Father Louis Furet, Missionary of the Paris Foreign Missions Society: His Life and Scientific Observations on Okinawa (1855–1862)

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[Received 11 July, 2017; Accepted 12 February, 2018]

Abstract

During the second half of the 1850s, Louis Furet (1816–1900), a French priest sent by the Paris Foreign Missions Society, undertook the first extended scientific meteorological observations on Okinawa, the main island of the kingdom of Ryukyu, today’s Okinawa Prefecture. Using instruments borrowed from the French Navy Depot, he collected data five times a day according to the then recently standardized protocols. These data were all addressed to Charles Sainte-Claire Deville, the founder, in 1852, of the French Meteorological Society. In November 2015, Gaston Demarée, a historian of meteorology, and the author, a historian of Okinawa, had the good fortune to unearth the totality of Furet’s meteorological material, which consists of observation sheets and letters, in the archives of Météo-France, the French national meteorological service and a distant heir to the French Meteorological Society. The present article is not directly concerned with data analysis proper (see the article by Demarée, Mailier et al.). It nevertheless closely examines the variables recorded in the different tables—daily, monthly, yearly—used by Furet and the additional information contained in the margins. It also aims at presenting the course of Furet’s life and scientific education, which singled him out among fellow missionaries, and the social context of his observations. His research interests on Okinawa were actually far from being limited to meteorology, even to the point of earning him criticism from his superior for an excessive commitment to science. They ranged in scope from the natural sciences to the description of the inhabitants’ lives. During his six-year stay on Okinawa, Furet corresponded with several important scientific institutions and learned societies. The ten or so articles he published in their journals deal with the geology, fossils—for the study of which he is also recognized as a pioneer—and natural resources of Okinawa, as well as with its culture, history and language. The present article also provides a full list of the typhoons or tropical storms, along with elements of description, that have been recorded by the missionaries who resided on Okinawa between May 1844, when the first missionary set foot on the island, and October 1862, when Furet’s departure for Japan put an end to the missionary presence for decades.

Key words: Okinawa, climatology, typhoon, Louis Furet, missionary scientist, Paris Foreign Missions Society, Ryukyu Islands

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I. Introduction

The subject matter of this study is a French Roman Catholic missionary, Father Louis Furet, who undertook some pioneering work as a meteorologist on Okinawa during the second half of the 1850s, on the cusp of Japan’s resolute opening to western science. Fortunately, the totality of his observation sheets, along with three letters, have come down to us and are now kept in the archives of Météo-France, the French national meteorological service (Reference A00045d Furet 1853–1860). When Gaston Demarée and I unearthed that material in November 2015, it seemed to have been left untouched since the time it was entrusted to the French Meteorological Society, the remote ancestor of today’s Météo-France.

Its author being a historian and not a meteorologist, this article is primarily concerned with presenting the man, his educational background and the context of his meteorological and other scientific activities, not with critically assessing his methodology and measurements, or with the analysis of the data proper. However, it examines in detail the different types of data tables used by Furet and the nature of the additional information contained in the margins of his observation sheets.

Typhoons and tropical storms being fairly frequent on Okinawa, most of the missionaries who preceded Furet on the island, starting in 1844, could witness such phenomena and have noted their occurrence, in greater or lesser detail, in their correspondence or journals. We thus found it useful to supplement Furet’s data on the matter with those recorded by these men. A table gathers chronologically, with contextual information and elements of description, all the typhoons and tropical storms that occurred during the period between 1844 and 1862.

II. Science at the service of faith

Father Furet carried out his missionary work as a member of the Société des Missions étrangères de Paris (Paris Foreign Missions Society), the largest French missionary body. Founded in 1663 by letters patent from King Louis XIV, that society is not a religious order but an association consisting of diocesan priests who remain formally attached to their diocese of origin after joining it.

The 19th century was a thriving period for the Christian missions of all denominations. Examples of missionaries involved in scientific enquiry are not rare (Fournier, 1932). On their own initiative or at the request of scientific institutions, they could take advantage of their sojourns in distant and little-known areas to contribute to the scientific inventory of the world. Botany and zoology are the two domains in which they proved to be the most active.

Furet’s case, however, should not be confused with that of occasional missionary scientists. Both his solid education in the sciences, which led him first to become a professor, not a parish priest, before becoming a missionary, and the range of his scientific and scholarly interests while he served in missionary work set him clearly apart from many of the other missionaries also involved in scientific activities. Moreover, save the botanist Urbain Faurie (Zheng and Zheng, 2005), none of his colleagues sent to Okinawa or Japan in the second half of the 19th century seems to have shown a particular inclination to scientific observation.

