

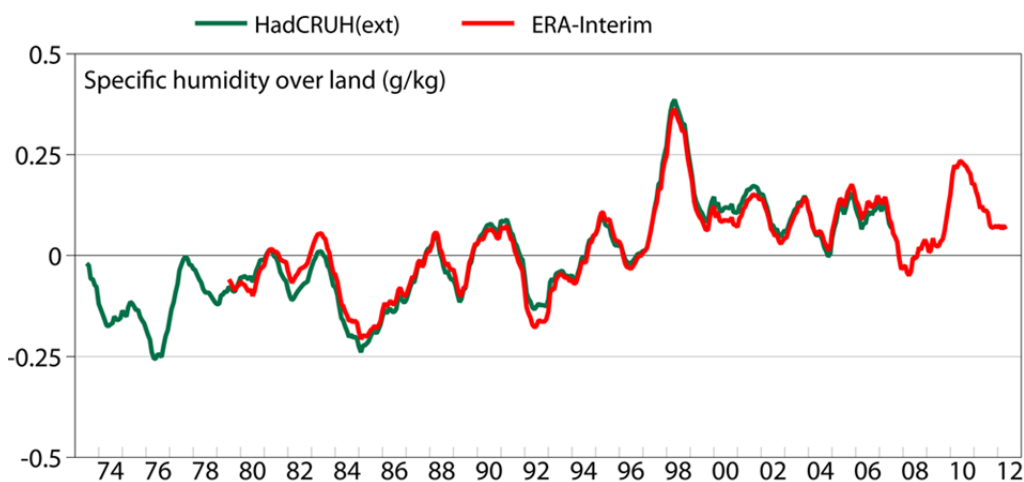
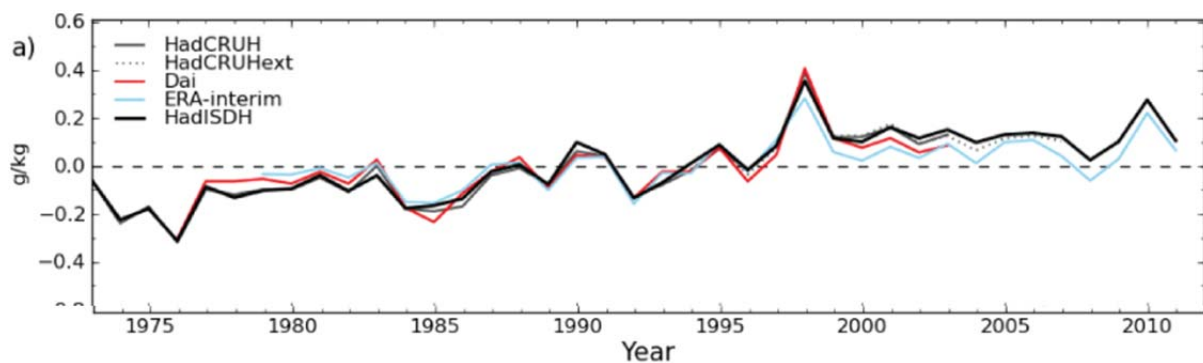
**Review of MS No.: cp-2012-153 “ HadISDH: An updated land surface specific humidity product for climate monitoring” by K. M. Willett et al.**

This is an excellent paper, which reports a careful study to build an extendable specific-humidity dataset suitable for climate monitoring. This dataset will provide a much-needed complement to the ERA reanalysis product that has already been shown by Simmons et al. (2010) (through comparison with the lead author’s earlier HadCRUH and HadCRUHext datasets) to be largely suitable for this purpose. The paper certainly merits publication, though point (i) below must be resolved, and changes are needed to accommodate point (ii). Some further discussion to take point (iii) into accounts is recommended.

Please note that I am an expert neither in synoptic measurement of humidity nor in homogenization of observational datasets, so I have not attempted detailed scrutiny of this aspect of the paper, other than to check that the writing is clear, which it indeed is.

