

Research Focus on Tropical Basin Interaction (TBI)

Yuko M. Okumura (yukoo@ig.utexas.edu)
Ingo Richter (richter@jamstec.go.jp)

RF overview

Start date: March 1, 2020
Planned end date: December 31, 2024

Background

The interactions among the tropical Pacific, Atlantic, and Indian Ocean basins are increasingly recognized as a key factor in understanding climate variability on interannual to decadal timescales. While recent years have seen progress toward understanding tropical basin interactions, much remains to be learned. This includes a deeper understanding of the mechanisms, the preferred pathways, and the potential benefits for seasonal-to-decadal prediction. The RF TBI aims to make progress in these areas by fostering research activities and holding workshops and summer schools. Specific outcomes will include the coordination of new climate model experiments and community review papers.

Membership changes

RF member Susan Bates decided to step down due to her new position at the Nature Conservancy. She has been replaced by Dietmar Dommenges (Monash University), who brings to the table expertise in ENSO theory, tropical basin interaction, and conceptual modeling.

As agreed at the time of the last annual review, Noel Keenlyside has stepped down as co-chair and has been replaced by Yuko Okumura (University of Texas at Austin).

Status of the RF in relation to the proposed timeline

While the RF activities remain behind the proposed schedule, we are making good progress toward achieving our goals. The workshop planned for 2020 was held online in early 2021 with approximately 200 registered participants, as reported at the 26th Session of the CLIVAR Scientific Steering Group. Another leftover task from 2020, the establishment of four working groups (WGs), has been accomplished. The coordinated GCM experiments have not been started yet but we now have an outline of the experiment design and 15 groups have expressed interest in participating. A meeting of prospective participants was held in November 2021. Some details of the experiment design remain to be fixed but we are optimistic that the experiments can begin in the first quarter of 2022.

2020-2021 activities

In addition to the activities mentioned in the above paragraph, RF members have been involved in a number of activities contributing to the goals of RF TBI.

Together with Jose Santos, Ingo Richter has guest-edited a Special Issue of CLIVAR Exchanges that was published in July 2021 (<https://doi.org/10.36071/clivar.80.2021>). This Special Issue is dedicated to the TBI Workshop held in February 2021. In addition to 11 short articles in which workshop participants summarize their results, the Special Issue also features a post-analysis of the organizational aspects of the workshop (including feedback from participants), and a summary of the workshop outcomes by Ingo and Noel.

In accordance with the RF proposal, 4 WGs have been set up. These are WG1: Coordinated GCM Experiments; WG2: Conceptual models and theory; WG3: Observations; WG4: Paleo proxies. WG1, WG2, and WG4 are led by the RF members Ingo, Dietmar, and Yuko, respectively. For WG3, we have enlisted the help of Gregory Foltz (NOAA/AOML). Several other new members have been invited to join WG4 to enhance research expertise: Julien Emile-Geay, Jud Partin, and Lea Svendsen. WG membership is listed on the RF website.

Regarding WG1, Ingo has been working on soliciting participation in the coordinated experiments and has held a meeting to discuss experiment design. Yuko has held a meeting of WG4, and a summary of this meeting has been posted on the TBI website. WG2 and WG3 have been established relatively recently and do not have any results to report yet.

Several general RF TBI meetings have been held to coordinate RF activities.

A session on TBI will be held at the upcoming AGU Fall Meeting, with RF members Yuko, Andrea, Chunzai and Ingo as conveners.

Achievements for 2020-2021

- Workshops
The "WCRP-CLIVAR Workshop on Climate Interactions among the Tropical Basins" was held online as planned from February 24-26, 2021 (<https://www.clivar.org/events/wcrp-clivar-workshop-climate-interactions-among-tropical-basins-online>).
- Scientific results from activities
Many RF members have participated in TBI-related research activities. The Special Issue of CLIVAR Exchanges, guest-edited by Ingo, has been published. It contains several research papers presented at the TBI Workshop (<https://www.clivar.org/documents/exchanges-80>). The overview article co-authored by Ingo and Noel summarises the current status of TBI research and the way forward.
- Scientific capacity building and career support
Ingo Richter has submitted a JSPS (Japanese equivalent of NSF) proposal with Reik Donner (PIK, Germany) and Giorgia DiCapua (PIK; Early Career Scientist) as collaborators (pending). This collaboration was initiated through the TBI

Workshop. Additionally, Reik's Master's Student, Luisa Alves, is applying for the JSPS Summer Program, which would allow a two-month stay at JAMSTEC in the summer of 2022, to be hosted by Ingo (to be submitted by the end of November).