To Furet himself, the missionary calling and the spreading of science could not be dissociated. As he put it before leaving France for East Asia: “Thanks to what I have learned with regard to the sciences, I hope I will be able to serve science and hence, religion.” (Beillevaire, 1999, p. 61). His commitment to the cause of science was even to earn him criticism from his superior, Napoléon Libois, during his sojourn in Hong Kong in 1855: “The good father Furet is too much infatuated with science, and he talks too often and too willingly about it. It is regrettable, for in many other respects, he is an excellent missionary.”

III. Furet’s life course up to his stay on Okinawa

The second of eight children, Louis Théodore
Furet was born on November 25, 1816, to devout Roman Catholic parents in Commer, a small village in the rural department of Mayenne, in western France. His eldest sister, Agathe, also made the choice of a religious life and became a nun. As a merchant and a rent collector, his father was ranked socially above the peasantry. Louis received a high school education in the college of the city of Mayenne, which at the time served as a minor seminary. He thereafter entered the seminary of Le Mans, in the neighboring department of Sarthe, and he was ordained a priest in May 1839. Meanwhile he had already started teaching natural sciences, which then included physics and chemistry, at the minor seminary of the diocese of Le Mans, located in Précigné.

Encouraged by his bishop to pursue his further scientific education, Furet departed for Paris in 1845 and studied at the Collège Stanislas, where he was also employed as a science assistant, and at the Sorbonne. For two years he attended classes in mathematics, physics, chemistry and even astronomy. In May 1847 the French University awarded him the baccalaureate in mathematical sciences. He was thereupon offered a professorship at the Collège Stanislas, but instead he preferred to go back to Précigné and resume his teaching at the minor seminary, probably feeling that to be an obligation.

Attracted to missionary work under the influence of fellow priests, he eventually took the leap and joined the seminary of the Paris Foreign Missions Society in January 1852, at the late age of 36 (Fig. 1). As a missionary aspirant, he made the most of his time in Paris to acquire practical knowledge in meteorology and medicine, notably, and to establish contacts with scholars at various institutions such as the Collège de France, the Musée national d’histoire naturelle (National Museum of Natural History), the École des Mines or the Paris Observatory.

Louis Furet left France for China in April 1853. After stops at Singapore and Manila, he reached Hong Kong, the seat of the procurator of the Foreign Missions Society for East Asia, in October of the same year. In Paris the directing board of the society had already assigned him to the Sichuan mission. However, the ongoing Taiping rebellion prevented him from venturing into the interior of China and from taking up his post. With the prospect of an impending opening of Japan raised by the success of Commodore Perry’s expedition, Furet was eventually asked to join the Japan mission, which was in the process of resumption after a six-year interruption. Japan remained forbidden to western residents, save now to a U.S. consul, but three French priests had already been present, during the previous decade, in the kingdom of Ryukyu, which was a tributary of both China, since 1372, and Japan, since 1609, through the domination of Satsuma, Japan’s southernmost fief.
Allowed to dwell on Okinawa, the main island and political center of the kingdom, the missionaries acquired the chance to study Japanese, in preparation for penetrating Japan, together with Chinese and the Okinawan vernacular, a dialect of the Ryukyuan language. They could even benefit from the assistance of local literati put at their service, not without reluctance at that early stage, by the authorities. However, pursuant to the Japanese anti-Christian edicts, they were by no means permitted to spread their faith.

Furet landed at Naha (Nafa in local contemporary pronunciation), Okinawa’s only port of any importance, with two other priests on February 26, 1855. Only two months later, at the beginning of May, he was unexpectedly invited to embark on an Anglo-French naval expedition to Ezo (Hokkaido) and the seas beyond. This was the far eastern front of the Crimean War (October 1853–March 1856), and the British and French navies were conducting joint operations against Russian ships and bases. With little hesitation, Furet accepted the invitation and left Okinawa in a rush, only to hear a few days later in Nagasaki, to his utter dismay, that the commander of the French squadron, Tardy de Montravel, was forbidding him to stay aboard for, in the absence of a treaty, he would not allow him to set foot on Japan’s coasts.

Forced to withdraw to Hong Kong, Furet was given a second opportunity, in the spring of 1856, to embark on another French expedition, commanded by Admiral N. F. Guérin, which visited Hakodate and explored the Strait of Tartary. In October 1856 the French Navy eventually took him back to Okinawa, where he was to live continuously until October 1862. In total, he would spend more than six years on Okinawa, the longest stay among the French missionaries. With his colleague Bernard Petitjean (1829–1884), who joined him in 1860, he is the last western missionary to reside in the kingdom of Ryukyu before its complete demise in 1879.

