



Royal Netherlands
Meteorological Institute
*Ministry of Infrastructure and the
Environment*

Extracted weather data of Nagasaki (Japan) from the Diaries of the Dejima Chief 1700-1860, 1817-1823 and from the Von Siebold Documents 1825-1828

Project description and file descriptions

A.P.M. Baede and G.P. Können

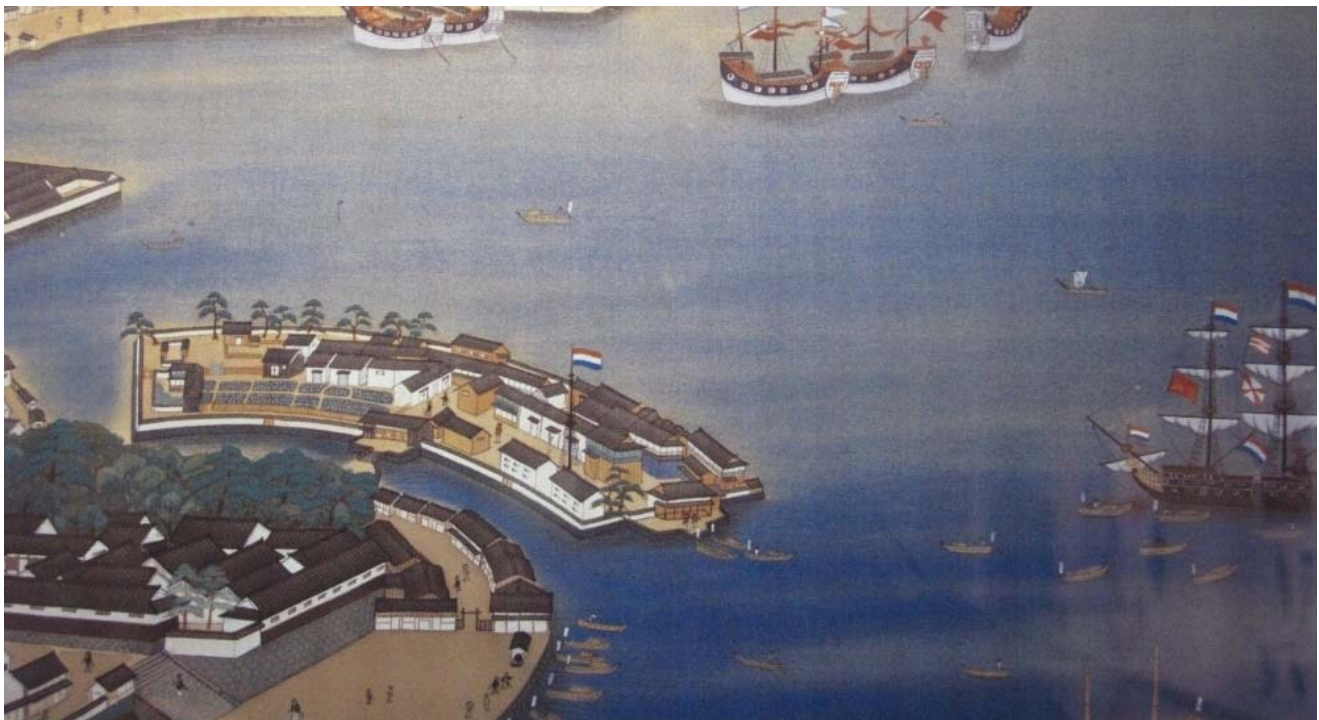
De Bilt, 2016 | Technical report; TR-358

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Summary

In the framework of a long-term joint co-operation between Japan and KNMI aimed at climate reconstruction of Japan in its pre-instrumental era, we now explored the availability of the mostly visual weather data in the daily Diary of the Chief of the Dutch trading post on the island Dejima near Nagasaki. A Pilot project extracted the Januaries of the years 1700-1860; the Follow-up project extracted all months during the period 1817-1823, the term of office of the Chief Jan Cock Blomhoff. Together with the subsequently extracted Von Siebold data 1825-1828 (a supplementary project), the Cock Blomhoff series provides a detailed picture of the Kyushu daily weather in the early 19th century. With this report all data are made systematically accessible and available for further analysis.

