

Manila Observatory celebrates its 150th Anniversary with an international conference

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Abstract

Manila Observatory celebrated its 150th anniversary last 25 September 2015 with an international conference entitled, *Scientific Frontiers: Serving the Peripheries in Times of Change*. This paper provides the following: (1) Message of the Executive Director, (2) Message of the Chairman of the Board of Trustees, (3) news article about the conference, (4) list of conference speakers, (5) profiles of speakers, and (6) abstracts of talks.

Keywords

News—History—Conference Proceedings

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Commemorative stamp from the Philippine Postal Corporation (PhilPost) for Manila Observatory's 150th Anniversary. Shown in the stamp is the Solar Research Building and the portrait of Fr. Federico Faura, SJ, the founder of *El Observatorio de Manila*.

1. Messages

1.1 From the Executive Director

At the cusp of our 150th year it is with deep and humble gratitude that we welcome you to next generation of the Manila Observatory's mission of service through our faith and science. As we look back at the history of our simple beginnings and the decades of discovery it may seem at times that the journey was uncharted. In hindsight, we realize that each discovery, each transition and each step forward into the frontiers of earth science were actually pieces of what was to become the mission of the pioneer weather and earthquake observation institution in the Far East.



Ms. Antonia Yulo-Loyzaga
Executive Director of Manila
Observatory

Our journey into the history of *El Observatorio de Manila* begins today with asking the questions “Who were these men?” and “What were they doing here?” We will find at least part of the answer when we contemplate the beginnings of earth science in the Philippines. However, we will also discover that the answer truly lies in the living articulation of their mission as brothers who belonged to what we know today as the 500 year-old Society of Jesus. That mission was grounded in their daily interpretations of the motto of the Manila Observatory to this day, *Lumen de Lumine*, or to share light from Light.

As we strive to understand the historicity of the Manila Observatory, we hope you will continue to journey with us as we find ourselves confronting the challenges of tomorrow's world today. The values of integrity in the pursuit of excellence in scientific research are at the core of this mission. Understanding the science of disasters involving the interaction of the atmosphere, land and ocean, and the risks they pose to human development and inclusive growth are now at its forefront.

Today marks the first step in the journey towards commemorating and celebrating 150 years discovery. We are grateful that you have taken this time to accompany us as we walk together and re-ignite the spirit of our founders even as we strive confront the story of our own times.

My sincerest thanks to all who worked very hard have made this first in a series of celebrations possible.

1.2 From the Chairman of the Board of Trustees

We are grateful to be sharers in the mission of the Manila Observatory, especially during this time that we are celebrating 150 years of its service to the nation and this dynamic region of Asia. We are humbled to be part of a long and illustrious tradition of scientific and environmental work that has always been driven by a desire to serve others and find God in all things, particularly in God's creation. Bearing this characteristically Ignatian desire and inspiration, we are excited to be placed at the interface of development and environment, science and society, at the crossroads of secularity and faith, and other such frontiers where we hope to incarnate our care for others, for God and creation.



Fr. Jose Ramon Villarin, SJ
President of Ateneo de Manila
University and Chairman of the
Board of Trustees of Manila
Observatory

As men and women of science, we are not fazed by the challenges of our calling. We find solace in all that has gone before us, in all that has been built from the faithful and disciplined commitment of those who have been part of the Manila Observatory ever since its foundation in 1865. And we draw strength from this conviction that we are men and women on a mission that is larger than our selves, a mission that places us at the crossroads of the present and the future, daring us to keep watch over developments in this age of the anthropocene that are more compelling and urgent than ever.

Thank you for celebrating with us. Thank you for sharing our joy and our love for others, for God and creation.

“WITH THESE PLANS FOR THE FUTURE THERE IS EVERY CONFIDENCE THAT THE OBSERVATORY WILL CONTINUE TO FULFILL, UNDER GOD, ITS PART IN THE SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT OF THE PHILIPPINES BOTH FOR THE UNIVERSAL UNFOLDING OF SCIENTIFIC TRUTH AND FOR THE PRACTICAL APPLICATION OF THAT TRUTH TO BETTER AND MORE SECURE LIVING FOR THE FILIPINO PEOPLE.”

