THE REPUBLIC OF THE PHILIPPINES

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The Philippines has a long history of diverse settlers. Chinese traders visited the Philippines in the 10th century *AD*, and Muslims settled in the southern part of the islands during the 15th century. The Portuguese navigator Ferdinand Magellan discovered the islands in 1521, and the first successful European settlement was made by the Spanish under the explorer Miguel López de Legazpi in 1565. The battle of Manila Bay was fought during the Spanish-American War, and the *Treaty of Paris* with Spain ceded the Philippines to United States control in 1898. The treaty limits of the Philippines consisted of an enclosing box with appropriate zigzags to accommodate the island of Borneo.

The U.S. Coast and Geodetic Survey (USC&GS) executed the earliest topographic work of significance from 1901-1942. Numerous local datums were established at "Astro stations" that include: Bancalan Island, Cagayan Sulu Island, Davao, Iligan, Misamis Oriental, and Zamboanga on Mindanao Island, Legaspi and Vigan on Luzon Island, Ormoc and Tacloban on Leyte Island, and Iloilo on Panay Island. This large number of Datums is the result of numerous triangulation parties starting work in different areas of the Philippines all about the same time. For example, at one time in Luzon alone-detached surveys were based on 13 different astronomic stations. Eventually these surveys were brought together on what was known as the Vigan Datum of 1901. This Datum was the mean of the values for Vigan astronomic station as derived through the unadjusted field computations from five astronomic stations. This datum served its purpose for a time but as the triangulation was extended to the central and southern part of the islands it was found necessary to establish a new datum. The results of the basic trigonometric surveys were reported on topographic and hydrographic field sheets that have never been published. A 1:200,000 series of city plans and topographic sheets were the only series printed before World War II.

The Luzon Datum of 1911 is defined by its origin near San Andres Point on Marinduque Island in the Southern Tagalog Region. That point is at station Balanacan (a port name) where: Φ_o = 13° 33' 41.000" North, Δ_o = 121° 52' 03.000" East of Greenwich, and the geoid/spheroid separation $H_o - h_o$ = 0.34 meters. The defining geodetic azimuth (from south) to station Baltasar is: α_o = 009° 12' 37.000", the ellipsoid of reference is the Clarke 1866 where: a = 6,378,206.4 meters, and $^1/_f$ = 294.9786982. All original survey work was Second-Order or lower. It was well controlled by 98 measured base lines, 52 observed azimuths, and 49 latitude and telegraphic longitude stations. The supplementary triangulation extended along the shores of bays and harbors and up rivers and creeks. Most of the coast triangulation was Third-Order accuracy, notably the chain along the west and north coasts of Luzon Island and that on the west and south coasts of Panay Island.

The first Grid system used in the Philippines was devised by the USC&GS in 1919, which was also the first Grid used in the United States. The "Grid System for Progressive Maps in the United States" was the defining design for the World Polyconic Grid (WPG), the predecessor of the Universal Transverse Mercator (UTM) Grid. During the 1930's, the Work Projects Administration for the City of New York extended some of the specifications for the "Grid System for Military Maps." The first use of False Easting was introduced to the American Grid System at the Central Meridian (λ_o) where False Easting = 1,000,000 U.S. Survey yards. May of 1943 marked the first use of the WPG by the U.S. Army Map Service (AMS). The Philippines were based on a special local meridian (122°) of that Grid as computed and tabulated by the USC&GS. Although the WPG overprint color was purple for most of the world, the color used for the Philippines was black. The 1:200,000 maps had a 10,000-yard grid interval and the WPG was used in the Philippines until 1952.

Other Grids found in the Philippines include the Netherlands East Indies (NEI) Equatorial Zone British Metric Blue Grid based on the Lambert Conical Orthomorphic projection. The NEI Equatorial Zone Black or Brown Grid in U.S. yards is also found there (numerically the same Grid with different units), but the occurrences for both are only on Cagayan Sulu Island and in the Sibutu Island group. These two Grids commonly found in Malaysia and Indonesia flabbergasted me when I first encountered them some decades ago. Besides Bukit Rimpah Datum being referenced to the Bessel 1841 ellipsoid, the Scale Factor at the Latitude of Origin (m_o) = 0.997, False Easting = 900,000.000 m. (984,250.000 yd.), False Northing = 3,900,000.00 m. (4,265,083.333 yd.). The Central Meridian (λ_o) = 110°, and the Latitude of Origin (Φ_o) = 00° = the equator! I wasted my time trying to get these parameters to work with Lambert Conformal Conic formulas until I realized that the Lambert Conformal Conic with a Latitude of Origin at the equator decomposes to a Normal Mercator! The NEI transformations worked fine after that.

