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Daily temperature observations in Florence at the mid-eighteenth century: the Martini series (1756–1775)

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Abstract
In the framework of the meteorological observations in Florence after the Medici Network (1654–1670), the earliest surviving record by Pietro Gaetano Grifoni (1751–1766) was followed and partially overlapped by the temperature series by Luca Martini (1756–1775), which has been recovered from different sources and analyzed in this paper. Martini series should be divided in two periods, the turning year being 1765, when he changed house, still in Florence. A critical data analysis and the comparison with the Grifoni contemporary series in Florence clarify the thermometric liquid and scale used in the different periods. The reconstruction of the 1756–1775 daily average temperatures is carried out here following a methodology that includes the conversion from the apparent solar time to the Central Europe Time; the transformation from single/double readings to a daily average; the analysis of the hourly temperature variation during the calendar year in the 1961–1990 reference period in Florence; the test made with the snow benchmark; and the correction of the bias due to the local microclimate in the first period. The final series (1751–1775) has been composed combining Grifoni and Martini observations, covers one quarter of the eighteenth century, and constitutes the only surviving outdoor temperature record in Florence. The comparison with other periods from the mid-seventeenth to the early-twenty-first century confirms that in the mid-eighteenth century, the temperature reached the lowest levels and that a marked warming has characterized the most recent decades. Information on the pre-industrial climatology in Florence can be useful for climatic change study.

Keywords Temperature series · Early instrumental records · History of meteorology · Climate change

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1 Introduction

Early instrumental records are especially precious for their exceptional informative content and are extremely important for climate change study. However, ideas, instruments, and observation protocols were under development, and metadata are scarce. Therefore, their recovery and analysis require well-focused and accurate historical, physical, and mathematical investigations to recognize and correct drawbacks and extract the climate information. Moreover, it is fundamental to preserve the original values: any correction needs to be supported by clear evidence and its application has to be evaluated carefully, case by case.

This paper concludes the series of temperature observations in Florence during the eighteenth century. As it is well known, the development of the meteorological instruments and the earliest observations in Florence in the seventeenth century, i.e. the Medici Network, have been carefully considered from the historical point of view (Maracchi 1991; Crisci et al. 1998; Galluzzi 2001; Vergari 2006; Borchi and Macii 2009). On the other hand, the data concerning the temperature observations from 1654 to 1670 (Camuffo and Bertolin 2012a), as well as the survived records by Leonardo Ximenes in 1752 (Ximenes 1753) and by Pietro Gaetano Grifoni from 1751 to 1766 (Guadagni 1767; Camuffo et al. 2020), have been already recovered and published. However, the observations taken in the second half of the eighteenth century, by Luca Martini, Alessandro Bicchierai, and other minor observers, e.g. Giuseppe Cavallini di Cevoli, are still unexploited. The aim of this paper is to explain the used methodology and conclude the recovery, correction, and analysis of the daily temperature series in Florence by Luca Martini and compare it with the one by Pietro Gaetano Grifoni over the common period.

An overview of the early temperature observations in Florence in the seventeenth and eighteenth centuries, recovered and analyzed data, is summarized in Table.ESM1 and will be explained in the next sections.

2 The observers

2.1 Luca Martini

The biographical information on Martini is scarce: his birth and death dates are even unknown. He was a renamed medicine doctor at the Santa Maria Nuova Hospital in Florence and published several papers about general illness or specific case studies. He was also a botanist and in 1756 he become member of the Florentine Botanical Society where he was secretary from 1776 to 1770 and from 1775 to 1783, when the Society was dissolved by the Grand Duke Pietro Leopoldo. When he became a member of this Society, he took regular temperature and pressure observations as well as daily weather notes. The data were used to interpret agricultural challenges and crop production. Martini published the first period, from November 1756 to June 1765, in tabular form in a book about climate, agriculture, and plagues (Targioni-Tozzetti 1767). In this period, he lived in the city center, and then he moved to another house in a better ventilated area on the other side of the Arno River. He continued to publish his readings in a medical book series (Targioni 1773, 1775a, b, 1778), with a specific attention to the relation between climate and epidemics. The temperature was measured both indoors and outdoors, but at different sampling times. During the whole observation period, Martini changed house and instruments as explained in Sections 3.2 and 3.4, and he also made some tests to evaluate the temperature difference between two outdoor sampling locations in his first house, the loggia and the free air outside a window. The early part of the Martini observations (1756 to 1766) overlaps with Grifoni, but readings were taken at different hours. The daily averages calculated from these independent observers will be compared to ascertain their correspondence and obtain a sound temperature record.

Schouw (1839) considered Martini readings of the period 1757–1765 and published only the averages, the absolute minimum and maximum values at monthly and seasonal level. Anyhow, he evaluated Martini readings hardly reliable for the following reasons: the readings at 11 p.m. were taken indoors in the library; the readings taken outdoors in the loggia were considered not adequately ventilated, because the difference between the yearly average temperatures at 7 or 8 a.m. and 1 p.m. was too low compared to other contemporary observers, i.e. −1.57 °R according to Martini, while Chiminello in Padua measured −3.57 °R at the same hours (Toaldo 1781); similarly, the difference between the measured values at 7 a.m. and midday was −4.04 °R according to the Ximeniano Observatory in Florence. Finally, Schouw criticized that the thermometric liquid was wine spirit that was known to have strong departures from mercury thermometers (Camuffo and della Valle 2016).

2.2 Alessandro Bicchierai

In 1762, Martini proposed a younger colleague, the medicine doctor and physician Bicchierai, to become a member of the Florentine Botanical Society and encouraged him to continue with the meteorological readings. In reality, Bicchierai continued the Martini record from 1775 to 1795 when he was 61 years old; he died in March 1797. Only 3 years survived: the manuscript logs concerning 1775 and 1795, still kept in the Archives of the Society, and 1794 that was published (Bicchierai 1795). The metadata concerning the thermometer location are scarce and have been collected in previous studies (Vergari 2006; Vergari et al. 2013). However, it is reported that he read a Fahrenheit thermometer six times a day, two in the morning and four in the afternoon. The location was the Santa Maria Nuova Hospital, where Bicchierai worked. The logs report that the thermometer was hung to a window, but very probably on the internal side. This choice is justified by two reasons: the first is that Bicchierai likely selected the coldest room of the hospital to cope with the directives of the Royal Society, London (Jurin 1723); the second is that indoor measurements were intended to be useful to interpret the illness of hospitalized people, being representative of their environment. This interpretation is supported by the fact that the Gran Duke Pietro Leopoldo of Tuscany wanted to promote the hospital as a laboratory for healthcare, teaching, and research (Vergari et al. 2013).

2.3 Giuseppe Cavallini di Cevoli

Cavallini was a medicine doctor in the same Santa Maria Nuova Hospital, charged of documenting and commenting the illness and the surgical operations. Cavallini (1779) published monthly averages from January 1776 to December 1778 in tables including air temperature (°F), atmospheric pressure, main winds, the number of males and females who came into the hospital, the number of people who came out alive and who died, and forms of illness. There is no specification, but the recorded temperature was very likely taken indoors, representative of the rooms where patients lived. The facts that (i) this period falls within the period of the Bicchierai observations; (ii) the measurements were taken in the same hospital with a Fahrenheit thermometer; and (iii) Cavallini was a young colleague of Bicchierai lead to conclude that Cavallini published the data taken by Bicchierai or, more likely, he assisted Bicchierai in this task. Moreover, Cavallini took some other temperature observations to complete the medical records of his patients. Cavallini died in 1791 and Bicchierai continued the measurements for 4 years.

3 The original observations

The observations of Bicchierai and Cavallini were taken indoors with medical aims and are not representative of the outdoor climate, except for some short periods. Therefore, they will be disregarded in this paper, except for some spot checks to the Martini series using Cavallini (ESM6).

After Grifoni, Martini is the only observer useful for weather purposes. He observed for 19 years and 2 months, and only 77 days, i.e. about the 1% of the total, had missed the three readings, while for 96% of the days, at least two observations are available. Missing periods were mainly December 1762 and January 1763 when Martini went to Ferrara (Targioni-Tozzetti 1767). In June 1765, when Martini changed house, there were no gaps. The last reading reported in the record is dated 17 June, but in the same book, it is specified (page 130) that Martini inhabited in his first house until the end of May. Therefore, the readings of June should be attributed to the second location.

Despite the regularity in observing, the situation is rather complex, based on a number of sources, two locations, indoor and outdoor exposures, wine spirit and mercury thermometers, use of apparent solar time, three main reading times and one with seasonal adjustment, and some control tests and weather notes; all these features will be explained and discussed in the next sections.

3.1 The Martini record: sources and covered periods

1 November 1756 to 17 June 1765 Giovanni Targioni-Tozzetti was a botanist and medicine doctor at the Santa Maria Nuova Hospital, colleague and friend of Martini. On request of the Grand Duke of Tuscany, he published an important book, entitled "*Alimurgia*" that means food from plants in periods of famine (Targioni-Tozzetti 1767), where he reported the description of the climate of Tuscany, famines, plagues, and extreme weather events over the last six centuries. In that period, the connection between the outbreaks of epidemics and weather conditions, as well as between climate and agriculture, was a crucial topic of high social relevance. The third part of *Alimurgia* contains 9 years of temperature and pressure readings and weather notes, taken by Martini, from 1 November 1756 to 17 June 1765. The end date was likely determined by printing reasons and schedule, because the 17 June filled the last line of the page. The unbroken record for 1765 was reported in another book (Targioni 1773).

In *Alimurgia*, the main information related to the Martini series was specified, such as locations, exposures, thermometer types, and sampling times as discussed in the next sections. The data are reported in tabular form and pages are organized in two main columns (Fig.ESM1). Each of them is further divided in five columns. The first column reports the date (year/month/day), the next three the temperatures recorded the same day at 8 a.m., 1 p.m., and 11 p.m., respectively. In the last column, under the heading "*Temporali*" (weather notes), there are some letters indicating meteorological phenomena, such as rain (P, *pioggia* in Italian), snow (M, *neve*), hail (G, *grandine*), wind (V, *vento*), and clear sky (S, *sereno*). Readings were reported with 0.25 °R (i.e., 0.31 °C) resolution, where the fractional parts are indicated with dots; e.g., one dot means 0.25 °R, two dots 0.5 °R, and three dots 0.75 °R (Fig.ESM1). Moreover, the dagger symbol † before a number indicated a negative value, i.e. below the freezing point.

A few years later, Targioni-Tozzetti had to defend his book against some criticisms and published another book, entitled "*Analisi e difesa della celebre opera intitolata Alimurgia*," i.e. analysis and defense of the famous book entitled *Alimurgia* (Targioni-Tozzetti 1767). In this book, he specified that the zero of the Réaumur thermometers was "the point of ice". This is an ambiguous statement because it does not clarify whether it was for melting ice (i.e., 0 °C) or freezing water with salt mixtures (i.e., −1 °C). This has been established with the snow benchmark (Section 4.4).

On April 6 and October 4, 1766 Martini wrote two letters to Giovanni Targioni-Tozzetti (Martini 1766a,b) where he specified that the thermometers had never been moved from their positions for the whole period. He intended the whole period considered in the publication, i.e. from November 1756 to May 1765, before he changed house.

1765–1775 The data from January 1765 to December 1775 were collected in a medical journal entitled "*Raccolta di opuscoli medico-pratici*" cured by Luigi Giovanni Targioni, a medicine doctor and scientist. They were published in a tabular form, in four booklets, with some differences with respect to the previous period. Each page was composed of five columns, reporting the date, the hour, the temperature reading, the barometer reading, and finally the weather notes. The two daily readings, at 8 a.m. and 1 p.m. respectively, were placed in two subsequent rows (Fig.ESM2).

Targioni (1773) included the 1765–1772 record; Targioni (1775a) reported the year 1773; Targioni (1775b) the year 1774, and Targioni (1778) the year 1775. The late evening readings were reported only in 1775. Moreover, in 1775, the three daily readings returned to be printed in the same row and the weather notes were moved to the 5th column, while the last one was for the barometer readings (Fig.ESM3).

3.2 Locations and exposures

Historical maps of Florence were consulted to individuate the urban context of the locations and possibly the buildings where Martini observed. Two maps were particularly useful. The first map was drawn and copper engraved by Wenzel Hollar von Prachna (Hollar 1660) with size 45.5 × 74 cm (Fig. 1a, b). The urban context reproduces the situation in 1584, with the details of the churches, palaces, and the most relevant buildings, and an overview of the minor ones, including gardens and other green areas. The second map was drawn by Ferdinando Ruggieri (1731) with size 50 × 68 cm; it is less detailed, but reports the street names and the contemporary urban context.

From November 1756 to the end of May 1765, Martini took readings in his first house in Ginori Street, a small street 240 m long, in the city center, located 400 m west of Servi Street where Grifoni was taking temperature readings as well (Guadagni 1767; Camuffo et al. 2020). The building remains unknown. Targioni-Tozzetti (1767) and Martini in his second letter (Martini 1766b) specify that in Ginori Street, the outdoor thermometer for the daytime

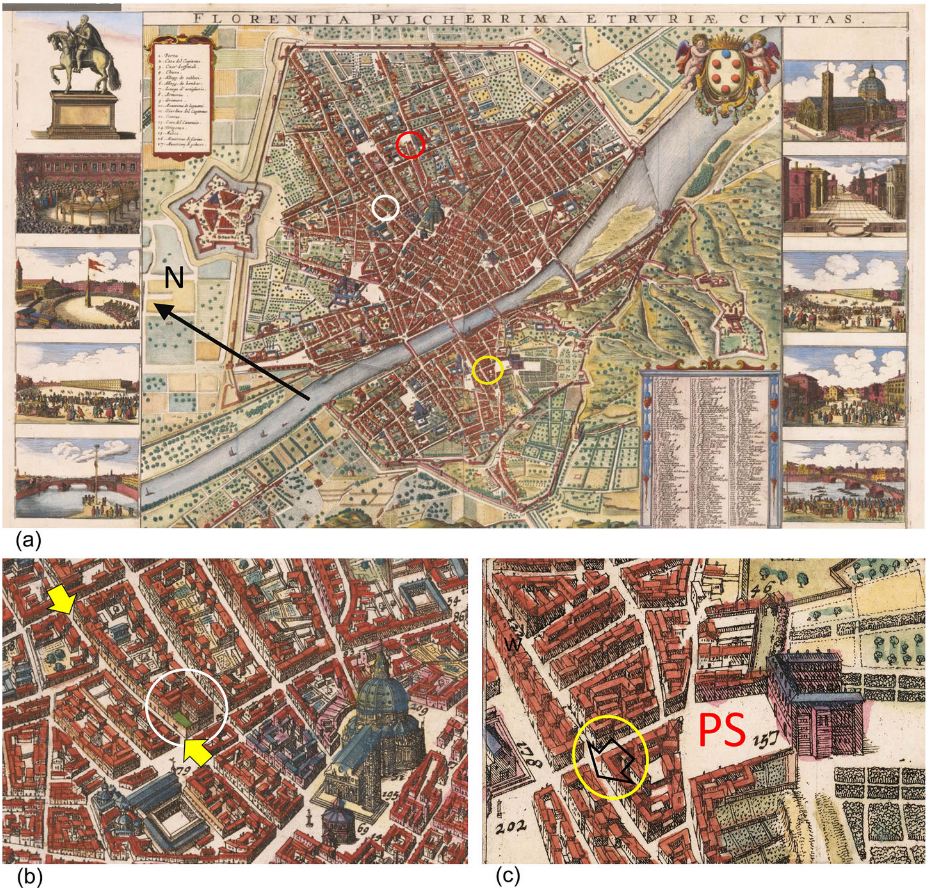

Fig. 1 **a** Map of Florence (Hollar 1660) indicating the Grifoni house in Servi Street (red circle), Martini house in Ginori Street (white circle), the 2nd Martini house near Pitti Square (yellow circle). North is 300° oriented. **b** Detail showing Ginori Street (arrows) and encircled the most likely building. **c** Detail of Pitti Square (PS) and encircled the most likely building. The arrow points the Ridolfi house in front of the Martini window

readings was located in a loggia and the indoor thermometer for the late evening readings in the library. Martini in his second letter (Martini 1766b) confirms that the thermometers were always kept in the same positions.

In the second period, i.e. from June 1765 to 1775, Martini took readings near Pitti Square (Targioni-Tozzetti 1767; Martini 1766b). This is a better ventilated area in the border of the town, beyond the Arno River, surrounded by small hills and vegetated landscape. Targioni (1773) wrote that the outdoor thermometer was shielded, exposed outside a window facing west. In particular, in the second letter (Martini 1766b), Martini specified that the window was in front of the portico of Mr. Ridolfi. The Ridolfi family was rich and famous, and had some buildings in Maggio Street. One of them was with a portico, close to Pitti Square in front of Marsili Street, which suggests that the Martini house was in the corner between these two streets (Fig. 1c), because his library had a wall facing east and south (Targioni 1773). In this period, the outdoor readings were taken and published regularly, but not the indoor ones.

3.3 Reading times

Time was expressed in apparent solar time (AST), i.e. the sundial time, and the reading time is associated to each reading. Martini observed the outdoor thermometer in the early morning, i.e. at 8 in the winter and 7 a.m. in the warm season from May to September, and 1 h after noon. From 1758 to the end of May 1765, he measured in his library in the late evening at 11 p.m. (Targioni-Tozzetti 1767). After he moved, the indoor readings continued to be taken, at least for 1766 (Martini 1766b), but they were not published, probably because the indoor values were considered irrelevant for agriculture and public health. Only in the last year, i.e. 1775, the indoor measurements were published again (Targioni 1778).

Of course, the observing time was regulated with the solar culmination, e.g. sundial; therefore, for the data analysis and in particular the reconstruction of the daily averages, the readings have been transformed from AST to Central Europe Time (CET) with the equation of time and in addition the departure from the First Meridian for the longitude of Florence has been considered, as already made for the series of Padua (Camuffo 2002) and, more recently, for the Grifoni record in Florence (Camuffo et al. 2002a, b, c).

3.4 Thermometer location and identification

A key point is to identify the thermometers used by Martini, in particular if they were two or three (Fig. 2 and Table.ESM2), and their characteristics.

In *Alimurgia*, Targioni-Tozzetti (1767) wrote that Martini in the first period used two Réaumur thermometers (Fig. 2): one of wine spirit (WS-A) for the outdoor readings in the morning and early afternoon, and one of mercury (Hg-B), carefully purged for air to remove imperceptible bubbles, for the evening readings in the library.

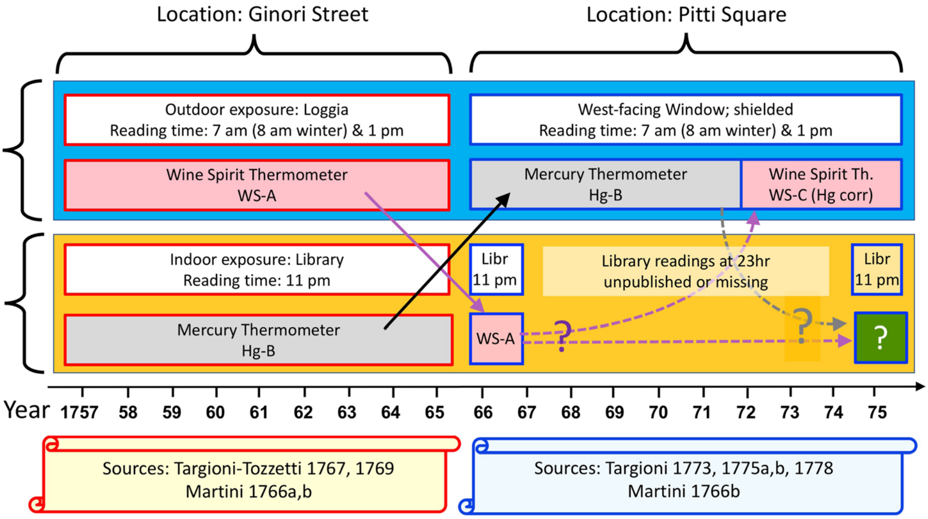

Fig. 2 Overview of the Martini record, i.e. main sources, locations, outdoor and indoor exposures, and thermometers. Red border for the first location; blue for the second one. Continuous-line arrows indicate thermometer relocations; broken-line arrows possible relocation. Lib for library; WS for wine-spirit and Hg for mercury thermometer

In his second letter to Giovanni Targioni Tozzetti, Martini (1766b) specified that after the move, he exchanged the indoor thermometer (Hg-B) with the outdoor one (WS-A). The thermometer WS-A that was kept in the loggia of his previous house was exposed in the library of the new house for the evening readings; on the other hand, the mercury thermometer Hg-B that was in the library of his previous house was then exposed out of a window. There is no explanation why the two thermometers were exchanged between them, but in the mid-eighteenth century, the thermometers were not weatherproof and it is possible that the vulnerable tablet of WS-A in the loggia was deteriorated by temperature and humidity cycles, although it was shielded from rain.

In other publications (Anonymous 1771; Targioni 1773), it was reported that the 1769–1770 outdoor readings were taken with a precise Réaumur mercury thermometer, likely the thermometer Hg-B. Nothing is reported about the thermometers used for the years 1773, 1774, and 1775 (Targioni 1775a, 1775b, 1778).

In January 1772, Martini made a further change: Hg-B was substituted with a wine-spirit thermometer (named WS-C), having the same response of Hg-B (Targioni 1773), i.e. without departure from linearity. Was WS-C WS-A or a third thermometer? It is unclear why Hg-B was changed. It is unlikely that it was accidentally broken because the change was made at the turn of the year that seems a deliberately planned change; e.g., the wooden tablet with the ink marked scale on a glued strip chart was deteriorating after 5-year exposure to weather. One might hypothesize that Martini simply exchanged the positions of the thermometers to keep Hg-B protected inside and placed WS-A outside. This suggests that the thermometers were only two, hence that WS-C was WS-A, and in such a case, there is no need to correct WS-A for the departure from linearity. On the other hand, if Hg-B was damaged too much, Martini was obliged to buy another thermometer, i.e. WS-C, and leave WS-A in the library. Another possibility is that both thermometers, WS-A and Hg-B, were deteriorated after the outdoor exposure, and that Martini restored WS-A by changing the wooden tablet, or simply the glued strip chart with the ink marked scale, by direct comparison with Hg-B, which explains why Targioni (1773) defined it to be exactly correspondent to the mercury, suggesting that WS-C is the previous WS-A restored and recalibrated with Hg-B. After a gap, the library readings were published again only for the year 1775 (Targioni 1778), but without specifying the thermometer type. The indoor readings are not of particular interest by themselves, but they are useful to understand how the thermometers were managed, and whether they were two or three. In conclusion, the historical analysis is not sufficient to identify the thermometers and the solution is given later, extracted from the readings, that have been analyzed to assess whether WS-A and WS-C were really not affected by departure from linearity.

