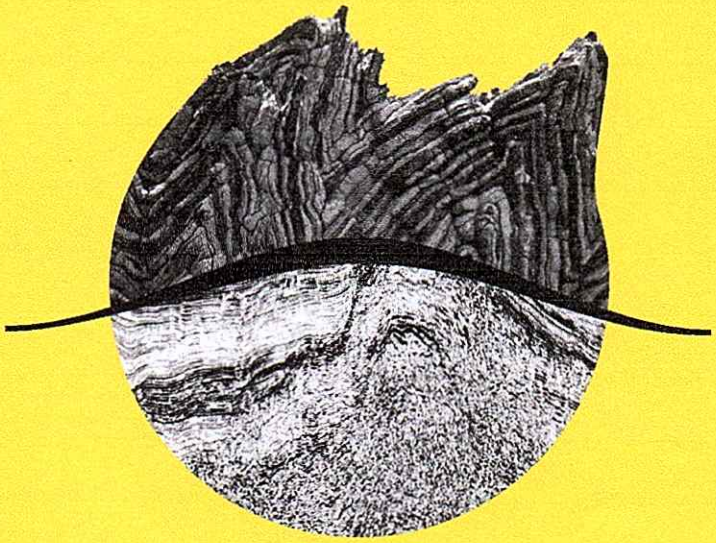
INDONESIAN SOCIETY OF PETROLEUM GEOLOGISTS
2ND ISPG RESEARCH FORUM

PROCEEDING



APPLIED BASIC CONCEPT AND PIT FALL UNDERSTANDING

UNIVERSITAS
INDONESIA

MARCH 22-23
2018

ISPG

ISPG
RESEARCH
FORUM

PROCEDDING OF 2ND ISPG RESEARCH FORUM "APPLIED BASIC CONCEPT AND PIT FALL UNDERSTANDING"

Head of Redactor

Prihatin Tri Setyobudi

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Editor Coordinator

Yuanita Devy Marhendra Putri

Reviewer Coordinator

Yan Bachtiar Muslihah

Oversight Committee: Sukmandaru Prihatmoko (President of Ikatan Ahli Geologi Indonesia) & Julianta Panjaitan (President of Indonesian Society of Petroleum Geologists)

Chairman of ISPG Research Forum: I Putu Ary Wijaya

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IKATAN AHLI GEOLOGI INDONESIA (IAGI)

Redactor:

Rukan Crown Palace Block C-28, Lantai 1, Jl. Prof. Dr. Soepomo, SH No. 231, Kel. Menteng Dalam, Kec. Tebet, Kota Administrasi Jakarta Selatan
Telephone: (021) 83702848 / (021) 83789431
E-Mail : researchforum@ispg.or.id

March 2018

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MESSAGES FROM THE CHAIRMAN

Dear colleagues and friends,
On behalf of the committee, I would like to invite you to participate and attend in 2nd ISPG Research Forum. The second ISPG Research Forum will be jointly hosted by Indonesian Society of Petroleum Geologist (ISPG), Indonesian Association of Geologists (IAGI) and University of Indonesia. The Research Forum will be held on March 28 2018, in University of Indonesia - Jakarta. The ISPG Research Forum is held as one of the agenda of a series of events commemorating the 57th anniversary of the IAGI.

ISPG humbly attempts to take part to enliven a culture of research particularly among of Indonesian geoscientist. Therefore we invite you young geoscientist, academicians, researchers and professionals to participate in presenting your scientific papers in our research forum. ISPG Research Forum devotes to geologists, geophysicists, geochemists and other scholars and experts of all disciplines related to oil and gas exploration. The second ISPG Research Forum wrapped in a theme **Applied Basic Concept and Pit Fall Understanding** . The forum attempts to rally and assemble new ideas, new methods and developments in technologies of oil and gas exploration.

We hope all the active participations, stakeholders, speakers and visitors will gain valuable benefit from the event, reacquaint with colleagues, discover and exchange ideas, and broaden their knowledge. We also wish ISPG Research Forum will be an effective event to bridge between researches to the real application in industry.