—Fr. James J. Hennesey, SJ, “The Manila Observatory,” *Philippine Studies* 8, no. 1 (1960): 99–120.



Manila Observatory at Ateneo de Manila University Campus, Loyola Heights, Quezon City, Philippines

2. MO's 150th Anniversary Conference

Manila Observatory (MO) celebrated its 150th anniversary with an international conference entitled, *Scientific Frontiers: Serving the Peripheries in Times of Change*, which was held last 25 September 2016, 9:00 AM to 5:00 PM at the observatory's Fr. Francis J. Heyden, SJ Hall. Fr. Jose Ramon T. Villarin, SJ, President of Ateneo de Manila University and Chairman of Board of Trustees of Manila Observatory gave the Welcome Remarks, while MO Executive Director Ma. Antonia Yulo-Loyza gave the Opening Remarks.

The keynote speaker was Fr. Augustin Udías, SJ of Cátedra de Geofísica, Faculty of Physical Science, Universidad Complutense, Madrid. Fr. Udías is the author of the book, *Searching the Heavens and the Earth: The History of Jesuit Observatories* (Kluwer, Dordrecht, 2003). A section in the book featured Manila Observatory. Fr. Udías was introduced by MO Science Director Fr. Daniel J. McNamara, SJ.

The recorded video presentation of Fr. Udías was then followed by 30-minute presentations of other resource speakers with 15-minute open forums. Dr. Gemma Teresa T. Narisma, MO Associate Director for Research and Program Manager of Regional Climate Systems, gave a 20-minute talk on MO Science Agenda. Director Antonia Yulo Loyza gave the Closing Remarks.

After the program, the speakers and guests were given a tour of Manila Observatory's Exhibition at the Solar Research Building which showcased the instruments, photos, and other memorabilia in the observatory's 150-year history.

Below is the list of resource speakers and their talks:

- **Dr. Fredolin Tangang**, SEACLID/CORDEX South-east Asia and the National University of Malaysia: *Pressing Issues on Climate Change and Disaster Risks and their Implications on Sustainable Development in Southeast Asia*.

- **Dr. George Mount**, Laboratory for Atmospheric Research, Washington State University: *Existing and Emerging Atmospheric Measurement Systems for Understanding Air Quality in Mega Manila*.
- **Mr. Masanobu Tsuji**, Japan Aerospace Exploration Agency (JAXA): *RS-GIS, Aerospace Initiatives: Strategies in Responding to Disaster Risk*
- **Dr. Akimasa Yoshikawa**, International Center for Space Weather Science and Education, Kyushu University: *MAGDAS Network, Space Weather, and Geomagnetic Storms*.
- **Dr. Keith Groves**, Institute for Scientific Research, Boston College: *SCINDA Network and GNSS for Equatorial Ionospheric Research*.
- **Mr. Ishmael Narag**, Philippine Institute of Volcanology and Seismology (PhilVolcs): *State of Earthquake Science in the Philippines and the West Valley Fault System*.

2.1 Fr. Agustín Udías, SJ

2.1.1 Speaker's Profile

Fr. Agustín Udías, SJ was born in Santander, Spain in 1935. He became a priest of the Society of Jesus in 1964 and holds doctorates in geophysics from Saint Louis University and Ciencias Físicas from Universidad Complutense de Madrid. He has served as Research Associate in Seismology at the University of California, Berkeley, Lecturer at the Wolfgang Goethe Universität, Frankfurt am Main, and Universidad Complutense de Madrid, and Associate Professor at the Universidad de Barcelona. Since 1977 he has been Professor of Geophysics and since 2005 Professor Emeritus at the Universidad Complutense de Madrid.