Straight baselines are a method for a sovereign nation to define its territorial waters by defining points along its coast from which lines are drawn (on a Mercator projection). This then establishes a line (ellipsoidal loxodrome or rhumb line) from which that nation's claim to territorial limits is measured. The straight baseline is a "new" development in international law. It had its inception in 1951 with the decision in the *Anglo-Norwegian Fisheries* case in which the International Court of Justice upheld Norway's method of delimiting an exclusive fisheries zone by drawing

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straight baselines along the Norwegian coast above the Arctic Circle, independent of the low-water mark. This established a new system of baselines from which the territorial sea could be measured, provided certain geographic situations were satisfied. This system with certain modifications was approved by the 1958 Geneva conference on the Law of the Sea.

On 17 June 1961, the Government of the Philippines approved Republic Act No. 3046, "An Act to Define the Baselines of the Territorial Sea of the Philippines." The Philippine government adopted the so-called "archipelago principle" in drawing a series of 80 straight baselines about the external group of islands. This baseline system in effect closed the important Surigao Strait, Sibuto Passage, Balabac Strait, and Mindoro Strait, as well as the more internal passages through the Philippine Islands. The largest body of water enclosed was the Sulu Sea. Other significant seas enclosed include the Moro, Mindanao, and Sibuyan. Furthermore, the Indonesian island of Pulau Miangas and the Indonesian Straight Baselines were enclosed within the Philippine territorial sea! The United States (and Indonesia) did not recognize this declaration of territorial waters, which represents a thorny issue in international boundary claims. Furthermore, to become recognized under international law, there must be an absence of formal protests from other nations, and the territorial waters declaration must be ratified by at least 22 other nations.

From 1947 to 1962, a national civil Grid was used on the Luzon Datum of 1911 known as the Philippine Transverse Mercator Grid with four zones. All four Gauss-Schreiber zones had a False Easting at the Central Meridian of 500 km, all four had a Scale Factor at Origin (m_o) = 0.99995, and all four had a False Northing Latitude of Origin of: (ϕ_{FN}) = 04° 00' 00" North. Zones II, III, and IV had Central Meridians (λ_o) = 121°, 123°, and 125°, respectively. For some reason unfathomable to me, Zone I had a Central Meridian (λ_o) = 118° 20' East of Greenwich. In a recent telephone conversation with Mr. Joseph F. Dracup (retired Chief of Triangulation at USC&GS), he suggested that the weird Central Meridian might have been designed to minimize the Grid scale factor somewhere in the Philippine Islands. On examination of a map of the area, Palawan Island fits that criterion. Of course, the military 1:50,000 mapping was based on the Gauss-Krüger Transverse Mercator projection with the UTM Grid.

In 1962, a new national civil Grid was introduced for the Luzon Datum of 1911, and it was changed to the Gauss-Krüger Transverse Mercator projection. The previous Grid Scale Factor at Origin and False Easting was retained, the False Northing Latitude of Origin was changed to the equator, and the Central Meridians (λ_o) = 117°, 119°, 121°, 123°, and 125° for Zones I to V. A civilian edition of the 1:50,000 topographic series was produced in association with U.S. agencies starting in 1961 and completed in the 1970's. All 967 sheets have been published in color.

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Business

Real 3D Inc. has filed a patent infringement and misappropriation of trade secrets suit against Canadian company ATI Technologies Inc. The suit alleges patent infringement of key patents in Real 3D's patent portfolio. The suit also alleges that ATI and others have conspired to misappropriate Real 3D's trade secrets and know-how involving 3D graphic technology, and accomplishing this unfair competition by improperly soliciting and hiring key Real 3D engineering staff. For information, contact 407-515-5029.

Software

DAT/EM Systems International's CAPTURE NT mapping software has been updated to interface with stereoplotters from ADAM Technologies. This new update allows the ADAM plotters to collect 3D data directly into the world's two most popular CAD packages. For information, contact www.datem.com.

VYSOR Integration Inc. announced v4.2 of their geoPiXCL Remote Sensing, Image Processing and Graphics program development toolkit. geoPiXCL is a development solution that includes an integrated multiple document code editor with context sensitive command help, code helper applications, full control of TWAIN-compliant devices like scanners and digital cameras, and access to serial devices such as digitizing tables.