Finally, to ensure that you receive regular updates please refer to www.ispg.iagi.or.id as further details regarding the conferences are announced.
We are looking forward to seeing you in the event.

Your Faithfully,

I Putu Ary Wijaya

FOREWORDS FROM THE ISPG PRESIDENT

Dear colleagues and friends,
Indonesian Society of Petroleum Geologists (ISPG) is sub organization of Indonesian Association of Geologists (IAGI) which are focused in petroleum and gas industry. Our organization aim to promote welfare and educating the professional life of Indonesian petroleum geologists in particular and Indonesian nation in general.

One of our mission is actively conduct research forum to gather knowledge and linkage from university, research center and industry. The 1st ISPG research forum has been done in March 2017 by collaboration with Pertamina University. Success story has been made in the first event. As continuity of this program, The 2nd ISPG Research Forum will be held in March 2018 in collaboration with University of Indonesia. Therefore, we would like to invite geoscientist (geologist, geophysicist, geochemist) to join in our event ISPG Research Forum.

We believe by delivering excellent technical knowledge sharing program & high quality of paper research summary thru ISPG research forum, it will help and support our thought to Indonesian government especially in energy sector.

Finally, I hope the output result of the ISPG Research Forum will give impact and contribution to petroleum geology Indonesian community.

Your Faithfully,

Julianta P. Panjaitan

EDITORIAL STAFF AND ISPG RESEARCH FORUM COMMITTEE

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2. Well Log Analysis and Petrophysics

Keynote Speaker: Ricky Adiwibowo (Pertamina EP/SPWLA)
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Reviewer: Didit Putra Kusuma (PHE ONWJ)

3. Seismic and Non-Seismic, Geostatistic and Reservoir Modeling

Keynote Speaker: Charlie Wu (Universitas Indonesia)

Chairsession & Judge: Pongga Wardaya (CGG)
Judge: Humbang Purba (LEMIGAS)
Reviewer: Djedi Widiarto (Pertamina), Charlie Wu (Universitas Indonesia)

4. Petroleum System, New Play and Unconventional Reservoir
Keynote Speaker: Awang Harun Satyana (SKK MIGAS)
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5. Drilling, Geological Operation, Production, EOR, and Abandonment Site Restoration
Keynote Speaker: Frans Mulder (Lloyd's Register)
Chairsession & Judge: Sugeng Hartono (Petrochina)
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Reviewer: Pujo Ponco (PHE ONWJ)

6. Geothermal Energy
Keynote Speaker: Yunus Daud (Universitas Indonesia)
Chairsession & Judge: Supriyanto (Universitas Indonesia)
Judge: Untung Sumotarto (Universitas Trisakti)
Reviewer: Tavip Dwikorianto (PGE), Yunus Daud (UI)

- Poster Judge at Day 1: Anggi Yusriani (LEMIGAS); Yunus Daud (Universitas Indonesia); Ricky Tompu (LEMIGAS).
- Poster Judge at Day 2: Abang Mansyursyah Surya Nugraha (Universitas Pertamina); Reza Syahputra (Universitas Indonesia); Aldo Febriansyah Putra (ITB).

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2. Muhamad Iqbal Rezza Maulana - Geologi Perminyakan STT MIGAS Balikpapan
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19. Bryna Mustika - Geofisika UPN Yogyakarta
20. Feby Ramadhanty - Teknik Geologi Trisakti

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PRESENTATION SCHEDULE "ISPG RESEARCH FORUM 2018"
UNIVERSITAS INDONESIA, DEPOK
22 -23 MARCH 2018

