Hydrol. Earth Syst. Sci. Discuss., 7, C5016–C5018, 2011
www.hydrol-earth-syst-sci-discuss.net/7/C5016/2011/

Hydrology and Earth System Sciences Discussions

Interactive comment on "Bias correction of satellite rainfall estimation using a radar-gauge product" *by* K. Tesfagiorgis et al.

Anonymous Referee #2

Received and published: 8 February 2011

Overall this was an interesting paper, trying to bias-correct satellite-retrieved rainfall estimates on the basis of a gauge-radar product. Apart from the numerous minor issues (typos/spelling etc) there are some main area of concern I have.

i) The paper does attempt to tackle a rather complex, difficult, and often insurmountable problem. This in itself should be carefully approached: while some issues can be resolved, others can only be partially resolved, and attempts to provide 'an answer' often only address 'findings' for particularly cases studied.

ii) The assumption that 'radar is good' is a bad idea. While there is no doubt that radar has very nice spatial coverage and provides information in the gaps between the gauges, radar does have some serious issues (clutter, range, bright-band) which are

not really mentioned by the authors. This can be problematic since even with gauge-correction, these radar artefacts are likely to be present in the final product in one form or other. Ultimately, bias-correcting on a pixel-pixel basis will perpetuate the errors from one field into another field.

iii) the portrayal of the satellite-based observations is basic. I would say that satellites estimates are much more than 'approximations': the nuances of the English language can be subtle at times, but the satellite-derived precipitation estimates are 'estimates'. In addition, the sentence that states that "IR products are the only sources of rainfall observations in mountainous regions" is wrong. We have passive microwave products, combined products, satellite-borne precipitation radar etc.

iv) There has to be a greater appreciation of the precipitation characteristics and measurement techniques. In particular, all gauges really produce and accumulation of precipitation at a point (i.e. time integral & point) whereas radar and satellites provide point-in-time, areal estimates (i.e. instantaneous & spatially integrated). This fundamental factor seems to be have been neglected in the radar: the hourly radar data is not really an accumulation, but a summation of a number of samples; the satellite estimate likewise. The gauge data although at a point, if measured over 1 hour, posses a time-integral factor inherent in all precipitation studies. Moreover, the intensity distribution of the rainfall data is heavily skewed towards zero: this in itself is enough to make most 'models' inappropriate – yet alone the statists associated with any calibration/validation.

v) care need to taken when 'selecting' representative cases. Representative rainfall cases are essentially all no-rain cases! In particular, when matching up data sets (as in this case) care needs to taken in what data is excluded: zero is a valid rainfall value. For example, although satellite rain: radar rain pixels are okay, and you might exclude satellite no-rain: radar no-rain, but what do you do with the no-rain:rain and the rain:no-rain?

HESSD

7, C5016–C5018, 2011

vi) Ultimately, the problem here is whether the mathematically-formulated framework can adequately work on the full gamut of gauge/radar/satellite data sets and under all meteorological conditions. One thing that is strikingly obvious when expanding techniques to the full range of events is that although it might seem to work in a number of situations, that overall it rarely works in all.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 8913, 2010.