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Philippine Cartography and the Jesuits

ANGEL HIDALGO, S.J.

Cartography, in all the early missions, was practically part of being a missionary. Working in unchartered areas, he had to make original maps for his own use. It was a rare missionary who did not draw accurate sketches of the region where he lived, the paths he took, rivers crossed and mountains traversed. He faithfully wrote long *ex-officio* letters to Superiors. These were also destined for an audience curious not only about the progress of evangelization but also about the strange climates and cultures where he labored. A great variety of maps and charts accompanied these letters with detailed observations on local geography, climatology, ethnography, etc. These treasures lie largely untapped, awaiting analysis and publication. This brief study will be limited to cartography in the Philippines, and is undertaken as a contribution to the celebration of the 400th anniversary of the arrival of the Jesuits in the Philippines.

GEOGRAPHIC MAPS

THE CHARTOGRAPHY OF FR. PEDRO MURILLO VELARDE, S.J.

The first map of Fr. Murillo Velarde was preceded by the map of Fr. Andrés Serrano, S.J., published in 1701 at the end of a religious book.¹ We do not know of any other previous maps. Fr. Murillo mentions that the first map of Mindanao was made by Fr. Pedro Gutierrez, S.J. who, while sailing around the island,

1. Pedro Murillo Velarde, S.J., *Geografía histórica* (Madrid: G. Ramirez, 1752), Prologo, p. 30.

took notice of the capes, bays, inlets and scuttles, and with this information, composed the first map of the island.²

On the occasion of the "Bicentenary of [Fr. Murillo's] First Map," (which we call "A"), [1734-1934], Fr. Selga published a long article about the different maps of Fr. Murillo, especially the "A" in 1734 and the "B" in 1744.³ In the same study is reproduced a "Biographical Commemoration" which contains many interesting personal details of Fr. Murillo's life.

Fr. Murillo came to the Philippines in 1723, to serve as professor of canon law and of theology in the University of St. Ignatius, Manila. He subsequently held the positions of Rector of San Pedro, Makati, secretary of the Philippine Province, visitor of the Mindanao Mission, Rector of Antipolo residence, and delegate to the 17th Jesuit General Congregation at Rome.

He felt from his youth a special inclination for cartography. In describing the life of Fr. Pedro Gutierrez, he mentions that after sailing around Mindanao and measuring all possible geographical details, Gutierrez drafted the map of the island for public use. This information was used by Fr. Murillo in his *Carta Hydrographica y Chorographica de las Islas Filipinas*, Dedicada al Rey Nuestro Señor.

Fr. Murillo was well prepared for his great project, with all the necessary means then available. He himself mentioned the books he had in his library when he began his *Geografia Historica*: the Works of Pomponio Mela, of Ptolomeo and Gerardo Ricciolo, Mallet, Teland and Gotogredo. He knew the Great Atlas of Bleau, the historical and other atlases; the maps of Fer de Samson, of Medrano, Chiquet, Langlet Robe, Aferden and the one of the Royal Academy of Paris. To this bibliography he added the dictionaries of Ottelio, Moreri, Baudrand and, among others, the one which according to Fr. Murillo was the most perfect, namely the one published by Alonso Lasor de Varea.

He studied the descriptions made by the British, Dutch, French, Portuguese and Spaniards. He read the travel descriptions of Tabernier, Mandeslo, Medrano, Dampier and Schociten; he saw the references of Herrera, Barros, Fernandez de Quirós, Martyniz and

2. Pedro Murillo Velarde, S.J., *Historia de la Provincia de Philipinas de la Compañia de Jesus*, (1749), p. 496.

3. Miguel Selga, S.J., *Mapas de Filipinas por el P. Murillo Velarde* (Manila: Publications of the Manila Observatory, 1934), II, no. 4, pp. 1-129.

Halde; and finally, the *Cartas Edificantes* and a great many other maps and particular reports.⁴

Though up to date on all these materials, one thing was lacking to Fr. Murillo: the experience of personal observation. This he acquired on several occasions with individual trips to various islands, sailing along the coast and penetrating into the interior of some of them.