3.5 Thermometer scale

As known, in the 1730s, Réaumur produced some wine-spirit thermometers, nicknamed "true Réaumur," with a special calibration that corresponded to 0 °R at the freezing point of artificial ice and 80 °R at the boiling point of wine spirit, and since 1739, the upper calibration was changed with the boiling point of water. The thermometers used by Martini were Réaumur of the second generation for three reasons: the date, i.e. 18 years after the "true" was abandoned; the fact that nobody in Italy used the early type, while the second is documented since 1740; the consistency of the data, because the difference between the "true" and the later Réaumur thermometers exceeds 5 °C in the summer (Camuffo 2020).

The wine-spirit thermometers calibrated at the two fixed points of water suffer from the departure from linearity of ethyl alcohol, and the departure increases if there is some water diluted inside (Camuffo and della Valle 2016). The bias is especially relevant for the warm period and must be corrected. Another possibility is to calibrate thermometers making reference to some selected temperatures read on a mercury thermometer dipped in the same bath (Toaldo 1775; Cavendish et al. 1777). With this latter methodology, wine-spirit thermometers respond like a mercury thermometer and do not need corrections. However, the scarcity of metadata does not help to establish which calibration was made. Martini, Targioni-Tozzetti, and Targioni were convinced that all Martini's thermometers were of excellent quality, carefully calibrated and with identical readings. As the thermometers were placed in different indoor and outdoor locations, and read at different times of the day and the night, it was almost impossible that they noticed whether the wine-spirit thermometer had departures from linearity. However, an intriguing note was found in Targioni (1773) when he presented the data taken in the second house, reporting that Martini used a mercury thermometer since the end of the year 1771 and after he used a wine-spirit thermometer exactly correspondent to the mercury. This might be interpreted as this wine-spirit thermometer was calibrated by direct comparison with the mercury thermometer but this hypothesis will be verified in the next sections.

In his defense book, Targioni-Tozzetti (1767) specified that the zero of the Réaumur thermometer was "the point of ice". Today we know that water changes physical state at 0 °C, but at that time, there were two possibilities: the melting point of natural ice at 0 °C that was possible only in the winter, and the freezing point determined when ice crystal started to form on the bulb, obtained with ice artificially formed with salt mixtures. It occurred at −1 °C (De Luc 1772) and it was proposed by Réaumur (1730, 1731) to make calibrations in all seasons. The specification that the thermometer had the known Réaumur scale with the freezing point means that the scale was between −1 and 100 °C, divided into 80°, as in the case of Grifoni (Camuffo et al. 2020).

4 Data analysis

4.1 Identification of the thermometers used by Martini

Martini used some thermometers and it is crucial to identify them in order to apply corrections, if necessary. To clarify the situation, the original readings were visualized and analyzed under different hypotheses. The two key hypotheses (H1, H2) concerning the calibration of a wine-spirit thermometer are as follows: (H1) Was it calibrated at the two fixed points and does it need correction for the departure from linearity? (H2) Was it calibrated making reference to a mercury thermometer, hence any correction is needed?

In Fig.ESM4 and 5, the whole Martini series at 7/8 a.m. and 1 p.m. AST are shown, with the only difference that in the period 1756–1765, the thermometer WS-A was considered under the hypotheses H1 and H2, respectively. In Fig.ESM4, the marked homogeneity break in 1765 might be attributed to the change of house, but the temperatures at 7/8 a.m. (Fig.ESM4a) are too high for that hour in Florence, in particular the maxima. Therefore, the data analysis indicated that the thermometer WS-A in the loggia was more likely calibrated making reference to a mercury thermometer.

In Fig.ESM6 and 7, the Martini observations at 7/8 a.m. are compared to the ones by Grifoni at 9 a.m. in the common period 1756–1766, under the two hypotheses H1 and H2, respectively. This further comparison reinforces the hypothesis of a wine-spirit thermometer calibrated making reference two mercury. One may object that readings were taken at different hours and locations. But, concerning the sampling time, temperature at 7/8 a.m. in the morning cannot be higher than the one at 9 a.m. in any moment of the year; therefore, the higher values of the Martini series might be attributed to the different location. Anyhow, a difference up to 7 °C is definitely not acceptable, as both the locations were outdoors under a loggia.

In conclusion, the most likely hypothesis is that the thermometer WS-A, like WS-C, was calibrated making reference to a mercury thermometer. This also likely suggests that WS-A and WS-C were the same thermometer or had the same characteristics.

4.2 Reconstruction of daily average temperatures

The identification of the most likely thermometers used by Martini was the prerequisite for the data analysis, that included the following steps, as already made for Grifoni (Camuffo et al. 2020).

(i) Modern temperature unit: all the readings have been transformed into Celsius degrees.
(ii) Modern time unit: all the reading times have been transformed from AST to CET.
(iii) Evaluation of the correction needed to transform readings made at each particular AST sampling time into values homogeneous to modern temperature records at CET (Fig. 3a). The reference period 1961–1990 has been expressed in matrix form in order to assess the

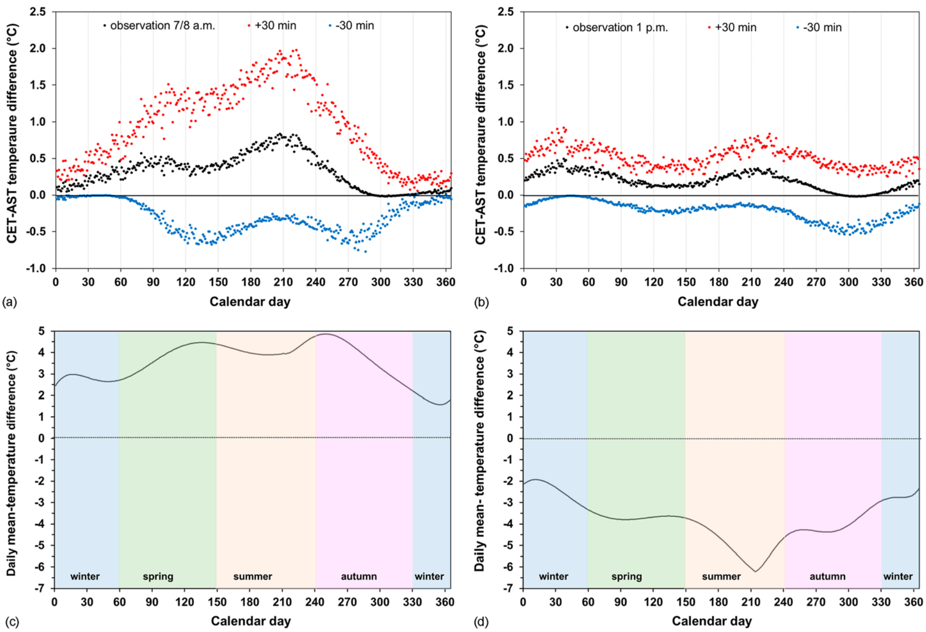

Fig. 3 Bias for the AST and CET time reference. **a** Mean temperature difference calculated over the calendar year between readings taken at 7/8 a.m. CET (modern clock) and AST (Martini with sundial) in Florence (black dots) for the reference period 1961–1990. Red dots: reading 30 min after the observation hour; blue dots: reading 30 min before the observation hour. **b** As in **a** but for 1 p.m. CET and AST

daily temperature cycles over the calendar year and the related temperature changes from 1 h to another in order to reconstruct the daily averages.

(iv) All the original readings have been corrected to get a homogenous set of temperatures to be compared with modern records.

(v) From the daily temperature cycle observed over the calendar year in the reference period, the corrected a.m. readings have been used to reconstruct the daily averages (Fig. 3c).

(vi) The same has been done with the observations taken at 1 p.m. (Fig. 3b and Fig. 3d).

(vii) The two reconstructions made starting from the morning or the early afternoon observations may differ between them for specific exposition bias or weather variability. Therefore, the two types of averages have been compared.

(viii) As there is no reason to prefer the reconstruction from morning or afternoon readings, a more general average has been computed (Fig. 4).

The reconstructed record in Fig. 4 is presented in different colors to distinguish the two locations and the three thermometers. It is evident that the first set of data, taken in Ginori Street, is not homogeneous with the following periods, especially for the apparently milder winters.

4.3 Comparison with the Grifoni series

Over the common period from 1757 to 1766, it is possible to compare the daily averages reconstructed from Grifoni to those from Martini. The difference between the two reconstructions (Fig. 5) shows that (i) the values from the early afternoon data by Martini are lower than those by Grifoni, and those from the morning data higher; (ii) the Martini dataset obtained as average of the morning and afternoon readings in average equals Grifoni; (iii) the difference between Grifoni and Martini is affected by a seasonal character that will be investigated in the next sections.

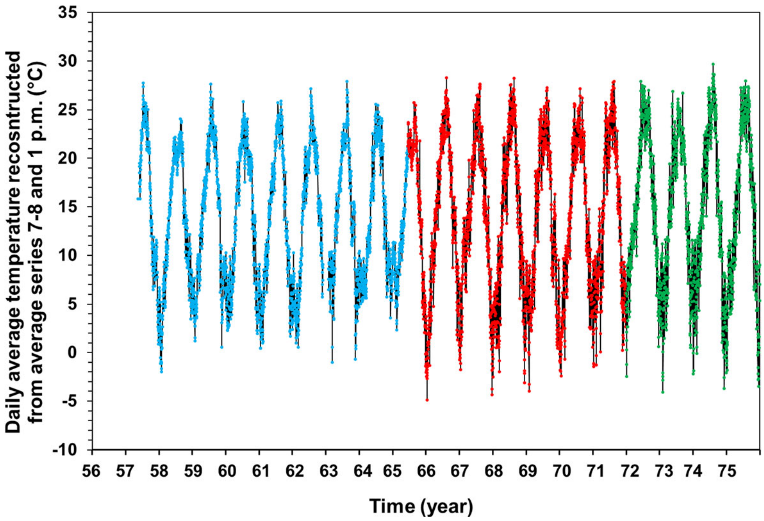

Fig. 4 Daily average temperatures obtained from the average of the series reconstructed from the observations at 7/8 a.m. and at 1 p.m. Cyan: record in Ginori Street, thermometer WS-A; red: record in Pitti Square, thermometer Hg-B. Green: record in Pitti Square, thermometer WS-C

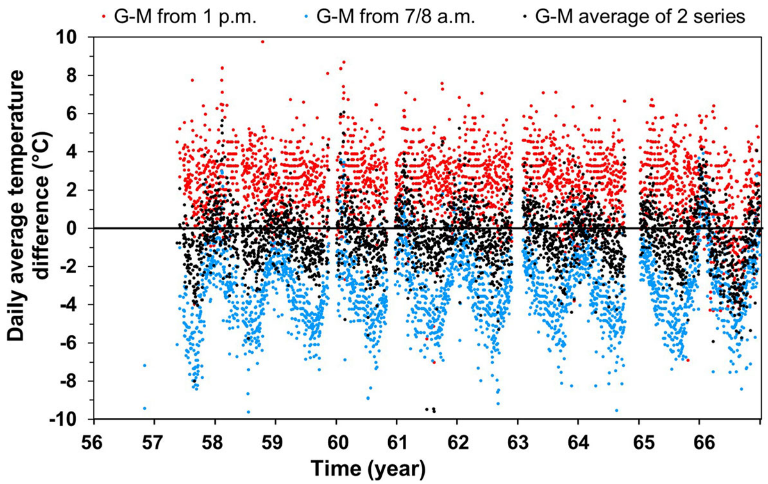

Fig. 5 Difference between the daily average temperature series of Grifoni and Martini reconstructed from the observations taken in the morning (blue dots), at 1 p.m. (red dots) and from the average between the two series separately reconstructed (black dots)

4.4 The snow benchmark

Snowflakes constitute an objective benchmark to verify the accuracy of the lower calibration point, if the site was affected by a particular microclimate, or the combination of the two. It is known that snowflakes melt when the temperature is above 0 °C but, in the case of dry air, the loss of vaporization heat lowers the snowflake temperature that may remain in the ice phase. In Italy, it has been observed that the inflection point to which snowflakes may survive in dynamic equilibrium is around 2.5 °C, when the ambient relative humidity is 70–75% (Camuffo 2002a, b, c, 2019; Camuffo et al. 2017a, b, 2020).

Therefore, an analysis of the compatibility between temperature and snowfall was performed. As the record specified the days with snow, but not at what time the snow fell, the test has been made only considering the temperatures at 8 a.m. AST because they are more likely representative of snowfall, while 1 p.m. might be associated with snowmelt. This distribution in Fig. 6a suggests that the temperature of the loggia in Ginori Street was some 4 °C higher than in open country, while in Pitti Square, the situation was realistic. A comparison between the two locations (Fig. 6b, c) shows that in Ginori Street, the frequency of snowing days above 2.5 °C was too high, i.e. 47%, indicating that the loggia was warmer, while the percentage calculated for Pitti Square, i.e. 14%, may be considered normal.

4.5 Correction of Martini and Grifoni series for the "loggia" effect

In Ginori Street, from September 1758 to July 1761, Martini decided to test if the loggia had the same temperature as open air. He made a series of 13 simultaneous paired readings, one in the loggia and another outside a window of the first floor (Targioni-Tozzetti 1767). In the middle seasons (May and September), the paired readings were very similar between them, but not in the summer, when most of the tests were performed. The best fit of the test readings (Fig.ESM8) constitutes a correction for the local microclimate distortion and indicates that in

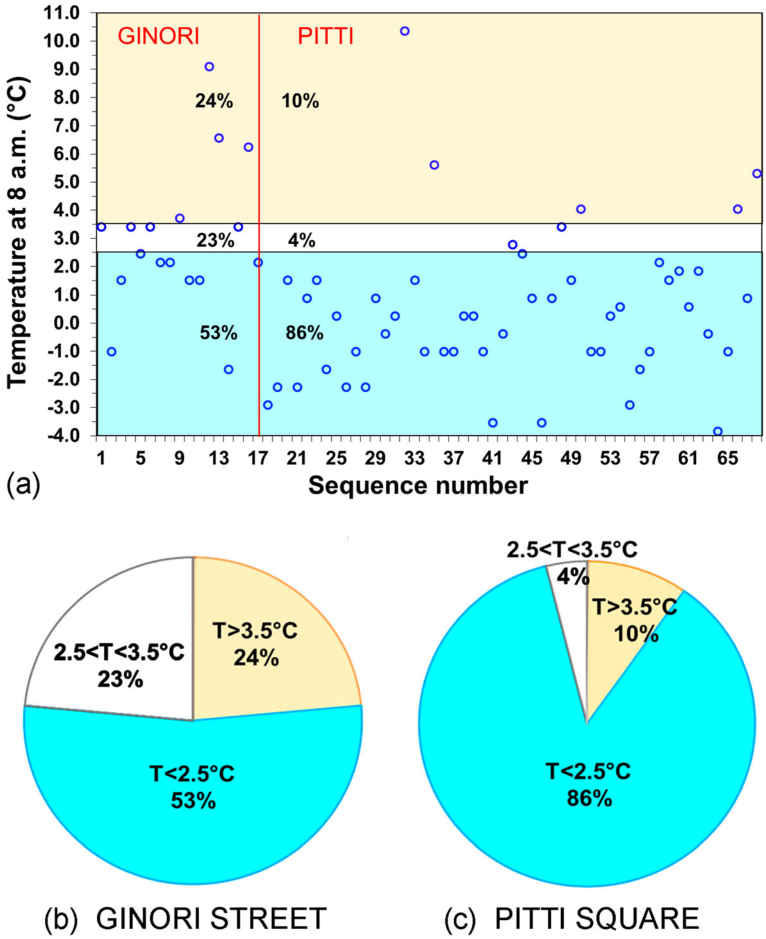

Fig. 6 **a** Temperature readings at 8 a.m. AST in snow days from 1756 to 1775. The red line indicates the change of house in 1765 from Ginori Street to Pitti Square. Cyan area: snow domain; white: mostly snow transition; yellow: rain domain calculated for RH = 65%. **b** Percentage of snow days at different temperatures in Ginori Street. **c** The same in Pitti Square

the summer, the loggia was cooler and in the winter milder than outside of about 4 °C, in agreement with the snow benchmark.

Martini specified the date of the tests, but not the hour, and the pairs of readings were not repeated during the day. Very likely he performed the tests around midday, as he was concerned on the effect of sunshine and largest departure at that hour, while at early morning the readings would have been more homogeneous. The obtained best fit allowed to correct the series of the daily averages taken from the readings at 1 p.m., removing the microclimate bias of the loggia in Ginori Street, as described in ESM5. In the final Martini series, obtained as the mean between the daily series reconstructed from the observations taken in the morning and early afternoon, the discontinuity due to the change of house has been reduced (Fig.ESM9).

As in the common period, the values of the Grifoni series were very close to Martini in Ginori Street before correction, and both series were taken in a loggia in the same urban context, a linear interpolation between the corrected Martini series and the Grifoni one

(Fig.ESM10) has been performed to remove from the latter the microclimate bias discovered by analyzing the Martini records that was not possible in the previous article (Camuffo et al. 2020).

The whole Florentine series 1751–1775, obtained combining and averaging in the common period the corrected values of Grifoni and Martini, is shown in Fig.ESM11.

When the plot of the Martini record uncorrected for the loggia microclimate departure is considered (Fig. 4), it must be noted that the eye is sensitive to recognize inhomogeneity in the distributions of extremes, i.e. the summer maxima and winter minima, and it is evident that the minima change distribution after the move in 1765. However, the extremes constitute only a small part of the distribution, and a better evaluation should be made considering the percentile distribution that takes into account all intermediate levels. To do this, firstly, Grifoni and Martini series have been considered separately, excluding the years with more than 10% of missing data. Then, the percentiles of both series have been calculated year by year, repeating the calculations for the series before and after the correction for the loggia microclimate distortion (Fig. 7a, b). The graphs show that the loggia correction has eliminated the homogeneity break that existed for the different location and exposure in the two buildings where Martini observed, and that there are no significant differences between Grifoni and Martini. Their monthly averages are nearly overlapped with departures range within ±1.5 °C around zero (Fig.ESM12).

4.6 Climate change

A comparison is made between the monthly temperatures in Florence, taken in different periods composed of two or three decades in which sound data were available, i.e. the earliest 1654–1670 record of the Medici Network; the Grifoni-Martini record representative of the eighteenth century; the 1881–1890 period on the turn between the nineteenth and twentieth century; the 1961–1990 reference period and the 1991–2017 contemporary period. The monthly distribution (Fig. 8a) shows that 1751–1775 was the coldest period in all seasons and the present-day situation the warmest one. The averages calculated on the different periods (Fig. 8b) provide the same result.

5 Conclusions

This paper concludes the main body of temperature observations taken in Florence during the eighteenth century, providing an unbroken set of daily averages from January 1751 to December 1775. Moreover, it reports a commented history of other observations in the second half of the eighteenth century, either lost or taken indoors, that are unable to provide sound climate information.

The observations by Martini, combined with those by Grifoni, cover one quarter of the eighteenth century and constitute almost all the surviving outdoor record in Florence. This is a particularly important record because the eighteenth century was the coldest period of the Little Ice Age in Italy that was unparalleled for the number of times the main Italian rivers and the Venice Lagoon were frozen over (Camuffo et al. 2017a).

The Martini record is especially important because he did a series of tests, in open air from a window, to evaluate the microclimate bias in the loggia where he was measuring. The test was in agreement with the snow benchmark and gave the opportunity of refining the quality of the record.

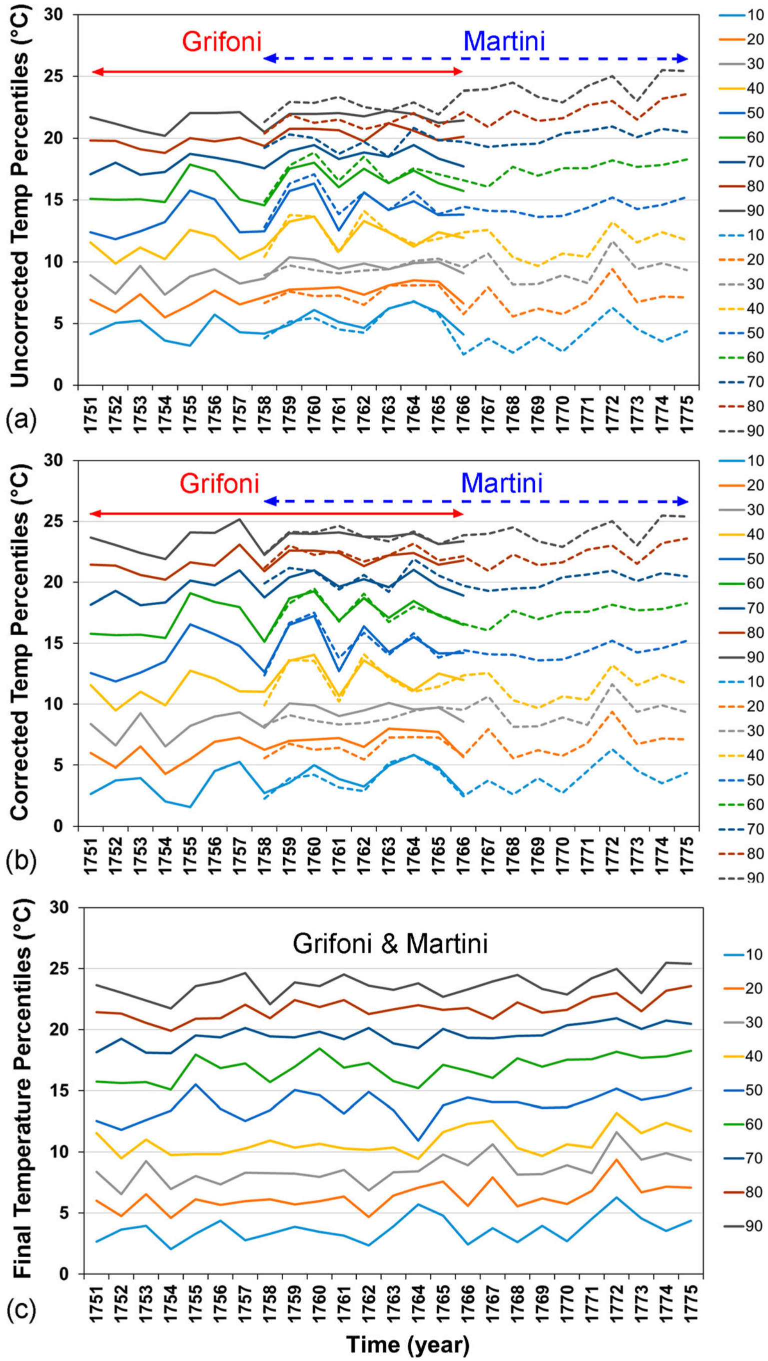

Fig. 7 Yearly percentiles calculated for the Grifoni (solid line) and Martini (dashed line) series, **a** uncorrected and **b** corrected for the loggia microclimate departure; **c** yearly percentiles calculated for the 1751–1775 reconstructed corrected series

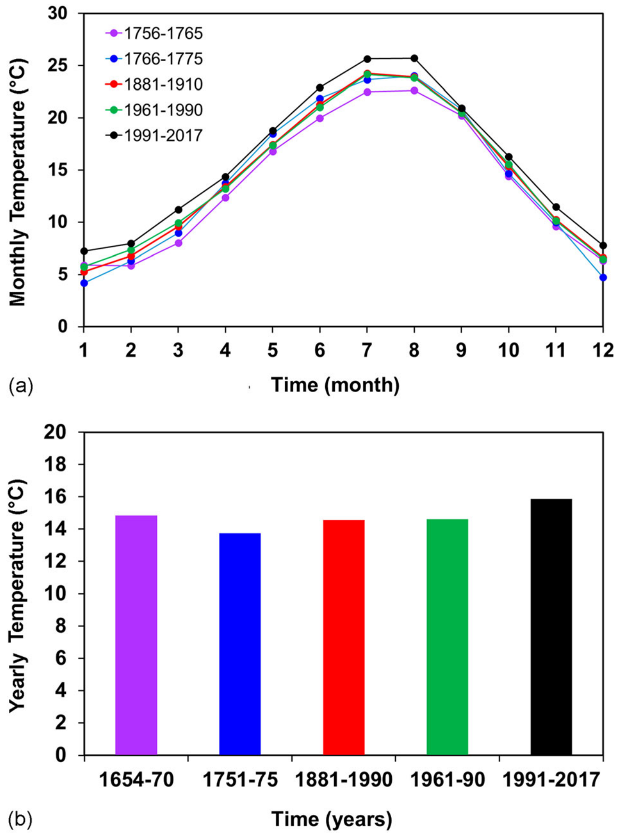

Fig. 8 **a** Monthly average temperatures in Florence in 1654–1670, 1751–1775, 1881–1910, 1961–1990, and 1991–2017. **b** Average temperatures on the same periods

The first part of the Martini record was contemporary to the Grifoni one. The two contemporary series, taken at a short distance one from another, both in the same urban context and under a loggia, gave very similar readings, showing the accuracy of both observers. Under such conditions, the correction equation found to relate the Martini loggia with the open air applies to Grifoni too, and this gave the opportunity to revise the Grifoni series and remove the microclimate bias due to the loggia that was evidenced by the snow benchmark. It also made possible to fill some short gaps that affected the Grifoni series when Grifoni was out of Florence.

