publications

Mission Statement

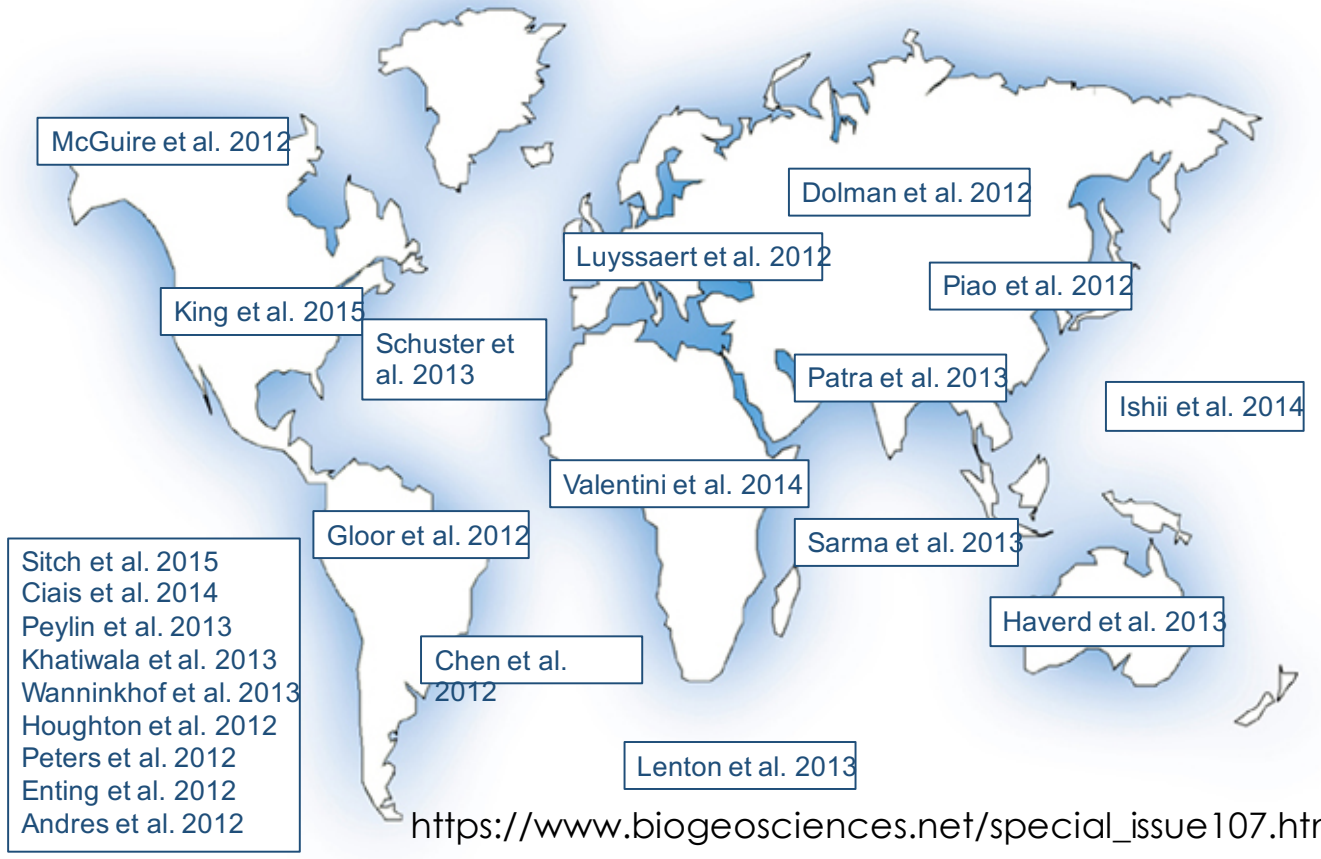
The Global Carbon Project (GCP) integrates knowledge of greenhouse gases for human activities and the Earth system.
Our projects include global budgets for three dominant greenhouse gases — carbon dioxide, methane, and nitrous oxide — and complementary efforts in urban, regional, cumulative, and negative emissions.