Ver 15 Mar 2018

Day, Date and Time	Paper ID	Activities and Paper Tittle of Presentation	Authors	Institution
A. CLASS SESSION				
Day #1 Thursday March 22, 2018				
06.30 - 08.00		Registration		
08.00 - 09.00		Opening Ceremony		
09.00 - 09.30		Cofee Break and **Poster Session**		
SESSION 1		**Surface and Near Surface Geology, Tectonic and Basin Analysis**		
09.30 - 10.00		**Keynote Speker 1: Herman Darman - FOSI/Indogeo SE**		
10.00 - 10.20	RF18ISPG-076-GL	Provenance of Mesozoic Meluhu sandstone and its implication to petroleum system in Meluhu area, southeast arm of Sulawesi	Sugeng Sapto Surjono, Anggit Anggara Santika, and Muhamad Rizki Asy'ari	Department of Geological Engineering, Faculty of Engineering, Universitas Gadjah Mada,
10.20 - 10.40	RF18ISPG-042-GL	AN INTEGRATED STUDY ON ANALYZING SANDSTONE DIAGENESIS AND ITS IMPACT ON POROSITY AND PERMEABILITY, CASE STUDY: BAYAH FORMATION	L. Gideon Sidabutar1, Harlan Renald1 , Ivan Ibrahim1 , Avishena Prananda2	1Geological Engineering Department, Faculty of Earth Science and Technology, Trisakti University, Jakarta, Indonesia, 2Geophysics Department, Faculty of Mathematics and Natural Science, University of Indonesia, Depok, Indonesia
10.40 - 11.00	RF18ISPG-037-TBS	Tectonostratigraphic Framework and Under-Explored Plays of the Oligo-Miocene Reservoirs in the Offshore SE Sumatera PSC, Asri Basin	Primadani, G.S., Watkinson, I.M.[1], Gunawan, H., Ralanarko, D.[2]	[1]Royal Holloway University of London, Surrey, United Kingdom; [2] CNOOC SES, Ltd., Jakarta, Indonesia
11.00 - 11.20	RF18ISPG-004-WLS	Textural Analysis Of Bioturbated Sediment: An Outcrop Study of Sambipitu Formation as an Analogue To Understand Biogenic Influence On Reservoir Quality	1,2 Michel Ostias Jene, 1,2 Slamet Sugiarto	1 Department of Geological Engineering, AKPRIND Institute of Science & Technology, Yogyakarta 2 GAIA Research Indonesia
11.20 - 11.40	RF18ISPG-048-TBS	The Rejuvenation of Rift Play Concept and Petroleum System of the Northern Ombilin Basin	M.Addiansyah, M.H.Prasetyo, A.Krestanu, R.D.Linggadipura, M.Anggraini, B.K.Susilo	Geological Engineering Study Program of Sriwijaya University, Palembang, Indonesia
11.40 - 12.40		LUNCH		
SESSION 2		**Well Log Analysis and Petrophysics**		
12.40 - 13.10		**Keynote Speker 2: Ricky Adiwibowo - Pertamina EP**		
13.10 - 15.30	RF18ISPG-044-WL	The Overpressure Generating Mechanism in Gumai Graben, "MN" Block, Central Palembang Sub Basin for	Fariz Kustama Kadafi Loudoe1, Aiman Haidar Shamlan1, Eko Laksono1, Iin Muhsinah1	PT. Pertamina (Persero)
13.30 - 13.50	RF18ISPG-059-WL	Pore Type Inversion and S-Wave Velocity Estimation for Characterization of Salawati Carbonate Reservoir	M. Syamsu Rosid1, Yogi Muliandi1, Al Hafeez2	1 Department of Physics, University of Indonesia; 2 J.O.B PERTAMINA – PetroChina Salawati
13.50 - 14.10	RF18ISPG-067-WL	Petrophysical Analysis in Tight Gas Sand Reservoir to Determine Optimum Hydraulic Fracturing Interval	Agung Sandi1, Ken Prabowo BDS1, Litto Habrianta2, Prihadi Sumintadireja1	1Institut Teknologi Bandung; 2Rizki Bulat Barisan
14.10 - 14.30	RF18ISPG-080-WL	AN IN-DEPTH UNDERSTANDING OF SAND-SILT-CLAY (SSC) ADVANCED PETROPHYSICAL MODEL AND ITS ESSENTIAL APPLICATIONS TO LITHOLOGY COMPUTATION, PERMEABILITY ESTIMATION AND SATURATION MODELLING	Yudiyoko Ega Sugiharto*; Ramli Ibrahim*	* PETRONAS Carigali Sendirian Berhad
