CMIP5 Simulation Plans

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Program for Climate Model Diagnosis and Intercomparison

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CMIP5: Three Suites of Experiments

“Near-Term” (decadal prediction)

- TIER 1
  - CORE (initialized ocean state)
  - hindcasts & forecasts

“Long-Term” (century & longer)

- TIER 1
  - CORE diagnosis
  - evaluation & projection
- TIER 2
  - AMIP
  - “time-slice”

Atmosphere-Only
(for computationally demanding and NWP models)
CMIP5 Decadal Prediction Experiments

- Additional predictions
  - Initialized in ‘01, ‘02, ‘03 … ‘09 (8)
- Prediction with 2010 Pinatubo-like eruption (10)
- Hindcasts without volcanoes (5)
- AMIP (5)
- 10-year hindcast & prediction ensembles:
  - Initialized 1960, 1965, …, 2005 (10)
- 30-year hindcast and prediction ensembles:
  - Initialized 1960, 1980 & 2005 (10)
- Increase ensemble sizes from O(3) to O(10) members (8)
- Tier 1: ≥1700 yrs
- Alternative initialization strategies (3)
- 100-yr “control” & 1% CO₂ (7)
- Core: 480 yrs

Additional notes:
- Prediction with 2010 Pinatubo-like eruption (10)
- Hindcasts without volcanoes (5)
- AMIP (5)
CMIP5 Long-term Experiments

All simulations are forced by prescribed concentrations except those “E-driven” (i.e., emission-driven).

Control, AMIP, & 20 C (8)
RCP4.5, RCP8.5 (15)

E-driven control & 20 C (11)
E-driven RCP8.5 (11)

1%/yr CO₂ (140 yrs) (15)
abrupt 4XCO₂ (150 yrs) (14)
fixed SST with 1x & 4xCO₂ (12)

Core: ≥1718 yrs
Tier 1: ≥1727 yrs
Tier 2: ≥2038 yrs

Coupled carbon-cycle climate models only

IDAG
23 January ’09
# CMIP5 Summary of Years Requested (Long-Term Only)

## Experiment

<table>
<thead>
<tr>
<th>Experiment</th>
<th>AOGCMs and Coupled Carbon/Climate Models</th>
<th>Coupled Carbon/Climate Models Only</th>
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<tbody>
<tr>
<td></td>
<td>Core</td>
<td>Tier 1</td>
</tr>
<tr>
<td>Model evaluation (control, historical &amp; AMIP)</td>
<td>686</td>
<td>≥372</td>
</tr>
<tr>
<td>Future projections (prescribed concentration)</td>
<td>190</td>
<td>390</td>
</tr>
<tr>
<td>Future projections (Emissions-driven)</td>
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<tr>
<td>Understanding differences in projections (diagnostic runs)</td>
<td>350</td>
<td>160</td>
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<tr>
<td>Paleoclimate</td>
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<tr>
<td>Detection &amp; attribution</td>
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<td>312</td>
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<tr>
<td><strong>Totals:</strong></td>
<td>1226</td>
<td>≥1434</td>
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</table>

**CMIP3:** Avg. years simulated = 2800 (500-8400, med=2200)
CMIP5 Atmosphere-Only Experiments
(targeted for computationally demanding and NWP models)

AMIP (1979-2008) (10)
Future “time-slice” (2026-2035) (10)

AMIP ensemble (7)
Future “time-slice” ensemble (7)

AMIP SSTs with 4xCO$_2$ (4)

patterned ΔSST (clouds) (5)
uniform ΔSST (clouds) (3)

aqua planet (clouds) (3)

Core: 40 yrs
Tier 1: ≥185 yrs
Tier 2: 30 yrs
Summary of CMIP5 participation

- 12 modeling groups responded to request
- 24 different models registered (+17 QUMP)
- At least 5 other modeling groups expected to participate (Canada, Germany, Italy, Korea, USA)

<table>
<thead>
<tr>
<th>Experiment Suite</th>
<th>Likely # of models</th>
<th>Total simulated years expected</th>
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<tr>
<td>&quot;Decadal&quot; prediction</td>
<td>10</td>
<td>14053</td>
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<tr>
<td>Longer term</td>
<td>16</td>
<td>76147</td>
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<tr>
<td>Atmosphere-only</td>
<td>10</td>
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### CMIP5 Model Resolution (mean over models)

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<th>long-term</th>
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<td><strong>atmosphere</strong></td>
<td></td>
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<tr>
<td>horiz. (deg)</td>
<td>1.76</td>
<td>1.97</td>
<td>0.59</td>
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<td>levels</td>
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<td>34</td>
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<td><strong>ocean</strong></td>
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<tr>
<td>horiz. (deg)</td>
<td>0.93</td>
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<tr>
<td>levels</td>
<td>38</td>
<td>39</td>
<td>NA</td>
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Anticipated AR5 WG1 Meetings (AR4 time line plus 6 years)

- Scoping meetings
  - Spring/fall 2009?
- 1st Lead Authors meeting - Sept 2010
- 2nd Lead Authors meeting - May 2011
- 3rd Lead Authors meeting - Nov 2011
- 4th Lead Authors meeting - Jun 2012
- Plenary - Jan/Feb 2013
- NOTE: WGII and WGIII plenaries in 2014
Estimated deadlines for WG1 contributions

- Papers accepted - May 2011
  - 2nd Lead Authors meeting
- Data available to public - Dec 2010
  - Between 1 and 2 LA meetings
- Runs done Summer 2010
  - Analysis will begin
  - No firm sunset date for data to be made public
- Several groups plan to begin simulations now.
Forcing specifications

• Integrated Assessment Model Consortium will provide
  ➔ Concentrations
  ➔ Emissions
  ➔ Time-evolving land-use change

• Atmospheric Chemistry and Climate (AC&C) will convert this to global grids.

• Schedule:
  ➔ Pre-industrial values by end 12/08
  ➔ Historical values through 2005 by 3/09
  ➔ Future scenarios by 7/09

• Solar and volcanic??
Model Output

• Don’t panic (but I am)!

• Output list should be available soon

• New:
  → Carbon cycle
  → Satellite simulator output (ISCCP, Calipso, ?)
  → High frequency (daily) precip., temperature & ??? for full historical and projection simulations.