IV. Furet’s research activities on Okinawa

Apart from his meteorological observations, which will be examined separately, Furet demonstrated a fairly wide range of scientific and scholarly interests while he was in Hong Kong and then on Okinawa. He was a corresponding member, formally or de facto, of four learned institutions or societies:

- The Société impériale zoologique d’acclimatation (Imperial Zoological Society of Acclimatization), founded in February 1854 by Isidore Geoffroy Saint-Hilaire (1805–1861). In a letter dated March 20, 1855, the latter notified the superior of the seminary of the Foreign Missions Society, François Albrand, of Furet’s appointment as honorary member of the society.

In Hong Kong, Furet and two other missionaries were charged by the society with studying silkworm rearing in order to facilitate their importation to France. Furet is reputed to have sent hundreds of plants and animals to Paris during his stay in East Asia (Fournier, 1932, p. 124). They were directed to the Jardin des plantes (Botanical Garden) and to the National Museum of Natural History located on its premises. Furet’s correspondence shows, in particular, that he was in communication with Joseph Decaisne, a Belgian-born professor at the Museum of Natural History who presided over the Société botanique de France (French Botanical Society).

- The Société orientale (Oriental Society), founded in 1841. Furet was introduced to it by the Orientalist Léon de Rosny (1837–1914), a pioneer of Japanese studies who was to open the first public course of Japanese in Europe in 1863. In all likelihood, Furet met him in Paris in 1852 or 1853, during his preparatory year at the seminary of the Foreign Missions Society. The journal of the society, Revue de l’Orient, de l’Algérie et des colonies, published five of his articles or letter-articles between 1854 and 1861.

- The Société d’ethnographie (Ethnographic Society). The above-mentioned Léon de Rosny founded it in 1859, and Furet was named a corresponding member from its inception. He submitted a series of articles and notes to its journal, Revue orientale et américaine, mostly in the form of letters addressed to Rosny, the
editor. Reprinted as a booklet by the latter, his articles were praised by the Orientalist Max Müller as a contribution of value to knowledge of Okinawa and the Ryukyu Islands in the West (Furet, 1860a; Müller, 1861).

- The Académie des sciences (Academy of Sciences). Furet’s name appears twice in the Comptes rendus de l’Académie des sciences (the proceedings of the Academy), in connection with Okinawa, for the year 1859.

  Firstly, as the originator of the meteorological data presented for the period from December 1856 to September 1858, in a very synthetic manner, by Charles Sainte-Claire Deville (1814–1876), together with the missionary’s seismological observations (Furet, 1859b). Thanks to this academic recognition, Furet’s measurements and meteorological activity on Okinawa rapidly found an echo in specialized journals in German. They were further quoted in J. J. Rein’s travel narrative in Japan, which was soon translated into English (Furet, 1860b, p. 153–154; Furet, 1872, p. 46–47; Rein, 1881, p. 146–147; Rein, 1884, p. 128–129).

  Secondly, Furet’s name also appears in the proceedings of the Academy as the author of an article on the geology and fossils of Okinawa (Furet, 1859a). As indicated in a letter of July 5, 1858, kept in the archives of the Academy, Furet addressed his manuscript directly to the secretary of the Academy, the geologist Léonce Élie de Beaumont (1798–1874), to whom he had paid a visit in 1852 or 1853. Sainte-Claire Deville was actually assisting Élie de Beaumont in the chair of geology at the Collège de France and would succeed him after his death. Furet’s pioneering study of Okinawan fossils has been quoted in turn by a German, a Japanese and an American scientist, the latter as late as 1960 (Petermann, 1860, p. 156; Yoshiwara, 1901, p. 5; Stearns MacNeil, 1960, p. 8, 18).

  Furet’s passionate interest in fossils dated back to the 1840s. Paleontology was barely out of its infancy when the search for fossils quickly became a craze in France, as in Europe, and found many enlightened amateurs, especially in the education community. Even during his formative year at the Foreign Missions seminary, Furet spent time searching for fossils in the areas surrounding Paris (Beillevaire, 1999, p. 52–54). In collaboration with colleagues and students, he had contributed greatly to the important fossil collection gathered at the minor seminary in Précigné.

  In all, Furet published seven of what may be called research articles or notes on Okinawa. Fossils apart, they deal with a wide range of subjects, from the morphology of the island, its natural resources, fauna and agriculture, to education, women, language and glimpses of the history of the kingdom.

  Not only was Furet curious to discover his Ryukyuan environment, either physical or human, but with the help of local scholars, liberally provided by the royal government in Furet’s time, he also became a pioneer in the study of Japanese language and culture. In 1858, under the title Manuel de philosophie japonaise (Textbook of Japanese philosophy), he published a translation of the Shin-kagami-gusa, a popular textbook of Confucian morals dating from the early 18th century (Furet, 1858; Beillevaire, 1999, p. 184). But he has also left a number of manuscripts comprised of research notes on a great variety of topics and literary translations, among which a surprising French rendering, and most probably its first western translation, of the classical anthology of Japanese poetry Hyakunin-isshu, titled by Furet “Vers des cent hommes illustres” (Verses from the hundred illustrious men).

