



**GEOSCIENCE  
ATMOSPHERE 2017**

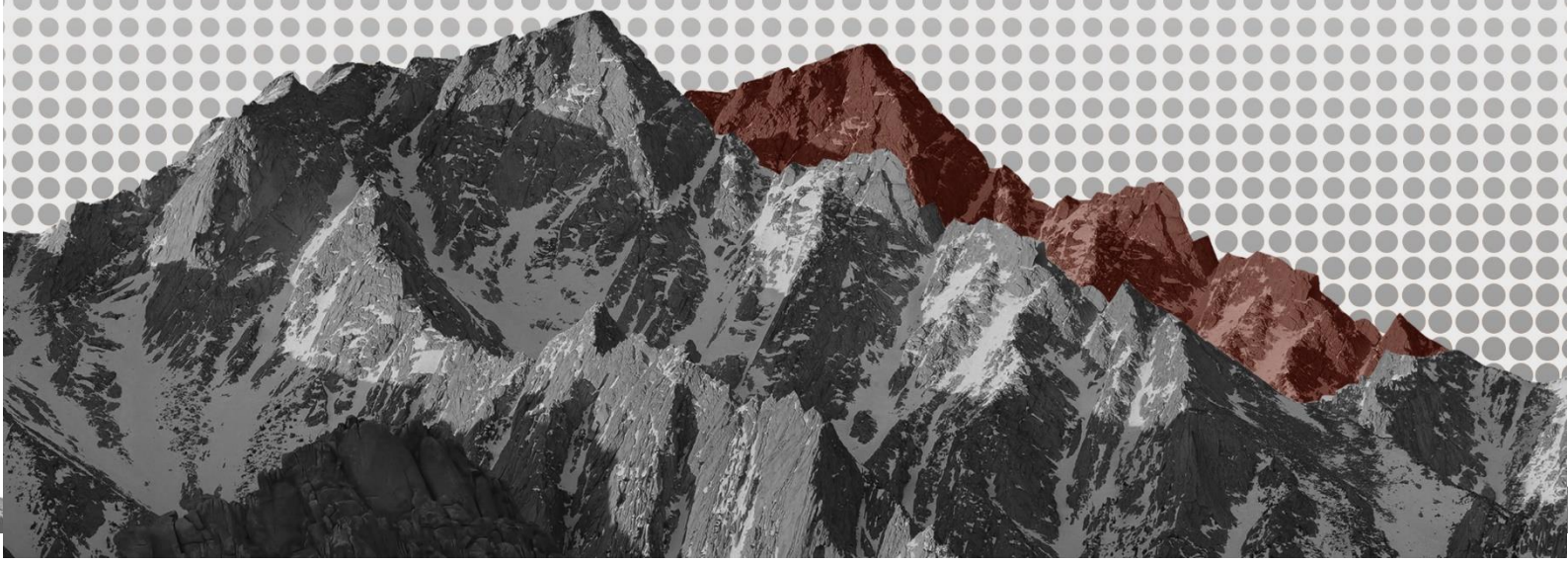


**ITS**  
**INTERNATIONAL  
GEOSCIENCE  
CONVENTION**

**SUNDAY, 8<sup>TH</sup> OCTOBER 2017**  
**SURABAYA, INDONESIA**

**OPTIMIZING THE ROLE OF GEOSCIENCE  
EFFICIENCY TO EXPLORE THE ENERGY**

**PROGRAM BOOK**





## ITS INTERNATIONAL GEOSCIENCE CONVENTION

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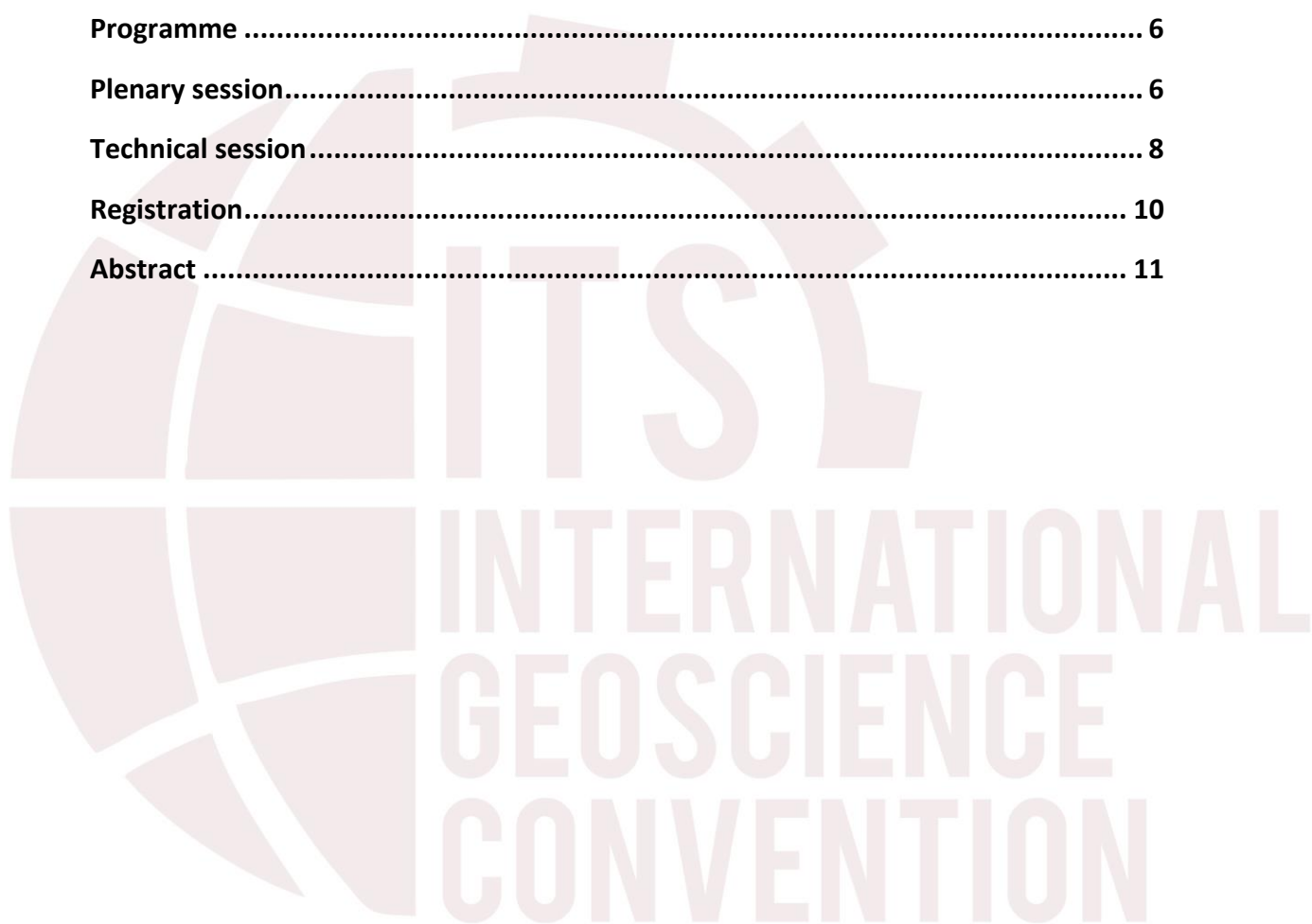
*Organized by:*