After this correction, the Grifoni and Martini records provide a homogeneous dataset, tested at nine percentile levels, that in addition confirms the accuracy of the methodology used to transform spot observations at selected hours into daily averages. The whole record of the reconstructed daily averages is available in ESM7.

Comparing the annual trend in different periods over the centuries, a similar behavior was found, but with some differences throughout the course of the year. In 1654–1670, 1881–1910, and 1961–1990, the yearly averages were very similar, but with a slightly different seasonal distribution in 1654–1670, when the June and August average values were a little higher.

In 1751–1766, the temperature in the summer and winter was few degrees lower than in the other centuries, and it appears the coldest period of the last four centuries. The particular cold of the eighteenth century and the marked warming of the recent decades have been confirmed by the long series of Padova and Bologna (Camuffo and Bertolin 2012b; Camuffo et al. 2017b).

In the last two decades, the temperature is a few degrees higher than in all the previous centuries, the most marked difference being in the summer, characterized by the occurrence of heat waves, a phenomenon recognized by not only statistical data analysis, but also with high social and economic impact, and largely perceived by the population (Grasso et al. 2017).

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Data availability Not applicable.

Code availability Not applicable.

Declarations

Conflict of interest The authors declare no competing interests.

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Electronic Supplementary Material

Title: Daily temperature observations in Florence at mid-18th century: the Martini series (1756-1775)

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ESM1. Supplement to Section 1 Introduction

Table.ESM1 Overview of early temperature observations in Florence (17th-18th centuries), recovered and analysed data

Survived Record	Lost Record	Observer	Exposure in/out	Source	Recovered and analysed record
1654-1670		Medici Network of the Grand Duke of Tuscany	outdoor	original logs	Camuffo and Bertolin (2012)
	1728-1748	Cipriano Antonino Targioni	?		
	1737-1740	Giovanni Targioni-Tozzetti	?		
1751- 1766		Pietro Grifoni	outdoor	Guadagni 1767	Camuffo et al. 2020
1752		Leonardo Ximenes	indoor*	Ximenes 1753	Camuffo et al. 2020
1757-1775		Luca Martini	outdoor & indoor*	Targioni-Tozzetti 1767, 1769; Targioni 1773; 1775a,b, 1778; Martini 1766a,b	This paper
1775, 1794, and 1795	1776-1793	Alessandro Bicchierai	indoor*	Bicchierai 1795; original logs	
1776-1778		Giuseppe Cavallini di Cevoli	indoor*	Cavallini 1779	

Note: Story and useful metadata in Vergari 2006; Vergari et al. 2013.
*Observations taken indoors are not useful to reconstruct the outdoor climate.

ESM2. Supplement to Section 3.1 The Martini record. Sources and covered periods

Tables with the meteorological observations by Luca Martini

(131)

OSSERVAZIONI
METEOROLOGICHE FIORENTINE
NOTATE
DAL SIGNOR DOTTOR LUCA MARTINI.

Giorni.		Gradi del Termometro. Alle ore 8. della mattina.	Alle ore 1. doppo mezzo giorno.	Alle ore 11. della sera.	Temporali.
1756 Nov.	1	11..			
	2	11..			
	3	11..			
	4	11..			
	10	9..			
	11	9..			
	12	9			
	13	8..			
	14	8			
	15	8			
	16	7..			
	17	7..			
	18	8			
	19	8..			
	20	8..			
	21	8..			
	22	8			
	23	7..			
	24	8			
	25	8			
	26	8..			
	27	8			
	28	8			
	29	8			
	30	7..			
Dic.	1	5		7	
	2	5..		7	
	3	4...		7..	
	4	6		7	

Giorni.		Gradi del Termometro. Alle ore 8. della mattina.	Alle ore 1. dopo mezzogiorno.	Alle ore 11. della sera.	Temporali.
Dic.	5	8		7..	
	6	7		7..	
	7	7..		8	
	8	6		7..	
	9	4..		7	
	10	3		7	
	11	2		7	
	12	1..		6	
	13	2		6	
	14	4		7	
	15	5		6..	
	16	5..		6..	
	17	6..		6..	
	18	6..		7	
	19	7		7	
	20	7		7..	
	21	7..		7..	
	22	7...		8	
	23	8		8	
	24	6		7..	
	25	7		8	
	26	7		8	
	27	6		8	
	28	8		8..	
	29	7..		8	
	30	7		8	
	31	6..		8	
1757. Gen.	1	5..		8	
	2	6		8	

Fig.ESM1 Example of Martini daily observations from 1st November 1756 to 2nd January 1757 (Targioni-Tozzetti 1767).

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GENNAIO 1765.

Giorni	Ore	Gr. del Ter.	Gr. del Bar.	Temporali
8	8. m.	9	27 10	pioggia
	1 d.	9		pioggia
9	8 m.	9	— 10	coperto
	1 d.	9		coperto
10	8 m.	9.	— 10	pioggia grande
	1 d.	9..		pioggia grande
11	8 m.	8.	— 11	coperto
	1 d.	9		coperto
12	8 m.	8	— 10	pioggia
	1 d.	9		coperto
13	8 m.	6...	28 1	ſereno
	1 d.	8..		ſereno
14	8 m.	7..	— 1..	coperto
	1 d.	8..		coperto
15	8 m.	8	— 1[illegible]	ſereno
	1 d.	8.		ſereno
16	8 m.	7..	—	ſereno
	1 d.	9		coperto
17	8 m.	8	27 11	pioggia
	1 d.	9		coperto
18	8 m.	8	— 10	coperto
	1 d.	9.		ſereno
19	8 m.	7	— 11	ſereno
	1 d.	8...		ſereno
20	8 m.	5.	28 ..	ſereno
	1 d.	7...		ſereno
21	8 m.	4...	— 1	ſereno
	1 d.	6..		ſereno
22	8 m.	5.	—	vario
	1 d.	7..	...	vario

Fig.ESM2 Example of Martini daily observations from 8th to 22th January 1765 (Targioni 1773).

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OSSERVAZIONI

METEOROLOGICHE FIORENTINE

notate dal Sig. Dottore

L U C A   M A R T I N I

per l'Anno 1775.

G E N N A I O 1775.

Giorni	8 m.	1 d.	11 ſ.	Tempor.	Bar.
1	0. 2	0	6...	ſereno	22
2	0	0	6...	cop. neve	18
3	1..	3.	6	ſereno	22
4	0. 1	2..	5...	ſeren. var.	20
5	0. 1	0	7.	ſereno	20
6	0. 1	2..	7...	ſereno	22
7	0. 1..	1	7...	ſereno	24
8	0. 2	0	7	ſereno	25
9	0	2.	7	coperto	24
10	0	2	7..	neb. ſer.	24
11	0	2..	7..	ſereno	24
12	2...	5..	7...	neb. piog.	22
13	3	7...	8..	coperto	22..
14	3	6..	9	coperto	4
15	4	6...	9..	coperto	22..
16	4..	7	10	ſereno	24
17	2	4..	10	ſereno	22..
18	3..	4..	9	piog. pic.	22
19	4	9	9...	p. pic. cop.	22..

Fig.ESM3 Example of Martini daily observations of January 1775 (Targioni 1778).

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Targioni GL (1778) Raccolta opuscoli medico-pratici, Volume IV. Moücke, Florence

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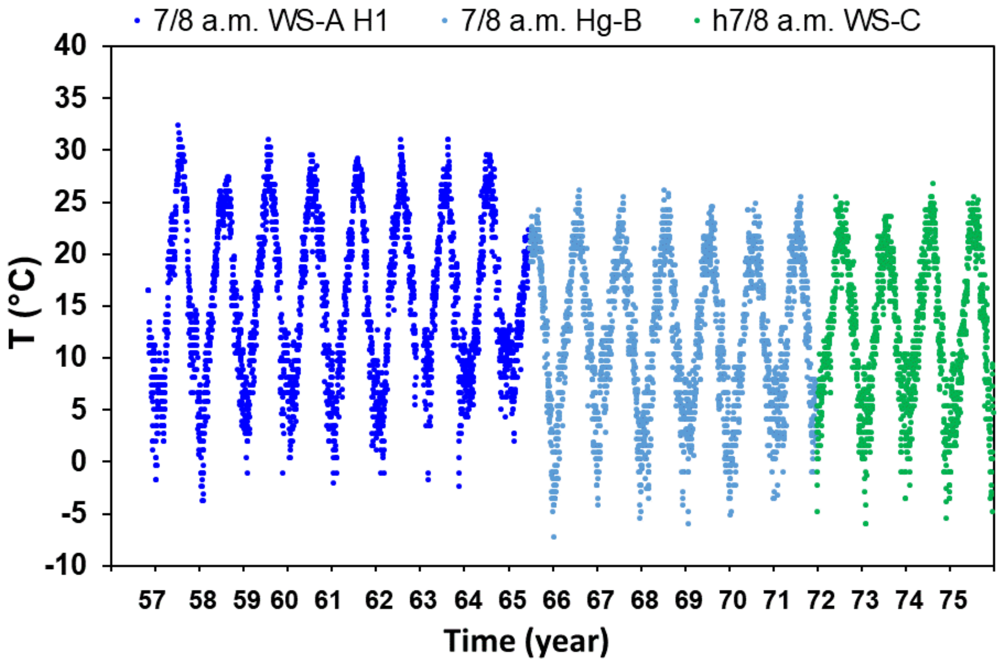
ESM3. Supplement to Section 3.4 Thermometers location and identification

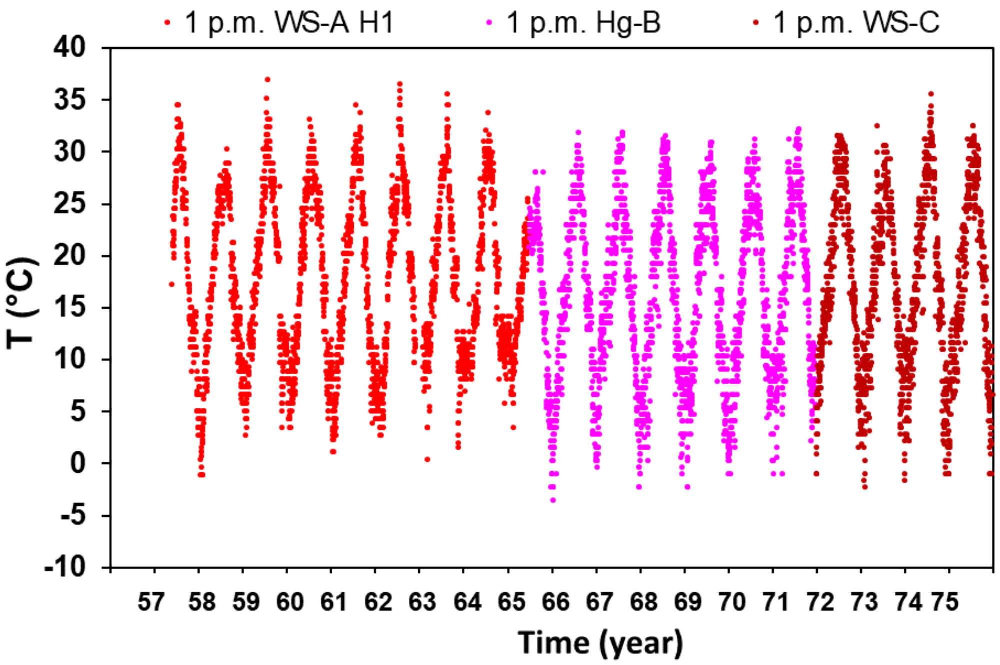
Table.ESM2 Overview of the Martini record: periods, locations, exposures, thermometers and sources

1st Location: Ginori Street	**Period: 1st November 1756 to 31st May 1765**	
1st outdoor exposure: loggia	Reading time: 7 a.m. (8 a.m. in winter) & 1 p.m.	wine-spirit thermometer: WS-A
1st indoor exposure: library	reading time: 11 p.m.	mercury thermometer: Hg-B
Sources	Targioni-Tozzetti 1767, 1769; Martini 1766a,b	
2nd Location: Pitti Square	Period: **1st June 1765 to 31st December 1777**	
2nd outdoor exposure: west-facing window; shielded thermometer	Reading time: 7 a.m. (8 a.m. in winter) & 1 p.m.	mercury thermometer: Hg-B (period: 1765-1772)
		wine-spirit thermometer: WS-C (WS-C=WS-A?) (period: 1773-1777)
2nd indoor exposure: library	reading time: 11 p.m.	wine-spirit thermometer: WS-A (period: 1765-1767)
		unspecified thermometer (Hg-B?) (period: 1775)
Sources	Targioni 1773, 1775a,b, 1778; Martini 1766b	

ESM4. Supplement to Section 4.1 Identification of the thermometers used by Martini

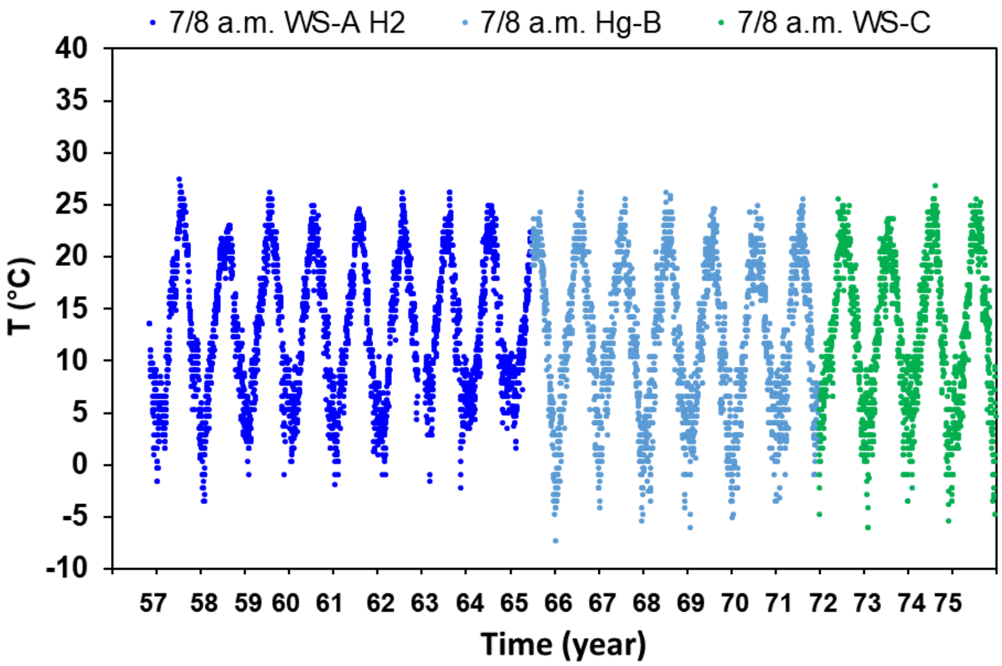


a)

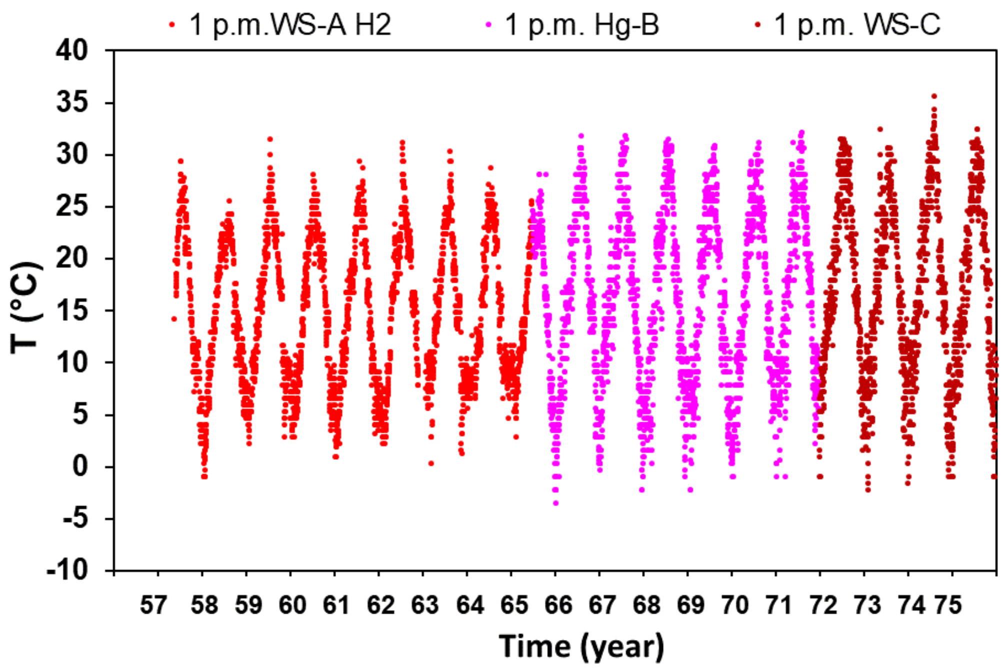


b)

Fig.ESM4 The Martini series at (a) 7/8 a.m. and (b) 1 p.m. under the hypothesis (H1) of wine-spirit thermometers calibrated at the two fixed points; correction by departure from linearity applied. Different colours have been used for the different thermometers.



a)



b)

Fig.ESM5 The Martini series at (a) 7/8 a.m. and (b) 1 p.m. under the hypothesis (H2) of wine-spirit thermometers calibrated making reference to a mercury thermometer; no correction needed. Different colours have been used for the different thermometers.

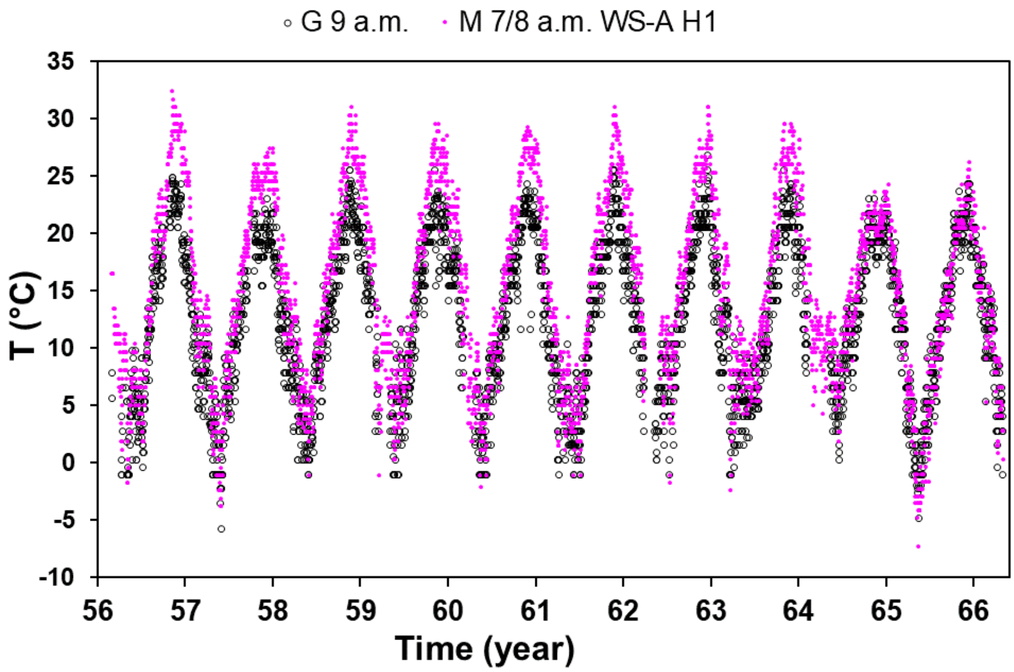


Fig.ESM6 Comparison between the Grifoni series at 9 a.m. and Martini series at 7/8 a.m. in the common period under the hypothesis of wine-spirit thermometers calibrated at the two fixed points (H1); correction by departure from linearity applied.