  Furet always took great care of perpetuating lively relations with his friends in France, especially with his former colleagues at Précigné and his patrons among the regional nobility or gentry, but also with several Parisian families. The large quantities of local, and sometimes Japanese, handicrafts and fabrics he managed to gather on Okinawa and to ship to his friends via Hong Kong, in spite of long periods of isolation, are impressive and allow us to consider him also as a forerunner of Japonism (Beillevaire, 2014).

  In July 1852, while he was a resident at the
The seminary of the Foreign Missions Society in Paris, Furet was permitted to visit the electric telegraph at the Ministry of the Interior (Beillevaire, 1999, p. 55). On the occasion, the director offered to give him instructions on how to assemble such a device should the occasion arise to acquire one in China where he was expected to take up residence. As we know, Furet was sent instead to Okinawa. Nevertheless, his friends in France eventually procured him an electric telegraph that was safely delivered to him there via Hong Kong. However, he would never be able to make it work for lack of nitric and muriatic acids, no captain being keen to carry these substances aboard for fear of damaging his ship (Brooke, 1986, p. 93). With other presents such as a telescope, watches, clocks, Furet had in mind the seduction of the Ryukyuan rulers and to convince them of the superiority of the Christian faith over Confucianism.

V. Furet’s preparation as a field meteorologist

There is no evidence that Furet had already acquired any serious practical experience in meteorological measurements before he chose to become a missionary. In preparation for his departure in April 1853, he received instruction at the Navy Depot of Maps and Plans in Paris, which he says he “frequently visited” in those months. Judging by the tone of the letters that he would later send to Charles Sainte-Claire Deville, there is no doubt that he also had the opportunity of getting to know him in person. The latter was the secretary of the Société météorologique de France (French Meteorological Society), which he had founded in December 1852 with Émilien Renou. He was then to be the recipient of all the meteorological observations Furet would make in East Asia. As mentioned above, he is to be credited for having published a summarized presentation of twenty-two months of these observations in the proceedings of the Academy of Sciences.

In a letter dated January 25, 1853, the Ministry of the Navy and Colonies Théodore Ducon notified Furet, through his superior at the Foreign Missions seminary, Jean Barran, that the Navy was ready to grant him all the material support he had requested, i.e., meteorological instruments, “save the pluviometer,” and books. Furet went to fetch them from the Navy Depot. The instruments had been carefully calibrated by Alexandre Delamarche (1815–1884), a naval hydrological engineer who was the French representative at the Brussels Maritime Conference held later in 1853 under Adolphe Quetlet’s chairmanship.

No detail is available from Furet’s correspondence concerning these instruments, with the exception of the “Bunten siphon barometer”, which is mentioned in his letter dated Nafa, October 10, 1858, reporting to Sainte-Claire Deville the recent breakage of its tube. On that occasion, Furet writes that if ever a new instrument can be sent to him, he would prefer to have “a single-reading barometer” (un baromètre à lecture unique), “the Bunten one,” he explains, “being awkward because of the additions” (Furet, Archives of Météo-France).

Furet made his first meteorological observations on his way to Hong Kong, via Singapore and Manila, i.e., from May to September 1853. In mid-August, he sent data tables to Sainte-Claire Deville from Singapore, and in October, soon after his arrival, from Hong Kong.

VI. Furet’s meteorological activities on Okinawa

1) At the Seigenji, April–May 1855

Furet and two fellow priests of the Paris Foreign Missions Society landed at Okinawa on February 26, 1855. They were hosted at the Seigenji, a small Shingon monastery located close to the shore at Ameku (locally pronounced Amiku), in Tomari village (Tumai), near Naha. The place had been made available to foreigners as a temporary shelter for their provisions and sick personnel since the visit of the British Royal Navy in 1816. It had also been the dwelling of three French priests from the same missionary society as Furet between 1844 and 1848.
Furet started making daily observations there, four times a day, from April 2 to May 4. As has been said above, it was then proposed that he join an Anglo-French expedition bound for the north of Japan. He thus left Okinawa on May 7, after scarcely more than two months spent on the island. Forced to return to Hong Kong against his will, he was eventually to remain away from Okinawa for about one and a half years, until October 26, 1856.