**CONTENT**

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Content.....	1
Welcome Remarks.....	2
About ITS International Geoscience Convention.....	3
Background .....	3
Objective.....	3
Convention Venue Map.....	4
Programme .....	6
Plenary session.....	6
Technical session.....	8
Registration.....	10
Abstract .....	11





## WELCOME REMARKS

Dear all participants of ITS International Geoscience Convention 2017,

It's a big honor for us to welcome you all in Surabaya for attending IIGC 2017. ITS International Geoscience Convention (IIGC 2017) is one sub event of Geoscience Atmosphere 2017 or commonly called Geosphere 2017. This event is organized by Geophysical Engineering Department ITS, Geomatics Engineering Department ITS, Society of Exploration Geophysicists ITS SC, and Himpunan Mahasiswa Teknik Geofisika ITS. This year, IIGC's theme is "Optimizing the Role of Geoscientist, Efficiency the Energy", from this theme we hope the role of geoscientist nowadays could make a big impact and play as a main character to make an efficiency energy in the future. This event aims to be an annual gathering platform for geoscientists all around the world to discover and explore more about the development and innovation of geoscience in the future regarding nowadays energy issues.



IIGC 2017 has 2 special sessions, Plenary Session and Technical Session. The Plenary Session will discuss topics or issues that happening nowadays with some keynote speakers who are experts in their sector such as national regulation, science, and industrial aspect. The Technical Session is a platform for international journal or research publication. Various topics will be presented and published in technical session such as Oil & Gas Exploration, Geotechnical, Mining, Land & Sea Monitoring, and Earth Satellite.

The last but not least, i would say thank you in advance for all sponsors and committees that for all hard work to held this event.

Enjoy the heat and good atmosphere in Surabaya!

Best Regards,

Cevin Ian Agfa

Project Officer of GEOSPHERE 2017

## ABOUT ITS INTERNATIONAL GEOSCIENCE CONVENTION

### Background

This event was named IIGC (ITS International Geoscience Convention) was held by Himpunan Mahaiswa Teknik Geofisika ITS (Geophysics Engineering Student Association) with a background of many innovations about the field of geoscience that is still buried in a person. Why can it be? Because the knowledge about Geoscience is very broad and not many people know even who are experts in the field.

Special Unit for Upstream Oil and Gas Activities (SKK Migas) recorded the realization of investment in upstream oil and gas sector of US \$ 3.98 billion. The achievement is still far from the target, due to low world oil prices. Head of SKK Migas, Amien Sunaryadi, said that the realization of investment in the first semester of 2017 was US \$ 3.98 billion or only 29 percent of the target set in the work plan and budget of US \$ 13.8 billion. The small realization of these investments resulted from the low world oil prices, so the contractors postponed the implementation of the project. In addition, also due to regulations that have been issued by the previous government.

The General Plan of National Energy, abbreviated as RUEN, is the Central Government's policy on the national energy management plan which is the elaboration and implementation plan of the National Energy Policy that is cross-sectoral to achieve the National Energy Policy targets. The direction of energy policy in the future is based on the paradigm that energy resources are no longer used as export commodities, but as national development capital. The objectives are to: (a) realize the independence of energy management, (b) ensure the availability of energy and the fulfillment of domestic energy needs, (c) optimize the management of integrated and sustainable energy resources, (d) increase energy efficiency utilization, (e) fair and equitable access to energy, technological development, energy industry and domestic energy services, (f) creating employment and controlled impacts of climate change and sustainable environmental functions.

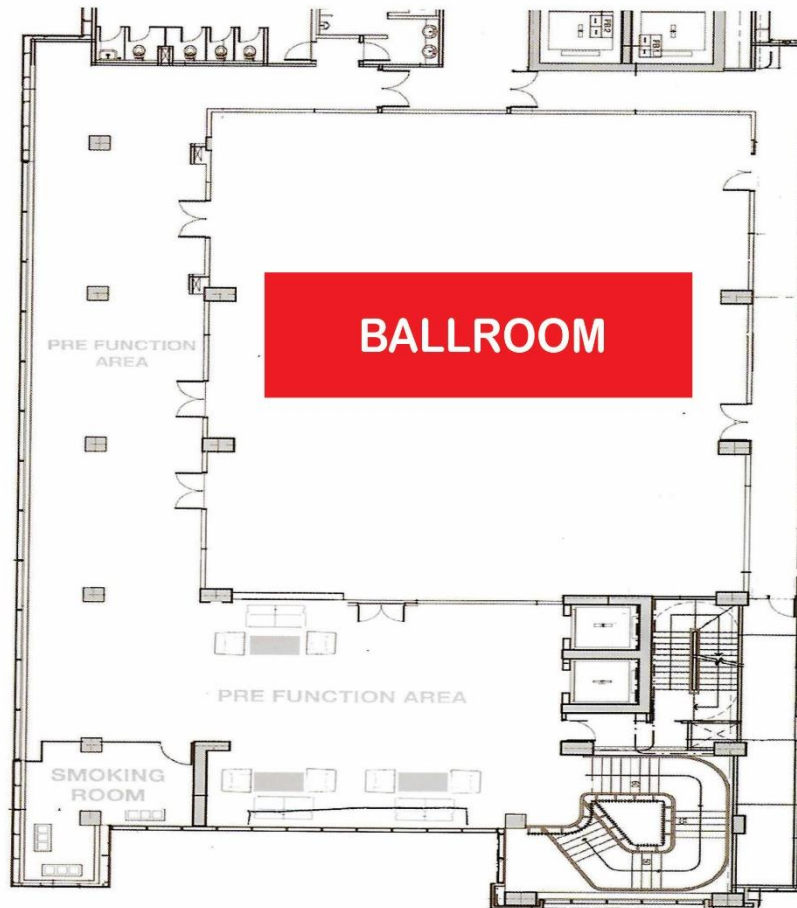
### Objective

1. IIGC (ITS International Geoscience Convention) was held to publicize to the public who are interested in this object in the form of plenary session and technical session.
2. Plenary session is a sub event in IIGC in the form of talk show from experts of this object. So that the audience can listen and get some knowledge and experience about geoscience presented by experts in this field.
3. Technical sessions are also a sub event of IIGC but with a form of exposure of papers from participants. In this session the audience is divided into various rooms and in different time each of which there is a presentation paper presented by master and doctor of geoscience.

