

Analyzing the Nijo family diary to Understand the Weather in the Latter Stage of the Edo Period -The comparison with the Sekiguchi diary

*Tamana Yonezawa¹, *Urara Shimozono¹

1. Ikeda Junior-Senior High School

1 The motive of the study

We learned about the novelist, Kafu Nagai, who lived from 1879 to 1959, in our Japanese Literature class. We knew that he had kept a record of the weather in his diary. But we wanted to know about older Japanese weather charts; namely those that recorded the weather before 1883. Sekiguchi family lived in Namamugi of the current Kanagawa Prefecture. And we found older documents, called the Sekiguchi diary, in which the weather of the Edo period was recorded.

This year, we converted the Nijo Family diary into data. The Nijo family diary is an old collection of documents written by the Nijo family from 1635 to 1912. Although there are some gaps in the records, the documents record what happened in Kyoto and the weather.

2nd The purpose of the research

The weather record written by the Nijo family was analyzed in composition with the recent weather data. We also compared this record with what we found in the Sekiguchi diary of the Edo era.

3rd Experimental methods #1

(1) To turn the information about the weather in the Nijo family Diary into data, we wrote both the Christian and the Japanese calendar, but in the comparisons of weather we used the Christian era. We deleted years when information for more than one-third of the year was omitted and data for February 29. We analyzed 202 years from 1676 through 1867.

(2) The weather recorded in the Nijo family Diary was classified to make it closer to the definitions of the modern meteorological agency.

(3) The descriptions such as "Today is cloudy, and become fine weather from 3 a.m." were defined as follow:

- cloudy for more than 80% of the day, more than 19 hours as cloudy,
- cloudy less than 80% of the day, as sunny.

4th Data #1

While comparing the annual appearance of different weather with the present, we found that in the Edo era, the days with fine weather in all periods was around 70% in all seasons.

In the Temmei famine from 1782 to 1787, the fine weather percentage (including that in famine) was 66.9% and it was the lowest of the study period.

In the Tenpo famine from 1835 to 1837, the percentages of both rain and snow were the lowest of the study period.

Data #2

We made a graph of the appearance-ratio of the fine weather and the rain recorded in Nijo family diary from 1677 to 1867.

The red bars show fine weather and the short dark blue bars show rain.

In the period of any famine, the appearance-ratio of sunshine falls.

Data #3

February was most common for the last snow, and was earlier later than in the present, and the period between the first snow of the year of Kyoto of the Edo and the last snow of the season was found to be shorter.

5th Results

As for the weather in the Edo era which was taken from Nijo family diary, like data, the appearance-ratio of the sunshine is equal to or more than 15 % higher than today, and the appearance-ratio of rain and snow is low.

Also, as for snow, the appearance-ratio is higher in winter than in spring.

6th Discussion

When looking at the Edo era, like in the table of data#1, the appearance-ratio of rain and snow recorded in the Nijo family diary is low and was influenced by the little-ice-age.

Because the cold air was strong in the Edo era, it is thought that the number of days with snow in March to May decreased because the southern coast low atmosphere pressure which brings about snow in the spring didn't develop too much.

Also, it is thought that the appearance-ratio of the sunshine is high like data is caused by the decline of temperature, making the Siberian anticyclone in the winter stronger, causing a wintry pressure pattern to strengthen in Japan.

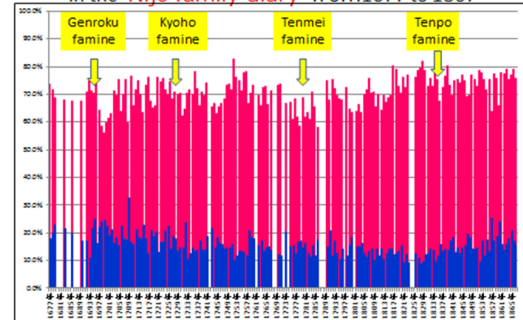
7th Challenges for the future

To make use of other documented data and restore the weather information and analyze it in the wider period.

