

# Expert Team on Climate Change Detection and Indices (ETCCDI)

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# Outline

- ETCCDI in brief
- Achievements
- Collaboration with other groups
- Key challenges



The joint [CCI/WCRP/JCOMM Expert Team](#) on Climate Change Detection and Indices (ETCCDI) has a mandate to address the need for the objective measurement and characterization of climate variability and change by providing international coordination and helping organizing collaboration on climate change detection and indices relevant to climate change detection, and by encouraging the comparison of modelled data and observations.

# Terms of Reference

- Coordinate, organize, and collaborate on climate extremes, indices, and climate change detection (Links to GC Extremes, GFCS)
- Encourage and facilitate the development of national and international datasets;
- Further develop and publicize internationally agreed indices;
- Facilitate the use of observational data to evaluate model output and provide guidance on related data and model output requirements for extremes analysis;
- Coordinate relevant regional activities, e.g., the calculation and exchange of indices, through regional workshops

# Membership



**Albert Klein Tank**  
**The Netherlands**



**Xuebin Zhang**  
**Canada**



**Lisa Alexander**  
**Australia**



**Ali Behrangi**  
**USA**



**Lukas Gudmundsson**  
**Switzerland**



**Gabi Hegerl**  
**UK**



**Kevin Horsburgh**  
**UK**



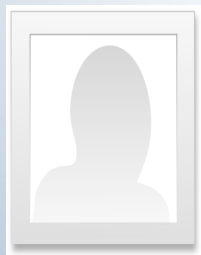
**Kathy McInnes**  
**Australia**



**Moukouba  
Moutoumoukanta**  
**Congo**



**Jim Renwick**  
**New Zealand**



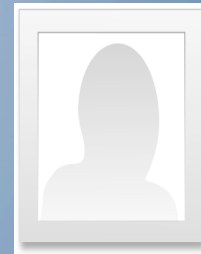
**Ying Sun**  
**China**



**Jorge Vazquez-Aguirre**  
**Mexico**



**Xiaolan Wang**  
**Canada**



**Scott Woodruff**  
**USA**

# Achievements

- development of a set of indices and software that computes the indices
- capacity building through hands-on training of data analysis by organizing regional climate change workshops
- coordinating the calculation of indices for both observed and climate model simulated data
- contributing to climate change science

# Indices and tools

- Set of 27 indices defined derived from daily temperature and precipitation (Klein Tank et al. 2009, Zhang et al. 2011, Zwiers et al. 2013)
- Software packages RClimDex and its variants (e.g. FClimDex and climdex.pcic.r) widely used
- Technical document (Klein Tank et al. 2009) providing guidelines to the National Meteorological and Hydrological Services (NMHSs)