## CONVENTION VENUE MAP

### SWISS BELINN HOTEL MANYAR

#### 3<sup>rd</sup> FLOOR SWISS BELINN HOTEL



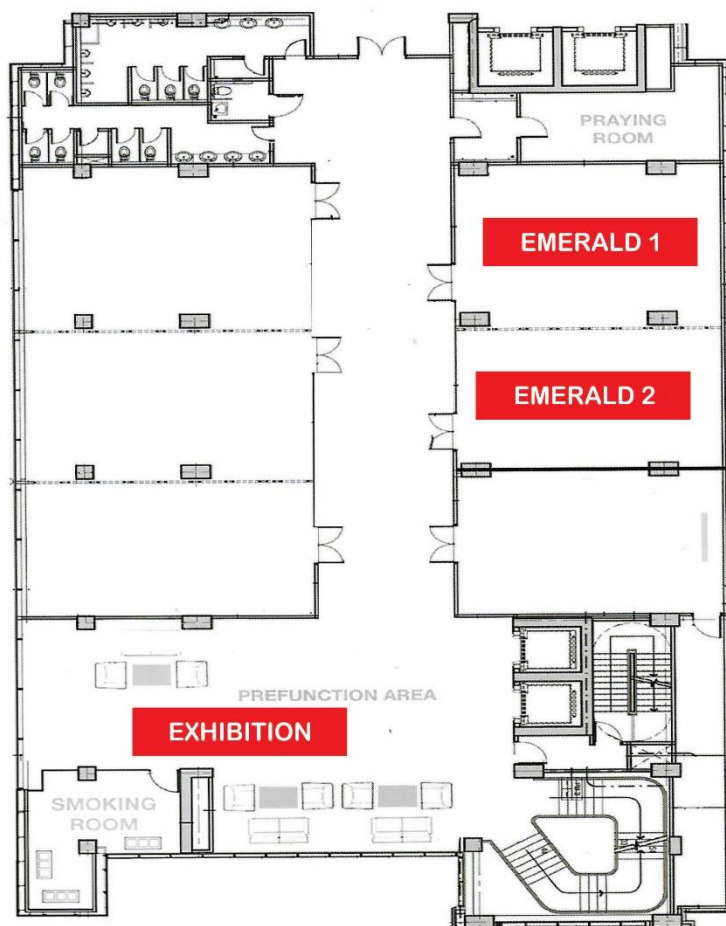
Plenary Session Venue :  
Ballroom Swiss Belinn Hotel



## CONVENTION VENUE MAP

### SWISS BELINN HOTEL MANYAR

#### 2<sup>nd</sup> FLOOR SWISS BELINN HOTEL



Technical Session - Venue :  
Emerald 1, Emerald 2

Exhibition Venue :  
Prefunction Area 2<sup>nd</sup> Floor Swiss Bell Hotel

## PROGRAMME

### PLENARY SESSION

In plenary session, the professionals will give presentations and sit together to talk about the given topic.



#### **Mr. Nanang Abdul Manaf (Indonesia)**

Background:

1. President Director of Pertamina EP (2017-Present)
2. Vice President Exploration of Pertamina EP (2011-2017)
3. General Manager Pertamina EP Libya (2009-2011)



#### **Mr. Dwi Hari Soeryadi (Indonesia)**

Background:

1. Elected Member of National Energy Council Republic of Indonesia (2014-Present)
2. President Director PT. Talang Mas Contractors, Jakarta & Surabaya (2014-Present)
3. Director Teknik & Usaha PD Pasar Surya Surabaya (2010-2013)
4. General Manager, PT Duta Mitra Propertindo & Developer (2008-2013)



#### **Mr. Dicky Rahmadi (Indonesia)**

Background:

1. Manager G&G Eastern Indonesia Region (2008-Present)
2. President Himpunan Ahli Geofisika Indonesia (HAGI) (2014-2016)



#### **Mr. How Wei Chen (Taiwan)**

Background:

1. Professor at Institute of Geophysics National Central University Taiwan

Specialty:

Computatuonal Seismology, Wave Motion Theory, Electromagnetic Prospecting, Seismic Data Analysis



#### **Mr. Chao Hung Lin (Taiwan)**

1. Professor at Department of Geomatics, National Cheng-Kung University



## PROGRAMME

October 8<sup>th</sup> 2017

PLENARY SESSION		
Venue	Ballroom Swiss Belinn Manyar Surabaya	
Opening		
08.15-08.20	Welcoming remark from Head of Department Geophysics Engineering	Mr. Joni Hermana
08.20-08.25	Welcoming remark from Head Event of ITS International Geoscience Convention	Mr. Cevin Ian Agfa
National Anthem : Indonesia Raya		
Plenary Session : "Optimizing Role of Geoscience – Efficiency To Explore the Energy"		
Moderator : Radifan Hassan		
08.30-09.00	Keynote Speech-1 : Role Of Science To Increase Efficiency Of Resource Exploration	Mr. How Wei Chen / Professor at Institute University Taiwan
09.00-09.30	Keynote Speech-2 : The Role Of National Energy Council To Increase Efficiency Of Resource Exploration	Mr. Dwi Hari Soeryadi / Elected Member of the National Energy Council of Indonesia
09.30-10.00	Keynote Speech-3 : Advice For Government About Their Contribution To Increase Efficiency Of Resource Exploration	Mr. Dicky Rahmadi / Senior G&G Eastern Indonesia Region at SKK Migas
10.00-10.15	COFFE BREAK	
10.15-10.45	Keynote Speech-4 : Company Point Of View To Increase Efficiency Of Resource Exploration	Mr. Nanang Abdul Manaf / President Director of Pertamina EP
10.45-11.15	Keynote Speech-5 : Multi-temporal Cloud Cover processing for Landsat Imagery	Mr. Chao Hung Lin / Professor at Department of Geomatics, National Cheng-Kung University
11.15-11.40	Question-answer	
11.40-11.45	Photo Session	
11.45-12.30	LUNCH BREAK	

