Report to CLIVAR SSG-19

Panel or Working Group: ETCCDI

1. Contributions to developing CLIVAR science and fit, where appropriate, to the CLIVAR imperatives

Anthopogenic Climate Change
The ET is actively contributing to the understanding of anthropogenic climate change. This involves several areas of the ET's work: 1) The ET is working with the support of the ClimDEX Project to produce global gridded indices of temperature and precipitation extremes, to update and improve the HadEX indices product, as well as other gridded indices activities. This activity not only helps to improve our understanding of past changes in climate extremes, it also provides basic datasets for climate model validation and detection and attribution work. The updated gridded indices are expected to be on-line in June-July 2012. 2) The ET is organizing the computation of indices based on CMIP5 model simulations and will dissimilate the resulting data to the winder climate research community. This is especially important for those who have difficulties in downloading the vast volume of daily data and in processing the data. The indices data are expected to be available on-line in June-July. The activity will be an important contribution to the IPCC AR5 assessment, several chapters of the AR5 WGI report will likely have figures based on these indices data. 3) The ET is also working closely with the International ad-hoc Detection and Attribution Group (IDAG) on detection and attribution. Several ET members are also IDAG members.

Zhang X., L. Alexander, G. Hegerl, P. Jones, A. Klein Tank, T. Peterson, B. Trewin, F. Zwiers, 2011: Indices for monitoring changes in extremes based on daily temperature and precipitation data. *WIREs Clim Change*, 2: 851-870. doi: 10.1002/wcc.147

Capacity Development
A principal activity of the ET is maintaining a sustained programme of regional workshops that drive capacity development in less developed regions where both data availability is scarce and/or data accessibility is difficult, helping regional climate service. The results from the workshops are published in the peer-reviewed literature and will continue to be an important contribution to the IPCC assessments. The ET continues to develop this successful workshop formula, looking at ways to increase regional collaboration and participation in international activities of scientists involved in its capacity development activities.

2. Briefly list any specific areas of your panel's activities that you think would contribute to the WCRP Grand Challenges as identified by the JSC at its most recent meeting[1]

[1]
1. Provision of skillful future climate information on regional scales (includes decadal and polar predictability)

ETCCDI's activites are central to the Grand Challenge on the science underpinning the prediction and attribution of extreme events.

3. Key science questions that you anticipate your community would want to tackle in the next 5-10 years within the context of a more ocean-atmosphere orientated CLIVAR (1-3 suggestions)

a) Detection and attribution of anthropogenic influence on weather and climate extremes at regional scale

b) Contribution to event attribution

c) Influence of large-scale circulation on weather and climate extremes

4. Cooperation with other WCRP projects, outside bodies (e,g. IGBP) and links to applications

In addition to CLIVAR/GEWEX, ETCCDI has two sponsors – the WMO Commission for Climatology (CCl) and the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM).

The CCl perspective is that the work of ETCCDI is directed at improving climate change detection and indices with a strong focus on capacity development. ETCCDI contributes to the provision of climate services through its regional capacity development workshops and its continued recommendation of free observational data exchange.

ETCCDI collaborates with the following CCl Task Forces:

- OPACE-I Task Team on Climate Data Rescue (TT-DARE)
- OPACE-II Task Team on National Climate Monitoring Products (TT-NCMP)
- OPACE-IV Expert Team on Climate Risk and Sector specific Climate Indices (ET-CRSCI)

JCOMM provides the mechanism for international coordination, regulation and management of oceanographic and marine meteorological observing, data management and services systems. JCOMM is interested in the use of indices and in developing an improved suite of indices to provide information for its stakeholders.

Despite CLIVAR and JCOMM co-sponsorship, the ET recommended list of indices are currently only land based. Whether these should expand to include marine indices is a topic of continuing discussion and will be expanded upon by a JCOMM

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2. Regional sea-level rise
3. Cryosphere response to climate change (including ice sheets, water resources, permafrost and carbon)
4. Improved understanding of the interactions of clouds, aerosols, precipitation, and radiation and their contributions to climate sensitivity
5. Past and future changes in water availability (with connections to water security and hydrological cycle)
6. Science underpinning the prediction and attribution of extreme events

position paper that is in preparation.

Work on marine indices generally considers better characterizing variability and ocean-land links, rather than marine extremes. While the ET is not limited to considering extremes indices, there is reluctance to expand its charter to include indices that are not place-based, in other words, indices on global teleconnections. The expertise within other parts of the CLIVAR community is better suited to make recommendations on these types of indices and to use such indices to understand teleconnection patterns. How these indices are linked to extremes over land is an important research area, for example the attribution of long-term trends in land extremes in relation to the longer timescales of ocean variability.

Indices that include marine place-based indices that describe variability and the development of joint terrestrial-ocean indices are being considered. Monthly marine indices would be appropriate for example based on the International Comprehensive Ocean-Atmosphere Data Set (ICOADS) data set and model output. Monitoring and attributing surface temperature variability is the most obvious terrestrial-land linkage. The definition of sub-surface indices such as ocean heat content is an active research area and is constrained by limitations in the coverage of observations. The latter would require recommendations on which data sets should be used and best practices on how to combine data sets since there are intrinsic differences between land and marine data. Marine data could also be useful to derive land variability in the absence of land observations, such as for small islands. The usefulness of combining marine and land datasets is best explored in well-observed regions including Europe and North America.