14.30 - 14.50	RF18ISPG-006-WLS	Analysis of Resistivity Value and Salinity Water Formation And Its Relation With Depositional Environments of Baturaja Formation, Gumai Formation and Air Benakat Formation in South Sumatera Basin	Aditya Arya Dewa1, Viki Fintaru1	Department of Geology UPN "Veteran" Yogyakarta
14.50 - 15.10	RF18ISPG-108-WLS	Petrophysical Analysis and Rock Typing to Determine The Quality of Carbonate Reservoir	1 Praditya Febri Yudhistira; 2 Nur Rahma Saini	1 Dept. of Geology, UPN "Veteran" Yogyakarta; 2 Pertamina Hulu Energi ONWJ
15.10 - 15.40		Cofee Break and **Poster Session**		
SESSION 3		**Seismic and Non Seismic, Geostatistic and Reservoir Modeling**		
15.40 - 16.10		**Keynote Speker 3: Charlie Wu - Universitas Indonesia**		
16.10 - 16.30	RF18ISPG-051-SI	The Amplitude Evolution to Study The Geomorphology of Fluvial Channel In The Taranaki Basin, New Zealand	Joko Wiyono, Muhammad Rozalli	GDA
16.30 - 16.50	RF18ISPG-077-RM	Advanced Fluids and Poretypes Simulation in Carbonate Reef Reservoir using Simultaneous DEM-Rockphysics Modelling (SDRM) Method	Mario Christy1, M Wahdanadi Haidar2, Erawati Fitriyani3, Reza Wardhana1, Kresna Bima Sudirgo1	1.Universitas Indonesia, Jakarta, Indonesia; 2. Pertamina Petrochina JOB East Java, Jakarta, Indonesia; 3. Lloyd's Register, Senergy Energy Services, Jakarta, Indonesia
16.50 - 17.10	RF18ISPG-002-GFS	T.R.I.H. ANOMALY ANALYSIS (TIME-LAPSE, RESISTIVITY, ISOCHOR, HYPOCENTER) USING GM2C (GRAVITY, MT, MEQ, CSAMT) METHOD INTEGRATION TO IDENTIFY NEW RESERVOIR POTENTIAL IN MALABAR MOUNTAIN AREA, WAYANG WINDU, PANGALENGAN, WEST JAVA	Dwiqie Riaviano; Ulyl Aidi Al-Abshor; EM.Rifqi Wilda Pradana	University of Pembangunan Nasional "Veteran" Yogyakarta
17.10 - 17.30	RF18ISPG-029-RMS	Interpretation of Gravity Measurement Data in Karangsambung Area Using Ordinary Kriging Method	Nadira Nanda Paringgusti Wijanarko, Owen Nicon Jimawan, Jeffrey Halim	Geological Engineering, Bandung Institute of Technology, Bandung, Indonesia
17.30 - 17.50	RF18ISPG-007-GFS	Application of Magnetotelluric Method in Unconventional Reservoir	David Andrian; Radean Gogomora Simanjorang; Reza Syahputra; Willy Yeremi;Yaser Rizky Hendrian	Departement of Geoscience,University of Indonesia,Depok,West Java
17.50 - 18.20		**Discussion**		
18.20 - 19.00		**Sholat**		
19.00 - 21.00		**Gala Diner**		
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Session 4		**Petroleum System, New Play and Unconventional Reservoir**		
07.00 - 07.30		**Keynote Speaker 4: Awang Harun Satyana - SKK MIGAS**		
07.30 - 07.50	RF18ISPG-020-SR	CHARACTERISTICS OF OIL SEEPAGES BOYOLALI: WHERE DID THEY COME FROM?	Tri Peni Setyowati*, Yurry Putra Nusantara, Arlo Budi Wicaksono, Anggi Yusriani, Ahmad Hidayatullah	PPPTMGB "LEMIGAS"
07.50 - 08.10	RF18ISPG-034-SR	Subsurface and Geochemical Case Study of West Cepu Ridge and Kening Trough in East Java Basin	Aditya Pradono, Dadali Rakasiwi, Cahyaningratri P.R	Geological Engineering Universitas Trisakti and Sele Raya Energi
