



# Coordinating Committee for Geoscience Programmes in East and Southeast Asia (CCOP)

## **CCOP ANNUAL REPORT 2017**



*CCOP Technical Secretariat  
Bangkok*

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CCOP Technical Secretariat  
CCOP Building, 75/10 Rama VI Road  
Phayathai, Ratchathewi  
Bangkok, 10400, THAILAND  
Tel. +66 (0) 2644 5468 ; Fax. +66 (0) 2644 5429  
E-mail: [ccopts@ccop.or.th](mailto:ccopts@ccop.or.th)  
Website: <http://www.ccop.asia>

Picture on cover page:

*Delegates of the 69<sup>th</sup> Steering Committee Meeting at the Bellevue Resort, Panglao Island, Bohol, Philippines*

## MESSAGE FROM THE CHAIRMAN



Greetings! First and foremost, on behalf of the CCOP family members, I want to begin by expressing my appreciation to the Government of Philippines, Mines and Geosciences Bureau of the Department of Environment and Natural Resources, the Energy Resource Development Bureau of the Department of Energy and other relevant Philippines agencies for all you have done for the 53<sup>rd</sup> CCOP Annual Session and the 69<sup>th</sup> Steering Committee Meeting in Cebu and Bohol island, the Philippines. Besides, I would like to convey my sincere gratitude to CCOP Technical Secretariat team for making the occasions such a wonderful experience, both scientifically and socially, and to **Dr. Adichat Surinkum** for his continued strong leadership.

In spite of bad weather conditions, both the 53<sup>rd</sup> Annual Session and the 69<sup>th</sup> Steering Committee Meeting were overwhelmingly successful. All these successes have been largely due to the hard work of the organizing committee with guidance from the CCOPTS. The invaluable support of Member Countries, Cooperating Countries, Cooperating Organizations and Advisory Group were also crucial factors in ensuring the success of this year's Annual Session and Steering Committee Meetings. In this year, particularly, new events such as Busan Promotional Night during the Annual Session have made the event more prominent than previous CCOP meetings.

CCOP, which was founded in 1966 by four Member Countries; People's Republic of China, Japan, Republic of Korea and the Philippines; has now become one of the crucial intergovernmental organizations specialized in the field of Geoscience with fourteen Member Countries, fourteen Cooperating Countries, fifteen Cooperating Organizations and Advisory Group coming from various countries. CCOP's long history and its sustained growth are built on a firm foundation of excellence in partnership and regional integrity among the countries. Indeed, CCOP's unique culture is a key source of ongoing strength and scientific cooperation in East and Southeast Asia region.

CCOP's mission aims, through its outreach, partnership, Earth science data and knowledge sharing across national boundaries, to contribute to the national development and welfare of the people in the Member Countries. In order to promote geoscience innovation, we must strengthen our ability to reach our potential as capable and become world class geoscience research institutions. It is also essential to raise awareness about the importance of geoscience by providing a broad spectrum of scientific data and knowledge to the public.

End of this year 2017, my Chairmanship is going to end. **Mr. Shahar Effendi Abdullah Azizi**, Vice-Chairman of the CCOP Steering Committee, Permanent Representative of Malaysia to CCOP and Director-General of the Department of Mineral and Geoscience Malaysia is going to be the new Chairperson of the CCOP Steering Committee. I wish the new Chairman all the success as he enter into another new career.

For the build-up to the 70<sup>th</sup> Steering Committee in Vientiane, capital city of Lao PDR, I wish the Organizing Committee of Lao PDR the best as their planning gets underway. After that, the 54<sup>th</sup> Annual Session and 71<sup>st</sup> Steering Committee Meeting are going to take place in Busan, the Republic of Korea together with KIGAM's centennial anniversary. The occasion will be a platform where we envision another next century for drawing road maps for the role of geoscience surveys and the future of the CCOP. For this reason, I would be glad to receive your endorsement for the next year occasions and continuous development of CCOP. I am looking forward to seeing you at the 70<sup>th</sup> Steering Committee Meeting in Vientiane, Lao PDR as well as the 54<sup>th</sup> CCOP Annual Session and 71<sup>st</sup> Steering Committee Meeting in Busan, the Republic of Korea in 2018.

May your new year be filled with happiness!

Thank you very much.

**Dr. Joong-Ho Synn**  
Chairman, CCOP Steering Committee

# CCOP: VISION, MISSION AND STRATEGY

**Vision:** A premier intergovernmental Earth science organization in East and Southeast Asia.



**Mission:** To contribute significantly to the economic development and sustainable management of the environment and improvement of the quality of life of its Member Countries by the application of Earth science knowledge.

## STRATEGIC FOCUS:

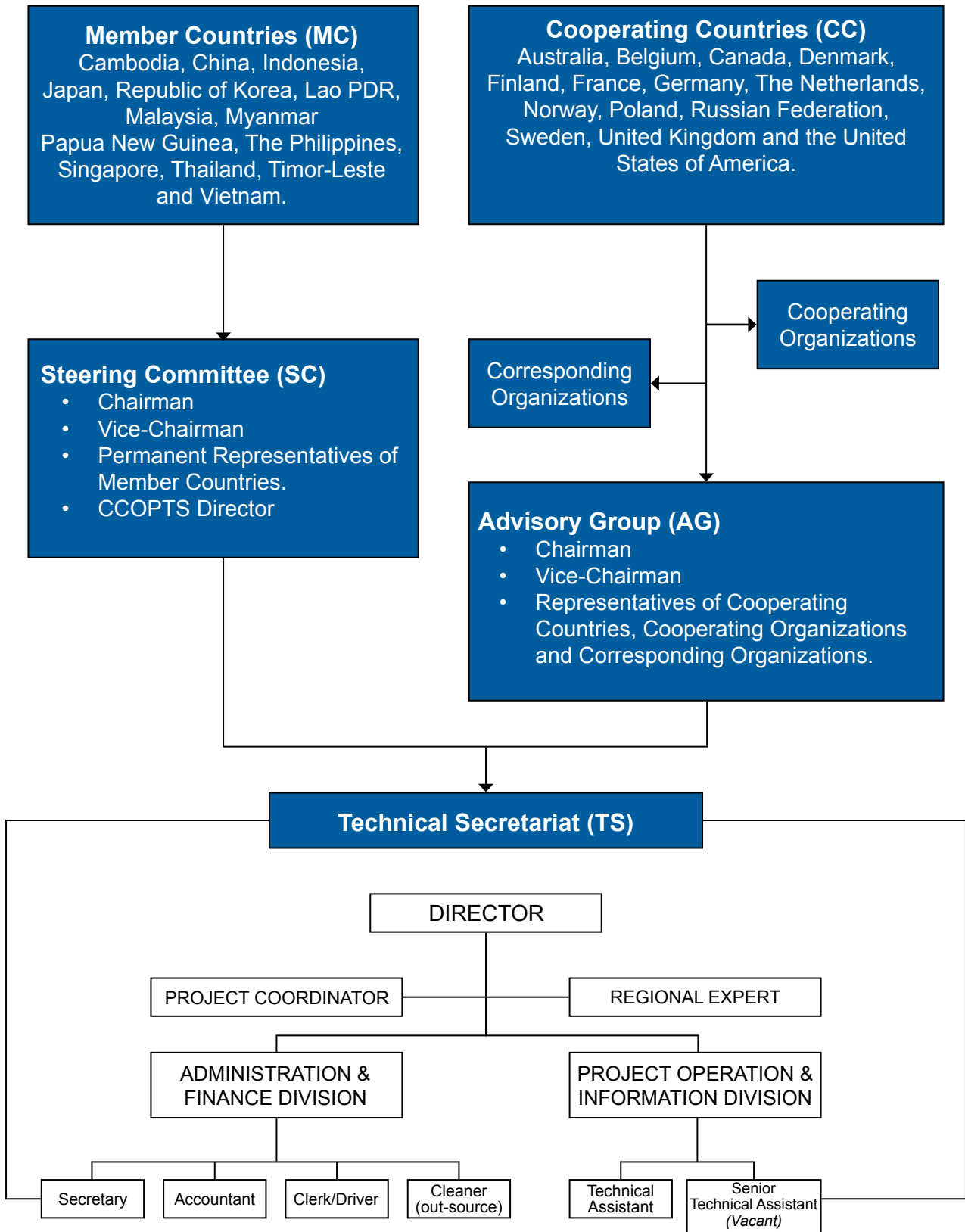
- **Outreach** – to enhance influence with decision makers, investors and the public through the provision of relevant Earth science information and to develop appropriate skills for communicating effectively with CCOP stakeholders.
- **Cooperation and Partnership** – to enhance the internal and external partnerships to improve the quality, reach application and impact of our Earth science information and knowledge.
- **Knowledge Enhancement and Sharing** – to manage, promote, share and exploit the region’s Earth science information and skills.
- **Data and Information** – to advance sharing of data and information and integrate Earth science data across national boundaries.

**Member Countries:** Cambodia, China, Indonesia, Japan, Republic of Korea, Lao PDR, Malaysia, Myanmar, Papua New Guinea, Philippines, Singapore, Thailand, Timor-Leste and Vietnam.

**Cooperating Countries:** Australia, Belgium, Canada, Denmark, Finland, France, Germany, The Netherlands, Norway, Poland, Russian Federation, Sweden, United Kingdom and United States of America.

**Cooperating Organizations:** ASCOPE, CIFEG, CPC, EURO-GEOSURVEYS, GETECH, IOC, IOMAC, IUGS, PETRAD, SPC, UN-ESCAP, UNEP, UNESCO, UKM and THE WORLD BANK.

# MANAGEMENT AND ORGANIZATION



As of 31 December 2017, the CCOP Technical Secretariat (CCOPTS) has nine personnel, comprising three professionals, five supporting staff and one out-sourced staff. **Dr. Kamaludin bin Hassan**, resigned from CCOPTS as Regional Expert effective 29 December 2017.



The CCOPTS at the 53<sup>rd</sup> CCOP Annual Session, October 2017, Cebu City, Philippines.

Third at the back row is **Dr. Kamaludin bin Hassan**.



The CCOPTS Director with the ladies of the CCOPTS at the Farewell Dinner, 69<sup>th</sup> CCOP SC Meeting, Bohol, Philippines.

In 2017, **Dr. Joong-Ho Synn**, Permanent Representative of Republic of Korea to CCOP and **Dato' Mior Sallehuddin Mior Jadid**, Permanent Representative of Malaysia to CCOP, continued to serve as Chairman and Vice-Chairman of the CCOP Steering Committee (SC). In June 2017, **Mr. Shahar Effendi bin Abdullah Azizi** succeeded **Dato' Mior Sallehuddin Mior Jadid** as Permanent Representative of Malaysia to CCOP. **Mr. Shahar Effendi bin Abdullah Azizi** also automatically sits as the Vice-Chairperson of the CCOP Steering Committee (SC), the post that **Dato' Mior Sallehuddin** previously held, with the term ending 31 December 2017. **Ms. Franca Schwarz**, Honorary Adviser to CCOP, continued her services as Chairperson of the CCOP Advisory Group, with **Mr. Ioannis Abatzis**, Representative of Denmark to CCOP, as Vice-Chairperson.

In 2017, there were also changes in the Permanent Representatives (PR) of Member Countries to CCOP, **Dr. Yusaku Yano**, Director-General, Geological Survey of Japan (GSJ), National Institute of Advanced Industrial Science and Technology (AIST), succeeded **Dr. Eikichi Tsukuda** as Permanent Representative of Japan to CCOP starting April 2017; **Mr. Shahar Effendi bin Abdullah Azizi**, Director-General, Mineral and Geoscience Department of Malaysia (JMG), succeeded **Dato' Mior Sallehuddin Mior Jadid** as Permanent Representative of Malaysia to CCOP starting June 2017; **Atty. Wilfredo G. Moncano**, Acting Director, Mines and Geosciences Bureau (MGB), succeeded **Engr. Mario Luis J. Jacinto** as Permanent Representative of the Philippines to CCOP starting July 2017; **Mr. Keo Khamphavong**, Acting Director-General, Department of Geology and Minerals (DGM), Ministry of Energy and Mines of Lao PDR, succeeded **Mr. Boualay Saatsy** as Permanent Representative of Lao PDR to CCOP starting August 2017; **Mr. Rudy Suhendar**, Head of Geological Agency (GA), Ministry of Energy and Mineral Resources (MEMR), succeeded **Mr. Rida Mulyana** as Permanent Representative of Indonesia to CCOP starting December 2017; and **Prof. Kerry Sieh**, Director, Earth Observatory of Singapore and AXA-Nanyang Chair in Natural Hazards, succeeded **Prof. Charles Martin Rubin** as Permanent Representative of Singapore to CCOP starting December 2017.

## HIGHLIGHTS FOR THE YEAR 2017

### The 68<sup>th</sup> Steering Committee Meeting

The 68<sup>th</sup> CCOP Steering Committee Meeting was held at the Grand Amara Hotel, Naypyitaw, Myanmar, on 7-9 March 2017. The Meeting was attended by delegates of the following Member Countries (MC): **CAMBODIA, CHINA, INDONESIA, JAPAN, REPUBLIC OF KOREA, LAO PDR, MALAYSIA, MYANMAR, THAILAND, PHILIPPINES** and **VIETNAM**. Also present was **Ms. Franca Schwarz**, Chairperson of the CCOP Advisory Group, and the Director and staff of the CCOP Technical Secretariat (CCOPTS). A representative of **Electricity Generating Authority of Thailand (EGAT)** attended the meeting as Observer.

**H.E. U Ohn Winn**, Union Minister of Natural Resources and Environmental Conservation and **Dr. Ye Myint Swe**, Permanent Representative of Myanmar to CCOP, Director-General, Department of Geological Survey and Mineral Exploration, Ministry of Natural Resources and Environmental Conservation, gave the welcome remarks. **Dr. Joong-Ho Synn**, Chairman of CCOP Steering Committee, Permanent Representative of the Republic of Korea to CCOP and President of Korea Institute of Geoscience and Mineral Resources (KIGAM), officially opened the 68<sup>th</sup> CCOP Steering Committee Meeting.



H.E. U Ohn Winn presenting a gift to Dr. Joong-Ho Synn after having officially opened the 68<sup>th</sup> SC Meeting.



Heads of Delegations of the 68<sup>th</sup> CCOP Steering Committee Meeting, together with H.E. U Ohn Winn.

The Meeting endorsed the Revised CCOP Workplan 2017, Revised CCOP Budget 2017 as well as the recommendations of the 17<sup>th</sup> CCOP Select Finance Committee Meeting.

On the standardization of the CCOP Member Country Annual Cash Contribution, the Meeting endorsed the CCOPTS proposal of using two parameters, the GDP per capita and healthy life expectancy of the "World Happiness 2016 Ranking", and the proposed three groups as follows:

Group I Japan, Republic of Korea (Leader), Malaysia, China, Thailand

Group II: Indonesia, Vietnam, Philippines (Leader), Papua New Guinea

Group III: Lao PDR, Cambodia, Myanmar (Leader), Timor-Leste

The Meeting further decided that each group will discuss on how much to increase in the annual cash contribution bearing in mind the need of the CCOPTS of at least USD 50,000 by year 2020 in order to achieve the CCOP Strategic Action Plan 2016-2020.

See more at <http://ccop.asia/article/the-68th-ccop-steering-committee-meeting-7-9-march-2017-myanmar>

## The 53<sup>rd</sup> CCOP Annual Session

The 53<sup>rd</sup> Annual Session of the Coordinating Committee for Geoscience Programmes in East and Southeast Asia (CCOP) was held at the Waterfront Cebu City Hotel and Casino, Cebu City, Philippines on 16 – 19 October 2017. It was organized by the Philippine Government through the Mines and Geosciences Bureau (MGB) of the Department of Environment and Natural Resources (DENR), the Energy Resource Development Bureau (ERDB) of the Department of Energy (DOE) and other relevant Philippine agencies with the CCOPTS.

The Session was attended by representatives of the following Member Countries: **CAMBODIA, CHINA, INDONESIA, JAPAN, REPUBLIC OF KOREA, LAO PDR, MALAYSIA, MYANMAR, PAPUA NEW GUINEA, PHILIPPINES, THAILAND** and **VIETNAM**. **MONGOLIA** attended as an observer. Representatives from the Cooperating Countries: **CANADA, DENMARK, FINLAND, GERMANY, UNITED KINGDOM** and **UNITED STATES OF AMERICA**, were in attendance. From the Cooperating Organizations: **Universiti Kebangsaan Malaysia (UKM)** and **UNESCO-Bangkok**, attended the session. **Energy China Forum (ECF)** attended as an observer organization. Also present at the Meeting were the Honorary Advisers of CCOP and the CCOPTS staff.



Head of Delegations of the 53<sup>rd</sup> CCOP Annual Session with Hon. **Roy A. Cimatu** (in the middle wearing long-sleeves traditional Philippine 'Barong Tagalog' and **Mr. Baltazar Tribulano** on his left).

The welcome addresses were delivered by **Atty. Wilfredo G. Moncano**, the Permanent Representative of the Philippines to CCOP, and Acting Director, Mines and Geosciences Bureau, DENR, and **Mr. Baltazar Tribulano**, Chief of the Provincial Disaster Risk Reduction and Management Office of Cebu, Officer-In-Charge of the Provincial Environment and Natural Resources of the Provincial Government of Cebu, representing the Governor of the Province of Cebu. Special messages were delivered by **Mr. Ioannis Abatzis**, Vice-Chairperson of the CCOP Advisory Group and Representative of Denmark to CCOP; and **Mr. Shahar Effendi Abdullah Azizi**, Vice-Chairperson of the CCOP Steering Committee, Permanent Representative of Malaysia to CCOP and Director-General of the Department of Mineral and Geoscience Malaysia (JMG). **Hon. Roy A. Cimatu**, Secretary of the Department of Environment and Natural Resources (DENR), officially opened the 53<sup>rd</sup> CCOP Annual Session.



# 53<sup>rd</sup> CCOP Annual Session

Waterfront Cebu City Hotel, Cebu City, Philippines  
October 16-19, 2017





Mr. Shahar Effendi Abdullah Azizi (left) presenting a token of appreciation to Hon. Roy A. Cimatu (right).

**Atty. Wilfredo G. Moncano**, Permanent Representative of the Philippines to CCOP, and Acting Director of the Philippine Mines and Geosciences Bureau, DENR, was elected Chairperson of the Session and **Dr. Young Joo Lee**, Director of Global Cooperation Division, Korea Institute of Geoscience and Mineral Resources (KIGAM), as Vice-Chairperson. The representatives from Thailand (**Ms. Wanida Rangubpit**) and Canada (**Dr. Philip Hill**) were elected as Rapporteurs.

The CCOP Progress Report started by a presentation on the updates of the CCOP-KIGAM Unconventional Oil and Gas Resources Project (UC Project) by Project Coordinator, **Mr. Simplicio**

**Caluyong**. USB flash disks containing the Map of potentially prospective shale energy resource basins in Asia and other relevant information were distributed to all participants at the Session. **Dr. Adichat Surinkum**, CCOPTS Director, summarized the Progress Report of CCOP including organizational changes (personnel), the current financial situation, technical activities and cooperation and support from Cooperating Countries and Organizations during the year 2016 with emphasis on the progress during January to June 2017. The Member Countries, Cooperating Countries and Cooperating Organizations represented at the Session made presentations on their country and organization report. The CCOP Workplan for 2018 was presented by the CCOPTS Director for the information and comments of the Session.

The Advisory Group met and discussed separately, and presented at the Session their recommendations for CCOP.

A thematic session with poster session on the topic “The Role of Geoscience in Safeguarding Our Environment” was held. Keynote address on “Sustainability in the Mining Sector: Geoscientific Contributions to Global Challenges” was delivered by **Dr. Ralph Martin Friedrich Watzel**, President, Bundesanstalt für Geowissenschaften und Rohstoffe (BGR, Germany). There were 5 sub-sessions under the thematic session: Mineral and Energy Resources Development and Environmental Protection; Geohazard Risk Reduction; Geoscience Information Management; Groundwater Resource Development and Environmental Protection; and Geoheritage.



Dr. Ralph Martin Friedrich Watzel delivering the keynote address at the Thematic Session.