Fr. Udías is the author of *Principles of Seismology* (Cambridge University Press, 1999), *El universo, la ciencia y Dios* (PPC, Madrid, 2001), *Searching the Heavens and the Earth: The History of Jesuit Observatories* (Kluwer, Dordrecht, 2003), *Historia de la Física: De Arquímedes a Einstein* (Síntesis, Madrid, 2004), and with J. Mezcua of *Fundamentos de Geofísica* (1 ed. Alhambra, 1985, 2. Ed. Alianza, Madrid, 1997). He has published articles on the topics of earthquake source mechanism, seismicity, and the seismotectonics of the Mediterranean region as well as on science and religion and on Teilhard de Chardin.

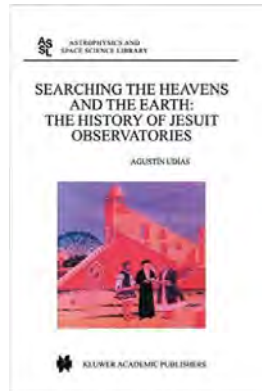


Fr. Agustín Udías, SJ, Professor Emeritus Universidad Complutense de Madrid

2.1.2 The History of Jesuit Observatories

Jesuit interest in the natural sciences began in the very early days of the foundation of the Society of Jesus in 1540. This work can be related to the development of Jesuit colleges in the sixteenth and seventeenth centuries, coinciding with the birth and progress of modern science. An important part of the activities of Jesuits in the different fields of science has been the foundation of observatories. These observatories were connected with the chairs of mathematics established in all major colleges. All these observatories ceased with suppression of the Society in 1773.

Soon after the restoration of the Society of Jesus in 1814, the foundation of the new observatories began: the first in the Collegio Romano in 1824, followed by those of Stonyhurst College, England, founded in 1838, and in Georgetown University, Washington, founded in 1841. Many others followed on every continent where Jesuits were present, such as the Manila Observatory in the Philippines in 1865. The first of these observatories were mainly dedicated to astronomy and meteorology; later they specialized in geomagnetism, solar physics and seismology.



Searching the Heavens and the Earth: The History of Jesuit Observatories by Fr. Agustín Udías, SJ (Kluwer, Dordrecht, 2003)

2.1.3 Talk Transcript: The History of Manila Observatory

It is for me an honor to contribute to the celebration of the 150 years of the establishment of Manila Observatory. Let us recall a little the beginnings of its history.

In 1865 the Spanish Jesuit Francisco Colina, a teacher of mathematics at the Ateneo Municipal, as the Jesuit secondary school of Manila was then called, began meteorological observations with a rather rudimentary equipment. These were the first steps of the Manila Observatory whose 150th Anniversary we celebrate. The same year a violent typhoon produced heavy damage in Manila. Colina published his observations during the typhoon in the newspapers and attracted public attention to the new observatory which had the name *Observatorio del Ateneo Municipal*. New instruments were installed and meteorological observations began to be made at regular intervals.

Two years later in 1867 Fr. Federico Faura became director who gave a great impulse to the observatory with the acquisition of new instruments specially a *Meteorograph*, an instrument created by the Jesuit Angelo

Secchi, director of the Observatory of the Roman College in Rome. Soon seismological and magnetic equipment were added to the Observatory and later an equatorial telescope was installed in a dome. In 1879 Faura began the study of typhoons and made and announced to the public the arrival to Manila of a serious typhoon. This was the first forecast of a tropical storm made in the Far East. Faura was in contact with Benito Viñes, a Jesuit director of the Observatory of the Belen College in Havana who had been studying hurricanes for many years. Faura soon recognized that the tropical hurricanes of the Caribbean and the typhoons of the Far East were the same type of phenomena. In 1882 Faura published the first book on typhoons. The Observatory acquired a recognized prestige.

In 1884 the Observatory acquired official status by the Spanish colonial administration and became the headquarter of the Servicio Meteorológico de la Isla de Luzón (Meteorological Service of the Island of Luzon) with a network of 13 stations and the observatory became known as *El Observatorio de Manila* (Manila Observatory). It is interesting to note that this was the first meteorological service created by the government of Spain, the one in Spain was established three years later.

