CARPE DIEM WEST
ACADEMY

CASE STUDY – SEATTLE, WA

CMIP5: What's New and How to Integrate it Into Your Planning Process

Many western water managers have been using the CMIP3 downscaled climate projections to plan for the effects of climate change on their water systems. Now that the CMIP5 projections have been released, water managers are wondering what this means for those who have invested considerable time and resources into using past projections. Do they need to start over? Can they integrate the new information into planning they've already done? Can they stand by their vulnerability assessments which used CMIP3 projections?

We explored these questions and more in our October 2013 webinar "CMIP5 Updated Climate Models: Implications for Western Water Management." Imtiaz Rangwala of CIRES/Western Water Assessment gave his take on the new CMIP5 climate projections while Paul Fleming of Seattle Public Utilities shared the utility's plans for incorporating the new data into their climate adaptation decisions.

CMIP5 Updated Climate Models: What's New?

The recently-released CMIP5 projections have new emissions scenarios and many more model simulations than the previous iteration of downscaled data. The models have improved how they represent some physical processes, such as the ocean circulation. Results have been archived for more climate variables, at daily time steps, and at higher spatial resolutions. However, while the CMIP5 projections have more complexity that allows us to examine regional conditions more clearly, the model results do not necessarily have more credibility when downscaled for the West or at smaller regional scales. Mountains and their effects are still not represented sufficiently, so major uncertainties still exist for regions throughout the West. For example, summer precipitation, especially monsoon precipitation, is still uncertain.

The new emissions scenarios have different names, but are comparable to those from the CMIP3. However, the "core" scenarios, which receive the most attention in impacts studies, are different. While the global spatial patterns of change are very similar, their intensities are greater for the higher emissions in the CMIP5 projections. These differences emerge in data at the regional scale. For CMIP5, there are greater tendencies for wet conditions, while there were greater tendencies for dry conditions

under CMIP3. The spread in the model simulations is still large, and the specific method of downscaling may be making the results wetter than they should be, especially for the upper Colorado River Basin. With regard to extremes, the big advance isn't the content of the results, but simply access to the results. The more extensive archiving of CMIP5 results allows looking at daily precipitation extremes.

Implication for Western Water Managers: The Seattle Case Study

Seattle Public Utilities (SPU) climate adaptation planning focuses on water supply, urban drainage, and sea level rise. Their climate program objectives include engaging with the latest science, assessing impacts and vulnerabilities, establishing collaborative partnerships, strengthening the capacity of their institutions and people to adapt, mainstreaming adaptation into their decision making processes, and developing portfolios of adaptation.

As part of their adaptation planning, SPU has used CMIP3 projections downscaled to the watershed level to examine the impacts of climate change on their water supply. SPU then augmented their downscaling-based studies with "bottom up" analysis of the idiosyncratic aspects of their specific systems. These analyses include predictions about the sensitivity of their system's assets over the life cycle of each asset. Now that the CMIP5 projections are out, SPU isn't planning on starting their adaptation studies from scratch. Rather, their earlier efforts are allowing them to do more analysis in-house with the CMIP5 results.

CMIP5: The Bottom Line

As we learned in the Academy's first webinar session, climate adaptation is an iterative process. The reality of climate uncertainty means that preparation must be ongoing. That's why the Academy's Iterative Risk Management Roadmap is cyclical and emphasizes moving beyond the "analysis paralysis" of starting over with the release of new projections. Western communities can stand by vulnerability assessments and adaptation planning based on CMIP3 projections and add to that information with the new emissions scenarios and projections from CMIP5.

However, we remind you to beware of the hypnotic potential of projections! Don't get trapped by the false level of precision - the availability of more variables doesn't necessarily equate to more credibility. Use CMIP5 and other downscaled projections to test how your system can perform under different plausible futures, and then be sure to exit the analysis loop! Climate adaptation will only happen when we move on to making and implementing decisions.

Tools

Data Tools:

CMIP5 GCM data. Data from GCM runs for IPCC AR5. Earth System Grid gateway hosted by the Program for Climate Model Diagnosis and Intercomparison (PCMDI). Note that CMIP5 (Climate Model Intercomparison Project) is next generation after CMIP3.
http://cmip-pcmdi.llnl.gov/cmip5/

Downscaled CMIP3 and CMIP5 Climate & Hydrology Projections. This data tool was developed by a team of government agencies and universities and contains statistically downscaled data at a 1/8 degree spatial resolution. It was derived from climate projections referenced in IPCC AR4. Data includes temperature, precipitation and hydrologic conditions. Check out the tutorial tab on their site for a demonstration on custom data retrieval methods.
http://gdo-dcp.ucllnl.org/downscaled_cmip_projections/dcpInterface.html