See more at <http://www.ccop.asia/article/the-53rd-ccop-annual-session-cebu-city-philippines>

## The 69<sup>th</sup> Steering Committee Meeting

The 69<sup>th</sup> CCOP Steering Committee (SC) Meeting was held at The Bellevue Resort, Panglao Island, Bohol, Philippines, on 20-21 October 2017. The Meeting was attended by delegates of the following Member Countries (MC): **CAMBODIA, CHINA, INDONESIA, JAPAN, REPUBLIC OF KOREA, LAO PDR, MALAYSIA, MYANMAR, THAILAND, PAPUA NEW GUINEA, PHILIPPINES and VIETNAM**. Also present were **Dato’ Yunus Abdul Razak**, Honorary Adviser, representing the Chair of the CCOP Advisory Group (AG), and the CCOPTS Director with his staff.

Welcoming remarks were delivered by **Atty. Wilfredo G. Moncano**, the Permanent Representative of the Philippines to CCOP, and Acting Director, Mines & Geosciences Bureau (MGB), Department of Environment and Natural Resources (DENR), Philippines, and **Hon. Edgar Chatto**, Governor of the Province of Bohol. **Mr. Shahar Effendi bin Abdullah Azizi**, Vice-Chairperson of the CCOP Steering Committee, Permanent Representative of Malaysia to CCOP and Director-General of Malaysia's Mineral and Geoscience Department, officially opened the 69<sup>th</sup> CCOP Steering Committee Meeting.



Delegates of the 69<sup>th</sup> CCOP Steering Committee Meeting. In the middle, wearing the Philippine traditional 'Barong Tagalog' is the Governor of Bohol Province, **Hon. Edgar Chatto**.

**Mr. Lim Vatha** of Cambodia and **Dr. Yolanda Aguilar** of Philippines were elected as Rapporteurs.

The CCOPTS Director tabled the CCOP Progress Report covering the period 1 January 2017 to 30 June 2017. The report included the administration and personnel, finance, technical cooperation and project support, technical activities, fellowships and grants, publications and documentations.

**Republic of Korea (ROK) Delegation** recommended including in the CCOP Workplan 2018, the 9<sup>th</sup> International Conference on Asian Marine Geology (ICAMG-9) which will be convened during October-November 2018. The organizing committee of ICAMG-9 has a plan to open a session for CCOP Member Countries (MC).

**Vietnam Delegation** conveyed their agreement in hosting the BGR Training Course on Risk-Sensitive Spatial Planning in 2018. They also informed that Vietnam will host the GEOSEA-XV to be held on 16 to 17 October 2018, plus pre- and post-convention excursions. Vietnam requested CCOP to host one event in conjunction with GEOSEA-XV, and to assist Vietnam both in disseminating information and call for attendance, as well as co-organizing the program.

The Meeting endorsed the CCOP 2018 Workplan presented by the CCOPTS Director. Thailand Delegation informed the Meeting that the Department of Mineral Resources (DMR) and China Geological Survey (CGS) plan to jointly conduct the China-ASEAN Cross-border Geological Map Compilation. They will propose this new initiative at the 70<sup>th</sup> CCOP Steering Committee Meeting in Vientiane. The project funding support shall be from the core countries of CLMTV and from the invited multilateral cooperation partners.

**The Philippines** reiterated their request to include in the CCOP 2018 Workplan a Project on Coal Assessment of Mindanao for clean coal technology power generation.

The **Lao PDR Delegation** informed the Meeting that Laos is pleased to host the 70<sup>th</sup> CCOP Steering Committee Meeting. It will be held on 14-16 March 2018 in Vientiane, the capital city of Lao PDR.

The **Republic of Korea Delegation** informed the Meeting that they will host the 54<sup>th</sup> CCOP Annual Session and 71<sup>st</sup> CCOP Steering Committee Meeting in Busan, Republic of Korea, on 28 October to 3 November 2018.

The CCOP Technical Secretariat reported on the status of the EAGER Award Project. The Meeting endorsed the proposal of the CCOPTS to pay the EAGER Grant amount of USD 5,000 to **Mr. Johannes Hutabarat**, 2010 EAGER Awardee by using CCOP 2018 budget and to other EAGER Awardees who have not received the Grant, as well. The Meeting further endorsed the cessation of the EAGER Project.

The CCOP Technical Secretariat proposed improvements on the Thematic Session as recommended by **Dr. Reedman** for the consideration of the Meeting. The Meeting endorsed the CCOPTS proposals that topic for a Thematic Session be more focused on an area of particular current interest to CCOP, and that all papers submitted from a particular Member Country be pre-edited by their own elected editors before submission to CCOPTS for a final pre-publication review.



**Shahar Effendi bin Abdullah Azizi** (Left) and **Atty. Wilfredo Moncano** (Right), Chairman and Vice-Chairman of the CCOP Steering Committee for 2018-2019.

The Meeting elected the Permanent Representative of Malaysia to CCOP, **Mr. Shahar Effendi bin Abdullah Azizi**, and the Permanent Representative of the Philippines to CCOP, **Atty. Wilfredo Moncano**, as CCOP Steering Committee Chairperson and Vice-Chairperson for year 2018-2019, respectively.

The Meeting endorsed the proposed timetable of the Election of the CCOPTS Director for 1 April 2019 - 31 March 2022.

The Meeting endorsed the nomination of **Dr. Eikichi Tsukuda** from Japan, as CCOP Honorary Adviser.

**Republic of Korea Delegation** proposed the invitation of the CCOP MCs to PyeongChang Olympic Winter Games which will be held on 9-25 February 2018 to share the low carbon CCUS (Carbon Capture, Utilization & Storage) technology.

See more at <http://www.ccop.asia/article/the-69th-steering-committee-meeting-20-21-oct-2017-bohol-philippines>



Delegates of the 69<sup>th</sup> Steering Committee Meeting at the famous Chocolate Hills of Bohol during the field trip.

# TECHNICAL PROGRAMMES AND ACTIVITIES

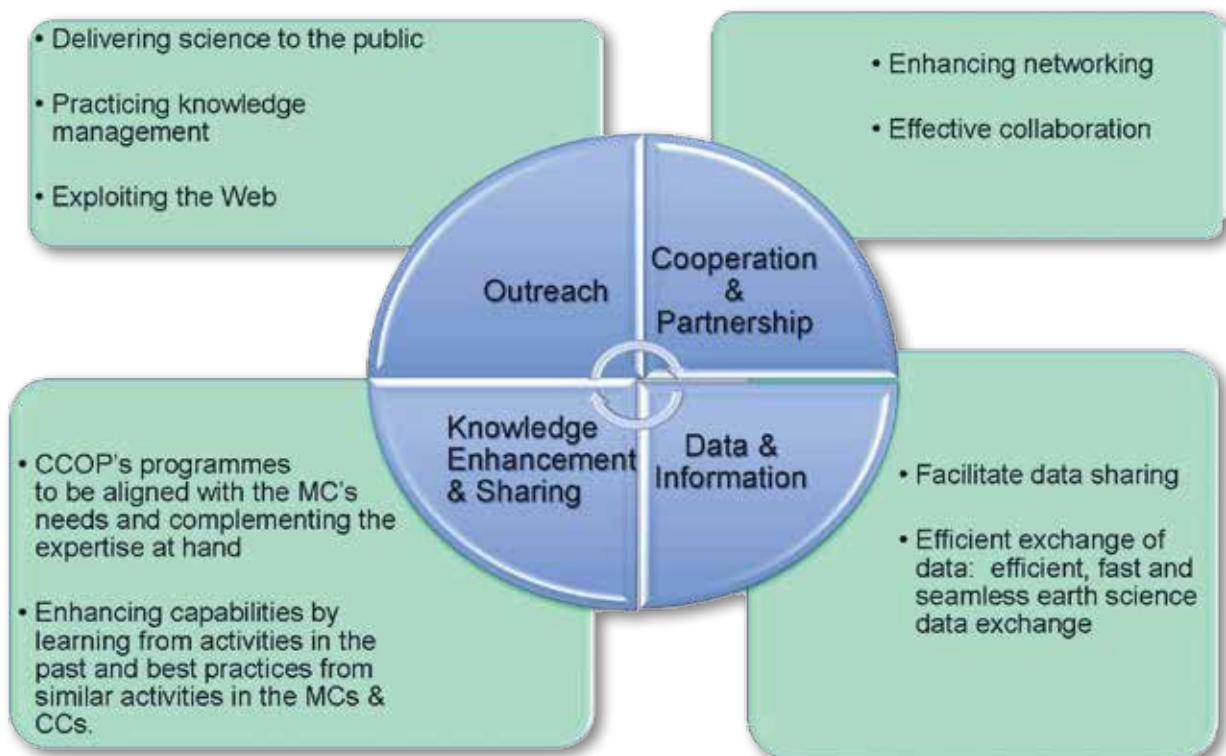
In 2017, a total of 35 training/workshop activities were carried out and attended by 1,284 participants from the CCOP Member Countries. With strategic focus on capacity building, knowledge sharing and technology transfer; the workshops, training courses, symposiums, working group meetings and expert visits were conducted during the reporting period and Member Countries participation were highly appreciated.

## Summary of CCOP Member Countries' Participation in Technical Activities

STRATEGIC GOAL	NO. OF ACTIVITIES	NO. OF PARTICIPANTS
Outreach	5	256
Cooperation & Partnership	2	
KES	23	948
Data & Information	4	80
<b>TOTAL</b>	<b>34</b>	<b>1,284</b>



CCOP Strategic Plan for 2016-2020 was approved by the 65<sup>th</sup> SC Meeting, Xian, China, 28-29 Nov 2015.



## OUTREACH

In 2017, the outreach initiatives carried out include attending technical meetings, giving lectures, discussions and telephone conferences. The activities are reported in accordance to the 2017 CCOP Workplan.

### Satun Aspiring Geopark

CCOPTS Director attended with UNESCO Bangkok team in Department of Mineral Resources activity on creating geopark awareness to stakeholders, 21-23 January 2017. In 2016, Thailand submitted nomination to UNESCO for Satun Aspiring Geopark as a new Global Geopark. Since then, DMR as a geoscience supporter on this nomination organized many geoscience activities in order to facilitate the cooperation among the locals. There are many stakeholders involved in this project and all are quite excited to learn more about geology of their own territories. DMR also trained many young geotour guides, most of them are secondary and high school students. Local administrations have also organized a week of Geopark Festival for tourists from both Thailand and Malaysia during the first week of February 2017.



Activities during the Geopark Festival in Satun, February 2017.

CCOPTS Director attended as observer in two events, the Annual meeting between The Department of Mineral Resources (DMR) of Thailand and Department of Mineral and Geoscience Malaysia (JMG), and the workshop on “Satun Aspiring Geopark”, held in Satun Province, southern Thailand, 2-7 May 2017. The events were attended by geoscientists from both countries. Local government officials also attended the geopark workshop. In the JMG/DMR meeting, best practices on joint mapping of 25k and 5k scales were presented and discussed. Both parties also technically agreed on the 2017-2018 programs where the final decision will be made by the Committee in August 2017. The “Satun Aspiring Geopark” workshop had discussed on the managing and sharing of experiences between resource persons (from Thailand, Republic of Korea and Malaysia) and the participants in relation to UNESCO Geopark mechanism.

### DMR-CCOP-TNCU Technical Seminar on Biostratigraphy and Karst Morphology of Satun Aspiring Geopark

CCOP, DMR and Thai National Commission of UNESCO (TNCU), successfully co-organized the DMR-CCOP-TNCU Technical Seminar on Biostratigraphy and Karst Morphology of Satun Aspiring Geopark on 13-14 July 2017 at the Berkeley Hotel Pratunam in Bangkok, Thailand. A total of 93 participants, from Cambodia, Thailand and CCOPTS Director attended the seminar. The seminar aims at sharing and discussing technical issues on paleontology, stratigraphy, karst morphology and geological significances of Satun Aspiring Geopark. The seminar also intends to project Thailand's Satun Geopark to be internationally recognized as a member of UNESCO Geopark.

## Paleoseismic Training Course

CCOPTS Director attended the Paleoseismic Training Course opening session in Chiang Rai, Thailand during 15-26 February 2017. The activity was organized by DMR of Thailand and the Earth Observatory of Singapore (EOS). Over 60 participants from Thailand, Lao PDR, Myanmar, Cambodia, Malaysia and Vietnam attended the training course. The resource persons are paleoseismic experts coming from Australia, China, France, Singapore and USA. Representatives from CLMTV countries attended the first session of the technical presentation.

## CLMTV Working Group Meeting

CCOPTS Director attended the CLMTV Working Group Meeting in Chiang Rai, north Thailand, 16 to 18 February. It was suggested that future activity be based on Transboundary Geoscience Program under the CCOP framework, to which all parties agreed on the proposed mechanism.

## Seminar on Geohazards in CLMTV countries

CCOPTS Director chaired the morning session of the Seminar on Geohazard in CLMTV countries, held in Bangkok on 27 September 2017. The seminar was co-organized by the Earth Observatory of Singapore and the Department of Mineral Resources of Thailand. Presentations on the topic were made by representatives from five CCOP countries: Cambodia, Lao PDR, Myanmar, Thailand and Vietnam; by the experts from the Earth Observatory of Singapore, led by **Prof. Dr. Kerry Sieh**; as well as from other research organizations of Thailand. The experts agreed to continue the research on the same topic, especially in Lao PDR and Vietnam.



## VIGMR-GSJ-CCOP Workshop: “Practical analysis of GSHP logging data”

The Vietnam Institute of Geosciences and Mineral Resources (VIGMR), in collaboration with the Geological Survey of Japan (GSJ) and CCOP, organized an international workshop "Practical analysis of data logging GSHP", on 20 February 2017, at the Institute headquarters, Hanoi, Vietnam. The workshop was attended by 50 delegates from the Geological Survey of Japan, University of Fukushima, Akita University, Vietnam Institute of Energy, Vietnam Institute of Geosciences and Mineral Resources as well as scientists, managers from units within and outside of the Ministry of Natural Resources and Environment and a number of private companies.

The workshop programs included technical presentations and visit to the GSHP system installed at the VIGMR, since October 2016. Further information of the workshop can be accessed at <http://www.ccop.or.th/article/vigmr-gsj-ccop-workshop-practical-analysis-of-gshp-logging-data>.



Participants of the VIGMR-GSJ-CCOP Workshop: "Practical analysis of GSHP logging data".

## **Practical Training on the Digital Action Plan of the Department of Mineral Resources (DMR) of Thailand**

CCOPTS Director was invited to deliver an opening lecture on "Data and Information Technology Program in CCOP", in a training course on "Digital DMR" organized by DMR, 26-28 April 2017, in Ayutthaya Province, Thailand. The purpose of the course is to provide information on current Thailand policy on Information Technology and to formulate a draft of DMR's strategic plan on IT. The training course was supervised by experts from the National Institute of Development Administration (NIDA), Thailand.

The "CCOP Geoscience Sharing Infrastructure" program was deliberated and discussed in the session, while the CCOP strategic plan was also shared with the NIDA experts and the participants. In doing the SWOT analysis many geoscience related programs, such as earthquake monitoring, transboundary groundwater, geochemistry map and geo-park activities were used as examples.

## **International Workshop on Landslide Risk Assessment and Management for the ASEAN Member States**

CCOPTS Director presented a keynote speech on "Landslide Mitigation in CCOP" in the 1<sup>st</sup> International Workshop on Landslide Risk Assessment and Management for the ASEAN Member States, organized by Thailand National Electronics and Computer Technology Center (NECTEC), 1-2 June 2017, at NECTEC Bussakorn Conference Room, Thailand Science Park. He also talked on the Community-based approach for hazard mitigation and reducing the number of casualty. Many best practices were presented by both academicians and government officials from ASEAN countries. WebGIS approach was proposed by CCOPTS Director as a means of sharing data. A new Landslide networking was established and land-use zoning will be an important topic for the next workshop discussion.

## **Forum on Feasibility Study of Shale Oil and Coal Bed Methane: New Resource Potential**

CCOPTS Director presented a keynote speech on "New Energy Resources in East and Southeast Asia", with updated status on the unconventional energy development in CCOP Member Countries, in the 1<sup>st</sup> Petroleum Geoscience Forum "Feasibility of Shale Oil and Coal Bed Methane: New Resource Potential", organized by PTT Exploration and Production (one of Thailand National Oil Companies), 15 June 2017, at Centara Grand Hotel, Bangkok, Thailand. CCOP activities such as, GSJ/CCOP WebGIS application, Energy China Forum, KIGAM/CCOP unconventional energy, KIGAM IS-Geo training course were highlighted in the presentation/discussion. The meeting agreed to hold the next shale oil/gas discussion on results of shale core sample analysis, in Ayutthaya province later this year.

## Electrical Generating Authority of Thailand “Geoscience Day”

CCOPTS Director attended and shared CCOP 2016-2020 Action plan activities at the “Geoscience Day” meeting organized by the Electrical Generating Authority of Thailand (EGAT), 16-17 June 2017, at MaeMoh Training Center, Lampang province, Thailand. It was an annual meeting where geoscientists working on the new frontier topics shared their activities, which included Coalbed Methane, new version of multi-purposed geothermal power plant, and seismic study along the transboundary active faults.

## Thai Geopark Network Workshop

CCOPTS Director presented a keynote speech on “Role of CCOP in Promoting and Developing UNESCO Global Geopark in East and Southeast Asia” at the Thai Geopark Network Workshop organized by Department of Mineral Resources (DMR) of Thailand, 23-25 June 2017 at Phuwiang Fossil Research and Dinosaur Museum, Khon Kaen province, Thailand. The workshop aimed to promote geotourism related to geo-sites in Thailand, particularly in Khon Kaen province. Most of the participants were local administration officers and school teachers working in the nearby province together with DMR personnel. The Phuwiang site is the first Dinosaur fossil location found during the Uranium Exploration Project in the 1900s. Since then, hundreds of dinosaur researchers have visited the site, while thousands of tourists visited the Phuwiang Museum every year.

## Potash exploration

CCOPTS Director attended and assisted Department of Mineral Resources, Thailand, on potash exploration, 28-30 June 2017, in Nakorn Ratchasima province, northeastern Thailand. The potash exploration forms as part of the Thai government policy to conduct proper mining activity, especially on underground mining, as well as, as to search for future fertilizer supply to support Thailand’s agricultural activities. This project also trains young driller on potash drilling technique, where special drilling mud is used. At the moment, there are only two CCOP countries, Thailand and Lao PDR, which have great potential of potash resources. Currently, most of potash is imported from Canada and Germany to CCOP MCs.

## The 5<sup>th</sup> Asia-Pacific Coastal Aquifer Management Meeting (APCamm)

The 5<sup>th</sup> Asia-Pacific Coastal Aquifer Management Meeting (APCamm) was held at University of Da Nang, Vietnam, July 17-19, 2017. The meeting was partly sponsored by MONRE and co-organised by Hanoi University of Natural Resources and Environment and the University of Danang. A total of 130 participants from Australia, Cambodia, China, India, Korea, Thailand, USA, Vietnam and CCOPTS attended the meeting. There were 31 oral presentations and 16 posters exhibited. CCOPTS attended the meeting to expose and advertise CCOP as future partner of the activity.



Participants of the 5<sup>th</sup> Asia-Pacific Coastal Aquifer Management Meeting (APCamm).

The meeting was first established in 2009 and had formed a bi-annual forum to share knowledge in coastal aquifer water resources and management, with a focus on the Asia-Pacific region. The meeting forms an avenue where scientists, engineers, managers and other ground water stakeholders who are concerned with coastal groundwater in the Asia-Pacific region could interact, discuss, establish linkages and communicate on the subject in a formal forum. It is a fact that a large portion of the world's population inhabits coastal areas, and puts significant stress on surface and ground water resources. In addition, sea level rise due to climate change is expected to adversely impact coastal systems, in particular, groundwater resources. A UN report showed that by 2050, seven of the ten most vulnerable countries worldwide are in the Asia-Pacific region.

