POS Panel
Discussion on Extremes

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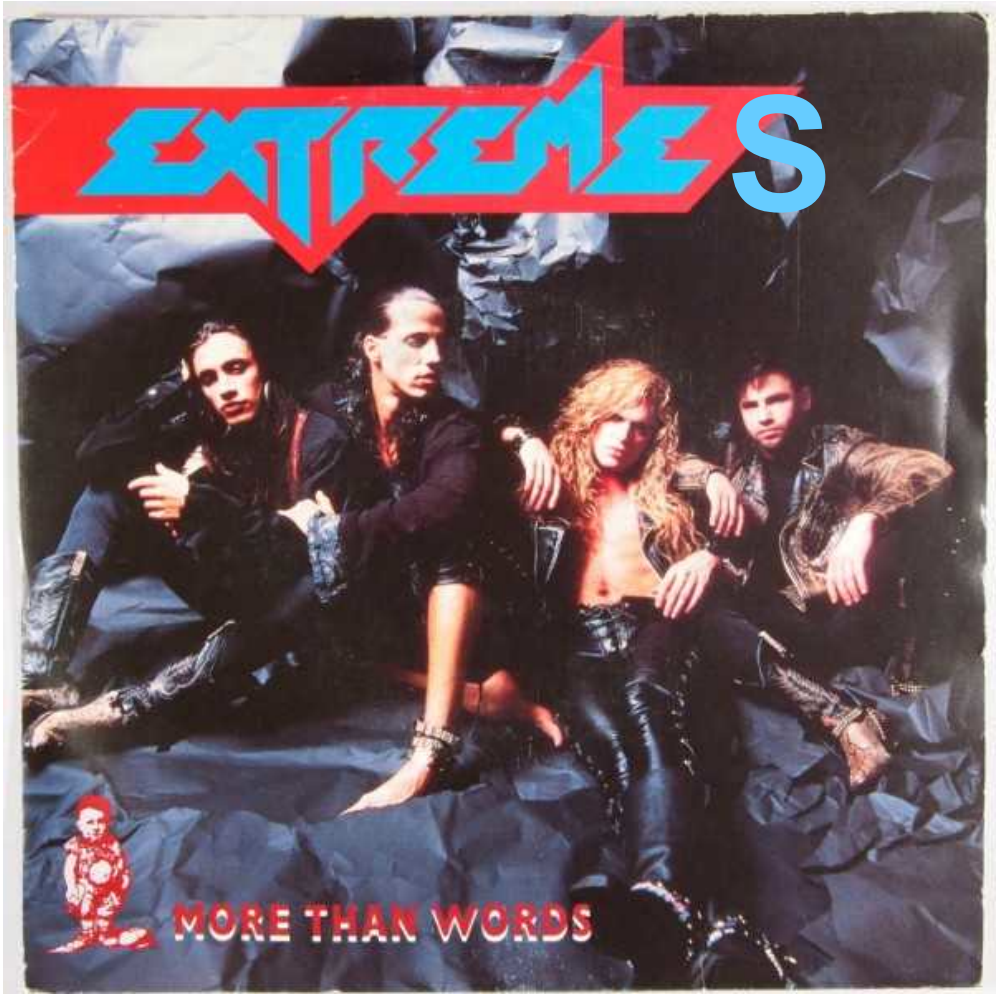
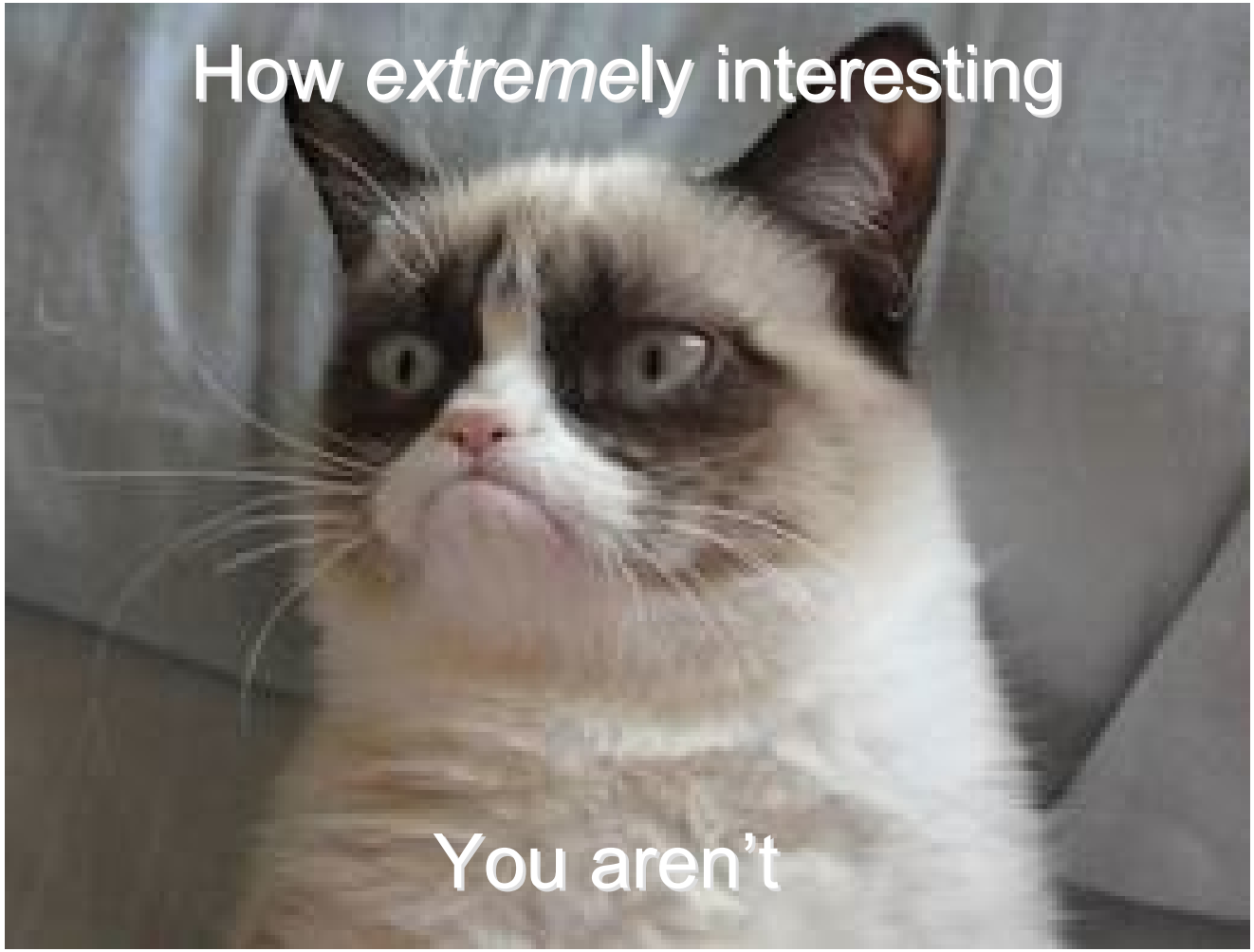
US CLIVAR 2013

