Paleoclimate Modeling Intercomparison Project

- Supported by WCRP/CLIVAR/WGCM and IGBP/PAGES
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- Objectives:
  - Understand mechanisms of past climate change
  - Evaluate roles of feedbacks from the different climate subsystems (atmosphere, ocean, land-surface, sea-ice …)
  - Evaluate the ability of climate models to simulate a climate different from that of today

- PMIP3 in CMIP5
  CMIP5: long term simulations
  Taylor et al. 2009

- Other periods
  - Warm climates, abrupt events, transients…
What has been done in 2010-2011

- Kyoto meeting in December 2010 (Hosted by Ayako Abe-Ouchi’s group)
  - PMIP3 status
  - Major objectives and organization around CMIP5 simulations, data syntheses and model-data comparisons
  - Other PMIP activities, warm periods (including PLIOMIP, abrupt changes, transient experiments, carbon cycle (PCMIP), proxy modeling (isotopes, biogeochemistry, other tracers in ocean)

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<td><strong>Talks</strong></td>
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Coordination of a suite of papers and newsletters

- PMIP boundary conditions
  - Schmidt et al., GMD 2010 + revision 2011: LM
  - Abe-Ouchi et al., GMD, in progress: LGM
- Meeting outputs:
  - PAGES: Schmittner et al. 2011: PMIP3 workshop
- CMIP5 CLIVAR Newsletter:
  - Braconnot et al. 2011: The Paleoclimate Modeling Intercomparison Project contribution to CMIP5
- PMIP2 synthesis and perspectives:
  - Braconnot et al., submitted: Systematic evaluation of models used for future climate projections using the paleorecord

CMIP5 simulations and database
Connection with sessions in different conferences
  - EGU (April 2011), INQUA (July 2011), WCRP-OSP (next week).
Workshops (planning and coordination)
BC for PMIP3/CMIP5

- **Mid-Holocene**
  - 6000 BP

- **Last Glacial Maximum**
  - 21000 BP
  - LGM Ice-sheet: Ensemble mean of 3 reconstructions from D. Peltier, L. Tarasov and K. Lambeck respectively

- **Last Millennium**
  - 800-1860-2000

CMIP5 BC
- Insolation
- Greenhouse gases
- Sensitivity: Remnant ice-sheet, vegetation

CMIP5 BC
- Ice-sheet, land/sea
- Greenhouse gases
- Sensitivity exp: River runoff, ice-sheet, vegetation

CMIP5 BC
- Solar irradiance
- 1600-2000

Volcanism
- 800-2000
## Status of PMIP3/CMIP5 simulations

### Group | Country | 6k | 6k | 21k | LM | CMIP5 / Model | Atm | Ocn
---|---|---|---|---|---|---|---|---
BCC | China | Completed | Completed | Not started | End 2011? | BCC-CSM1.1 | 128x64 x L28 | 360x232 x L40
BCCR | Norway | Running Spring 2011 | Start Sum 2011 | Fall 2011 | December 2011 | Start Sep 2011 | Spring 2012 | KOM 1.2.2 | 96x48 x L19 | 182x149 x L31
CAU | IFM-GEOMAR | Germany | Completed | Completed | Not started? | October 2011 | CNRM-CM5 | 256x128 x L31 | 362x292 x L42
Free Univ. Berlin | Germany | Running August 2011? | Running September | | | | | COSMOS-eso | 96x48xL19 | OR30xL40
GFDL | USA | Completed | Completed | Start end 2011 | Mid 2012 | 144x90 x L24 | 360x200 x L50
GISS | USA | Completed | Running September | Running July 2011? | Running July 2011 | 144x90 x L40 | 288x180 x L32
IPSL | France | Completed | Completed | Running August 2011 | Start end July 2011 | IPSLCM5a | 96x95 x L39 | 182x149 x L31
KNMI | Netherlands | Completed | Completed | | | EC-Earth | 320x160 x L62 | 362x292 x L42
LASG/IAP | China | Completed | Not started | October 2011 | Not started | October 2011 | 128x60 x L26 | FGOALS_g2.0 | 360x180 x L30
LOVECLIM | Belgium | Completed | Completed | Not started | September 2011 | Completed | LOVECLIM | 32x64 x L3 | 122x65 x L20
MIROC | Japan | Completed | Completed | Running August 2011 | | | | | | |
MPI | Germany | Completed | Completed | Start in July 2011 | Start in July 2011 | ECHAM6/MPRIOM | 196x96 x L47 | 256x220 x L40
MRI | Japan | Completed | Completed | Running Dec 2011? | Not started | July 2012? | MRI | 320x160 x L48 | 364x368 x L51
NCAR | USA | Completed | Completed | Completed | Completed | CCSM4 | 288x192 x L26 | 320x384 x L60
OSUv6 | USA | Completed | Not started | Running November 2011 | Not started | | | | | |
QCCCE/CSIRO | Australia | Completed | Completed | | | CSIRO T63 MK3.6 | 192x96 x L16 | 152x192 x L31
UK Groups (UBRIS/LEEDS/EDIN/URGH - Hadley) | UK | Completed | Completed | Not started | Fall 2011 | Completed | HadCM3 | HadGEM2-ES | 192x145 x L38 | 360x216 x L40
UNSW-CSIRO | Australia | Completed | Completed | Not started | September 2011 | Completed | CSIRO Mk3L 1.2 | 84x56 x L18 | 128x112 x L21