The data files are available from <https://data.knmi.nl/datasets>.

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1. History of the joint Japan-KNMI efforts to reconstruct the past Japanese climate

This current project is part of a multi-annual co-operative umbrella project of KNMI (drs. Können and Baede) and the Department of Geography of the Tokyo Metropolitan University (prof. dr. T. Mikami, prof. dr. M. Zaiki and collaborators), together with incidental contributions from other institutes. This umbrella project aims at reconstructing the pre-1880 Japanese climate, initially only on the basis of visual observations taken by Japanese administrators together with instrumental data taken by the Dutch on the island of Dejima near Nagasaki, which was thought at the time to be the only source of quantitative meteorological information in the pre-Meiji era. In the course of the project however, the Dejima data could be supplemented by other 19th-century instrumental data, recovered from various archives in Japan and elsewhere.

The umbrella project started in 1998. By that time T. Mikami had collected and digitized the visual weather observations which had been taken on a well-organized basis by Japanese administrators since the 18th century and even earlier. The analysis of this documentary series

revealed that it was possible to deduce from the visual precipitation observations the winter temperatures on Kyushu [1] and the summer temperatures on Honshu.

The Japanese documentary series have been written down in Diaries. These series end in the 1860s, a decade before the start of the official Japanese meteorological network. The highly desirable direct calibration of these documentary series with instrumental data was made possible by the existence of instrumental data taken by the Dutch at the trade factory in Dejima (Nagasaki), where pre-1880 three times per day temperature and pressure observations were taken in the 1820s, 1850s and 1870s, the latter overlapping by 6 months with the readings by the official Nagasaki meteorological station [2-4]. The Dejima data were extracted and analyzed jointly by the Dutch and the Japanese members of the project; the results were published in 2002/03 [3,4].

In the subsequent years, it was found that more pre-1880 instrumental series exist, hidden in forgotten or private Japanese archives. The discovery of these series, spread over the 19th century, changed the focus of the project: the first priority became the reconstruction of the 19th century climate on the basis of all recovered pre-1880 instrumental data. The analysis of these newly recovered series was published in 2006 [5,6]. Spread over the 19th century, eighteen years of the Tokyo and Nagasaki recovered temperature and pressure observations run parallel; these data turned out to be of sufficient quality to reconstruct from them the 19th-century summer and winter atmospheric circulation over Japan. The paper about it was published in 2009 [7] and marks for the moment the end of our attempts to reconstruct the Japanese climate of the 19th century on the basis of recovered instrumental data.

In the present project we return to the original focus: the reconstruction of the Japanese climate on the basis of documentary series. Documentary series are available from Saga (1703-1866) and Isahaya (1676-1868) and are suitable to reconstruct the climate of Kyushu; calibration of these series could be done via the data from the Diaries of the Chiefs of Dejima, which start in 1649. Figure 1 shows the positions of the towns on Kyushu relevant for the present study.

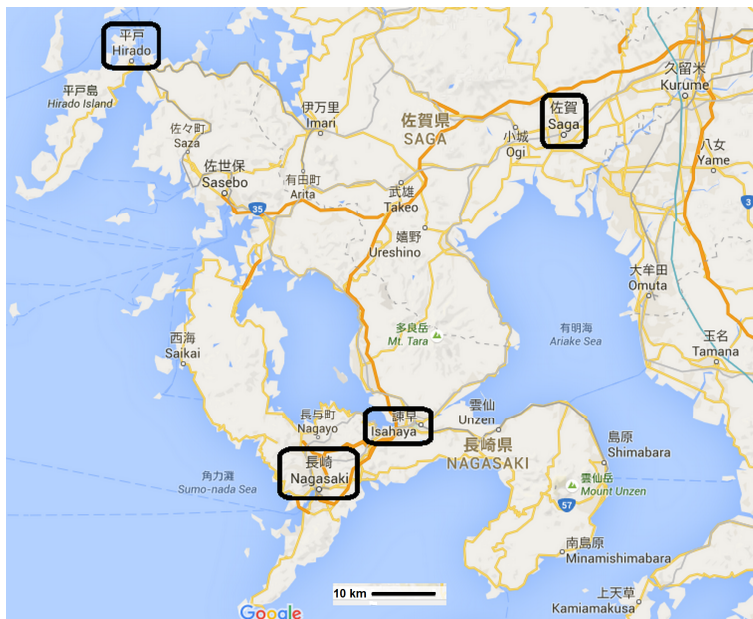


Fig. 1 Part of the westernmost Japanese island Kyushu. Black boxes point out the cities and towns mentioned in this report. Dejima was a small artificial island 190 m long and 75 m wide in the bay of Nagasaki, at a short distance (12 m) offshore, connected via a bridge with Nagasaki. At present Dejima is no longer an island but is part of Nagasaki.

