

# CLIVAR-PAGES Working Group

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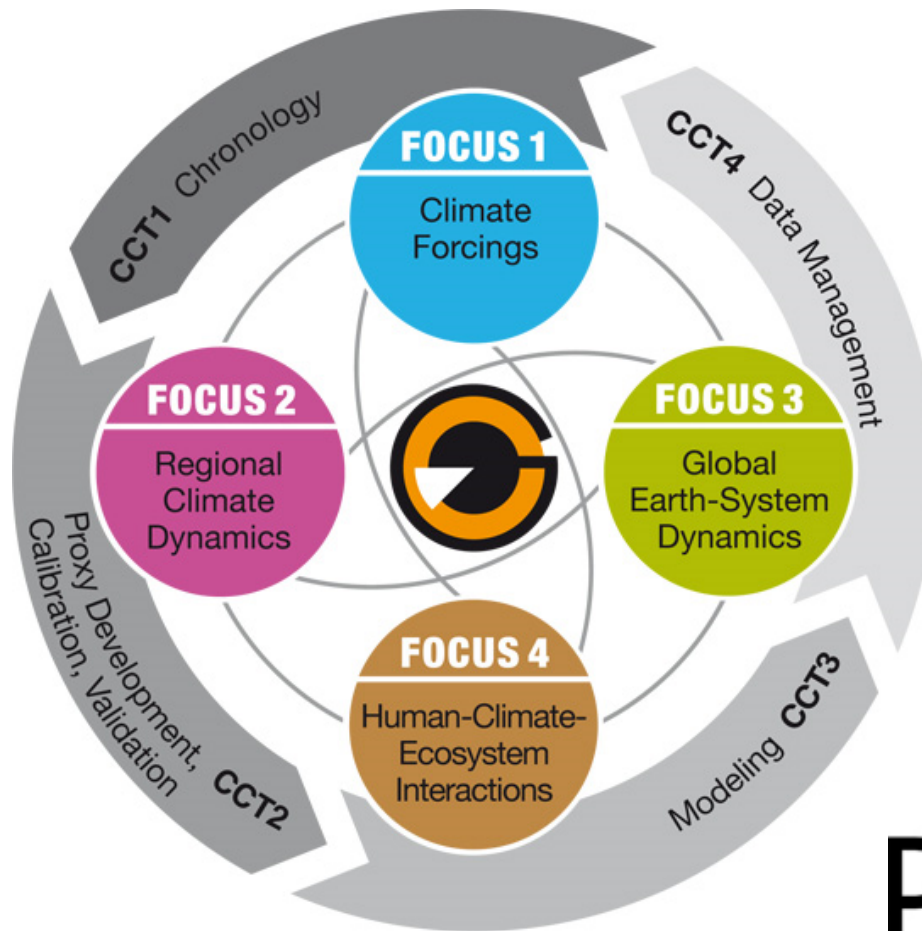
# Pre-instrumental climate variability

- a longer baseline than the short instrumental record
- a larger variety of « natural experiments » with external forcings
- relevance for the study of complex processes (e.g. ENSO, AMO...)
- relevance for the detection of changes (e.g. extreme events)
- relevance for climate predictability
  - . memory of the system
  - . intrinsic variability versus forced response
  - . impacts of external forcings (spec. solar, volcanic activity)

# This presentation

- Introduction to PAGES (Past Global Changes)
- Ocean 2K Initiative
- CMIP5/PMIP3 simulations
- Workshop
- Other Activities
- Key Science Questions
- JSC Grand Challenges
- Emerging science
- Future Activities

