

Research Focus Name: CONCEPT-HEAT

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Overview on CLIVAR Research focus CONCEPT-HEAT

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CONCEPT HEAT

<http://www.clivar.org/research-foci/heat-budget>

The CLIVAR research focus CONCEPT-HEAT (Consistency between planetary energy balance and ocean heat storage) is focused on Earth's Energy Imbalance (EEI) and its largest component, the changes in ocean heat content (OHC). CONCEPT-HEAT aims to bring together experts from ocean and atmospheric reanalysis, air-sea fluxes, OHC, atmospheric radiation, sea level, and climate models to better synthesize all the information available. A goal is to foster collaboration among these different communities and build up a multi-disciplinary community to promote progress and an integrated view.

Objectives of CONCEPT-HEAT.

- I. Quantify Earth's energy imbalance, the ocean heat budget, and atmosphere-ocean turbulent and radiative heat fluxes, their observational uncertainty, and their variability for a range of time and space scales using different observing strategies (e.g., in-situ, satellite), reanalysis systems, and climate models.
- II. Analyze the consistency between the satellite-based planetary heat balance and ocean heat storage estimates using data sets and information products from global observing systems (remote sensing and in situ) and ocean reanalysis. In addition, the results can be used to compare to outputs from climate models to facilitate validation.

Implementation: 21st CLIVAR SSG meeting: November 2014

Planned ending date? Research foci normally last for order 5 years. C-H began in 2014, and could evolve into a WCRP wide activity. A common CLIVAR/GEWEX workshop in November 2018 is planned to further discuss this issue.

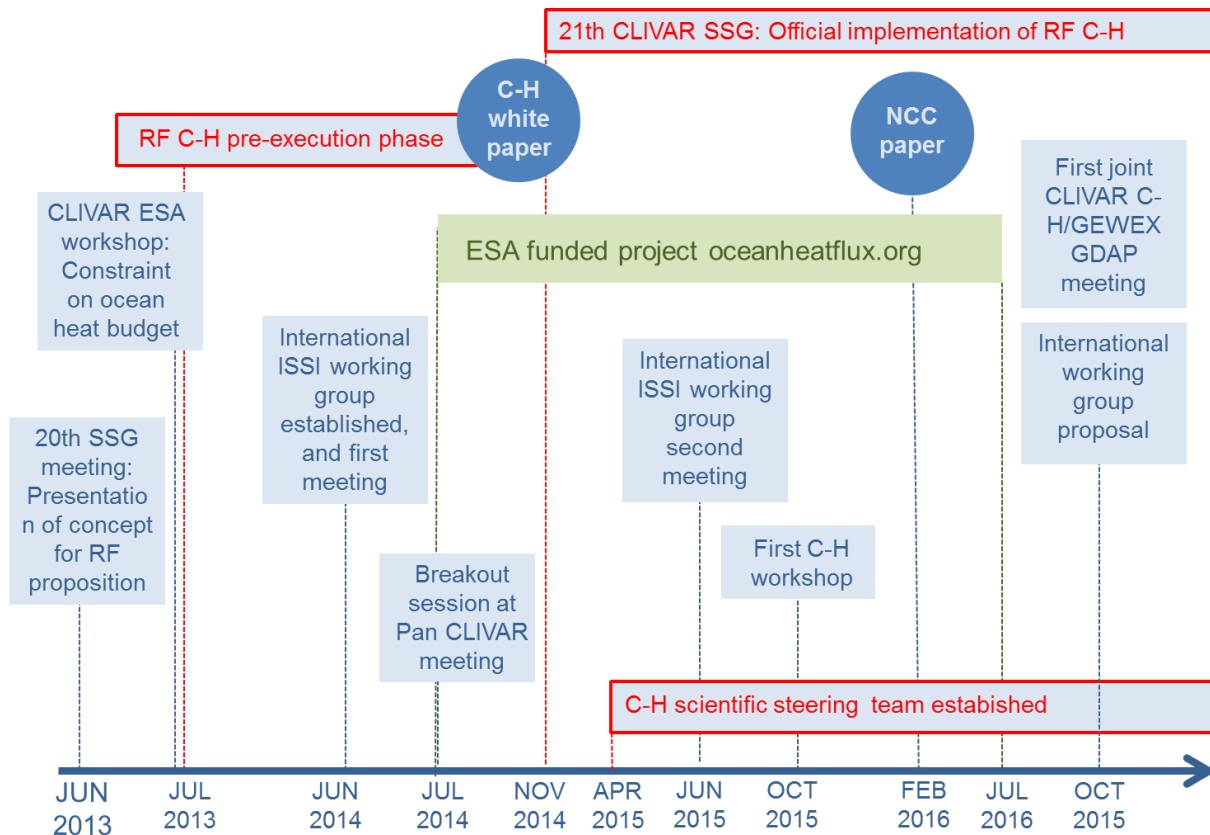


Figure 1: Schematic overview on milestones of the CLIVAR research focus CONCEPT-HEAT.

Achievements for 2016-2018

During 2016, the publication of the perspective paper on the Earth Energy Imbalance in Nature Climate Change was a fundamental step forward on knowledge exchange and scientific capacity building. Since the second half of the year 2016 up to now, strong achievements on knowledge exchange are under the way, particularly between CLIVAR (e.g. CONCEPT-HEAT) and GEWEX (e.g. GDAP). These discussions will fundamentally contribute to the main goal of C-H to build up a multi-disciplinary synergy community on the energy flow through the climate system, and the Earth Energy Imbalance. Intensive and various discussions had been performed, and a joint meeting of CLIVAR C-H and GEWEX GDAP has taken place on the 9th of October 2017 (host: NCAR, Boulder).

Several scientific sessions have been held: at AGU 2016, AGU 2017, Ocean Science 2018, GEWEX Science Conference in May 2018 in Canada.

A workshop has been now organized which will take place in Toulouse: “The Earth’s Energy Imbalance and its implications“ (<https://www.wcrp-climate.org/news/wcrp-news/1311-2018-wcrp-workshop-the-earth-s-energy-imbalance-and-its-implications-eei>) during the second week of November 2018. This workshop has grown out of the CLIVAR RF C-H activity, aiming that WCRP Core Projects work together for a new WCRP-wide initiative to identify research goals and opportunities for Earth’s Energy Imbalance and to strengthen future international scientific collaboration with experts for EEI assessments.

Plans for 2019 and beyond

CONCEPT-HEAT has been active for 4 years, and will declare success at the end of 2018, as the activity is expanded to become more WCRP-wide.

Articles published in 2016/17 as part of RF activities

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- Trenberth, K. E., J. T. Fasullo, K. von Schuckmann and L. Cheng, 2016: Insights into Earth’s energy imbalance from multiple sources. *J. Climate*, doi:10.1175/JCLI-D-16-0339, DOI: 10.1175/JCLI-D-16-0339.1

Trenberth, K. E., and J. T. Fasullo, 2017: Atlantic meridional heat transports computed from balancing Earth's energy locally. *Geophys. Res. Lett.*, 44, 1919–1927, doi:10.1002/2016GL072475, <http://dx.doi.org/10.1002/2016GL072475>

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Budget and other needs for 2019

No budget application