In this three-day meeting, the first two days was allocated for discussing topics which include: Coastal Aquifer Management; Numerical Modeling; Investigations of Coastal Aquifers; Island Hydrogeology; Geochemistry and Isotopes; and Saltwater Intrusion Vulnerability, Climate Change and Sea level rise Impacts to Coastal aquifers. CCOPTS presentation titled “The role of Coordinating Committee for Geoscience Programs in East and Southeast Asia (CCOP) in promoting groundwater and other geoscience activities” was delivered by **Dr. Kamaludin bin Hassan**, APCAMM Chairman, **Prof. Namsik Park**, wishes to collaborate with CCOP in organizing the next event. A day excursion to the Central Coastal Vietnam and visit to Gio Linh groundwater wellfield and water treatment plant were also arranged.



CCOPTS presentation titled “The role of Coordinating Committee for Geoscience Programs in East and Southeast Asia (CCOP) in promoting groundwater and other geoscience activities”.

### **Best Practices on Landslide Mitigation**

CCOPTS Director was invited by the PTT Global Chemical Public Company (PTTGC) to give a presentation on “Best Practices on Landslide Mitigation” to the Rayong Province community on 5-6 August 2017. Most of the participants are local communities who recently experienced landslide hazard. Field observations were later made on various affected sites. The communities all agreed that the natural and/or simple man-made protection must be applied as soon as possible before the next rainy season. Examples from Tak and Lampang will be used, because of the similar geological condition and also have settlement downstream. As a Corporate Social Responsibility, PTTGC will shoulder the project.

### **Energy Workshop 2017**

CCOPTS Director was invited to deliver a presentation on the Energy Resources of Southeast Asia to the participants of the “Energy Workshop 2017” organized by Electrical Generating Authority of Thailand, on 9-11 August 2017 at Prachuab Khirikhan. The workshop had discussed both on the demand and supply sides of the energy situation in SE Asia. There was also a long discussion on the Energy Gridding System in the region. Trends on green energy was also discussed where the price and technology are still not suitable for SE Asia countries.

### **Geohazard at Rayong Province, Eastern Thailand**

CCOPTS Director was invited as a resource person at a Geohazard workshop organized by the Department of Mineral Resources of Thailand (DMR), on 28-30 August 2017 at Rayong Province, eastern Thailand. Thirty participants from all DMR Regional offices attended the workshop and have shared different experiences on geo-hazard mitigation. In the exercise, only routine landslide management was used as an example. The standard procedure for landslide mitigation was set up and will be applied to other geo-hazard scenario depending on the local geological condition.

## Courtesy visit to the Permanent Representative of Japan to CCOP

CCOPTS Director made a courtesy visit to the Permanent Representative of Japan to CCOP, the Director-General of the Geological Survey of Japan, Dr. Yusaku Yano, and attended the ASEAN Mineral Database Training Program at Tsukuba, Japan, on 4-5 September 2017. The discussion of the visit was focused on the current activities of CCOP under the GSJ and JICA program. A side meeting with Japanese experts on formulating a new project on Magnetic and Gravity data compilation was also held. In the meeting it was agreed to put forward a time table of the project for consideration in the national coordinator meeting, during the CCOP AS in Cebu.



## Courtesy visit to Prof. Tokiyuki Sato, Dean of the Graduate School of International Resources Sciences of Akita University

CCOPTS Director made a courtesy visit to **Prof. Tokiyuki Sato**, Dean of the Graduate School of International Resources Sciences of Akita University and discussed on the Higher Education Program of CCOP, on 7-8 September 2017. At present, only two Member Countries are eligible to apply for a full scholarship through the JICA program, Lao PDR and Cambodia. Recruitment process for graduate students of both countries will be organized during October at the capital city of each country. Prof. Hikari Fujii, advisor to the President of International Affairs will himself do the recruitment. GSHP is one of the key projects of Akita University where good candidate from CCOP MCs may be able to apply for graduate study and short term training. There are many GSHP facilities located not far from Akita University and on-site visit is available to all visitors.

## Courtesy visit to the Permanent Representative of Lao PDR to CCOP



CCOPTS Director made a courtesy visit, on 13-14 September, to the Permanent Representative of Lao PDR to CCOP, **Mr. Keo Khamphavong** for a discussion on the possibility of hosting the 70<sup>th</sup> Steering Committee Meeting in March 2018. Top executives of Department of Geology and Minerals had also attended the discussion. The details, on venue and date will be informed by Lao PDR team leader during the 69<sup>th</sup> Steering Committee Meeting in Philippines.

## The 5<sup>th</sup> Asia-Pacific Geoparks Network Symposium

The 5<sup>th</sup> Asia-Pacific Geoparks Network Symposium was held in Zhijin International Conference Centre, Zhijin, China, 19-22 September 2017. The Symposium was organised by Zhijindong Cave UNESCO Global Geopark and supported by Global Geoparks Network (GGN), Asia Pacific Geoparks Network (APGN), Chinese Geoparks Network (CGN), Bijie Municipal Government, Provincial Department of Land and Resources of Guizhou, and the Zhijin Government. A total of about 800 participants from many countries attended the meet. CCOPTS attended the meeting with the aim to expose, advertise and invite GGN/APGN as partner for geopark capacity building programmes.

The symposium opening ceremony and keynote speeches were mainly held on the morning of the first day, 19<sup>th</sup> September. Many oral presentations and some keynotes followed suit throughout the event duration. Many geoparks booths were opened and had attracted large crowd of interested participants.

UGGN has now 37 countries memberships. China has the most number of global geoparks in the world, total 35, and with 205 approved national geoparks. It has been estimated that about more than 250 million visitors visited China geoparks each year, generating hundreds billions yuan of total income. Apart from protecting the geological heritage, promoting local development including culture, infrastructure, industries, etc. Geoparks and its concept help the locals to earn income through the boosting of the tourism industries.

In the 4 days meet, a one day excursion was arranged to the Zhijindong Cave UGG Museum, Zhijindong Cave (dubbed the most beautiful cave in China), karsts landscapes such as gorge, natural bridge, cuesta and caves in Qijehe River, and the Miao minority village. A short discussion on GGN-CCOP partnership was granted by the five UGGN board members with CCOPTS representative, **Dr. Kamaludin Hassan**, in the evening of the 2<sup>nd</sup> day Symposium.

### The 9<sup>th</sup> Jeju Water World Forum

CCOPTS Director gave a presentation on “Groundwater Cooperation in SE Asia Countries”, during the 9<sup>th</sup> Jeju Water World Forum at the Maison Jeju Grand Hotel, Jeju City, Republic of Korea, on 20 September 2017. The forum was co-organized by the Jeju Province Development Cooperation (JPDC), with the theme “Sustainable Development and Value Creation of Water Resource”. CCOPTS Director participated as panelist in the panel discussions on “Sustainable water development for water security and sustainable growth” on the same date; while on September 21, he participated as panelist in the panel discussions “Exploring the Hidden Value of Groundwater Resources and Global Brand Strategy of Jeju Samdasoo” and “Global Cooperation in Jeju Water Forum”. The forum was sponsored by Jeju Special Self-Governing Province, Ministry of Environment, KIGAM, Korea Institute of Civil Engineering and Building Technology, Korea Rural Community Corporation and Jeju Research Institute. During the discussion, JPDC together with KIGAM agreed to support CCOP on the capacity building for hydrogeologists in Mekong Sub-region starting from 2018.



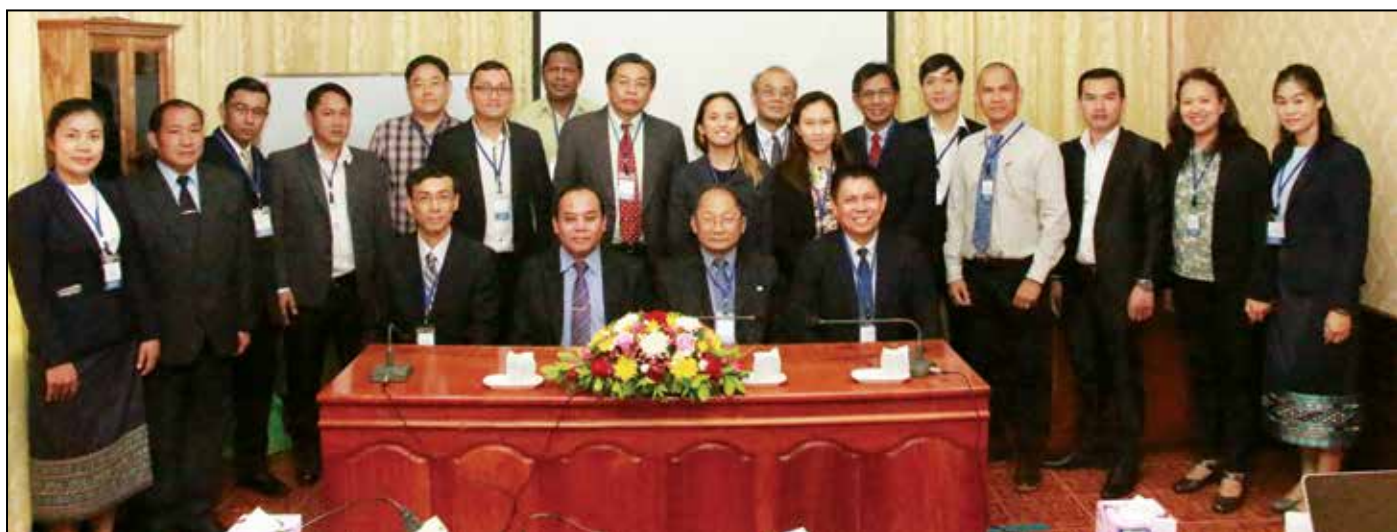
CCOPTS Director made a presentation on “Groundwater Cooperation in SE Asia Countries”, during the 9<sup>th</sup> Jeju Water World Forum at the Maison Jeju Grand Hotel, Jeju City, Republic of Korea.

### Geoinformation Sharing Infrastructure for East and Southeast Asia (GSi) Project

The Japanese-funded CCOP Geoinformation Sharing Infrastructure for East and Southeast Asia (GSi) Project scheduled for 2015 – 2019, aims to develop new geoinformation integration and sharing system using international standards and free and open-source software among CCOP countries.

In parallel with the 53<sup>rd</sup> CCOP Annual Session held in Cebu City, Philippines, a GSi Project Meeting was held on 17 October 2017. There were 12 participants in the meeting from Cambodia, Indonesia, Japan, Lao PDR, Philippines, Thailand, Vietnam and CCOPTS. **Dr. Shinji Takarada**, GSi Project Leader reported the current status of the CCOP GSi Project. **Dr. Joel Bandibas** made a presentation on the recent developments of the GSi system. Member Countries presented reports on their country's recent developments in data compilation and upload, as well as their requests on the GSi project.

The 2<sup>nd</sup> GSi International Workshop was held on 5-7 December 2017 in Luang Prabang, Laos in cooperation with the Department of Geology and Minerals under Laos' Ministry of Energy and Mines. Twenty (20) participants from the member countries (Cambodia, Japan, Republic of Korea, Lao PDR, Malaysia, Myanmar, Papua New Guinea, Philippines, Thailand and Vietnam) including the staff of the CCOPTS attended the workshop. All the CCOP member countries represented in the workshop gave a report on their preliminary 5-year data upload plan, name of national and data coordinators, progress of data upload and portal site, requests and suggestions on GSi project and country's current status of Spatial Data Information System and extent of Geographic Information System usage. **Mr. Simplicio Caluyong**, CCOPTS presented the KIGAM Unconventional Oil and Gas Resources Project's plan of publishing the project's output, Map of Potentially Prospective Shale Energy Resource Basins in Asia through the GSi System. Hands-on training on the usage of the GSi System with real data, and on mobile web gis development was conducted by **Dr. Bandibas** on the first and second days of the workshop.



(Top) Participants of the 2<sup>nd</sup> GSi Project Workshop. Seated from L-R, **Dr. Shinji Takarada**, GSi Project Leader, GSJ; **Mr. Khoun Phetsengsy**, Deputy Director-General, Department of Geology & Minerals of Laos' Ministry of Energy and Mines; **Dr. Adichat Surinkum**, CCOPTS Director; and **Dr. Joel Bandibas**, GSi System Developer, GSJ.

(Bottom) Hands-on exercises during the training session at the 2<sup>nd</sup> GSi Project Workshop.

Currently, there are around 20 portals from CCOP Member Countries viewable from the GSi system. The official launching of the main GSi portal site from CCOP as well as each country institute's portal sites is planned to be held during the 3<sup>rd</sup> GSi Project Workshop in 2018. In preparation for this, each country will have to populate more data to their portals, and check the quality of the data available in the portal. Development of the GSi system will still be ongoing, focusing on the improvement of its user interface, and responding to the requests of the Project members. The Project will also make interactions with other major international projects and disseminate the GSi System to the world through press releases.

## PUBLICATIONS

### Journal of Groundwater Science and Engineering

The outcome of the CCOP-KIGAM-UNESCO-MME Workshop on "Climate Change and Groundwater Resources in the Mekong River Basin", that was held 1-2 June 2016, in Sihanoukville, Cambodia, is published in the Journal of Groundwater Science and Engineering, Vol. 5, No.1, March 2017 edition. This can be downloaded from [http://gwse.iheg.org.cn/EN/volumn/volumn\\_1157.shtml](http://gwse.iheg.org.cn/EN/volumn/volumn_1157.shtml)

### Proceedings of the 52<sup>nd</sup> CCOP Annual Session "Geoscience for the Society"

The proceedings of the Thematic Session, "Geoscience for the Society" held at the 52<sup>nd</sup> CCOP Annual Session on 31 October to 3 November 2016, Bangkok, Thailand contain 19 full papers from Member and Cooperating Countries of CCOP. The 185 pages publication is available both electronically and in printed book. Its 11MB PDF file can be downloaded from this link, <http://www.ccop.or.th/download/as/52as2.pdf>

### CCOP Annual Report 2016

The CCOP Annual Report for 2016 is available both in printed and digital formats. The 64-page report summarizes the projects and activities carried out during the year 2016, the financial standing and more. Its digital file with about 5MB size can be downloaded from the link: <http://www.ccop.asia/download/CCOP-AR2016.pdf>



## COOPERATION AND PARTNERSHIP

In 2017, CCOP continued to collaborate with its MCs, CCs and COs to implement the planned activities and adopt activities in new areas of concern. Outreach activities have continuously been developed. Thanks to generous support by funding agencies and in-kind contribution by member countries, to optimize the benefits of the partly sponsored programmes. The Table below summarizes the cooperation and activities of the Member countries, Cooperating Countries and Cooperating Organizations.

Summary of CCOP Technical Activities with Member Countries, and Cooperating Countries & Organizations in 2017

COUNTRY/ ORGANIZATION	CCOP TECHNICAL ACTIVITIES
<b>1) Member Countries</b>	
<b>Cambodia</b>	MME hosted the CCOP-KIGAM-UNESCO-MME Workshop on “Transboundary aquifer-surface water management in Mekong basin”, Sunway Hotel, Phnom Penh, Cambodia, 25-26 July 2017 and assisted the installation of the ground water monitoring system for the project.
<b>China</b>	<p>China Geological Survey (CGS) support financially and technically the following activity:</p> <ul style="list-style-type: none"> <li>• Workshop/Training on IGDP-II and Compilation Technology for the CCOP Member Countries, 22-24 May 2017, Beijing, China</li> </ul> <p>China organised:</p> <ul style="list-style-type: none"> <li>• China-ASEAN-CCOP 2<sup>nd</sup> Workshop and Training Course on Marine Geoscience Capacity Building and Geohazards Reduction and Prevention, 4-23 August 2017, Guangzhou, China.</li> <li>• China ASEAN Mining Cooperation Forum and Exhibition, at Nanning, southern China, 23-24 August 2017.</li> <li>• 5<sup>th</sup> Asia-Pacific Geoparks Network Symposium was held in Zhijin International Conference Centre, Zhijin, China, September 19-22, 2017.</li> <li>• Energy China Forum (ECF) 2017: 7<sup>th</sup> Asia-Pacific Shale Gas Summit, 11-13 October 2017, at Jianguo Hotel, Shanghai, People’s Republic of China.</li> </ul>
<b>Indonesia</b>	<p>Geological Agency of Indonesia (GA) hosted and co-funded the GSJ-CCOP-GA Groundwater Project Phase III Meeting, 21-23 March 2017, Bali, Indonesia.</p> <p>LEMIGAS and GA hosted and co-funded the CCOP–KIGAM UCM8, 18 – 20 July 2017, Yogyakarta, Indonesia</p>
<b>Japan</b>	<p>GSJ support financially and technically the following activities:</p> <ul style="list-style-type: none"> <li>• CCOP Geoinformation Sharing Infrastructure (GSi) Project Meeting, Waterfront Cebu City Hotel and Casino, Cebu, 17 October 2017</li> <li>• CCOP- ASEAN Seamless Geology Project Meeting, Waterfront Cebu City Hotel and Casino, Cebu, 17 October 2017</li> <li>• CCOP-IUGS Task Group on Geohazards (TGG) Joint Seminar, Waterfront Cebu City Hotel and Casino, Cebu, 18 October 2017</li> <li>• Joint Meeting of the MAMEA and IGDP-II Projects, Waterfront Cebu City Hotel and Casino, Cebu, 18 October 2017.</li> <li>• CCOP-GSJ Groundwater Project and installation of GSHP systems</li> <li>• The 2<sup>nd</sup> GSi International Workshop, 5-7 December 2017, Luang Prabang, Lao PDR.</li> <li>• High Education Support Network in CCOP region</li> </ul>

**COUNTRY/  
ORGANIZATION****CCOP TECHNICAL ACTIVITIES****Republic of  
Korea**

KIGAM support financially and technically the following projects:

- Unconventional Oil & Gas Project (UC): Mapping of Black Shale Formations for the Prediction of Shale Resources
  - a. CCOP – KIGAM UCM7, 28-30 March 2017, Bangkok, Thailand
  - b. CCOP – KIGAM UCM8, 18-20 July 2017, Yogyakarta, Indonesia
  - c. CCOP–KIGAM (UCM9), 12-14 October 2017, Waterfront Cebu City Hotel & Casino, Cebu City, Philippines
- “Groundwater-Surface Water Interaction and Comparative Study of Groundwater Dependent Ecosystems in the Mekong Basin: Application to Transboundary Aquifer Management”
  - a. CCOP-KIGAM-UNESCO-MME Workshop on “Transboundary aquifer-surface water management in Mekong basin”, Sunway Hotel, Phnom Penh, Cambodia, 25-26 July 2017

KIGAM and ISGeo continued to support and organize training courses:

- Regular Training Course on Petroleum Exploration, Development and Production, 6-31 March 2017, Daejeon, Republic of Korea
- Regular Training Course on “Groundwater Theory and Practices” 19 - 30 June, 2017 at IS-Geo of KIGAM, Daejeon, Republic of Korea
- Regular Training Course on “Carbon Resource Recycling Appropriate Technology” , 8-15 September 2017 at IS-Geo KIGAM, Daejeon, Korea
- Regular Training Course on “Coastal geology, Geohazards and Management (GeoCoast)”, 27 November to 1 December 2017, at IS-Geo KIGAM, Daejeon, Korea

**Lao PDR**

The Department of Geology and Minerals under Laos’ Ministry of Energy and Mines hosted the 2<sup>nd</sup> GSi International Workshop held on 5-7 December 2017 in Luang Prabang.

**Malaysia**

The Department of Mineral and Geoscience Malaysia (JMG) and Department of Mineral Resources (DMR) of Thailand, organized the 14<sup>th</sup> Malaysia-Thailand Border Joint Geological Survey Committee Meeting (14<sup>th</sup> MT-JGSC) in Penang, Malaysia, 14-19 August 2017.

Malaysia, thru UKM and CCOP, hosted:

- Malaysia Window to Cambridge at Universiti Kebangsaan Malaysia (MW2C@UKM) Inaugural Training; Kuala Lumpur, Ipoh and Cameron Highlands; 10-12 October 2017
- CCOP-SEADPRI-ANCST Workshop on Disasters and Heritage Areas, Waterfront Cebu City Hotel and Casino, Cebu, 15 October, 2017

**Myanmar**

CCOPTS Director paid a courtesy visit to the Minister, Union Minister, Ministry of Natural Resources and Environmental Conservation, on 15-18 January 2017 and have a meeting with the Department of Geological Survey and Mineral Exploration (DGSE), Naypyitaw and Mandalay, Myanmar.