# PAGES – Past Global Changes



# PAGES Working Groups

## The 2k network

*Africa2k*

*Arctic2k*

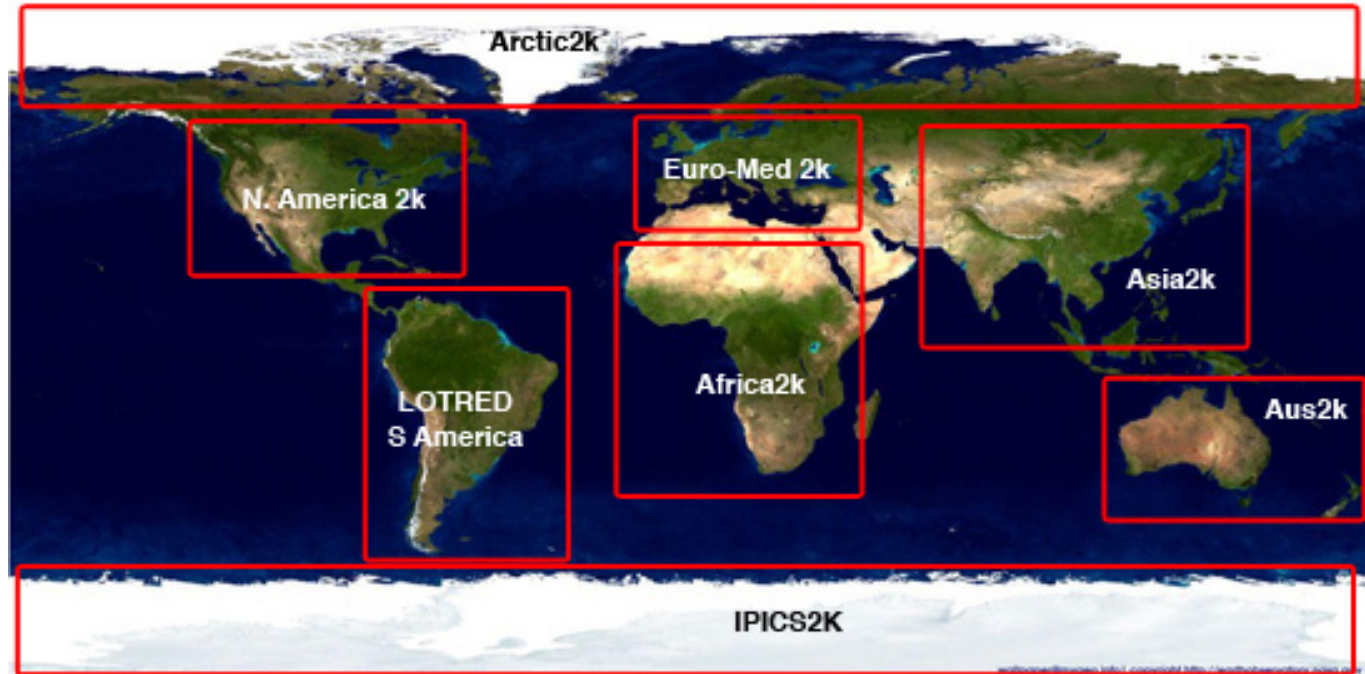
*Asia2k*

*Aus2k*

*Euro-Med2k*

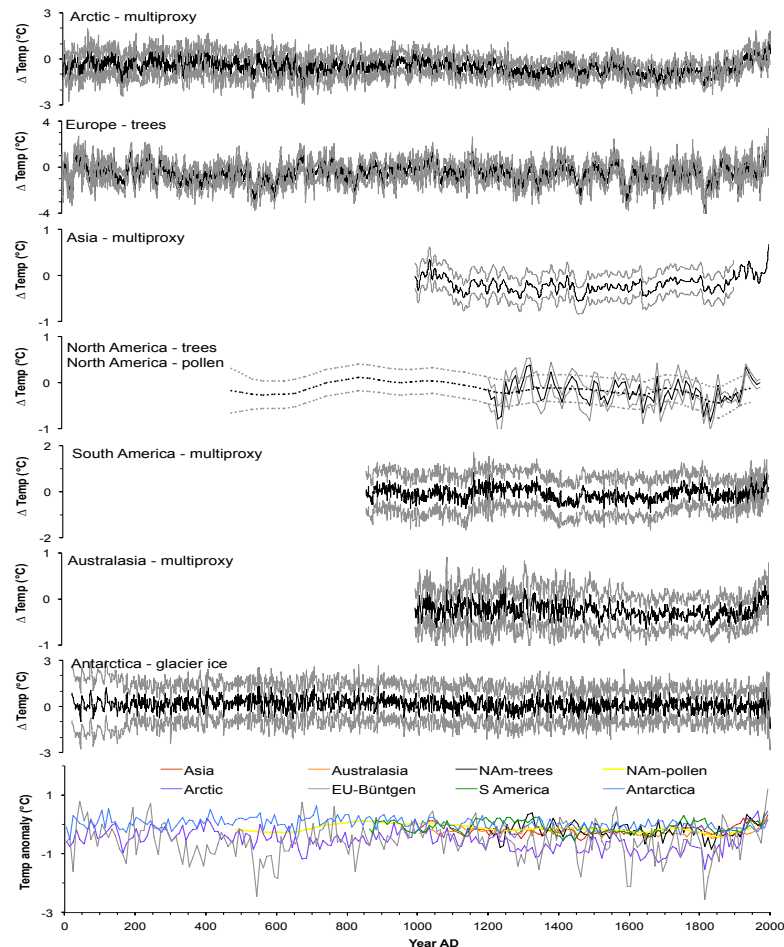
*LOTRED-SA*

*NAmerica2k*



# PAGES Working Groups

## The 2k network : work under progress



- Millennial trends

- Bipolar aspects  
(Arctic/Antarctic)  
at centennial scale

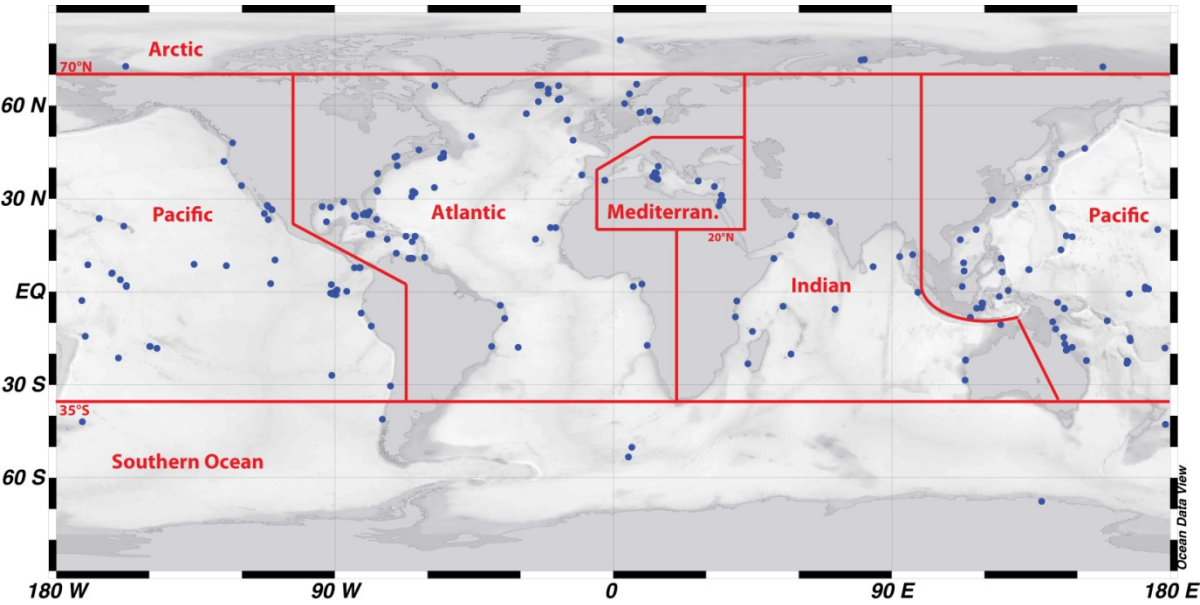
- Decadal aspects  
Cold decades/ volc. forcing

*(unpublished data, work under progress)*

# Ocean 2K Initiative

- Part of the PAGES 2k network
- To place observed historical marine conditions into the context of climatic variation over the past 2,000 years
- Two outputs planned, to be developed in time for IPCC's AR5 WG1 report & PAGES 2k synthesis:
  - Metadatabase of Ocean 2k-relevant paleodata and paleomodelling simulations
  - Preliminary synthesis of the principal common features in the underlying data and model output