08.10 - 08.30	RF18ISPG-115-UN	Abrupt Changes in Reservoir Properties of Coal and Its Governing Factors for Carbon Dioxide Absorbability	Afikah Rahim a,b, Sugeng Sapto Surjono a, Hendra Amijaya a, Kyuro Sasaki b	a. Geological Engineering Department, Faculty of Engineering, Universitas Gadjah Mada, Indonesia b. Earth Resources Engineering, Kyushu University, Japan
08.30 - 08.50	RF18ISPG-101-UNS	Insight on Mineral Identification and Porosity Characterization of Pematang Shale, Central Sumatera, Indonesia: Should We Discard U.S. Shale Analogue?	Hendra Amijaya, Ferian Anggara	Department of Geological Engineering, Gadjah Mada University
08.50 - 09.10	RF18ISPG-086-SRS	1D MATURITY MODELLING AND HYDROCARBON PHASE DETERMINATION IN CENTRAL ARDJUNA SUB BASIN, NORTHWEST JAVA BASIN FOR PREDICTING TIMING OF MIGRATION	Destamika Pramudianti1, Rahmatullah Ramadhan1, Vida Irine Rossa1, Sapto Kis Daryono1, Jayanti Anggraini2, Rahmat Budiana2	1Dept. of Geology, UPN "Veteran" Yogyakarta; 2Pertamina Hulu Energi
09.10 - 09.40		Cofee Break and **Poster Session**		
Session 5		**Drilling, Geological Operation, Production, EOR, and Abandonment Site Restoration**		
09.40 - 10.10		**Keynote Speaker 5: Frans Mulder - Llyod's Register**		
10.10 - 10.20	RF18ISPG-118-GF	Maximizing Magnetic Resonance Applications in Clastic and Carbonate Reservoirs.	Cahyo Nugroho , Gunawan Sucahyo	Baker Hughes, a GE company
10.20 - 10.40	RF18ISPG-058-WL	Applied Resevoir Rock Classification Using Modified Lucia Rocktyping Combination With Naive Bayes classification Method for Production Analysis	Kresna Bima Sudirgo1 , Mochamad Wahdanadi Haidar2, Erawati Fitriyani3, Reza Wardhana1, Mario Christy1	1.Universitas Indonesia, Jakarta, Indonesia 2. Pertamina Petrochina JOB, Jakarta, Indonesia 3. Llyod Register, Jakarta, Indonesia
10.40 - 11.00	RF18ISPG-079-OG	DENSITY EQUIVALENT (DEQ): A NEW PRESSURE GRADIENT INTERPRETATION METHODOLOGY AND ITS ESSENTIAL APPLICATIONS FOR SUBSURFACE STUDY IN OFFSHORE SABAH, MALAYSIA	Yudiyoko Ega Sugiharto*; Isham Fariz Ishak*; Ramli Ibrahim*	* PETRONAS Carigali Sendirian Berhad
11.00 - 11.20	RF18ISPG-112-PE	Updating Stress Dependent Parameters from Producing Reservoir Formation, Case: 'Jaeger' Oilfield, Indonesia	Rieza Rachmat Putra, Abdul Haris, Imam S. Ronoatmojo	Dept. Of Geoscience, University of Indonesia, INDONESIA
11.20 - 11.40	RF18ISPG-054-PES	Enhanced Oil Recovery by Plasma Pulse Technology to Increase Oil Exploitation: The Ups and Downs in Petroleum Production and Environmental Sector	Putra Nuramdhan, Sandi Putrazony, Alvin Taufik Hidayat	Geological Engineering Department, University of Pembangunan Nasional "Veteran" Yogyakarta, Indonesia
11.40 - 13.10		**Sholat Jumat and Lunch**		
Session 6		**Geothermal Energy**		
13.10 - 13.40		**Keynote Speaker 6: Yunus Daud - Universitas Indonesia**		
13.40 - 14.00	RF18ISPG-073-GT	Potential Geothermal Utilisation in Central Sumatra Basin: a Comparative Study With Other Potential Geotermal Sedimentary Basin	Felix M. H. Sihombing1, Dyah N. Sahdarini1, Syahputra Reza1	Geoscience Department, Faculty of Mathematics and Sciences, University of Indonesia
14.00 - 14.20	RF18ISPG-085-GTS	Geostatistical Analysis of Mercury (Hg) Data at Geothermal Prospect of Dompu District, West Nusa Tenggara	Rizal Adi Prabowo*, Rhefika Diah Anggraeni*, Virga Hydra Sahara*	*Institut Teknologi Bandung, Fakultas Ilmu dan Teknologi Kebumian, Program Studi Teknik Geologi