## Philippines

Philippines hosted the following activities:

- 2<sup>nd</sup> BGR-CCOP International Training Course on 'Risk-Sensitive Spatial Planning in CCOP Member Countries' in Manila, Philippines, 18-28 September, 2017
- CCOP-KIGAM UCM9, 12-14 October 2017, Cebu City, Philippines
- CCOP Coffee Table Book Project: "Best Practices on Mine Rehabilitation and Decommissioning Plan in CCOP Region", Waterfront Cebu City Hotel and Casino, Cebu, 15 October 2017
- CCOP-SEADPRI-ANCST Workshop on Disasters and Heritage Areas, Waterfront Cebu City Hotel and Casino, Cebu, 15 October, 2017
- 53<sup>rd</sup> CCOP Annual Session, Waterfront Cebu City Hotel and Casino, Cebu, Philippines on 16 – 19 October 2017
- CCOP Geoinformation Sharing Infrastructure (GSi) Project Meeting, Waterfront Cebu City Hotel and Casino, Cebu, 17 October 2017
- CCOP- ASEAN Seamless Geology Project Meeting, Waterfront Cebu City Hotel and Casino, Cebu, 17 October 2017
- CCOP-IUGS Task Group on Geohazards (TGG) Joint Seminar, Waterfront Cebu City Hotel and Casino, Cebu, 18 October 2017
- Joint Meeting of the MAMEA and IGDP-II Projects, Waterfront Cebu City Hotel and Casino, Cebu, 18 October 2017.
- 69<sup>th</sup> CCOP Steering Committee Meeting, The Bellevue Resort, Panglao Island, Bohol, Philippines on 20-21 October 2017

## Thailand

Thailand hosted the following activities:

- DMR-CCOP Technical Workshop on Transboundary Georesources Management, 11-14 January 2017, Srinakarindh Dam, Kanchanaburi Province, Thailand
- BGR-CCOP First International Training Course on Risk-Sensitive Spatial Planning, 20 February - 2 March 2017, Bangkok, Thailand
- CCOP – KIGAM UCM7, 28-30 March 2017, Bangkok, Thailand
- Workshop on Thailand- China Coastal management and Geological Survey Techniques under the Thailand-China Marine Cooperation, 8-20 May, Chantaburi, Thailand
- IAEA Training Workshop on Uranium Geochemistry, Thailand Institute of Nuclear Technology, 16-19 May, Bangkok, Thailand
- Department of Mineral Resources of Thailand (DMR), CCOP and Thai National Commission of UNESCO (TNCU) co-organized the DMR-CCOP-TNCU Technical Seminar on Biostratigraphy and Karst Morphology of Satun Aspiring Geopark at the Berkeley Hotel, Pratunam Bangkok, 13-14 July 2017
- DMR and JMG organized the 14th Malaysia-Thailand Border Joint Geological Survey Committee Meeting (14th MT-JGSC) in Penang, Malaysia, 14-19 August 2017
- DMR and CCOP co-organized Technical Seminar on Jurassic-Cretaceous (J/K) Boundary of Southeast Asia at the Sukosol Hotel, Bangkok, 1st September 2017
- 16<sup>th</sup> Gondwana International Conference with theme "Puzzling out Gondwana", Asia Hotel, Bangkok, Thailand, on 7-21 Nov 2017. In conjunction with the event, two IGCP meets were also held:
  - a. IGCP 628 meeting (Gondwana Map), and
  - b. IGCP 632 - 6<sup>th</sup> Symposium (Jurassic Crises)

DMR continues to support the siting of the CCOPTS Permanent Office Building in DMR Complex, Bangkok, Thailand.

COUNTRY/ ORGANIZATION	CCOP TECHNICAL ACTIVITIES
<b>Vietnam</b>	<p>Vietnam hosted the following activity:</p> <ul style="list-style-type: none"> <li>• VIGMR-GSJ-CCOP Workshop: “Practical analysis of GSHP logging data”, Hanoi, 20 February 2017</li> <li>• 5<sup>th</sup> Asia-Pacific Coastal Aquifer Management Meeting (APCMM) at University of Da Nang, Da Nang, Vietnam, July 17-19, 2017</li> </ul>
<b>2) Cooperating Countries</b>	
<b>Germany</b>	<p>BGR financially and technically support training courses on “Risk-Sensitive Spatial Planning in CCOP Member Countries”</p> <ul style="list-style-type: none"> <li>• BGR-CCOP First International Training Course on Risk-Sensitive Spatial Planning, 20 February - 2 March 2017, Bangkok, Thailand</li> <li>• 2<sup>nd</sup> BGR-CCOP International Training Course on Risk-Sensitive Spatial Planning in CCOP Member Countries’ in Manila, Philippines, 18-28 September 2017</li> </ul>
<b>3) Cooperating Organizations</b>	
<b>EuroGeoSurveys</b>	<p>EuroGeoSurveys or The Geological Surveys of Europe has initiated the participation of CCOP in the European Commission “International Network of Raw Materials Training Centres” (Intermin) Project, which will have its kick-off meeting in Brussel, in February 2018.</p>
<b>UKM</b>	<p>UKM and CCOP, organized:</p> <ul style="list-style-type: none"> <li>• Malaysia Window to Cambridge at Universiti Kebangsaan Malaysia (MW2C@UKM) Inaugural Training; Kuala Lumpur, Ipoh and Cameron Highlands; 10-12 October 2017</li> <li>• CCOP-SEADPRI-ANCST Workshop on Disasters and Heritage Areas, Waterfront Cebu City Hotel and Casino, Cebu, 15 October 2017</li> </ul>
<b>UNESCO</b>	<p>UNESCO, KIGAM, and CCOPTS formulated the proposal on groundwater project “Groundwater-surface water interaction and comparative study of groundwater dependent ecosystems in the Mekong basin: application to transboundary aquifer management”</p>
<b>WORLD BANK</b>	<p>CCOPTS plan to use the remaining World Bank budget from CASM Workshop for GSJ-Myanmar Water Simulation Workshop and CCOP-Philippines Mine Rehabilitation Book Project scheduled in 2017.</p>

## United Nations Framework Classification on Resources (UNFC), Monthly On-line Conference by the Bureau Members of the Expert Group on Resource Classification (EGRC)

The UNFC provides countries, companies, financial institutions and other stakeholders a futuristic tool for sustainable development of energy and mineral resource endowments. UNFC classification for energy resources include oil and gas, renewable energy, nuclear fuel resources, mineral resources, injection projects for the geological storage of CO<sub>2</sub>, and the anthropogenic resources such as secondary resources recycled from residues and wastes.



The CCOPTS Director is a member of the 21-person EGRC Bureau that regularly meets via on-line conferences that is coordinated by the Secretariat from the Sustainable Energy Division of the United Nations Economic Commission for Europe (UNECE) in Geneva, Switzerland. CCOPTS and UNECE will work together for the new project: Developing the Guideline for the application of UNFC to mineral and oil/gas resources for the CCOP countries. This Project is in line with the United Nations Sustainable Development Goals and will highlight the importance of energy and mineral resources in attaining such goals.

More information about the UNFC and EGRC sessions/meetings can be found in the UNECE website <https://www.unece.org/energy/se/egrc.html>.

### European Commission “International Network of Raw Materials Training Centres” (Intermin) Project

CCOPTS was invited by EuroGeoSurveys (EGS), The Geological Surveys of Europe, and had successfully registered itself as one of the 14 partners of the Intermin project. The project, acronym “Intermin”, aims at mapping skills and knowledge in the EU and leading counterparts in third countries, identify key knowledge gaps and emerging needs, develop roadmap for improving skills and knowledge, as well as establish common training programmes in the raw materials sectors. The project coordinator is **Prof. Manuel Regueiro y González-Barros** from the Geological Survey of Spain. The project is proposed to run for 3 years and is expected to kick-off with an official meeting in Brussel, 13-14 February 2018. Its estimated budget is about €1.266 million, whereby CCOP is allocated about €30.4k.

Throughout 2017, there have been many communications between CCOPTS, Geological Survey of Spain, and the EU Portal <http://ec.europa.eu/research/participants/portal/desktop/en/home.html>.

# KNOWLEDGE ENHANCEMENT AND SHARING (KES)

## GEO-HAZARDS PREDICTION AND MITIGATION

### BGR-CCOP International Training Course on Risk-Sensitive Spatial Planning in CCOP Member Countries

The training course forms a collaborative project between CCOP and the Federal Institute for Geosciences and Natural Resources, Germany (BGR) for the CCOP Member Countries. The project was proposed by BGR and approved at the 66<sup>th</sup> CCOP Steering Committee meeting in Siem Reap, Cambodia in March 2016, with final approval from the Federal Ministry for Economic Cooperation and Development (BMZ), Germany on July 14, 2016. It is agreed that at least three training courses will be carried out in 2017-2018, each 13 days duration, in Thailand, Philippines and Vietnam.

The training course is funded by BMZ and is conducted by the two BGR experts **Dr. Dirk Balzer** and **Dr. Dirk Kuhn**. It is a capacity building measure on Disaster Risk Management (DRM) and Spatial Planning aimed for professionals in authority and related fields. It aims to support the requirements and future challenges of the Sendai Framework for Disaster Risk Reduction (SFDRR), strengthen disaster risk governance to manage Disaster Risk Reduction (DRR) and to promote the dialogue and cooperation among the relevant authorities and thereby support risk-sensitive spatial planning. The participants are given familiarization with the concepts and dimensions of disaster risk and are provided training in the elaboration of pre-disaster risk assessments from the Latin American Countries (El Salvador, Guatemala, Honduras, Nicaragua) and Pakistan, in order to build the knowledge on Disaster Risk Reduction (DRR).

### The 1<sup>st</sup> BGR-CCOP International Training Course on Risk-Sensitive Spatial Planning

The 1<sup>st</sup> BGR-CCOP International Training Course on Risk-Sensitive Spatial Planning in CCOP Member Countries took place from 20 February to 2 March 2017 in Bangkok, Thailand and was organized by the Federal Institute for Geosciences and Natural Resources (BGR, Germany) in cooperation with CCOP Technical Secretariat (CCOPTS). A total of 20 participants attended the training course; they are representatives from eight CCOP Member Countries (Cambodia, Indonesia, Papua New Guinea, Lao PDR, Myanmar, Philippines, Thailand and Vietnam) and the CCOPTS.



Participants showing-off certificates of completion, together with the trainers and CCOPTS.

A field excursion to the UNESCO World Heritage Site of Ayutthaya was conducted on 27 February 2017, which was severely affected by the 2011 Mega Flood Event in Thailand. The excursion was supplemented with a seminar entailing presentations from various provincial authorities, responsible for the Flood Risk Mitigation Plan of Ayutthaya. The seminar was honored to be officially opened by the Governor of the Ayutthaya province, his Excellency, **Dr. Sujin Chaichumsak**.

Further information of the training course can be accessed at <http://www.ccop.or.th/article/the-first-bgr-ccop-international-training-course-on-risk-sensitive-spatial-planning>.

### **The 2<sup>nd</sup> BGR-CCOP International Training Course on Risk-Sensitive Spatial Planning**

The 2<sup>nd</sup> BGR-CCOP International Training Course on Risk-Sensitive Spatial Planning in CCOP Member Countries took place from 18-28 September 2017 in Manila, Philippines and was organized by the Federal Institute for Geosciences and Natural Resources (BGR, Germany) in cooperation with CCOPTS. A total of 18 participants attended the training course; they are representatives from eight CCOP Member Countries (Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Thailand and Vietnam) and the CCOPTS.

A field excursion to Taal Volcano Observatory in Talisay, Batangas, DRRM Activities of Local Government of Tagaytay City, and Museums (Puzzle and Orlina Art) was conducted on 23<sup>rd</sup> and 24<sup>th</sup> September 2017. The excursion was a good exposure to the participants, learning on the geological hazards, its monitoring and management practices.



Participants of the 2<sup>nd</sup> BGR-CCOP International Training Course on Risk-Sensitive Spatial Planning.

### **The 2<sup>nd</sup> Workshop & Training Courses on Capacity Building on Marine Geoscience and Geohazards Reduction & Prevention for ASEAN Member States**

The 2<sup>nd</sup> Workshop and Training Courses on Marine Geoscience Capacity Building and Marine Geoscience Capacity Building and Geohazards Reduction and Prevention of China-ASEAN-CCOP was held on 14-23 August 2017, in Guangzhou, China. It was attended by 70 participants, 36 from ASEAN Countries (Cambodia, China, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Thailand and Vietnam), 31 from local participants and 3 from the CCOP Technical Secretariat. It was held as a workshop for five days, a half day for on-site training at Guangzhou Guangdong Seismic Network Center and two full-day field trip to visit Wetland Park, Nansha district in Guangzhou province, Danxia landform or red beds at Guanzhou Lotus Hi Lotus Hill and Sea-Cliffs and outcrops in small village at Shi Jing Nan Lu road, Baiyun District.

Many technical presentations from CGS and country presentations from ASEAN member states were delivered during the workshop. A presentation to highlight CCOP activities, titled “Coastal Management in Southeast Asia Countries” was presented by CCOPTS Director.

A memorandum on the possibility on further cooperation on marine geoscience and collaboration under CGS/ CCOP platform was signed by China, ASEAN member countries and CCOP.



Participants of the 2<sup>nd</sup> Workshop & Training Courses on Capacity Building on Marine Geoscience and Geohazards Reduction & Prevention for ASEAN Member States.

## Malaysia Window to Cambridge at Universiti Kebangsaan Malaysia (MW2C@UKM) Inaugural Training

The inaugural Malaysia Window to Cambridge at Universiti Kebangsaan Malaysia (MW2C@UKM) Training Workshop on “Geohazards and Disaster Risk Reduction: Communicating with Stakeholders” was held from 10-12 October 2017 in Malaysia. It was organised by the Geological Society of Malaysia in collaboration with Malaysian Commonwealth Studies Centre (MCSC) and the Cambridge Malaysian Education and Development Trust (CMEDT), Universiti Kebangsaan Malaysia’s Southeast Asia Disaster Prevention Initiative, the IRDR International Centre of Excellence for Disaster Risk and Climate Extremes (ICoE-SEADPRI-UKM), Institute of Geology Malaysia, Department of Minerals and Geoscience Malaysia (JMG), Coordinating Committee for Geoscience Programmes in East and Southeast Asia (CCOP), Asian Network on Climate Science and Technology (ANCST) and Regional Congress of Geology, Minerals and Energy Resources of Southeast Asia (GEOSEA). It was attended by 31 local and regional participants from ASEAN countries as well as the United Kingdom. The nine ASEAN participants represent Indonesia, Myanmar, Philippines, Thailand and Vietnam. The training workshop was conducted with the aim of enhancing the capacity of geologists as geohazard communicators through the sharing of professional experiences and the different modes of risk communication, following the aspiration of the Sendai Framework on Disaster Risk Reduction (2015-2030).

The workshop comprised five sessions: two sessions on technical paper presentations, one session of field trip, and a session each on regional perspectives and communicating geoscience. The paper presentations were held at Hotel Istana Kuala Lumpur in conjunction with the 30<sup>th</sup> National Geoscience Conference 2017 (NGC 2017); the field trip had started from Kuala Lumpur towards Tambun in Ipoh, Gunung Pass and lastly Cameron Highlands; while the session on Regional Perspectives was conducted at Heritage Hotel in Cameron Highlands where participants from the ASEAN countries shared their experiences and knowledge related to the issues of geohazards and disaster risk reduction; and the last session on Communicating Geoscience, was facilitated by **Dr. Alan Thompson** of Cuesta Consulting Ltd., United Kingdom.



Briefing to participants at the site on the landslides and slope failures in Cameron Highlands during the field trip of the MW2C@UKM Training Workshop on “Geohazards and Disaster Risk Reduction: Communicating with Stakeholders”

### **CCOP-SEADPRI-ANCST Workshop on Disasters and Heritage Areas**

In conjunction with the CCOP 53<sup>rd</sup> Annual Session, CCOP-SEADPRI-ANCST Workshop on Disasters and Heritage Areas was held at the Waterfront Cebu City Hotel and Casino, Cebu, the Philippines, on 15 October 2017. The meeting forms the second of the workshop series held jointly between Coordinating Committee for Geoscience Programmes in East and Southeast Asia (CCOP), Southeast Asia Disaster Prevention Research Initiative (SEADPRI) and Asian Network on Climate Science and Technology (ANCST). Ten participants representing the Philippines, Thailand, Malaysia and CCOPTS attended the workshop.

The workshop highlighted the inclusivity of three elements; heritage areas of national significance, disasters, and humans, where these geological and/or cultural heritage areas exhibit the relict, processes or vulnerability to geological or climatic disasters within the existing community. The scope of heritage areas discussed includes World Heritage Sites, national heritage sites, geoparks and conservation parks/areas. It was agreed that, in Southeast Asia, looking at heritage areas from the perspective of disaster threats is a very new dimension and should be explored further.

More information is available at: <http://www.ccop.or.th/article/ccop-seadpri-ancst-workshop-on-disasters-and-heritage-areas>.

### **CCOP-IUGS Task Group on Geohazards (TGG) Joint Seminar**

The International Union of Geological Sciences (IUGS) was founded in 1961; it is a member of the International Council of Science and presently it is one of Cooperating Organizations of CCOP. The IUGS Task Group on Geohazards (TGG) was endorsed at the 70<sup>th</sup> IUGS EC meeting in Cape Town, South Africa during 31 August - 1 September, 2016. Since then, TGG had organized international collaboration teams with a network system that promote the exchange of information, and hold various workshops and symposia sessions in international conferences.

The CCOP-IUGS Task Group on Geohazards (TGG) seminar was held in conjunction with the 53<sup>rd</sup> CCOP Annual Session, on October 18, 2017 at the Waterfront Cebu City Hotel, Philippines. The seminar was chaired by **Dr. Yakusuni Okubo**, (Technical Counsellor, Japan Space Systems, Japan) and **Dr. Kazuhisa Goto** (Associate Professor, Tohoku University, Japan), in which seven geohazard papers were presented, and was attended by about 40 participants.

## ENVIRONMENTAL GEOLOGY

### Workshop on “Tropical Sandy Beach Processes and Morphodynamics” under the Thailand-China Marine Cooperation

The Coordinating Committee for Geoscience Programmes in East and Southeast Asia (CCOP) with the Royal Thai Department of Mineral Resources (DMR) and the Third Institute of Oceanography, China (TIO); Island Research Center, China (IRC); and State Oceanic Administration, China (SOA); under the Thailand-China Marine Cooperation, has co-organized a technical workshop on coastal management and geological survey techniques at the Sand Dunes Chaolao Beach Resort, Chanthaburi province, Thailand, 8–20 May 2017. The Workshop programs include 2 days of seminar on “Geological Coastal Management in Eastern Thailand” held 8-9 May 2017 and 15 days of on-boat and on-shore training at the coastal zone in Chanthaburi province, eastern Thailand. There were 138 participants, which include 14 participants from CCOP member countries (10 from China, 2 from Malaysia and 1 from Philippines) and 2 from the CCOPTS.



Distinguish guests, and Resource persons of The “Tropical Sandy Beach Processes and Morphodynamics” under the Thailand-China Marine Cooperation.

CCOP participants also presented country reports on Coastal Study and Management in member countries. A discussion session was followed with focus on Coastal Change Technical Studies and future collaboration opportunities among member countries. During the 15-days of the on-shore and on-boat training, a trip to see the coastal land-use in Chantaburi area was also arranged.

Further information of the workshop can be accessed at <http://www.ccop.or.th/article/workshop-on-tropical-sandy-beach-processes-and-morphodynamics-under-the-thailand-china-marine-cooperation>.



Participants & Trainees are under named “LaemsingTeam”.

The on-shore and on-boat training, a trip to see the coastal land-use in Chantaburi area.



## KIGAM Regular Training Course on Coastal geology, Geohazards and Management (GeoCoast)

In collaboration with CCOP, International School for Geoscience Resources (IS-Geo) of KIGAM conducted regular training course on Coastal geology, Geohazards and Management (GeoCoast) from 27 November to 1 December 2017 at Daejeon, Republic of Korea. A total of 21 participants, 17 trainees are from the CCOP Member Countries, attended the training course.