# Ocean 2k

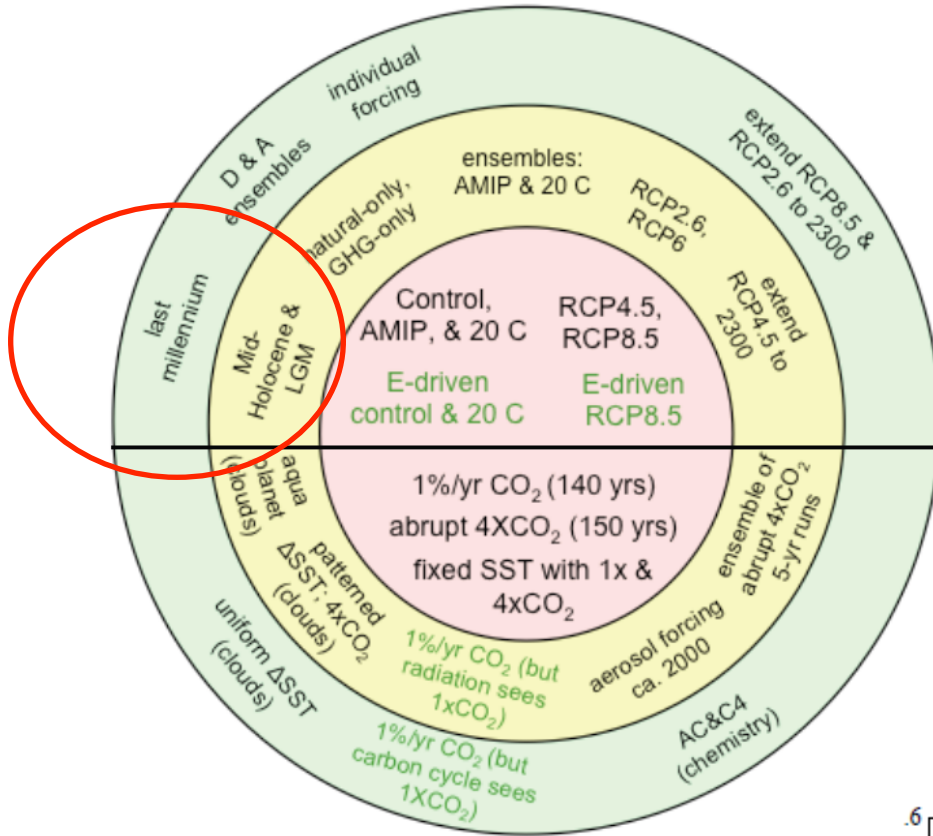


- Large areas
- Focus on SST
- Metadatabase online

[www.pages-igbp.org/workinggroups/ocean2k/metadatabase](http://www.pages-igbp.org/workinggroups/ocean2k/metadatabase)



# CMIP5 – PMIP3 experiments



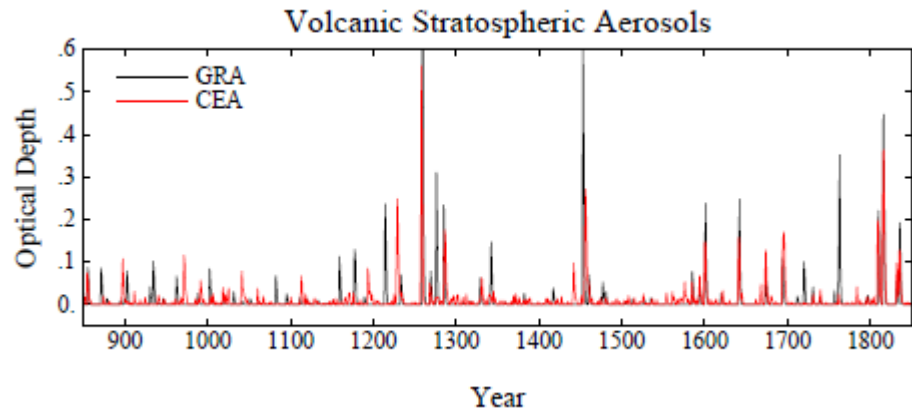
**Last millennium**

## PMIP3-CMIP5

- 0ka (pre industrial)
- 6ka (mid Holocene)
- 21 ka (Last Glacial Maximum)
- last millennium

## Other PMIP3 experiments

- 8.2 ka (water hosing)
- Last Interglacial
- Pliocene
- + extra transient simulations



# Planned PMIP3/CMIP5 work

List of PMIP3/CMIP5 participants  
Information as of May 4th 2012

Up to date info: <https://pmip3.lscce.ipsl.fr/wiki/doku.php/pmip3:database:status>