REgional Carbon Cycle Assessment and Processes-1

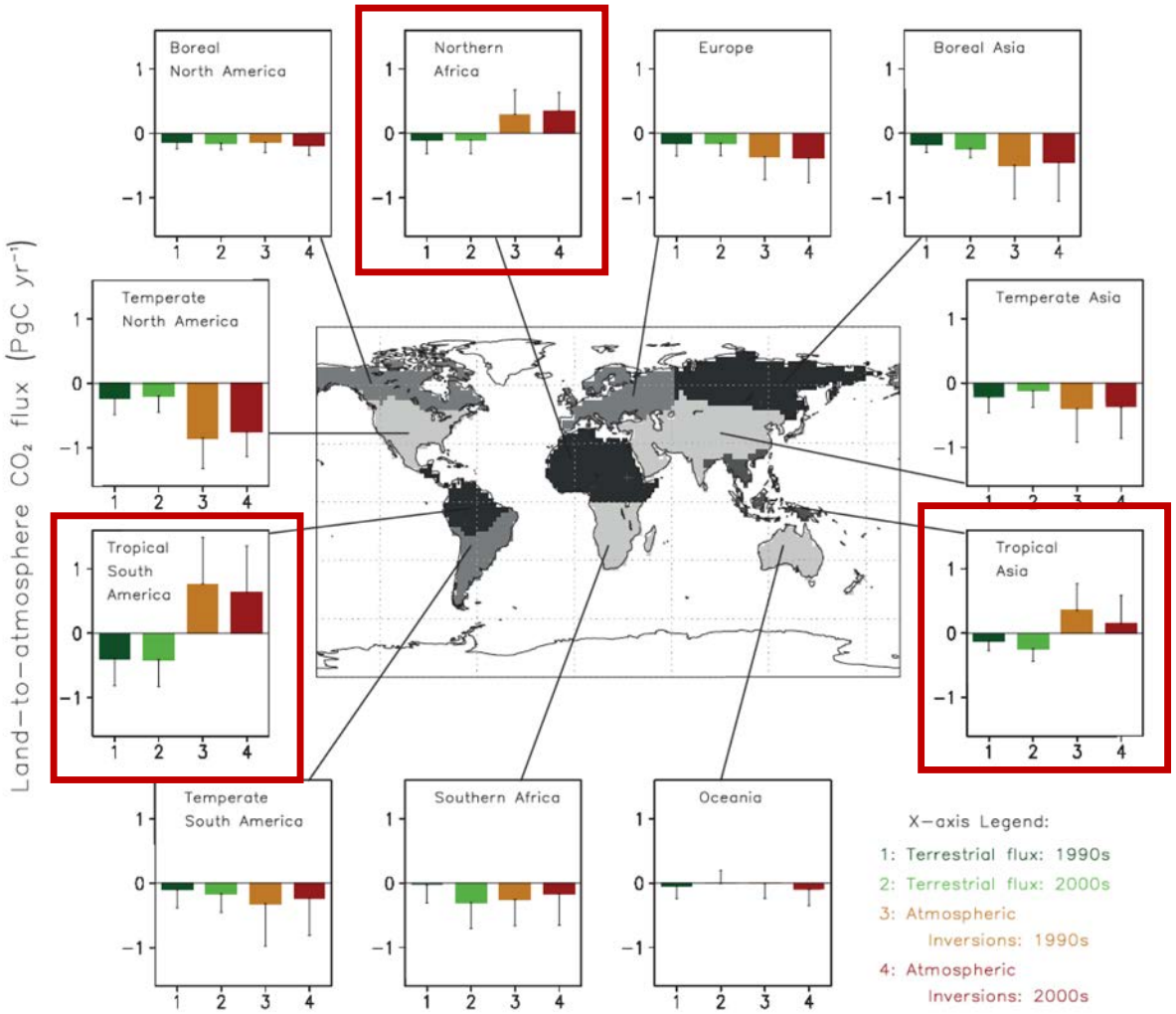


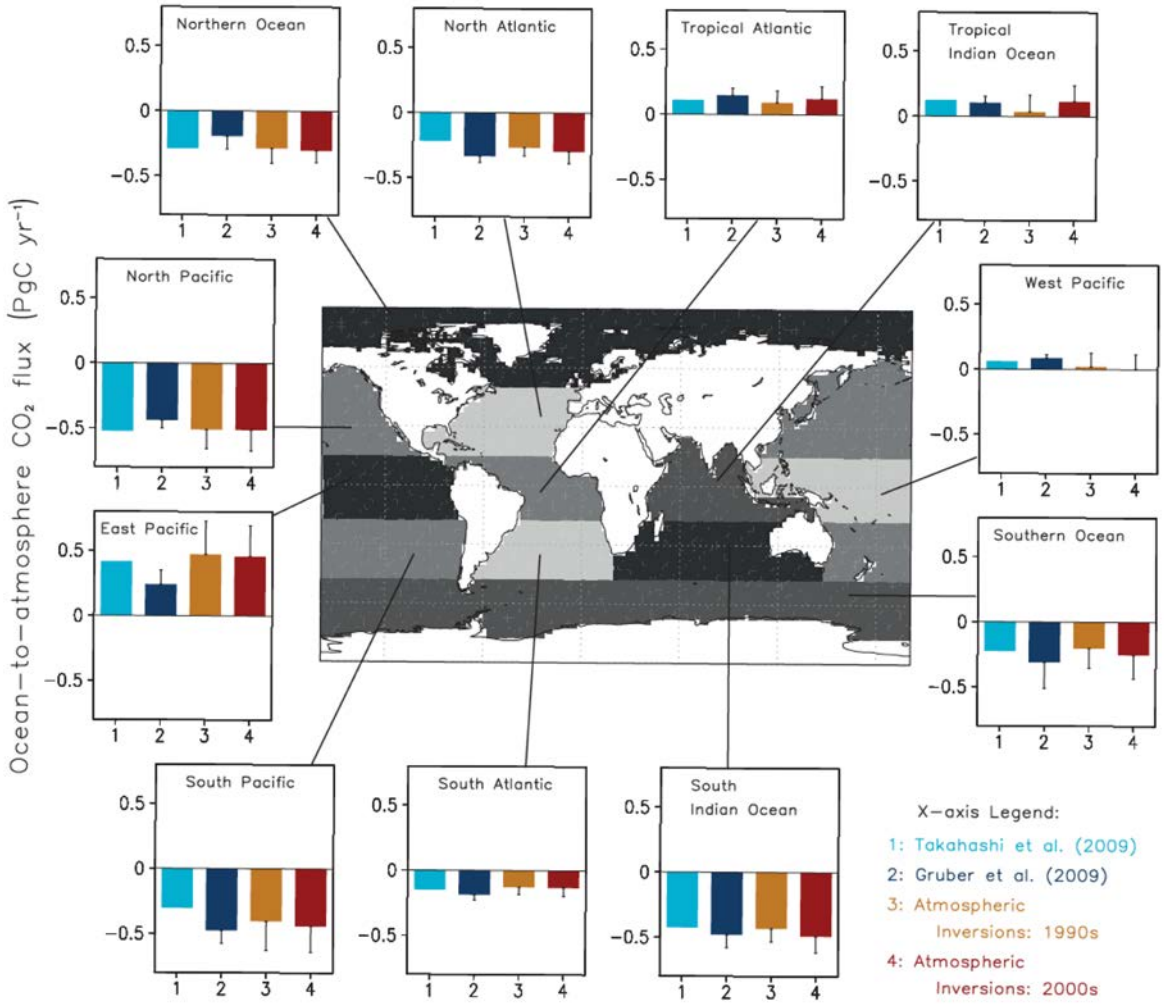
Canadell et al., 2011



https://www.biogeosciences.net/special_issue107.html

REgional Carbon Cycle Assessment and Processes-2





Ciais et al. 2013, IPCC AR5

RECCAP-2 Goals

1. Step-increase in constraining regional carbon budgets with multiple model/product ensembles and benchmarking against new data.
2. Opportunities to apply data assimilation and Bayesian fusion approaches.
3. Complete 3-GHGs Budget (CO_2, CH_4, N_2O)