The aim of the course is to foster professionals from all over the world in the fields of Geocoast and Geohazards as well as to enhance the capabilities of the cooperating countries/organizations with Korea/KIGAM. The 1-week training course provided participants concepts of wave, tide and other coastal processes particularly wave-dominated systems but also estuaries and deltas, focusing on the Southeast Asia Pacific region. **Prof. Andrew Short** from the University of Sydney had covered the 5-day indoor lecture. The trainees also attended Korean language & cultural class held for an hour, every day.



The training course had been successfully organized and benefited all the participants. It forms the basis for future cooperation between the participants and KIGAM/IS-Geo.

## WATER RESOURCES INTEGRATED MANAGEMENT

### KIGAM Regular Training Course on Groundwater Theory and Practices

Within a series of regular training courses provided by KIGAM/ISGeo in collaboration with CCOP, the KIGAM/ISGeo Regular Training Course on Groundwater Theory and Practices was conducted from 19 - 30 June, 2017 in the International School for Geoscience Resources of KIGAM, Daejeon, Republic of Korea, with a total of 20 participants including 14 participants from CCOP Member Countries. It is an intensive groundwater training course that aims to provide participants with a broad understanding of water as a resource, focusing on groundwater and including surface water with measures to provide for their sustainability. The course intends to foster professionals from all over the world in the fields of minerals and groundwater resources research as well as to enhance the capabilities of the cooperating countries/organizations with Korea/KIGAM. The course covers both theory and practice, where lectures, hands-on practical exercises and field work were consecutively carried out. Given the importance of groundwater now and in the future, it is essential for the participants and especially the decision makers to recognize the potential vulnerabilities associated with the over-exploitation of groundwater.

During the 15-days training course, **Prof. Frank W. Schwartz** and **Dr. Eung-Seok Lee** (Ohio University) led the lectures and exercises covering 2 modules: Module 1- Groundwater Basics and Hydrogeological Investigations and Module 2- Groundwater Practices: Contamination, Remediation and Water Security. **Dr. Yongcheol Kim** (KIGAM) guided on Korea Water Resources Corporation (K-Water) Tour and together with a field exercise on aquifer tests and data interpretation based on the investigation well, which is already drilled within KIGAM's compound.

Besides the knowledge in the field of Groundwater, all participants also had the opportunity to learn Korean language every day, after lunch, to know more about Korean cultures.

The training course was successful and had benefited all the participants. It forms a base for networking between the groundwater professionals on future cooperation and between CCOP member countries and KIGAM/IS-Geo.



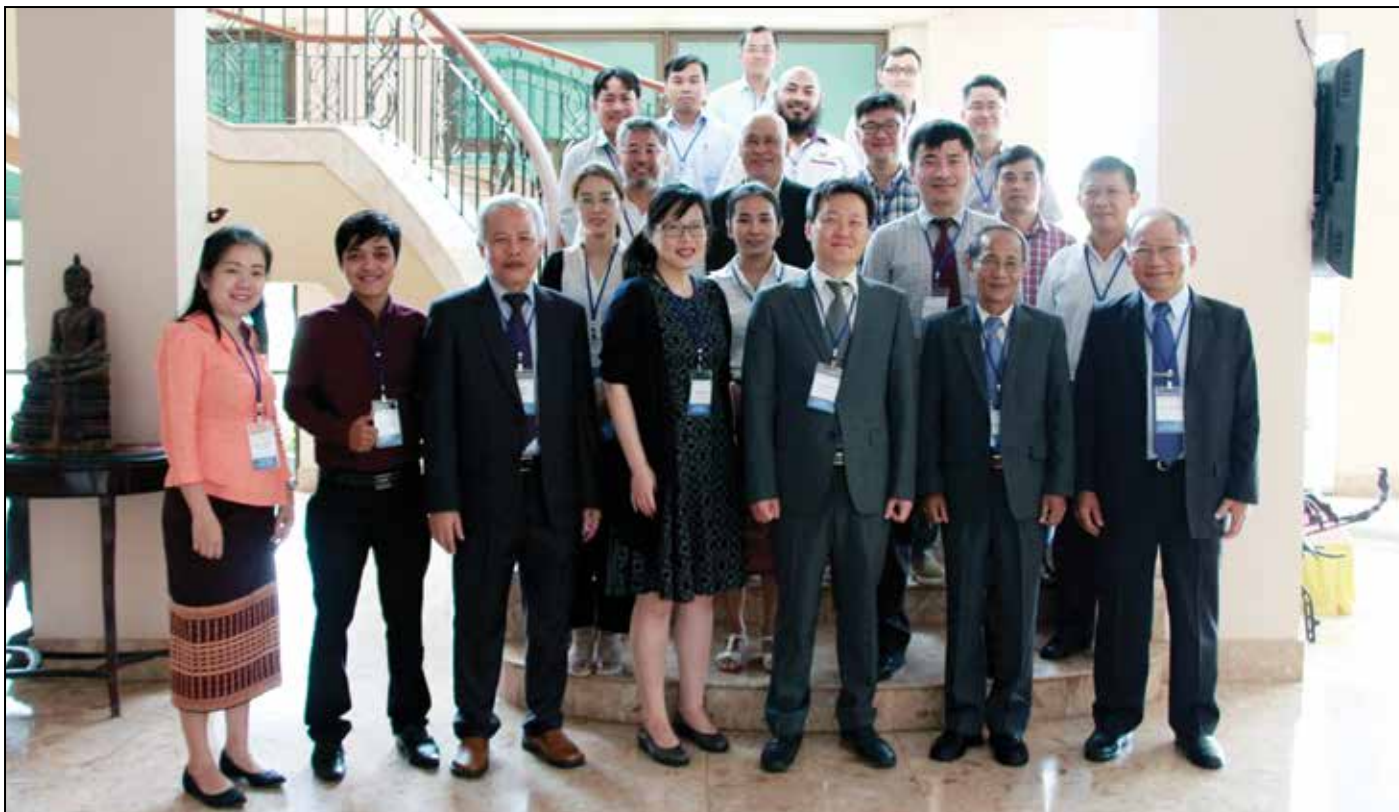
### **CCOP-KIGAM Project “Groundwater-Surface Water Interaction and Comparative Study of Groundwater Dependent Ecosystems in the Mekong Basin: Application to Transboundary Aquifer Management”**

The project, initiated by the Korea Institute of Geoscience and Mineral Resources (KIGAM) with collaboration of CCOPTS and cooperation of UNESCO Bangkok was carried out from March to November 2017. The project aims to acquire basic hydrogeology and groundwater data to strengthen water resources management in Greater Mekong Subregion (GMS) and to promote the sharing of information and best practices among Mekong countries in transboundary aquifer management.

The project includes installation of groundwater monitoring systems in the selected Transboundary Aquifer (TBA) of the GMS, collection of groundwater monitoring data to study groundwater-surface water interaction process and its potential influence on groundwater-dependent ecosystem (GDE), and comprehensive analysis of groundwater quantity and quality status in the GMS. The project was launched during the workshop “CCOP-KIGAM-UNESCO-MME Workshop on Transboundary Aquifer-Surface Water Management in Mekong Basin”, held 25-26 July 2017, in Phnom Penh, Cambodia.

### ***CCOP-KIGAM-UNESCO-MME Workshop on “Transboundary aquifer-surface water management in Mekong basin”***

The CCOP-KIGAM-UNESCO-MME Workshop on “Transboundary aquifer-surface water management in Mekong basin” was held in Sunway Hotel, Phnom Penh, Cambodia, 25-26 July 2017. The workshop forms part of the activities programmed in the CCOP-KIGAM project “Groundwater-Surface Water Interaction and Comparative Study of Groundwater Dependent Ecosystems in the Mekong Basin: Application to Transboundary Aquifer Management”. The objectives of the workshop were to promote the sharing of information and best practices among Mekong countries in transboundary aquifer management. The key players of each country in the Mekong River Basin were invited to address major issues and status of the groundwater management. Strategy to enhance collaboration to adapt to future challenges between neighboring countries was also discussed. A total of 22 participants from CCOP Member Countries (represented by Cambodia, Republic of Korea, Lao PDR, Thailand, and Vietnam), UNESCO Bangkok and CCOPTS attended the workshop.



Participants of the CCOP-KIGAM-UNESCO-MME “Transboundary aquifer-surface water management in Mekong basin”.

During the first day of the workshop nine oral presentations were delivered. CCOPTS presented on “CCOP role in promoting groundwater and other geoscience activities in East & Southeast Asia”. The day ended with discussion on the installation of the monitoring well. In the second day, a field work was carried out to the Lerk Daek District, by the Mekong River, 68 km southeast of Phnom Penh. A shallow groundwater well about 3.8m depth was successfully augered and installed. The augering equipment was brought from Korea, especially for this workshop.

Drilling of the monitoring well was carried out end of October to early November 2017. According to the geology map of Cambodia, the study area is composed of unconsolidated sediment, thus, the well was drilled with drag bit (diameter: 6.8”) up to depth of approximately 110 m. The developed well will be used as a monitoring well in the KIGAM/UNESCO groundwater program of the Transboundary Aquifer Management of the Mekong Basin.



Drilling and Monitoring Site at Preak Thouch, Preak Tlorb , Lerk Dark Kandal Province, Cambodia.

## ENERGY AND MINERAL RESOURCES SUSTAINABLE DEVELOPMENT

### DMR-CCOP Technical Workshop on Transboundary Georesources Management

DMR and CCOP organized a workshop on Transboundary Georesources Management on 11-14 January 2017 in Srinakarindh Dam, Kanchanaburi province, western Thailand. A total of 21 Thai participants from various government agencies attended this workshop, including six resource persons from both private and government agencies. Topics presented ranges from Georesources of SE Asia, Project management, International Cooperation and how to manage all stakeholders at the end. Many case studies on Georesources were presented by resource persons, while participants made different exercises based on those presentations. Two field trips on Geosite and Mining along the Thailand and Myanmar borders were also conducted.

Further information of the workshop can be accessed at <http://www.ccop.or.th/article/ccop-dmr-technical-workshop-on-transboundary-georesources-management>.



Participants visit at the Nautiloid Geosite

### KIGAM Regular Training Course on Petroleum Exploration, Development and Production

The KIGAM/ISGeo training course on Petroleum Exploration, Development and Production was conducted from 6-31 March 2017 in the International School for Geoscience Resources (IS-Geo) of KIGAM, Daejeon, Republic of Korea, with a total of 23 participants including 16 participants from CCOP Member Countries. The training course aims to foster professionals from all over the world in the fields of petroleum, oil and gas field related research as well as to enhance the capabilities of the cooperating countries/organizations with Korea/KIGAM. The 4-week training course provided practical skills on the application of suitability analysis in the field of petroleum geology and engineering. The contents of the course comprised a general overview on petroleum economics, reservoir and sequence stratigraphy, reservoir geophysics, petrophysics, gas hydrate, petroleum engineering and unconventional resources. There were 20 Korean instructors involved in the course.

KIGAM IS-Geo also provided a number of activities outside the classroom , i.e., visit to MOFA (Ministry of Foreign Affairs), GECC (Global Energy Cooperation Center), half-day seminar on the overview on the current status of energy policies of Korean government and energy cooperation diplomacy with **Mr. Jae-ha Choi**, Director of International Energy Security Division. A half-day tour in Seoul to visit one of Korean famous palace called “Gyeongbokgung Palace” and a culture trip to Jeonju city was arranged. KIGAM Lab tour by KIGAM researcher from petroleum & marine division was also conducted where visit to gas hydrate department and marine geology research center were made. The course also entailed a country report briefing on 31 May 2017. Korean language and cultural class was held every day for an hour.

The training course has been successfully organized and reached the targets and benefited all the attended participants. It formed a good base for future networking and cooperation among CCOP member countries and KIGAM/IS-Geo.



Participants of the KIGAM/ISGeo Regular Training Course on Petroleum Exploration, Development and Production.

## **IAEA Training Workshop on Uranium Geochemistry, Thailand Institute of Nuclear Technology**

Joint IAEA Technical Cooperation (TC) Training Workshop on Uranium Geochemistry in the Asia-Pacific Region RAS2019 on “Conducting the Comprehensive Management and Recovery of Radioactive and Associated Mineral Resources” was organized on 16-19 May in Bangkok, Thailand, in cooperation with the CCOPTS. The Workshop focused on the physical and chemical properties of radioactive elements and the applications of exploration and future extraction technologies. The application of the newly updated United Nations Framework Classification for Resources (UNFC) on classifying and reporting of Uranium and Thorium resources was elaborated during the Workshop. CCOPTS Director made a keynote presentation on “Roles of CCOP on Sustainable Geo-resources Development in East and Southeast Asia”, wherein the importance of regional cooperation to attain the capacity building objectives of the TC was highly emphasized. At the end of the Workshop, a panel discussion on “Critical challenges in advancing uranium projects in Asia-Pacific: a geochemical perspective” was made with many inputs from IAEA and participants. The inputs will be important to design the future activities of the TC.

A total of 36 participants attended the Workshop including 25 participants from the CCOP member countries.

## KIGAM Regular Training Course on Exploration and Development of Mineral Resources

Within a series of regular training courses provided by KIGAM/IS-Geo in collaboration with CCOP for member countries, the KIGAM/ISGeo training course on Exploration and Development of Mineral Resources was conducted from 22 May - 14 June 2017 in the International School for Geoscience Resources of KIGAM, Daejeon, Republic of Korea, with a total of 22 participants including 14 participants from CCOP Member Countries. The training course aims to enhance capacity building of professionals from all over the world in the fields of mineral resources and to foster familiarization with KIGAM and related organisations in Korea. The nearly 4-weeks training course provided participants a learning opportunity from basic to applicable level of mineral exploration and development and of related techniques in the field of geology, geophysics and geochemistry. The contents of this course comprised an overview on principles and genetic concepts of mineral deposit systems, mineral resources and their exploration and assessment, mining engineering and brief overview on mineral processing and extractive metallurgy. A total of seven instructors were involved in the course.

In addition to academics, IS-Geo also provided relevant activities that include culture trip, KIGAM Lab tour, country briefing session with report and Korean language and cultural class. The completion and closing ceremony was participated by **Dr. Sung-Rock Lee**, Director of IS-Geo.

The training course was successfully organized, reached the targets and benefited all the participants. It forms a good base for future cooperation between CCOP member countries and KIGAM/IS-Geo. The network of mineral resources professionals should be maintained and developed for future collaborative activities within the region. Advanced courses regarding contents, activities such as field excursion, case study and discussion for the network are recommended for consideration of future plans.



Participants at the Korean language and cultural class provided during the training course.

Further information of the training course can be accessed at <http://www.ccop.or.th/article/regular-training-course-on-exploration-and-development-of-mineral-resources>.

## CCOP - KIGAM Unconventional Oil and Gas Resources Project: Mapping of black shale formation for the prediction of shale resources (UC Project)

The Memorandum of Agreement (MOA) between CCOP and KIGAM for the implementation of the CCOP-KIGAM Unconventional Oil and Gas Project: Mapping of black shale formations for the prediction of shale resources was signed during the 64<sup>th</sup> CCOP Steering Committee Meeting on 24 March 2015 in Krabi, Thailand.

The Goal of the UC Project is to create the highest possible value for society from oil and gas resources in order to improve the quality of life of the people in the CCOP member countries. The Project is designed to sustain the experiences, technology transfer and institutional capacity building projects in CCOP. The Goal is also consistent with the aspiration of the member countries for a sustainable development of the energy resources and energy security.

The implementation of the UC Project in CCOP is very timely and provides a new opportunity (and new challenges) in the CCOP region. Shale exploration and development leverages on the advancements in directional drilling, micro-seismic monitoring and fracturing technologies. The Project will also create a better learning and collaborative environment for the CCOP countries as these technologies are developing at a very fast pace. The CCOP countries will learn new geochemical models of how rocks reacts to well optimization, surface management technology, impact to the environment and to answer the question: Can it be done safely?

In the course of the UC Project's implementation critical discussions were conducted comparing shale oil/gas resource assessment methodologies. These discussions led to the UC Project national coordinators' decision to adopt the EIA/ARI World Shale Gas and Shale Oil Resource Assessment Method (June 2013) as CCOP's Guideline Methodology.

In 2017, the UC Project successfully conducted three (3) meetings / workshops (coded **UCM7**, **UCM8** and **UCM9**) with technical sessions and field works integrated in the agenda.

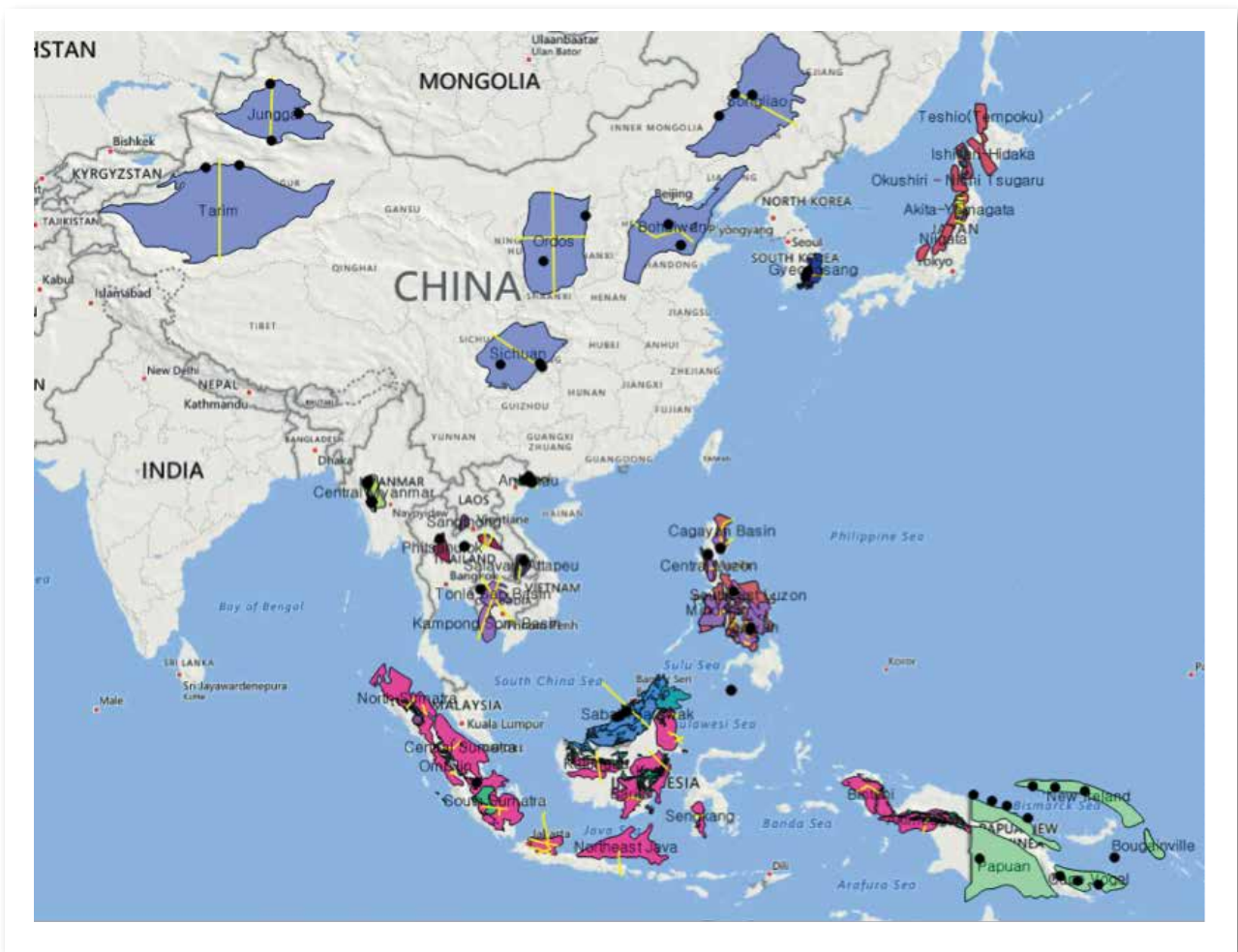
1. **UCM7** was conducted in Bangkok, Thailand on 28 - 30 March 2017 with 27 participants in attendance,
2. **UCM8** was conducted in Jogjakarta, Indonesia on 18-20 July 2017, with 36 participants, and
3. **UCM9** was conducted in Cebu City, Philippines on 12-14 October 2017 with 36 participants.