2) At the Kumemura house, December 1856–October 1860

During Furet’s absence, on November 24, 1855, the French Navy, under the command of Admiral N. F. Guérin, had succeeded at wresting a “treaty” or “convention” (joyaku in Japanese) with the Ryukyu government, in the wake of the “compact” obtained by Commodore Perry in July 1854. The agreement allowed the French to rent land and build houses. By applying it promptly to their situation, Furet’s companions, Prudence Girard (1821–1867) and Eugène Mermet (1828–1889), had made the choice of Matsuoyama, scarcely a hill, in Kumemura (Kuninda in Ryukyuan), on the eastern edge of Naha port, to have their own house built there. The house was completed at the beginning of 1856, and the missionaries moved in without delay. Located at an altitude of about ten meters, the house was unfortunately exposed directly to the winds, of which Furet was soon to complain after his return (Fig. 2 and Fig. 3).

Their new lodging brought the missionaries greater privacy and comfort. Their relations with the authorities also improved sensibly in the following year as a consequence of the separate opening policy of Satsuma. Concerned that the Edo government could take advantage of its hegemony to monopolize the commerce with western powers, the lord of Satsuma, Shimazu Nariakira, planned to attract their navies to

Fig. 2  Change of residence: From the Seigenji in Ameku to the house in Kumemura, early 1856 (Map taken from Kyuyo, Tokyo, Kadokawa shoten).
Okinawa Island in order to engage in trade with them. Fully fallen under its thumb in the early 17th century, the kingdom of Ryukyu was not only a docile Satsuma dominion, but it also totally escaped control from Edo. To implement the lord of Satsuma’s plan, the Ryukyuan government had been given orders to relax its surveillance over foreign visitors and to provide them with the best treatment. This would first, and in fact almost solely, benefit the French missionaries whom Shimazu Nariakira thought could serve as intermediaries to establish trade relations with their government.

It is in that serene climate, with full freedom of movement, that Furet could give free rein to his scientific curiosities and perform the demanding tasks of meteorology. From December 1856 to September 1858, he would most often make all the measurements and observations—temperature, pressure, and atmosphere—five times a day. Thereafter, until October 1860, following the breakage of his barometer, he would have to content himself with only recording average temperature, vapor tension, relative humidity, and wind frequency.

**VII. Furet’s observation sheets**

We will not dwell here on the observations made at the Seigenji during the short period between April 2 and May 4, 1855. All the measurements are entered successively, day after day and for the different hours, first in a seven-column table, not counting the hour column, then in an eight-column table with the addition, after only a few days, of the minimum temperatures. The whole fills only two pages. Observations were made on no more than twenty-six days. No measurements are reported from April 20 to 28, save on the 21st and 22nd. Furet gives no explanation for that discontinuity, which finds no reason either in the French religious calendar of 1855 (Fig. 4).
At the time, Furet apparently aimed at reading his instruments four times a day, at 6 and 10 a.m., 2 and 6 p.m. (sometimes 4:30 p.m.), as he had done previously during his journey from France to Hong Kong. But one notes quite a few irregularities revealing, probably, the unsteady environment the missionary had to cope with during that adaptation phase.

When Furet resumes his observations at the end of 1856, after an eighteen-month absence, his temperature measuring has become far more detailed and he reads his instruments five times a day instead of four. It is likely that he had the opportunity to improve his methodology or practical knowledge, either in Hong Kong or during his voyage to Ezo and the Strait of Tartary in the spring of 1856 through his contacts with the surgeon and meteorologist Jean Barthe, who was with him aboard the Sibylle, or with officers also engaged in meteorological observations (Demarée et al., 2015).

While at the Seigenji the data tables are comprised of eight columns, as said above, and record as many variables, those drawn at Kumemura are usually comprised of twelve, sometimes thirteen, columns, not counting the day column, and record a corresponding number of variables. Apart from the “corrected height” for the barometric pressure, which was lacking at the Seigenji, the data tables at Kumemura are supplemented with the following five variables relating to the temperature and the atmospheric humidity (in place of the only two variables “temperature” and “minimum temperature”): the “dry bulb” and “wet bulb” temperatures, their “difference,” the “vapor tension” and the “relative humidity.”

For the Kumemura period, Furet’s observation procedures closely follow the “Instruction sur les observations météorologiques à faire
Dans les hôpitaux coloniaux (Instruction on the meteorological observations to be made in colonial hospitals) published in the February 1852 issue of the *Revue coloniale*. His data tables, hand-drawn by himself, are also directly copied on those reproduced at the end of that article.