He used all the existent information and made frequent consultations with competent persons, establishing at the same time sincere and fruitful friendships with Admiral Jose González Cabrera Bueno and with Fr. Juan Francisco de San Antonio, at the moment when both of them had just published their excellent books: *La Navegación práctica y especulativa* by the former, and *Crónicas de la Apostólica Provincia de San Gregorio* by the latter.⁵

The most important map of Fr. Murillo is the "A," the one dated 1734. The engraver was Nicolas de la Cruz Bagay, the same who engraved the "B" map of 1744. The first map has marginal information including reduced maps of Cavite, Zamboanga and Guam, as well as several scenes of the social and family life in the Philippines. The "B" map, smaller than the first, was entitled *Mapa de las Islas Philipinas, Hecho Por El Padre Pedro Murillo Velarde, S.J., 1744.*

In 1768, the Society of Jesus was exiled from the Philippines. The Jesuits were absent for ninety-one years, returning in 1859. In the appendix of the "Letters of Mindanao" (Volume 6) is explained how the plate of Murillo's map "A" was found when the Society of Jesus came to the Philippines for the second time. After some minor work of restoration of the original plate, it was in good enough condition to reprint new copies of map "A" of the Philippines.⁶

ATLAS OF THE PHILIPPINE ISLANDS

The geographical Atlas of the Philippines was prepared by the Manila Observatory under the direction of Fr. Jose Algué. Its

4. Murillo, *Historia*, vol. 1, Prologue.

5. Selga, *Mapas*, p. 12.

6. "Mapa de las Islas Filipinas del P. Pedro Murillo Velarde." *Cartas de los Padres de la Compañía de Jesus de la Mision de Filipinas* 6 (1887): 339-41.

complete title is: *Atlas de Filipinas; Colección de 30 Mapas Trabajados por delineantes filipinos bajo la direccion del P. José Algué, S.J., Director del Observatorio de Manila, 1899.* It was printed in Washington in 1900.

The superintendent of the "U.S. Coast and Geodetic Survey," Mr. Henry S. Pritchett, expressed in the short introduction of the *Atlas* its origin and history. He wrote:

Shortly after the Philippine commissioners reached Manila it was learned that a series of maps, covering the more important islands of the archipelago, was being prepared at the Jesuit observatory under the supervision of the director, Rev. José Algué, S.J.

An inspection of such of the maps as already had been completed, satisfied the commission that they were superior to anything hitherto published. It was learned that the Jesuit Fathers planned to make the series quite complete, but they had no very definite ideas as to when the work would be completed or how the maps would be published eventually.

The commission conceived the idea of securing their cooperation in the preparation of a comprehensive atlas of the archipelago.

It is an interesting fact that the technical work was executed wholly by native Philippine draftsmen. It was carried on under the immediate supervision of Rev. José Algué, S.J., director of the Manila Observatory.

The entire absence of accurate surveys of many of the islands was necessarily a serious drawback, but the Jesuits spared no pains in securing all available data, and verified them by consultation with members of the other religious orders, as well as with old residents, travelers and explorers. To the admirable work of their own order is due practically all of our present knowledge of the interior of Mindanao.

Henry S. Pritchett

Superintendent

This *Atlas* represents the available knowledge of the archipelago at the time of its printing, with its abundant and varied information. Since there were some differences in the scales adopted in various maps, the necessary work of making all uniform was undertaken in the office of the Coast and Geodetic Survey.

GEOPHYSICAL CHARTOGRAPHY

In this second part of this note we shall consider the geographical chartography embracing also the whole archipelago.

ETHNOGRAPHIC MAPS OF MINDANAO AND OF THE PHILIPPINES.

There were many partial maps made by the missionaries in visiting the fields of their apostolate, with indication of islands, routes, altitudes, rivers and roads. A great part of this material was used in drawing up some of the maps of Mindanao, and the general one of the Philippines.