Participants of the UCM9, Cebu City, Philippines, October 2017

The participants are mainly the national coordinators (main contact persons) and members of local UC Project teams from Cambodia, China, Indonesia, Japan, Korea, Lao-PDR, Malaysia, Myanmar, Philippines, Papua New Guinea, Thailand and Vietnam. Representatives from the ASEAN Council on Petroleum (ASCOPE) also participated in the mentioned activities on their own costs.

The activities that were conducted for Year 2017 successfully accomplished its objectives of applying the Guideline Methodology for the assessment of oil and gas shale resources in the CCOP Region. Various case studies on resource assessment were presented and thoroughly discussed. A consistent resource assessment workflow was established, the data to be used were identified and there is now an enhanced understanding on the assessment parameters by the participating countries. The participants also learned to use the QGIS software, a free download software, as an important tool through various workshop exercises on basin / shale mapping. The UC Project (Phase 1) has identified at least forty six (46) shale basins in the CCOP region.



Map of Potentially Prospective Shale Energy Resource Basins in Asia in QGIS system.

The **Map of Potentially Prospective Shale Energy Resource Basins in Asia**, one of the main output of the UC Project Phase 1, was also reported by the CCOPTS Project Coordinator at the 53<sup>rd</sup> CCOP Annual Session and 69<sup>th</sup> Steering Committee Meeting. A USB flash disk was distributed at the mentioned CCOP events containing (digital version) of the Map together the following information:

1. *ShaleResourceMap - Map of Potentially Prospective Shale Energy Resource Basins in Asia.*
2. *MapGuide - Easy-To-Follow instructions on how to use QGIS (PDF)*
3. *BasinDescription - Description of the basin with information on geology, tectonic setting, stratigraphy, exploration history and shale information.*
4. *QGIS\_Software(64bit) - Free download version of QGIS for 64 bit computers.*
5. *QGIS\_Software(32bit) - Free download version of QGIS for 32 bit computers.*



A USB containing all the list of documents - List of Participants, Event Program, Note for Information, Presentations (including the Country Reports), discussion notes, and photos taken from the events were provided to all participants in each meeting/workshop. A dedicated webpage for the UC Project is also maintained by CCOPTS and used as depository of all the documents from UC Project events, providing a convenient source of references and information for the member countries.

These documents can be downloaded from <http://ccop.asia/uc/>.

## The 14<sup>th</sup> Malaysia-Thailand Border Joint Geological Survey Committee Meeting (14<sup>th</sup> MT-JGSC)

CCOPTS Director was invited to join the Joint Meeting on Cross-border Geological Mapping workshop organized by the Mineral and Geoscience Department of Malaysia (JMG) and Department of Mineral Resources (DMR) of Thailand, in Penang, Malaysia on 14-19 August 2017. Permanent Representative of Malaysia to CCOP, **Mr. Shahar Effendi bin Abdullah Azizi**, Director-General of JMG, chaired the opening session. A field trip to Jerai Aspiring Geopark was also arranged. The joint MT-JGSC working group had started since 2000, and had published many international geoscientific publications. This is one of the best practices on Transboundary geoscience project of two neighboring countries, where sharing mechanism play the key role.

## China ASEAN Mining Cooperation Forum and Exhibition

CCOPTS Director was invited to present the updated status on mineral resources exploration of CCOP member countries, especially on the transboundary area, in the China ASEAN Mining Cooperation Forum and Exhibition, 23-24 August, at Nanning, southern China. A signing ceremony and Roundtable Conference of China-ASEAN Geoscience Cooperation, with **Prof. Dr. Qiuming Cheng**, President of International Union of Geological Science (IUGS) and CCOPTS Director as key guests, were also held. In the forum, participants had a great opportunity to learn more on updated exploration and mining technology and initiate partnership with Chinese mining experts.

## Technical Seminar on Jurassic – Cretaceous Boundary of Southeast Asia

Department of Mineral Resources of Thailand (DMR) and CCOP co-organized the technical seminar on Jurassic-Cretaceous (J/K) Boundary of SE Asia at the Sukosol Hotel, Bangkok, 1 September 2017. Ninety-five (95) participants had attended the Seminar. **Mr. Sieng Sotham**, from Cambodia, and **Mr. Mat Niza Abdul Rahman**, from Malaysia, were invited as keynote speakers. The seminar had focused on correlating evidence of J/K boundary among countries. Many proposals were proposed by the participants during the discussion, which includes capacity building and J/K transboundary mapping.



Participants of Technical Seminar on Jurassic – Cretaceous Boundary of Southeast Asia.

## KIGAM Regular Training Course on Carbon Resource Recycling Appropriate Technology

The training course on Carbon Resource Recycling Appropriate Technology forms one of the regular training courses of KIGAM International School for Geoscience Resources (IS-Geo), in collaboration with CCOP. It was conducted at IS-Geo KIGAM, Daejeon, Republic of Korea, from 8-15 September 2017, with 10 trainees participation; 8 trainees from CCOP Member Countries, 1 from CCOPTS and 1 from Ethiopia.

The training course aims to foster professionals from all over the world in the fields of climate change, carbon capture, utilization and sequestration (CCUS) as well as to enhance the capabilities of the cooperating countries/organizations with Korea/ KIGAM. The course provides an introduction to the carbon resource recycling appropriate technology, and related technological innovations for CO<sub>2</sub> utilization and sequestration. More practically, utilization of carbonated minerals for mine backfill, assessment of mine hazards and mineral extraction process from mine tailings are also covered.

Before the training course proper, trainees were invited to attend the Opening Ceremony of “**2017 Korea Carbon Forum**”, held at Convention and Exhibition Center (COEX), Seoul, Republic of Korea, on 8 September 2017. The aims of “2017 Korea Carbon Forum” were;

- Catalyzing and facilitating the international collaborative efforts to respond climate change in the line with the international agreement on the new climate regime in 2015 (the 21<sup>st</sup> Conference of the Parties to the United Nations Framework Convention on Climate Change, in Paris, France)
- Promoting the carbon emissions trading as an effective way to deal with the global climate change issue in the domestic and international perspective

The main events of the forum included:

- **Phase 1:** Official Events (Initiative Declaration on Ecofriendly Low-Carbon City), Invited Lecture, Performance, Keynote Speech etc.
- **Phase 2:** 12 sessions, 38 presentations topics



Participants were invited to attend the opening ceremony of “2017 Korea Carbon Forum-Initiative Declaration for eco-friendly low carbon city” event.

The invited international participants also took part in “Initiative Declaration for eco-friendly low carbon city”. Technical tour to Daesung MDI Limechem Center, Hanil Cement Co., Ltd, Danyang Plant, Korea Institute of Limestone & Advanced Materials (KILAM) and Mancheonha Sky Walk were arranged on 9 September 2017.

The training course had been successfully organized and would be a good base for future cooperation possibilities among CCOP Member Countries and KIGAM IS-Geo.

## Energy China Forum 2017: 7<sup>th</sup> Asia-Pacific Shale Gas Summit

Energy China Forum (ECF) 2017: 7<sup>th</sup> Asia-Pacific Shale Gas Summit was held 11-13 October 2017, at Jianguo Hotel, Shanghai, People's Republic of China. ECF is the largest leading forum for public-private dialogue on energy development, serving leaders and professionals especially for shale gas industries. Seven ECF summits had been successfully held since 2011. The aim of the 7<sup>th</sup> ECF Summit was to gather professionals and experts from all around the world to explore policy trends, discuss latest shale development, classify and study industry chain, access to business partnering and project matchmaking, to learn both market 101 and advanced business strategy in China Oil & Gas industries and having a face to face communication with Chinese partners as well as global investors. ECF 2017 was organized by the Shanghai United Institute for Unconventional Resources (SUI) and the Shanghai Energy Economy Committee of Shanghai Economist Association, with support from the China Petroleum Enterprises Association (CPEA) and the Coordinating Committee for Geoscience Programmes in East and Southeast Asia (CCOP)

The event had attracted a total of 106 participants (24 speakers, 74 delegates and 8 from the media) representing governmental and international organizations, universities, research institutes and companies for discussion, exchange of information and networking. Two delegates from Thailand, representing the Department of Mineral Fuels, Ministry of Energy and PTT Exploration and Production Public Company were present. A total of 24 presentations were delivered in the 2.5-day symposium. A presentation titled "Development of Unconventional Resources in East and Southeast Asia - Overview and Updates" was presented by the Regional Expert, **Dr. Kamaludin Hassan**. CCOPTS was also invited to officiate the "ECF2017 Oil & Gas Tech Innovation Award" on the evening of 12<sup>th</sup> Oct 2017, where 5 nominations for Environment & Energy Conservation, Stimulation & EOR Technology, Cost Reduction & Efficiency Technology, Exploration & Production Technology and Intelligent & Information Technology were awarded. The award aims to recognize and acknowledge outstanding innovative product and leading technology that have excellent contribution and effort to oil and gas industry.

More information is available at: <http://www.ccop.or.th/article/energy-china-forum-2017-7th-asia-pacific-shale-gas-summit>.



Winners of the "ECF2017 Oil & Gas Tech Innovation Award".

## CCOP Book Project: “Best Practices on Mine Rehabilitation and Decommissioning Plan in CCOP Region”

In conjunction with the 53<sup>rd</sup> CCOP Annual Session, the CCOP Coffee Table Book Project side meeting was held at the Waterfront Cebu City Hotel and Casino, on 15 October 2017. The meeting was officiated by **Engr. Rodolfo L. Velasco, Jr.** from the Philippines Mines and Geosciences Bureau and attended by 18 representatives from Japan, Republic of Korea, Lao PDR, Papua New Guinea, Philippines, Thailand and the CCOPTS.



Participants of the CCOP Book Project Meeting, 15 October 2017, Cebu City, Philippines

In the meeting, representatives from Japan and the Philippines made presentations on the proposed contents of the book project. The meeting agreed to form an editorial team, comprising representatives from Philippines, Japan, Malaysia and the CCOPTS. The financial contributors for the project are China, CCOPTS and the Philippines. The timelines proposed include:

- Submission of Country Report to the Philippines representative by end of December 2017
- Submission of collated Country Report to CCOP Book Project Editorial Team by 15 January 2018
- Submission of Draft Country Report to professional editor by February 2018
- Presentation of Draft CCOP Book Project in Lao PDR during the CCOP 70<sup>th</sup> Steering Committee Meeting in March 2018
- Final Presentation of CCOP Book Project in Bangkok, Thailand (at CCOPTS) in July 2018
- Book Launching during the 54<sup>th</sup> CCOP Annual Session and 71<sup>st</sup> Steering Committee Meeting in Busan, Republic of Korea, in October 2018

## 16<sup>th</sup> Gondwana International Conference

The 16<sup>th</sup> Gondwana International Conference with theme “Puzzling out Gondwana” was held at the Asia Hotel Bangkok, Thailand, on 7-21 November 2017. In conjunction with the event, two IGCP meetings: IGCP 628 meeting (Gondwana Map) and IGCP 632 - 6<sup>th</sup> Symposium (Jurassic Crises) were also held. About 300 participants comprising experts, researchers and students from 20 countries attended the conference. Thailand’s Department of Mineral Resources (DMR) and International Association of Gondwana Research (IAGR) are the main organizers of the event, with CCOPTS as one of the co-organizers, together with various local government agencies and geoscientific organizations. The main conference program – Technical Sessions was conducted during 13-16 November 2017.

The pre-, mid- and post-conference field excursions to Thailand Gondwana evidences geological sites and cultural sites in Bangkok and its vicinity were arranged.

The Minister of Natural Resources and Environment Thailand (MONRE), **H.E. General Surasak Karnjanarat**, graced the Opening Ceremony on 13 November 2017 together with the heads of the Organizing Committees; **Dr. Tawsaporn Nuchanong**, Director-General of DMR and **Prof. Dr. M Santosh**, Secretary General of IAGR. CCOPTS representatives participated in the technical sessions.



Officials of Department of Mineral Resources (Thailand) and International Association of Gondwana Research (IAGR), the main organizers of 16<sup>th</sup> Gondwana International Conference.

The Conference presentations and discussions had focused on various new and updated geological, geochemical, and geophysical evidence of Gondwana evolution. The sea level and climatic change discussions enhanced the understanding of Gondwana assembly and breakup. One of the important outcomes of the Conference is the updated Gondwana Geological Map, reflecting the current understanding of Gondwana evolution. The meeting had provided platform for networking, exchange of ideas, research activities/results sharing, and collaboration opportunities.

### **Coal Mining and Utilization for Sustainable Development International Conference (CM&USD2017)**

The Electricity Generating Authority of Thailand (EGAT), Mae Moh Mine Lampang, in collaboration with the Department of Mining and Petroleum Engineering, Faculty of Engineering, Chulalongkorn University, the Department of Mining and Materials Engineering, Faculty of Engineering Prince of Songkla University and the Department of Mining and Petroleum Engineering, Faculty of Engineering Chiang Mai University, organized the first international academic conference “Coal Mining and Utilization for Sustainable Development International Conference (CM&USD2017)” during 23-24 November 2017 at Mae Moh Mine, Lampang Province.

The objective of the conference is to provide opportunities for worldwide professors, academic researchers, and students to meet and share knowledge and experiences with each other. It is expected to be a perfect platform for speakers and participants at all experience levels to co-create the evolution of professional development in coal mining industrial technology. The scopes of research paper required for this conference include; 1) Drilling and Blasting, 2) Mining System and Planning, 3) Geo-technics in Mining, 4) Mine Environmental and Monitoring, 5) Mine Occupational Health and Safety, 6) Post Mining and Mine Reclamation, 7) Coal Processing and Utilization, 8) Socio-Economic Aspects in Mining.

CCOPTS Director was invited to participate as a representative of CCOP. CCOPTS supported 9 participants, 2 Indonesia, 4 Philippines, 2 Thailand and 1 Japan, to attend this conference. The experts from Japan and Malaysia made oral presentations during the conference. All of CCOPTS supported participants actively engaged in all programs, especially during the discussion and the field excursion. More future collaborations between EGAT and Malaysia, EGAT and Indonesia are also discussed during the conference too.

## OTHERS

### East Asia Geoscience and Environmental Research (EAGER) Project

The EAGER Project is a trust fund set up in the Geological Society of America with personal contribution of **Dr. Maurice “Ric” Terman**, CCOP Honorary Advisor, to be used for funding research in geoscience in the region. Under the programme, a grant will be made available for research on Geoscience and Environment in East and Southeast Asia to candidates from the Member Country hosting the CCOP Annual Session since 2003.

The 69<sup>th</sup> CCOP Steering Committee Meeting held on 20-21 October 2017 in Bohol, Philippines endorsed the proposal of the CCOPTS to pay the EAGER Grant amount of USD 5,000 to **Mr. Johannes Hutabarat**, 2010 EAGER Awardee and to other EAGER Awardees who have not received the Grant, as well. The Meeting further endorsed the cessation of the EAGER Project.

List of all EAGER Grant Awardees since the EAGER Project started in 2003

DATE AWARDED	AWARDEE / UNIVERSITY	RESEARCH TITLE
2003 Oct at 40AS, Kuala Lumpur, Malaysia	<b>Ms. Marilah Sarman</b> , a PhD student at the Institute of the Environment and Development, LESTARI, Universiti Kebangsaan Malaysia	Geological Heritage Resources Database for Conservation and Sustainable Use: The Case of Langkawi Islands
2004 Nov at 41AS, Tsukuba, Japan	<b>Ms. Zhen Li</b> , a PhD student at Nagoya University	High Resolution Climate Change and the Human Impacts on the Song Hong Delta Areas, Vietnam during the Holocene.
2005 Sept at 42AS, Beijing, China	<b>Ms. Pan Xiao-Fie</b> , a PhD student at the Institute of Geology and Geophysics Chinese Academy of Science, Beijing	The pressure depth temperature regime (P-T-X) for fluid infiltration and auriferous fluid source of two typical Indonesian gold deposits, the Nanjinshan and the Jinwozi, in the Beishan mountains
2006 Nov at 43AS, Daejeon, Korea	<b>Mr. Seung-Pil Jung</b> , is a PhD student at the School of Civil, Urban, and Geosystems Engineering of Seoul National University	Integration of DFN Model and Production Data for the Characterization of a Fractured Reservoir Using the Ensemble Kalman Filter
2007 Oct at 44AS, Cebu, Philippines	<b>Dr. Maybellyn A. Zepeda</b> , Supervising Science Research Specialist of the Mines and Geosciences Bureau, Department of Environment and Natural Resources, Philippines	Early Maastrichtian Short-Term Climate Events: Evidence Based on Foraminifera Response and Isotope Records
2009 Oct at 46AS Vungtau, Vietnam <i>*Note 2008 EAGER Grant supposedly awarded at 45AS, Khonkaen, Thailand was deferred to 2009.</i>	<b>Ms Namphon Kampilang</b> is a PhD student at the University of Portsmouth, School of Earth and Environmental Studies	A Geological Ground Model for the Study of Climate Change induced Flooding Hazards in Bangkok, Thailand
	<b>Ms Nguyen Thi Hai Van</b> , a Ph.D. Student at the International Institute for Geo-Information and Earth Observation (ITC), The Netherlands	Multi-hazards risk assessment for an urbanized mountainous area in Vietnam. Implications for urban planning and design.
2010 Oct at 47AS, Manado, Indonesia	<b>Mr. Johannes Hutabarat</b> , a PhD student at the Department of Geology, Faculty of Earth Science & Technology, Institut Teknologi Bandung	Petrology and Geochemistry Characteristics of Volcanic Jatibarang in Northwest Java Basin and the Implication of Paleogene Volcanism System.
2011 (2011 AS supposedly held in Bangkok was cancelled and postponed to 2012 due to flooding in Thailand)	<b>Ms. Mallika Nilorm</b> , PhD student at the University of Portsmouth	Risk and vulnerability from landslide hazards: impacts of Geotourism in a World Heritage site
2012 Nov at 48AS, Langkawi, Malaysia	<b>Mr. Ahmad Farid Abu Bakar</b> , a PhD student in the University of Malaya	The transport and fate of selected acid mine ions in surface water and river sediment with regards to mining activities
2013 Oct at 49AS, Sendai, Japan	<b>Mr. Kazuya Ishitsuka</b> , Kyoto University	Mapping and understanding of the evolution of displacement in aquifer system after the reduction of groundwater usage by using satellite imagery.
2015 Nov at 51AS, Xi'an, China	<b>Mr. Hui Wang</b> , a Ph.D. Student at the Institute of Mineral Resources, Chinese Academy of Geological Sciences	Genetic model of the Saishitang Cu deposit, Qinghai Province, China.

## DATA AND INFORMATION

### Baseline Geochemical Mapping using IUGS standard

CCOPTS Director attended and observed the geochemical survey activity organized by Department of Mineral Resources in Nan Province, Northern Thailand, 5-9 February 2017. The area covers most of the Nan province, adjacent with Lao PDR. This activity is one of the programs under CCOP action plan on Baseline Geochemical Mapping using IUGS standard. Some Member Countries are conducting similar activity under Bilateral Program between China Geological Survey and CCOP MCs, like Lao PDR, Indonesia, Cambodia and PNG. It was also an opportunity to update and share progress related to WebGIS and Seamless Geology with DMR team on the Transboundary Geoscience study.



Collecting samples and processing in Nan Province, Thailand.

CCOPTS Director was invited to visit the working site on DMR Geochemical Baseline mapping during 26-28 May in Sing Buri province, central Thailand. This program is one of the activities related to both Geochemical Baseline Geochemical Map supported by CGS and WebGIS system supported by GSJ. DMR geoscientists for this mapping program are the Thai national coordinators on Geochemical Mapping, who had recently attended the workshop in China. They had used the GSJ WebGIS for uploading the result to DMR server, while sampling location with IUGS standard. However, some of the IUGS standard chemical information is not available for this project due to laboratory limitation in Thailand.