The extraction of weather data from the Isahaya and Saga data has been assigned to the Japanese members of our group; the extraction and evaluation of the Dejima documentary data has been assigned to us. All extractions have been done from the original hand-written documents. Figures 2-4 highlight their varying quality.

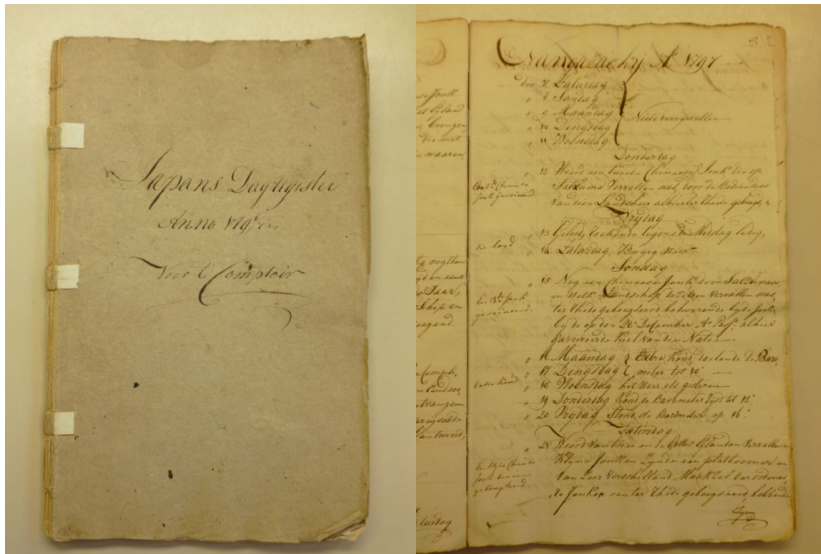


Fig. 2 Sample copy of an 18th-century legible page of the Chief's Diary (Dec 1797).

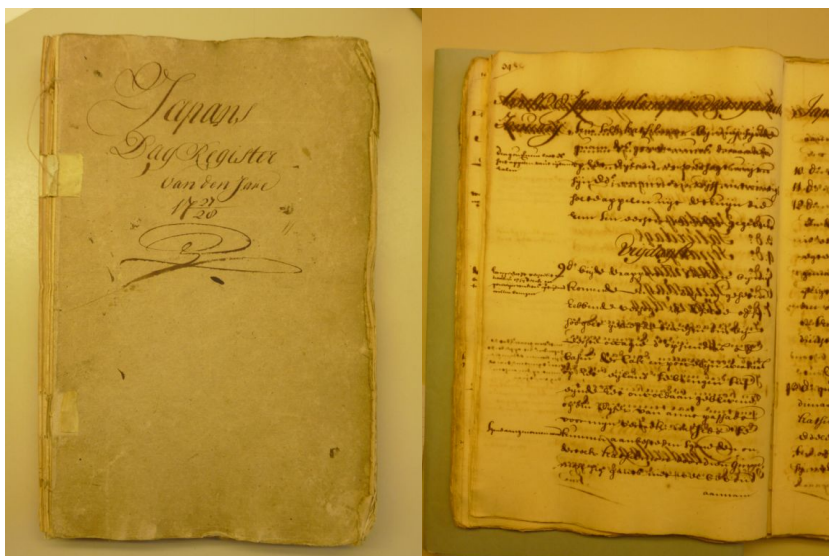


Fig. 3 Sample copy of an 18th-century difficult-to-read page of the Chief's Diary (Jan 1728).