Leaving aside the numerous local charts and sketches in the "Letters of the Mission," we will restrict ourselves to presenting only some details about the Ethnographic Map of Mindanao and Jolo, made by the Jesuit Fathers and published in 1887 by Fr. Pablo Pastells — as an illustration of their long study of the different races of Mindanao.

So extensive and varied was the gamut of the races which populated the Philippines at the time of the return of the Jesuits to Mindanao after ninety-one years of absence, (1768-1859) that they decided to make a complete study of the ethnography of the region. Later this was extended to the whole Philippines. The first research was made by Fr. Pastells, superior of the Mission and famous historian of the Philippines.⁷

Fr. Pastells started his description with the orography of Mindanao, the four principal mountain ranges. Having once described the great mountains, the writer passes to the hydrography, locating the principal rivers and lakes. He adds some information about baguios, hurricanes, climate and tides; all of them of a great interest for local climatology. But the principal purpose of the map is to indicate the location of the twenty-three ethnic groups scattered over the whole area of Mindanao, Basilan and Jolo.⁸

Fr. Pastells mentions previous research about these ethnic groups which he presents, made by the professor of Leimeritz, Blumentritt, and published in 1884. But the special interest of Fr. Pastells' work lies in its assigning specific locations to the different races, based on information provided by the missionaries.

7. P. Pastells, "Mapa Etnografico de Mindanao," *Cartas* 7 (1887): 326-49.

8. *Ibid.*, pp. 336-49. The list of the principal races of Mindanao, marked in the ethnographic map of Fr. Pastells is: 1) Visayas, 2) Mamanuas, 3) Manobos, 4) Mandayas, 5) Manguangas, 6) Monteses, 7) Atas, 8) Guiangas, 9) Bagobos, 10) Calaganes, 11) Tagacaolos, 12) Dulanganes, 13) Tirurayes, 14) Tagabelies, 15) Samales, 16) Bilanes, 17) Subanos, 18) Moros Ilanos, 19) Moros Sanguiles, 20) Moros Lulangas, 21) Moros Calibuganes, 22) Moros Iacanes, 23) Moros Semales.

The study made by Fr. Pastells of Mindanao in 1887 was soon extended to the whole Philippines by the researchers of the Manila Observatory. In 1900 was published in the Collection of Maps for the Atlas of the Philippines, map number three of the series. This map lists sixty-nine ethnic families, comprising the three principal races of the Philippines.

THE FIRST SCIENTIFIC EXPEDITION OF THE MANILA OBSERVATORY.

As soon as the foundation of the Manila Observatory was known, it was asked to participate in international scientific ventures.⁹ For example, three appointed members of the Observatory took part in the observation of the solar eclipse of 18 August 1868.

Frs. Faura, Ricart and Nonell left Manila in the British gunboat "Serpent" on the 5th of August via Iloilo to continue towards Basilan and Zamboanga. In the afternoon of the 12th the ship sailed for the Celebes Islands with the purpose of arriving in time at the zone of total eclipse in the island of Mantewalok. There, the Manila Observatory made its first public appearance. It was an excellent occasion to inaugurate international relations with the delegates of other scientific institutions of France, England, Holland, Germany and Italy. From Rome came Fr. Angelo Secchi, S.J., director of the Roman Observatory, well known for his solar studies and discoveries.

Fr. Faura sent to Fr. Secchi the result of his observations from Singapore to be published in his bulletin.¹⁰

MAGNETISM IN THE PHILIPPINES AND THE MANILA OBSERVATORY

Magnetism in the Philippines has a history worthy of note. We will indicate briefly some highlights. We must begin with Fr. Martin Juan, S.J.

9. A. Hidalgo, S.J., "El P. Federico Faura y el Observatorio de Manila," (1974), pp. 12-15.

10. Thanks to the benevolence of Fr. Daniel O'Connell, S.J., Director then of the Castelgandolfo Observatory, we have a copy of the study presented by Fr. Faura to be published in the *Bulletino Meteorologico dell' Osservatorio del Collegio Romano*, vol. 7, no. 12 (31 Dec. 1868): 101-7.