## PROGRAMME

October 8<sup>th</sup> 2017

### TECHNICAL SESSION

In Technical Session, there are oral presentation from the paper making participants who have been selected. There are 4 sub theme for the technical session which is Hydrocarbon Exploration, Mining Exploration, Land and Sea Monitoring, and Geotechnical

TECHNICAL SESSION						
TIME	EMERALD 1			EMERALD 2		
	LAND AND SEA MONITORING : 12.30-14.30			GEOTECHNICAL : 12.30-12.55		
	MINING EXPLORATION : 14.30-15.25			HYDROCARBON EXPLORATION : 12.55-15.25		
12.30 - 12.55	IIGC0026	Detection Of Land Use Changes In Batam Island Coastal Using Remote Sensing	Oktavianto Gustin	IIGC0001	Behavior Of Swelling Pressure Of Expansive Soil Within The Active Zone	Mr. Indarto Dr. Ir
12.55 - 13.20	IIGC0007	The Utilization Of Mobile Base Station In Cadastre Surveying	Mr. Achmad Setiawan	IIGC0006	Reservoir Characterization and Volumetric Calculation Of Hydrocarbons Reserves in "RRD" Field, Layer Z.2260 Talang Akar Formation, North West Java Basin	Mr. Rizki Rahmandani
13.20 - 13.45	IIGC0023	Landslide Zoning And Mitigation Area Clapar, Madukoro District, Banjarnegara District, Central Java	Mr. Sugeng Raharjo	IIGC0011	Reverse Time Migration On Geological Complex Settings : A New Geophysical Tools In Seismic Migration	Mr. Fuad Aulia Bahriy
13.45 - 14.10	IIGC0009	Complete Village Participatory	Mr. Reza Abdullah	IIGC0017	Early Miocene Carbonate Distribution Analysis Using Spectral	Mr. Krisna Hari Mukti

		Mapping Based On WEBGIS			Inversion: Case Study In Early Miocene Carbonate Of Upper Cibulakan Formation, "KHM" Structure, North West Java Basin, Indonesia	
14.10 - 14.35	IIGC0002	Alteration And Ore Mineralogy Of Metamorphic Rocks Hosted Hydrothermal Gold Deposit At Rumbia Mountains, Bombana Regency, Southeast Sulawesi, Indonesia	Mr. Hasria	IIGC0020	Waterflooding Development Prediction In Carbonate Reservoir At Field X Using Reservoir Simulation	Mr. Novia Fazilani
14.35 - 15.00	IGC0003	The Study Of Hydrothermal Alteration And Type Of Primary Tin Mineralization In Tsk. Pengarem, Southern Of Bangka Island	Mr. Franto	IIGC0024	Seismic Forward Modelling to Reverse-time Migration with Finite-difference Method	Mr. Syauqy Lenterano El Ilhami
15.00 - 15.25	IIGC0004	Mineral and Geochemistry Study of Lower Kutai Basin Coal East Kalimantan	Mr. Agus Winarno	IIGC0025	Seism geomorphic Interpretation Spectral Decomposition Channel Detection for Hydrocarbon Exploration	Mr. Sunjay
15.30 - 16.00	COFFE BREAK					
16.00 - 17.00	CLOSING CEREMONY					



## REGISTRATION

Via website

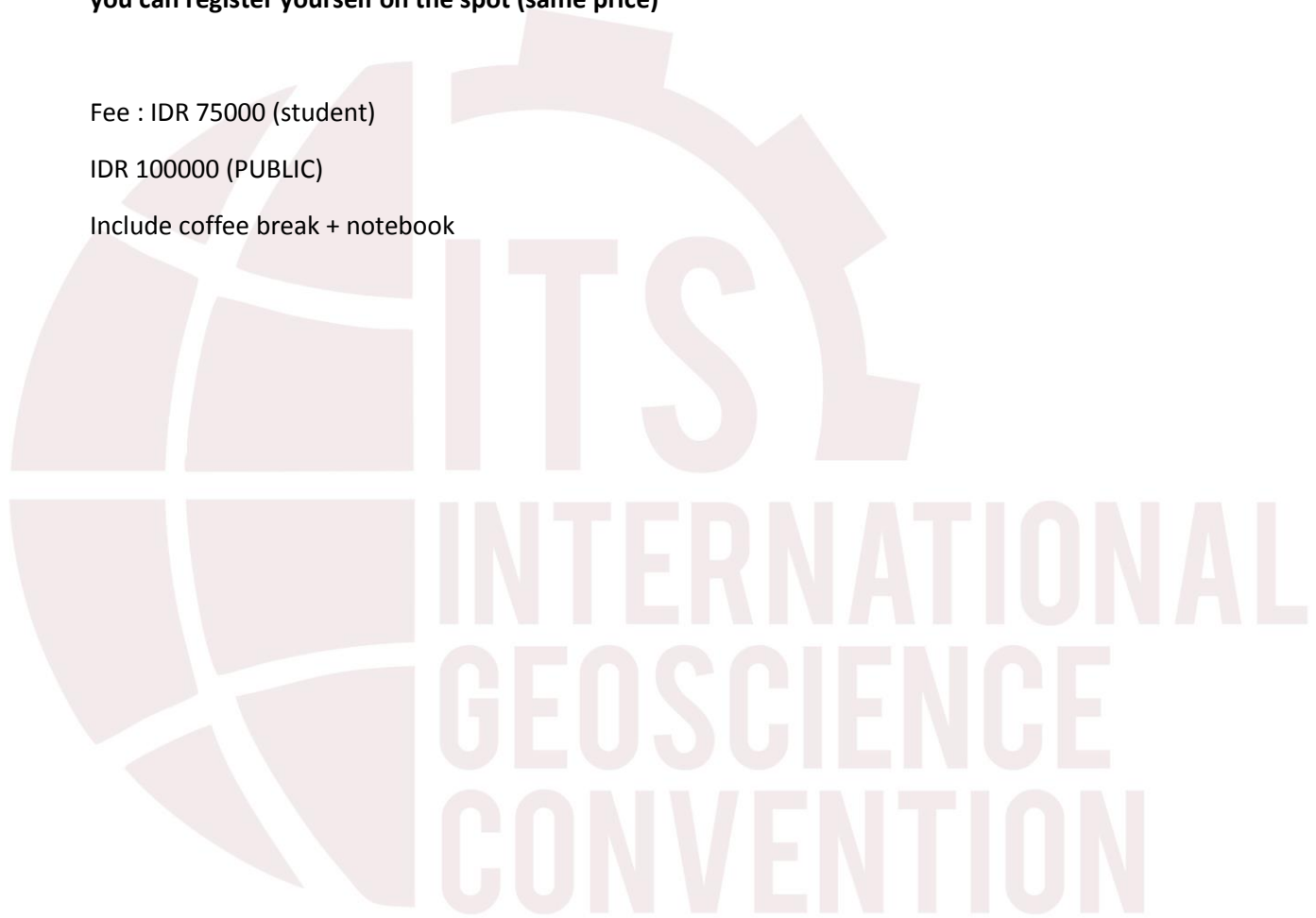
1. Prepare the required documents (as specified below):
  - o A scan of valid Company ID Card/ Student ID card / identity card
  - o A scan of transfer payment receipt  
0536812505 (Aisyah Fairuz S – Bank BNI)
2. **Fill The following Google form, and upload all the documents required:**  
<https://intip.in/iigc2017>

