DWR
CCTAG
Scenarios Subgroup Meeting

January 17, 2013
MEETING GOALS and OBJECTIVES:
Recap past progress and full CCTAG meeting
  Schwarz
Discussion inclusion of other metrics
  Lynn
CCTAG Scenario recommendations documentation/wrap-up (for end 2014)
  Lynn
Discussion of potential study/comparison culled multi-model mean vs. full ensemble multi-model mean
  Schwarz
Other Topics (Time permitting)
  Adding extreme/stress test scenarios
  Downscaling
  Flood analysis
Objective: Select a manageable suite of climate change scenarios for water management purposes in California.

Step 1. Filter latest suite of GCMs* for those that do not produce reasonable climatologies and distributions of anomalies for temperature and precipitation along the West Coast/California. 

This will probably be done using the methodology proposed by Rupp et al. (OCCRI) currently in draft. Needs to be reviewed by CCTAG/DWR.

Remaining GCMs

Culled GCMs (not used/discarded)

Step 2. Further refine suite of GCMs by culling those that exhibit poor performance for Temperature, Precipitation, and Humidity for California. (No downscaling)

A) Develop comparison methodology
B) Establish criteria and criteria weighting for measuring performance of each GCM
C) Perform GCM Comparisons

Parallel Processes

Initiate study to evaluate GCM performance using a decision support tool to compare observed historical and simulated historical periods for use in future scenario evaluation activities

Initiate separate/parallel process for devising scenarios and analysis methodologies for flood protection activities

Step 3. Compile a suite of preferred GCMs for Water Management Analysis

Step 4. Evaluate downscaling methodologies and formulate recommendations (Process/methodology for doing this as yet to be determined.)

Step 5. Develop recommendations for compressing or reducing the number of individual GCM runs for specific applications

Eg. Step 3 suite of GCMs includes 15 GCMs. However agency X doesn’t have the resources to run 15 GCMs x 3 emissions scenarios. For their purpose, evaluating the likely range of potential futures and median impact are most useful. How can they compress the 15x3 runs down to 3-5 or even 1?

* Coupled Model Intercomparison Project Phase 5 (CMIP5)
For many purposes, an ensemble of global models is required. Using all 40+ available Global Climate Models (GCMs) isn’t practical. Remove (cull) GCMs that don’t adequately represent historical conditions.

**Global Climatology Assessment**
Gleckler et al. IPCC 5th Assessment Report evaluated modeled historical
- Radiation
- Temperature
- Pressure, wind

**Regional Assessment**
Rupp, Mote et al. Southwestern U.S.
- Temperature & Precipitation
- Pressure patterns, El Niño structure

**CA/NV Extremes Assessment**
Cayan et al. CNAP, SW CSC Group
- Dry and Wet Precipitation extremes
- Heat waves and cold snaps
- El Niño spatial & temporal patterns

Numbers of GCMs to be retained after Global, Regional Mean and Regional Extremes Assessments are a preliminary estimate.

A subset of GCMs for California Water Resources Assessment

~40+ GCMs
~20 GCMs
~15 GCMs
~11 GCMs
Metrics at global scale
P. Gleckler (PCMDI, LLNL) evaluation of GCMs at global scales
Gleckler is member of international team conducting GCM evaluation
Metrics at Regional Scale for Southwest U.S.
David Rupp, Phil Mote, OSU Southwest U.S. evaluation

*metrics are scalar measures comparing GCM historical to observed historical climatology.*

“*it remains largely unknown what aspects of observed climate must be correctly simulated in order to make reliable predictions of climate change.*” Glecklet et al 2008

Further diagnostics to Evaluate GCM at California/Nevada scale based upon prior CCTAG discussions, examples shown here
California Water Resource Evaluation

Metrics

- Correlation between El Nino 3.4 temperatures and water year precipitation
- **Multi-year dry spell statistics** [what is definition of dry year?]
  - Number of consecutive dry years per 10 year period
  - Number of dry years per 10 year period
  - Median water year precipitation
  - Average water year precipitation
  - 25th percentile water year precipitation
- 3 day precipitation/annual total
  - Max
  - Median
  - Standard Deviation

- All models also tested for temporal and spatial fidelity of seasonal temperature and precipitation patterns
Cull the 15 CMIP5 GCMs to 11 GCMs

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California Water Resources Evaluation Metrics

Additional Metrics to consider:

• Spectral analysis, cyclic patterns of California precipitation.

• Others?

Adoption of final set of metrics and set of plan for completion of analysis and documentation
CCTAG Scenarios Recommendations

Subgroup Tasks

CCTAG Term ends December 2014

“Detailed recommendations on a suite of climate scenarios appropriate for DWR’s planning activities” –March 2012 Scope letter
Potential Study:

Comparison of MMM of Culled ensemble vs. MMM full ensemble

• Validate work done to cull the larger ensemble
• Determine whether use of full ensemble or culled ensemble should be recommended when either would be feasible
Other Topics

Downscaling
Extreme/Stress test scenarios
Flood analysis
THANK YOU!