4. Continue to explore the dual constraints from using bottom-up and top-down approaches (atmospheric inversions).
5. Bring new process level understanding particularly on:
   - Anthropogenic processes and fluxes affected by human activity (eg, LUC, lateral flows, inland waters)
   - More emphasis on sub-decadal and decadal variaibility, particularly in the oceans
6. Aim at the higher spatial resolution, including focusing in single countries when possible

RECCAP-2 Products

1. New regional budgets for the three main GHGs (CO2, CH4, N2O)
2. New global flux products (eg, fluxnet upscaled, inversions, biospheric modeling, biomass)
3. New global flux synthesis products (papers)
4. Budget of land-ocean fluxes with new constraints
5. Contributions to the global stocktaking of the Paris Agreement (towards net zero GHG emissions).
6. Others.

Global Carbon Budget

Earth Syst. Sci. Data, 10, 405–448, 2018
https://doi.org/10.5194/essd-10-405-2018
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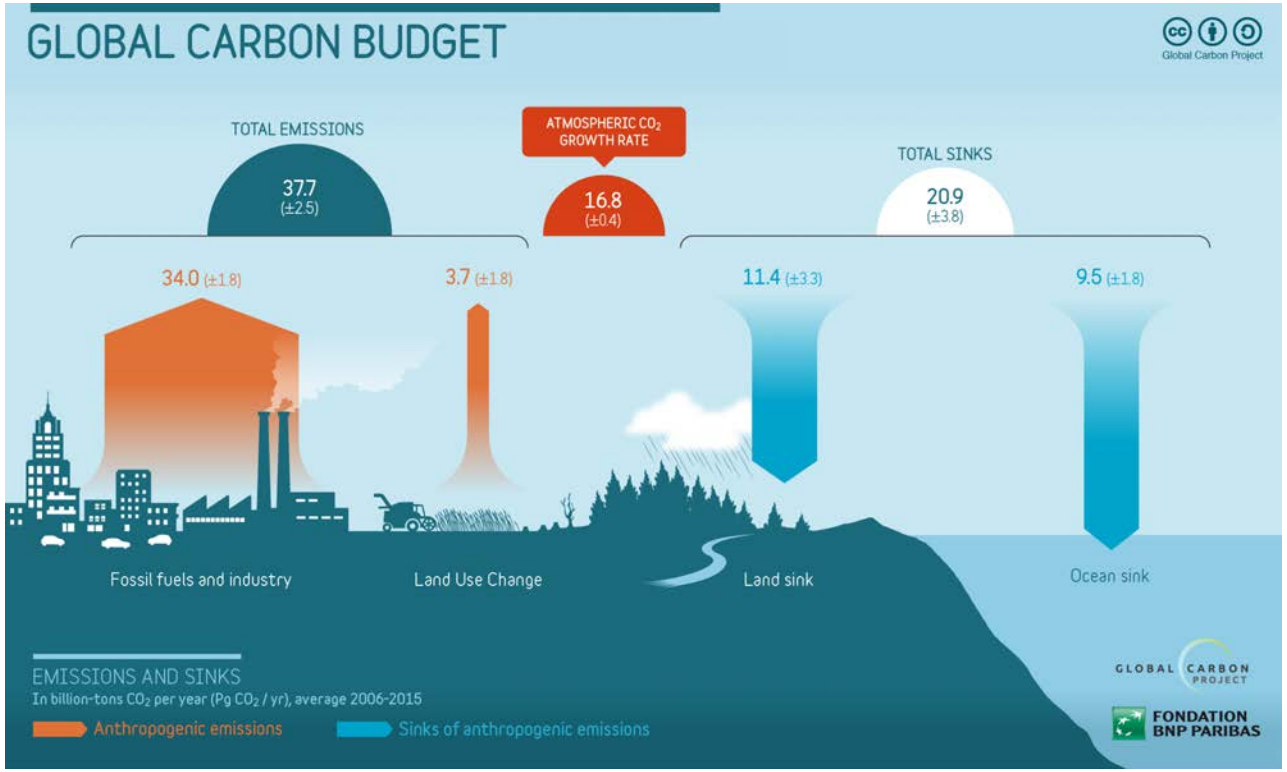
Global Carbon Budget 2017