When Fr. Martin Juan was assigned to the magnetic department of the Manila Observatory, he decided to bring with him the best instruments then available in Europe. He visited the observatory of Stonyhurst, England, living with Fr. Perry for almost one year. Then he went to Paris in 1886 to get a theodolite-bousselle and inclinometer. Having established friendly relations with Mr. Moureaux, in charge of the magnetic chart of France, Fr. Martin Juan remained with him for several days in the Park of Saint Maure. There he verified the constants of his new theodolite-bousselle.

Before leaving for Manila, Fr. Martin Juan wanted to make some magnetic observations in Madrid and in Tortosa near the site of the future Observatorio del Ebro (1904). He made them in October 1886. He finally embarked for Manila in the ship "Isla de Mindanao," and reached his destination on 6 January 1887.

In Ermita district, Manila, where the Jesuits were living, the new building of the Normal School was inaugurated on 31 March 1886, and the Observatory was annexed to this school. On the arrival of Fr. Martin Juan, all magnetic instruments were transferred to the new building and the construction of the provisional compartment for absolute magnetic observations began immediately. Later the observatory was transferred to a solid building erected specifically for this purpose. Fr. Martin Juan departed for Mindanao 4 April 1888. Simultaneously with the observations, Fr. Martin wanted to gather information about the famous "collas" or sudden storms, frequent in the southern Philippines, especially in the Jolo Sea. Not yet satisfied with this multiple work, he also planned to collect a great variety of shells of mollusks and crustacea which the beaches of Mindanao offered in great abundance.

But as soon as he began his observations through Mindanao, an inopportune fever and sunstroke cut short his life, and consequently the initial work was suspended for several years.¹¹ The observations were renewed in 1890, continuing at intervals during the next two years, in order to present the final work in the Worlds

11. Ricardo Cirera y Salce, S.J., *El Magnetismo Terrestre en Filipinas* (Manila: Chofré y Cia, 1893); Saderra Maso, S.J. *Cartas de los Padres de la Compañía de Jesus de la Mision de Filipinas* 8 (1889): 87, 124, 183, 195, 229, 349-53. See also "Diario de un Viaje al Sur de Filipinas" of Fr. Martin Juan, *Cartas* 8:231-44.

Fair of Chicago, 1892, celebrating the fourth centenary of the discovery of America.

The vacuum caused by the death of Fr. Martin was filled by Fr. Ricardo Cirera, who later became the founder of the Observatorio del Ebro in Tortosa, Spain.

In 1890 Don Toribio Jabellanos, expert observer of magnetism for fifty years, was given the task of completing as much as possible the magnetic observations of Mindanao. At the same time, he inspected the various meteorological stations of the region.

Fr. Miguel Saderra Mata, at that moment acting director of the Observatory in the absence of Fr. Faura, made a scientific journey to China and Japan, mainly to complete the data for the general map of the magnetic field of the Philippines and neighboring countries. He returned to Manila, his mission accomplished, in March 1892. Later, Fr. Cirera himself filled in the needed data from the Visayas and northern Mindanao. With all the data at hand, the calculation and delineation of the magnetic chart began.¹²

THE CLIMATOLOGY OF THE PHILIPPINES

The Manila Observatory continued its cartographic tradition with four new aspects of the scientific cartography:

1. Meteorological Stations. [See PLATE XV]
2. Temperature Map. [See PLATE XVI]
3. Climate Map. [See PLATE XVII]

Fr. Jose Coronas, in charge of the meteorological section of the Manila Observatory, published a book *The Climate and Weather of the Philippines 1903-1918*, in which as a graphic expression of its contents, he inserted three maps in color. In statistical tables with sketches and pictures, the prevalent winds, monthly humidity and cloudiness were given — all of great importance for the knowledge of climate and for the development of agriculture.

According to Fr. Coronas, the most important elements of climate are: temperature and rainfall, humidity and nubosity, direction and intensity of winds, and the forecast of weather during the approaching typhoon and storms.