WG Theme Song Recommendation From Baylor



Meme



Extremes Discussion

-Extremes (of all sorts) are a US CLIVAR Research Challenge

->section of Ch. 5 on extremes could use your editing!

-Working Group on short-term P,T extremes and large-scale meteorological patterns is wrapping up (workshop, two review papers)

-Points to Ponder

- Feedback to Working Group, especially next steps
- Panel's role in the Research Challenge
- Relationship to other efforts on extremes
- Relationship to National Assessment
- Interaction with other panels, maybe PPAI for identifying key indices and PCMDI for process study
- Considerable definitional / nomenclature issues (land of 10,000 indices, "weather extremes" vs "climate extremes")

From Draft Science Plan

Key questions are:

What are the important dynamical processes that underlie short-term precipitation and temperature extremes?

How do these short-term processes interact with the larger-scale, slower and potentially-predictable climate fluctuations linked to the ocean?

What are the timescales, metrics, statistics, and analysis tools that are most relevant for extremes, both to their dynamics and societal impacts?

What properties of extremes, if any, are changing under global warming?

‘Extremes’ WG: points for feedback

- Useful next steps, especially as relating to science plan, National Assessment
- Connecting with other communities doing similar or overlapping work
- Working towards a more developed language of extremes (dynamics and impact-based separation of timescales and identification of key metrics, etc. -- what types of extremes are most important to focus on first)

Albert Tank's List of Indices

http://etccdi.pacificclimate.org/docs/ETCCDMIndicesComparison1.pdf

Indices of Daily Temperature and Precipitation Extremes

Temperature indices:

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	**Index**	**Description**	**Formula**	**ClimDex**	**Frich**	**ECA**	**KT&K**	**Kiktev**	**STARDEX**	**Osborn**	**Bonsal**	**KleinT**		**Interpretation**
2	FD	Frost days	No. days TN < 0°C	●	●	●	●	●	●					Day count; fixed threshold
3	SU	Summer days	No. days TX > 25°C			●	●							Day count; fixed threshold
4	CFD	Consecutive FD	Greatest no. consec. days TN < 0°			●								Maximum span of days
5	CSU	Consecutive SU	Greatest no. consec. days TX > 25°			●								Maximum span of days
6	HD17	Heating degree days	Sum of 17°C-TG (days TG < 17°C)			●								Temperature sum
7	ID	Ice days	No. days TX < 0°C			●								Day count; fixed threshold
8	TR	Tropical nights	No. days TN > 20°C			●								Day count; fixed threshold
9	TN10p or Tmin10p, TX10p	Cold nights / days	No. days TN < 10ptile calculated for each calendar day (on basis of 1961-90) using running 5 day window	●		●	●		●					Day count; percentile threshold following smoothed annual cycle
10	TG10p	Cold days	See TN10p			●								See TN10p
11	TN90p	Warm nights	See TN10p	●	●	●	●	●						See TN10p
12	TX90p or Tmax90p	Warm days (or day-times)	See TN10p	●		●	●		●					See TN10p
13	TG90p	Warm days	See TN10p			●								See TN10p
14	HWDI	Heat wave duration index	No. days in intervals of at least 6 days with TX > 5°C+mean calculated for each calendar day (on basis of 1961-90) using running 5 day window	●	●	●	●		●					Count of days in runs of 6 or more days; smoothed annual cycle mean+5°C threshold
15	CWDI	Cold wave duration index	See HWDI, but TN < -5°C+mean			●	●							See HWDI
16	HWFI, CWFI	Warm / cold spell days	See HWDI, but TG > 90ptile instead of TX > 5°C+mean			●						●		Count of days in runs of 6 or more days; smoothed annual cycle percentile threshold
17	ETR	Extreme temperature range	Difference: max(TX)-min(TN)	●	●	●								Temperature difference
18	GSL	Growing season length	Count of days between first span of at least 6 days TG > 5°C and first span after 1 Jul/1Jan of 6 days TG < 5°C	●	●	●								Span of days; 6 day threshold 5°C