Data#1 The annual appearance of weather

period/place	incidence of the weather(%)			
	sunny	cloudy	rain	snow
1981to2010*Kyoto	51.0	15.6	27.1	8.1
1676to1696*Kyoto	72.1	7.1	18.9	1.9
1697to1726*Kyoto	70.3	8.9	18.7	2.1
1727to1756*Kyoto	70.0	11.6	16.6	1.8
1757to1786*Kyoto	66.9	14.9	16.5	1.7
1787to1816*Kyoto	68.7	16.2	13.8	1.3
1817to1846*Kyoto	75.7	10.8	12.6	0.8
1847to1867*Kyoto	76.7	7.5	15.1	1.1

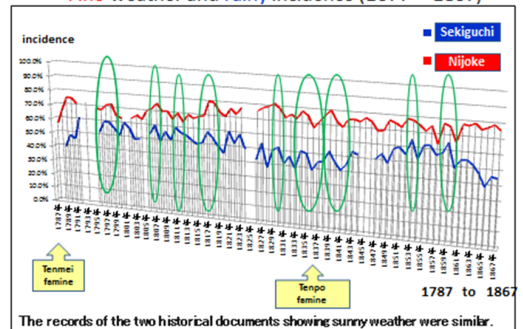
In the Tenmei famine from 1782 to 1787, the fine weather percentage was 66.9% and it was the lowest of the study period. In the Tenpo famine from 1835 to 1837, the percentages of both rain and snow were the lowest of the study period.

Data#3 Fine weather and rainy incidence in the Nijo family diary from 1677 to 1867

In the period of any famine, the appearance-ratio of sunshine falls.

Data#2-1 The appearance of weather in different seasons

period/place	season	incidence of the weather(%)			
		sunny	cloudy	rain	snow
1981to2010*Kyoto	spring	45.9	11.6	25.9	16.6
	summer	44.0	22.8	33.2	0.0
	autumn	59.2	14.6	26.1	0.1
	winter	57.2	9.7	17.3	15.8
1676to1696*Kyoto	spring	69.4	8.1	21.4	1.2
	summer	69.8	6.4	23.8	0.0
	autumn	75.6	6.8	17.4	0.1
	winter	73.4	7.4	11.7	7.5
1697to1726*Kyoto	spring	69.4	8.7	20.6	1.2
	summer	69.3	7.2	23.5	0.0
	autumn	70.2	10.2	19.5	0.0
	winter	72.5	9.2	11.1	7.3
1727to1756*Kyoto	spring	65.5	17.2	16.7	0.6
	summer	69.6	11.2	19.2	0.0
	autumn	70.3	11.6	18.1	0.0
	winter	74.5	11.5	7.9	6.1

Data#4 Nijo family diary and Sekiguchi diary
Fine weather and rainy incidence (1677~1867)

The records of the two historical documents showing sunny weather were similar.

Data#2-2 The appearance of weather in different seasons

period/place	season	incidence of the weather(%)			
		sunny	cloudy	rain	snow
1757to1786*Kyoto	spring	66.0	12.0	21.1	1.0
	summer	67.5	13.6	18.8	0.0
	autumn	66.8	16.4	16.6	0.2
	winter	69.1	14.8	10.3	5.8
1787to1816*kyoto	spring	64.2	14.7	20.0	1.1
	summer	76.9	9.6	13.5	0.0
	autumn	70.1	14.9	15.0	0.0
	winter	70.7	16.5	8.0	4.9
1817to1846*Kyoto	spring	72.5	11.5	15.4	0.5
	summer	76.9	9.6	13.5	0.0
	autumn	76.4	11.2	12.4	0.0
	winter	77.0	11.0	9.1	2.7
1847to1867*Kyoto	spring	74.0	8.9	16.8	0.4
	summer	75.4	7.1	17.4	0.0
	autumn	78.2	7.3	14.4	0.1
	winter	79.5	6.7	11.5	4.2

Data#6 Comparison between first snow of the year and the last snow of the season of Kyoto

The first snow of the year and last snow of the season of Kyoto		
period	first snow	last snow
1981~2010*present	December 15	March 20
1676~1696*Edo era	December 27	February 14
1697~1726*Edo era	December 21	March 9
1727~1756*Edo era	January 5	February 25
1757~1786*Edo era	December 23	February 23
1787~1816*Edo era	December 28	February 23
1817~1846*Edo era	January 2	February 27
1847~1867*Edo era	January 3	February 25

February was most common for the last snow, and was earlier later than in the present, and the period between the first snow of the year of Kyoto of the Edo and the last snow of the season was found to be shorter.