**July 2011**
Rqs: would be better to have all LM MH and LGM simulations through CMIP5. PMIP3 imposes PI and 1xCO2.
PMIP3 MH precipitation (subsample)

Dataset: Bartlein et al. 2010

Updated data synthesis for model/data, including an estimate of uncertainties

From Otto-Bliesner, INQUA 2011
LGM annual T (subsample)

Data syntheses (with uncertainties)
Land (Bartlein et al. 2010)
Ocean (MARGO 2009)
Other datasets available (for ESM)

- Vegetation BIOME 6000
- Charcoal influx Z-score
- Lake status
- Dust flux

### Pre-PMIP3 millennium comparisons

**Comparison of GCM simulations and reconstructions for the last 2k/millennium**

**AOGCMs & forcing**

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<td>ECHO-G</td>
<td>(2) 1000-yr, (1) 8000-yr</td>
<td>SVG</td>
<td>González-Rouco et al. (2006)</td>
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<tr>
<td>CSM1.4</td>
<td>(1) 1000-yr</td>
<td>SVGA</td>
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<td>CCSM3</td>
<td>(1) 1000-yr, (3) 500-yr</td>
<td>SVG</td>
<td>Hofer et al. (2010)</td>
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<tr>
<td>MPI-ESM</td>
<td>(5) E1 1200-yr, (3) E2 1200-yr</td>
<td>SVGALO</td>
<td>Jungclaus et al. (2010)</td>
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<td>CNRM</td>
<td>(1) 1000-yr</td>
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<td>IPSL</td>
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<td>SGAO</td>
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<td>HadCM</td>
<td>(1) 500-yr</td>
<td>SVGALO</td>
<td>Tett et al. (2007)</td>
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**Courtesy: J. F. Gonzales Roucou**
MCA-LIA transition 1000-1250 / 1500-1850

Courtesy: J. F. Gonzales Roucou (see also PAGES newsletter)
T response & Forcing: MCA-LIA

MCA (1000 - 1250 AD) - LIA (1500 - 1850 AD)

Reconstructions
- IPSL
- CNRM
- MPI-ESM-E2
- MPI-ESM-E1
- CSM1.4
- CCSM3
- ECHO-G

Ammann_07
Mann_03
Crowley_00
Jones_98
Mann_08
Moberg_05

ΔT
-0.1
0
0.1
0.2
0.3
0.4
0.5
0.6

ΔF
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35

Courtesy: J. F. Gonzales Roucou
Workshop on climate variability

Objectives: to produce a “synthetic” high profile paper on short-term (interannual to decadal) tropical variability

- High resolution proxy data (corals, shells, giant bivalves, tree rings, speleothems, tropical ice cores)
- PMIP simulations, proxy modeling

Meeting outputs

- Synthesis paper for LM and MH (draft ready by March 2012)
- PAGES or PAGES/CLIVAR? special issue on past ENSO (P. Braconnot as guest editor)
- PMIP working group on short term climate variability (< 100 yrs)
PlioMIP Modelling Groups

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<td>Hadley - UK</td>
<td>Alan Haywood, Dan Lunt, Paul Valdes</td>
<td>HadAM3</td>
<td>HadCM3</td>
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<td>University of New South Wales</td>
<td>Geere G Higgs</td>
<td>CSIRO Mk3L Version 1.2</td>
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<td>NCAR</td>
<td>Bette Otto-Bliesner, Nan Rosenbloom</td>
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<td>University of Massachusetts, Amherst</td>
<td>Roli DeConto, Sebastian Kaeng</td>
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<td>Genesis V. 3.0</td>
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<td>Laboratory de Physique Atmosphérique et</td>
<td>Alexandre Heriot</td>
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<td>Planet Simulator version Most 15</td>
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<td>GISS</td>
<td>Mark Chandler</td>
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<td>Bjerknes/Bergen</td>
<td>Kerim H. Nisancioglu</td>
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<td>NorESM</td>
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<td>IAP/CAS</td>
<td>Zheng Weiping, Zhang Zhonghui, Greg Tang</td>
<td>CAM3</td>
<td>FGOLAS-g2.0, FOAM1.5</td>
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<td>Koninklijk Nederlands</td>
<td>Nanne Weber, Erik Tuenter</td>
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<td>Meteorologisch Instituut</td>
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<tr>
<td>Center for Climate System Research,</td>
<td>Ayako Abe-Ouchi, Wing-Le-Chai, Ryoko Osuka</td>
<td>MIROC 3.2 GCM</td>
<td>MIROC 3.2 GCM</td>
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<td>University of Tokyo</td>
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<td>Laboratoire des Sciences du Climat et de</td>
<td>Camille Contoux, Anne Josi, Gilles Ramstein</td>
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<tr>
<td>University of Tsukuba</td>
<td>Yuichi Kamei, Hironori Udaka</td>
<td>MRI-CGCM 2.3</td>
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Planned meetings

- PCMIP: carbon cycle LM and LGM (S. Harrison, Blue Mountains, Australia November 21st-25th 2011)

- Benchmarking (February, to be defined)

- Present/past/future (Hawaii, March 2012), PAGES/CLIVAR (G. Schmidt, V. Masson-Delmotte)

- PMIP3 ocean with MARGO group: 19-25 March (Bremen? M. Kucera)
Next PMIP conference

- **PMIP 3 Workshop**
  Crewe, UK
  May 6th to 11th 2012

**Local organizers**
- Alan Haywood (University of Leeds)
- Jeni Milsom (University of Bristol)

**Objectives**
- Review PMIP activity, new results
- Finalisation of common publications