# Indices Examples

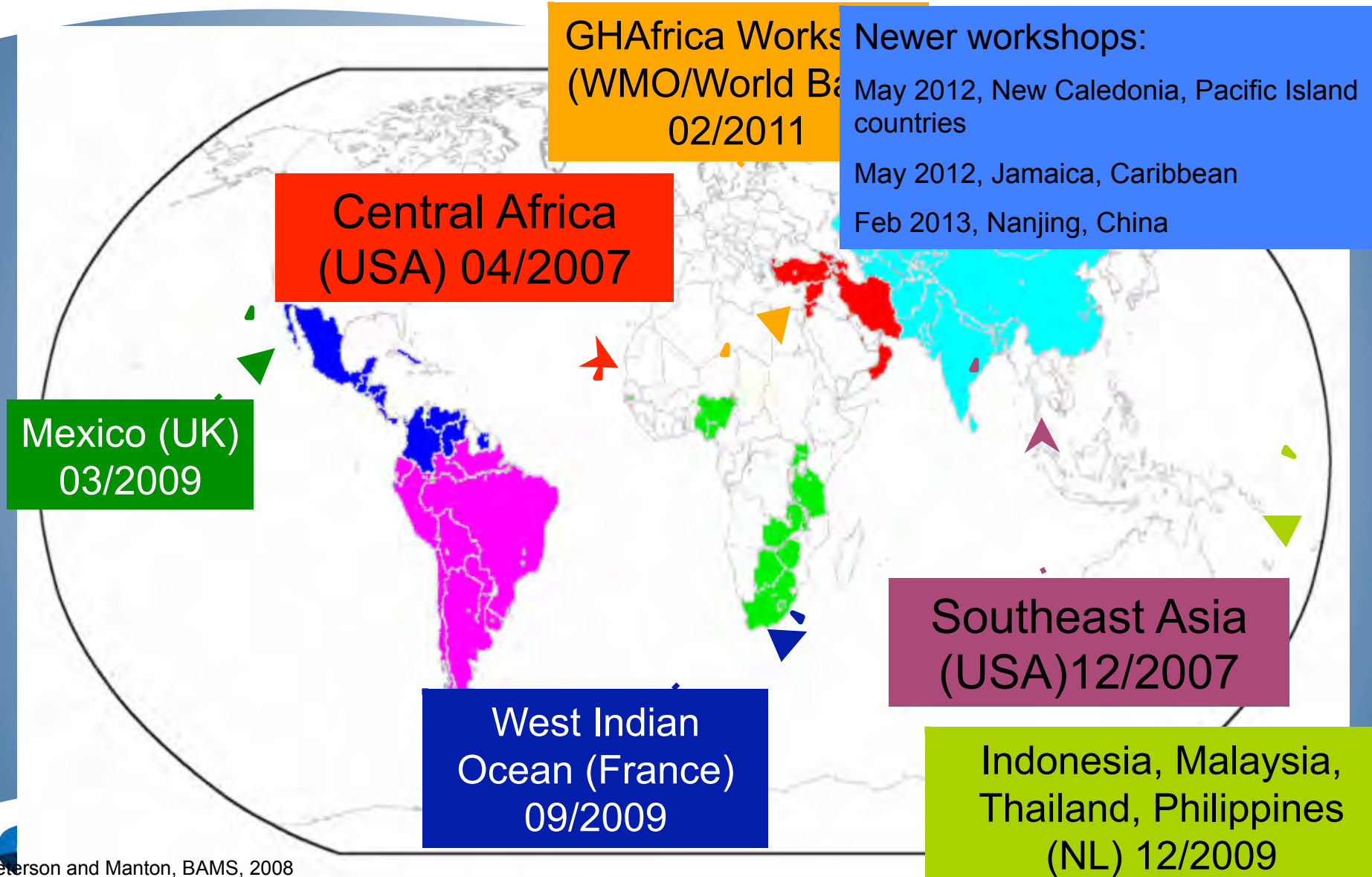
	Index	Name	Definition
<i>temperature</i>	TXx	Max Tmax	Warmest daily maximum temperature
	TNn	Min Tmin	Coldest daily minimum temperature
	TN10p	Cool nights	Fraction of days when Tmin < 10th percentile
	TX90p	Warm days	Fraction of days when Tmax > 90th percentile
	WSDI	Warm spell duration indicator	Annual number of days with at least 6 consecutive days when Tmax > 90th percentile
<i>precipitation</i>	Rx1day	Max 1-day precipitation	Annual/monthly maximum 1-day precipitation
	R95p	Annual contribution from very wet days	Annual sum of daily precipitation > 95th percentile
	R10mm	Heavy precipitation days	Annual days when precipitation $\geq$ 10 mm
	CDD	Consecutive dry days	Maximum annual consecutive days < 1mm



# Capacity building and regional workshops

- Supported by various funders
- Practice and goals:
  - Free software + hands-on training + post workshop follow-ups
  - build capacity to analyze observed changes in extremes
  - improve information services on extremes
  - publish peer-reviewed papers from each workshop
  - contribute to worldwide database of derived indices
- Workshop papers done in time for TAR, AR4, SREX and AR5
  - ET website keeps record of all past workshops
  - [www.climdex.org](http://www.climdex.org) hosts all in situ data and global datasets

# WMO ETCCDI Workshops 2001-2013 (complemented by APN)



# Indices Data: Observations

- HadEX2 released (1901-2010)
- Better coverage than HadEX
- Workshop data ingested
- Data paper published
- Separate dataset based on GHCN-daily data offers near real time update for monitoring (1951-onwards)