Corinne Le Quéré[1], Robbie M. Andrew[2], Pierre Friedlingstein[3], Stephen Sitch[4], Julia Pongratz[5], Andrew C. Manning[6], Jan Ivar Korsbakken[2], Glen P. Peters[2], Josep G. Canadell[7], Robert B. Jackson[8], Thomas A. Boden[9], Pieter P. Tans[10], Oliver D. Andrews[1], Vivek K. Arora[11], Dorothee C. E. Bakker[6], Leticia Barbero[12,13], Meike Becker[14,15], Richard A. Betts[16,4], Laurent Bopp[17], Frédéric Chevallier[18], Louise P. Chini[19], Philippe Ciais[18], Catherine E. Cosca[20], Jessica Cross[20], Kim Currie[21], Thomas Gasser[22], Ian Harris[23], Judith Hauck[24], Vanessa Haverd[25], Richard A. Houghton[26], Christopher W. Hunt[27], George Hurtt[19], Tatiana Ilyina[5], Atul K. Jain[28], Etsushi Kato[29], Markus Kautz[30], Ralph F. Keeling[31], Kees Klein Goldewijk[32,33], Arne Körtzinger[34], Peter Landschützer[5], Nathalie Lefèvre[35], Andrew Lenton[36,37], Sebastian Lienert[38,39], Ivan Lima[40], Danica Lombardozzi[41], Nicolas Metzl[35], Frank Millero[42], Pedro M. S. Monteiro[43], David R. Munro[44], Julia E. M. S. Nabel[5], Shin-ichiro Nakaoka[45], Yukihiro Nojiri[45], X. Antonio Padin[46], Anna Peregon[18], Benjamin Pfeil[14,15], Denis Pierrot[12,13], Benjamin Poulter[47,48], Gregor Rehder[49], Janet Reimer[50], Christian Rödenbeck[51], Jörg Schwinger[52], Roland Séférian[53], Ingunn Skjelvan[52], Benjamin D. Stocker[54], Hanqin Tian[55], Bronte Tilbrook[36,37], Francesco N. Tubiello[56], Ingrid T. van der Laan-Luijkx[57], Guido R. van der Werf[58], Steven van Heuven[59], Nicolas Viovy[18], Nicolas Vuichard[18], Anthony P. Walker[60], Andrew J. Watson[4], Andrew J. Wiltshire[16], Sönke Zaehle[51], and Dan Zhu[18]



