

## Drought WG Telecom – Summary (3/2/2007)

### Agenda:

- 1) Discussion of drought index (Dave Gutzler)
- 2) Model simulations (Siegfried Schubert)
- 3) Next telecon (tentatively on April 13 at 1:30pm eastern time)

### 1. Drought index

Dave reminded everyone that the short paper to USCLIVAR Variations is nearly completed (needs any last minute feedback no later than early Monday).

Dave summarized the email discussions on the drought index. Brad Lyon did an interesting analysis comparing the PDSI with precipitation, and found little difference between the two when looking at long-term averages. There was discussion about the need to use something more physically based than PDSI. Soil moisture is the obvious choice though there are problems in that every model has a somewhat different soil moisture variable, and they are not directly related to the real-world soil moisture. Wayne and Kingtse provided a nice list of different indices and the pros and cons of each. Jerry Meehl forwarded a copy of a New Zealand report on drought, in which they define a “Potential evaporation Deficit” drought index.

Dave G. emphasized the need to choose time scales (should include the annual cycle?), that the index should allow defining an onset and demise of drought, and that it should tie in with operational monitoring and prediction (easy for T and P, but what about soil moisture?).

David Rind cautioned that anything that depends on the past observed negative correlation between P and T, could break down under a changing climate. For example, there are indications that a warmer climate could produce more rain. David also cautioned about the used of soil moisture (was pretty much dismissed in the IPCC report because of the differences between models). Randy noted that soil moisture in models should be considered more as indices of soil wetness, and problems with comparing the soil moisture between models and observations can be alleviated by scaling each with their own climatological variability.

Randy proposed a diagnostic analysis of land models forced with observations. The GSWP2 experiment does this with 20 models all run with the same forcing for 10 years (perhaps somewhat short record – but would provide a useful initial look). The analysis would involve scaling each soil moisture as mentioned above and then comparing statistics and looking at how robust the results are in terms of some type of a drought definition based on say the CPDF, variance, etc). If the results are robust, this would be useful e.g., for real time monitoring of drought using any of the land models – (link to operations). Also, a similar analysis could be done for the AGCM simulations. David

Rind questioned whether it was correct to use an offline calculation in which there are no feedbacks (similar to the problem with AMIP runs). Dave G. pointed out the need to also consider other quantities such as snow. Ning questioned the realism of the deep soil moisture in current models (are there some that are known to be better than others?). Are there other longer (50-100 year) forcing data sets available? Randy indicated that he would pursue this diagnostic project by taking an initial look the GSWP2 data.

Dave G. indicated that he would try to summarize the discussions on the drought index and come up with some near term action items.

## 2. Model Simulations

Siegfried outlined a series of AGCM experiments (see attached ppt – Cathy please post this ppt on the website along with the notes for this telecon). The idea is for several modeling groups to do identical (somewhat idealized) experiments to address issues of model dependence on the response to SSTs (and the role of soil moisture), and to look in more detail at the physical mechanisms linking the SST changes to drought.

Comments from Richard and Mingfang:

A few points - the future global warming pattern is unlikely to be like the one shown (top figure in slide 2 of accompanying ppt) in that it will show tropical Pacific warming. For the Atl pattern model work to date suggests it is the tropical part that is important. Should we try other experiments with just that part specified? We like the idea of doing the model response to a uniform warming - the SST changes in the future look pretty uniform to me in the IPCC models.

The soil moisture experiments - why \*deep\* soil moisture fixed?

Eddy transports of heat, moisture and momentum are critical to the response to SST changes so groups who do these experiments should save daily data or do as we do and accumulate monthly means of eddy covariances - all of them - as the model runs and save them.

Tom Delworth indicated that such runs could serve as an important benchmark for model development. Details will need to be worked out including data distribution and storage (example of IPCC, possible ftp sites, central location, GDS?). Also, should we at least initially confine this activity to the WG (I include here our expanded list of participants)?

Need to consider link to DRICOMP.

Rong suggested that we may want to do some runs with observed CO2 changes. We (the GMAO) have done runs with changing CO2 with the NSIPP AGCM (C20C AMIP-style simulations), and those showed little impact on the precipitation, though there was some impact on the temperature in the upper stratosphere.

I will form a model simulation subgroup to discuss this further and come up with a plan. The following is my initial cut at membership. Let me know if you are not on the list and would like to be included (or if you are on the list and don't want to be)

Richard Seager  
Mingfang Ting  
Rong Fu  
David Rind  
Tom Delworth  
Arun Kumar  
Phil Pegion  
Max Suarez  
Marty Hoerling  
Randy Koster

3. Next telecon ((tentatively on April 13 at 1:30pm eastern time)

- discussion of observations and possible joint diagnostic studies (linked to model simulations and drought index work) - Sumant
- updates and drought index and model simulations