Additional Session				
14.20 - 14.40	RF18ISPG-070-GLS	Reservoir Analog Characterization Based on Outcrops and Darcy's Methods: A Preliminary Study of Potential Petroleum Play in Walat Formation, Sukabumi, West Java	Benyamin Perwira Shidqi; Ferry Fandrian; Sheila Ayu Pricila; Marsya Alfiana As'ad;Ildrem Syafri; Robby Saputra	Faculty of Geological Engineering, Universitas Padjadjaran
14.40 - 15.00	RF18ISPG-072-UNS	Exploration Challenges in North West Java: New Carbonates Play in Upper Cibulakan Formation	Marsya Alfiana As'ad1; Sheila Ayu Pricilia1; Benyamin Perwira Shidqi1; Ferry Fandrian1; Ildrem Syafri1; Ali Jambak2	1Faculty of Geological Engineering, Universitas Padjadjaran; 2Geological Department, Trisakti University
15.00 - 15.20	RF18ISPG-088-TGS	FORAMINIFERA APPLICATION FOR PALEOCLIMATE STUDY IN BATUPUTIH AREA , BATURAJA	Randi Mawardi; Elisabet Dwi Mayasari	Geological Engineering Study Program, Sriwijaya University,
15.20 - 16.00		**Discussion**		
16.00 - 16.30		Cofee Break and **Poster Session**		
16.30 - 17.00		Closing Ceremony Preparation		
17.00 - 17.30		**Closing Ceremony**		