**you can register yourself on the spot (same price)**

Fee : IDR 75000 (student)

IDR 100000 (PUBLIC)

Include coffee break + notebook



## ABSTRACT

### *Technical Paper Session*

Paper ID: IIGC0001

#### **Behavior of Swelling Pressure of Expansive Soil within The Active Zone of Surabaya Citraland**

Indarto<sup>a</sup>, Denny Hosen<sup>b</sup>, Adi Prayitno<sup>c</sup>

<sup>a</sup>*Civil Engineering Infrastructure Department of Vocation Faculty- ITS, Indonesia,*  
[indarto@ce.its.ac.id](mailto:indarto@ce.its.ac.id)

<sup>b</sup>*Master's Graduate of Post Graduate of Civil Engineering Department of FTSP-ITS, Indonesia,*  
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<sup>c</sup>*Graduate of Civil Engineering Infrastructure Department of Vocation Faculty-ITS,Indonesia,*  
[adieprajitno@gmail.com](mailto:adieprajitno@gmail.com)

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#### **Abstract**

The ability of expansive soils to swell and shrink causes damage to the structures, especially for light buildings and pavements. Generally, swells and shrinks this expansive soil due to changes in water content in the active zone. This paper is a study about behavior of swelling pressure of expansive soil within the active zone. This research using undisturbed samples of soil that was taken from Surabaya Citraland. The experiment of swelling pressure was started from the samples with natural water content, furthermore a series of swelling pressure experiments is performed for a series of samples that was added or subtracted by some water to increase or decrease its water content. Repeated swelling pressure experiments were also performed for a sample that has undergone a drying-wetting cycle repetition. The experiment shows that swelling pressure decrease with increasing of water content of soil, in other side the swelling pressure of expansive soil remain constant after sixth repetition of swelling pressure experiment

*Key words;* expansive soil, swelling pressure, active zone;

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## The Utilization of Mobile Base Station in Cadastre Surveying

Achmad Setiawan<sup>1</sup>, Arief Syaifullah<sup>2</sup>, Kusmiarto<sup>3</sup>

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### Abstract

The uneven distribution of base stations is one of the problems with CORS utilization using The RTK-NTRIP method. Long distance becomes an obstacle in solving ambiguity resolution, resulting in data (correction) loss and rover takes a long time to reach a fixed solution. Therefore, a mechanism is needed to bring the master station closer to the measurement site. The mobile base station serves to make the baseline shorter. The purpose of this research is to test the level of efficiency and accuracy of the lateral shift aspect as well as the difference in the area of land from the utilization of mobile base station. The research method is comparative experiment with quantitative approach. The same samples were measured from two different stations: the base station and the mobile base station. The test was carried out to observe the differences in observation duration and coordinates. The results of this research point out that (1) the average observation duration using the mobile base station is 1.27 minutes, while the average observation duration directly from the base station is 8.84 minutes. (2). The  $t$  test with a significance level ( $\alpha$ ) of 5% applying 0.10 m as the maximum tolerance in the residential area, a  $t$  test shows = -1.59488 with a  $t$  table = 2.26216. Meanwhile, applying 0.25 m as the maximum tolerance in the agricultural area, a test shows  $t$  test = -8.44019 with a  $t$  table = 2.20099. The average observation duration values show that the benefit of mobile base station can improve the measurement efficiency by 14% and the range of lateral shift in the residential and agricultural areas is proven to stay within the specified tolerance of  $0,5\sqrt{L}$  according to The Technical Instruction of PMNA/KBPN No. 3/1997.

*Key words*; expansive soil, swelling pressure, active zone;

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## Landslide Zoning and Mitigation in Clapar Area, Madukara District, Banjarnegara Regency, Central Java

Sugeng Raharjo<sup>a</sup>, Eko Teguh Paripurno<sup>a</sup>, Joko Hartadi<sup>a</sup>, Oktavia Dewi Alfiani<sup>a</sup>

Megasari Widyastuti<sup>b</sup>, Muflichatul Mardziah<sup>b</sup>

<sup>a</sup>First affiliation, lecture at Geological Engineering Dept. UPN "Veteran", SWK 104 St.  
Condongcatur Depok Sleman, Yogyakarta 55283, Indonesia

<sup>b</sup>Second affiliation, student at Geological Engineering Dept. UPN "Veteran", SWK 104 St.  
Condongcatur Depok Sleman, Yogyakarta 55283, Indonesia

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### Abstract

Landslide disaster is one of the most frequent disasters in Clapar, Banjarnegara. Landslide is a recurring event and there is no suitable method to respond the threat until now, so that preventive stage have not been maximized. The scientist explains that the movement of land in the area is very active, but the level of activity that can cause landslides can't be known qualitatively or quantitatively. The method that used to achieving these purposes is geology and landscape morphology mapping in areas that have been and have possibility landslide disaster. Factors that controls the landslide motion are geomorphology, rock type, geological structure and land use, while the triggers are water infiltration and rock fractures. Slope in Clapar is 30 - 70% and the rock type is clay with quartzite and chert fragments from Totogan Formation, volcanic breccia from Tapak Formation, and polymictic breccia from Ligung Formation. Geological structure that found is right slip fault (Rickard, 1972) with the strike and dip of fault is N 359°E/79°. The land usage are pine forest, salak farm, and settlement. Angle of shear strength from direct shear test soil sample in Clapar slope is 27° with safety factor value is 1.045 included in the critical class. According to those existing data, Clapar included into area that are very vulnerable to landslides. It is because this area was affected by major slip fault and steep angle. The most land usages is salak farms which is the plants has fibrous root that control the properties of soil. It makes the water easily infiltrate into the soil that causes increase the weight of the soil and make the plane become slippery.