12. *El Magnetismo Terrestre en Filipinas*, Chap. 6: Cartas Magneticas, p. 91. We should mention here the recent publication of the Observatory about the magnetic field of the Philippines: "PART I: The Magnetic Survey of the Philippines, 1888-1892: An Evaluation and Re-assessment," by Fr. Pierre Gouin, S.J., September 1980.

This book of Fr. Coronas was completed with another one, *Climatology in the Philippines*, prepared with abundant tables and illustrations for the monumental work *Archipelago Filipino*; and with another long study published in the *Philippine Census of 1918, Manila*. Included in the article were three colored maps of meteorological stations, a temperature map, and the climate map with indications of the mean and extreme annual temperatures.

Particularly worthy of note is the annual mean rainfall in Baguio: 4,596.6 millimeters, which in 1911 reached the extraordinary height of 9,038.3 mm, only surpassed by the rainfall of Cherrapunji in the Khasi mountains of India with figure of 10,820 mm.

CHARTS ABOUT IMPORTANT EARTHQUAKES OF THE PHILIPPINES

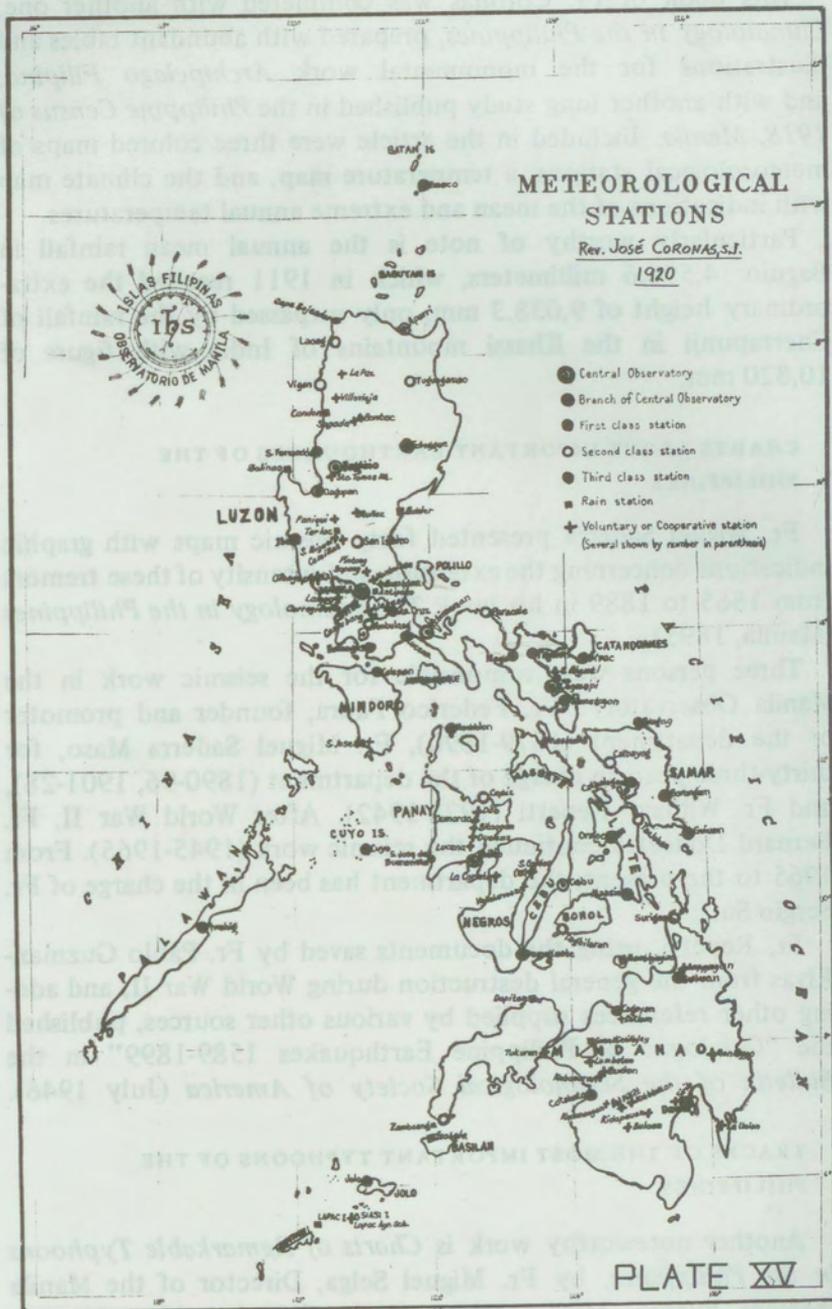
Fr. Miguel Saderra presented forty seismic maps with graphic indications concerning the extension and intensity of these tremors from 1865 to 1889 in his book *The Seismology in the Philippines* (Manila, 1895).