Global Methane Budget

Earth Syst. Sci. Data, 8, 697–751, 2016
www.earth-syst-sci-data.net/8/697/2016/
doi:10.5194/essd-8-697-2016
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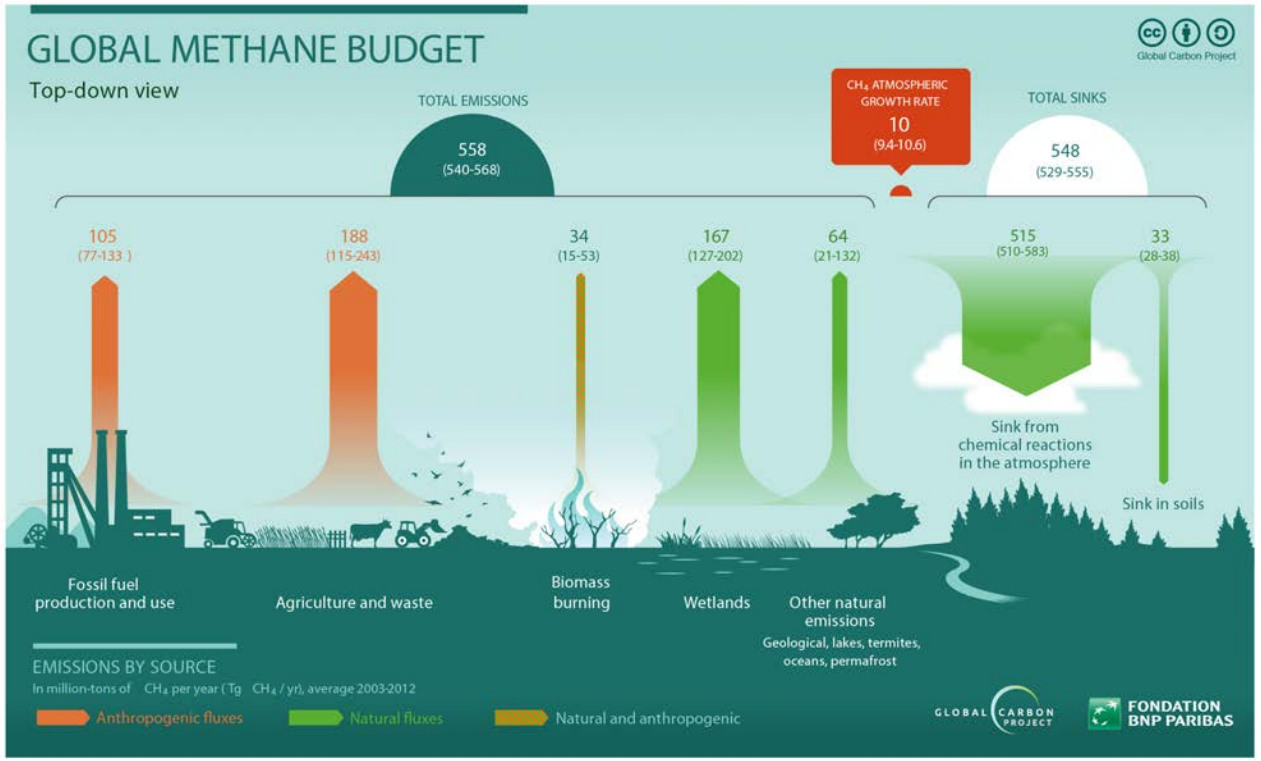
The global methane budget 2000–2012

