

## ***Interactive comment on “Do GCM’s predict the climate... or macroweather?” by S. Lovejoy et al.***

**R. Pielke Sr**

pielkesr@gmail.com

Received and published: 29 December 2012

This is an excellent, much needed assessment of the ability of multi-decadal climate models to accurately simulate climatic conditions on this time scale.

As I wrote in my paper

Pielke, R.A., 1998: Climate prediction as an initial value problem. *Bull. Amer. Meteor. Soc.*, 79, 2743-2746

“weather prediction is a subset of climate prediction and that both are, therefore, initial value problems in the context of nonlinear geophysical flow.”

and

“...longer-term feedback and physical processes must be included. This makes climate prediction a much more difficult problem than weather prediction”.

C784

In our paper

Rial, J., R.A. Pielke Sr., M. Beniston, M. Claussen, J. Canadell, P. Cox, H. Held, N. de Noblet-Ducoudre, R. Prinn, J. Reynolds, and J.D. Salas, 2004: Nonlinearities, feedbacks and critical thresholds within the Earth’s climate system. *Climatic Change*, 65, 11-38

we concluded that

“The Earth’s climate system is highly nonlinear: inputs and outputs are not proportional, change is often episodic and abrupt, rather than slow and gradual, and multiple equilibria are the norm.”

With respect to what the authors refers to as “macroweather”, however, there remain major issues with the ability of climate models to skillfully simulate the real world climate system. Examples of papers that document this limitation include

1. Fyfe, J. C., W. J. Merryfield, V. Kharin, G. J. Boer, W.-S. Lee, and K. von Salzen (2011), Skillful predictions of decadal trends in global mean surface temperature, *Geophys. Res. Lett.*, 38, L22801, doi:10.1029/2011GL049508

who concluded that

“...for longer term decadal hindcasts a linear trend correction may be required if the model does not reproduce long-term trends. For this reason, we correct for systematic long-term trend biases.”

2. Xu, Zhongfeng and Zong-Liang Yang, 2012: An improved dynamical downscaling method with GCM bias corrections and its validation with 30 years of climate simulations. *Journal of Climate* 2012 doi: <http://dx.doi.org/10.1175/JCLI-D-12-00005.1>

who find that without tuning from real world observations, the model predictions are in significant error. For example, they found that

“...the traditional dynamic downscaling (TDD) [i.e. without tuning] overestimates pre-

C785



Certainly on the regional scale [which is by far the most important in terms of impacts to the environment and society] these models have shown little if any skill when run in a hindcast mode.

We discuss this challenge, for example, in our paper

Pielke Sr., R.A., and R.L. Wilby, 2012: Regional climate downscaling – what's the point? *Eos Forum*, 93, No. 5, 52-53, doi:10.1029/2012EO050008. <http://pielkeclimatesci.files.wordpress.com/2012/02/r-361.pdf>

and in a set of weblog posts [<http://pielkeclimatesci.wordpress.com/?s=cmip5>].

My only recommendation for the authors before final acceptance, is a discussion of these issues.

---

Interactive comment on *Earth Syst. Dynam. Discuss.*, 3, 1259, 2012.