

## ***Interactive comment on “Hydroclimatic Variability and Predictability: A Survey of Recent Research” by Randal D. Koster et al.***

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» This is a somewhat unusual but useful format for a scientific paper, as explained by the authors: not intended as an extensive review of the dynamic field of research in hydrometeorological predictions, but an instructive topical description of some relevant aspects of the scientific field, illustrated by studies which were presented at EricWoods honor symposium. The body of the paper is well written and well structured, but the degree to which the selected studies are self-explanatory varies somewhat and could be improved (see detailed comments below). Some figures showed very interesting results (8, 10, 11).

Thank you. Specific responses are provided below.

»Detailed comments »p2, l26: also the fact that many hydrological catchments cross

C1

national boundaries, and that cascades in impacts take place that are not limited to individual catchments is a reason to address this topic using large scale models

We address this with the following addition: “Many important hydrological problems must be addressed at the large basin scale, a scale that transcends political boundaries and is not amenable to techniques designed for traditional small-scale catchments.”

» p3, l28: you might mention that also developments in the observational records and techniques have contributed to this progress

The reviewer is right. We have amended the text as follows (new text underlined): “. . .the continually growing availability of powerful computational tools (along with more extensive observational records and improved analysis techniques) for examining this variability. . .”

» p4, l15: the reason why this modelling at hyperresolution would be beneficial could be mentioned here, it is not obvious

We amended the sentence to read (new text underlined): “Wood et al. (2011) emphasize the importance to society of developing hyper-resolution ( $\leq 1$  km resolution) land surface modeling systems at continental to global scales; such resolutions would allow an improved representation of the impacts of spatial heterogeneity in surface properties on large-scale hydrological and atmospheric dynamics.”

» p5, l16: please replace “predictions” by “projections”

Done.

» p5, l22 and Figure 2: the degree to which “local” phenomena are explained by “nearby” drivers is also a matter of definition of scales. If one is interested in precipitation variability at 50x50km resolution then it is obvious that nearby drivers have a large impact. Aggregation to the spatial scale of entire continents, however, makes also inland territories sensitive to ENSO-like drivers

C2

True. We have changed the main text to emphasize that we are not speaking of Australia as a whole (new text underlined): “In another study, variability of rainfall over parts of Queensland, Australia, is found to be potentially controlled more by nearby sea surface temperatures (SSTs) than by distant climate phenomena such as El Niño (Figure 2).” We have also amended the caption to read (new text underlined): “In many places the high local SSTs (within a few hundred km of the coast) accounted for more of the precipitation than the prevailing La Niña conditions did at the spatial scales considered here.”

» p8, l9: typo in “Berghuijs”

Corrected.

» p12, l28: which “Dirmeyer (2013)” is referred to here? There are 3 papers Dirmeyer 2013

Actually, there are three Dirmeyer et al (2013) papers, but only one Dirmeyer (2013) paper. We think the figure is referred to correctly as is.

» Summary: a reference to a website where the original presentations can be downloaded would be a valuable addition to this paper

We agree, but we have no control over how long these presentations will be maintained on the workshop website – this would be subject to the whims of the folks at Princeton. While we were told that there are no immediate plans to remove the presentations, we think that providing what may soon be a dead link is inappropriate. If the editor wants us to include the link, we can. For now, we leave it out. In any case, most of the figures point to papers that contain additional information, and all of the papers point to a contact that can be reached for further information.

» Comments per figure

» Figure 3: the textual explanation is fairly thin: it is unclear what kind of model upgrade was applied, and whether the bias correction of VICET or the bias correction of the

C3

NARCCAP was the dominant factor in explaining the differences shown

The caption has been overhauled. The VICET model overwrites the VIC-estimated ET components using bias-corrected values, which has the effect of improving the estimation of other hydrological variables as well, as now explicitly stated in the updated figure caption. The differences in hydrological behavior between the two simulations have nothing to do with the bias correction of NARCCAP forcing, as the two simulations utilize the same meteorological forcing. This has been clarified in the updated figure caption.

» Figure 6: many of the terms mentioned in the figure are not explained. Also it is unclear what is meant with “living agents”

The caption for figure 6 has been expanded to explain all terms. The reference to “living agents” was unnecessary and has been removed.

» Figure 7: what are the units of the contours shown?

Units are now provided in the caption.

» Figure 13: the units of the lead time shown on the left is unclear. The units are now provided in the caption.

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