Marielle Saunois[1], Philippe Bousquet[1], Ben Poulter[2], Anna Peregon[1], Philippe Ciais[1], Josep G. Canadell[3], Edward J. Dlugokencky[4], Giuseppe Etiope[5], David Bastviken[6], Sander Houweling[7,8], Greet Janssens-Maenhout[9], Francesco N. Tubiello[10], Simona Castaldi[11,12,13], Robert B. Jackson[14], Mihai Alexe[9], Vivek K. Arora[15], David J. Beerling[16], Peter Bergamaschi[9], Donald R. Blake[17], Gordon Brailsford[18], Victor Brovkin[19], Lori Bruhwiler[4], Cyril Crevoisier[20], Patrick Crill[21], Kristofer Covey[22], Charles Curry[23], Christian Frankenberg[24], Nicola Gedney[25], Lena Höglund-Isaksson[26], Misa Ishizawa[27], Akihiko Ito[27], Fortunat Joos[28], Heon-Sook Kim[27], Thomas Kleinen[19], Paul Krummel[29], Jean-François Lamarque[30], Ray Langenfelds[29], Robin Locatelli[1], Toshinobu Machida[27], Shamil Maksyutov[27], Kyle C. McDonald[31], Julia Marshall[32], Joe R. Melton[33], Isamu Morino[25], Vaishali Naik[34], Simon O'Doherty[35], Frans-Jan W. Parmentier[36], Prabir K. Patra[37], Changhui Peng[38], Shushi Peng[1], Glen P. Peters[39], Isabelle Pison[1], Catherine Prigent[40], Ronald Prinn[41], Michel Ramonet[1], William J. Riley[42], Makoto Saito[27], Monia Santini[13], Ronny Schroeder[31,43], Isobel J. Simpson[17], Renato Spahni[28], Paul Steele[29], Atsushi Takizawa[44], Brett F. Thornton[21], Hanqin Tian[45], Yasunori Tohjima[27], Nicolas Viovy[1], Apostolos Voulgarakis[46], Michiel van Weele[47], Guido R. van der Werf[48], Ray Weiss[49], Christine Wiedinmyer[30], David J. Wilton[16], Andy Wiltshire[50], Doug Worthy[51], Debra Wunch[52], Xiyan Xu[42], Yukio Yoshida[27], Bowen Zhang[45], Zhen Zhang[2,53], and Qiuan Zhu[54]



Global Methane Budget

Bottom-up budget

Atmospheric observations

Emission inventories

Biogeochemistry models & data-driven methods

Methane sinks

Inverse models

Top-down budget

Ground-based data from observation networks (AGAGE, CSIRO, NOAA, UCI, LSCE, others).

Satellite data (SCIAMACHY, GOSAT)

Agriculture and waste related emissions, fossil fuel emissions (EDGAR4.2, EPA, IIASA, FAO).

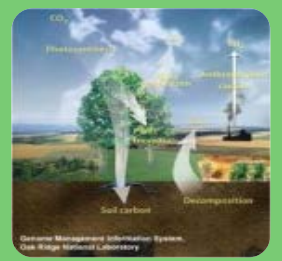
Fire emissions (GFED3 & 4s, FINN, GFAS, FAO).

Biofuel estimates

Ensemble of 11 wetland models, following the WETCHIMP intercomparison

Model for Termites emissions

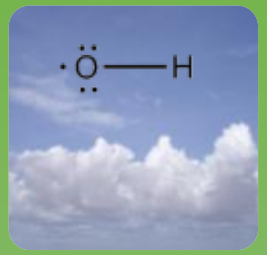
Other sources from literature



From Kirschke et al., (2013) Long-term trends and decadal variability of the OH sink.

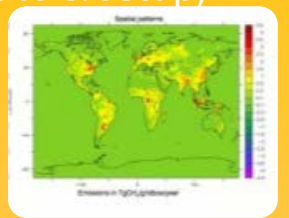
ACCMIP CTMs intercomparison.