### GSJ-CCOP-GA Groundwater Project Phase III Meeting

The CCOP-GSJ-GA Groundwater Project Phase III Meeting was held on 21-23 March 2017, in Bali, Indonesia. It was attended by 31 participants from Cambodia, China, Indonesia, Japan, Republic of Korea, Lao PDR, Malaysia, Myanmar, Papua New Guinea, Philippines, Thailand, and Vietnam and the CCOP Technical Secretariat.

This project was reported earlier under KES in the presentation that was approved already in the 68<sup>th</sup> SC. However since the output of the phase III meeting deals with data and information, it is here reported in this section.

The meeting had discussed on the 2017 Workplan and agreed that the three groups DB Group 1, represented by China, Japan, Korea and Thailand and DB Group 2 represented by Indonesia, Malaysia, Philippines and Vietnam, and the Public Policy Group carry out their scheduled tasks.



Discussion during the meeting.

The participants agreed to produce a technical report on CCOP Groundwater Project Phase III by the end of the project in 2019. The next project meeting is scheduled to be in the first quarter of 2018, in Cambodia.

More information on the activity is reported in: <http://www.ccop.or.th/article/gsj-ccop-ga-groundwater-project-phase-iii-meeting-21-23-march-2017-bali-indonesia>



Participants of the GSJ-CCOP-GA Groundwater Project Phase III Meeting at the rice terraces in Bali Island during the field trip.

## Workshop/Training on IGDP(II) and Compilation Technology for CCOP Member Countries

The phase II of the CCOP-CGS Project on Integrated Geophysical and Geochemical Data Processing (IGDP) was kicked-off by a Workshop/Training on IGDP-II and Compilation Technology for the CCOP Member Countries, held on 22-24 May 2017 in Beijing, China. This was hosted and funded by China Geological Survey (CGS) through its Development and Research Center (DRC).

There were 18 participants in the workshop/training from CCOP Member Countries, Cambodia, China, Indonesia, Japan, Korea, Malaysia and Vietnam including the staff of CCOP Technical Secretariat.

At the Opening Ceremony, CCOPTS Director, **Dr. Adichat Surinkum**, delivered the welcome address. **Dr. Shu Siqi**, Director of the International Cooperation Division, Department of Science and Technology & International Cooperation, on behalf of **Dr. Li Jinfa**, Permanent Representative of P.R. China to CCOP, and Vice-President, CGS, warmly welcomed all delegates and officially opened the workshop.

Country presentations on geoscience data management and processing, national geophysical compilation activities and the use of RGIS-IGDP software were made by Cambodia, Indonesia, Japan, Malaysia and Vietnam.



Discussion during the IGDP-2 workshop in Beijing.

Further information of the workshop/training can be accessed at <http://www.ccop.or.th/article/ccop-cgs-workshop-training-on-igdp-ii-and-compilation-technology-for-the-ccop-member-countries-22-24-may-2017-beijing-china>



Participants of the IGDP-2 Workshop in Beijing during the Welcome Dinner together with the Permanent Representative of China to CCOP, **Dr. Li Jinfa** (seated in the front row, third from the left).

### Joint Meeting of the MAMEA and IGDP-II Projects

A Joint Meeting of the MAMEA Project: Compilation and Publication of a Revised “Magnetic Anomaly Map of East Asia 1:4,000,000” and the Integrated Geological Data Processing and Geophysical Compilation Technology Phase II (IGDP-2) Project was held on 18 October 2017 in parallel with 53<sup>rd</sup> CCOP Annual Session in Cebu City, at Waterfront Cebu Hotel and Casino, Philippines. There were 11 participants in the meeting representing China, Japan, Lao PDR, Philippines, Thailand and the CCOPTS.

MAMEA Project Leader, **Dr. Takemi Ishihara**, and IGDP-2 Project Leader, **Dr. Zhang Minghua**, introduced and updated the Projects to the participants. Member Countries participants reported on the status of their country’s magnetic data and gravity map compilation. The CCOP Member Countries are encouraged to submit their existing magnetic and gravity data and related information in a draft map for further discussion.

It was agreed that all CCOP Member Countries should appoint and update contact persons for both magnetic and gravity data compilation. CCOPTS will send a request letter to all participating Member Countries. The next IGDP-2 workshop will be in May 2018 in China, and MAMEA Project team is also welcome to the workshop.



Discussion during the IGDP2-MAMEA Projects joint meeting in Cebu, Philippines.

## FINANCIAL HIGHLIGHTS

From January 1 to December 31, 2017, Member Countries' total cash contributions amounted to **USD 360,000.00**, consisting of Cambodia (USD 10,000), China (USD 50,000), Indonesia (USD 40,000), Japan (USD 50,000), Republic of Korea (USD 60,000), Malaysia (USD 50,000), Myanmar (USD 5,000), Philippines (USD 40,000) and Vietnam (USD 25,000). Thailand cash contribution for 2017 was received in advance since 2016, Cambodia cash contribution for 2016 was received in 2017 (USD 5,000) and Vietnam cash Contribution for 2016 was received in 2017 (USD 25,000).

The expected cash contribution to receive from Lao PDR for 2017 is USD 10,000.00, Papua New Guinea for 2016 and 2017 is USD 50,000.00 and Timor-Leste for 2017 is USD 10,000.00 (**Table 1**).

Table 1: Cash Contributions of Member Countries for 2016-2017  
(Ending 31 December 2017)

Member Countries	2016 Contribution Received in 2016	2017 Contribution Received in 2016	2016 Contribution Received in 2017	2017 Contribution Received in 2017	2017 Contribution Expected to Receive
Cambodia	-	-	5,000.00**	10,000.00****	-
China	50,000.00	-	-	50,000.00	-
Indonesia	40,000.00	-	-	40,000.00	-
Japan	50,000.00	-	-	50,000.00	-
Republic of Korea	60,000.00	-	-	60,000.00	-
Lao PDR	10,000.00	-	-	-	10,000.00
Malaysia	50,000.00	-	-	50,000.00	-
Myanmar	5,000.00	-	-	5,000.00	-
Papua New Guinea	-	-	-	-	50,000.00
Philippines	40,000.00	-	-	40,000.00	-
Singapore	-	-	-	-	-
Thailand	40,000.00	39,710.47*	-	-	-
Timor-Leste	10,000.00	-	-	-	10,000.00
Vietnam	-	-	25,000.00***	25,000.00	-
<b>Total</b>	<b>355,000.00</b>	<b>39,710.47</b>	<b>30,000.00</b>	<b>330,000.00</b>	<b>70,000.00</b>

\*Thailand cash contribution for 2017 was received in advance since 2016 (USD 39,710.47)

\*\*Cambodia cash contribution for 2016 was received in 2017 (USD 5,000)

\*\*\*Vietnam cash contribution for 2016 was received in 2017 (USD 25,000)

\*\*\*\*Cambodia increased cash contribution for 2017 from USD 5,000 to USD 10,000

In addition to Member Countries' contributions, the amount of **USD 34,059.72** earned from the management of projects during January - December 2017 period which from "International Environmental Partnership Grant Award (IEP Grant)" (USD 3,000.00), "First BGR-CCOP International Training Course on Risk-Sensitive Spatial Planning for CCOP Member Countries" 1<sup>st</sup> installment 2017 (1/3) (USD 5,435.00), "CCOP-KIGAM Unconventional Oil and Gas Project: Mapping of Black Shale Formations for the Prediction of Shale Resources Phase III", 1<sup>st</sup> installment 2017 (1/2) (USD 3,191.34), "CCOP-GSJ-GA Groundwater Project Phase III Meeting" (USD 3,672.00), "CCOP-KIGAM-UNESCO-MME Workshop Transboundary Aquifer-Surface Water Management in Mekong Basin", 1<sup>st</sup> installment 2017 (1/2) (USD 3,067.65), "CCOP-KIGAM Unconventional Oil and Gas Project: Mapping of Black Shale Formations for the Prediction of Shale Resources Phase III", 2<sup>nd</sup> installment 2017 (2/2) (USD 3,221.40), "Second BGR-CCOP International Training Course on Risk-Sensitive Spatial Planning for CCOP Member Countries" 2<sup>nd</sup> installment 2017 (2/3) (USD 5,720.00), "PTTGC Project on Water Management" (USD 496.63), "Geoinformation Sharing Infrastructure for East and Southeast Asia (GSi) International Workshop" (USD 2,932.00), "CCOP-KIGAM-UNESCO-MME Workshop Transboundary Aquifer-Surface Water Management in Mekong Basin", 2<sup>nd</sup> installment 2017 (2/2) (USD 3,191.27) and "PTTGC for Landslide Mitigation Program" (USD 132.43) are shown in (**Table 2**).

Other incomes during the period amounted to **USD 2,804.26** from interest earned (USD 1,373.92), Processed from Sale of Publications (USD -), Gain on Conversion Currencies and Exchange rate (USD 1,283.19), and miscellaneous incomes (USD 147.15). The total income during the period was **USD 396,863.98**. The expenditure of **USD 407,306.86** was incurred from operation and administrative support. The cash balance as of ending December 2017 amounted to **USD 857,340.00**.

Other Fund (outstanding balanced) (USD 55,203.55) that consists of "BGR-CCOP International Training Course on Risk-Sensitive Spatial Planning for CCOP Member Countries" (BGR), Germany (USD 42,014.03), "CCOP-KIGAM Unconventional Oil and Gas Project: Mapping of Black Shale Formations for the Prediction of Shale Resources Phase III" (USD 3,576.88), "CCOP-KIGAM-UNESCO-MME Workshop Transboundary Aquifer-Surface Water Management in Mekong Basin" (USD 8,757.20) and "International Environmental Partnership Grant Award (IEP Grant)", (USD 855.44).

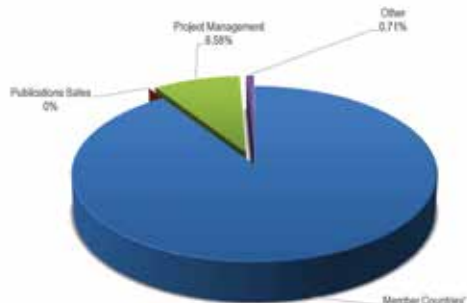
The Technical Secretariat office premise is continuously provided by the Royal Thai Government, through the kind arrangements of the Department of Mineral Resources (DMR), Ministry of Environment and Natural Resources, at the CCOPTS Building, DMR Complex, Rama VI Road, Bangkok, Thailand.

Table 2: Management Income from Execution of Project and Activity  
(January 1 - December 31, 2017)

Funding Source	Activities	Country	Period	Amount (USD)
IEP Grant	International Environmental Partnership Grant Award (IEP Grant)	Bangkok, Thailand	October 31- November 3, 2016	3,000.00
BGR	First BGR-CCOP International Training Course on Risk-Sensitive Spatial Planning for CCOP Member Countries	Bangkok, Thailand 1 <sup>st</sup> installment 2017 (1/3)	February 20 - March 2 2017	5,435.00
KIGAM	CCOP-KIGAM Unconventional Oil and Gas Project: Mapping of Black Shale Formations for the Prediction of Shale Resources Phase III	Bangkok, Thailand 1 <sup>st</sup> installment 2017 (1/2)	March 1, 2017	3,191.34
GSJ/AIST	CCOP-GSJ-GA Groundwater Project Phase III Meeting	Bali, Indonesia	March 21-23, 2017	3,672.00
KIGAM	CCOP-KIGAM-UNESCO-MME Workshop Transboundary Aquifer-Surface Water Management in Mekong Basin	Phnom Penh, Cambodia 1 <sup>st</sup> installment 2017 (1/2)	July 25-26, 2017	3,067.65
KIGAM	CCOP-KIGAM Unconventional Oil and Gas Project: Mapping of Black Shale Formations for the Prediction of Shale Resources Phase III	Bangkok, Thailand 2 <sup>nd</sup> installment 2017 (2/2)	March 1, 2017	3,221.40
BGR	Second BGR-CCOP International Training Course on Risk-Sensitive Spatial Planning for CCOP Member Countries	Manila, Philippines 2 <sup>nd</sup> installment 2017 (2/3)	September 16-28, 2017	5,720.00
PTTGC	PTTGC Project on Water Management	Rayong, Thailand	November 1-2, 2017	496.63
GSJ/AIST	Geoinformation Sharing Infrastructure for East and Southeast Asia (GSi) International Workshop	Luang Prabang, Lao PDR	December 5-7, 2017	2,932.00
KIGAM	CCOP-KIGAM-UNESCO-MME Workshop Transboundary Aquifer-Surface Water Management in Mekong Basin	Phnom Penh, Cambodia 2 <sup>nd</sup> installment 2017 (2/2)	-	3,191.27
PTTGC	PTTGC for Landslide Mitigation Program	Lampang and Uttaradit, Thailand	December 9-10, 2017	132.43
<b>Total Project Management Income</b>				<b>34,059.72</b>
<b>Net Total Project Management Income for Budget Year 2017</b>				<b>34,059.72</b>

Target Project Management Income for year 2017, USD 28,448.00

CCOP REVENUE 2017



CCOP EXPENDITURE 2017

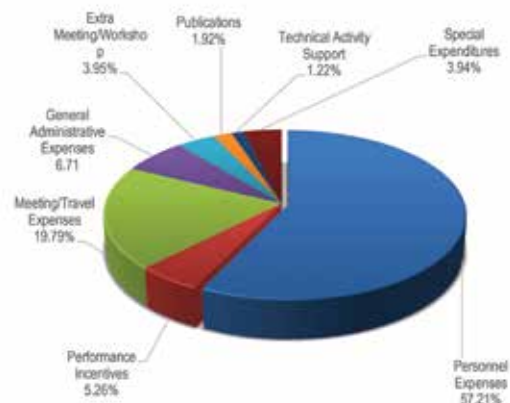


Table 3: CCOP Financial Statement for year ended 31 December 2017 (amount in US Dollars)

DESCRIPTION	2016		2017	
	USD	USD %	USD	USD %
<b>Fund Balance</b>	<b>835,492.30</b>		<b>810,465.29</b>	
<b>Income:</b>				
<i>Member Countries' Contributions</i>	394,710.47	85.72	360,000.00	90.71
<i>Publications sales</i>	13.92	-	-	-
<i>Project management</i>	32,067.82	6.96	34,059.72	8.58
<i>Others</i>	33,690.62	7.32	2,804.26	0.71
<b>Total Income</b>	<b>460,482.83</b>	<b>100.00</b>	<b>396,863.98</b>	<b>100.00</b>
<b>Expenditures:</b>				
<i>Personnel expenses</i>	236,501.25	48.24	233,018.21	57.21
<i>Performance Incentives</i>	20,116.53	4.10	21,422.94	5.26
<i>Meeting/Travel Expenses</i>	91,538.01	18.67	80,588.53	19.79
<i>General Administrative Expenses</i>	33,233.16	6.78	27,339.63	6.71
<i>Extra Meeting/Workshop (Housing Subsidy)</i>	14,408.87	2.94	16,096.73	3.95
<i>Publications</i>	4,114.27	0.84	7,830.52	1.92
<i>Technical Activity Support</i>	5,519.60	1.12	4,958.22	1.22
<i>Special Expenditures</i>	16,718.98	3.41	16,052.08	3.94
<i>Fund supported for a special event at the celebration of 50<sup>th</sup> Year of CCOP Anniversary</i>	68,158.00	13.90	-	-
<b>Total Expenditure</b>	<b>490,308.67</b>	<b>100.00</b>	<b>407,306.86</b>	<b>100.00</b>
<i>Income over/(under) expenses</i>	(29,825.84)		(10,442.88)	
<i>Total Fund Balance before adjustment.</i>	805,666.46		800,022.41	
<i>Adjusting entries</i>				
<i>Unrealized gain/(loss) on exchange rate for Retained Earning</i>	4,798.83		5,153.50	
<i>Tax payable</i>	-		-	
<b>Year-end Balance</b>	<b>810,465.29</b>		<b>805,175.91</b>	
<i>Adjustment to reflect actual cash inflow/outflow):</i>				
<i>Account payable</i>	-		-	
<i>Other Fund (outstanding balanced)</i> BGR (USD 42,014.03) KIGAM Unconventional Oil & Gas Project (USD 3,576.88) KIGAM Groundwater Meeting (USD 8,757.20) IEP Grant (USD 855.44)	115,655.52		55,203.55	
<i>Office equipment (net)</i>	(18,495.86)		(4,302.38)	
<i>Advance</i>	(33.41)		(36.79)	
<i>Account Receivable</i>	(17.38)		(19.13)	
<i>Tax deductible</i>	1,397.74		1,318.84	
<b>Year-end Cash Balance</b>	<b>908,971.90</b>		<b>857,340.00</b>	

# LIST OF CONTACTS

## CCOP STEERING COMMITTEE

### MEMBER COUNTRIES PERMANENT REPRESENTATIVES (14)

The Steering Committee is a policy making body of CCOP, which shall establish policies and principles for CCOP activities, approve work plan, budget, accounts for each year, new programme proposals, establish subsidiary bodies, appoint the Director, receive and consider the reports of Director on the functions delegated to him.

#### **CAMBODIA:**

##### **H.E. Mr. Cheap Sour**

Permanent Representative of Cambodia to CCOP  
Director-General  
General Department of Petroleum  
Ministry of Mines and Energy  
#13-14 Russian Confederation Blvd.  
Khan Dangkor, P.O. Box 1442  
Phnom Penh, Cambodia

#### **CHINA:**

##### **Dr. Li Jinfa**

Permanent Representative of China to CCOP  
Vice-President  
China Geological Survey (CGS)  
45 Fuwai Street, Xicheng District  
Beijing 100037  
People's Republic of China

#### **INDONESIA:**

##### **Mr. Rudy Suhendar**

Permanent Representative of Indonesia to CCOP  
Head, Geological Agency  
Ministry of Energy and Mineral Resources (MEMR)  
Jl. Diponegoro No. 57, Bandung  
40122, West Java, Indonesia

#### **JAPAN:**

##### **Dr. Yusaku Yano**

Permanent Representative of Japan to CCOP  
Director-General  
Geological Survey of Japan, AIST  
National Institute of Advanced Industrial Science and Technology  
1-1-1 Higashi, No. 7, Tsukuba  
Ibaraki 305-8567, Japan

#### **KOREA:**

##### **Dr. Joong-Ho Synn**

Chairman, CCOP Steering Committee  
Permanent Representative of Republic of Korea to CCOP  
President, Korea Institute of Geoscience and Mineral Resources (KIGAM) 124, Gwahak-ro  
Yuseong-gu, Daejeon, 34132  
Republic of Korea

#### **LAO PDR:**

##### **Mr. Keo Khamphavong**

Permanent Representative of Lao PDR to CCOP  
Acting Director-General  
Department of Geology and Minerals  
Ministry of Energy and Mines  
Khounboulom Road, Vientiane

#### **MALAYSIA:**

##### **Mr. Shahar Effendi bin Abdullah Azizi**

Vice-Chairman, CCOP Steering Committee  
Permanent Representative of Malaysia to CCOP  
Director-General  
Department of Mineral and Geoscience Malaysia  
Aras 8 dan 9, Menara PjH,  
No. 2, Jalan Tun Abdul Razak,  
Precinct 2, 62100 Putrajaya,  
Malaysia

#### **MYANMAR:**

##### **Dr. Ye Myint Swe**

Permanent Representative of Myanmar to CCOP  
Department of Geological Survey and Mineral Exploration  
Ministry of Natural Resources and Environmental Conservation  
Nay Pyi Taw  
Republic of the Union of Myanmar

#### **PAPUA NEW GUINEA:**

##### **Mr. John Arumba**

Director, Geohazards Management  
Department of Mineral Policy and Geohazards Management  
Private Mail Bag, Port Moresby Post Office, National Capital District  
Papua New Guinea

#### **THE PHILIPPINES:**

Atty. Wilfredo G. Moncano  
Permanent Representative of the Philippines to CCOP  
Acting Director, Mines & Geosciences Bureau (MGB)  
North Avenue, Diliman,  
Quezon City 1600  
Republic of The Philippines