	Institute	Country	0k <i>piControl</i>	6k <i>midHolocene</i>	21k <i>lgm</i>	LM <i>past1000 (1000 years)</i>	1% CO <sub>2</sub> <i>1pctCO2 (140 years)</i>	CMIP5	PlioMIP	Last Interglacial	Holocene	Carbon cycle	Atm	Ocn	Model id	Term of Use	Data Node	Publish to
1	AWI	Germany	Completed	Completed	Completed			No	Yes	Yes	No	Yes	96x48 x L19	120x101 x L40	COSMOS-aso ?		DKRZ ?	ESG-WDCC ?
2	BCC	China	CMIP5 (500)	CMIP5 (100)		CMIP5	CMIP5			No	No	Yes	128x64 x L26	360x232 x L40	bcc-csm1-1	Unrestricted	BCC	ESG-PCMDI
3	BCCR	Norway	Running Summer 2012	Running Summer 2012	Running Summer 2012	Running Summer 2012	Start April 2012 May 2012	No	Yes	Yes	No	Yes	96x48 x L26	100x116 x L32	NorESM1-L	Unrestricted	DKRZ ?	ESG-WDCC ?
4	CAU-GEOMAR	Germany	Completed	Completed			Running	No	Yes	Yes		No	96x48 x L19	182x149 x L31	KCM1-2-2	Non-commercial only	DKRZ ?	ESG-WDCC ?
5	CNRM-CERFACS	France	CMIP5 (850)	CMIP5 (200)	Running April 2012		CMIP5			No	No	No	256x128 x L31	362x292 x L42	CNRM-CM5	Non-commercial only	CNRM	ESG-PCMDI
6	FUB	Germany	PMIP3 (400)		PMIP3 (800)			No		No	No	Yes	96x48 x L19	120x101 x L40	COSMOS-ASO	Unrestricted	IPSL (DKRZ later?)	ESG-BADC
7	NOAA-GFDL	USA	CMIP5 (470)		Start Spring 2012		CMIP5			No	No	Yes/No	144x90 x L24	360x200 x L50	GFDL-CM3	Unrestricted	GFDL	ESG-PCMDI
8	NASA-GISS	USA	CMIP5 (1183)	Completed	Completed	CMIP5			Yes		Yes	No	144x90 x L40	288x180 x L32	GISS-E2-R	Unrestricted	NCCS	ESG-PCMDI
9	IPSL	France	CMIP5 (1000)	CMIP5 (500)	CMIP5 (200)	Running April 2012	CMIP5		Yes			Yes	96x96 x L39	182x149 x L31	IPSL-CM5A-LR	Unrestricted	IPSL	ESG-BADC
10	KNMI or ICHEC ?	Netherlands	Completed	Completed			?	?	Yes	No	No	No	320x160 x L62	362x292 x L42	EC-Earth-2-2	Unrestricted	BADC or IPSL ?	ESG-BADC
11a	LASG-IAP LASG-CES	China	CMIP5 (900)	Completed	Completed		CMIP5						128x60 x L26	360x180 x L30	FGOALS-g2	Unrestricted	LASG	ESG-PCMDI
11b			CMIP5 (501)	Completed ?	Started ? End ?				Yes			No	x L26		FGOALS-s2	Unrestricted	LASG	ESG-PCMDI
11c			Completed		Completed								72x45 x L26		FGOALS-gl	Unrestricted	LASG	ESG-PCMDI
12	LOVECLIM	Belgium France Netherlands	Completed	Completed	Completed	Completed		No		Yes	Yes	No	32x64 x L3	122x65 x L20	LOVECLIM1-2	Unrestricted	IPSL	ESG-BADC
13	MIROC	Japan	CMIP5 (531)	CMIP5 (100)	CMIP5 (100)	CMIP5	CMIP5		Yes			Yes	128x64 x L80	256x192 x L44	MIROC-ESM	Non-commercial only	DIAS	ESG-PCMDI
14	MPI-M	Germany	CMIP5 (1156)	CMIP5 (100)	CMIP5 (100)	CMIP5	CMIP5					No	196x98 x L47	256x220 x L40	MPI-ESM-P	Unrestricted	DKRZ	ESG-WDCC
15	MRI	Japan	CMIP5 (500)	CMIP5 (100)	Running April 2012	Not started July 2012?	CMIP5		Yes	No	No	No	320x160 x L48	364x368 x L51	MRI-CGCM3	Non-commercial only	DIAS	ESG-PCMDI
16	NCAR	USA	CMIP5 (501)	CMIP5 (301)	CMIP5 (101)	CMIP5	CMIP5		Yes			No	288x192 x L26	320x384 x L60	CCSM4	Unrestricted	NCAR	ESG-NCAR
17	OSUvic	USA	Completed	Running May 2012	Running May 2012		Not started April 2012	No		No	No	No	128x64 x L10	100 x 100 x L19	OSUvic-0-3	Unrestricted	?	?
18	CSIRO-QCCCE	Australia	CMIP5 (500)	CMIP5			CMIP5					No	192x96 x L18	192x192 x L31	CSIRO-Mk3-6-0	Non-commercial only	NCI	ESG-NCI
19	UK Groups (UBRIS/LEEDS/EDINB URGH - Hadley)	UK	CMIP5 (497)	CMIP5 (-ES: 102 -CC: 35)	Not started Spring 2012	Running Summer 2012	CMIP5		Yes	Yes	Yes	Yes	192x145 x L38	380x216 x L40	HadGEM2-ES HadGEM2-CC	Unrestricted	BADC	ESG-BADC
20	UNSW	Australia	PMIP3 (1000)	PMIP3 (500)	Running June 2012	PMIP3	PMIP3	No	Yes	Yes	Yes	No	64x56 x L18	128x112 x L21	CSIRO-Mk3L-1-2	Non-commercial only	IPSL (NCI later?)	ESG-BADC
21	UoFT	Canada	Running June 2012		Running June 2012			No		No	No	No	256x128 x L26	320x388 x L40	UoFT-CCSM3	Unrestricted	?	?