2. Current project: exploration of the Chief's Diaries

2a. Pilot: Januaries 1700-1860

The purpose of the Chief's Diary project was:

- a. to explore how much meteorological information lies hidden in the Chief's Diaries, with emphasis on precipitation
- b. to investigate whether this amount suffices to contribute substantially to reconstructing quantitative information about the pre-1860 Japanese climate

In the Pilot project, only one month per year was extracted. We chose for January. The reason for that choice is that we knew [1] that the visually observed snowfall-ratio in January (the

percentage ratio of snowfall days to all precipitation days) provides a means to reconstruct the Kyushu winter temperatures. Although Diaries of the Dejima Chiefs run from 1649-1860, we limited in this Pilot the extraction to 1700-1860, the reason being the difficult legibility of the earlier documents.

Extraction took place from November 2009 till February 2010. We obtained special permission to examine the original Diaries in the Dutch National Archives in The Hague. During 9 man-days 147 Januaries were extracted. All available Januaries 1700-1860 were extracted, with the exception of 1710-1716. The archive number of the Dejima Chief Diaries is 1.04.21.

Table 1 shows the number of days with weather entries per January month. The count includes direct weather entries ('today rain') as well as weather related entries ('unloading of the ship was hindered by snow').

Table 1 Pilot project: Number of days with weather entries per January month (including wind).

	0	1	2	3	4	5	6	7	8	9		
164x	<i>Hirado</i>	<i>Hirado</i>	<i>Edo</i>	<i>Edo</i>	<i>Edo</i>	<i>Edo</i>	<i>Edo</i>	<i>Edo</i>	<i>Edo</i>	<i>Edo</i>	23	164x
165x												165x
166x												166x
167x												167x
168x												168x
169x												169x
170x	1	2	4	9	19	4	2	1	5	(0)*		170x
171x						--		0	1	0		171x
172x	<i>Acc</i>	<i>HInk</i>	<i>HInk</i>	4	<i>NotR</i>	0	<i>Acc</i>	4	0	8		172x
173x	3	3	4	5	0	2	1	5	0	0		173x
174x	0	2	1	0	5	6	9	1	1	0		174x
175x	4	5	7	0	6	0	0	7	6	4		175x
176x	2	0	0	31	5	3	9	14	8	2		176x
177x	5	19	16	9	4	9	16	17	3	7		177x
178x	5	13	10	4	11	12	13	14	0	16		178x
179x	8	1	0	4	3	17	11	12	--	21		179x
180x	21	0	0	0	<i>NoUse</i>	0	1	3	0	0		180x
181x	0	0	0	0	2	0	0	0	25	16		181x
182x	25	31	27	26	0	0	0	0	0	0		182x
183x	0	0	0	0	--	--	--	--	--	--		183x
184x	--	--	--	--	0	0	0	0	--	6		184x
185x	3	--	--	--	0	0	0	0	--	0		185x
186x	0	--	--	--	--	--	--	--	--	--		186x
	0	1	2	3	4	5	6	7	8	9		

-- : No January reports available (presumably lost)

Blank: Not checked

Hirado: Before the settlement at Dejima

Edo: No reports available because the staff travelled to Edo (Tokyo)

NoUse: Reports not readable (paper damage)

Blue: Extracted by APMB; **Red**: Extracted by GPK

NotR: Handwriting not readable for GPK

HInk: Heavy ink rot. Skipped for the moment by GPK, but may be readable for others.

Acc: only accessible after special permission – not yet explored

*: 1709 checked from 1-16; 17-31 still remains to be done

The overall result of the Pilot was as follows. Weather entries in the first half of the 18th century are scarce: on average only 3 per month (10% of the days). The second half of the 18th century contains on average 8 entries per month (27% of the days), with increased activity in the 1770s and 1780s. However even during that period the number of days with weather reports is typically less than 40%. The 19th century is almost void of weather entries, with as prominent exception 1818-1823, being the Januaries during Chief Cock Blomhoff's term of office. His January Diaries contain on average 25 entries per month (81% of the days).

The conclusion of the Pilot project is that in general the average density of the weather entries in the Dejima Chief's Diaries 1700-1860 is not high enough to contribute significantly to the reconstruction of the winter temperatures via the statistical analyses applied earlier on the Japanese documentary series [1]. However, for the last decades of the 18th century, the density seems high enough to serve as an independent comparison with the Isahaya and Saga documentary series. Figure 6 on p.8 gives an impression of the state of these Japanese diaries.