5. Workshops/meetings held

4th Session of ETCCDI - Victoria, Canada on 23-25 February 2011

Hosted by Francis Zwiers and the Pacific Climate Impacts Consortium at the University of Victoria. The ETCCDI sponsors renewed the membership and term of the expert team in 2010 and this meeting served as a kick-off meeting, providing the setting to scope a work plan for the new ETCCDI four-year term.

The following ETCCDI workshops on regional climate indices have taken place:

Date	Location	Region	Funding
Jan 2011	CIIFEN, Equador	South America	WMO
Feb 2011	ICPAC, Kenya	Greater Horn of Africa	WMO, World Bank, WCRP
Dec 2011	Gambia	West Africa	WMO, ACMAD
May 2012	New Caledonia	Pacific Island Countries and East Timor	Australian government. ET members organized this workshop, though the ET is not an officially sponsor.
May 2012	Mona, Jamaica	Caribbean	NOAA, WMO, WCRP, local

			organizer

6. New activities being planned, including timeline

Indices developments

As outlined in Zhang et al 2011, the issues that the ET will address over the next four years of mandate includes the development of gridded indices data sets, the use of ETCCDI and related workshops to expand global coverage, and how this process contributes to the IPCC assessments. Data issues important for indices calculation, such as the production of homogenized data sets, are emphasized. There is an ongoing discussion on new indices developments, including more process-based indices (such as those related to droughts and the rainy season) and more impact-relevant indices (such as those related to heat waves and health conditions).

ARC Linkage ClimdEX Project Overview

The ARC Linkage ClimdEX Project is underway to develop the next generation data sets of global gridded indices of climate extremes including an update of HadEX. The project will use quality controlled daily in situ temperature and precipitation observations from multiple sources (e.g. NOAA Global Historical Climatology Network (GHCN-Daily), ECA&D, SACA&D and data generated through the ETCCDI training workshops and related regional activities), and calculate climate extremes indices using the ETCCDI set of indices and software. The output will be available via a web interface as station and gridded data to serve the research needs of climate variability, model evaluation, detection and attribution, process studies and ultimately to inform the impacts community and relevant stakeholders. There would be two types of datasets available. One has a focus for long-term stations for climate trend analysis and detection and attribution. Another has a focus for climate monitoring such that indices would be updated near real time. Some data would be available on-line in June 2012. Future work includes the publication of a paper describing the data and initial trend analysis, maintenance of indices datasets.

International Surface Temperatures Initiative (ISTI)

For the first time, a single comprehensive international databank of the actual land surface meteorological observations taken globally at monthly, daily and sub-daily resolutions will be developed. This databank will be version controlled and seek to ascertain data provenance, preferably enabling researchers to trace the data back to the original data record. It will also have associated metadata including images and changes in instrumentation and practices to the extent known. The databank will need to be updated in real-time. Novel approaches to data recovery such as crowd sourcing digitization may be pursued. The ETCCDI contributes significantly to the activities of the ISTI group. See: http://www.surfacetemperatures.org/

Calculation of Indices from Model Output

The ETCCDI indices software FClimDex, normally used with station data, has been modified for use with gridded climate model data sets in netcdf format. Time series

are calculated over the Giorgi regions and compared with HadEX and reanalyses (ERA40, ERAINT and NCEP). The analysis has been completed for the CMIP3 output and is being repeated for CMIP5. Initial results have been provided to the AR5 WGI writing processes. The on-going work includes the publication of papers describing the indices, publication of the indices already calculated in a website, computation of indices and making them available when additional climate model simulations become available.

7. Workshops / meetings planned

8. Issues for the SSG

Request guidance from CLIVAR on a roadmap for defining a set of ocean indices relevant for the community

Annex A

Proforma for CLIVAR Panel and Working Group requests for SSG approval for meetings

Requests should be made through D/ICPO (Catherine.beswick@noc.ac.uk), against the following headings:

1. **Panel or Working Group:** ETCCDI

2. **Title of meeting or workshop:** ETCCDI regional workshops

3. **Proposed venue:** Tbd.

   Workshops will be held in 2013 depending on funding sources. The ET requests that CLIVAR allocates a budget to support CLIVAR lecturers to attend.

4. **Proposed dates:** 2013 tbd.

5. **Proposed attendees, including likely number:** ~20

6. **Rationale, motivation and justification, including: relevance to CLIVAR themes & JSC cross cutting topics and any cross-panel/working group links and interactions involved:**

   A principal activity of the ET is maintaining a sustained programme of regional workshops that drive capacity development in less developed regions where both data availability is scarce and/or data accessibility is difficult, helping regional climate services and improving the global data analysis for climate monitoring and detection and attribution studies.

7. **Specific objectives and key agenda items:**

   The general goals of the workshops include:

   - Derive indices from daily data, especially measures of changes in extremes
   - Fill in blank data areas in "global" analysis of climate indices
   - Increase confidence in local analyses by placing these analyses in a larger, regional context that includes results from neighboring stations and countries.
   - Increase regional research synergies by sharing insights and improve analyses between neighboring countries
   - Foster greater appreciation for data and data archeology

8. Anticipated outcomes (deliverables):

Specific goals for each workshop include producing a peer-reviewed journal article on analysis of climate change for the giving region, and making available the data and indices in the analysis.

9. Format:

Week-long workshop with lectures on calculating climate extremes, data processing and quality control and practical sessions. During the latter, the participants work on the data they bring to the workshop to produce a regional analysis.

10. Science Organising Committee (if relevant)

11. Local Organising Committee (if relevant)

12. Proposed funding sources and anticipated funding requested from WCRP:

$10K – Travel and accommodation to send a CLIVAR specialist for 3 workshops