*Keyword:* landslide; land usages; infiltration; Clapar

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## Completed Participatory Mapping of Village Based on WebGIS

Reza Abdullah, Danang Arief Widiyanto, Irpan Muhamad Ilham Kosasih,  
Ario Aditia Pratama, Hasnim Kaulani, Muhammad Ridwan,  
Rangga Agung Chrisnawati, Ruthdiah Aprilia, Shelvi Manurung  
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### Abstract

In order to make the land registration, it's required the land database information in the form of a basic map that contain information about the land, that has subjects, objects and other information. The development of land database can create the Government Policy that be a National Map as known as One Map Policy. The development of based online Geographic Land Information System Application (WEBGIS) is done by establishing the land database, starting with the preparation of data that be the land that has been given identification number and the collecting the textual data, then combined and forming the land database within the scope of one village. The development of WEBGIS focuses on the development of better spatial data by involving the active role of the village / offices by optimizing the empowerment of youth organization of the village. The community acts as a land data taker or land data information giver using Geojot+ Geotagging based on android and Ios- application. Spatial data and textual data are integrated using the application. The processing Spatial data is using AutoCAD applications, textual data using Geojot Core., and then will be integrated with ARCGIS with the addition of attributes based on Geojot Core data. The Using of WEBGIS Applications for village offices and their usefulness for land and village government offices. The goal is to create better land administration between agencies so will be formed one map policy. And as a consideration in the proposal draft of Village Bill, in order to make transition of land have report to the village officers.

*Keywords: Completed Participatory Mapping of Village, One Map Policy, WEBGIS*

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## Detection of Land Use Changes In Batam Island Coastal Using Remote Sensing

Oktavianto Gustin, Arif Roziqin, Dwi Ely Kurniawan

[oktavianto@polibatam.ac.id](mailto:oktavianto@polibatam.ac.id)

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### Abstract

Batam is one of the fastest growing cities in Indonesia that has resulted in increasing demand for industrial, commercial and residential areas. However, due to limited land supply there is a process of transferring existing land functions. By detecting changes in land use, we can find out how much land use changes are influenced by social, economic and industrial in Batam Island. This research was conducted on the detection of land use change using Remote Sensing multi-temporal or differentiated image of the year with a supervised Classification Technique to obtain Land use information and changes in Batam Island, area percentage of land use change from 2010 and 2016 in Batam Island, determining the relationship of land use change to conditions in the industry sector presented in to the maps. The calculation result of classification accuracy test obtained total overall accuracy of 84% where the classification results can be said good and almost in accordance with the results on the field. The relationship between land use classification change with industrial condition on the area of non-agricultural region I can be said to have influence with the number of companies and the workers number on the data of labor changes from Central Bureau of Statistic/Badan Pusat Statistik (BPS) 2010-2014 with the assumption of changing function and the many needs of various land uses sector except agriculture, the area of non-agriculture region II can be said to have influence with the number of companies and the number of workers in the data of labor changes BPS 2010-2014 with the assumption of changing function and the many land use needs of various sectors except agriculture, increased farming can be said to have influence with the number of agriculture companies that also increases in data of labor changes BPS 2010-2014, the area of the Areas without Vegetation Coverage Class increased can be said to have influence with the number increased of companies and the number of manpower on the data labor changes BPS 2010-2014 with the assumption that there are many land use needs of various sectors except agriculture.

*Keywords: Changes of land use, Landsat, Classification, Remote Sensing, Map*

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Paper ID: IIGC0002

**Alteration and Ore Mineralogy  
Of Metamorphic Rocks Hosted Hydrothermal Gold Deposit at Rumbia Mountains, Bombana  
Regency, Southeast Sulawesi**

**Hasria<sup>1,2\*</sup>, Arifudin Idrus<sup>1</sup> & I Wayan Warmada<sup>1</sup>**

<sup>1</sup>*Department of Geological Engineering, Gadjah Mada University, Indonesia*

<sup>2</sup>*Department of Geological Engineering, Halu Oleo University, Indonesia*

*\*Corresponding author: hasriageologi@gmail.com*

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## Abstract

In Indonesia, gold is commonly mined from porphyry, epithermal and skarn type deposits that are commonly found in volcanic/magmatic belts. However, were recently numerous gold prospects discovered in association with metamorphic rocks. This paper is intended to describe an alteration and ore mineralogy hosted by metamorphic rocks at Rumbia mountains, Bombana regency, Southeast Sulawesi province, Indonesia. The study area is found the placer and primary gold hosted by metamorphic rocks. The placer gold is evidently derived from gold-bearing quartz veins hosted by Pompangeo Metamorphic Complex (PMC). This study is conducted in three stages, three stages including desk study, field work and laboratory analysis. Desk study mainly covers literature reviews. Field work includes mapping of surface geology, alteration and ore mineralization as well as sampling of representative rocks types, altered rocks and gold-bearing veins. Laboratory analysis includes the petrologic observation of handspecimen samples, petrographic analysis of the thin section and ore microscopy for polished section and XRD (*X-ray diffraction*) analysis. From petrographic observation, the type of alteration found in the study area can be divided into six types including sericitization, argillic, inner propylitic, propylitic, carbonization and carbonatization alterations. These quartz veins are currently recognized in metamorphic rocks at Rumbia mountains. Mineralogically, gold is closely related to chalcopyrite, pyrite, hematite, cinnabar, stibnite and possibly minor goethite. Based on those characteristics, it obviously indicates that the primary gold deposit present in the study area is of orogenic gold deposits type. The orogenic gold deposit is one of the new targets for exploration in Indonesia.

*Keywords* : alteration, ore mineralogy, hydrothermal gold deposit, metamorphic rocks, Rumbia mountains, Southeast Sulawesi.

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Paper ID: IIGC0003

## Study of Primary Tin Mineralization in Pengarem, Southern Bangka Island

Frantoab\*, Subagyo, P.a, Lucas, D.Sa

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*bDepartment of Mining Engineering, Bangka Belitung University, Indonesia*

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### Abstract

Research on hydrothermal alteration mineral and mineralization type of primary tin was conducted in Pengarem village, South Bangka District. This research attempted to find out the type and mineralogy alteration of the site. The methodology involved lithological and structural observation, and X-Ray Diffraction (XRD) analysis. Lithology constructing the bed was commonly sandstone unit. The developing alteration in this site consisted of argilic zone that characterized by clay minerals such as kaolinite and illite. Primary tin mineralization developing in this site was polymetallic vein mineralization. The veins developed in sandstone unit, had relatively small size, and spreaded locally. The veins were consisted of quartz unit carrying tin mineralization (cassiterite) and associated with zinc oxide minerals that were ilmenite and hematite. The typical tin mineralization in this site was mineralization in gozzan unit, and was the result of supergene process carried by mineral cassiterite that associated with minerals iron oxide such as ilmenite and goethite.

