

## ***Interactive comment on “Construction of surface air temperature series of Qingdao in China for the period 1899 to 2014” by Yan Li et al.***

**Anonymous Referee #2**

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This paper is an important contribution to filling a data gap by means of newly digitized temperatures from Qingdao, China by means of data from colonial times in the late 19th century and up to World War I. The time series of Qingdao is of specific interest because there are 10 years of hourly observations from 1905 to 1914. This makes it possible to compare the diurnal cycle of temperature with present-day observations.

The paper is well-written, straightforward to understand and on a solid mathematical foundation. As such it deserves publication in Earth System Science Data. In terms of content, the only thing that is lacking is an estimate of uncertainties. How reliable are the early parts of the period? Does the high temporal resolution in 1905 to 1914 help to constrain uncertainties with respect to the other periods to to present-day climate? How much does the now dataset improve existing datasets, e.g. from CRUTEM?

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I recommend that the paper should be published in ESSD, provided that the authors have addressed to remarks and comments outlined below.

Specific comments:

Line 85 (Table 1): Are the given times local times within the time zone or true local times (i.e. additionally take the longitude of the station into account? Given that Qingdao was a German colony, it appears straightforward to assume that the "Anleitung zur Anstellung und Berechnung meteorologischer Beobachtungen" (van Bebber, 1904) or a similar official publication was used as reference. These manuals state that hourly observations must be taken on the hour, but three times daily ("climate") observations must be taken at true local time, which depends on longitude. Given the fact that there are several different "climate" observation times (7-14-21, 8-14-22, etc.) and given the fact that true local time may differ almost one hour from zone time (if the station is on the western edge of the reference longitude "belt"), it is important to know when these observations were taken. To my knowledge, Beijing local time was used in all of China prior to 1913, but it appears plausible that the colony rather followed what today is UTC+8 (in which case the time difference would be negligible, since Qingdao is almost on 120 E). So, if at all possible, the authors should constrain the actual time used in these observations.

Lines 150/151: These are heights above sea level, I assume? Is any information available where the thermometers were situated with respect to the ground?

Lines 248/249: Wouldn't the most straightforward explanation for the "hiatus" be the increasing amounts of aerosols in the atmosphere? So I suggest to reformulate this paragraph.

Lines 267-269: Discussing wavelets with time scales of 80 years in a 100 year time series is rather close to overinterpretation.

There are a number of typos I would like the authors to correct. Also, there are a

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number of less than optimal formulations. For example:

Line 18: Excel

Lines 18-21: Something is missing in this sentence.

Line 60: Delete "there are".

Line 61: Add question mark after the question.

Line 68: "...the archive of the..."

Line 138: "...are not efficient..."

Lines 310-314: I am aware of the restrictions of 20CR, but is one newly constructed time series really enough to state that there is a problem with 20CR?

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