Soil uptake & chlorine sink from literature

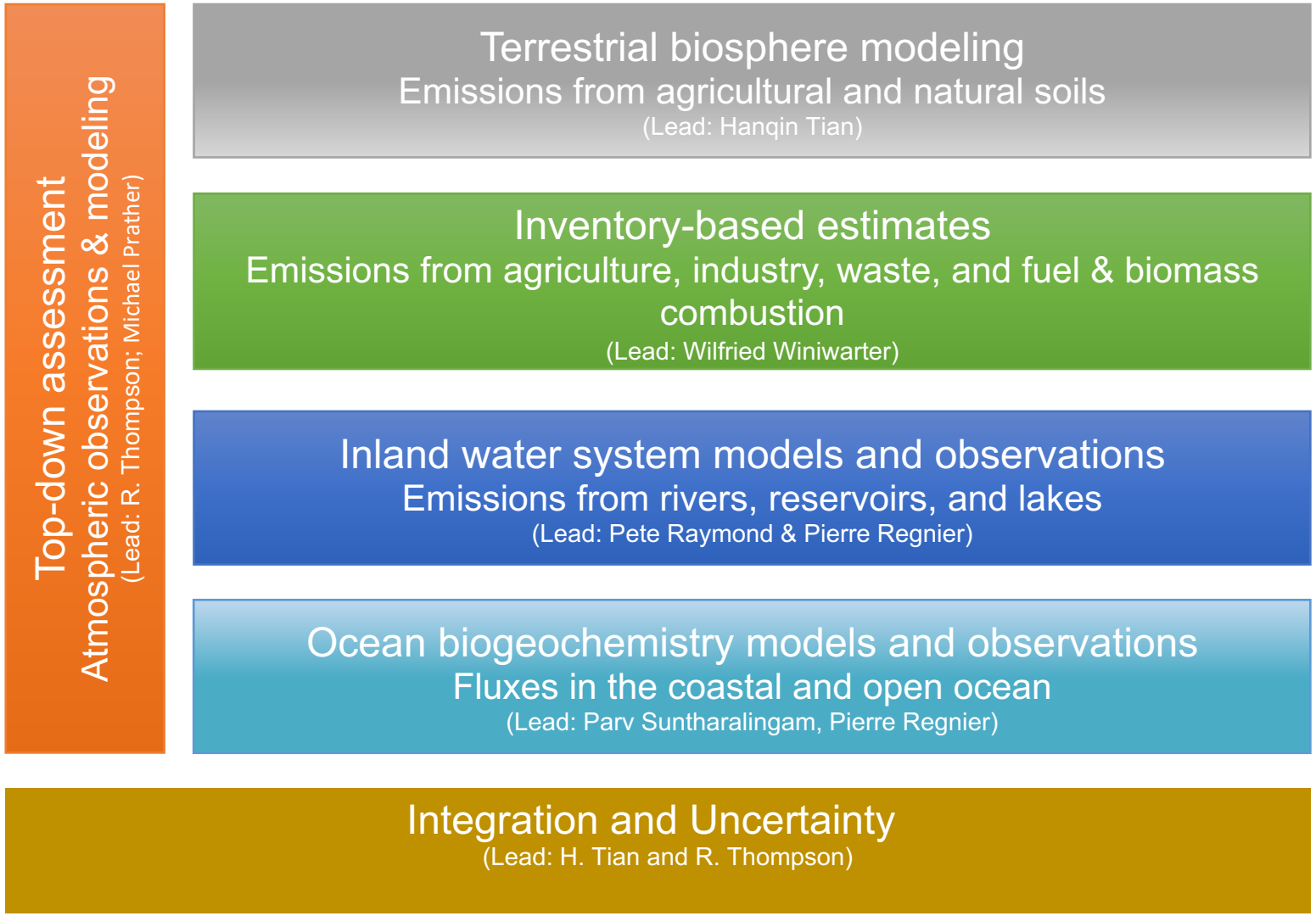


Suite of different 8 atmospheric inversion models (TM5-4DVAR (JRC & SRON), LMDZ-MIOP, PYVAR-LMDz, C-Tracker-CH_4, GELCA, ACTM, TM3, NIESTM).

Ensemble of 30 inversions (diff. obs & setup)



Global N_2O Budget: Components



GCP Activity Schedule

1. 12th Global Carbon Budget: November 2018
2. First Global N2O Budget: February-March 2019
3. Third Methane Budget: March-May 2019
4. RECCAP-2: 2018-2023 (First Global Stocktake 2023)
5. First All RECCAP-2 Meeting: March 2019, Japan