- Belén Rodríguez has submitted a proposal to the National Research Council of Spain (CSIC) to organize a meeting in Madrid in 2023 on multidecadal modulations of TBI (pending).
- Regina R. Rodrigues and Roxy Koll have submitted a pre-proposal for the STI Framework Programme Coordinated call for BRICS multilateral projects – 5th Call 2021, which aims to understand the role of tropical interbasin interaction on extremes.
- Knowledge exchange

The RF TBI is linked to other CLIVAR activities through co-memberships of the following members: Andrea (Pacific Region Panel), Ingo and Regina (Atlantic Region Panel), Noel (Climate Dynamics Panel), Malte, Mike, and Chunzai (ENSO Conceptual Model group), Roxy and Mike (Indian Ocean Region Panel), and Malte (Tropical Pacific Decadal Variability group). Furthermore, Regina is co-chairing one of the WCRP lighthouse activity (LHA) teams.

Ingo has presented RF TBI activities on a number of occasions, including the Japan CLIVAR Committee Meeting, the JICore Workshop (a JAMSTEC-IPRC collaboration), and in personal communications to Rowan Sutton and Shoshiro Minobe (members of LHA EPESC). Belen Rodriguez-Fonseca has been a member of the CLIVAR-Spain panel and has presented RF TBI activities in this capacity.

Plans for 2022 and beyond

We are planning to hold a workshop to discuss first results of the coordinated experiments in the fall of 2022. Noel has tentatively offered to host this workshop in Norway, assuming that in-person attendance will be possible. To promote the use of proxy data for TBI research and beyond, WG4 is planning to collaborate with NCAR to create a paleoclimate section in the Climate Data Guide (<https://climatedataguide.ucar.edu/>).

Articles published in 2020/21 as part of RF activities (if any)

CLIVAR Exchanges Special Issue: WCRP-CLIVAR Workshop on Climate Interactions among the Tropical Basins. *edited by Jose Santos and Ingo Richter*. doi: [10.36071/clivar.80.2021](https://doi.org/10.36071/clivar.80.2021)

Ham, Y.-G., Lee, H.-J., Jo, H.-S., Lee, S.-G., Cai, W., & Rodrigues, R. R. (2021). Inter-basin interaction between variability in the South Atlantic Ocean and the El Niño/Southern Oscillation. *Geophysical Research Letters*, 48, e2021GL093338. <https://doi.org/10.1029/2021GL093338>.

Budget and other needs for 2022 (in CHF)

We would like to request CHF 5,000 for the workshop that is planned to be held in Norway in the fall of 2022. These funds would be used to support travel costs of international participants, preferably from low-income countries. Due to the ongoing COVID-19 pandemic there is a chance, however, that the meeting will have to be held online. In this case the funds may be used to support the logistic needs of online meetings.

Annex A

Proforma for CLIVAR Research Focus requests for SSG approval for meetings

Note: If your group has approved funds in 2021 that were not used because of Covid19 and any 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. **RF name:** TBI RF
2. **Title of meeting or workshop:** WCRP/CLIVAR workshop on interaction among the tropical basins: observations, numerical experiments and paleo-proxies
3. **Proposed venue (or indicate if online):** Norway
4. **Proposed dates:** October 3-7, 2022
5. **Proposed attendees, including likely number:** participants of the coordinated GCM experiments, members of the RF and its working groups, invited speakers, wider scientific community; anticipated number of participants: ~ 100 (including online participants)
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:**

One of the main objectives of this workshop will be to present results from the coordinated GCM experiments that are scheduled to begin in early 2022. In addition, it will offer an opportunity to present new results regarding all aspects of tropical basin interaction, including observations, paleo-proxies, and conceptual models.

The goals of this workshop are closely linked to the CLIVAR goals of predicting variability of the oceans on a wide range of time scales, and will be of interest to the Pacific, Atlantic and Indian Ocean Region Panels, and the Climate Dynamics Panel. They are also linked to the wider WCRP objectives of better understanding and reliably projecting future climate change. Specifically, the workshop should contribute to the goals of the Lighthouse Activity (LHA) Explaining and Predicting Earth System Change (EPESC). We will invite members of this LHA to attend the workshop.
7. **Specific objectives and key agenda items:**

Specific agenda items include:

 - a) Reports from the participants on the progress of the coordinated experiments and presentation of first results.
 - b) Presentation of latest research results in tropical basin interaction.
 - c) Discussions among the RF members on future activities of the RF.
8. **Anticipated outcomes (deliverables):** The workshop should contribute to accelerating completion of the coordinated experiments. Results presented at the

workshop may form the basis for a special collection/issue in a peer reviewed journal.

9. **Format:** Hybrid
10. **Science Organizing Committee (if relevant)** Noel Keenlyside, Ingo Richter, TBD
11. **Local Organizing Committee (if relevant)** Noel Keenlyside, TBD
12. **Proposed funding sources and anticipated funding requested from WCRP:**
The costs of the workshop can be partly covered by research grants of Noel Keenlyside. In addition we would like to request from WCRP CHF 5,000 for travel expenses of participants.