The observations made by Furet at Kume-mura, regardless of the narrowing of their scope after the barometer had become useless in the autumn of 1858, extend globally from December 1856 to October 1860. The meteorological material gathered during these four years is recorded on four sorts of data tables, drawn on large sheets of paper totaling some one hundred and forty-three pages:

1) **Monthly tables of daily data** (Fig. 5)

There are five of these for each month, drawn on separate sheets of paper. They respectively record the data collected daily at 6 and 10 a.m., 1, 4 and 10 p.m. These detailed monthly tables

<table>
<thead>
<tr>
<th>Day</th>
<th>Barometric pressure</th>
<th>Temperature</th>
<th>General state of the atmosphere</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1. Force and direction of the wind (1 to 7)</td>
</tr>
<tr>
<td>1. Observed height</td>
<td></td>
<td></td>
<td>2. Quantity of clouds (0 to 4)</td>
</tr>
<tr>
<td>2. Temperature of mercury</td>
<td></td>
<td></td>
<td>3. Shape of clouds (Ci, Cu, St, N, Ci-Cu, etc.)</td>
</tr>
<tr>
<td>3. Corrected height</td>
<td></td>
<td></td>
<td>4.5. Rain, storm</td>
</tr>
</tbody>
</table>

![Fig. 5 Example of a monthly table showing the measurements recorded at 6 a.m. on the first three days of February 1857. Beneath, the template printed in the February 1852 issue of the *Revue coloniale*.](image-url)
cover the period from December 1856 to September 1858.

On September 24, 1858, the only remaining barometer tube lent to Furet by the Navy Depot got broken. As a consequence, pressures and oscillations would no longer be measured during the rest of his stay on Okinawa, only temperatures and wind frequencies. The incident is reported with interesting contextual details to Sainte-Claire Deville in a letter dated October 10, 1858, throughout which Furet uses a martial metaphor:

“Hence I am left with no arms to measure atmospheric pressure or to forecast typhoons. The fact is that this dogu (instrument) has earned a great reputation. All our masters [teachers] and many others were acquainted with it. A Japanese even asked to buy it.

If my observations can be of any use to the French Meteorological Society, I am ready to carry on here or elsewhere, but it is necessary to ship me new arms.

I leave it to you, Sir, to decide whether it is useful to rearm me. If so, I kindly ask you to take care of finding me a new barometer, either from your honorable society or from the Navy Depot, for my own budget does not allow me to fight at my own expenses.”

(Furet, Archives of Météo-France)

The Japanese here alluded to by Furet is either Ichiki Shiro himself or one of his assistants. These men had arrived on Okinawa at the end of 1857 for the purpose of negotiating with the French government, on behalf of the lord of Satsuma and through the intermediary of the missionaries, the purchase of a warship, weapons and machine tools, along with the dispatch of students to Europe and the invitation of naval specialists to Satsuma (Beillevaire, 2010).

2) Monthly summary tables (Fig. 6 and Fig. 7)

They cover the same period December 1856–September 1858.

3) Annual summary tables (Fig. 8)

They cover the period from January 1857 to October 1860. From January 1857 to August 1858, five variables tend to be taken into account each month: average temperature / vapor tension / relative humidity / average pressure / oscillation. From September 1858 to October 1860, the barometer being out of work, only three variables continue to be noted: average temperature / vapor tension / relative humidity.

In the margin of these annual tables, Furet has recorded and described all the earthquakes that occurred in the Naha area, with contextual meteorological information provided in accordance with the recommendation of the Annuaire météorologique de France pour 1851 (Meteorological yearbook of France for 1851). For the three and a half years between March 1857 and August 1860, no less than forty-five
earth tremors and jolts were felt, a surprisingly high number compared with today (a list and description of these earthquakes is available in Demarée et al., 2016).

4) Annual tables of the “relative frequency of winds” (Fig. 9)

For each month from January 1857 to October 1860, they indicate the wind directions (N., N.E., E., S.E., S., S.O., O., N.O.) and the ratios from west to east and south to north. In the tables for 1859 and 1860, an additional column gives details concerning strong winds and typhoons.

VIII. An inventory of typhoons and tropical storms for the period 1844-1862

Typhoons and tropical storms are phenomena
that not only interest meteorologists like Furet, but also, because of the serious disruption they cause to daily life, events that do not escape anyone's notice. Between 1844 and 1862, when all the missionaries would be gone, eight French priests, including Furet, and two British Protestant ministers tarried on Okinawa for varying lengths of time. From their correspondence, journals and related sources, we drew up a table of all the occurrences of those exceptional meteorological events, regardless of their designation by the witness, be they typhoons proper or tropical storms (Fig. 10).

On September 18 and 19, 1860, the winds of what is designated a typhoon blew extremely hard. Furet has left a vivid account of the damage they caused to the missionaries' house. The fear he felt during that stressful event...
could fully justify the dissatisfaction he had expressed, on his return to Okinawa in late 1856, as to his colleagues’ choice of an elevated place to locate their house (Fig. 11).

"Without our dear wall built on the north side, I believe it would have been the end of our house. On the 19th, night and day, a violent hurricane blew continuously for more than twelve hours. Our house was dancing and swinging. The big fir trees that surround it broke at the trunk and came to expire at the foot of the wall or at the corner of the kitchen. Obviously Divine Providence protected us. We have had only for about one piaster of damage. Our house is inundated from the northern side. The water was so violently pushed that it infiltrated over the bricks, giving us showers in our beds, and that the library had to be moved.