Joint CCI/CLIVAR/JCOMM Expert Team (ET)
on Climate Change Detection and Indices (ETCCDI)

http://etccdi.pacificclimate.org/index.shtml

ETCCDI/CRD Climate Change Indices
27 Core Indices

1. Number of Frost Days
2. Number of Summer Days
3. Number of Icing Days
4. Number of Tropical Nights
5. Growing Season Length
6. Monthly Maximum Value of Daily Maximum Temperature
7. Monthly Maximum Value of Daily Minimum Temperature
8. Monthly Minimum Value of Daily Maximum Temperature

…

26. Annual Total Precipitation When Rainrate > 99%
27. Annual Total Precipitation in Wet Days

‘Extremes’ WG: focus & purpose

Try to make focus narrow enough for progress:

- North American region
- Short term (approx. 1 to 5 days)
- Temperature (heat waves and cold air outbreaks) and Precipitation (emphasizing processes other than hurricanes, which has its own working group)
- Events associated with Large Scale Meteorological Patterns (LSMPs): synoptic to continental-scale circulations that are large enough to be well-captured by observations and models, and to have some prediction and down-scaling potential. These patterns are defined by the extreme events, rather than in terms of known modes (ENSO, MJO, NAO, etc.) though such modes may play a role

Main thrusts:

- Identifying the patterns, investigating the underlying dynamics, assessing their simulation in current models
- Identifying main gaps in understanding

‘Extremes’ WG: objectives

1. Synthesize knowledge on LSMP–extremes links (2 journal articles; 2013 workshop)
2. Identify key questions & knowledge gaps (2 journal articles; 2013 workshop)
3. Develop methodology/protocols using LSMPs in observation and model output analyses (2013 workshop; follow-up publication)
4. Help to develop community of extremes researchers

‘Extremes’ WG: activities

To date:

- Teleconferences
- Wiki & other web presence for information sharing
- 2 survey papers (P and T separate) begun (structure, preliminary section leaders)
- WG meeting at Fall AGU
- Workshop planning

Planned and in-progress:

- 2 survey papers (P extremes; T extremes)
- Workshop in summer 2013
- Post-workshop document
- Future work / CLIVAR science plan / extremes community
- Theme song and internet meme

'Extremes' WG: membership/expertise

Regular committee members

Richard Grotjahn – Co-Chair (UC Davis): dynamics, synoptics & modeling of T extremes and extreme frontal system precip.
Mathew Barlow – Co-Chair (UMASS Lowell): large-scale climate variability and change on local conditions; extreme precip.
Robert Black (Georgia Tech): LSCPs and extreme weather in Southeastern US
Joshua Xiouhua Fu (U. Hawaii): Tropical dynamics, modeling and prediction of monsoon, MJO, and extreme events
Alexander Gershunov (Scripps; UC San Diego): climate extreme events; teleconnections; extreme weather statistics
William Gutowski (Iowa St. Univ.) atmospheric dynamics in climate, dynamics of the hydrologic cycle and regional climate.
Rick Katz (NCAR): extreme statistical methods applied to meteorological data
Arun Kumar (CPC NCEP/NOAA): Seasonal climate variability; weather-climate connection; climate models diagnostics
Lai-Yung (Ruby) Leung (PNNL, Washington): Mesoscale modelling, regional climate model downscaling
Young-Kwon Lim (NASA GSFC) Climate variability and weather/climate extremes in observations, reanalysis, & model data.
Russ S. Schumaker (Colo. St. Univ.): organized precipitation systems producing extreme amounts of precipitation
Michael Wehner (LBL, California): extreme value statistics applied to observed and modeled precipitation and temperature

International Members

Tereza Cavazos (CICESE, Mexico) Extreme rainfall under climate change conditions. CLIVAR-VAMOS extremes WG member.
John Gyakum (McGill U., Canada) Synoptic analyses of atmospheric blocking; Heavy precipitation events

Contributing Members

Anthony Barnston (IRI Columbia U): seasonal forecasting
Michael Bosilovich (GMAO, NASA/GSFC): Reanalysis and data issues