Climate
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Discussions

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comment

Interactive comment on "Effects of undetected data quality issues on climatological analyses" *by* Stefan Hunziker et al.

Anonymous Referee #1

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Review of Hunziker et al., 'Effects of undetected data quality issues on climatological analyses' The issues raised in this paper are important – in particular, that data quality control methods which focus on daily data may not detect systematic issues that are important at annual or monthly timescales, and that those systematic issues may distort trends and/or homogenisation processes.

The key substantive result of this paper, in my view, was that for TN, the median adjustment in DATAQC-E was very different to that in DATAQC-S (with flow-on consequences for the trends). However, there is no indication in the paper as to why such a difference might have happened. One could reasonably form a null hypothesis that data quality issues might be expected to be randomly distributed in sign and in time; the results found suggest that there is a systematic departure from that null hypothesis, but without any

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[Discussion paper]

information as to what might be driving the difference, it is very hard to know how to interpret results (or whether they might be applicable to other networks). I think further analysis/discussion of the cause of this difference is important in a revised paper.

Other comments are as follows:

Major comments

P2 line 27 (and elsewhere) – the text at various points suggests that the observed increase in diurnal temperature range may be indicative of a problem. There are cases elsewhere in the world where increases in diurnal range have been associated with drying trends (e.g. Dittus et al 2014 (Aust. Met. Oceanogr. J. 64-261-71) found an association between recent decreases in rainfall and increased frost frequency in parts of southern Australia), and the diurnal temperature range increases found in this study seem to me to be broadly consistent with the observed decreases in precipitation. Potential rainfall-DTR relationships could also be brought into the discussion in sections 4.3.2 and 4.3.3, as well as being linked to the statement 'stronger increase in TX than TN in the Altiplano' at page 14 line 22.

P4 line 19-20 – does this mean that TX at these stations is not over a full 24 hours? If so, what is the time window that is used, and how confident are we that this practice has remained unchanged over the period of observations? Would TN also be over less than 24 hours? (if so, this might lead to low minimum temperatures which occur during afternoon storms – a common scenario in the tropics – being missed).

Section 3.1.2 – I found this section very difficult to understand as a standalone paper. While it is reasonable to refer people to the IJC paper for full details (I also note that it is an open-access paper), I think more explanation is needed in this section so that readers can have at least a basic understanding of what is happening without having to look up a different paper. A new table would be useful, I think, with a brief explanation of each test – at present, for example, it is not at all obvious to the reader what 'missing temperature interval' or 'PRCP gaps' mean. Some of the checks in this list also aren't

fully explained in the IJC paper (moderate and strong irregularities in the data pattern, frequent and large inhomogeneities, strong asymmetric rounding patterns).

Section 3.1.2 – I would also question how important the 'rounding errors' are. The example given in the IJC paper would affect temperatures by less than 0.1°C (which would not be worth worrying about), but there may be more significant examples.

Section 3.1.2 – flagging of 40% of measurements is a large number. It would be useful to have an indication of which individual tests most commonly led to flagging. With 40% of observations flagged, presumably a substantial number of stations were removed altogether – how many? (Somewhere – maybe section 3.4 – it would be useful to say how many of the original stations were still available for analysis for each of the two methods). It would also be useful to know whether UDQIs were concentrated in one particular era or spread fairly evenly through the time series.

Section 3.5 – it needs to be made clear that these trends are for the 1981-2010 period (as it is currently worded, there is the possibility of confusion between the timespan over which trends are calculated and the timespan used as a baseline for normal/index calculation).

P9 line 4-14 – the wording in this paragraph is not as clear as it might be. It is a perfectly reasonable decision to use a monthly method for comparative purposes, since what you are trying to do here is compare one QC method with another. (Also, as far as I know, there are no fully automated daily methods in existence).

Section 4.1 – it's probably also worth noting somewhere that TX correlations are much stronger than TN correlations in the valleys (presumably because TN is much more strongly influenced by local topography). Another question which may be worth considering is the extent to which there might be seasonal influences on correlations in a tropical climate – experience from other parts of the world suggest that TN correlation length scales in tropical climates are much shorter in the rainy season than in the dry season (perhaps because in tropical climates in the wet season, low temperatures

sometimes occur during rain events).

P13 line 19 (and onwards) – another possible effect of UDQIs is that they could also hide real inhomogeneities – either directly, or indirectly through adding noise to a time series (and thus reducing the signal-noise ratio).

Minor comments

P2 line 14 – should be 'lose significance'.

P6 line 30 – 'Spearman' should be capitalised.

P7 line 9 – 'usually becomes slightly negative' – do you mean 'weaker'? I wouldn't expect a day shift to reduce a strong positive correlation to below 0.

P8 line 1 – should be 'performances'

P10 line 30 – 10.2°C seems very large – is this actually a data quality problem large enough to trigger homogeneity checks?

P11 line 23 – 'inflation of the trend spread' – this doesn't make sense as the trend spread is decreasing, not increasing. I guess you could use 'deflation', but I think just 'decrease' is fine.

P13 line 13 – should read 'Peruvian Andes and Switzerland'.

P15 line 5 – should read 'trends of a few climate change indices'

P15 line 7 – should read 'drawing of clear conclusions'

P15 line 16-18 – while missed observations of a few millimetres may have a negligible effect on monthly sums, they still affect indices which use number of rain days > 1 mm as a basis (e.g. SDII).

References – I note that the Gubler et al paper is now published.

Interactive comment on Clim. Past Discuss., https://doi.org/10.5194/cp-2017-64, 2017.