Three persons were responsible for the seismic work in the Manila Observatory: Fr. Federico Faura, founder and promoter of the department (1879-1890), Fr. Miguel Saderra Maso, for thirty-three years in charge of the department (1890-96, 1901-28), and Fr. William Repetti (1928-1942). After World War II, Fr. Bernard Doucette continued the seismic work (1945-1965). From 1965 to the present, the department has been in the charge of Fr. Sergio Su.

Fr. Repetti, using the documents saved by Fr. Pablo Guzman-Rivas from the general destruction during World War II, and adding other references supplied by various other sources, published the "Catalogue of Philippine Earthquakes 1589-1899" in the *Bulletin of the Seismological Society of America* (July 1946).

TRACKS OF THE MOST IMPORTANT TYPHOONS OF THE PHILIPPINES

Another noteworthy work is *Charts of Remarkable Typhoons in the Philippines*, by Fr. Miguel Selga, Director of the Manila Weather Bureau, Manila, which tracks the most important ty-



Map of meteorological stations in the Philippines by Fr. José Coronas, S.J.

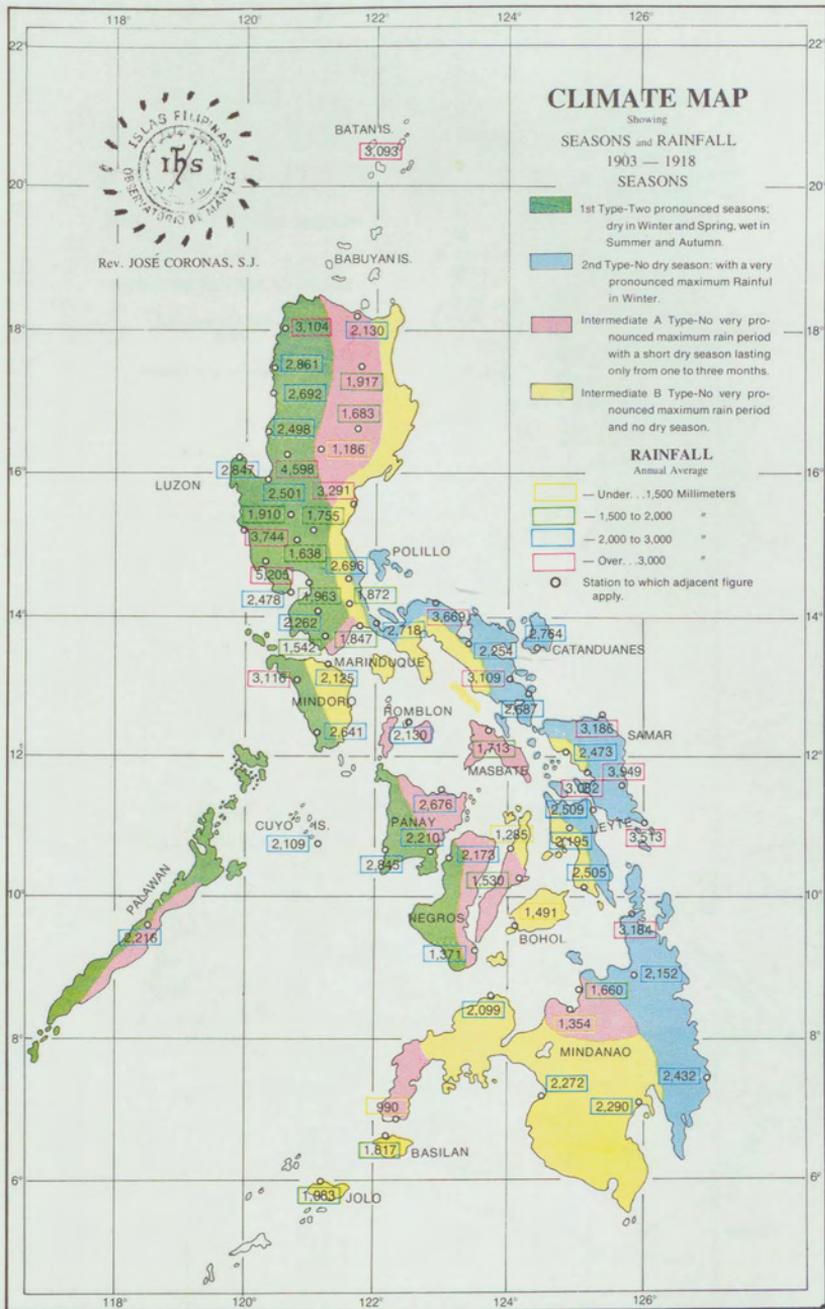
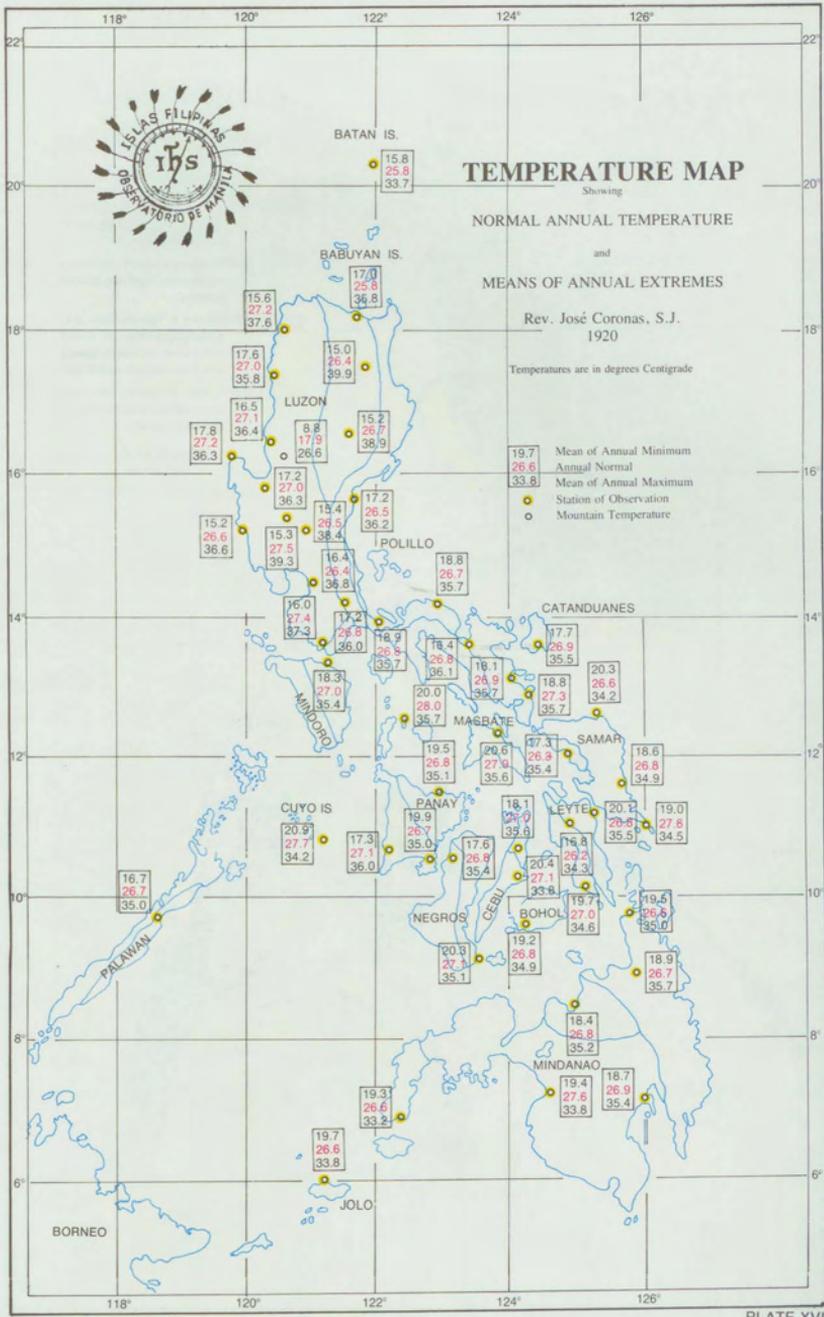