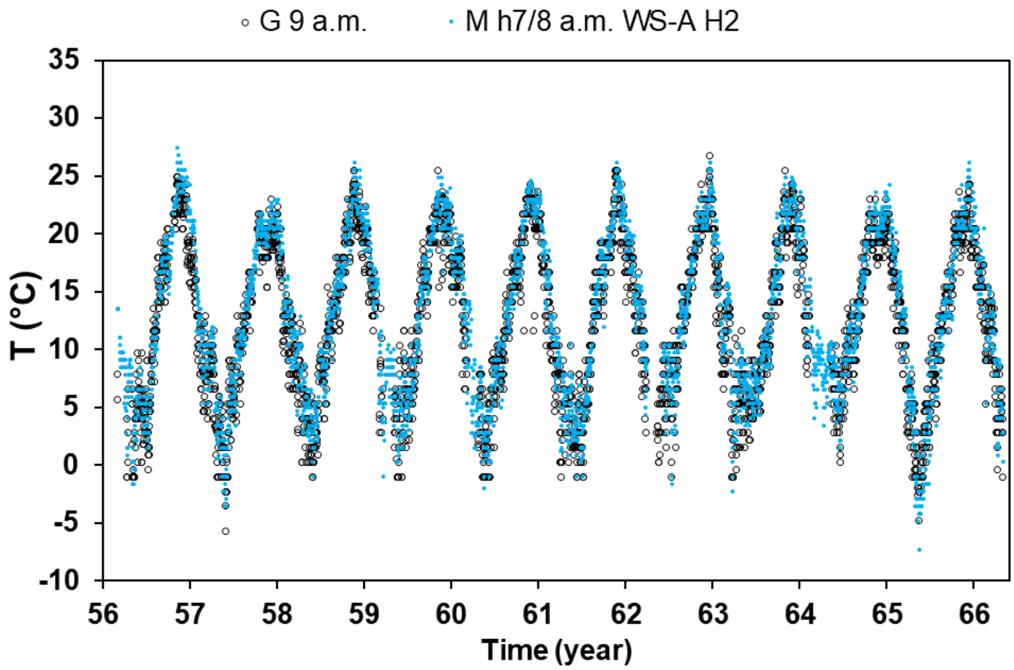


Fig.ESM7 Comparison between the Grifoni series at 9 a.m. and Martini series at 7/8 a.m. in the common period under the hypothesis of wine-spirit thermometers calibrated making reference to a mercury thermometer (H2); no correction needed.

ESM5. Supplement to Section 4.5 Correction of Martini and Grifoni series for the "loggia" effect

The interpolation of the test readings gives:

$$T_W = 1.31T_L - 3.47 \quad (1)$$

where T_W and T_L represent the temperatures outside the window and in the loggia, respectively (Fig.ESM9). The Pearson determination coefficient was $R^2 = 0.97$. Equation (1) shows that the readings were the same when the temperature was around 13.5°C, but in summer the loggia was cooler (e.g. $T_L = 25.5$°C when $T_W = 29.9$ °C) and milder in winter (e.g. $T_L = 0$°C when $T_W =- 3.5$°C).

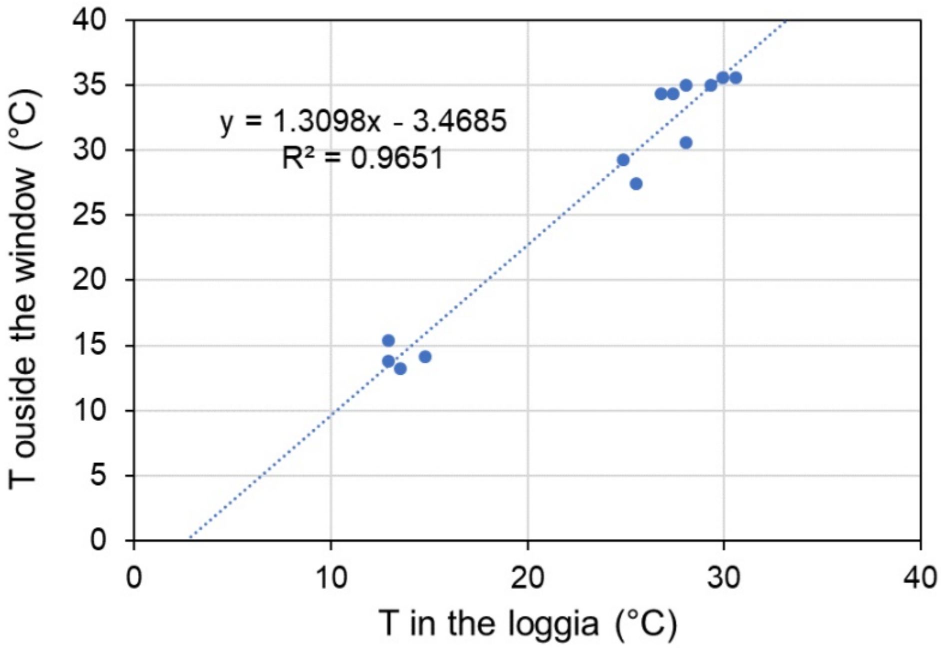
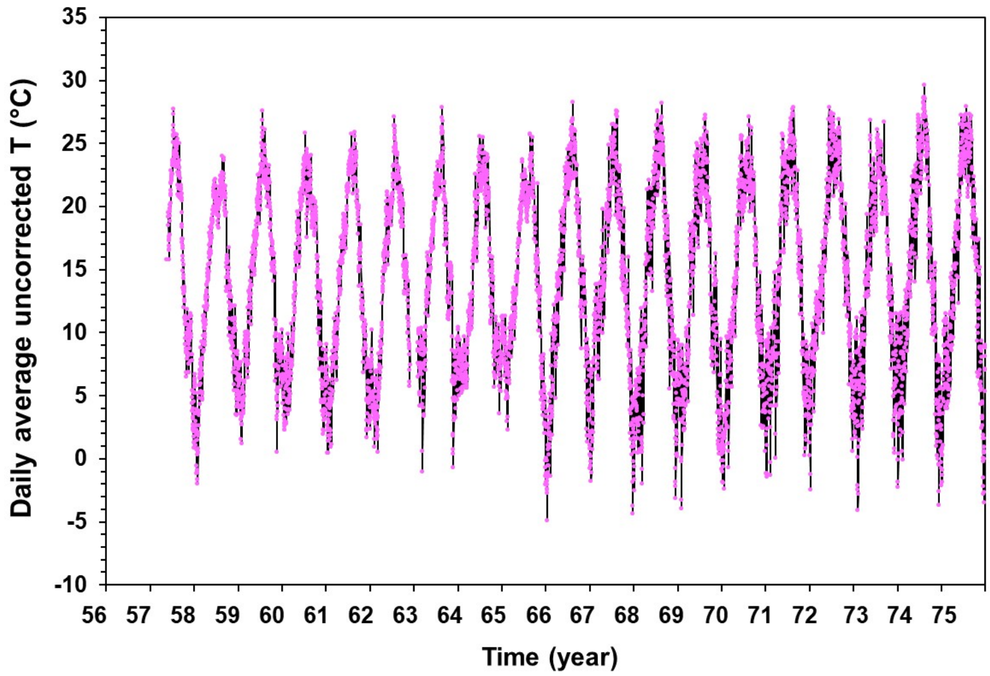


Fig.ESM8 Linear regression of the test readings taken outside a window and in the loggia of the Martini house in Ginori Street in the period 1758-1761.

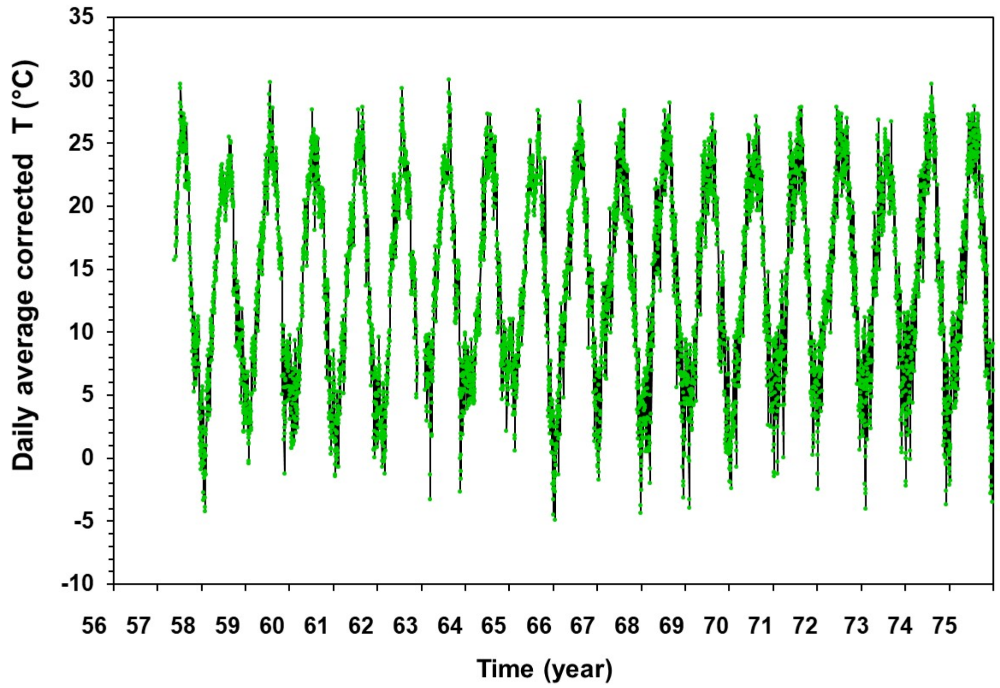
It is reasonable to suppose that Martini made the tests in clear days and around midday, when the temperature difference between the loggia and the free air outside the window was maximum. The book *Alimurgia* was focused to relate climate to agriculture, and the interest was to evaluate how much urban observations were representative of the real temperature in the countryside, therefore Martini was concerned on the estimation of the maximum difference, i.e. clear sky and midday.
Using the weather notes reported by Martini in *Alimurgia,* the days characterized by clear sky have been counted to be as 50% of the total. Hence, the equation (1) has been modified as follows, in order to halve the correction and be applied to all days:

$$T_W = (1 + \tfrac{1.31-1}{2})T_L - (\tfrac{3.47}{2}) \quad (2)$$

Equation (2) has been then applied to the daily series reconstructed from the observations taken at 1 p.m. in the loggia of Ginori street, in order to remove the local microclimate bias. Finally, for this period, the daily average has been obtained as the mean between the daily series reconstructed from the observations taken at 7/8 a.m. and the corrected average reconstructed from the observations at 1 p.m. The final Martini series, with the correction for the "loggia" effect in the first period, has been compared with the uncorrected series in Fig. ESM10. The discontinuity due to the change of house has been reduced and the corrected series seems more homogeneous.



a)



b)

Fig.ESM9 Daily average temperature series obtained as average of the morning and noon reconstructed series: (a) both uncorrected; (b) the 1 p.m. series corrected for the microclimate departure of the loggia.

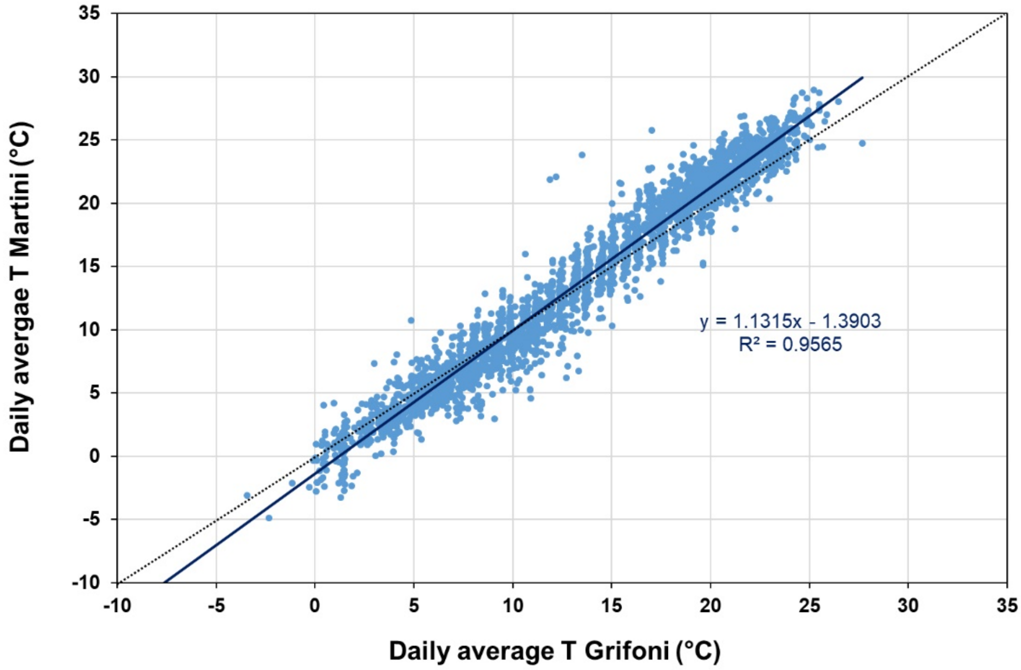


Fig.ESM10 Linear interpolation between Martini daily average temperature series corrected for the “loggia” effect and Grifoni uncorrected one in the common period (1756-1766).

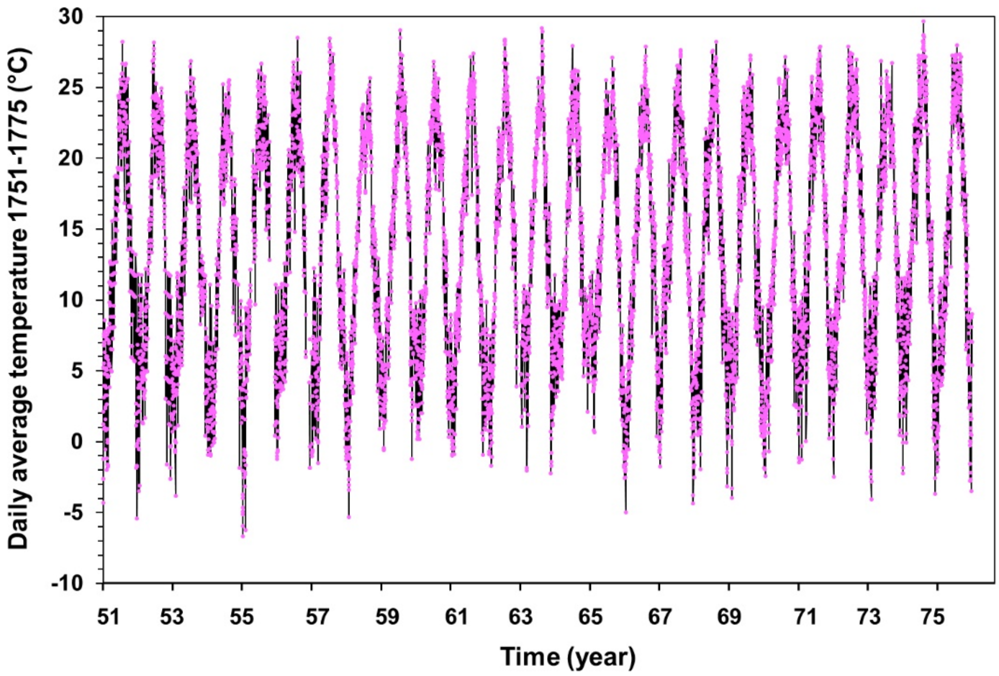
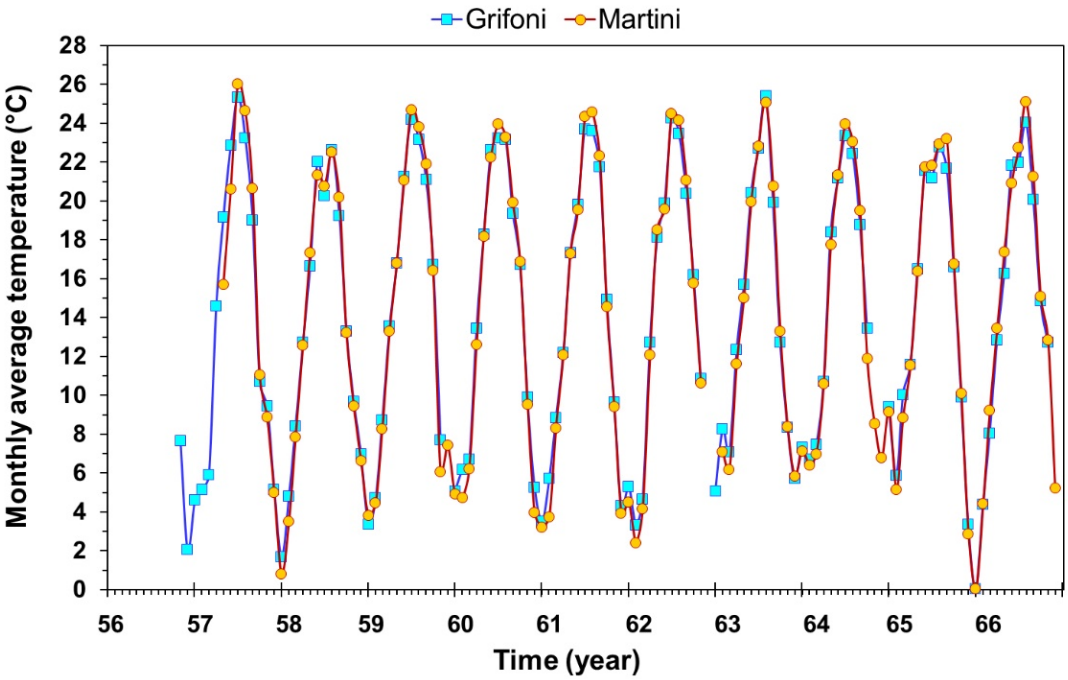
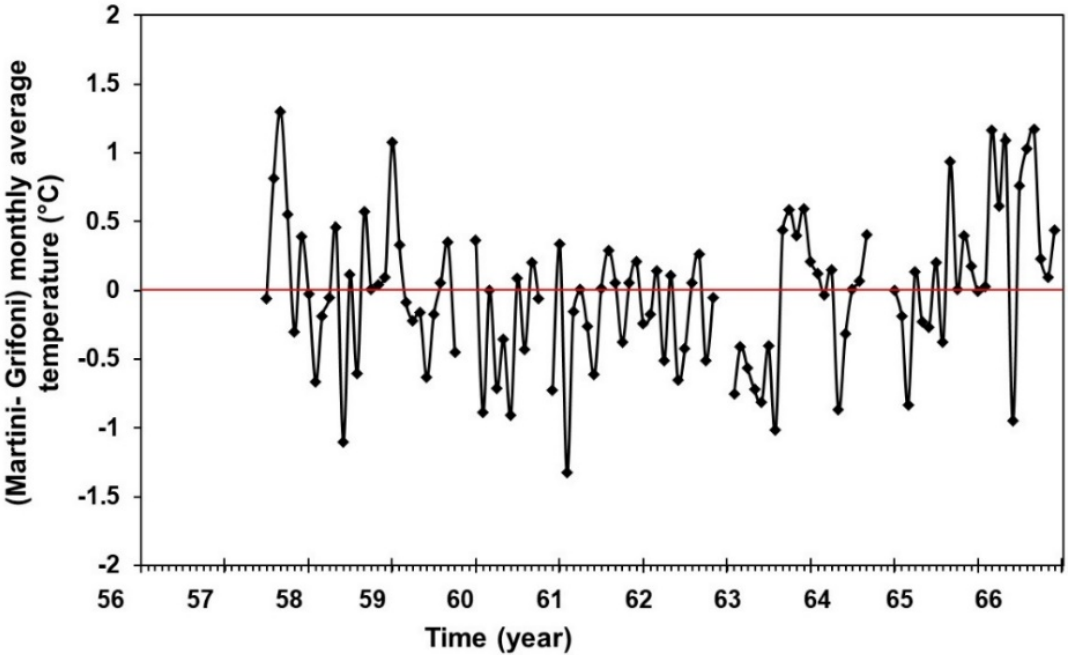


Fig.ESM11 Daily average temperature series in Florence in the period 1751-1775, where the first part 1751-1765 has been corrected for the “loggia” effect.



a)



b)

Fig.ESM12 (a) Monthly average temperature of Grifoni and Martini corrected series; (b) difference Martini - Grifoni monthly average corrected temperature.

ESM6. Supplement to Section 3. The original observations.

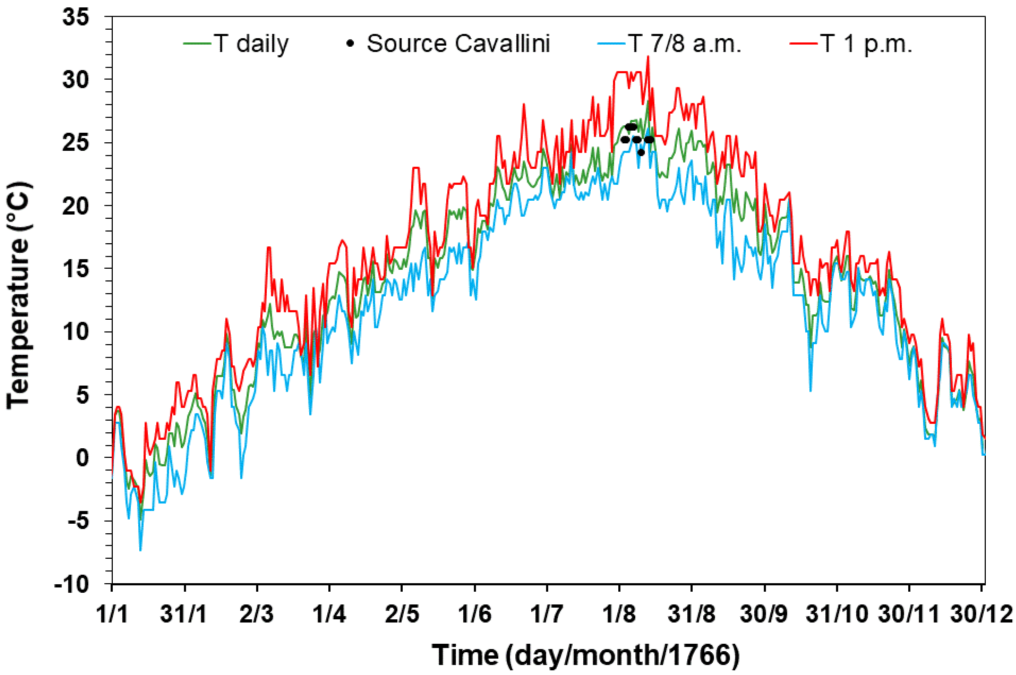


Fig.ESM13 Comparison between some spots observations taken by Cavallini in August 1766 (red dots) and the Martini series: reconstructed daily average (black line); readings at 7/8 a.m. (light blue line); readings at 1 p.m. (orange line).