*Keywords: primary tin, Pengarem, polymetallic, vein, gozzan.*

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Paper ID: IIGC0004

## Mineral and Geochemistry Study of Lower Kutai Basin Coal East Kalimantan

Agus Winarno<sup>1,2\*</sup>, D. Hendra Amijaya<sup>1</sup> & Agung Harijoko<sup>1</sup>

<sup>1</sup>Department of Geological Engineering, Universitas Gadjah Mada, Indonesia

<sup>2</sup>Department of Mining Engineering, Mulawarman University, Indonesia

\*Corresponding author : aguswinar71@gmail.com

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### Abstract

This study aims to determine the type of mineral and geochemical character of low rank coal. The coal samples were located at Indominco Mandiri Coal Mine KW 01PB0435 in East Kutai District, East Kalimantan. This area of research is entered into the Lower Kutai Basin, where in this basin there are two formations containing coal, namely Pulaubalang and Balikpapan Formation. The methods used are X-Ray Diffraction (XRD), proximate, and ultimate coal analysis. The results of this study based on X-Ray Diffraction (XRD) analysis of coal contents are clays minerals (kaolinite, illite), quartz, carbonates (calcite and dolomite), sulphides (pyrite and chalcopyrite) and oxides (rutile and goethite). While geochemically coal has a calorific value of 6052.6 cal./gram (Subbitumionus A Coal), moisture 13.3% (adb), ash 4.0% (adb), volatile matter 41.5% (adb), fixed carbon 41.2% (adb), and sulfur content 1.77% (adb).

*Keywords:* X-Ray Diffraction, proximate, and ultimate

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Paper ID: IIGC0006

***Reservoir Characterization and Volumetric Calculation Of Hydrocarbons Reserves in “RRD” Field, Layer Z.2260 Talang Akar Formation, North West Java Basin***

Rizki Rahmandani,<sup>a</sup> Budi Eka Nurcahya,<sup>a</sup> Tania Meidiana,<sup>b</sup> Agung Dwi Alfianto,<sup>b</sup>  
<sup>a</sup>Program Studi Geofisika, Jurusan Fisika, Fakultas Matematika dan Ilmu Pengetahuan Alam,  
Universitas Gadjah Mada, Sekip Utara, Bulaksumur, Yogyakarta 55281, Indonesia  
<sup>b</sup>PT. Pertamina Ep Asset 3, Jalan Patra Raya No.01 Klayon, Cirebon 45151, Indonesia

**Abstract**

“RRD” field is one of the hydrocarbon prospects in North West Java Basin. One of the potential oil reserves in this field was found on Talang Akar Formation Z.2260 layer and indicated by the presence of oil show on drill steam test data. Physical parameters such as acoustic impedance, porosity and hydrocarbon saturation are essential to determine the distribution of reservoir layer. Acoustic impedance can distinguish the reservoir and nonreservoir zone, while porosity and hydrocarbon saturation can be used in the calculation of oil reserves on the layer Z.2260. Model Based Inversion was performed to find out the lithology distribution determined by acoustic impedance. Porosity distribution was identified using crossplot acoustic impedance and porosity analysis while hydrocarbon saturation distribution was determined using cokriging geostatistical analysis. The result shows the existence of sandstone reservoir with acoustic impedance values ranging from 8500–10.000 (m/s)(g/cc) that spreads over 2 zones in the research area of anticline zone A and R. Sandstone with such acoustic impedance range has a porosity value of 8-12% and hydrocarbon saturation 25-50%. The reservoir zone A has value 0,201 (MMbbl) as well as R area 1,689 (MMbbl).

Keyword: Model Based Inversion, Hydrocarbon Reserve, Cokriging, Z.2260.

Paper ID: IIGC0011

## Seismic Forward Modelling to Reverse-time Migration with Finite-difference Method

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### Abstract

Finite-difference is a common tool to perceive solution of any partial differential equations. In seismic Exploration, this method is used commonly for seismic migration in oil and gas industry. It is more well-known called reverse-time migration. Compared with another migration methods, reverse-time migration is the most accurate migration method despite of its cost. In this paper, we used acoustic wave equation with finite-difference approach to simulate acoustic wave propagation in 2D velocity model that we created. We can obtain seismic records from the simulation. The records were wavefiled which had propagated from particular source through velocity model and received by geophone on the surface. The records became data that we used to image reflectors in the subsurface. To apply reverse-time migration algorithm we used two-way wave equation to separate upgoing and downgoing wave (Baysal et al, 1984). The records that we had obtained, became time-reversed and boundary condition for backward-time propagation for upgoing and downgoing wavefield. Computation in this method is the main difficulty without advanced computation ability to proceed such algorithm such algorithm like convolution and deconvolution with high amounts of gridpoints is hard to produce detailed image. In this paper, we used modest computation ability to create fine image of the subsurface from velocity model that we created with hundreds of gridpoints.

*Keywords: Finite-difference, Acoustic wave equation, reverse-time migration, Two-way wave equation, Seismic forward modelling*

Paper ID: IIGC0017

## Early Miocene Carbonate “G-0” Distribution Analysis Using Spectral Inversion

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### Abstract

“KHM” structure is one of PT. Pertamina EP oil producing field in Subang, Nort West Java Basin. One of the hydrocarbon producers of this structure is located in thin bedded early miocene carbonate reservoir which in Upper Cibulakan Formation. The thin bedded reservoir becomes a challenge because the post stack time migration seismic resolution can't resolve the each layer. To distinguish and delineates the reservoir's lateral continuity needed spectral decomposition analysis. This analysis obtained 3 best frequencies to acquire a better imaging which known as tuning cube, they are 15 Hz, 20 Hz, and 25 Hz . Furthermore, these frequencies were blended to get spectral decomposition volume. The volumes have same frequency and amplitude with post stack time migration seismic data, so it can be used for further interpretation. To predict the distribution and depositional facies of early miocene carbonate, performed seismic interpretation by using model based acoustic impedance inverion on spectral decomposition volume and porosity analysis. The result of this study suggest the lateral distribution of early miocene carbonate can be characterized. Acoustic impedance zone that associated with porous carbonate have ranges values of 8050 – 9800 gr/cc m/. This is supported by petrophysics analysis that generates porosity values of 7.4 – 13.9 % in this zone. The relationship of both analysis based on the correlation of well, known that porous carbonate was deposited on a shelf margin facies.