The history of Manila Observatory is well known, I will just mention two critical moments. The first with the change of the Spanish administration of Philippines to that of the United States, which recognized the scientific work done at the observatory, resulted in the appointment of the Observatory as head of the newly created Philippine Weather Bureau and the second with the independence of Philippines after the Second World War with the change of the work of the observatory to seismology, ionospheric and solar physics studies, abandoning meteorology which was covered by a newly created national service. More recently the observatory has taken as main work environmental studies, being designated as the Climate Change Information Center for the Philippines. Thus Manila Observatory continues today the work started 150 years ago, one of the few Jesuit observatories still in operation.

Thank you for giving me this opportunity to join in the celebration of this anniversary.

—Agustín Udías, Madrid, 24 September 2015

Estos, alma, ¡Ay dolor! que ves ahora campos de soledad, monton de escombros, fueron un tiempo cúpula famosa.

---Fr. Miguel Selga, SJ, 10 February 1945

2.2 Dr. Fredolin Tangang

2.2.1 Speaker's Profile

Dr. Fredolin Tangang is Professor of Climatology at the National University of Malaysia. Prof. Tangang obtained a PhD from University of British Columbia, Canada in 1997, where he researched and developed a model to forecast the El Niño–Southern Oscillation (ENSO). Currently Prof. Tangang also serves as IPCC Working Group I Vice Chair. He is also a fellow at the Academy of Sciences Malaysia since 2011. Prof. Tangang has conducted numerous research projects where his primary research interests include climate variability and climate change. Prof. Tangang has also published numerous articles in high impact factors international journals. Currently, Prof. Tangang is the Project Leader of the Southeast Asia Regional Climate Downscaling (SEACLID)/CORDEX Southeast Asia Project that involves 17 institutions from 13 countries.



Dr. Fredolin Tangang
Professor of Climatology,
National University of
Malaysia

2.2.2 Pressing Issues on Climate Change and Disaster Risks and their Implications on Sustainable Development in Southeast Asia

Climate Change is the most serious environmental issue that will be affecting humanity in the coming decades, especially in regions and countries that have high exposure and vulnerability and low resilience to the impacts of climate change. According to the latest assessment report of the United Nations Intergovernmental Panel on Climate Change (IPCC), without substantial mitigation efforts by countries in the world in reducing greenhouse gases emissions, the Earth's temperature will continue to rise and climate will continue to change. With a Business-As-Usual (BAU) emission scenario, global mean temperature is projected to increase by as much as 4-5°C by the end of the 21st century. Weather and climate extreme events are also projected to increase and intensify.

To reduce the risks to climate change and related disasters, both adaptation and substantial sustained reduction of greenhouse gases emission are required. However, risk to climate hazards is also a function of both exposure and vulnerability. Adaptation to climate change hazards at local and national scales requires understanding of both exposure and vulnerability and linkages to socioeconomic processes and sustainable development. Moreover, adaptation is place- and context-specific, with no single approach for risk reduction appropriate across all regions. While adapting to climate change is within the capability and means of most developed countries, it will be a tremendous challenge for developing countries in regions such as the Southeast Asia. In Southeast

Asia, one critical issue is the large knowledge gap not only in climate change science but also in exposure and vulnerability to climate change hazards. This talk dwells on this issue on knowledge gaps and ways to address them.

2.3 Dr. George Mount

2.3.1 Speaker's Profile

Dr. George Mount is Professor Emeritus at the Department of Civil and Environmental Engineering in the Laboratory for Atmospheric Research of the Washington State University. He obtained his PhD in Astrogeophysics from the University of Colorado in 1975. He belongs to the American Geophysical Union, and is currently a member of the NSF NEON Project Advisory Committee and the NASA Standing Review Board for the Orbiting Carbon Observatory 2 and 3. Prof. Mount's research interests include atmospheric spectroscopy for measurement of trace gases; spectroscopic instrumentation; tropospheric trace gas chemistry; atmospheric radiation and radiative transfer; and measurement of tropospheric trace gases from space.