ESM7. Dataset: corrected temperature series, Florence, 1751-1775

year	month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1751	1	-4.33	-1.20	-2.61	1.25	2.09	5.18	5.25	6.82	7.62	3.14	0.92	3.97	7.01	5.52	7.43	6.31	4.80	8.58	7.82	1.03	4.79	5.15	3.25	-0.54	2.45	3.94	0.89	2.37	1.59	0.80	3.78
1751	2	6.01	5.21	5.93	5.13	5.09	5.05	7.27	7.22	2.65	-1.17	-1.97	3.27	4.73	0.91	0.11	4.60	7.57	6.02	-0.07	-1.62	-1.66	-1.70	-1.75	5.76	7.98	7.19	7.90	7.87			
1751	3	7.07	5.53	7.76	5.46	6.94	4.64	5.37	3.83	8.33	9.81	11.29	10.51	11.25	11.22	12.71	9.67	11.16	11.15	12.64	9.61	5.06	8.82	6.55	8.05	8.04	12.56	12.55	12.54	6.50	11.78	12.53
1751	4	11.01	6.49	4.97	4.97	6.48	6.48	6.49	8.00	11.77	14.04	15.55	12.54	11.79	11.79	8.03	11.05	8.04	7.29	8.81	8.81	11.08	9.58	11.85	8.09	11.11	12.63	8.11	12.64	11.90	14.17	
1751	5	14.17	13.43	11.17	11.93	18.72	14.96	15.72	14.21	16.48	16.48	17.24	14.98	16.49	16.49	18.75	15.73	15.73	15.73	14.22	16.48	18.74	12.70	15.71	12.69	18.72	17.20	17.19	14.92	16.42	15.65	17.90
1751	6	18.65	17.12	17.11	19.36	17.08	17.82	16.29	19.29	17.01	16.99	16.97	17.70	19.19	22.19	24.43	24.41	22.87	21.34	22.82	24.31	24.28	24.26	22.72	21.94	20.41	20.38	22.62	22.59	23.32	25.56	
1751	7	20.25	22.49	23.22	23.95	24.68	22.39	22.37	21.59	19.31	20.04	22.29	25.28	20.74	19.22	20.71	22.21	22.19	23.69	25.19	25.94	25.18	23.67	28.20	26.69	25.19	25.95	25.21	25.98	22.22	23.75	23.77
1751	8	22.29	22.32	22.35	23.90	23.94	24.74	23.28	25.60	21.14	21.20	22.78	16.82	21.42	21.51	23.11	20.93	23.24	20.26	21.06	21.10	21.89	24.95	24.98	25.02	26.56	25.09	22.86	23.64	26.69	22.20	22.98
1751	9	23.01	23.04	25.33	19.32	16.32	19.36	17.88	20.16	20.18	20.96	22.48	20.99	19.50	25.55	22.55	22.56	22.57	25.61	24.11	24.12	18.09	13.57	14.34	17.36	16.61	17.37	16.62	16.63	20.41	18.90	
1751	10	21.17	18.15	18.91	18.15	15.89	18.15	15.14	18.15	14.38	13.62	16.64	12.11	14.37	10.59	12.85	13.60	12.09	12.84	14.35	16.60	15.84	16.59	15.83	10.54	8.27	6.76	6.75	5.99	12.02	6.73	12.00
1751	11	11.99	8.97	5.94	10.46	11.96	8.93	8.93	10.43	10.42	13.43	11.91	10.39	11.89	11.88	10.36	11.86	11.85	10.34	11.84	10.32	10.31	11.81	11.80	10.28	11.78	10.27	5.73	11.76	11.75	10.24	
1751	12	10.23	11.74	11.73	5.69	11.72	13.23	11.72	11.72	11.72	11.72	13.23	11.72	11.72	1.17	-1.85	2.69	1.94	1.96	-0.29	-0.28	-1.77	-1.75	-1.73	-1.70	-1.68	-5.42	-0.10	1.44	4.50	4.54	6.85
1752	1	6.24	7.85	7.95	11.82	2.09	4.43	6.38	3.80	0.08	3.14	0.16	-0.56	3.99	-0.51	2.52	-3.50	-3.12	2.17	4.05	5.55	5.92	9.68	8.53	8.89	9.62	11.11	10.32	11.05	9.13	7.59	3.78
1752	2	6.38	9.36	9.70	8.15	9.62	10.33	9.53	11.75	5.67	4.87	4.82	4.40	7.75	5.82	4.64	4.60	4.17	3.75	5.22	1.40	4.37	1.31	5.80	6.89	6.10	6.06	3.75	6.73	4.55		
1752	3	6.70	4.78	3.23	6.22	4.67	4.64	4.99	3.07	3.42	3.02	10.16	8.25	9.36	4.81	7.81	9.30	7.39	4.36	3.59	1.68	6.57	9.20	8.81	11.07	12.19	6.52	6.51	5.75	4.99	11.02	9.51
1752	4	9.51	9.88	6.86	7.24	4.97	7.24	4.98	4.98	8.00	9.51	8.01	10.65	12.17	7.27	9.54	9.54	11.06	9.55	10.69	11.08	10.71	12.60	11.85	14.12	12.62	13.38	13.39	13.02	13.78	12.66	
1752	5	15.31	14.94	15.70	15.70	15.71	14.20	15.72	12.70	15.35	14.97	14.22	13.85	13.85	18.00	17.24	16.49	18.37	18.00	16.48	14.22	15.35	17.98	18.73	17.97	20.23	21.35	16.06	13.79	14.15	15.65	16.40
1752	6	13.36	18.63	21.26	20.49	24.25	26.87	26.10	23.06	23.05	21.14	22.63	22.23	23.34	22.94	24.43	28.18	27.40	27.00	27.73	27.33	24.28	26.52	22.35	21.94	24.18	23.02	21.11	18.82	21.06	24.05	
1752	7	21.76	18.72	19.45	20.55	22.42	23.15	22.37	22.72	24.21	22.3	24.55	25.28	25.27	22.23	21.09	22.21	21.44	22.94	24.44	24.43	20.66	18.77	20.28	22.17	23.3	22.93	23.7	20.32	19.2	20.73	22.26
1752	8	21.54	18.92	19.71	22.01	22.81	23.99	24.04	22.96	24.15	24.22	17.87	18.33	20.29	19.25	20.09	20.18	20.22	20.26	22.19	19.59	20.38	21.93	23.47	19.74	20.15	21.32	20.59	22.14	21.41	22.2	21.47
1752	9	21.5	20.77	24.95	24.6	23.87	23.51	20.14	22.05	23.2	22.47	23.24	23.63	22.14	24.04	21.42	18.41	17.29	19.95	20.33	19.59	21.11	23	22.64	19.62	18.88	19.26	18.13	18.89	20.03	19.65	
1752	10	21.17	17.02	15.13	15.14	15.51	16.27	16.64	16.64	14.38	16.64	17.77	15.88	13.62	12.86	12.1	14.36	13.22	10.58	9.063	6.04	4.525	3.01	4.513	6.016	6.01	4.494	4.487	4.48	4.472	5.597	4.457
1752	11	-1.59	-1.60	4.43	4.42	5.93	5.92	4.40	8.92	5.89	10.41	7.38	11.90	8.87	5.84	4.33	4.32	11.85	4.30	10.33	2.77	10.31	1.25	1.24	2.74	8.77	4.23	4.22	4.22	2.70	4.20	
1752	12	11.74	11.74	10.22	10.22	10.21	11.72	3.28	3.06	1.15	-0.36	-1.86	-2.62	4.18	7.20	7.21	10.23	6.47	1.96	-0.29	4.25	5.77	8.81	5.44	6.60	8.13	5.14	4.42	5.97	0.73	3.03	1.57
1753	1	1.71	1.82	1.92	3.52	3.60	3.67	6.00	5.31	1.59	3.89	3.93	3.21	3.24	5.52	4.03	2.53	4.80	5.56	7.07	5.18	4.03	3.64	2.12	0.97	0.95	-0.59	-0.62	-0.65	0.08	0.04	-0.75
1753	2	-3.80	-0.07	6.68	3.25	4.71	6.56	5.00	3.45	5.67	4.87	3.31	3.65	5.86	7.33	10.30	9.12	10.96	10.54	11.63	11.59	11.92	8.86	6.18	5.00	4.96	1.15	4.89	6.36			
1753	3	4.06	7.04	7.38	4.71	7.32	5.77	7.63	7.22	8.33	10.19	11.29	5.99	5.21	5.19	5.54	8.16	7.39	8.88	9.62	6.21	8.84	9.58	7.68	9.18	6.91	8.03	9.53	9.52	11.03	11.78	11.02
1753	4	11.77	13.28	14.03	12.52	9.12	9.12	7.99	6.11	6.49	8.76	6.50	5.75	5.38	7.64	7.27	11.05	11.81	11.06	14.09	14.10	15.61	17.13	12.61	13.37	12.62	12.63	12.64	14.15	12.65	14.17	
1753	5	14.55	17.95	17.20	17.21	17.22	11.94	10.43	12.70	12.71	13.09	13.47	15.73	13.47	12.72	14.23	13.85	14.98	14.22	14.22	15.73	14.21	16.47	19.86	20.99	20.23	18.33	17.95	18.69	16.42	19.43	22.05
1753	6	23.17	24.67	23.15	20.87	19.72	19.33	20.44	23.82	23.05	23.03	21.50	23.36	21.46	22.19	23.30	22.14	20.23	22.85	21.32	19.78	20.51	21.24	23.48	19.68	19.28	16.99	18.85	19.58	20.30	21.79	
1753	7	24.02	21.74	22.46	22.82	20.15	22.39	23.12	26.50	26.85	25.70	25.30	25.28	25.64	24.50	23.35	24.85	22.19	19.92	23.31	20.66	16.88	19.15	19.15	22.17	22.17	22.18	22.94	21.45	20.71	21.86	20.75
1753	8	22.29	20.06	23.86	22.39	22.06	23.99	24.79	25.60	24.15	21.58	25.04	22.85	20.67	23.02	20.09	22.44	21.73	21.77	21.43	18.08	20.00	17.40	18.57	19.74	19.77	21.69	20.97	24.02	21.41	22.20	21.47
1753	9	23.39	17.76	17.78	17.43	17.83	20.50	20.90	20.54	20.56	20.96	18.71	19.11	21.76	20.27	19.15	18.79	18.05	18.06	18.07	20.35	16.58	16.59	16.60	15.85	14.35	16.62	18.13	15.87	15.12	15.88	
1753	10	15.51	15.13	17.40	16.64	16.65	18.15	16.64	16.64	12.12	10.98	15.13	15.88	16.63	17.01	16.63	13.60	14.35	10.58	8.31	10.19	12.07	12.06	11.30	12.05	10.54	12.79	10.52	9.76	10.51	12.01	11.25
1753	11	11.99	10.48	9.34	13.10	11.21	8.93	10.81	9.67	11.93	10.41	10.02	9.26	10.38	12.26	10.36	9.98	12.61	10.34	9.95	11.07	11.82	9.17	10.29	11.79	10.27	9.89	10.64	11.76	11.75	11.37	
1753	12	11.36	11.74	10.60	11.73	11.72	11.34	11.72	10.58	10.21	11.34	11.72	0.40	3.42	2.67	5.70	7.22	7.23	7.99	7.25	7.27	7.28	4.29	5.06	7.35	2.85	4.39	3.67	1.44	1.48	1.53	6.1

year	month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1754	1	5.86	1.06	4.93	3.52	-0.93	1.03	0.72	1.91	3.09	4.27	-0.59	0.19	0.98	1.00	7.05	4.80	6.31	5.94	5.56	1.40	4.03	-0.51	3.25	4.36	6.23	6.96	11.08	5.77	1.96	1.55	2.27
1754	2	3.74	-0.82	-0.86	2.11	0.94	-0.99	1.99	4.96	4.91	4.87	2.18	4.78	6.24	9.59	6.90	1.58	2.29	3.37	5.22	2.91	3.24	2.45	-0.24	1.23	4.21	1.15	0.74	5.60			
1754	3	4.81	2.51	2.10	6.97	2.03	2.38	4.61	0.06	4.18	2.27	0.73	-0.05	0.68	2.17	2.90	1.75	0.60	0.21	1.32	2.82	2.05	3.54	4.29	6.16	3.89	4.26	6.13	8.01	7.25	4.99	5.74
1754	4	6.49	8.75	8.37	11.76	7.99	7.99	8.75	9.51	9.89	11.78	12.53	12.54	11.79	12.93	10.29	11.05	9.55	6.54	11.83	12.59	11.08	10.34	12.61	11.11	9.60	11.88	14.15	12.64	14.16	14.17	
1754	5	11.91	12.29	14.94	13.82	13.82	14.20	14.21	14.21	11.57	14.60	13.47	14.22	15.36	15.73	18.00	20.26	18.75	18.75	18.75	19.12	19.87	18.74	17.98	18.72	17.21	18.33	19.46	19.07	22.08	17.92	17.90
1754	6	17.14	18.63	17.11	19.74	20.10	20.08	23.08	20.80	20.40	20.01	19.61	19.59	19.95	25.21	19.90	19.88	21.74	19.45	16.79	19.03	18.25	16.71	17.44	17.42	19.28	20.38	21.49	16.93	18.04	19.52	
1754	7	20.25	21.74	21.71	22.06	23.92	22.77	22.37	21.97	20.82	22.30	21.91	23.78	22.63	24.50	24.11	23.71	22.19	21.43	19.16	19.53	19.52	18.77	18.39	19.90	21.04	22.18	21.44	21.45	22.97	20.73	21.13
1754	8	20.78	21.94	21.60	23.90	20.55	22.48	21.40	21.83	21.14	22.71	25.04	23.61	24.82	23.77	25.37	24.33	25.50	25.17	24.07	23.74	24.15	21.93	20.46	21.25	21.28	21.32	20.59	21.00	19.93	18.22	18.80
1754	9	20.05	15.50	16.30	16.99	17.55	18.61	18.63	18.28	17.92	20.20	20.22	20.99	21.76	18.01	20.28	20.30	18.05	15.80	13.54	15.06	15.07	15.08	15.47	15.10	15.10	14.36	14.74	15.12	15.12	14.37	
1754	10	16.64	9.47	9.10	11.36	15.51	15.51	15.51	15.89	11.36	14.38	15.13	17.39	18.14	18.14	18.51	15.87	15.11	13.60	18.12	13.21	8.30	7.54	13.57	13.94	15.06	15.43	15.43	13.53	11.26	12.01	11.25
1754	11	13.50	13.50	13.49	13.86	15.73	13.38	12.82	8.05	15.45	13.17	14.88	13.86	12.27	13.07	13.08	12.17	11.10	11.09	7.69	8.05	8.56	6.40	6.52	8.00	8.91	8.91	9.38	8.69	7.90	4.15	
1754	12	2.91	1.89	0.87	-1.86	3.05	4.93	5.30	7.19	6.43	3.79	4.55	6.44	7.20	8.71	5.70	7.59	9.49	6.48	7.25	9.91	7.66	6.55	5.82	2.45	1.34	3.64	5.93	7.48	8.27	6.05	3.08
1755	1	5.48	3.70	2.67	5.02	1.71	-4.63	-4.94	-3.75	-5.96	-6.67	-5.12	-3.96	-2.04	4.01	4.03	2.53	4.05	4.05	3.67	2.53	4.03	-0.88	-0.52	-1.30	-0.56	-0.59	-2.50	-2.16	1.59	-0.71	-0.75
1755	2	-2.29	-2.33	-3.13	-1.66	-6.23	-0.99	4.25	8.35	9.44	5.62	6.71	9.31	8.51	3.56	3.13	3.09	6.06	6.02	5.97	4.42	5.51	4.33	4.29	7.64	6.10	8.70	8.28	7.87			
1755	3	9.34	7.42	8.51	6.59	5.05	7.66	9.14	7.22	5.31	7.55	9.78	6.74	7.47	7.45	6.68	7.03	8.15	8.88	9.62	8.47	9.59	9.96	8.81	8.05	6.91	6.14	9.53	12.16	9.89	9.89	11.02
1755	4	10.64	10.64	14.81	16.06	16.28	15.82	15.82	15.70	16.49	16.03	17.62	17.61	18.75	19.54	18.97	18.97	18.85	20.55	21.69	21.34	20.54	20.20	15.63	18.65	19.41	20.55	19.43	19.06	17.18	14.92	
1755	5	14.93	12.67	14.19	15.70	18.72	17.22	19.11	16.48	13.46	19.12	16.11	16.11	15.73	16.49	15.73	15.73	18.75	12.29	9.69	13.84	13.08	14.59	14.20	18.72	19.09	18.33	20.21	18.69	17.85	19.80	17.90
1755	6	17.89	19.39	20.13	22.00	21.61	21.59	18.55	20.05	20.78	22.27	21.50	19.97	21.46	22.94	22.92	24.41	23.25	24.36	25.09	25.44	26.17	25.39	24.61	24.96	21.92	20.38	19.60	21.08	21.06	23.30	
1755	7	21.76	24.00	19.45	19.42	19.78	20.13	20.86	20.84	22.33	17.78	19.27	22.27	24.14	25.25	24.48	25.98	25.21	23.69	24.44	26.70	26.69	24.80	25.94	25.94	25.94	24.07	22.19	19.19	19.96	20.73	22.26
1755	8	20.03	19.30	19.34	22.39	20.92	20.97	19.51	20.32	19.63	20.45	21.27	21.34	22.18	22.26	23.87	24.71	24.75	25.54	25.21	24.87	25.66	23.44	24.23	25.77	22.79	24.33	23.99	22.14	19.90	20.69	20.51
1755	9	23.76	23.79	20.05	18.18	19.34	18.23	20.90	20.92	20.94	22.47	23.99	16.46	14.97	14.99	16.51	16.53	18.05	19.57	19.58	21.10	20.35	19.61	20.37	22.64	21.14	19.64	18.89	16.63	18.14	23.05	
1755	10	18.90	16.69	17.83	18.91	15.14	15.89	18.91	16.64	15.51	15.51	14.38	15.88	18.14	20.03	21.15	18.13	16.62	16.61	17.36	12.83	15.37	13.56	12.43	12.43	12.21	9.93	8.91	9.26	6.30	6.65	7.45
1755	11	8.13	6.55	7.12	8.60	9.06	5.19	5.76	10.10	6.57	8.28	8.28	5.90	4.43	5.91	7.17	7.62	6.72	6.26	6.73	8.78	6.62	6.28	8.22	7.20	7.77	7.89	9.15	9.15	12.45	12.34	
1755	12	11.67	9.29	8.95	8.38	7.59	4.90	4.75	3.85	4.20	1.15	1.15	4.55	7.20	0.41	0.42	4.20	8.73	4.97	6.50	6.89	7.28	8.81	11.10	8.10	8.13	2.88	1.41	1.44	4.50	10.58	3.84
1756	1	3.97	-1.20	2.67	-1.01	1.33	1.41	-0.79	0.78	-0.68	3.14	-0.59	2.46	5.50	7.79	8.94	10.83	5.56	0.28	4.80	7.06	7.81	3.27	4.00	5.49	7.36	7.33	6.93	6.90	3.85	5.32	8.31
1756	2	5.25	8.23	6.68	5.89	5.84	3.54	6.51	4.96	7.93	4.11	4.07	6.66	4.73	9.21	6.15	3.84	7.57	9.03	10.88	6.30	8.90	11.12	6.55	7.27	7.98	8.70	7.90	5.60	4.55		
1756	3	4.81	5.53	7.00	3.95	8.45	9.92	9.89	7.60	9.84	9.06	4.50	3.72	5.59	5.81	7.06	4.39	6.64	10.39	9.62	10.36	5.44	11.09	12.59	11.07	11.81	8.03	4.25	5.00	8.01	8.76	10.26
1756	4	10.26	7.24	7.24	11.76	7.99	5.73	4.98	7.24	7.25	7.25	9.52	11.03	11.03	11.04	11.80	14.07	11.81	13.33	11.83	12.59	15.61	13.36	17.14	17.90	15.64	17.16	17.16	18.30	17.18	17.19	
1756	5	19.46	20.59	20.22	14.95	14.20	17.22	15.72	16.10	19.50	15.73	13.47	13.09	15.73	16.87	15.73	11.96	14.22	15.73	16.48	14.97	16.48	17.98	18.73	19.48	20.23	20.22	19.46	18.69	18.30	19.43	18.66
1756	6	18.65	18.63	19.37	20.11	21.61	22.34	24.59	23.06	25.31	18.88	17.72	19.97	19.57	20.68	21.03	21.39	24.38	24.36	25.09	24.31	25.04	26.14	26.12	25.72	26.44	26.80	25.64	25.61	24.08	24.05	
1756	7	18.74	20.98	23.22	25.46	23.92	20.88	20.11	19.33	14.78	16.27	19.27	19.25	20.74	22.99	24.11	23.71	24.10	25.36	25.47	23.68	23.30	24.43	24.43	25.94	24.06	24.44	24.08	19.19	21.47	22.24	24.53
1756	8	23.80	23.83	25.37	24.66	26.96	28.52	24.04	19.57	21.89	21.95	21.65	23.23	25.95	25.28	23.49	23.67	22.54	23.66	20.30	20.34	23.40	21.93	20.83	18.98	20.53	19.43	21.35	20.04	24.05	21.07	22.60
1756	9	26.03	20.77	21.55	20.83	22.74	20.87	21.65	19.78	20.94	21.33	18.71	19.86	20.25	21.02	18.02	20.68	21.07	18.06	21.09	20.72	18.09	18.85	18.49	19.62	19.63	18.51	18.13	16.91	16.58	16.69	
1756	10	19.66	18.15	18.15	18.91	20.04	14.38	16.64	14.00	16.64	11.74	12.11	13.62	19.65	12.10	10.59	15.11	16.62	13.60	15.48	16.60	14.33	13.95	15.83	13.56	15.82	14.30	13.54	13.53	10.51	5.97	5.97
1756	11	6.34	8.97	11.11	12.24	12.47	12.13	9.29	7.48	5.33	4.54	4.76	4.54	4.54	5.68	5.80	7.28	7.75	7.52	8.21	7.76	4.01	6.75	3.68	4.36	5.62	5.28	4.94	5.29	4.27	4.04	
1756	12	4.62	4.05	4.17	4.41	6.00	7.37	6.13	3.85	3.18	4.17	-1.86	-1.86	-0.35	2.67	4.57	7.22	5.60	7.08	8.00	8.91	8.69	8.12	4.60	5.17	4.73	5.86	5.86	6.78	7.69	5.65	4.55