Legend	Status expected completion date	Available in CMIP5 DB (nb years in CMIP5 DB)
	No	Available in PMIP3 DB (nb years in PMIP3 DB)
	Yes	

PMIP3 + PlioMIP groups: Note that the models used for PlioMIP are often not (exactly) the same as the ones used for PMIP3/CMIP5

PlioMIP-only (not in the table): LPAP, UoM

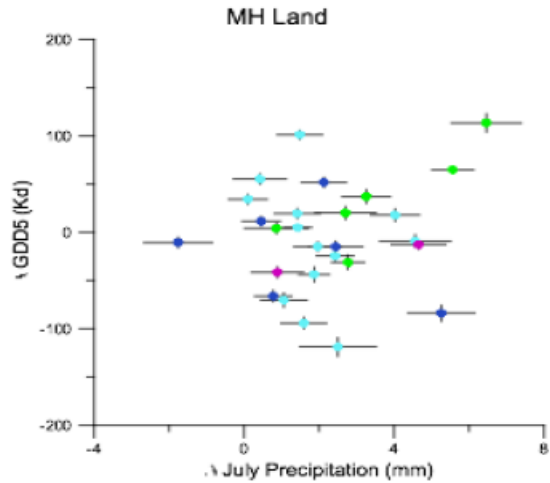
# CLIVAR-PAGES workshop

## Hawaii, 1-3 March, 2012

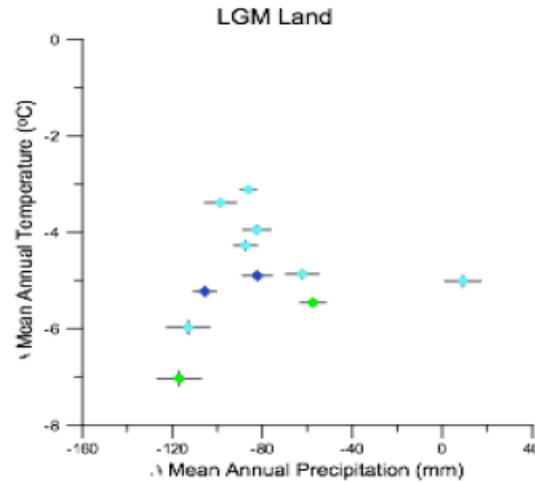
- How to use the CMIP5 paleo-climate simulations to better interpret the future simulations?
- Existing methodologies developed within PMIP (Braconnot et al, NCC, 2012)
- Preliminary results : models do match important aspects of the observed responses, for global mean climate changes, climate variability, and regional responses in temperature and precipitation.
- Challenges:
  - synthesis data sets with uncertainties
  - proxy modelling
  - quantifiably linking skill in paleo-simulations with structural variations in future projections.

