

Group II

Discussion Report

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Droughts

- Surface Water Availability and Supply Indicators are the key indices of drought
 - not comprehensive enough
 - Need for better index and monitoring
- Disproportionate focus on 'supply' side of drought but not enough on the 'demand'
 - Specifically, the changes in ET demand are poorly understood
- Drought indices should
 - Reflect the status of the water budget
 - Consider how it influences responses
 - Be dependent on the target audiences
- Drought monitor (NIDAS) is very useful - as it tries to reflect all of these
 - can be a good framework for monitoring to enhance
- Droughts have a high degree of spatial and temporal variability in occurrence - this clearly needs better monitoring
 - Need to use remote sensing data and integrate it with meteorological observations
- Strong push to obtain Paleo-climate data for drought monitoring
 - Provides a robust baseline
 - Provides null hypothesis to test and place climate change projections
 - e.g., Colorado River basin
 - **'ounce of data worth more than a pound of forecast'** - Kelly
 - Effective tool for action

- Drought is a combination of meteorology and management
 - Attribution needs to separate these two
 - E.g. current S. California dry conditions due to management and legal dispute
- Attribution needs to separate
 - Natural Variability
 - Land use change (including socio-economic increase)
 - Climate change
- Interest in attribution tend to go with longer drought events
 - Long drought is a bad thing to waste - use them for awareness and resources
- It is good to study the differences and causes between Mega droughts and Normal droughts
 - Can provide with knowledge base for communication
- Important to understand role of 'natural variability' versus 'global change'
 - Decadal variability in droughts?
- Understanding 'the Dogs that haven't barked in the night' - why some things did not happen?

Extremes

- Definitions are different in different fields - needs to be recognized
 - Engineering Infrastructure - return periods
 - Management - thresholds
 - Etc.
- Attribution needs to be performed for a variety of extreme events
 - E.g., single event, recurring event, prolonged event
- Are IPCC models too sensitive to temperature/land cover changes?
 - Thus expectations from them are for more extremes?
- Extremes occur over a relatively small spatial and temporal scales - so need for much better model resolution
 - Is the cool wet summer in midwest due to climate change?
 - Dense planting, irrigation, genetic modification - increased dew point in midwest
 - better model resolution; downscaling
- Sea Level rise simulation - attribution of coastal storm surges (thermal expansion, regional features?)
 - Might be more useful in coastal planning (e.g., Florida water resources)
- Statistics of historical extremes (i.e. 'static risk') provide an important baseline
 - Influenced by data quality
- IPCC data adequate for extremes? - especially extremes in short term
 - Newer models have better capability - e.g., incorporating urban environment
- Demand for extremes attribution - quick and accurate
 - Provide a description of event with a general/rote statement
 - Perform systematic research of the event scientifically to provide details later

Trends

- Land use change - measurement error contributing to trend (e.g., urbanization/heat island etc.)
- Efforts to investigate trends in data and compare with inconsistencies with trends from model

Cross-cutting issues

- A large number of model experimentation (forcing and ensembles) is required for accurate attribution
- Coarser models can still provide useful information
 - Run models at monthly/seasonal time scale
- Attribute studies can be done regardless of skill
 - But regional studies require skillful model
- Base set of AMIP runs should be available as a data base
 - From which PDFs of extremes can be constructed for quick assessment
- Need to do 'what if' scenarios in the models to understand extremes
- The world that might have been - in the absence of forcings
 - good model and good observations of forcings
- State of the science paper at regular interval - that synthesizes the research for general public/resource managers etc. (there is a large number of attribution papers coming out)
- 'perversity index' - e.g., cooler events occur with some regularity even when expecting warm events
 - Need to show / attribute 'perverse' (or opposite) events (e.g., cooler events in S. America this year) to maintain 'fair and balance'
- Attribution done mainly where people live - e.g., increased snow in east coast/decrease snow in Canada could be related
 - **People matter more than 'non-people'** - Kelly