year	month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1757	1	6.24	6.34	2.29	-1.01	-0.17	-0.86	-0.79	-0.73	-0.68	-0.63	-0.59	3.21	3.99	5.52	5.54	2.53	5.56	7.07	6.31	10.08	5.54	7.42	5.51	0.97	6.23	12.24	8.44	8.41	11.39	9.10	8.31
1757	2	6.01	6.72	10.08	5.89	6.98	6.56	3.49	7.22	11.71	7.89	4.82	0.25	0.21	6.20	4.64	1.96	4.55	6.77	1.82	2.15	3.62	6.60	3.16	4.63	2.70	4.92	5.64	7.11			
1757	3	6.12	4.02	5.87	9.99	9.96	2.38	1.59	0.81	0.03	-1.51	2.24	0.71	-0.07	5.19	2.90	4.39	5.88	5.11	5.09	4.32	7.33	9.58	7.30	8.05	8.04	11.05	9.53	9.90	10.27	12.53	14.79
1757	4	12.52	13.65	11.77	7.24	9.12	11.39	12.52	12.52	11.77	13.28	12.53	12.54	12.54	12.55	12.55	14.07	15.58	17.85	18.99	20.13	20.14	17.51	17.14	15.63	14.89	18.67	17.16	18.68	16.42	17.19	
1757	5	15.68	16.07	15.70	21.74	19.10	18.73	18.73	19.49	19.50	20.25	20.26	19.88	20.26	21.02	20.26	21.77	20.26	15.73	15.73	17.24	19.50	17.23	17.98	20.99	21.74	22.48	23.23	19.45	17.93	18.67	17.90
1757	6	20.21	21.54	19.61	18.21	16.96	16.00	16.82	17.21	17.76	18.10	18.29	19.51	20.11	20.30	20.78	20.97	20.63	21.08	22.03	21.89	22.43	24.22	22.95	23.56	23.90	23.95	23.63	23.33	24.33	23.75	
1757	7	23.34	23.14	24.62	25.29	23.67	24.25	24.19	26.01	26.84	27.47	28.46	27.89	28.06	27.85	27.08	25.88	24.80	26.07	24.92	25.06	25.36	26.20	24.82	24.25	27.05	26.19	26.46	25.92	25.95	26.33	24.57
1757	8	23.35	23.46	23.89	24.65	24.36	24.87	25.03	26.46	26.21	25.35	26.04	26.26	25.75	25.24	25.57	26.58	27.36	24.90	21.73	21.74	21.88	21.78	21.01	21.88	22.72	23.37	23.22	22.48	23.59	23.68	22.31
1757	9	21.82	22.23	22.33	21.74	19.83	20.80	21.04	21.57	20.83	19.73	21.56	22.12	22.43	22.59	21.76	20.88	19.97	20.87	20.52	20.06	18.75	17.88	18.45	18.19	18.34	17.20	17.31	16.08	16.05	12.43	
1757	10	15.49	15.06	15.28	14.78	11.20	12.49	13.02	14.14	13.90	12.55	12.76	13.33	13.21	11.06	11.01	10.37	9.24	8.82	8.00	8.44	8.91	10.31	11.92	9.37	11.41	6.73	8.44	5.55	6.47	5.25	6.86
1757	11	9.26	11.90	13.22	10.47	11.41	8.73	11.25	8.27	8.47	9.00	9.54	10.26	6.28	9.11	8.26	5.17	5.83	7.70	8.43	6.24	8.38	8.79	10.34	10.87	9.04	8.07	9.13	9.84	11.39	10.79	
1757	12	10.03	10.16	11.09	10.21	5.57	8.87	11.10	10.53	12.11	9.76	7.19	8.06	7.54	7.06	3.89	3.91	3.27	3.27	2.68	0.81	2.57	4.64	2.62	2.51	-0.39	0.22	-1.26	-1.01	-0.67	1.00	1.60
1758	1	3.25	4.41	5.98	6.21	4.45	5.80	4.92	6.25	2.20	0.20	-0.40	-0.59	1.18	4.15	4.76	2.70	2.53	-0.86	-1.91	-1.60	1.56	1.75	1.26	-0.48	-1.86	-1.10	-3.37	-2.64	-3.04	-5.30	-1.64
1758	2	0.75	-1.12	0.44	-0.40	-0.39	-1.16	4.36	2.86	1.44	2.63	5.39	5.60	7.33	7.71	5.35	7.26	6.02	3.79	2.63	5.65	6.49	7.73	6.87	8.83	6.77	4.70	4.12	5.03	8.20		
1758	3	7.80	6.57	6.04	5.25	6.14	5.75	5.65	3.41	3.93	3.40	3.58	5.51	6.88	10.16	8.06	8.61	10.10	12.59	10.98	10.71	10.66	11.25	11.35	10.82	11.39	7.52	8.54	7.88	8.27	6.93	8.13
1758	4	9.85	9.96	10.58	12.80	10.72	10.58	10.94	12.44	11.55	12.71	12.67	12.33	13.14	14.41	13.85	12.85	12.38	12.41	11.83	13.38	15.16	15.10	14.70	14.43	14.28	15.19	15.05	15.50	14.53	14.38	
1758	5	14.21	14.14	14.66	16.72	17.64	17.62	17.36	18.00	18.57	17.64	16.70	14.16	16.06	17.08	18.14	17.77	17.06	16.24	17.66	18.60	17.65	17.55	17.90	18.26	18.04	18.87	19.49	19.57	19.25	19.70	19.53
1758	6	19.62	19.24	19.63	19.46	20.54	20.15	20.86	21.98	21.70	22.25	22.60	22.42	23.49	22.90	23.41	23.60	22.86	19.44	20.06	21.13	20.92	21.20	21.70	23.77	21.68	21.51	20.58	21.92	21.89	21.32	
1758	7	22.57	20.80	20.01	19.90	20.81	20.94	20.83	20.88	20.35	20.41	19.94	20.78	21.71	21.69	21.07	19.90	20.34	17.68	17.55	19.01	19.10	20.59	19.44	21.30	19.59	19.98	21.69	21.69	21.63	23.35	21.95
1758	8	20.42	21.71	21.73	21.93	22.54	23.52	23.57	23.63	24.65	23.46	21.50	21.36	21.48	22.23	21.20	22.12	21.67	22.30	21.84	23.68	24.84	22.94	22.40	22.34	22.38	22.33	24.43	24.26	23.98	22.09	22.27
1758	9	22.82	25.17	25.65	23.81	20.99	22.43	21.64	21.48	21.92	20.11	20.73	20.14	20.93	21.42	23.35	21.48	21.67	21.13	19.96	19.00	20.02	19.50	15.27	13.74	13.40	12.72	13.28	13.43	12.38	13.51	
1758	10	14.77	16.18	15.38	15.90	16.37	14.81	14.27	14.99	16.61	14.52	14.07	15.57	16.09	14.53	14.37	9.72	8.90	10.63	11.68	9.45	9.44	11.41	14.98	14.71	14.53	13.21	11.92	8.09	9.00	11.64	13.50
1758	11	13.87	14.26	13.09	13.46	11.78	8.30	7.77	7.96	8.90	8.85	11.27	11.25	12.25	11.27	10.82	7.92	8.59	8.16	9.16	9.69	9.53	8.94	7.63	5.81	4.02	3.54	6.36	8.27	10.79	9.64	
1758	12	10.02	10.01	11.20	11.28	12.92	10.09	9.94	7.08	7.37	5.79	7.46	11.46	6.85	4.12	0.91	0.89	3.13	2.74	4.03	6.54	4.64	7.59	8.36	7.45	6.17	4.31	2.32	4.40	5.66	6.56	
1759	1	4.27	1.67	5.97	4.47	3.91	6.90	6.78	5.13	2.15	2.19	2.22	5.46	5.19	3.84	5.24	5.04	3.86	2.64	1.60	3.99	6.76	7.30	5.02	3.01	2.29	2.59	1.24	-0.43	-0.57	0.99	0.96
1759	2	2.04	1.30	2.44	5.33	3.31	4.26	2.56	5.46	2.96	4.20	3.16	3.65	3.00	3.21	2.85	2.18	2.95	1.46	4.45	5.07	8.41	5.44	4.70	7.50	8.96	8.93	9.28	9.60			
1759	3	9.59	9.36	10.14	9.73	8.13	10.05	9.68	9.32	7.18	8.98	7.86	8.07	8.33	8.18	9.21	6.97	7.33	8.23	5.28	4.49	5.50	9.33	9.26	11.81	8.75	5.97	6.55	8.66	9.86	10.10	11.43
1759	4	11.80	15.02	13.17	12.57	12.86	12.73	12.31	12.95	12.82	12.45	12.96	12.63	13.39	15.14	15.48	13.01	9.80	12.08	11.57	10.60	12.74	13.87	13.88	14.27	15.69	16.04	14.98	14.87	15.85	15.75	
1759	5	15.23	15.08	15.52	14.66	15.94	17.31	15.96	19.12	15.66	16.31	17.93	16.22	16.72	17.31	18.40	19.23	18.68	18.91	13.94	13.63	14.21	14.82	16.44	16.96	16.96	18.17	17.93	18.23	18.48	18.54	18.29
1759	6	18.71	19.83	19.61	17.24	18.66	17.65	18.47	19.20	22.45	21.80	21.30	21.07	20.26	21.60	19.12	19.04	23.86	22.66	22.14	23.31	23.19	23.17	24.66	21.85	21.96	21.63	22.02	22.95	22.87	22.82	
1759	7	20.21	19.42	19.90	20.01	21.33	21.12	23.94	22.74	23.19	25.04	24.05	24.73	24.71	24.45	25.33	25.79	26.48	26.49	26.14	27.38	28.53	29.03	27.31	26.15	26.86	25.57	25.04	26.50	23.76	24.10	22.77
1759	8	24.60	23.89	23.77	22.72	23.85	22.76	23.46	23.03	23.11	22.99	23.83	25.04	27.27	26.38	25.53	24.53	24.24	24.07	23.54	21.82	22.93	23.67	22.59	21.48	21.11	22.64	22.62	22.99	23.53	22.53	22.35
1759	9	23.17	20.68	20.09	20.69	22.06	22.42	22.46	22.38	24.64	24.25	23.90	24.06	24.33	22.77	22.34	23.98	22.93	20.84	20.62	22.43	17.80	17.95	19.06	20.72	20.17	20.17	20.38	19.83	19.45	18.88	
1759	10	17.79	17.83	16.82	18.24	17.97	15.93	15.86	17.95	15.40	14.35	15.41	15.24	17.42	18.61	17.02	17.95	16.84	16.57	16.57	16.29	16.56	16.53	16.98	14.96	14.21	15.68	15.31	15.84	16.62	15.06	15.06
1759	11	10.55	15.85	7.79	4.00	5.46	5.68	9.33	9.52	9.87	8.94	12.82	7.56	11.57	6.62	4.21	4.37	5.54	3.41	1.48	-1.23	3.17	1.91	4.00	4.42	4.42	2.43	2.80	4.42	5.61	8.56	
1759	12	6.28	6.17	7.93	7.61	7.28	8.32	8.30	8.50	8.96	8.27	7.94	7.40	8.43	9.26	8.20	8.20	5.69	4.54	6.93	7.87	8.39	8.72	8.21	7.18	7.73	4.64	7.39	5.65	5.70	7.45	7.84

year	month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1760	1	8.29	9.77	9.14	4.42	2.59	5.09	6.59	7.83	8.24	6.69	7.09	5.22	4.69	5.67	5.49	5.39	2.48	0.73	0.17	0.39	0.56	1.64	1.03	2.51	1.09	6.39	7.59	9.31	9.25	9.22	6.53
1760	2	6.13	5.39	7.06	4.88	1.57	0.20	0.16	2.64	3.35	4.81	4.23	4.74	5.12	7.69	8.68	9.93	10.57	9.94	8.04	9.11	7.94	4.11	2.01	4.13	4.50	3.95	5.33	5.97	5.55		
1760	3	6.47	6.37	6.42	4.98	4.06	2.74	3.69	1.99	3.84	6.01	5.16	8.10	7.01	8.28	10.41	8.54	10.68	9.19	6.37	4.65	5.14	5.87	8.00	6.09	7.25	6.70	7.76	7.18	6.38	7.95	7.44
1760	4	9.18	9.86	9.22	10.18	8.58	10.17	11.00	10.82	11.51	12.41	13.25	14.09	13.66	13.78	14.68	10.41	10.58	10.79	12.45	13.48	14.23	16.38	15.74	15.30	17.34	17.91	16.51	16.52	15.97	15.72	
1760	5	15.35	17.30	16.99	18.07	18.13	20.00	21.11	19.84	19.39	19.85	18.11	18.13	18.79	17.54	18.62	18.83	19.46	18.23	18.68	18.99	17.40	18.41	15.91	15.74	14.72	17.37	18.59	16.74	17.83	20.23	21.03
1760	6	22.37	22.58	22.44	22.40	21.81	21.32	22.16	21.29	21.23	21.63	22.37	23.27	22.50	22.56	22.69	21.86	21.49	22.53	21.33	22.22	21.85	23.68	23.80	22.65	23.53	23.12	22.77	24.10	23.60	22.55	
1760	7	23.22	24.69	24.52	24.94	24.47	26.82	25.36	25.41	25.38	26.50	24.04	22.25	19.13	23.82	23.05	24.00	25.33	25.39	25.17	25.28	25.26	25.45	26.02	25.77	23.58	18.13	17.86	18.95	19.81	20.82	21.97
1760	8	23.32	22.99	22.23	20.99	22.45	23.83	22.28	24.74	24.79	24.31	25.07	23.85	23.64	24.53	24.66	23.43	22.15	20.92	20.53	22.37	23.22	23.14	23.62	24.74	24.78	25.59	23.02	21.86	22.77	22.99	21.54
1760	9	19.99	19.70	21.00	19.82	17.73	19.42	19.39	18.55	19.29	19.69	19.84	19.87	18.60	19.81	18.98	20.84	19.03	19.03	22.40	20.80	18.81	19.72	20.95	19.83	20.84	19.10	19.33	18.63	19.06	19.43	
1760	10	21.48	21.28	19.94	20.94	19.76	18.48	21.23	19.73	21.70	21.00	19.34	20.76	20.01	20.39	17.12	15.10	10.90	12.90	14.60	16.31	16.48	14.95	14.36	16.39	13.42	12.30	8.72	14.58	13.69	12.79	10.62
1760	11	8.66	10.67	9.21	12.30	8.33	7.24	6.36	8.52	9.63	12.55	12.56	13.72	13.99	13.27	13.38	14.17	13.45	11.05	12.10	11.70	11.70	12.18	8.48	5.34	3.57	3.12	4.42	4.42	3.21	6.17	
1760	12	2.52	4.76	6.32	7.04	7.91	7.95	5.07	2.08	0.77	0.34	3.15	1.62	0.72	2.07	3.10	2.41	2.61	3.24	3.39	3.81	3.24	1.94	1.71	3.50	2.68	5.27	6.05	6.35	7.68	8.21	7.57
1761	1	8.57	7.46	8.99	7.15	5.50	4.52	2.81	7.37	5.14	4.75	0.33	2.70	2.35	-0.97	0.78	-0.89	0.08	2.41	-0.50	-0.20	3.83	3.54	1.56	1.54	3.00	4.42	2.58	2.17	6.07	4.92	2.18
1761	2	0.01	-0.49	4.92	5.62	3.12	0.56	-0.88	-0.40	4.62	4.11	4.54	5.60	0.51	5.37	5.67	5.88	7.66	8.38	8.79	8.76	7.97	9.06	7.15	8.91	5.50	2.32	5.62	4.05			
1761	3	8.12	6.73	8.61	6.97	8.25	7.65	9.11	7.44	8.09	9.06	10.37	10.98	9.00	8.30	8.45	8.29	9.15	9.46	9.75	9.28	9.81	10.00	11.15	8.29	7.69	7.16	7.26	6.39	7.17	8.87	9.29
1761	4	7.92	9.48	7.94	10.29	10.06	9.06	7.43	9.48	10.92	11.31	9.92	12.16	12.49	11.55	14.99	14.31	15.08	16.19	14.02	16.21	13.65	13.58	13.87	15.38	12.99	12.74	12.88	13.42	12.50	12.88	
1761	5	12.89	13.36	14.45	15.69	15.09	16.44	17.13	16.90	15.99	15.87	15.87	16.45	18.47	16.08	18.87	17.46	16.84	17.43	17.27	18.32	18.86	18.11	18.06	19.18	18.70	18.69	19.41	18.93	19.91	20.55	20.02
1761	6	18.57	18.24	16.89	17.19	18.19	18.12	18.64	19.23	20.46	19.68	20.40	18.19	19.34	19.80	17.79	17.64	17.52	16.08	18.34	19.43	19.38	20.86	21.42	22.21	22.09	22.59	23.45	23.45	23.26	21.94	
1761	7	17.16	22.52	22.65	21.76	21.57	23.07	22.47	22.60	24.31	23.87	24.81	25.10	23.90	24.84	24.54	24.38	25.05	24.04	24.56	24.59	25.56	25.27	24.95	25.17	24.67	24.12	27.18	25.21	24.31	25.38	25.38
1761	8	25.04	24.78	24.54	23.64	24.00	23.98	25.08	23.99	25.19	25.63	25.08	17.43	19.21	24.34	23.51	22.50	23.27	23.12	24.04	24.57	25.00	26.01	23.94	23.86	23.57	23.55	23.95	27.38	25.79	26.73	24.33
1761	9	24.81	23.58	24.82	24.51	26.01	24.68	25.24	24.97	25.49	25.39	24.31	22.84	21.03	20.99	21.13	21.58	20.31	20.13	22.44	20.64	20.57	19.91	19.76	19.32	20.03	20.18	19.79	21.08	20.14	15.76	
1761	10	12.90	18.26	18.19	14.28	15.52	15.45	17.54	16.51	16.50	15.58	16.69	18.55	17.60	16.29	17.77	19.40	17.58	16.65	15.62	12.94	12.18	11.78	11.86	10.66	11.78	13.15	12.08	10.65	11.87	10.69	10.59
1761	11	12.00	14.21	12.55	11.66	11.76	9.42	7.55	6.32	5.45	7.06	8.41	9.87	9.11	10.91	11.48	10.23	11.04	10.44	9.37	9.90	10.28	8.62	8.71	8.94	10.97	9.06	6.01	8.78	8.55	7.61	
1761	12	3.05	0.62	3.01	0.16	0.16	-0.92	0.22	2.02	4.13	5.07	7.64	8.62	7.94	6.88	7.73	6.98	6.07	4.63	4.46	5.46	5.44	4.26	3.08	0.95	5.13	5.43	6.45	3.78	3.21	2.03	2.00
1762	1	3.60	0.85	1.54	2.63	1.23	3.74	4.62	5.89	7.12	6.96	6.61	9.88	9.83	7.87	4.79	5.76	7.53	7.97	5.91	5.42	4.70	3.02	3.08	4.67	3.97	3.05	3.30	2.11	2.35	3.67	2.36
1762	2	3.98	4.64	3.25	1.89	1.90	2.40	-0.88	1.69	-0.69	0.75	2.59	1.64	5.03	5.19	1.90	4.43	6.85	5.51	7.01	7.45	6.33	2.45	2.65	-0.29	0.30	0.33	0.76	1.29			
1762	3	2.33	2.15	3.66	2.03	0.45	-1.71	-1.05	2.03	-0.07	3.12	5.36	3.61	3.68	4.99	4.96	8.60	4.69	4.87	4.68	6.39	5.81	3.91	4.55	7.15	5.11	6.29	8.06	5.41	7.50	8.98	8.99
1762	4	8.81	6.42	6.98	9.33	9.94	8.12	8.86	8.09	9.51	10.48	10.25	10.16	11.34	12.29	14.38	14.40	14.26	15.49	13.46	14.21	14.48	15.25	13.33	14.02	17.47	16.78	16.89	16.04	15.09	16.21	
1762	5	17.73	17.04	16.87	14.66	14.61	18.11	15.99	14.87	15.25	15.37	15.50	17.70	17.20	19.80	20.06	21.29	19.76	20.84	19.62	20.45	21.09	22.12	21.26	18.03	17.27	19.05	19.70	20.39	21.65	19.80	15.22
1762	6	15.77	16.58	18.33	17.45	17.30	18.78	19.24	18.37	19.23	19.89	19.66	20.39	20.81	20.76	20.32	19.64	20.16	20.22	21.05	21.49	21.46	21.23	21.45	20.49	19.86	19.99	21.47	20.34	20.76	19.85	
1762	7	18.47	20.73	21.11	21.86	22.71	21.38	21.52	21.38	21.09	21.48	22.82	23.42	24.20	23.77	24.50	24.84	24.90	23.73	26.19	26.71	28.34	28.02	28.34	27.49	27.27	28.26	28.25	27.23	26.11	25.35	24.91
1762	8	24.98	25.95	26.63	25.65	25.15	24.90	25.55	24.51	21.76	22.28	21.87	22.29	24.11	25.75	26.66	24.62	23.40	22.70	22.18	23.82	23.45	23.45	24.35	24.27	25.08	23.78	22.78	23.94	20.26	21.51	20.65
1762	9	21.34	21.50	18.69	19.95	20.25	21.28	22.00	20.63	22.07	20.74	20.33	19.55	20.21	20.79	22.49	22.98	22.16	21.01	21.37	20.46	18.85	19.40	18.59	18.59	21.41	21.75	21.30	21.78	20.26	20.41	
1762	10	20.56	19.83	20.74	21.00	18.97	16.40	16.75	16.11	15.35	14.09	15.07	12.31	12.17	13.98	16.35	16.17	14.79	13.95	13.31	14.93	16.68	15.93	16.85	16.23	14.54	17.97	15.84	12.81	13.72	16.03	16.11
1762	11	14.00	13.92	14.73	15.17	16.01	14.97	9.94	10.61	8.08	8.46	11.35	12.84	13.88	15.28	13.30	10.57	11.87	9.65	8.80	10.17	7.75	10.14	5.22	3.91	6.02	7.75	9.14	8.38	6.70	6.20	
1762	12	5.86	6.10	6.22	6.90	7.37	5.55	4.53	4.42	6.70	4.43	3.52	2.73	2.96	3.31	3.54	3.54	4.92	5.60	5.26	2.88	2.09	2.21	2.10	1.19	0.62	2.22	1.77	-2.33	-2.09	-2.43	-0.83