B. POSTER SESSION

Day #1 Thursday March 22, 2018				
Poster 1	RF18ISPG-011-GLS	STUDI PETROGRAFI ANDESIT FORMASI KIKIM DAERAH BUMI KAWA DAN SEKITARNYA, KECAMATAN LENGKITI, KABUPATAN OGAN KOMERING ULU, PROVINSI SUMATERA SELATAN	Wahyu Kruna Putri [1], Relzky Dwiando [1], Elisabet Dwi Mayasari [2], Harnani [2]	[1]Mahasiswa Program Studi Teknik Geologi, Universitas Sriwijaya; 2)Dosen Program Studi Teknik Geologi, Universitas Sriwijaya
Poster 2	RF18ISPG-013-TBS	COMPARISON OF CHARACTERISTICS OF LIMESTONE BATURAJA FORMATION BASED ON PETROGRAPHY ANALYSIS IN KARANGENDAH AREA AND NEGERIAGUNG AREA, SOUTH SUMATERA	Rian Batindo (1), Alan Triyoga (1), Harnani, S.T, M.T (2)	[1] Mahasiswa Teknik Geologi, Universitas Sriwijaya, Palembang ; (2) Dosen Teknik Geologi, Universitas Sriwijaya, Palembang
Poster 3	RF18ISPG-026-GLS	ARCHITECTURAL ELEMENTS OF VOLCANICLASTIC MASS TRANSPORT DEPOSITS OF BANYAK MEMBER, WESTERN KENDENG,EAST JAVA	[1,2]Slamet Sugiarto; [2] Ida Bagus Oka Agastya; [1,2] Micnel Ostias Jene; [1,2] Topan Ramadhan; [3]Yan Bachtiar Muslih	[1]Department of Geological Engineering, AKPRIND Institute of Science & Technology Yogyakarta; (2)GAIA Research Indonesia; (3)Department of Geological Engineering Univeristyof Pertamina
Poster 4	RF18ISPG-028-GTS	IDENTIFICATION OF RESERVOIR OIL AND GAS POTENTIAL USING GEOLOGICAL MAPPING AND PETROGRAPHY THIN SECTION ASSESMENT IN NGRAYONG FORMATION, KADIWONO AREA, BLORA-REMBANG, CENTRAL JAVA	Baharuddin Fahmi, Faiz Akbar Prihutama	Geological Engineering UPN Veteran Yogyakarta
Poster 5	RF18ISPG-046-GLS	ARCHITECTURAL, FACIES, AND DEPOSITIONAL ENVIRONMENT ANALYSIS OF PALEOGENE TO NEOGENE DEPOSIT IN THE NORTHERN OMBILIN BASIN: IMPLICATION HYDROCARBON POTENTIAL	Ray Diwatra Linggadipura, R. Edo Fernando, Muhammad Hafiz Prasetyo, Avi Krestanu, Muhammad Addiansyah, Budhi Kuswan Susilo	Sriwijaya University
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Poster 7	RF18ISPG-030-RMS	A CORRELATION BETWEEN SATURATION, KINETIC MODELLING, AND OVERPRESSURE OF HYDROCARBON EXPULSION AND MIGRATION FROM SOURCE ROCK	Owen Nixon Jimawan (1); Harris Pramana (2)	(1)Geological Engineering, Institute of Technology Bandung, Ganesha Street No. 10 Bandung, Indonesia 40132; (2)Petroleum Engineering, Institute of Technology Bandung, Ganesha Street No. 10 Bandung, Indonesia 40132
Poster 8	RF18ISPG-074-TBS	THE INFLUENCE OF MIDDLE MIOCENE RECENT TECTONIC ROTATION TOWARDS THE APPEARANCE OF GEOLOGICAL STRUCTURES PATTERN IN TALANG SAWAH VILLAGE, SOUTH SUMATRA BASIN	Tito Adha Briliantoro, Muhammad Ardiansyah, Muhammad Hafiz Prasetyo	Sriwijaya University
Poster 9	RF18ISPG-078-GL	A combined petrographic-geochemical provenance study of Paleozoic rocks, in East Johor Basin, Peninsular Malaysia, related to the tectonic setting	Sugeng Sapto Surjono, Mohd Shafeea Leman	Department of Geological Engineering, Faculty of Engineering, Universitas Gadjah Mada
Poster 10	RF18ISPG-109-GLS	Rock-Typing As an Approach In Studying Carbonate Reservoir Analogue By Using Field Surface Data In Sidorejo, Gunungkidul, D.I. Yogyakarta	Ichsan Ramadhan, Agung Rizki Perdana, Putra Herlanto, Rahmadi Hidayat	Gadjah Mada University and Kasetsart University
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Poster 12	RF18ISPG-064-WLS	Multi-Resolution Graph Based Clustering (MRGC) Method for Hydraulic Flow Unit Identification In Uncored Well to Enhanced Characterization of Carbonate Reservoir in Tuban Formation, East Java Basin	Putri Agustin, M Risdi Zainal, Fahrudin, Reddy Setyawan, M Wahdanadi Haidar	Diponegoro University