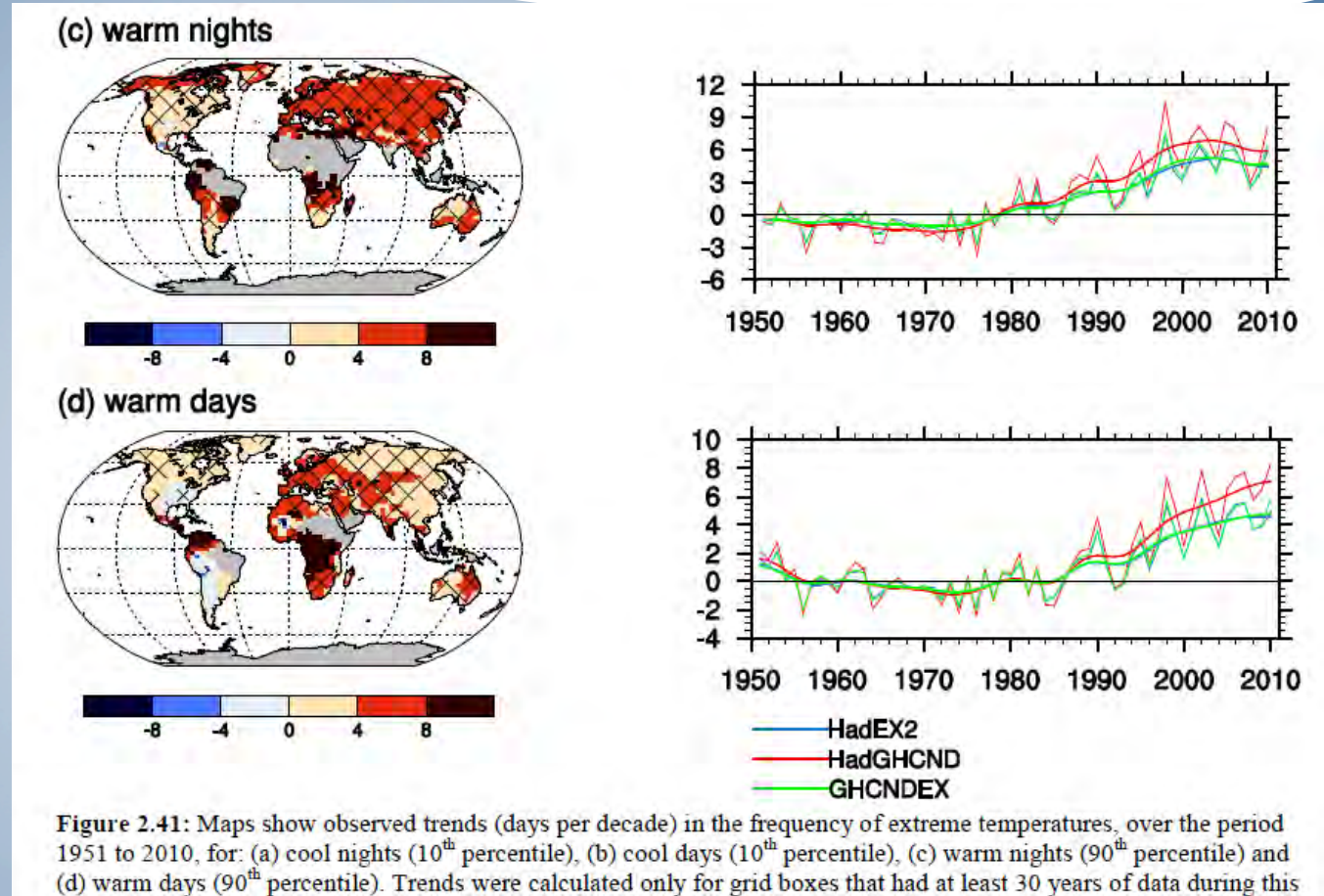
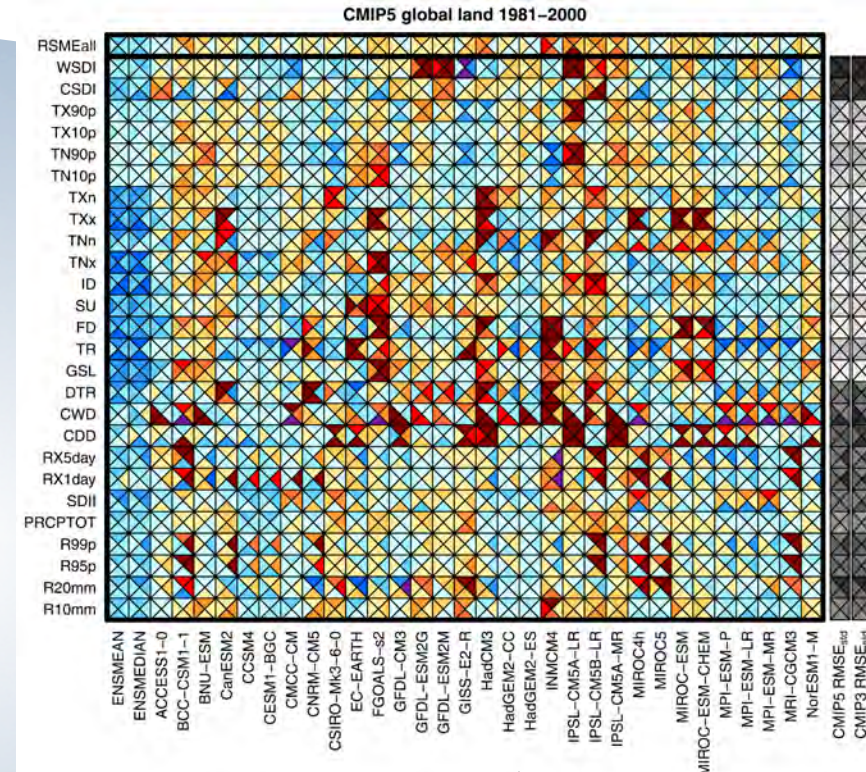