The other outcome of the Pilot is the completeness and quality of the weather entries during Chief Cock Blomhoff's term of office (1817-1823). This result initiated the follow-up extraction project described in Section 2b, later supplemented by the extraction of weather descriptions from the Von Siebold meteorological lists 1825-1828, described in Section 2c.

The complete result of the extraction within this Pilot is via the files described in Appendix A. The files includes the full text of all weather entries in (Old) Dutch and English as well as a summary table of these weather descriptions by day.

2b. Follow-up project: all month 1817-1823

In the follow-up project all months of from July 1817 till Dec 1823 were extracted. Again, the extraction took place from the original documents. The reason for exhaustingly extracting that specific period is that Chief Cock Blomhoff seemed particularly interested in weather: almost all his entries to the Diary contain a visual weather description. The main gaps in the series occur during the absence of the Chief from February to June 1818 and 1822, because of his obligatory journey to the Shogun's court in Edo (Tokyo), when his deputy (apparently less interested in the weather) took over the responsibility for keeping the Diary.

The Diaries contain mostly visual observations; quantitative temperature or pressure readings are scarce. However, a separate list of systematic temperature readings, 3 time a day, survived in the Von Siebold Archive of the University of Bochum and has been analyzed in an earlier stage of the project [4]. A similar list of pressure readings seems to be lost. In its raw form, the list of systematic temperatures may serve as a comparison with the temperatures mentioned in the Diaries; this raw version is included in the files of this Project.

As formulated by T. Mikami, the combination of the Chief's Diaries' visual data with the already homogenized instrumental Von Siebold/Cock Blomhoff temperature series [4] provides a detailed picture of the daily weather of the early 19th century, which is potentially suitable for comparison with and calibration of the long series of visual observations by Japanese administrators in Isahaya and Saga.

Extraction took place from January 2013 till March 2013. During 7 man-days the 77 months of Cock Blomhoff's stay in Dejima (July 1817 till November 1823) plus December 1823 were extracted in the National Archive of The Hague.

Table 2 shows the number of days with weather entries per month. The Table shows that the high density of weather entries of the Januaries of the Cock Blomhoff term found in the Pilot project, is typical for all Cock Blomhoff's months. Of the 72 months that Cock Blomhoff was in charge, there are 58 months containing at least 15 days of weather entries (>50% of the days) and 30 months containing at least 24 days with weather entries (> 80% of the days).

Table 2 Follow-up: Number of days with explicit weather entries per month Jul 1817- Nov 1823.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1817							8	2	4	0	1	^a 21	1817
1818	25	^b 18	^b 1	^b 8	^b 4	^b 8	23	19	13	9	7	17	1818
1819	16	19	21	21	16	28	30	27	27	29	30	30	1819
1820	25	24	22	19	28	17	22	29	29	31	30	29	1820
1821	31	27	24	16	18	19	22	20	28	23	19	5	1821
1822	27	^b 6	^b 0	^b 1	^b 2	^b 13	25	24	^c 15	27	25	25	1822
1823	26	17	16	22	15	11	26	26	29	29	^d 20	^e 0	1823
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	

^a6 Dec 1817: Start of Cock Blomhoff's term as Chief; ^bChief on journey to Edo; ^cChief was ill for 15 days; ^d22 Nov 1823: End of Cock Blomhoff's stay in Dejima; his last entry is on 21 Nov; ^eNew Chief in charge: De Sturler (till Aug 1826)

Blue: Extracted by APMB; **Red:** Extracted by GPK; **Blank:** not checked

The complete result of the extraction of this Follow-up project is accessible via the files described in Appendix B. The files include the full text of all weather entries in (Old) Dutch as well as summary tables (in English) of these weather descriptions by day. Files with the daily temperatures, which have been extracted earlier [4] from the Von Siebold Documents, have also been added to the database.