# PMIP2 vs PMIP3 models : no major change of behaviour

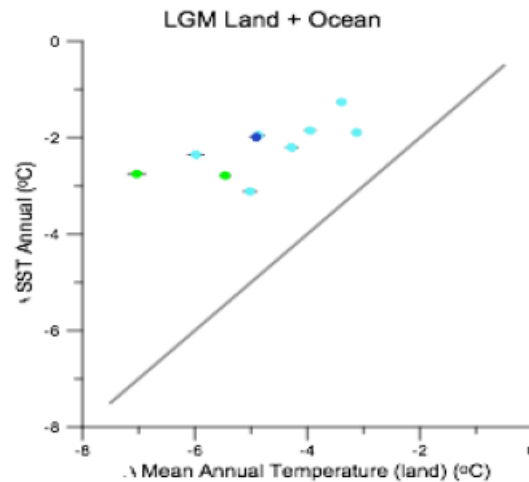
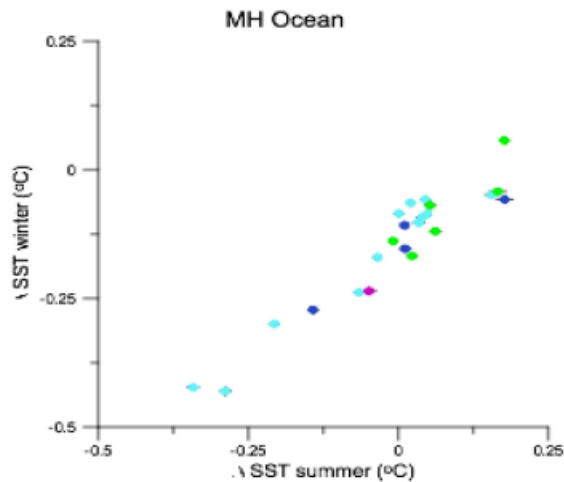
Mid Holocene (6 ka)



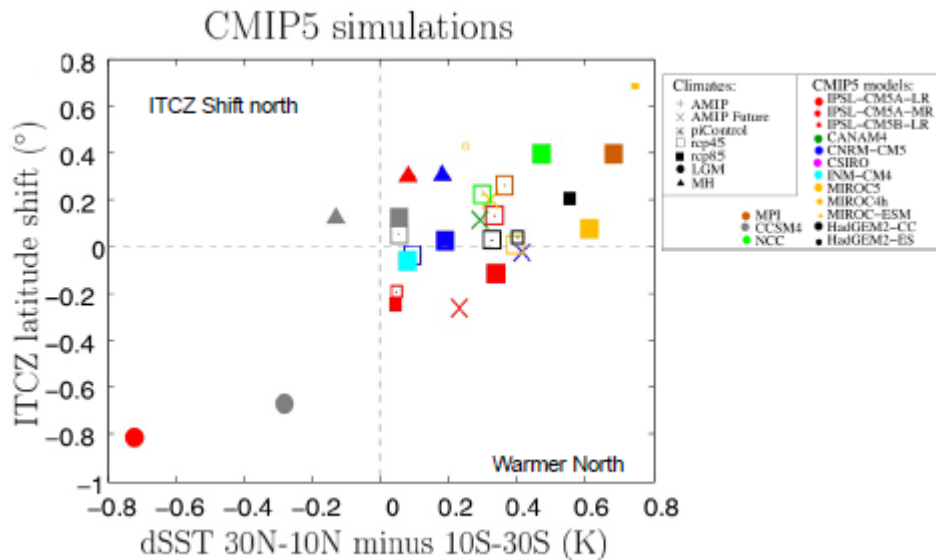
Last Glacial Maximum (21 ka)



PMIP2 (OAV)  
PMIP2 (OA)  
PMIP3 (OAC)  
PMIP3 (OA)