*Keywords: Spectral decomposition; acoustic impedance inversion; facies*



Paper ID: IIGC0020

## Waterflooding Development Prediction in Carbonate Reservoir at Field X using Reservoir Simulation

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### Abstract

Field X consist of a carbonate reservoir, producing since April 2014 with only 2 existing wells present, which is well NF-01 and NF-02. Production history of the field was performed from year 2014 until 2016. The original oil in place of Field X is 9.204 MMSTB (volumetric) and 9.0308 MMSTB (simulation). A method of optimizing Field X is Waterflooding after primary recovery has been done. In this study, the software used for the development of Field 'X' is Computer Modeling Group (CMG) IMEX Black Oil, by applying waterflooding as a method of optimizing the field, the optimization can be determined based on the consideration of various development scenarios. Reservoir simulation process consists of several steps which are; data preparation, model and grid construction, initialisation, history matching and prediction forecast. All the data up until history matching was given and the focus of this paper is to evaluate and predict several scenarios. The period of development is done for 19 years which is until December 2035. Several scenarios predicted were In-fill, conversion of wells, peripheral, 5-spot patterns and pilot studies. As the prediction developments were conducted, recovery from each scenario varies. These scenarios are then compared to be able to find the optimum result. After simulating several scenarios of as follows; infill-18 wells, infill-26 wells, infill-horizontal wells, covert all non-producing wells, peripheral wells, invert and normal 5-spot wells and comparing the recovery factor, it can be said that waterflooding implementation was insignificant as there were only a slight increase in recovery factor. The optimum scenario from waterflooding implementation is the peripheral pattern with a recovery factor of 38.17%.

*Keywords:* waterflood; injection; carbonate; reservoir; simulation

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## Reverse Time Migration On Geological Complex Settings : A New Geophysical Tools in Seismic Migration

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### Abstract

Reverse time migration is a method that utilizes wave propagation in two directions in forward and reverse. This approach improves previous migration methods, especially in the case of extreme dipping structures and high velocity contrast. Also reverse time migration can handle many waveforms. Despite having more accurate imaging capabilities, reverse time migration is expensive method. One other migration method is Kirchhoff method that based on diffraction summation. This method is commonly used by industry at this time. Experiments have been conducted to compare reverse time and Kirchhoff migration using complex geological settings: Marmousi Models and Salt Dome models. Migration Performed in pre-stack and depth Migration.

From the migration results that have been obtained, reverse time migration method proved to produce a better image than Kirchhoff migration. By producing a clearly data model on the boundary, however reverse time migration requires high computing capabilities. Depends on the case of geology settings and necessity.

*Keywords: Reverse Time Migration, Kirchoff Migration, Geological Complex*

INTERNATIONAL  
GEOSCIENCE  
CONVENTION

Paper ID: IIGC0025

## Seismogeomorphic Interpretation Spectral Decomposition Channel Detection for Hydrocarbon Exploration

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### Abstract

Seismogeomorphic Interpretation: Seismic attributes are useful to help the qualitative interpretation of the seismic data. Seismic attributes are derived from basic seismic measurements. The attributes are useful to ascertain structure, lithofacies, and reservoir parameters of a field as attribute properties can vary significantly with variations in lithology, geometry, and structural patterns of deposition for various lithofacies in an area. The basic poststack attributes may be grouped into the following classification- Time-derived: provide structural information; Amplitude-derived: provide stratigraphic and reservoir information; Frequency-derived: provide additional stratigraphic and reservoir information. While spectral decomposition is a good indicator of channel thickness, coherence and other edge detectors are good indicators of channel width. Since channels may have different spectral response than the neighbouring data points, different single frequency volumes will in general delineate or highlight different thickness channels. Channels filled with porous rock and encased in a nonporous matrix comprise one of the more important stratigraphic exploration plays. However, detailed mapping of channels has a much broader impact. By using modern and paleo analogs, mapping channels helps map the paleo depositional environment, and helps interpret less obvious prospective areas such as fans and levees. By mapping the width, tortuosity, and spatial relation of meandering channels, avulsions, braided streams, among others, geomorphologists are able to infer channel depth and fluid velocity during the time of formation, and thus better risk whether the fill is sand or shale prone. Seismic coherence and other edge-sensitive attributes are among the most popular means of mapping channel boundaries. Although these attributes can easily detect channel edges, they cannot indicate the channel's thickness. As channels become very thin (well below  $\frac{1}{4}$  wavelength) their waveform becomes constant, such that coherence measures based on waveform shape cannot see the channel at all. Spectral decomposition has been used to highlight channels. The spectral decomposition images are complementary to coherence and edge-detection attribute images in that they are sensitive to channel thickness rather than to lateral changes in seismic waveform or amplitude. Spectral decomposition analysis can be done within a fixed sized analysis window (using a short-window discrete Fourier transform, or SWDFT) following a picked stratigraphic horizon, thereby generating a suite of constant frequency spectral amplitude maps. Most commonly, the interpreter animates through these maps and chooses those maps with spatial patterns corresponding to reasonable geological models. There is a strong correlation between channel thickness and spectral amplitude. For thin beds below the tuning frequency, the composite seismic amplitude decreases linearly with thickness. Frequency corresponding to the peak spectral amplitude is an excellent means of summarizing the information content of the full spectrum, with a low peak frequency corresponding to thick channels, and a high peak frequency corresponding to thin channels. Even with careful tapering, spectral decomposition using the SWDFT has window effects. Frequency decomposition methods based on wavelet transforms compute instantaneous spectral attributes (ISA) in which peak frequency significantly increases with decreasing



layer thickness. The instantaneous amplitude gives a measure of reflection strength (magnitude) and often serves as a lithology identifier. Instantaneous attribute: Instantaneous attributes quantify wavelet shape at any sample point in a concise manner. Instantaneous attributes are computed sample by sample, and show instantaneous variations of various parameters. Instantaneous attributes such as trace envelope, its derivatives, frequency, and phase may be determined from complex trace. Instantaneous Amplitude: It is a measurement of the complex trace amplitude which may be visualized as the envelope of the seismic trace. Volumes of instantaneous attribute such as instantaneous amplitude and perigram are chosen to delineate the reservoir in terms of reflectivity as it gives information about the spatial distribution of the varied lithologies, both vertically and laterally. The instantaneous frequency, instantaneous bandwidth, dominant frequency, and response frequency isolate abrupt changes to characterize reflection zones, bedding, and lithology variation, while marking the unconformities and highlighting steam. Instantaneous phase delineates and map the unconformities as it is a good indicator of lateral discontinuities. Moreover, it is independent of seismic amplitude strength, which helps to analyze both weak and strong reflectors. It helps in mapping the unconformities in low seismic amplitude zones.

*Keywords: Spectral decomposition; Seismogeomorphic, Channel Detection*