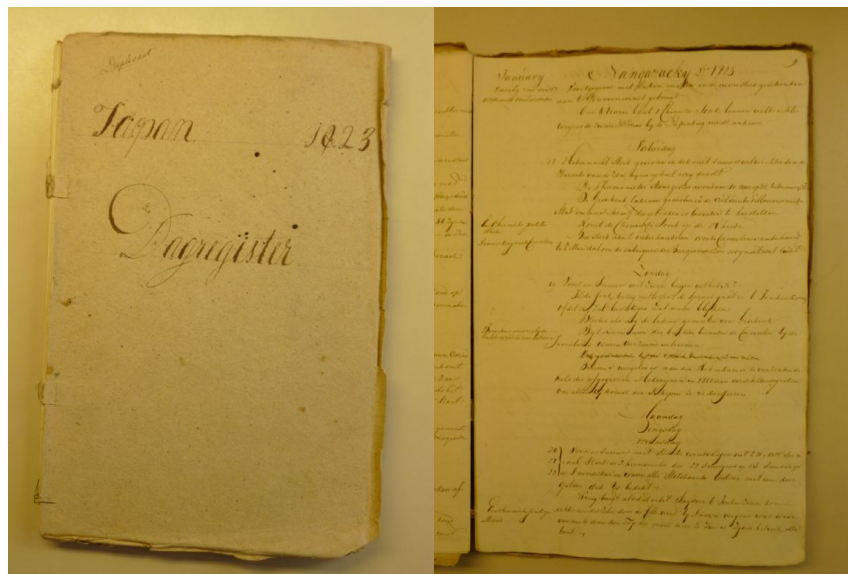


Fig. 4 Sample copy of Cock Blomhoff's Diary (Jan 1823).

2c. Supplemental project: Von Siebold 1825-1828

To supplement the data extracted from Cock Blomhoff's Diaries, we extracted all weather descriptions in the Von Siebold lists 1825-1828 (Fig. 5). The temperature, humidity and pressure from his lists have already been extracted and analyzed in an earlier stage of the umbrella project [4]; the present Supplemental project adds the weather data to it.

Table 3 summarizes the outcome of the Supplemental project. Note that virtually every available month has a 100% daily coverage.

Table 3 Supplement: Number of days with explicit weather entries per month 1825-1828.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1825	30	28	31	30	31	30	31	31	30	31	--	--	1825
1826	--	--	--	--	--	--	--	--	--	--	30	31	1826
1827	30	28	31	30	31	30	31	31	^a 29	31	30	31	1827
1828	30	29	31	30	31	30	31	31	28	--	--	--	1828
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	

--: Not available

Bold: thrice a day; Roman: once a day.

^a1-21 Sep thrice a day; 23-30 Sep: once a day

In combination with the extracted Diary data 1817-1823 the Supplemental project provides the most complete weather description for the period July 1819 till Nov 1828, leaving major gaps in 1824 and 1826.

