

## Climate Dynamics Panel

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### Panel overview

The main aim of the Climate Dynamics Panel is to advance our basic understanding of atmosphere-ocean climate dynamics using observations and models and to determine the role of climate dynamics in shaping climate variability and change on seasonal to centennial time scales. Our work to date has been organized around three areas; (i) the organisation of storms, blocks and jet streams on seasonal and longer time scales, (ii) ocean basin to ocean basin and tropical-extratropical teleconnections and (iii) the development of predictive theories of climate dynamics involving non-linear interactions between the dynamics and physics of the atmosphere and ocean.

CDP had a very successful 2021. We helped arrange five workshops/meetings covering predictability, regionalization, mid-latitude air-sea interaction, tropical basin interactions, and climate feedbacks. These were either purely online or hybrid, with up to 300 participants from across the globe and different career stages. We are leading a review paper on constraining regional climate change projections, which is an outcome of one of these workshops. From 2022, we will start annual workshops addressing topical issues in climate dynamics and including wider community, to promote climate dynamics.

No CDP members are scheduled to rotate off in 2022, except for Noel Keenlyside. Depending on the SSG, CDP would like Noel Keenlyside to complete a third and final year as co-chair. Jennifer Kay has stepped down from the panel, as she will take on other demanding community service (J. Climate editor). The panel is submitting proposal for three new members following the recommendations from SSG last year.

### Achievements for 2020-2021

#### Workshops

- Scientific exchange was facilitated among panel members through an online panel meeting from May 31<sup>st</sup> – June 4<sup>th</sup>; panel members recorded short presentations on their ideas for panel activities during the next 18 months (<https://www.clivar.org/news/5th-session-clivar-climate-dynamic-panel-took-place-virtually>). Panel has agreed on annually arranging a community workshop (see below).
- The panel had telecons on 8<sup>th</sup> April and Nov. 17<sup>th</sup> (<https://www.clivar.org/news/clivar-climate-dynamics-panel-telecon-held-april>; and <https://www.clivar.org/news/clivar-climate-dynamic-panel-panel-meet-november>).
- The panel arranged a workshop on “towards providing more reliable regional climate change projections” from June 21<sup>st</sup> - July 16<sup>th</sup> and completely online. The aim of the workshop was to write review paper (see below) to discuss pathways forward for constraining regional projections of climate change, and to highlight the need for a climate dynamics perspective on this issue. There were around 30 invited participants. The scientific organizing committee

consisted of Kang, Keenlyside Shang-Ping Xie, Simona Bordoni, Mat Collins, John Fyfe, Cathy Hohenegger.

- The panel contributed to organizing a workshop on “Multi-annual to Decadal Climate Predictability in the North Atlantic-Arctic Sector” from 20-22 September 2021. This was a hybrid event with more than 100 online participants, and regional hubs in Copenhagen and Bergen. Keenlyside and Mignot were co-organizers with involvement from AP and NORP. It was sponsored by EU Blue-Action and Trond Mohn Foundation funded Bjerknes Climate Prediction Unit. (<https://blue-action.eu/events/predictabilityworkshop>)
- Contributed to the “International workshop for mid-latitude air-sea interaction: Advancing Predictive Understanding of Regional Climate Variability and Change across Timescales”. The event took place June 8-9 (online) & June 12-14 (online + in-face), 2021. Minobe, and Keenlyside were part of the science organizing committee, and Yoshi was part of the local organizing committee, invited presentations by Sarah, and Rhys, contributed presentations by Bolan and Yoshi. The event was sponsored by the Japanese HotSpot2 Project. (<https://www.clivar.org/news/international-workshop-mid-latitude-air-sea-interaction-took-place-successfully>)
- We contributed to the CLIVAR Tropical Basin Interaction workshop, Virtual, February 24<sup>th</sup>-26<sup>th</sup>; Keenlyside was a co-organizer and there were more than 200 participants.
- We contributed to the CFMIP 2021 Virtual Meeting, September 14<sup>th</sup>-16<sup>th</sup>, held on virtual poster halls at Gather Town; Sarah Kang was a co-organizer and there were about 330 participants.
- The panel was involved in organizing several conference sessions:
  - AGU 2020**
    - A055 - Advancing predictive understanding of climate variability and change associated with air-sea interactions and interbasin connections (Shoshiro Minobe, Aixue Hu, Alexey Karpechko, Rhys Parfitt)
    - GC010 - Dynamics of Oceanic Mesoscale Eddies from Regional to Global Scales Under a Changing Climate (Aixue Hu, Mengrong Ding, and Luke P van Roekel)
  - EGU 2021**
    - OS1.4 - Tropical Atlantic climate: ocean processes, air-sea interactions, remote impacts, and climate change (Marta Martín-Rey; Marie-Lou Bachelery, Peter Brandt, Noel Keenlyside, Alban Lazar)

#### Scientific results from activities

- CLIVAR Exchanges Special Issue: WCRP-CLIVAR Workshop on Climate Interactions among the Tropical Basins; Keenlyside and Ingo Richter wrote the Editorial and an article on “Current status of TBI research and the way forward: Reflections on the WCRP-CLIVAR Workshop”
- Forward looking review on “Towards providing more reliable regional climate change projections” is being drafted for Nature Reviews Earth and Environment that is direct outcome of the CDP organized workshop.