Dr. George Mount
Professor Emeritus,
Department of Civil and
Environmental Engineering,
Washington State University

2.3.2 Existing and Emerging Atmospheric Measurement Systems for Understanding Air Quality in Mega Manila

Air quality in the Manila urban airshed is a major public health issue. The Manila Observatory is uniquely placed and uniquely staffed to take advantage of existing and emerging air quality measurement instrumentation, both ground-based and satellite-based, to understand and help mitigate Manila megacity air pollution. This talk will briefly describe the drivers for air quality measurements and its regulation and describe typical ground-based air quality instrumentation; then move quickly to state of the art instrumentation and especially the use of satellite measurements for investigation and understanding of the air quality problems in the Manila urban airshed. Future prospects for air quality measurements will be summarized.

2.4 Mr. Masanobu Tsuji

2.4.1 Speaker's Profile

Mr. Masanobu Tsuji is the Director of Japan Aerospace Exploration Agency (JAXA) Bangkok Office. He is also currently the executive secretary of Asia-Pacific Region Space Agency Forum (APRSF), of which the 22nd session will be held 1 to 4 December 2015 at Bali, Indonesia. He joined NASDA, former organization of JAXA in 1985 after getting a master degree in electronics and computer science from the Tokyo Institute of Technology. Before his position as Director of

JAXA Bangkok Office, Mr. Tsuji was Manager for International Cooperation Promotion in JAXA. Prior to this, he was engaged in the development of data relay satellite and ground stations and research on Earth observation from space. His recent interest is to implement space technology for societal needs of emerging countries.

2.4.2 RS-GIS, Aerospace Initiatives: Strategies in Responding to Disaster Risk

Earth observation satellite is a useful tool in all disaster management cycle, response, recovery and preparedness/mitigation phases. For examples, in response phase, we can get information about damaged houses, roads, railroads, and flooded or fire areas from satellite images. These information are useful for rescue work, and finding evacuation route, ensure helicopter landing area, traffic control, and so on. In this presentation activity of Sentinel Asia, which is international framework using Earth observation satellite images for Disaster Risk Reduction and Management (DRMM), will be explained. Also, some results of Sentinel Asia in large scale disasters will be reported. Space technology is powerful tool for DRMM and JAXA will continue emergency observation by ALOS-2 and other Earth observation satellites.



Mr. Masanobu Tsuji
Director, Japan Aerospace
Exploration Agency (JAXA)
Bangkok Office

2.5 Dr. Akimasa Yoshikawa

2.5.1 Speaker's Profile

Akimasa Yoshikawa (Ph.D., Kyushu University) is an Associate Professor of Space Science at Kyushu University. In particular, he is an expert on magnetosphere-ionosphere coupling. He has authored and co-authored over 90 papers published in international journals. In May 2015, he received a Tanakadate Award by the Society of Geomagnetism and Earth, Planetary and Space Sciences (SGEPSS) in Japan. He was Co-Chair of the Scientific Organizing Committee and Chair of the Local Organizing Committee of the United Nations/Japan Workshop on Space Weather in March 2015. At present, he also holds a number of positions: (1) Principal Investigator of the MAGDAS (MAGnetic Data Acquisition System) Project; (2) Steering Committee member of the International Space Weather Initiative (ISWI); (3) Member of the Ultra Large Terrestrial International Magnetic Array (ULTIMA) Consortium of magnetometer networks worldwide; (4) Steering Committee member of SGEPSS; (5) Secretary General of the science board of Space and Planetary Science section of the Japan Geoscience Union (JpGU); (6) Editorial board member of the Earth, Planets and Space (EPS) journal; (7) Coordinator of the Japan Society for the Promotion of Science (JSPS) Core-to-

Core program for Asia-Africa affairs (ISWI, MAGDAS, and other Capacity Building activities in Asia and Africa); and (8) Member of the Solar Terrestrial Physics Program (STPP) Subcommittee under the International Subgroup of the Earth and Planetary Science Committee and of the World Data System (WDS) committee of information sciences of Science Council of Japan.