year	month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1763	1	-0.28	0.40	1.09	2.46	3.83	3.83	4.63	4.63	4.28	5.65	3.93	3.21	4.75	7.03	4.79	4.04	1.03	1.03	4.05	1.78	7.05	8.55	7.02	7.00	3.96	3.94	8.44	3.88	6.87	7.59	6.80
1763	2	6.08	7.43	8.82	9.86	10.57	7.96	7.92	8.95	10.24	10.23	10.06	10.21	11.01	8.65	4.19	3.55	2.24	4.32	5.80	6.43	6.17	5.80	6.63	8.47	9.25	8.90	8.29	7.33			
1763	3	9.23	9.36	10.46	10.44	10.62	8.34	6.92	8.59	5.81	4.78	9.04	3.11	-2.04	-1.82	3.17	4.40	7.24	6.55	6.55	7.20	8.42	9.52	10.48	10.09	7.37	7.69	1.92	1.11	4.70	7.94	9.24
1763	4	7.27	6.45	7.73	10.14	9.91	6.69	6.28	8.63	9.84	8.33	10.41	11.05	11.94	12.78	12.85	12.32	13.11	13.20	13.63	16.05	14.09	15.51	13.96	12.82	16.69	16.98	15.77	14.57	14.86	16.14	
1763	5	13.39	11.00	12.70	12.37	12.95	13.30	14.74	13.80	14.09	14.67	13.72	14.10	14.73	14.03	14.11	15.35	16.05	15.38	14.78	16.20	16.22	16.61	16.97	17.98	18.43	18.22	18.01	17.76	18.19	18.18	18.01
1763	6	19.48	19.84	20.67	19.72	18.92	17.98	19.09	19.31	18.74	17.03	16.98	18.46	18.34	19.13	19.49	19.59	19.67	20.51	20.24	19.80	21.80	21.93	21.20	20.88	21.50	23.55	22.56	22.69	23.54	23.25	
1763	7	22.97	22.57	21.84	22.66	21.59	20.69	22.47	22.81	21.61	22.72	22.31	23.28	23.84	25.64	25.02	22.92	21.68	22.19	22.88	22.83	23.03	23.44	22.67	24.33	22.24	22.07	22.00	22.54	23.00	22.99	23.10
1763	8	22.25	22.25	24.16	24.40	24.17	23.68	22.87	22.42	22.40	24.12	23.99	23.20	24.73	25.20	24.25	24.78	26.61	28.14	29.20	28.97	28.26	27.34	27.27	26.63	27.05	27.21	27.74	25.47	24.49	25.34	24.30
1763	9	27.22	25.69	24.28	19.62	22.71	21.64	21.65	23.16	23.51	21.11	23.05	21.73	20.46	19.78	15.79	16.21	18.14	18.83	20.37	19.68	19.22	18.50	19.52	20.01	19.34	19.34	18.36	19.04	16.04	16.31	
1763	10	13.87	16.69	20.20	19.91	13.83	12.95	12.90	10.86	12.98	12.75	10.78	11.22	11.56	9.50	9.90	11.01	10.77	10.12	10.11	13.59	14.76	10.63	11.34	10.29	12.70	12.88	13.41	15.81	14.73	15.03	16.76
1763	11	16.09	16.09	14.81	13.97	16.01	14.99	14.98	15.20	15.47	14.46	14.73	14.73	14.38	11.39	9.71	6.85	4.01	3.90	4.87	0.74	-2.22	0.22	-1.70	-0.77	-1.40	1.74	1.94	3.74	6.03	6.34	
1763	12	7.61	10.11	7.46	7.25	5.79	4.57	2.43	1.29	2.21	1.15	1.91	5.42	9.69	7.97	6.98	5.91	6.87	6.98	8.79	5.95	2.42	5.64	5.92	3.59	4.90	6.00	2.49	6.45	7.78	8.50	9.49
1764	1	11.77	10.42	9.30	9.27	4.77	6.68	9.26	8.20	9.34	5.62	5.62	7.67	7.06	3.19	5.41	7.22	7.06	7.72	9.44	8.23	7.12	7.11	6.54	6.83	7.38	4.20	5.53	6.65	9.64	6.65	3.60
1764	2	7.45	6.08	5.41	8.47	7.81	3.54	5.22	6.73	5.67	6.06	6.21	9.40	6.42	4.95	4.91	4.96	4.84	4.97	5.69	5.31	9.91	9.39	6.13	8.27	8.67	7.95	6.43	7.53	5.94		
1764	3	8.64	7.77	7.41	6.16	5.63	4.57	5.56	6.49	6.31	5.12	6.44	4.79	4.88	5.75	5.52	5.89	4.91	4.43	5.90	7.20	8.53	9.80	9.31	8.13	8.04	9.83	11.23	10.43	9.55	10.79	9.29
1764	4	8.73	9.42	9.96	9.75	10.53	10.86	10.15	9.68	10.75	11.56	12.05	12.87	12.18	10.34	10.43	12.55	11.93	10.99	9.95	9.65	9.90	9.89	10.83	10.39	10.88	10.33	11.07	9.36	10.69	12.11	
1764	5	13.06	13.61	14.73	15.52	16.85	16.99	16.53	16.77	16.78	16.62	16.78	16.03	17.35	17.00	17.83	18.11	18.27	16.01	15.24	17.90	17.53	20.95	21.81	21.91	22.20	22.78	21.54	21.42	20.09	21.25	21.13
1764	6	17.11	16.52	17.73	17.48	15.64	16.84	16.17	17.10	17.26	18.43	18.59	19.64	20.55	22.30	21.84	22.61	22.46	23.03	23.16	23.13	24.31	24.94	24.21	23.87	25.15	24.91	26.11	25.71	25.84	25.20	
1764	7	24.34	27.93	24.36	22.17	22.31	21.05	22.55	23.02	23.49	22.01	21.76	21.50	23.53	23.58	24.34	22.55	22.89	22.76	22.77	23.97	22.91	22.69	23.22	25.80	26.24	24.33	23.91	24.65	25.61	26.12	25.23
1764	8	25.63	26.21	23.82	22.78	23.64	22.76	25.25	23.29	25.31	24.72	24.44	23.96	22.28	20.98	21.59	23.01	23.43	22.67	20.51	19.30	17.79	20.19	20.84	20.54	21.48	22.01	21.82	22.40	24.21	23.69	24.40
1764	9	23.81	25.45	26.16	25.60	24.54	20.31	18.86	20.68	19.56	21.13	21.50	21.51	21.52	20.99	21.37	21.98	22.13	22.12	19.52	16.38	15.20	14.72	14.35	16.04	15.72	16.47	12.94	13.35	10.66	10.29	
1764	10	10.46	9.73	12.74	11.60	11.93	14.39	14.97	15.07	15.69	14.98	16.11	15.15	14.93	15.75	15.23	14.06	14.47	14.14	14.45	13.34	13.79	11.55	12.34	7.50	8.91	7.28	8.86	5.48	6.51	4.63	7.62
1764	11	8.77	7.78	8.16	8.32	5.72	5.52	7.83	5.38	8.84	9.01	9.54	10.44	10.81	8.58	7.07	7.45	7.93	8.51	9.25	9.73	9.46	8.95	9.11	9.11	8.64	9.47	9.47	9.00	8.57	10.24	
1764	12	8.36	8.15	6.41	8.13	8.53	6.13	9.03	6.88	4.78	2.12	5.75	6.26	5.72	4.30	6.18	7.62	7.10	6.31	6.93	6.72	7.09	5.38	4.25	6.45	7.11	7.46	7.65	7.23	8.74	9.17	9.09
1765	1	10.07	9.66	11.01	10.08	9.81	9.06	9.52	11.62	11.11	11.59	10.34	10.66	7.81	8.82	10.01	9.79	9.95	10.04	8.76	7.03	4.83	6.14	7.98	9.36	9.26	8.32	8.53	10.58	11.96	9.53	6.62
1765	2	5.17	3.57	4.25	6.23	6.38	8.66	7.19	6.40	7.20	7.24	4.93	4.20	3.66	3.79	0.83	1.70	0.67	4.36	4.03	7.25	6.49	6.64	9.18	8.08	7.40	6.58	5.63	6.70			
1765	3	7.99	7.59	8.70	4.37	4.93	5.61	9.23	11.33	8.49	8.16	8.56	9.33	9.93	10.84	10.64	9.72	10.29	9.02	10.62	12.76	11.15	7.31	8.10	8.42	9.33	11.69	11.42	12.36	10.92	11.62	12.32
1765	4	9.82	10.07	12.73	11.33	13.48	12.41	13.68	12.54	13.73	14.49	13.15	9.12	9.73	7.76	10.17	10.18	8.92	9.92	11.07	10.88	10.14	11.08	12.09	10.15	12.05	12.43	12.27	13.49	13.76	14.94	
1765	5	14.77	13.63	13.54	12.92	14.03	13.37	15.28	14.97	14.33	14.41	15.74	16.23	16.25	17.27	18.82	14.47	16.37	17.15	18.36	17.30	17.93	18.12	17.41	19.75	20.26	19.06	18.74	17.24	17.64	17.79	19.13
1765	6	20.09	20.86	21.61	21.28	19.26	19.00	19.10	19.75	19.10	20.15	19.48	21.12	21.61	22.35	22.33	22.88	22.58	24.07	23.91	25.52	24.68	22.01	21.97	23.66	22.46	22.44	22.72	21.62	21.49	20.98	
1765	7	21.01	20.92	20.99	21.96	23.80	22.26	21.72	22.60	22.57	22.72	21.56	22.73	23.79	24.63	22.62	22.89	22.06	21.60	20.35	20.28	20.73	18.99	19.66	21.52	21.86	21.12	19.98	21.27	19.24	19.47	20.51
1765	8	20.77	21.76	20.96	21.68	21.74	20.76	21.66	22.17	23.08	22.55	22.04	21.64	21.24	22.48	21.82	22.49	22.43	22.08	21.04	23.19	21.78	24.30	24.01	26.29	27.09	25.34	24.71	24.68	24.42	24.22	24.56
1765	9	23.91	24.53	24.75	24.51	25.64	25.57	24.62	24.47	24.10	26.31	24.50	23.52	23.54	22.53	22.77	20.90	19.91	22.17	22.10	21.93	21.46	21.94	21.98	20.70	19.42	16.87	19.09	20.07	20.24	19.39	
1765	10	19.08	19.64	21.36	18.55	19.64	20.96	21.60	18.86	16.36	14.98	14.86	14.31	16.36	16.11	13.94	14.74	13.41	12.96	16.15	15.13	16.70	16.32	16.93	17.13	20.94	16.28	16.20	16.01	16.11	14.89	11.01
1765	11	12.13	13.81	13.22	9.75	9.31	13.11	11.39	13.22	14.16	14.08	13.33	13.85	12.57	13.51	13.51	12.60	13.51	12.44	10.28	8.22	7.26	3.65	3.01	4.50	6.73	7.13	6.38	4.21	4.78	4.83	
1765	12	6.77	7.43	6.58	3.41	2.58	1.53	2.58	4.69	6.27	3.48	8.21	7.52	4.79	5.21	4.22	3.65	3.46	-0.70	1.26	1.16	4.05	5.01	5.19	4.39	2.05	-0.25	-0.23	-1.82	-1.64	-1.22	-2.59

year	month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1766	1	-0.85	2.57	3.56	3.63	2.30	0.72	-1.88	-2.53	-1.08	-1.20	-2.09	-2.04	-4.98	-1.60	-0.33	-0.80	-0.96	-1.56	1.05	0.13	-1.08	-0.53	-0.55	1.42	2.37	2.92	0.15	2.21	1.64	0.07	0.58
1766	2	2.15	3.50	3.79	4.45	5.48	5.35	4.78	3.68	3.11	1.69	-0.52	1.78	5.21	6.34	7.06	6.28	6.72	8.70	9.55	5.68	4.52	3.86	3.13	1.56	2.25	3.21	4.89	5.32			
1766	3	5.60	5.52	8.80	8.63	10.85	11.27	9.84	10.86	9.34	7.72	10.66	8.23	9.13	8.49	8.11	7.72	7.72	8.94	8.94	8.40	9.20	7.07	7.14	6.16	5.65	8.94	10.60	8.75	6.81	10.79	11.85
1766	4	12.02	11.55	12.66	11.84	12.32	14.39	13.48	13.42	13.19	10.95	9.25	11.83	10.30	10.39	13.16	14.10	13.43	12.74	13.38	14.48	12.85	12.86	13.62	14.33	14.04	15.16	15.29	15.14	16.46	15.63	
1766	5	14.57	14.58	16.11	14.67	16.52	17.32	17.10	18.41	17.35	17.71	19.10	19.18	15.78	16.16	12.70	15.03	14.63	15.03	15.02	15.93	16.87	19.17	19.00	19.16	18.08	18.46	19.19	18.53	18.36	17.24	14.99
1766	6	15.66	16.43	18.04	18.24	19.46	19.82	19.86	21.62	21.90	22.73	23.82	22.89	21.48	21.68	20.96	21.69	22.46	22.53	22.57	22.39	22.14	22.37	22.78	21.53	22.86	22.07	22.50	22.34	22.85	23.92	
1766	7	25.09	22.86	21.29	19.28	20.49	22.44	21.47	21.58	21.90	21.75	23.08	24.32	21.58	22.34	21.17	22.06	22.51	21.65	22.56	23.53	23.77	22.81	24.13	21.28	21.34	21.65	21.48	23.18	22.99	23.88	23.66
1766	8	24.73	25.73	25.46	25.86	25.21	26.10	26.90	26.57	26.15	25.17	26.33	27.18	27.88	25.15	26.17	24.53	21.45	21.26	21.84	22.86	21.70	22.83	22.87	24.66	24.49	24.85	22.58	22.82	23.56	24.35	24.85
1766	9	23.33	23.36	24.45	24.47	23.50	24.36	23.19	21.77	23.31	20.29	18.72	19.36	19.05	21.57	22.52	22.15	20.13	19.88	21.20	18.74	19.18	18.58	19.60	19.28	19.04	19.25	19.71	16.52	15.60	17.95	
1766	10	20.28	17.20	17.11	16.09	17.37	17.83	18.45	19.35	19.72	19.79	19.36	16.20	14.14	13.75	14.12	14.28	12.37	11.72	11.71	7.40	10.92	10.91	12.57	14.51	12.28	12.57	11.81	12.94	15.79	16.85	15.50
1766	11	15.77	13.79	15.39	16.24	13.22	11.54	12.59	14.05	16.05	14.97	14.89	14.14	14.89	15.42	13.97	13.67	12.59	10.81	10.05	12.78	14.01	15.25	13.24	11.33	10.77	8.79	7.61	10.20	9.42	6.51	
1766	12	8.56	8.79	5.37	4.69	5.16	2.78	2.50	0.37	2.25	2.24	2.75	5.24	5.90	9.48	9.17	8.71	7.72	4.16	4.32	4.49	5.57	5.27	4.43	5.62	7.13	7.22	5.88	4.20	3.01	3.06	-0.33
1767	1	1.06	1.75	-0.73	2.16	0.31	0.18	-0.58	-0.55	1.68	2.01	-0.19	-1.75	-1.12	4.88	6.78	5.83	7.08	6.44	6.75	5.00	4.67	0.71	1.32	1.62	2.23	2.84	3.45	2.79	3.72	2.11	4.61
1767	2	7.59	7.72	7.06	7.99	8.91	8.88	9.33	11.36	9.91	10.36	10.02	9.69	10.77	11.54	11.51	12.44	12.74	11.14	13.81	13.32	11.25	11.87	10.12	10.42	12.62	10.71	11.96	11.96			
1767	3	13.84	9.42	12.57	10.04	7.51	7.19	6.56	10.03	9.55	8.13	7.98	10.03	11.30	10.67	12.26	9.42	6.27	6.28	9.45	11.98	13.88	11.69	10.75	10.13	11.72	10.16	12.85	11.76	12.09	13.37	11.18
1767	4	14.66	15.31	14.07	13.13	11.89	12.22	12.55	13.52	12.90	14.81	13.89	16.74	15.81	15.83	16.79	19.81	18.09	13.06	10.55	10.56	9.95	15.01	14.39	15.04	13.32	15.70	14.13	13.83	14.31	15.11	
1767	5	14.49	13.71	13.88	12.63	11.21	13.59	14.54	15.02	15.82	15.35	17.09	17.09	18.35	19.30	18.99	19.46	19.30	19.62	19.45	19.29	18.97	19.60	19.91	20.06	20.21	19.57	20.19	19.24	16.54	16.37	19.04
1767	6	19.19	20.12	21.37	17.73	18.81	20.69	20.99	24.92	23.79	18.25	20.60	21.68	21.19	20.53	21.14	19.54	18.89	19.65	20.89	19.29	21.32	19.71	21.27	21.24	22.16	22.77	24.00	23.97	25.53	23.92	
1767	7	25.31	24.50	24.94	24.44	22.52	21.86	22.47	25.44	26.52	24.59	25.51	24.86	24.20	24.01	21.94	23.49	22.83	24.70	24.68	26.55	26.52	23.97	25.21	25.82	25.17	25.15	25.28	25.26	25.73	24.82	26.32
1767	8	23.45	20.91	19.35	21.74	22.25	23.86	24.22	23.31	24.31	26.41	27.25	27.62	27.35	27.57	27.15	23.10	23.63	23.21	19.79	20.16	19.26	19.15	19.04	19.72	21.66	21.22	23.00	20.51	19.28	20.41	18.71
1767	9	19.36	20.02	20.99	19.90	20.55	23.24	21.99	22.94	22.79	18.22	19.48	19.48	19.32	19.47	21.36	18.51	18.18	18.49	20.37	20.98	19.07	17.16	15.57	14.29	15.21	14.88	14.54	16.10	14.50	15.74	
1767	10	14.14	13.49	15.36	15.97	18.95	15.61	13.38	13.84	14.29	14.90	15.36	18.02	19.90	18.78	18.92	17.02	13.85	15.10	14.77	14.76	13.49	13.17	13.47	13.31	12.67	12.67	11.88	12.82	13.29	12.50	10.92
1767	11	13.76	11.71	10.45	11.24	13.14	14.09	9.83	10.94	10.63	8.89	12.05	10.32	9.06	10.80	13.33	14.91	16.02	11.60	9.71	10.65	11.44	10.65	10.02	8.28	8.12	7.33	7.00	8.58	5.57	3.83	
1767	12	6.03	7.12	6.32	5.52	2.04	3.61	1.54	2.63	5.78	7.66	7.80	8.58	5.72	3.98	4.76	2.85	0.95	0.32	4.10	4.89	4.10	4.58	0.96	-3.76	-4.37	-1.82	-1.15	2.36	4.30	3.09	1.27
1768	1	-0.21	2.06	0.53	-1.63	-2.54	-0.61	1.00	1.66	2.63	4.54	4.86	4.24	2.04	1.57	2.99	5.19	5.82	4.39	5.01	5.79	6.25	6.07	5.27	4.93	3.18	3.79	6.13	5.16	4.19	3.06	3.98
1768	2	7.11	6.77	6.75	5.46	2.75	1.62	0.49	2.68	2.18	2.63	3.08	3.06	5.09	6.33	6.46	6.13	6.74	0.73	0.55	3.22	5.57	6.34	6.96	8.21	8.51	8.82	7.23	10.06	11.93		
1768	3	10.05	10.99	9.09	3.09	1.51	0.56	0.87	0.87	1.66	0.56	-0.86	-1.96	1.20	4.99	7.84	10.21	7.54	8.18	8.18	9.46	11.36	9.16	2.86	3.50	6.99	8.89	8.28	10.50	12.09	10.21	10.23
1768	4	10.25	11.37	9.65	9.03	10.94	12.85	15.39	12.26	13.54	14.03	10.73	8.85	9.82	12.36	13.64	13.18	15.56	16.21	15.91	17.66	17.36	17.54	18.18	21.35	18.84	17.59	18.24	17.93	15.73	14.64	
1768	5	17.49	20.34	19.25	19.57	20.21	22.11	19.43	17.39	18.97	18.66	18.98	21.51	19.30	19.62	14.57	15.99	16.62	17.09	15.04	17.56	16.92	18.65	19.59	19.27	19.58	20.20	21.46	17.97	19.54	20.16	19.68
1768	6	18.24	14.76	19.32	13.31	14.24	19.11	18.46	19.24	18.74	20.62	19.18	20.10	22.77	21.80	20.04	18.28	19.36	22.65	23.26	21.97	22.26	22.24	19.85	22.82	23.74	24.03	24.63	24.61	23.00	23.29	
1768	7	24.21	25.92	23.84	20.97	23.15	24.07	24.04	24.65	25.57	26.49	26.46	25.49	27.51	26.54	24.78	27.59	22.20	20.91	20.89	21.50	22.74	21.76	22.37	23.61	24.54	23.57	24.18	24.16	25.73	26.81	23.95
1768	8	25.34	22.65	25.66	23.80	23.83	24.97	23.58	23.94	24.78	25.62	23.46	24.46	24.20	25.99	25.57	26.89	26.31	27.16	27.05	26.31	25.57	26.25	28.20	26.19	26.07	24.69	23.79	23.35	25.28	24.99	24.39
1768	9	24.41	24.75	23.67	22.27	20.39	23.40	25.46	19.63	19.16	20.74	21.38	21.37	21.37	23.26	20.73	17.40	18.81	18.17	19.11	16.09	17.65	19.69	18.72	20.28	18.06	15.67	16.12	14.84	13.71	12.90	
1768	10	13.35	14.44	15.99	18.18	18.16	18.45	18.75	17.47	17.92	18.69	18.83	19.29	16.90	17.05	17.03	15.12	12.90	12.57	12.40	12.24	8.75	8.75	5.58	8.73	9.36	10.93	16.29	13.61	14.08	14.08	11.55
1768	11	10.92	9.19	7.14	9.19	12.98	14.25	7.78	6.68	7.31	9.37	10.63	10.64	11.90	11.59	10.17	12.38	11.60	10.34	9.86	11.28	8.92	9.70	9.54	8.60	8.12	6.85	5.90	4.32	3.20	3.35	
1768	12	6.50	8.07	8.53	9.78	9.46	6.76	5.96	5.95	5.78	2.92	1.65	-0.73	-2.17	-3.12	-1.87	1.12	5.21	3.79	6.47	4.42	2.21	0.32	4.75	1.93	0.21	0.39	6.11	4.25	1.46	6.25	6.79