#### Scientific capacity building and career support

- Workshops above all involved many early career researchers from across the globe.

#### Knowledge exchange

- CDP interacted with other panels and a research focus (AP, NORP, TBI) in several of the above listed activities.
- Some CDP members are also members of other groups, they bring the knowledge exchange between CDP and other groups.
- Contributing authors on IPCC AR6 (Mike Byrne on Chapters 2, 4, 8; Ramiro Saurral on Chapter 10; Natalie Burls on Chapter 7; Noel Keenlyside on Chapter 2)

### **Plans for 2022 and beyond**

- Online workshop on understanding the contributions of external and internal variability in climate variability and predictability.
- There are planned conference sessions at Ocean Sciences, EGU, AGU AOGS
  - AGU 2021**
  - GC056 - Mid-latitude air-sea interaction and inter-basin teleconnections under changing climate (Aixue Hu, Shoshiro Minobe, Bolan Gan)
  - GC129 - Large-Scale Atmosphere-Ocean Dynamics of Climate Variability and Climate Change (Robert Jnglin Wills, Dillon J Amaya, Natalie Burls, Elizabeth Maroon)
  - Ocean Sciences Meeting 2022**
  - AI04 - Extratropical climate variability and change associated with air-sea interactions (Yoshi Sasaki, Rhys Parfitt, Aixue Hu, Noel Keenlyside)
  - OC04 - Mesoscale eddies and their roles in the climate system: characteristics, dynamics, mechanisms, and interactions with the mean flow and the overlying atmosphere (Mengrong Ding, Aixue Hu and Pengfei Lin)
  - EGU2022**
  - OS1.8 - Tropical Atlantic climate: Ocean processes, air-sea interactions, remote impacts, and climate change (Marta Martín-Rey, Peter Brandt, Noel Keenlyside, Belen Rodríguez de Fonseca)
  - AOGS2022**
  - AS23 - Earth System Predictability, Prediction and Projection (June-Yi Lee, Andrea Alessandri, Yoshimitsu Chikamoto, Noel Keenlyside, Jing-Jia Luo)
- Workshop on Continental Climate Change: Simple Models to Understand the Future to take place in St Andrews, Scotland from 6-8 June 2022. Mike Byrne is lead organiser and the workshop is funded by the Carnegie Trust.
- The pattern effect workshop will take place in Boulder, CO, USA from 10-13 May 2022. Natalie Burls and Sarah Kang joined the Scientific Organizing Committee.
- 2022 CFMIP Meeting on Clouds, Precipitation, Circulation, and Climate Sensitivity will take place in Seattle, USA from 19-22 July 2022. Sarah Kang is part of the organizing committee.

### **Articles published in 2020/21 as part of panel activities (if any)**

### **Budget and other needs for 2022 (in CHF)**

We request 5000 CHF for the IT support for the CDP workshop: Understanding the contributions of external and internal variability in climate variability and predictability. We also request ICPO to provide the logistics support



## Annex A

### Proforma for CLIVAR Panel requests for SSG approval for meetings

**Note: If your group has approved funds in 2021 that were not used because of Covid19 and other unexpected issues, and you propose to use them in 2022, they should be included again in this request, in addition to any new request.**

1. **Panel name:** Climate Dynamics Panel
2. **Title of meeting or workshop:** Understanding the contributions of external and internal variability in climate variability and predictability
3. **Proposed venue (Or indicate if online):** Online
4. **Proposed dates:** Late July in 2022
5. **Proposed attendees, including likely number:** To be determined
6. **Rationale, motivation and justification, including: relevance to CLIVAR science & WCRP Strategic Plan and Lighthouse Activities, and any cross-panel/research foci links and interactions involved:**

The theme will be the interaction between internally generated and externally forced variability on decadal and longer timescales. It will cover the debate on decadal variability. This topic is important for understanding and predicting future climate change at regional scales and for the next decades. It aligns to several LHA – Digital Earths; Explaining and Predicting Earth System Change; My Climate Risk. It will integrate several panels – ARP, PRP, IORP, NORP—and the research focus TBI.
7. **Specific objectives and key agenda items:**

The workshop is the first one of the CDP workshop series, each with a specific topic and objective. This one aims to gather the wider CLIVAR community, to enhance the understanding of the contributions of external and internal variability in climate variability and predictability.
8. **Anticipated outcomes:** A review paper or CLIVAR exchanges special issue
9. **Format:** Online, including poster sessions
10. **Science Organizing Committee (if relevant)**

CDP members (Juliette Mignot, Noel Keenlyside, Natalie Burls, Alexey Karpechko, Mike Byrne), and we will invite some scientists outside CDP and from other CLIVAR panels
11. **Local Organizing Committee (if relevant)**

Online format, CDP members will be the organizing committee, ICPO will provide organizing support.
12. **Proposed funding sources and anticipated funding requested from WCRP:**

Although this workshop is online, we may need 5000 CHF for the IT support. We also request ICPO to provide the logistics support