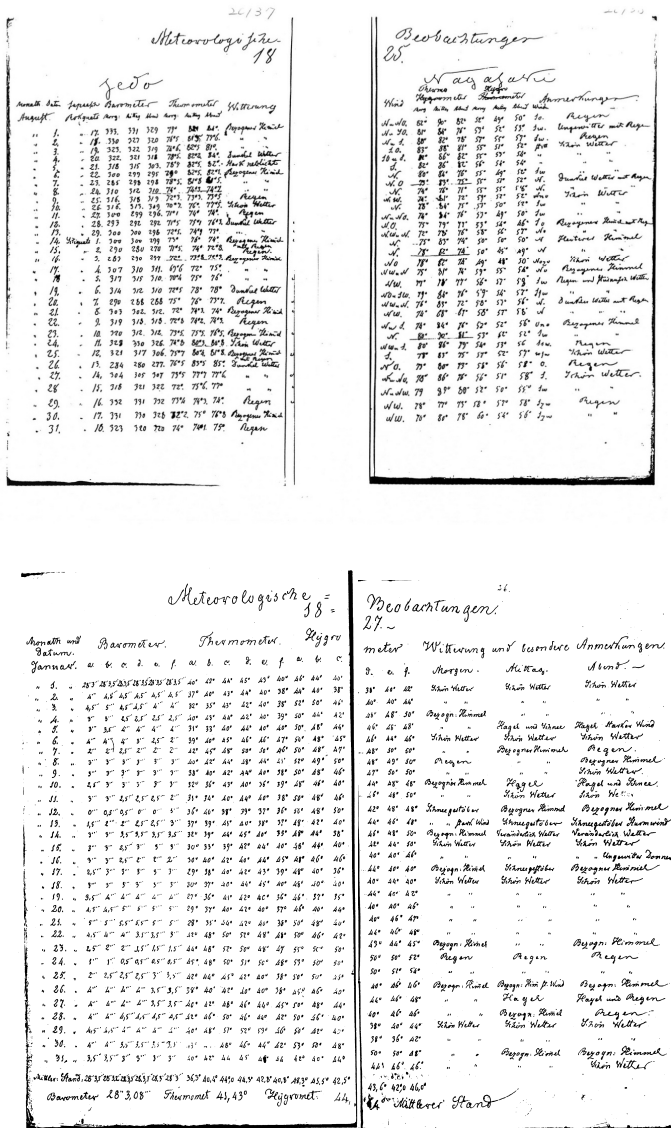


Fig. 5 Sample copies of the Von Siebold data, in his handwriting. Top: August 1825, with left Jedo (=Edo: Tokyo) and right Nagasaki (Dejima); bottom: December 1827, Dejima.

The complete result of the extraction of this Supplementary project, including a scan of Von Siebold's meteorological lists, is accessible via the files described in Appendix C. The files include the translations in English of the full descriptions of the weather observation by day. Files with the daily temperatures, humidity and pressure (from Nov 1826), which have been extracted earlier [4] from the Von Siebold Documents, are also added to the database. See [4] for unit issues and correction factors to be applied to the raw data.



Fig. 6 Sample copy of the Saga Diary. The page is from the 18th century.

3. References: papers that have appeared as result of the Japan-KNMI co-operation since its start in 1998 (Chronological order).

NB: All papers can be downloaded from www.guntherkonnen.com

- [1] T. Mikami, M. Zaiki, G.P. Können and P.D. Jones , “Winter temperature reconstruction at Dejima, Nagasaki based on historical meteorological documents during the last 300 Years”, Proceedings of the International Conference on Climate Change and Variability, Tokyo, Japan, September 13-17, 1999, by Tokyo Metropolitan University (Ed. T. Mikami), pp 103-106. Tokyo: International Geographical Union. (2000)
- [2] G.P. Können, M. Zaiki, and T. Mikami, “Recovery of early 19th century meteorological observations in Japan”, Proceedings of the International Conference on Climate Change and Variability, Tokyo, Japan, September 13-17, 1999, by Tokyo Metropolitan University (Ed. T. Mikami), pp 101-102. Tokyo: International Geographical Union. (2000)
- [3] M. Zaiki, T. Tsukahara, T. Mikami, and G. P. Können, “Instrumental Meteorological Records at Dejima, Nagasaki, in the 19th Century (in Japanese), Geographical Review of Japan (Ser. A), **75**, 901-912 (2002)
- [4] G.P. Können, A.P.M. Baede, M. Zaiki, T. Mikami, P.D. Jones, and T. Tsukahara, “Pre-1872 extension of the Japanese instrumental meteorological observation series back to 1819”, J. Climate **16**, 118-131 (2003)
- [5] M. Zaiki, G.P. Können, T. Tsukahara, P.D. Jones, T. Mikami, and K. Matsumoto, “Recovery of 19th century Tokyo/Osaka meteorological data in Japan”, Int. J. Climatology **26**, 399-423 (2006)
- [6] M. Zaiki, G.P. Können, P.D. Jones, T. Tsukahara, “Database of the 19th century instrumental meteorological records in East Asia and its application for studying past climate variability” (in Japanese), Research Bulletin of Asahi Breweries Foundation **19**, 129-135 (2006)
- [7] M. Zaiki, G.P. Können, K. Kimura, T. Mikami, and T. Tsukahara, “Reconstruction of historical pressure patterns over Japan using two-point pressure–temperature datasets since the 19th century, Climatic Change **95**, 231-248 (2009)

APPENDIX A:

File descriptions of the Pilot project (Januaries 1700-1860)

File: 1700-1860_Januaries_Text.doc

Contents:

For the periods 1700- 1709, 1717-1860:

- transcriptions of all January texts referring to weather events (in old Dutch)
- translation of these texts in English

File: 1700-1860_WEATHER_Januaries.xtl

Contents:

For the periods 1700-1709, 1717-1860:

Columns are (by day):

- indicator for rain, snow, hail or thunder occurrence
- compressed Diary text about weather (in English)
- wind direction
- wind speed in Beaufort
- temperature
- pressure
- ice thickness
- snow thickness
- remarks (including earthquakes, eclipses, fires etc.)