PLATE XVII

Climate map of the Philippines, with average rainfall, 1903-1918



Temperature map of the Philippines by Fr. José Coronas, S.J., 1920

phoons to hit the Philippines between 1902-1934, with an additional catalogue of other historically recorded typhoons.

The atlas of the typhoons presents in 12 plates the map of the Philippines crossed by the most conspicuous typhoons from 1902 to 1934. The commentary on these typhoons accompanies the tracks of the baguios, with additional historical information, amount of rainfall and the number of rain days, etc. The record is specified for every month from 1903 to 1934. The work has 12 plates – one for each month of the year – with indication of the course of the principal past storms during each month.

GRAVIMETRIC MAP OF THE PHILIPPINES

The fourth scientific study is about the gravimetry in the Philippines. The principal observations were made by Fr. Pierre Lejay, S.J., director of Zikawei Observatory in China. After his second set of observations he wrote the book *Gravimetric Survey of the Philippines* (Shanghai, China, 1939).

During his first visit to Manila from 29 December 1933 to 5 January 1934, Fr. Lejay made gravity observations in Baguio, Manila, San Pablo and Zamboanga. In 1938, at the invitation of the Manila Observatory, Fr. Lejay conducted a gravimetric survey from 28 January to 4 June 1938. In all, 204 determinations were made, taking the Manila Observatory as the fundamental base. Fr. Lejay found two anomalies in the Philippines. The first was that, contrary to the general conditions of the mountains of the eastern Asian continent, the mountains of Luzon are covered with positive anomalies. "We have the exceptional phenomena of finding very often in the Philippines, for the first time," remarked Fr. Lejay, "positive anomalies at the mountain stations."

As an explanation of this fact, it has been suggested that the formation of these mountains was due to an internal vertical pressure that pushed towards the surface high densities from deep layers. The base of the mountains is abnormally heavy and hence gravity is found to be in excess.

The second outstanding feature is the negligible action exerted by the volcanoes on the gravity of the region.

REPRESENTATION OF THE MANILA OBSERVATORY IN CHARTOGRAPHIC CONGRESSES.

As a conclusion to our article about Jesuit cartography in the Philippines and as a testimony of its service for the Society, we would like to mention the nomination of the Manila Observatory in the person of Fr. James J. Hennessey as delegate to various congresses of cartography as the representative of the Holy See.

The first was the IV Regional Conference of Cartography – from 21 November to 5 December 1964, held in Manila and attended by thirty international delegations. The second congress was the “8th Regional Chartographic Conference of the United Nations for Asia and the Far East,” held in Bangkok in January 1977, and attended by 219 delegates representing 40 nations.

We have gathered and compiled various aspects of Philippine Jesuit cartography to which the Manila Observatory devoted much time and interest throughout its history. All of these maps are of scientific and utilitarian interest for the Philippines, since geography, climate and agriculture are interconnected. A serious and deep analysis of the interaction of all geophysical phenomena (solar, magnetic, geological and weather) will undoubtedly be able to offer significant contributions toward both the scientific and humanistic progress of the Philippines and its people.