

Interactive comment on “Description of the ERA-CLIM historical upper-air data” by A. Stickler et al.

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Received and published: 13 January 2014

Thank you for the compliments.

Point-by-point reply to comments:

> Using a surface only reanalysis QC check scheme is a new and likely fruitful approach, as should be the feedback from future 3-D reanalysis. The limited application to temperature was a little disappointing, and the outlier criterion was huge. I would have like to see a more significant evaluation of this effort.

We have added a few sentences to section 4 explaining in more detail why we made the choice of 30 K for the temperature outliers, and why we limited the application of

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the reanalysis departures to the QC of temperature by now:

"At UBERN, thousands of implausible or suspicious values had already been flagged during the digitisation process. These values were re-checked against the respective images afterwards. [...] The additional raw quality control which was also applied to the data delivered by FFCUL, RIHMI and METFR was in general limited to range checks including expert knowledge and information from neighbouring upper-air levels.

The new, surface-only based reanalysis of ECMWF (ERA-20C; Poli et al., 2013) that was also produced in the framework of ERA-CLIM, was used to calculate reanalysis departures for each digitised value (including the values from METFR that were not subjected to range checks by UBERN), and for all parameters: temperature, pressure, geopotential height, wind and humidity. To improve the quality of the data, all temperature values with absolute departures > 30 K were re-checked manually. The value of 30 K was chosen globally, based on scatter plots of reanalysis departure against collection identifiers, as a cut-off value representative of strong outliers. This process led to the correction and/or flagging of an additional 2,325 temperature values (ca. 2‰ of all temperature values collocated with reanalysis values).

We decided to use a rather relaxed outlier criterion for temperature since the scatter of the respective departures was found to be quite large, and therefore a more detailed QC would have required either the application of further filtering criteria in order to reduce the number of values to be checked manually in an objective way (e.g., using information on the climate zones of the stations), or alternatively the use of an automated flagging procedure with a smaller, but possibly more subjective cut-off value (e.g., by simply defining the upper and lower 1-2 percentile of all digitised values as outliers, based on typical detected error rates in QC'd atmospheric data from previous digitisation projects).

On the "warm" side of the departures (which also tended to show larger outliers on average), we found that the large scatter can at least partly be explained by strong, lower

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tropospheric inversions, which are not always correctly represented in the reanalysis system. The scatter is further enhanced by the difference between the reanalysis and observation time combined with frontal passages or dislocations of frontal systems in the reanalysis in the midlatitudes. On the "cold" side, outliers > 30 K were often connected to previously undetected sign errors (missing negative sign) in the digitised data (which were subsequently corrected), while negative departures with absolute values < 30 K can again be caused by spatio-temporal incoherences between frontal passages in the reanalysis vs. observations in the midlatitudes. For pressure, geopotential height, wind and humidity, an additional QC based on reanalysis feedback has not yet been applied to the data, but is planned in the framework of its inclusion into CHUAN V2.0."

> Line 14, page 643: NETCDF => netCDF

Changed.

> page 645: Strickler et al. 2013a, is not available to see, restructure sentence to not refer to Figures

Done.

> L 20, p 645: possibly 'proper' => home

Changed.

> L 23, p 645: possibly 'research' => search

Done.

> L 26, p 645: '9' to nine

Done.

> L 20, p 647: 'atmospheric transmission data' – this doesn't seem like a common source. Are there meteorological data included? I see some are from mountain top

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observatories.

These data use spectrally resolved radiation intensity measurements to determine the atmospheric transmission $T = I_{surf}(\lambda) / I_{TOA}(\lambda)$ with the spectrally dependent intensities $I_{surf}(\lambda)$ at the surface and $I_{TOA}(\lambda)$ at the top of the atmosphere. We have added an explanatory footnote to the text. There are no meteorological data directly included. All measurements are for clear sky conditions.

> L 9, p 648: 'used instruments' => instruments used

Changed.

> L20, p 648: 'and supervise' = 'and to supervise'

Changed.

> Page 646: turn a-i item list into a table – easier and more clearly referenced later, e.g. p. 649.

Done. Changed reference on p. 649.

> L 23, p 652: It is worth knowing the conversion constants used. Numerical accuracy, real number truncation, and rounding can have an influence further down when research is done.

The conversion constants used have been added and referenced in a new table (Table 4). 3.3 RIHMI – this section is a bit confusing. The first paragraph mentions 'numerous errors in the OCR processing'. Then most of the remaining sections highlight how much it was used.

We have rephrased the respective sentence:

"This led to numerous errors in the OCR processing, which could however efficiently be detected during the QC process, as will be detailed in Section 4."

> L 1, p 655: "4" => four: In general all number less than 10 are written in text, e.g.

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one, two, three, : : .. nine.

We have changed all numbers less than 10 to text.

> Line 12, page 642, line 17, page 644, line 21-22 page 647: mio=million? Probably not an SI unit standard.

Mio changed to million.

> Line 14, page 642: focussing on so far less, maybe better => so far focusing on less; similar construct at line 20, page 644

Kept as is. Should be correct.

> '(<http://www.surface temperatures.org>)' => (ISTI, <http://www.surface temperatures.org>)

Acronym added.

> Insert 'CHUAN' in line 29, page 644

Done.

> Sect. => Section on page 645, and throughout the document.

Done. Section had been changed to Sect. by the typesetters of ESSD, but was not in our submitted document.

Interactive comment on Earth Syst. Sci. Data Discuss., 6, 641, 2013.