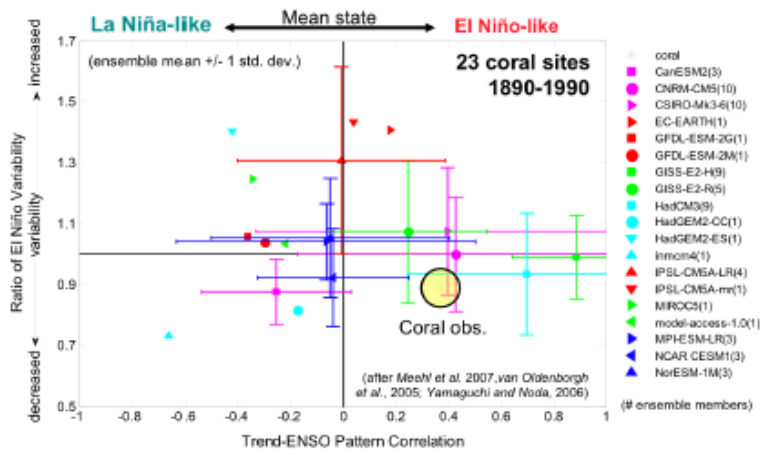
# Robustness of ITCZ shifts



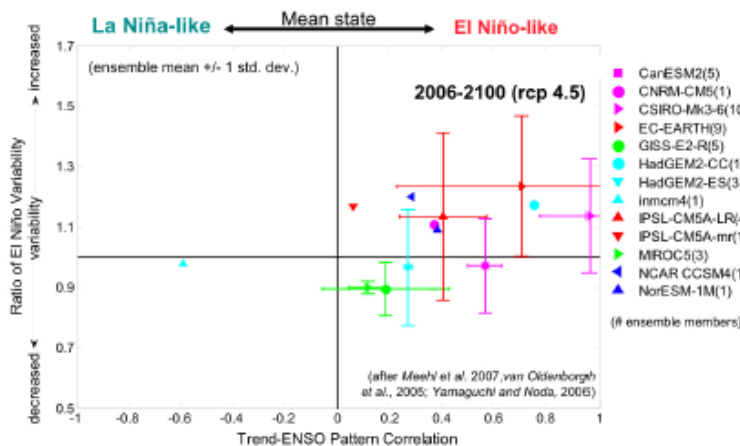
- Role of tropical SST gradients
- Robust across models and simulations (past and future)

# ENSO

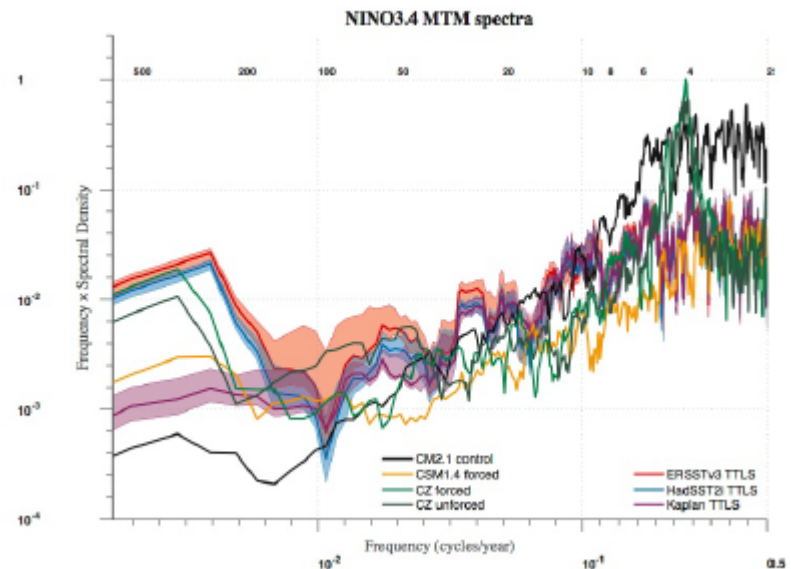
Trend in mean state and ENSO variance: corals vs CMIP5 pseudocorals (modeled from simulated historical SST&SSS)



Projections for mean state and ENSO variance: CMIP5 pseudocorals (modeled from rcp4.5 simulated SST&SSS)



- Coral proxy constraints :  
Trend in mean state vs ENSO variance  
CMIP5 pseudo-corals  
(modeled from SST and SST)



# Links with other CLIVAR panels

- WGCM
- Monsoon
- Atlantic
- ...

# Other Activities

- Panel meeting (24<sup>th</sup> Oct 2011)
- New listserve
- Co-chairs convened WCRP Open Science Conference poster session
- Rejuvenation of panel membership:

Joelle Gergis (AU)

Kevin Anchukaitis (US)

Hans Linderholm (Sweden)

Yi Wang (UK)

Ming Feng (AU)



# WCRP Grand Challenges

## *Provision of skillful future climate information on regional scales*

- Development of methodologies relating model skills for paleoclimates to projections.

## *Cryospheric response to climate change*

- Improving understanding of MOC variability.

## *Improved understanding of the interactions of clouds, aerosols, precipitation, and radiation and their contributions to climate sensitivity*

- Analysis of insights on climate sensibility based on past climate, based on model/data comparisons.

## *Past and future changes in water availability (with connections to water security and hydrological cycle)*

- Improving understanding of past changes in water cycles including droughts and floods.

## *Science underpinning the prediction and attribution of extreme events*

- Information from paleoclimate data and long (millennial) simulations on the recurrence of extreme events and relationships with external forcings.

# Future Activities

- CLIVAR-PAGES panel meeting in 2012-2013 (TBD)
- CLIVAR-PAGES workshop on the relationship between volcanic forcing and climate
- Revision of the vision document to be made mandate for new members
- Continued recruitment of new members, particularly with expertise spanning CLIVAR and PAGES
- Continuation of Ocean 2K initiative
- CLIVAR/PAGES paper to be submitted to peer reviewed journal