2.5.2 MAGDAS Network, Space Weather, and Geomagnetic Storms

The International Center for Space Weather Science and Education (ICSWSE) of Kyushu University started the deployment of the MAGnetic Data Acquisition System (MAGDAS) for near-real time global monitoring of the geospace environment in 2005. Since then, new observational points were added to the network almost every year. Currently, MAGDAS has been installed at 73 observational sites all over the world, making the MAGDAS network one of largest magnetic observational array in the world.



Dr. Akimasa Yoshikawa
Associate Professor of Space
Science, Kyushu University

Manila Observatory in Ateneo de Manila University is an important partner of ICSWSE. The research collaboration history in the Philippines extends back to 1993. The first data was collected from Muntinlupa station on July 1, 1993. Since then, MAGDAS was installed in six observational sites in the Philippines, and the ICSWSE subcenter was established on March 8, 2011 in Manila Observatory. The collaboration is not only for data acquisition but also for researcher exchange. In the celebration of the 150th anniversary of Manila Observatory, the importance of space weather study and how Manila observatory contributed to the development of its science will be presented. The researcher exchange between Manila observatory and Kyushu University will also be presented.

2.6 Dr. Keith Groves

2.6.1 Speaker's Profile

As the Principal Investigator for the Air Force program on ionospheric research, Dr. Groves served to initiate and lead efforts to understand the impact of ionospheric disturbances on ground- and space-based radio systems. He has also demonstrated expertise initiating and managing research efforts both across organizational, agency and international domains. He is well known for the development of a global ground-based real-time scintillation monitoring network and associated assimilation algorithms that model scintillation behavior and produce tailored products for satellite communication users (SCINDA). That system is currently being transitioned to operational status by the Air Force Weather Agency. He has utilized the ALTAIR radar for numerous investigations to understand equatorial ionospheric irregularities and associated

effects on radio wave propagation. At Boston College his research interests include radio wave scintillations, high power HF ionospheric modification, wave-particle interactions, and space weather impacts on communication, navigation and surveillance systems. He has authored and co-authored more than 70 papers, made numerous contributed and invited presentations and is an internationally recognized expert in the field of ionospheric scintillations.

2.6.2 SCINDA Network and GNSS for Equatorial Ionospheric Research



Dr. Keith Groves
Senior Research Scientist,
Boston College

Space weather generally refers to heliophysical phenomena or events that produce a negative impact on man-made systems. While many space weather events originate with impulsive disturbances on the sun, others result from complex internal interactions in the ionosphere-thermosphere system. The reliance of mankind on satellite-based services continues to increase rapidly, yet the global capacity for sensing space weather in the ionosphere seems headed towards decline. A number of recent ionospheric-focused space-based missions are either presently, or soon-to-be, no longer available, and the end of the multi-decade US Air Force Defense Meteorological Satellite Program is now in sight.

The challenge facing the space weather community is how to maintain or increase sensing capabilities in an operational environment constrained by a decreasing numbers of sensors. The upcoming launch of COSMIC-2 in 2016/2018 represents the most significant new capability planned for the future. GNSS RO data has some benefit for background ionospheric models, particularly over regions where ground-based GNSS TEC measurements are unavailable, but the space weather community has a dire need to leverage such missions for far more knowledge of the ionosphere, and specifically for information related to space weather impacts.

The challenge facing the space weather community is how to maintain or increase sensing capabilities in an operational environment constrained by a decreasing numbers of sensors. The upcoming launch of COSMIC-2 in 2016/2018 represents the most significant new capability planned for the future. GNSS RO data has some benefit for background ionospheric models, particularly over regions where ground-based GNSS TEC measurements are unavailable, but the space weather community has a dire need to leverage such missions for far more knowledge of the ionosphere, and specifically for information related to space weather impacts.