We now know from experience what it is to have an elevated house built on an elevated location in a typhoon country. Our Loochooans laugh at it and take good care to say that this had not been done on their advice\textsuperscript{11}.

IX. Epilogue

As of October 1860, Furet desisted from all meteorological observations. The breakage of his barometer tube had occurred two years before, and he gives no reason why he then decided to also cease observing temperatures. However, one can notice that it coincides with the arrival of his colleague Bernard Petitjean on October 26. He and Furet now were the last missionaries to reside on Okinawa while all their French colleagues had already moved to Japan, where they were also expecting to be transferred soon. They could not possibly foresee that they would be left waiting two more long years in total isolation from the outside.
world. Furet also invested a lot in his tutoring of Petitjean, freshly arrived from France and thirteen years younger, towards whom he immediately felt he had a protective role to play. Thus, the meteorological observations, already limited in scope, may simply have become pointless to him.

Even so, Furet retained enough scientific curiosity to describe in much detail the evolution of the positioning and aspect of the long-period comet known as the “Great Comet of 1861” (C/1861 J1 and 1861 II), which was visible in the sky over Naha in July and August of that year\(^{12}\). He had already described, but in only a few lines, another long-period comet, the very bright “Comet Donati” (designated C/1858 L1 and 1858 VI), which appeared over Naha between September 20 and October 22, 1858. In Japan, where it has been widely observed, it was nicknamed *hokiboshi*, the “broom-star,” owing to its extended tail. Furet’s short description of it is written on a piece of paper dated October 25, 1858, which was probably meant for Sainte-Claire Deville as it is now kept with his meteorological observations.

It was not until October 12, 1862, that Furet and his companion Petitjean eventually had the opportunity to embark on a French warship to be transported to Yokohama. On that occasion, the Ryukyuan authorities insisted on reimbursing the missionaries for the construction costs of their house.

In January 1863, Furet was the first Roman Catholic missionary to be assigned to Nagasaki since the 17th century. Petitjean met him six months later and together they took the first

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12. Although it was called the Great Comet of 1861, it was visible in the sky for almost a year. According to Furet, it was the most brilliant comet since 1665 because of its great distance from the sun, its angle of inclination, and the colors of its tail. The comet was visible from July 27 to September 18, 1861.
steps to restore a parish, still restricted to Westerners. Meanwhile the governor (bugyo) of Nagasaki invited them to teach in the shogunal school. Furet’s teaching focused on mathematics, physics and chemistry, and, for the purpose, he ordered quantities of textbooks from France (Beilleaire, 2008). Besides, he drew up the plans of Oura Tenshudo, the first church in modern Nagasaki. In his correspondence, as early as 1864, he reports his meeting, most likely in Urakami, with Christian Japanese who were descended from the 17th century converts. Unfortunately for him, he would be away from Nagasaki, back in France, the following year when a number of Japanese Christians dared visit the church and made themselves known to his colleague Petitjean.

Furet went back to France temporarily for more than a year, from December 1864 to February 1866. On returning to Nagasaki in May 1866, he found it difficult to accommodate himself to younger colleagues in an environment that had totally changed since the emergence of the so-called “hidden Christians”. In May 1867, he took up residence at the shipyard of Yokosuka (Yokosuka-zosen), which had been founded by the French two years earlier, within the framework of the agreements concluded between the government of Napoléon III and Edo. There, Furet was employed as both a chaplain for the French community and a teacher of mathematics and scientific matters for the Japanese students at the shipyard school. During his leisure time, he maintained an interest in botany in the company of the shipyard physician, Ludovic Savatier (1830–1891), an authority on Japanese flora and Japanese botanical knowledge (Polak, 2013, p. 12–53). Besides, as an expert on trees, Furet was invited to take part in an official Japanese expedition that was to explore the Province of Sagami in order to identify timber resources for the needs of the shipyard (Yoshida, 2007).

After the premature death, in December
1867, of his colleague Girard, who had created the parish of Yokohama as early as 1859, Furet had to replace him and to commute frequently between Yokosuka and Yokohama.

Disheartened by the political changes brought by the fall of the shogunate and the Meiji Restoration, in addition to his growing feeling of incapacity to gain an adequate command of oral Japanese, Furet chose irrevocably to leave Japan, in October 1869, and to put an end to his missionary work. Back in France, he was assigned as a parish priest to the diocese of Mayenne, which corresponded with his department of origin, first to a small village, then, in 1875, to Notre-Dame des Cordeliers in Laval, the capital city of the department. He died in his parish on January 15, 1900. One finds no mention of his past meteorological activities in the fragmentary memoirs he wrote after his return to France.