#### **SINGAPORE:**

##### **Prof. Kerry Sieh**

Permanent Representative of Singapore to CCOP  
Director, Earth Observatory of Singapore (EOS) & AXA-Nanyang Chair in Natural Hazards  
Nanyang Technological University  
50 Nanyang Avenue, Block N2-01a-15, Singapore 639798

#### **THAILAND:**

##### **Dr. Tawsaporn Nuchanong**

Permanent Representative of Thailand to CCOP  
Director-General, Department of Mineral Resources (DMR)  
75/10, Rama VI Road, Ratchathewee  
Bangkok 10400, Thailand

#### **TIMOR-LESTE:**

##### **Mr. Helio Casimiro Guttereres**

Permanent Representative of Timor-Leste to CCOP  
Project Manager Covalima Mapping & Head of Laboratory of Geology  
Directorate of Geology and Mineral Resources  
Secretary of State for Natural Resources, Fomento Building, 1st Floor Dom Aleixo Corte Real Street, Mandarin, P.O. Box 171,  
Dili, Timor-Leste

#### **VIETNAM:**

##### **Mr. Pham Phu Binh**

Permanent Representative of Vietnam to CCOP  
Ministry of Mineral Resources and Environment (MONRE)  
No. 10, Ton That Thuyet Street, Cau Giay District, Hanoi, Vietnam

## CCOP COOPERATING COUNTRIES AND REPRESENTATIVES (14)

### AUSTRALIA:

#### **Dr. Stuart Minchin**

Representative of Australia to CCOP  
Chief, Environmental Geoscience  
Division  
Geoscience Australia  
G.P.O. Box 378, Canberra 2601  
Australia

### BELGIUM:

#### **Prof. Dr. Ir. Léon Dejonghe**

Representative of Belgium to CCOP  
Geologist Director  
International Cooperation  
Geological Survey of Belgium  
Royal Belgian Institute of Natural  
Sciences  
13 Jenner Street, B-1000 Brussels  
Belgium

### CANADA:

#### **Dr. Philip R. Hill**

Representative of Canada to CCOP  
Director, Geological Survey of  
Canada - Pacific  
Natural Resources Canada  
9860 West Saanich Road, P.O. Box  
6000 Sidney, B.C., V8L 4B2, Canada

### DENMARK:

#### **Mr. Ioannis Abatzis**

Representative of Denmark to  
CCOP  
Vice-Chairperson, CCOP Advisory  
Group  
Senior Geophysical Adviser  
Department of Geophysics  
Geological Survey of Denmark and  
Greenland (GEUS)  
Øster Voldgade 10, DK-1350  
Copenhagen K, Denmark

### FINLAND:

#### **Dr. Philipp Schmidt-Thomé**

Representative of Finland to CCOP  
Head of International Cooperation.  
Geological Survey of Finland (GTK)  
P.O. Box 96, FI-02151 Espoo  
Finland

### FRANCE:

#### **Mr. Jean Claude Guillaneau**

Representative of France to CCOP  
Director, Georesources Division  
Bureau de Recherches Géologiques  
et Minière (BRGM)  
3 avenue C. Guillemin - BP 36009  
45060 Orléans Cedex 2  
France

### GERMANY:

#### **Dr. Arne Hoffmann-Rothe**

Representative of Germany to CCOP  
International Cooperation  
Bundesanstalt für  
Geowissenschaften und Rohstoffe  
(BGR)  
Federal Institute for Geosciences and  
Natural Resources  
Germany

### THE NETHERLANDS:

#### **Mr. Cornelis A. Bons**

Representative of The Netherlands  
to CCOP  
Specialist Advisor, Southeast Asia  
Deltares  
Boussinesqweg 1, 2623 HV Delft;  
P.O. Box 177, 2600 MH Delft  
The Netherlands

### NORWAY:

#### **Mr. Gunnar V. Soiland**

Representative of Norway to  
CCOP  
Project Director  
Norwegian Petroleum Directorate  
(NPD)  
Prof. Olav Hanssensvei 10, P.O. Box  
600, N-4003 Stavanger, Norway

### POLAND:

#### **Dr. Witold Szczucinski**

Representative of Poland to CCOP  
Professor, UAM  
Institute of Geology  
Adam Mickiewicz University in  
Poznan  
Makow Polnych 16  
61-606 Poznan, Poland

### RUSSIAN FEDERATION:

#### **Dr. Elena A. Konstantinovskaia**

Representative of Russian  
Federation to CCOP  
Senior Researcher  
Geological Institute  
Russian Academy of Sciences  
7, Pyzhevsky per., 119017 Moscow  
Russian Federation

### SWEDEN:

#### **Dr. Las Persson**

Representative of Sweden to CCOP  
Director  
Geological Survey of Sweden (SGU)  
P.O. Box 670, SE-75128  
Uppsala, Sweden

### UNITED KINGDOM:

#### **Dr Martin Smith**

Representative of the United  
Kingdom to CCOP  
Science Director  
British Geological Survey (BGS)  
Keyworth, Nottingham NG12 5GG  
United Kingdom

### UNITED STATES OF AMERICA:

#### **Dr. Jack H. Medlin**

Representative of U.S.A. to CCOP  
Chief, Asian and Pacific Programs  
Office of International Geology  
U.S. Geological Survey (USGS)  
MS-954 National Center  
12201 Sunrise Valley Drive  
Reston, Virginia, 20192  
U.S.A.

## CCOP COOPERATING ORGANIZATIONS AND REPRESENTATIVES (15)

### ASCOPE:

#### Mr. Nopporn Chuchinda

Secretary-in-Charge, ASCOPE  
ASEAN Council on Petroleum  
PTT Public Company Limited (Head  
office)  
20<sup>th</sup> floor, Building 1  
555 Vibhavadi Rangsit Road,  
Chatuchak  
Bangkok 10900 Thailand

### CIFEG:

#### Mr. Max Vidal

President  
International Center for Training  
and Exchanges in the Geosciences  
(CIFEG)  
3, Avenue Claude Guillemin, B.P.  
6517, 45065 Orléans Cedex 2,  
France

### CPC:

#### Mr. Gary Greene

President, Circum Pacific Council  
Center for Habitat Studies  
Moss Landing Marine Labs  
8272 Moss Landing Road, Moss  
Landing, CA 95039  
U.S.A.

### EURO-GEOSURVEYS:

#### Mr. Slavko Solar

Secretary-General, EuroGeoSurveys  
The Geological Surveys of Europe  
36-38, Rue Joseph II  
1000 Brussels, Belgium

### GETECH:

#### Dr. J. Derek Fairhead

President & Founder of GETECH  
Prof. of Applied Geophysics  
Geophysical Exploration  
Technology (GETECH)  
Kitson House, Elmete Hall  
Elmete Lane, Roundhay  
Leeds, LS8 2LJ, United Kingdom

### IOC:

#### Dr. Vladimir Ryabinin

Executive Secretary  
Intergovernmental Oceanographic  
Commission (IOC) of UNESCO  
1, rue Miollis, 75732 Paris CEDEX  
15, France

### IOMAC:

#### Dr. Hiran W. Jayawardene

Secretary-General  
Indian Ocean Marine Affairs  
Cooperation (IOMAC)  
Suite 4-212, Bandaranaike Memorial  
International Conference Hall  
(B.M.I.C.H.), Bauddhaloka Mawatha  
Colombo 7, Sri Lanka

### IUGS:

#### Prof. Dr. Hiroshi KITAZATO

Tokyo University of Marine Science  
and Technology  
4-5-7 Konan, Minato-ku,  
Tokyo 108-8477  
Japan

### PETRAD:

#### Mr. Bengt Hope

Managing Director  
PETRAD - International Programme  
for Petroleum Management and  
Administration  
Prof. Olav Hanssens vei 10  
P.O. Box 598, NO-4003 Stavanger  
Norway

### SPC:

#### Mr. Akuila Tawake

Officer-In-Charge  
Geosciences Division  
Secretariat of the Pacific Community  
Private Mail Bag, 241 Mead Road,  
Nabua Suva, Fiji Islands

### UN-ESCAP:

#### Dr. Shamshad Akhtar

Executive Secretary  
UN-ESCAP, United Nations Building  
Rajdamnern Nok Avenue  
Bangkok 10200, Thailand

### UNEP:

#### Dr. Isabelle Louis

Acting Regional Director and  
Representative  
Regional Office for Asia and the  
Pacific  
United Nations Environment  
Programme (UNEP)  
2<sup>nd</sup> Fl., Block A  
United Nations Building  
Rajdamnern Nok Avenue  
Bangkok 10200, Thailand

### UNESCO:

#### Dr. Giuseppe Arduino

Chief, Ecohydrology, Water Quality  
and Water Education Section  
Division of Water Sciences  
International Hydrological  
Programme (IHP)  
UNESCO  
Coordinator UNESCO Water Centres  
and Chairs  
7 Place de Fontenoy, 75007 Paris,  
France

### UKM

#### Assoc. Prof. Dr Sarah Aziz

Chair, SEADPRI  
Southeast Asia Disaster Prevention  
Research Institute (SEADPRI)  
Universiti Kebangsaan Malaysia  
(UKM) Selangor, Malaysia

### THE WORLD BANK:

#### Mr. Gotthard Walser

Senior Mining Specialist  
Industry and Mining Division  
Finance and Private Sector  
Development  
The World Bank Group  
1818 H. Street, N.W., Washington  
DC 20433, U.S.A.

## CCOP HONORARY ADVISERS

### CHINA:

**Prof. He Qixiang**

Honorary Adviser to CCOP  
Qingdao Institute of Marine Geology  
62 Fuzhou Road, Qingdao, 266071  
People's Republic of China

**Mr. Wang Daxiong**

Honorary Adviser to CCOP

**Mr. Wang Xiongliu**

Honorary Adviser to CCOP

**Prof. Dr. HE Qingcheng**

Honorary Adviser to CCOP  
Deputy Director-General  
Center for Deep Earth Exploration of  
CGS  
Director, IUGS Secretariat  
Chinese Academy of Geological  
Sciences  
26 Baiwanzhuang Road, Xicheng  
District  
Beijing 100037, China

### GERMANY:

**Ms. Franca Schwarz**

Chairperson, Advisory Group  
Head of Sub-Department  
International Cooperation  
Bundesanstalt für  
Geowissenschaften und Rohstoffe  
(BGR)  
Federal Institute for Geosciences and  
Natural Resources  
Stilleweg 2, Post Box 510153,  
D-30655 Hannover, Germany

### INDONESIA:

**Prof. Dr. Adjat Sudradijat**

Honorary Advisor to CCOP

**Dr. Sukyar**

Honorary Adviser to CCOP  
President Director,  
Mining Private Companies  
Republic of Indonesia

### JAPAN:

**Dr. Yoshihiko Shimazaki**

Honorary Adviser to CCOP  
3-2-36 Nishiazabu, Minato-ku Tokyo  
106-0031, Japan

**Dr. Hirokazu Kato**

Honorary Adviser to CCOP  
Emeritus Researcher  
National Institute of Advanced  
Industrial Science and Technology  
Higashi 1-1-1, AIST Central 7,  
Tsukuba, Ibaraki 305-8567, Japan

### JAPAN:

**Dr. Eikichi Tsukuda**

Emeritus Researcher  
Geological Survey of Japan  
National Institute of Advanced  
Industrial Science and Technology  
AIST Tsukuba Central 7  
1-1-1 Higashi, Tsukuba  
Ibaraki, 305-8567, Japan

### KOREA:

**Dr. Hee Young Chun**

Honorary Adviser to CCOP  
Emeritus Researcher, KIGAM  
914-1602 Treefull City  
Sangdae-Dong, Youseong-Gu  
Daejeon, Republic of Korea

### MALAYSIA:

**Mr. Fateh Chand**

Honorary Adviser to CCOP  
465 Jalan Desa Utama, Taman Desa  
58100 Kuala Lumpur, Malaysia

**Mr. Chen Shick Pei**

Honorary Adviser to CCOP  
No. 1617, Jalan Urat Mata  
Lorong 3, 93350 Kuching  
Sarawak, Malaysia

**Dato Yunus Abdul Razak**

Honorary Adviser to CCOP  
Associate Fellow, SEADPRI-UKM,  
Universiti Kebangsaan Malaysia  
(UKM)  
Chairman, Board of Geologists  
Malaysia  
D'Villa 10, Jalan Sunway 5/7,  
Bandar Sunway, 43500  
Semenyih, Malaysia

### NORWAY:

**Dr. Øystein Berg**

Honorary Adviser to CCOP  
Vaganesveien 16,  
4052 Royneberg, Norway

### THE PHILIPPINES:

**Dr. Guillermo R. Balce**

Honorary Adviser to CCOP  
Consultant for Energy and Mining,  
San Miguel Corporation  
153 EDSA, Mandaluyong City  
Metro Manila, Philippines

### THE NETHERLANDS:

**Dr. E. Oele**

Honorary Adviser to CCOP  
Kagerdreef 188  
2172 HR Sassenheim  
The Netherlands

**Dr. Henk J.W.G. Schalke**

Honorary Adviser to CCOP  
Lijtweg 13  
2341 HA Oegstgeest.  
The Netherlands

**Dr. Jos de Sonnevile**

Honorary Adviser to CCOP  
Deltares/TNO  
Sijzenlaan 44, The Hague,  
The Netherlands 2566WJ

### THAILAND:

**Mr. Sermsakdi Kulvanich**

Honorary Adviser to CCOP  
Sermsakdi K. Co., Ltd.  
76 Petkasem Road, Tambon  
Noppring  
Moo 4, Amphoe Muang  
Phang-Nga 82000, Thailand

**Mr. Somsak Potisat**

Honorary Adviser to CCOP  
125 /350 Magmai  
Soi 3/2, Ramintra 103/3 Rd.  
Kannayao District  
Bangkok 10230, Thailand

**Dr. Prinya Nutalaya**

Technical Adviser to CCOP  
473, Soi Utane 12, Sri Nakorn  
Pattana  
Navamintr Road, Bung Khum  
Bangkok 10240, Thailand

### UNITED KINGDOM:

**Dr. Anthony Reedman**

Honorary Adviser to CCOP  
15 Malvern Road, Mapperley  
Nottingham NG3 5GZ  
United Kingdom

### U.S.A.:

**Dr. Maurice J. Terman**

Honorary Adviser to CCOP  
Scientist Emeritus  
U.S. Geological Survey  
917 National Center, Reston  
VA 20192, U.S.A.

**Dr. David B. Prior**

Honorary Adviser to CCOP  
18310 Cattle Court  
College Station, Texas, 77845

## ABBREVIATIONS

Below are the meaning of the abbreviations used in the context of this report.

AG – Advisory Group  
AIST – National Institute of Advanced Industrial Science and Technology, Japan  
ANCST – Asian Network on Climate Science and Technology  
APGN – Asia Pacific Geoparks Network  
ARI – Advance Resources, Inc. USA  
APCMM - Asia-Pacific Coastal Aquifer Management Meeting  
ASCOPE – ASEAN Council on Petroleum  
ASEAN – Association of Southeast Asian Nations  
BGR – Federal Institute for Geosciences and Natural Resources, Germany  
BGS – British Geological Survey  
BMZ – Federal Ministry for Economic Cooperation and Development, Germany  
CC – Cooperating Country  
CCOPTS – CCOP Technical Secretariat  
CCS – Carbon Capture and Storage  
CCUS – Carbon Capture, Utilisation and Storage  
CGN – Chinese Geoparks Network  
CGS – China Geological Survey  
CIFEG – International Center for Training and Exchanges in the Geosciences  
CLMTV – Cambodia, Lao PDR, Myanmar, Thailand and Vietnam  
CO – Cooperating Organisation  
CO<sub>2</sub> – Carbon Dioxide  
CPC – Circum Pacific Council  
DENR – Department of Environment and Natural Resources, Philippines  
DGM – Department of Geology and Minerals, Lao PDR  
DGSE – Department of Geological Survey and Mineral Exploration, Myanmar  
DMR – Department of Mineral Resources, Thailand  
DOE – Department of Energy, Philippines  
DRM – Disaster Risk Management  
DRR – Disaster Risk Reduction  
EAGER – East Asia Geoscience and Environmental Research  
ECF – Energy China Forum, China  
EGAT – Electricity Generating Authority of Thailand  
EGRC – Expert Group on Resource Classification  
EGS – EuroGeoSurveys  
EIA – Energy Information Agency, USA  
EOR – Enhanced oil recovery  
EOS – Earth Observatory of Singapore  
ERDB – Energy Resource Development Bureau, Philippines  
ESCAP – Economic and Social Commission for Asia and the Pacific  
EU – European Union  
GA – Geological Agency of Indonesia  
GDMR – General Department of Mineral Resources, Cambodia  
GECC – Global Energy Cooperation Center, Republic of Korea  
GEOSEA – Regional Congress on Geology, Minerals and Energy Resources of Southeast Asia  
GETECH – Geophysical Exploration Technology  
GEUS – Geological Survey of Denmark and Greenland  
GGN – Global Geoparks Network  
GIS – Geographic Information System  
GMGS – Guangzhou Marine Geological Survey, China  
GSC – Geological Survey of Canada  
GSHP – Ground Source Heat Pump  
GSi – Geoinformation Sharing Infrastructure  
GSJ – Geological Survey of Japan  
GTK – Geological Survey of Finland  
IAEA – International Atomic Energy Agency  
ICAMG – International Conference on Asian Marine Geology  
IGCP – International Geoscience Programme Project

IGDP – Integrated Geophysical and Geochemical Data Processing  
 IHEG – Institute of Hydrogeology and Environmental Geology, China  
 Intermin – International Network of Raw Materials Training Centres  
 IOC – Intergovernmental Oceanographic Commission  
 IOMAC – Indian Ocean Marine Affairs Cooperation  
 IRC – Island Research Center, China  
 ISGeo – International School for Geoscience Resources, Republic of Korea  
 IUGS – International Union of Geological Sciences  
 J/K – Jurassic-Cretaceous geological boundary  
 JICA – Japan International Cooperation Agency  
 JMG – Department of Mineral and Geoscience Malaysia  
 JPDC – Jeju Province Development Cooperation  
 KES – Knowledge Enhancement and Sharing  
 KIGAM – Republic of Korea Institute of Geoscience and Mineral Resources  
 MAMEA – Magnetic Anomaly Map of East Asia  
 MC – Member Country  
 MCSC – Malaysian Commonwealth Studies Centre  
 MGB – Mines and Geoscience Bureau, Philippines  
 MEMR – Ministry of Energy and Mineral Resources, Indonesia  
 MLR – Ministry of Land and Resources, China  
 MME – Ministry of Mines and Energy, Cambodia  
 MOA – Memorandum of Agreement  
 MOFA – Ministry of Foreign Affairs, Republic of Korea  
 MONRE – Ministry of Natural Resources and Environment of Thailand, Vietnam  
 MT-JGSC – Malaysia Thailand Joint Geological Survey Committee  
 NAWAPI – National Center for Water Resources Planning and Investigation, Vietnam  
 NECTEC – Thailand National Electronics and Computer Technology Center  
 NIDA – National Institute of Development Administration Thailand  
 PETRAD – Petroleum Management and Administration, Norway  
 PTT – Petroleum Authority of Thailand  
 SC – Steering Committee  
 SEADPRI – Southeast Asia Disaster Prevention Research Initiative, Malaysia  
 SOA – State Oceanic Administration, China  
 SPC – Pacific Community in the Pacific Islands and Territories  
 TGG – Task Group on Geohazards  
 TIO – Third Institute of Oceanography, China  
 TNCU – Thai National Commission of UNESCO  
 UC – Unconventional Oil & Gas Project  
 UCM – Unconventional Oil & Gas Project Meeting  
 UGGN – UNESCO Global Geoparks Network  
 UKM – Universiti Kebangsaan Malaysia  
 UN – United Nations  
 UNECE - United Nations Economic Commission of Europe  
 UNEP – United Nations Environment Programme  
 UNESCO – United Nations Educational, Scientific and Cultural Organization  
 UNESCO-BGK – UNESCO Bangkok  
 UNFC – United Nations Framework Classification  
 VIGMR – Vietnam Institute of Geosciences and Mineral Resources



# **CCOP Annual Report 2017**