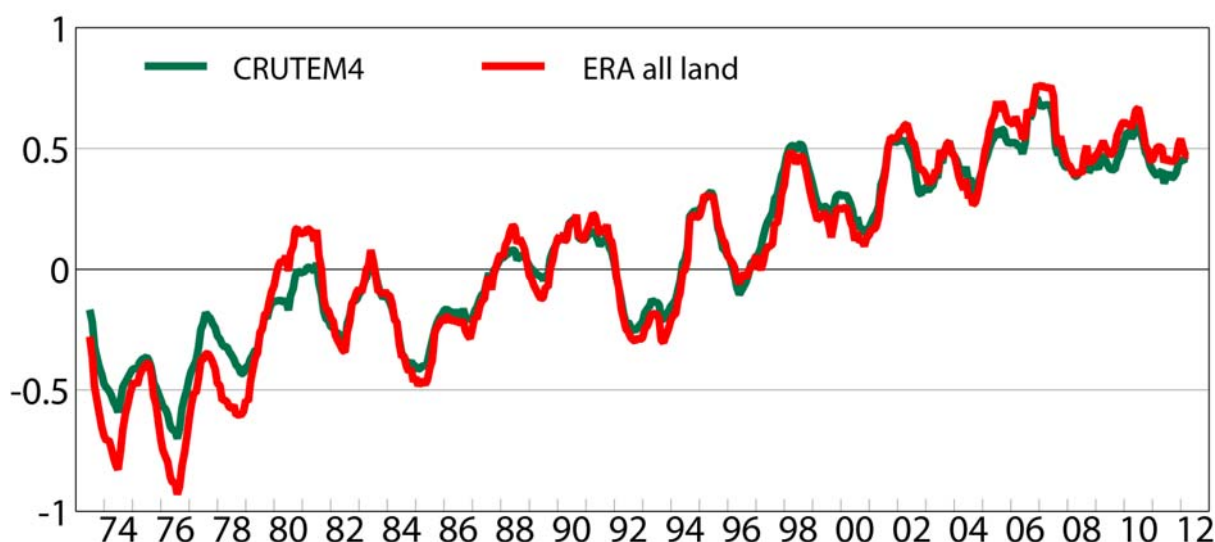
**Specific comments:**

(i) The ERA-Interim values plotted in Figure 10 appear to be incorrect. The agreement between ERA-Interim and HadCRUH/HadCRUHext is not as good as published in Simmons et al. (2010). The first panel below is extracted from Fig.10 and shows ERA-Interim to lie below the other curves from 1998 onwards. The second panel is my own update of a figure in Simmons et al. (2010). There’s finer-scale detail because I plot 12-month running means, not annual means. But the better agreement is clear. It is essential that this discrepancy be resolved. I am of course willing to assist in this.



(ii) The discussion of results needs to be a little deeper. To be sure specific humidity has increased over land since the 1970s, and the El Nino peaks of 1998 and 2010 are noteworthy, and duly noted in the paper. But inspection of the first panel of Fig. 10, as reproduced on the preceding page, shows that apart from the two El Nino peaks, specific humidity over land has not increased since the late 1990s. This should be discussed, and flagged in the Abstract.

Moreover, the discussion of warm years is not the correct one, in that the reference in the second sentence of section 5.4 to the warmest years on record refers to global means, not means over land, and specific humidity is presented here as means over land. The evolution of temperature averaged over land (12-month running means) is presented below, from CRUTEM4 and ERA-40/Interim. Here 2005 does not provide the highest values, and there is recent warming over land that is not accompanied by rising specific humidity. This is consistent with the fall in relative humidity reported by Simmons et al. (2010), which has continued since that paper was published. The discussion given in section 5.4 needs to be revised.



(iii) HadCRUH is a dataset that contains values of both specific and relative humidity. HadISDH is not a complete replacement for it as HadISDH currently provides values of only specific humidity. It is of course pleasing to see it noted on page 5158 that HadISDH paves the way for a relative humidity product, but a bit more explanation could be given as to why one was not produced at the same time as the specific humidity product, as this would have enabled HadCRUH to be superseded. One can understand why this might be, as there are places in the discussion where issues for specific humidity can be put to one side as they are associated with cold regions and low absolute values, which may not be so for relative humidity.

(iv) Page 5138, last line: There is a spurious “to” at the beginning of the line.

(v) Page 5140, line 15: “Instrumentation” could be changed to “measurement”, as “instrumental” appears earlier in the line.

(vi) Page 5156, line 5. ERA-Interim is largely independent, though if Td measurements were to be systematically and persistently biased over a significant region by a rather small amount, is there not a risk that this could creep into both ERA-Interim and HadISDH, notwithstanding the sophistication of the latter's various checks on the data?

(vii) Page 5159, line 2007. Perhaps some words such as “, and it provides an important [a much-needed][a vital] complement to the reanalysis data that have provided monitoring since then.” could be added after “2007”.