year	month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1769	1	8.00	9.32	8.74	9.42	8.67	8.70	8.73	8.29	7.68	6.59	4.71	5.82	7.40	8.99	6.62	5.98	7.08	4.55	6.59	3.11	4.67	7.49	7.79	6.51	6.02	4.57	4.24	7.69	6.08	6.38	0.04
1769	2	-3.30	-3.96	-0.20	1.04	2.91	8.25	5.39	8.99	8.49	8.15	7.18	5.27	3.19	4.28	5.04	5.18	4.53	4.36	5.44	4.79	3.83	3.34	2.38	2.21	3.62	2.35	5.49	2.80			
1769	3	5.95	7.21	6.89	6.25	5.14	7.50	5.29	5.29	4.98	4.35	4.19	6.72	9.72	10.04	10.36	10.05	9.90	8.81	8.82	5.98	8.36	5.85	8.23	9.03	8.25	7.00	7.96	7.03	8.31	6.43	4.55
1769	4	7.56	9.63	10.59	8.24	8.57	10.96	12.08	12.10	12.43	13.08	16.09	14.85	18.65	17.41	18.06	18.23	16.98	16.68	14.02	13.40	12.00	15.80	16.60	16.14	16.95	17.28	18.24	18.56	17.00	16.06	
1769	5	17.65	15.13	14.51	15.15	15.79	15.33	17.86	13.60	11.40	11.40	14.72	16.46	18.83	15.99	16.46	15.20	16.62	18.35	18.03	17.72	19.60	18.97	20.86	21.32	24.00	22.10	22.72	23.18	21.75	18.27	20.31
1769	6	22.35	21.38	22.00	22.30	22.60	23.06	22.57	23.81	25.06	24.09	24.39	23.58	24.19	24.80	22.88	17.18	17.47	19.97	19.47	16.76	18.79	19.56	19.69	21.24	22.00	22.77	22.74	23.34	22.05	22.03	
1769	7	19.47	20.87	20.68	20.97	22.52	21.55	22.62	22.44	23.99	20.33	19.36	20.60	20.41	22.44	24.46	24.75	25.36	24.07	25.31	25.13	22.74	21.76	21.27	20.93	22.01	23.25	23.55	21.00	21.46	22.86	21.90
1769	8	21.72	21.07	21.72	22.85	23.83	23.39	23.90	24.42	25.41	26.25	25.67	25.72	25.46	26.94	26.99	25.31	27.26	24.16	22.63	20.95	21.00	21.20	18.88	20.35	20.87	20.91	20.79	21.61	21.01	21.05	23.44
1769	9	23.78	23.65	25.09	25.90	24.96	23.56	22.30	21.52	19.95	20.43	19.64	19.80	20.74	18.84	19.62	20.09	19.29	16.91	18.63	18.93	17.81	18.58	19.99	20.60	17.90	19.46	18.65	18.47	17.34	17.79	
1769	10	15.25	14.75	12.99	11.55	11.85	13.09	12.12	8.63	7.98	8.75	7.47	8.24	10.27	9.31	7.40	8.18	8.48	9.26	8.46	8.45	9.07	11.11	11.90	11.89	13.78	10.46	7.93	6.82	10.14	10.61	13.76
1769	11	13.76	11.08	12.50	13.93	14.72	14.40	15.04	15.51	16.31	13.79	14.26	10.64	9.69	11.59	14.12	11.12	8.12	9.07	10.02	9.07	7.50	4.97	10.65	9.07	5.28	7.48	10.00	7.47	3.68	9.03	
1769	12	3.82	1.44	1.12	1.89	2.36	2.82	0.75	0.42	0.88	1.82	1.02	2.27	4.46	6.66	3.49	2.22	1.74	4.73	0.94	3.15	3.79	6.63	8.70	9.50	6.68	5.76	4.53	2.52	4.14	1.83	0.32
1770	1	-0.84	-0.15	1.17	0.58	1.25	0.97	-1.84	1.50	-1.00	0.75	-1.92	-0.65	0.46	0.94	1.09	2.04	-0.18	0.76	-2.41	1.05	1.67	3.55	1.95	3.35	3.18	1.89	2.19	2.95	2.14	1.64	2.09
1770	2	6.17	2.36	4.22	3.57	4.17	2.89	4.12	2.84	3.44	2.63	4.03	7.63	9.66	6.17	8.52	5.81	6.90	8.93	9.55	9.53	5.73	5.71	4.43	3.63	3.78	2.51	0.60	-0.67			
1770	3	1.22	4.37	7.52	10.04	8.45	9.71	8.13	7.19	7.66	9.71	9.71	10.98	10.67	10.36	9.73	7.84	6.27	8.18	5.66	7.09	5.68	6.32	5.70	5.71	5.73	6.53	7.80	9.24	9.41	10.06	10.55
1770	4	10.25	11.37	12.01	10.61	11.57	10.49	11.13	9.89	12.59	12.76	11.36	10.75	13.60	12.20	13.64	14.29	13.67	13.84	13.23	13.72	14.05	12.49	11.71	10.46	9.69	12.86	14.13	14.62	16.05	17.95	
1770	5	17.02	16.40	14.83	12.78	13.90	16.43	15.81	17.70	14.40	17.40	18.35	18.19	17.09	17.25	16.62	15.04	17.72	19.30	19.93	21.50	20.39	19.92	21.49	22.11	20.05	21.62	21.93	21.60	21.59	21.58	21.57
1770	6	21.08	19.81	18.21	19.78	22.60	22.58	23.83	23.18	23.95	22.51	22.18	25.63	25.29	24.01	25.40	25.54	21.73	20.28	19.31	20.55	20.84	20.03	20.00	19.66	18.85	19.61	21.48	22.08	23.32	21.87	
1770	7	20.26	20.08	19.58	20.34	20.79	20.92	21.68	23.70	21.62	20.81	20.78	20.60	19.94	20.39	20.36	21.28	22.04	22.97	23.26	23.55	23.68	23.97	22.85	24.87	25.17	21.99	23.23	22.89	24.15	24.60	22.84
1770	8	22.66	23.43	21.88	21.43	22.72	23.86	23.90	23.94	25.25	24.20	25.04	23.99	25.46	26.46	27.15	22.31	20.63	21.16	21.37	21.58	22.10	19.63	20.46	20.67	21.18	22.49	22.37	21.77	22.91	21.99	21.86
1770	9	21.42	22.54	22.72	23.53	26.23	25.77	22.62	22.47	23.11	20.59	19.80	19.64	23.90	20.73	20.10	19.93	21.66	21.01	21.63	21.62	20.97	20.16	21.25	21.55	21.84	21.66	21.33	21.31	22.71	22.37	
1770	10	17.46	19.01	18.36	18.97	15.32	15.46	16.85	15.89	16.34	16.95	16.62	16.45	18.01	18.31	17.19	15.44	16.53	15.41	14.14	11.45	10.96	10.64	10.48	10.47	9.99	10.46	12.35	13.77	12.50	13.76	13.13
1770	11	12.82	11.55	10.29	12.35	11.88	9.35	11.09	13.15	11.89	10.95	9.69	7.01	7.48	5.75	6.38	9.54	13.33	14.75	11.60	10.02	8.92	2.60	6.86	9.38	11.91	10.64	12.05	10.47	10.62	8.40	
1770	12	9.34	8.70	9.64	10.57	6.46	7.24	7.54	3.74	2.46	4.97	3.86	2.58	5.88	5.40	5.55	6.64	6.63	5.52	5.52	5.84	4.26	5.06	4.12	5.87	7.31	5.92	7.37	3.62	4.30	0.57	3.79
1771	1	9.26	9.32	9.21	8.94	8.04	1.92	1.95	-1.18	1.05	-1.46	-1.13	2.35	4.41	5.20	6.14	8.19	9.45	8.97	7.06	9.26	8.77	8.28	9.21	9.19	3.18	6.31	7.24	7.53	9.87	4.64	6.82
1771	2	8.06	9.61	8.48	3.72	5.75	3.67	-0.30	-1.27	2.50	4.21	6.71	7.95	4.77	6.96	7.89	10.39	7.06	7.67	4.18	4.16	5.57	6.18	6.64	7.10	6.30	5.50	5.65	5.64			
1771	3	8.32	8.15	7.83	8.77	8.61	10.66	12.55	11.61	9.71	9.55	10.35	13.35	13.04	14.78	13.05	14.00	12.43	12.59	10.71	10.72	10.89	8.85	8.07	5.08	0.04	1.95	4.17	4.19	8.31	9.27	8.02
1771	4	6.46	5.21	4.28	5.72	7.47	8.28	10.34	11.31	11.48	13.39	14.36	14.22	12.66	13.62	14.90	15.55	13.67	9.27	7.39	6.77	8.37	12.49	14.87	12.36	12.21	13.80	14.29	14.14	15.10	18.59	
1771	5	15.12	15.77	15.77	18.94	15.16	17.69	16.44	20.07	20.87	19.92	19.61	18.98	20.25	19.78	22.30	23.88	23.88	21.51	19.30	22.45	25.13	25.75	24.64	24.64	23.84	25.57	23.35	24.92	23.96	23.63	22.67
1771	6	22.66	22.65	16.32	17.25	16.60	19.74	21.46	21.92	23.16	23.93	23.60	23.42	24.19	23.85	20.67	22.70	20.31	19.18	19.79	21.03	20.68	20.50	18.58	19.03	19.48	21.19	20.53	22.08	20.79	19.03	
1771	7	22.63	23.87	23.21	24.44	21.89	22.81	22.78	20.23	21.15	23.02	22.67	25.17	24.20	25.12	23.83	22.54	22.83	24.23	24.68	25.28	22.74	24.13	24.58	25.66	26.12	26.57	26.39	26.05	26.67	26.97	26.00
1771	8	26.29	24.07	22.51	21.90	22.72	21.02	24.06	25.36	26.20	25.62	27.41	27.77	27.20	25.04	22.89	23.89	23.79	22.42	24.53	24.26	24.00	27.20	27.88	25.08	25.44	22.01	20.63	21.45	20.70	21.36	23.13
1771	9	24.10	23.02	25.25	24.79	21.02	21.35	21.04	20.42	19.00	19.64	20.11	20.59	19.64	20.10	21.36	21.35	20.87	21.64	20.84	20.67	21.76	22.85	19.99	19.18	20.26	18.35	17.07	17.36	17.50	14.79	
1771	10	16.19	15.38	15.04	17.71	17.84	15.77	14.65	14.31	14.76	16.32	16.62	17.24	17.38	17.05	17.50	17.81	18.11	11.47	12.88	14.29	15.22	17.43	14.58	13.94	15.20	14.40	15.98	15.19	13.76	11.55	13.76
1771	11	12.19	8.56	8.24	11.08	9.04	9.20	7.46	8.57	6.84	5.11	7.48	7.48	5.27	7.49	9.86	9.07	9.23	4.65	4.81	4.81	7.02	5.60	0.23	4.49	4.17	3.38	4.16	1.79	0.84	0.83	
1771	12	1.45	3.49	5.22	7.42	8.04	9.29	5.64	7.21	4.99	8.29	6.85	6.53	7.93	8.87	8.39	7.90	6.79	8.05	5.99	6.15	4.10	4.58	3.49	3.19	6.05	5.44	5.95	2.68	3.99	6.88	7.11

year	month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1772	1	6.11	4.90	2.11	0.26	1.25	-1.24	-2.47	4.18	4.52	2.64	4.23	8.50	8.98	5.83	2.67	3.30	5.19	4.55	6.43	7.21	7.98	9.07	7.00	6.67	8.23	10.73	9.29	8.16	6.56	8.43	9.66
1772	2	10.43	9.30	9.59	8.14	3.70	6.83	6.96	5.36	4.23	7.84	9.39	7.00	7.93	8.85	11.20	9.13	8.64	8.62	9.86	9.53	9.04	9.18	9.64	12.31	11.67	12.61	12.28	12.59	12.74		
1772	3	13.21	11.94	10.20	10.35	8.77	10.98	10.82	12.08	11.76	12.87	12.40	11.30	11.62	11.94	10.99	12.11	11.48	10.70	11.50	11.35	11.99	11.69	13.12	12.81	10.93	11.74	11.59	15.23	14.30	13.21	14.81
1772	4	13.56	14.05	12.96	13.13	12.20	13.33	13.66	15.10	13.69	12.76	13.89	15.01	13.29	15.20	14.11	14.44	15.56	17.16	16.70	14.03	9.95	10.91	13.45	12.67	11.90	13.17	14.76	17.30	17.31	15.43	
1772	5	16.07	14.98	14.83	16.73	17.05	18.95	18.33	14.86	17.08	15.50	17.24	15.83	18.04	17.09	18.36	19.46	17.72	15.83	18.35	18.03	18.18	19.76	20.07	22.11	21.47	21.47	19.40	18.76	19.86	20.48	22.20
1772	6	20.45	21.07	19.79	21.67	22.60	23.06	24.30	24.92	26.95	27.88	25.02	22.63	22.13	21.48	19.09	20.49	21.26	22.18	22.00	24.18	24.47	24.61	26.32	25.66	26.74	25.92	27.32	27.45	26.79	27.08	
1772	7	25.47	23.71	22.42	23.81	24.41	23.76	24.52	25.60	25.25	25.54	26.78	26.43	26.09	26.22	26.83	26.01	26.94	26.44	25.62	27.34	24.00	20.82	22.37	22.67	22.17	22.46	22.92	24.79	22.89	23.02	24.26
1772	8	25.34	25.01	25.98	23.01	21.93	21.49	22.01	23.15	22.73	23.25	25.35	24.14	24.51	24.25	23.99	22.00	21.89	22.58	24.53	24.74	22.42	23.41	24.41	24.93	25.76	24.85	23.00	22.88	24.17	25.94	26.28
1772	9	26.15	26.96	23.83	24.79	23.54	25.13	25.78	24.84	25.00	26.27	24.53	21.69	20.58	21.21	21.83	24.19	23.08	20.38	20.53	19.72	19.07	19.06	19.99	19.49	19.16	19.77	21.80	21.62	21.44	20.48	
1772	10	19.35	18.06	16.62	17.08	18.32	19.72	19.54	18.10	15.87	17.27	18.20	18.02	18.32	16.89	16.56	15.12	15.11	14.78	15.09	15.08	15.54	12.22	12.68	15.20	17.09	20.24	17.87	18.19	19.45	14.24	14.08
1772	11	12.97	14.71	13.77	14.87	14.56	11.41	11.25	12.52	12.68	12.37	15.21	15.37	16.32	15.69	15.06	13.96	13.17	13.49	14.76	15.07	13.02	12.23	10.02	10.49	10.01	9.06	5.90	8.89	9.36	9.67	
1772	12	9.66	11.86	10.74	10.10	10.40	10.23	10.54	9.89	8.30	6.39	7.96	6.53	4.15	7.13	3.81	3.80	5.84	3.31	1.57	0.63	4.26	6.95	5.70	6.03	4.79	4.18	4.37	5.20	6.19	5.62	4.42
1773	1	7.37	7.74	6.85	4.68	3.15	3.50	3.21	4.03	2.15	2.01	4.55	2.82	5.67	6.62	9.62	6.14	1.72	3.44	6.91	8.47	5.46	9.70	10.00	7.14	8.38	9.47	10.23	11.16	9.71	5.90	6.04
1773	2	2.54	2.99	-2.09	0.10	-2.46	-4.06	-2.82	0.94	4.39	8.47	5.92	8.58	6.19	4.59	7.41	5.50	5.79	5.78	2.60	1.48	5.09	6.66	7.12	8.84	8.20	6.14	6.13	5.64			
1773	3	7.84	6.73	7.52	11.61	10.82	9.71	9.08	9.40	9.87	11.13	11.61	3.41	2.78	4.04	2.95	5.32	6.27	2.34	6.45	5.67	9.15	9.63	7.59	7.76	10.30	11.89	10.33	6.56	4.83	5.64	6.13
1773	4	6.14	7.74	9.65	9.03	9.84	14.12	11.61	11.47	12.90	14.81	13.89	13.90	16.76	13.78	14.27	13.18	13.99	14.32	14.96	17.35	17.68	19.43	18.02	17.56	12.84	13.80	14.45	13.83	14.47	14.80	
1773	5	14.81	15.45	15.62	14.52	13.74	13.27	12.96	14.23	15.18	16.77	15.19	16.46	15.83	16.46	17.72	20.09	21.51	23.25	25.61	25.29	24.34	26.86	21.80	21.80	19.42	17.05	18.30	14.98	16.54	18.11	18.73
1773	6	20.45	21.70	22.63	18.99	18.81	20.38	18.78	20.66	21.27	21.41	22.18	21.52	19.61	20.69	23.67	23.01	23.78	21.23	22.31	17.71	19.11	18.45	19.85	20.77	20.90	20.87	21.32	21.29	18.90	22.03	
1773	7	18.69	21.66	20.68	18.29	20.31	18.71	18.05	18.34	19.26	19.54	20.78	22.17	22.78	23.38	23.36	24.12	25.04	26.12	25.47	25.28	25.73	24.61	25.21	24.72	23.27	24.83	25.12	24.31	22.57	23.02	22.37
1773	8	22.82	22.33	22.51	22.37	23.83	22.44	22.48	22.68	23.52	23.72	23.78	24.46	25.15	24.25	24.94	22.63	23.31	24.95	24.84	20.63	21.79	20.89	20.94	22.24	19.45	19.49	19.37	22.09	20.23	21.05	21.23
1773	9	20.63	22.07	23.19	22.11	22.12	22.14	21.36	22.94	26.74	21.85	20.74	21.37	21.06	23.10	20.73	20.09	19.76	20.70	21.31	21.46	21.76	21.58	21.57	22.34	21.37	21.82	21.17	21.15	20.18	20.48	
1773	10	17.93	19.96	17.89	19.76	19.42	19.40	16.38	17.15	18.24	18.06	16.78	17.39	16.11	17.36	16.40	16.39	12.81	14.15	14.46	15.08	13.17	12.69	14.10	14.26	13.62	13.30	12.19	12.82	11.56	13.13	13.92
1773	11	13.61	10.92	9.66	9.19	11.24	10.62	7.15	9.52	13.47	15.36	13.47	14.42	12.22	10.33	9.38	9.70	7.81	11.44	11.28	10.02	10.34	13.18	12.39	10.65	8.43	8.27	5.58	3.05	1.78	1.93	
1773	12	4.92	3.02	0.48	0.79	3.46	5.97	7.85	7.21	7.20	5.76	3.86	3.69	6.36	9.03	5.23	4.12	6.00	9.15	8.20	10.57	8.52	6.32	11.54	10.29	9.21	10.49	6.90	4.25	6.19	9.72	10.89
1774	1	10.21	2.69	2.74	-0.05	-2.22	-1.87	0.37	3.24	3.57	5.33	7.39	7.24	7.72	9.30	9.46	9.30	11.19	11.02	11.48	3.42	3.88	1.81	2.27	6.67	9.17	7.26	4.39	8.32	8.45	11.58	9.19
1774	2	10.27	9.61	10.22	6.88	5.75	4.78	4.60	5.20	3.60	0.58	-0.08	3.69	2.09	4.59	6.46	6.29	8.48	11.30	7.34	7.00	7.94	8.24	8.06	10.42	11.83	11.97	10.39	8.80			
1774	3	7.21	7.21	7.20	4.36	7.51	10.98	9.87	12.39	11.61	13.34	9.87	12.87	12.72	10.99	6.89	6.90	9.11	9.12	11.34	11.03	11.52	12.00	13.12	9.50	8.57	9.68	10.17	11.45	13.83	13.53	13.54
1774	4	9.93	15.31	14.07	14.71	13.78	16.32	14.61	13.83	15.11	13.71	13.41	13.59	15.97	18.35	18.06	18.86	18.40	18.89	14.65	13.09	12.79	14.06	14.39	15.67	16.32	16.33	16.18	16.67	20.47	20.48	
1774	5	20.81	21.60	22.40	17.83	18.47	16.90	15.17	17.70	20.55	20.40	20.56	18.67	18.04	20.09	20.25	21.51	21.67	22.77	20.24	19.61	20.87	22.44	22.59	22.43	18.16	16.26	17.83	14.03	17.65	19.21	18.73
1774	6	20.14	22.33	23.26	22.93	18.18	19.43	15.94	20.02	22.37	21.56	21.23	21.84	19.77	20.85	21.14	22.38	23.46	25.49	26.73	26.39	26.05	26.97	27.26	25.03	24.69	21.50	24.63	24.45	24.89	24.87	
1774	7	24.37	27.02	26.05	26.65	25.36	24.55	24.04	25.12	25.41	25.54	25.20	23.12	22.31	21.02	23.83	21.60	22.20	22.65	22.15	23.07	23.05	23.18	23.48	24.09	24.69	24.83	25.76	25.26	25.41	25.70	26.63
1774	8	27.24	27.06	27.24	27.74	28.24	28.28	28.63	28.68	29.67	28.14	27.72	27.93	27.20	27.09	26.36	26.42	27.57	28.58	27.21	25.05	25.89	25.94	24.57	24.45	24.02	22.96	22.84	27.14	26.54	22.15	22.81
1774	9	23.15	23.96	24.14	25.42	26.07	24.98	25.30	24.84	24.21	24.06	25.48	24.53	22.32	18.53	17.73	17.72	16.92	14.07	15.95	16.25	18.44	17.80	19.51	21.70	19.00	17.72	16.75	16.42	16.24	16.85	
1774	10	18.88	19.80	19.31	18.65	18.16	16.56	14.65	14.47	15.24	15.06	14.57	16.60	13.90	13.57	13.24	10.23	9.90	10.99	11.61	11.92	12.38	12.85	11.58	11.57	12.52	10.46	11.88	9.82	11.24	13.13	14.08
1774	11	14.55	15.34	14.55	13.93	13.45	13.77	13.62	12.52	15.52	14.89	10.63	10.01	9.38	3.53	1.02	5.44	7.81	10.34	10.34	4.66	4.34	1.97	1.34	0.23	2.44	2.43	1.80	2.58	1.78	6.83	
1774	12	3.98	0.02	4.43	6.15	8.19	8.02	-0.51	-2.57	-3.69	-0.39	3.07	4.63	3.52	2.56	4.12	7.75	7.90	7.10	5.52	3.78	4.10	2.69	5.70	0.66	1.31	3.55	4.85	4.25	0.51	2.62	-0.31
1775	1	-2.10	-0.78	2.27	0.26	-1.27	0.34	-0.89	-1.81	0.89	0.75	1.08	4.72	6.30	5.51	6.30	6.77	3.61	4.55	7.69	8.94	9.88	10.18	9.84	10.93	10.28	7.10	8.34	5.63	5.93	5.90	9.03
1775	2	9.01	11.51	10.69	10.20	11.12	8.57	3.97	4.10	5.97	7.84	7.50	11.11	10.29	10.90	7.10	8.50	7.37	9.25	6.55	4.32	3.99	8.24	7.59	5.84	5.51	5.66	7.86	8.01			
1775	3	4.53	5.00	6.89	6.25	8.93	8.93	7.82	9.55	11.45	9.40	9.40	9.56	10.67	7.20	5.47	6.27	8.80	10.38	9.76	11.67	10.57	14.37	13.91	14.71	14.25	12.68	12.70	8.61	8.94	12.74	12.60
1775	4	13.56	11.21	9.65	9.03	9.52	11.43	13.66	16.52	15.27	12.13	9.62	11.22	12.03	11.10	11.11	11.92	13.20	11.79	16.39	17.51	15.47	13.75	15.18	14.09	13.79	15.07	17.92	18.72	18.42	17.64	
1775	5	18.28	18.29	18.30	17.36	15.48	14.54	18.49	17.39	16.92	19.77	20.40	19.93	18.20	18.67	17.09	18.67	19.62	20.25	18.82	16.93	12.35	14.39	16.60	18.32	19.58	19.73	19.56	18.29	17.17	20.48	21.25
1775	6	22.50	20.91	22.47	23.56	22.92	26.53	23.99	23.18	25.06	27.25	23.60	22.63	24.03	22.74	23.67	24.59	23.46	21.86	24.21	25.13	25.73	23.66	23.47	25.34	26.89	26.24	26.53	26.50	22.84	22.97	
1775	7	22.63	24.50	24.15	23.81	24.10	22.81	23.26	25.60	23.36	24.75	26.46	27.07	26.88	27.17	27.30	25.70	23.46	23.91	24.36	22.29	23.84	23.18	24.11	25.98	25.17	24.83	27.97	27.31	26.51	25.86	25.05
1775	8	25.50	24.07	26.45	26.00	24.30	22.28	22.01	21.10	21.47	20.73	22.20	22.41	23.57	23.94	25.41	25.47	24.58	25.58	26.42	25.05	24.00	24.68	25.51	26.35	27.34	26.59	26.94	24.30	23.86	24.83	25.97
1775	9	21.73	24.28	25.40	26.05	27.17	25.92	25.62	24.84	25.47	25.32	23.11	22.95	19.32	20.42	19.31	17.56	19.13	16.75	18.16	19.09	18.29	19.69	20.14	19.34	19.48	19.30	19.75	21.94	22.39	20.48	
1775	10	19.03	21.22	21.36	20.23	19.42	18.77	17.33	17.47	16.82	15.69	15.99	16.45	16.11	16.10	15.61	16.39	16.06	14.94	15.40	19.02	16.49	16.01	17.26	13.15	12.52	10.46	6.83	9.35	12.19	9.98	6.50
1775	11	10.61	11.71	12.19	12.51	12.51	15.19	17.41	14.88	13.62	11.73	11.11	12.37	15.22	14.59	8.91	7.02	6.70	5.92	8.76	8.76	5.44	5.76	7.65	6.07	5.75	4.33	4.32	2.42	5.57	8.09	
1775	12	9.34	8.86	8.53	4.42	3.14	4.55	4.38	4.37	3.41	2.61	-0.25	-2.78	-1.53	0.03	1.92	1.59	-2.20	-2.68	0.94	0.63	0.00	-3.47	0.49	1.61	8.10	8.92	8.79	7.09	9.04	7.04	5.37