Acknowledgements

The author wishes to express his thanks to Mr. Pierre Paillot and Mr. Xavier Popineau of the documentation department at Météo-France for their invaluable help in locating Furet’s material and facilitating its consultation. This article also gives mention of his past meteorological activities in the fragmentary memoirs he wrote after his return to France.

Notes

1) Archives de la Société des Missions étrangères de Paris (hereinafter AMEP), vol. 314 (Procure de Hong-Kong, 1847−1858), p. 1619. The author is responsible for the translation of all the French documents quoted in this article.
2) It was not until 1855 that the diocese corresponding to the department of Mayenne was created. In Furet’s youth, the latter was included in the diocese of Le Mans.
4) For the details, see in particular the Bulletin de la Société impériale d’acclimatation for the years 1854 and 1855, tomes I and II.
5) AMEP, vol. 45 (Séminaire, 1847−1855), p. 1159.
6) The Matsuoyama area is known today as Matsu-yama Park.
8) Although it is not clear how they reached him in the first place, it is Jean Barthe who later passed part of Furet’s meteorological data, up to the year 1858, to Sainte-Claire Deville (Furet, 1859b).
9) Upon his arrival at Hong Kong, Furet already reported to Sainte-Claire Deville the loss of one of the spare tubes he had brought from France (Letter dated October 27, 1853, Archives of Méteo-France).
10) It is the British Protestant missionary Bernard Jean Bettelheim, sent to Okinawa with his family by the Loochoo Naval Mission, who spent the longest period of time on Okinawa, more than eight years, from May 1846 to July 1854 (Bettelheim, 2005, 2012). The French missionaries whose writings thereafter provide information concerning the typhoons are Augustin Forcade, on Okinawa from 1844 to 1846, Pierre Letardu, from 1846 to 1848, and Furet’s direct companions P. Girard and E. Mermet, already mentioned, who both arrived with him at Okinawa in February 1855 and stayed until October 1856 and October 1858, respectively.
12) AMEP, “Furet folder”, not paginated.

References


Appendix 1 Japanese lexicon.

<table>
<thead>
<tr>
<th>romanization/English</th>
<th>Japanese words</th>
<th>romanization/English</th>
<th>Japanese words</th>
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<td>Ameku</td>
<td>天久</td>
<td>Matsuyama Park</td>
<td>松山公園</td>
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<td>bugyo</td>
<td>奉行</td>
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<td>Tomari village</td>
<td>池村</td>
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パリ外国宣教会のルイ・フュレ神父
—彼の生涯と沖縄における科学的観測（1855-1862年）—

Patrick BEILLEVAIRE

1850年代の後半、パリ外国宣教会によって派遣されたフランス人宣教師、ルイ・フュレ（1816-1900年）は、琉球王国の本島・沖縄で最初の長期にわたる科学的な気象観測の実施を請け負った。フランス海軍兵舎部から借り受けた測器を使って、彼は最近標準化された方式に基づいて、1日5回の観測データを収集した。これらのデータは、すべてフランス気象学協会創設者（1852年創設）のシャルル・サント・クレア・ドヴィルに送られた。

ベルギー王立気象研究所の気象史研究者Gaston Demaréeと筆者は、最近になって、フュレの気象観測記録を発見したが、それらは、フランス気象学協会の後継者となったメテオ・フランス、つまり「フランス国立気象サービス」の公文書に含まれており、観測原簿と書簡類からなっている。

本稿は、データ分析そのものは関与しないが（本号のDemarée et al., 2018を参照）、フュレによって使われた各種の表（日別、月別、年別）に記録された数値と欄外の情報については縦密に調査している。本稿はまた、フュレの生涯を受けた科学教育について述べることを目指すが、それは多くの宣教師たちのなかで選りすぐられ、観測を行ったという社会的状況も関連している。

フュレの沖縄における研究の関心は、科学に対して過度に傾倒すぎているという上司からの批判を生んだとはいえ、実際のところ、気象学に限定されていなかったというにはほど遠かった。それらは、自然科学から住民の生活ぶりの記載にまで及んでいた。沖縄での6年間の滞在中に、フュレは数々の重要な科学研究所や学協会と書簡の交流を行っていた。彼は、地質学や化石学（彼の業績はその分野のパイオニアとして認められていた）および沖縄の天然資源を扱い、そして同様に沖縄の文化・歴史・言語を扱う各種学術雑誌に10編ほどの論文を刊行した。

また本稿では、台風や熱帯低気圧に関して、1844年5月（最初の宣教師上陸）から1862年10月（数十年にわたる宣教師在住に終止符を打つフュレの離日）の期間中に宣教師らによって記載された事項についても論述した。

キーワード：沖縄、気象学、台風、ルイ・フュレ、宣教師、パリ外国宣教会、琉球諸島

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