VYSOR also announced the immediate availability of v4.22 of the PiXCL Tools Image Processing and Graphics Language and EXE builder toolkit with direct command support for the IDRISI™ Geographic Information System from Clark University of Worcester, MA. For information, contact http://www.vysor.com.

People

The U.S. Senate has confirmed **Capt. Evelyn Fields** as director of the NOAA Corps. Since her confirmation, Fields has also been promoted to the rank of rear admiral, upper half. She officially assumed her new responsibilities in June. Before her confirmation, Fields served as deputy director of NOAA's National Ocean Service. Fields was the first African American woman to be commissioned in the NOAA Corps, the first woman to command a federal ship, and the second person to be U.S. Exchange Hydrographer with Canada.

Charles H. Foster

Charles H. Foster joined Air Survey Corporation of Virginia as project administrator. He is a Professional Land Surveyor and ASPRS Certified Photogrammetrist. Foster will be responsible for marketing activity in the Mid-Atlantic region.

Rick Garfield has joined Hitachi Software Global Technology, Ltd.'s Sales Team focusing on the company's emerging opportunities in the use of satellite data. Most recently with Autodesk, Inc., Garfield has broad experience in business development and sales of CAD and GIS software. He will focus on developing new business opportunities and sales support of satellite data and related application development services provided by HSGT.

ASPRS member and former employee **Don Hemenway** has been appointed director of electronic publishing for the American Association of Pharmaceutical Scientists in Alexandria, Virginia. Hemenway was most recently new media publisher with Camber Corporation.

Roland Knight has been appointed president of RADARSAT International (RSI). Previously chief operating officer at RSI, Knight joined the company as director of Finance in 1994. Knight is a member of ASPRS.

Karl Ramstrüm

Karl Ramstrüm was appointed CEO of Spectra Precision. Formerly head of the surveying division and CEO of Spectra Precision, AB in Sweden, Ramstrüm will relocate to the corporate headquarters in Dayton, Ohio. He has been with the company since 1969.

APEX Data Services, Inc. recently appointed **William B. Reid** as vice president for Business Development of the Strategic GIS Services Division. Reid, who will oversee the business development activities for the GIS Division, joined APEX with over 40 years experience in the GIS and utility industries. Reid has been a member of ASPRS for 29 years.

Greenhorne & O'Mara, Inc. (G&O) announced the certification of **Diane Rogers** as a Certified Mapping Scientist-Remote Sensing by the American Society of Photogrammetry and Remote Sensing. A G&O employee for more than 20 years, Rogers has experience in remote sensing, physical geography, geomorphology, land use, cartography, and GIS. Rogers became as ASPRS member in 1984.

Gregory Withee was named assistant administrator for Satellite and Information Services at the National Oceanic and Atmospheric Administration (NOAA). As such, he heads the National Environmental Satellite, Data, and Information Service (NESDIS), which operates the nation's geostationary and polar-orbiting weather satellites and maintains environmental data used by scientists throughout the world. Withee had been deputy assistant administrator at the satellite service since 1994.

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In Memoriam

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In 1987, the Philippine Bureau of Coast and Geodetic Survey was incorporated as a part of the National Mapping and Resource Information Authority (NAMRIA). A total of 467 GPS stations were observed which included 330 First Order stations, 101 Second Order stations, and 36 Third Order stations. This series of new observations was adjusted and published as the Philippine Reference System of 1992 (PRS92). According to NAMRIA this included the establishment of an EDM calibration baseline, and the determination of the seven Bursa-Wolf transformation parameters between the Luzon Datum of 1911 and WGS 84. Those parameters from WGS84 to PRS92 are published as: ΔX = +127.623 meters, ΔY = +67.245 meters, ΔZ = +47.043 meters, Scale = $+1.06002 \times 10^{-6}$, R_x = +3.07", R_y = -4.90", and R_z = -1.58". No accuracy statements were published with the parameters. Since this work was done with Australian government assistance, the sign of the rotation parameters is assumed to be the standard right-handed system favored in Australian and U.S. practice. Although some may favor the designator "PRS92," it is in fact still the original Luzon Datum of 1911 with published transformation parameters from WGS84 Datum. The original Datum observations were not recomputed. It is hoped that NAMRIA will resume their collaboration with the U.S. National Imagery and Mapping Agency and seek consulting services to modernize their geodetic system. An individualized geoid model would be a welcome foundation to this hypothetical datum.