Meanwhile, the number of ground-based GNSS sensors worldwide has increased substantially, yet progress instrumenting some vastly undersampled regions, such as Africa and parts of Asia, remains slow. In fact, the recent loss of support for many existing ground stations in such areas under the former Scintillation Network Decision Aid (SCINDA) program may actually result in a decrease in such sensing sites over the next 1–2 years, abruptly reversing a positive trend established over the last decade. Here we present results from previous GNSS-based studies of equatorial scintillation and potential solutions to the challenges current developments pose to the space weather enterprise. Specific topics include modeling advances required to detect and accurately characterize irregularities and associated scintillations from GNSS

RO measurements and an affordable approach to leverage existing ground stations to expand sensing capacity at critical locations in otherwise data-sparse regions.

2.7 Mr. Ishmael C. Narag

2.7.1 Speaker's Profile



Mr. Ishmael C. Narag
Supervising Science Research
Specialist, Philippine Institute
for Volcanology and
Seismology

Mr. Ishmael C. Narag is Supervising Science Research Specialist at the Seismological Observation and Earthquake Prediction Division of the Philippine Institute of Volcanology and Seismology (DOST-PHIVOLCS). He graduated with a Bachelor's degree in Mathematics from the University of the Philippines. His fields of expertise include Seismology and Seismic Hazard Assessment, Numerical Modelling of Tsunami, and Earthquake and Tsunami Monitoring and Warning System.

2.7.2 State of Earthquake Science in the Philippines and the West Valley Fault System

The Philippine Institute of Volcanology and Seismology or PHIVOLCS is a service institute of the Department of Science and Technology (DOST) that is principally mandated to mitigate disasters that may arise from volcanic eruptions, earthquakes, tsunami and other related geotectonic phenomena. PHIVOLCS provides maps of Philippine fault zones, active faults and trenches, liquefaction susceptibility, and tsunami prone areas. The Valley Fault System (VFS) in the Philippines, is a dominantly dextral strike-slip fault system that extends from Dingalan, Aurora in the north and runs through the cities of Quezon, Marikina, Pasig, Makati, Parañaque, Taguig and the provinces of Laguna and Cavite. PHIVOLCS has prepared detailed maps of the West Valley Fault and the East Valley Fault at 1:5,000 scale, which shows streets and building traversed by the fault. A 7.2 magnitude quake is expected from the movement of the West Valley fault in our lifetime, if the quake follows the recurrence cycle 200– to 400–year period.

Acknowledgments

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Front row, left to right: Dr. Gemma Narisma,^{1,2} Dr. William Padolina,³ Fr. Jose Ramon T. Villarin, SJ,^{1,2} Mr. Oscar M. Lopez,³ Fr. Daniel J. McNamara, SJ,^{1,2,5} Mr. Fernando Zapico,⁶ and Director Antonia Yulo Loyzaga.¹ *Second row:* Dr. Keith Groves,⁷ Dr. George Mount,⁸ Mr. Masanobu Tsuji,⁹ Dr. Fredolin Tangang,¹⁰ Dr. Quirino Sugon Jr.,^{1,2} and Mr. Guillermo Escribano.⁶ *Third row:* Dr. Celine Vicente,¹ Dr. Shiny John Vairamon,¹¹ Dr. James B. Simpás,^{1,2} Mr. Carlos Madrid,¹² Mr. Juan Carlos Lopez,⁶ and Mr. Juan Pita.⁶ AFFILIATIONS: 1. Manila Observatory, 2. Ateneo de Manila University, 3. National Academy of Science and Technology, 4. Oscar M. Lopez (OML) Center, 5. Ateneo de Davao University, 6. Embassy of Spain, 7. Boston College, 8. Washington State University, 9. Japan Aerospace Exploration Agency (JAXA), 10. National University of Malaysia, 11. Stella Maris College, Tamil Nadu, India, 12. Instituto Cervantes de Manila