Figure 2.41: Maps show observed trends (days per decade) in the frequency of extreme temperatures, over the period 1951 to 2010, for: (a) cool nights (10<sup>th</sup> percentile), (b) cool days (10<sup>th</sup> percentile), (c) warm nights (90<sup>th</sup> percentile) and (d) warm days (90<sup>th</sup> percentile). Trends were calculated only for grid boxes that had at least 30 years of data during this

Caesar et al., 2006; Donat et al. 2013a,b, IPCC AR5 Ch2

# Indices Data: GCM simulations

- Indices computed for CMIP5 simulations (historical, RCPs, pre-industrial control simulations, Sillmann et al. 2013)
- Available from ftp
- Indices used for model evaluation, detection/attribution, and projection



Sillmann et al (2013a, Fig. 10)

ERA  
Interim  
ERA-40  
NCEP1  
NCEP2

# Contribution to climate change science

- Studies based on ETCCDI indices represent the main body of literature regarding changes in precipitation and temperature extremes assessed in the IPCC AR4 (Trenberth et al., 2007), SREX (Seneviratne et al. 2012), and AR5 reports (Hartmann et al. 2013; Flato et al., 2013; Bindoff et al., 2013; Collins et al. 2013)
- A large number of AR5 figures based on ETCCDI coordinated work
- ETCCDI members as AR5 WGI CLAs, LAs, REs

# Collaboration with others

- IDAG: International ad-hoc Detection and Attribution Group
- CCI Expert Team/task forces on climate monitoring, data rescue, sector specific indices (water resources and agriculture)
- JCOMM: connection to ICOADS, COWCLIP, ETWCH
- GEWEX: extremes in precipitation, drought, runoff (?)
- WCRP Grand Challenge Extremes, Water

# Key challenges

## Manage expectations:

- Extremes inherently cross-cutting
- Linking WCRP science on extremes to CCI adaptation and climate service needs
- High expectation on capacity building and climate service
- Small team, limited capacity

## Keep the team focused, as well as open for new directions

- Maintain and enhance traditional indices work as demands grow
- Consider new areas such as climate events attribution

## Positioned to develop broadened indices

- Marine indices related to sea level, wind, wave and heatwaves
- Runoff indices

**Thank you!**