File: 1700-1860_Januaries_Weather_#entries_per_month.doc

Contents:

For the periods 1700-1709, 1717-1860:

- summary table displaying the number of days per month with weather description

APPENDIX B:

File descriptions of Follow-up project (all month 1817-1823)

File: 1817-1823_Blomhoff_Diary_Texts.doc

Contents:

For the period 1817-1823:

- transcriptions of all January texts referring to weather events (in Old Dutch)
- compressed translations of these texts in English are in the xtl files, below

Files:

1817_WEATHER_Blomhoff_Diary.xtl

1818_WEATHER_Blomhoff_Diary.xtl

1819_WEATHER_Blomhoff_Diary.xtl

1820_WEATHER_Blomhoff_Diary.xtl

1821_WEATHER_Blomhoff_Diary.xtl

1822_WEATHER_Blomhoff_Diary.xtl

1823_WEATHER_Blomhoff_Diary.xtl

Contents:

For the period 1817-1823:

Columns are by day for each year/month:

- indicator for rain, snow, hail or thunder occurrence
- translation of the Diary text about weather into English

- wind direction
- wind speed in Beaufort
- temperature
- pressure
- ice thickness
- snow thickness
- remarks (including earthquakes, eclipses, fires etc.)

Files:

1818_TEMP_Blomhoff-Siebold lists.xtl
 1819_TEMP_Blomhoff-Siebold lists.xtl
 1820_TEMP_Blomhoff-Siebold lists.xtl
 1821_TEMP_Blomhoff-Siebold lists.xtl
 1822_TEMP_Blomhoff-Siebold lists.xtl
 1823_TEMP_Blomhoff-Siebold lists.xtl

Contents:

For the period 1818-1823

- Daily temperatures Morning, Midday, Evening: outside and inside house as recorded by Cock Blomhoff 1818-1823

- These data has been extracted by M. Zaiki from the Cock Blomhoff/Von Siebold files (see, for details [4])

APPENDIX C:

File descriptions of Supplementary project (Siebold files, all month 1825-1828)

File:

1825-1828_Siebold_Documents.pdf

Contents:

Scan of the original 1825-1828 Von Siebold meteorological lists [Von Siebold Docs 20118-20239]

Columns are by day for each year/month:

Files:

1825_WEATHER_Siebold_lists.xtl
 1826_WEATHER_Siebold_lists.xtl
 1827_WEATHER_Siebold_lists.xtl
 1828_WEATHER_Siebold_lists.xtl

Contents:

For the period 1825-1828:

Columns are by day for each year/month:

- weather
- wind direction
- wind force

Files:

1825_TEMP_Siebold_lists.xtl
 1826_TEMP_PR_Siebold_lists.xtl
 1827_TEMP_PR_Siebold_lists.xtl
 1828_TEMP_PR_Siebold_lists.xtl

Contents:

For 1825:

Columns are by day for each year/month:

- subdaily temperature, humidity

For the period 1826-1828:

- subdaily temperature, pressure, humidity

NB: There are two tabs referring to Sept 1827. This is because of a change of observation schedule from 22 Sept onward.

APPENDIX D:

Background files

File: Dictionary of archaic weatherterms.doc

Contents:

For the period 1818-1823:

- description of Old Dutch weather terms
- translation of these terms in English

File: Dictionary of common weather terms.doc

Contents:

For the period 1818-1823:

- description of present-day Dutch weather terms, as used in the Diary
- translation of these terms in English
- description of Old Dutch wind speed terms, as used in the Diary
- translation of these terms in English
- key to our coding of these terms in Beaufort while compiling the Excel files
1817_WEATHER_Blomhoff_Diary.xtl, 1818_WEATHER_Blomhoff_Diary.xtl etc.

For a complete listing of KNMI-publications including PDF-files for the most recent ones, please check

<http://bibliotheek.knmi.nl/knmipub.html>