Poster 13	RF18ISPG-104-WL	Optimization Rock Physics Model Differential Effective Medium (DEM) Using Adaptive Batzle-Wang Fluids Elastic Parameters in East Java Carbonate Field	Reza Wardhana, M. Wahdanadi Haidar, Muhammad Iksan, Rizky Miftahul Akbar	Departement of Physics, Faculty of Mathematics and Natural Science University of Indonesia
Poster 14	RF18ISPG-105-WL	Estimation of permeability by using Stoneley waves parameter in sonic log and rock typing based on pore type in Tuban Carbonate Field, Indonesia	Rizky Miftahul Akbar, M. Wahdanadi Haidar, Reza Wardhana, Muhammad Iksan	Departement of Physics, Faculty of Mathematics and Natural Science University of Indonesia
Poster 15	RF18ISPG-107-WLS	PORE PRESSURE PREDICTION AND ANALYSIS OF OVERPRESSURE GENERATING MECHANISM	Sheila Kusuma Putri, Rahmaan P. Alam, Muhajir	University of Brawijaya
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Poster 18	RF18ISPG-036-GFS	RISE OF MAGNETOTELLURIC DATA QUALITY BASED ON COHERENCE PARAMETER IN SAVU BASIN, EAST NUSA TENGGARA	Rizky Ramadhan Dwiyantoro, G.M.Lucky Junursyah, DR.Yatini	Jurusan Teknik Geofisika, Universitas Pembangunan Nasional "Veteran" Yogyakarta
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Poster 20	RF18ISPG-100-GFS	APPLICATION OF RESISTIVITY METHOD IN EXPLORATION OF BURIED TEMPLE SITE, STUDY CHASE : PENANGGUNGAN MOUNTAIN, EAST JAVA	Hafiz Rizaldi, Ferdion Firdaus, M Novritsah Z, Wien Lestary	Institut Teknologi Sepuluh Nopember
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Poster 22	RF18ISPG-022-BRS	NEW PLAY IN INDONESIAN, FRACTURED BASEMENT RESERVOIR: AN OUTLOOK, CHARACTERISTICS, AND FUTURE EXPLORATION	Ektorik Dimas, Rizky Dwi Renaldi	Geological Engineering Departement, Sriwijaya University
Poster 23	RF18ISPG-024-BRS	THE MESOZOIKUM ROCK CHARACTERISTICS BASED ON GEOCHEMISTRY AND STRUCTURAL ANALYSIS : PROBABILITY FOR NEW PETROLEUM PLAY CONCEPT	Rima Wardhani, Ektorik Dimas dan Thea Ardelia H.	Teknik Geologi, Universitas Sriwijaya, Palembang
Poster 24	RF18ISPG-031-UCS	IDENTIFICATION OF BIOGENIC GAS POTENTIAL USING INTEGRATED SEISMIC DATA, WIRELINE LOG AND GEOCHEMISRTY DATA, STUDY CASE: MURIAH SUB-BASIN, BAWEAN ARC, OFFSHORE NORTHERN EAST JAVA	Ahmad Filza A, Baharuddin Fahmi, Yordan Irsyadie A, Jati Arif P, Elfriandhi Ekawijaya	Geological Engineering UPN Veteran Yogyakarta
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Poster 26	RF18ISPG-053-GLS	Geological Structure And Stratigraphy Analysis On The Occurrence of Oil Seepages Based On Surface Data In Cipluk Oil Field (Have Left) Area, Kendal, Central Java	Juventus Karo Sekali Naibobe, Yusuf Abdurrosyid, Yustino Danu Saputra	Institut Sains & Teknologi AKPRIND Yogyakarta
Poster 27	RF18ISPG-068-UNS	POST MORTEM EVALUATION OF HYDROCARBON POTENTIAL OF 'YS' FIELD, BARITO BASIN, EAST BORNEO PROVINCE	Yuni Sardi, Sugeng Sapto Surjono, Rovicky Dwi Putrohari	Universitas Gadjah Mada
Poster 28	RF18ISPG-103-GLS	SURFACE AND SUBSURFACE CONFIGURATION KALIGARANG ACTIVE FAULT IMPACT TO GENETIC NATURAL GAS SEEPAGE IN BOTO, BANCAK, SEMARANG	Arhananta, Hendra Setiawan, Abdul Aziz Makarim, Agung Prayoga, Suko Prakoso, Bellawan Kusuma Aji	Universitas Pembangunan Nasional "Veteran" Yogyakarta
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Rise of Magnetotelluric Data Quality Based on Coherence Parameter in Savu Basin, East Nusa Tenggara

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Authors: [1]Rizky Ramadhan Dwiyantoro, [2]Lucki Junursyah, [1]Yatini
Affiliation: [1] Geophysics Engineering, University of Pembangunan Nasional "Veteran" Yogyakarta, Indonesia
[2] Geological Survey Center, Indonesia
RamadhanDwiyantoro@yahoo.co.id

[Abstract] - Magnetotelluric (MT) is a passive geophysical method that utilizing natural electromagnetic wave source by measuring electric field variation in an upright and changing towards time with the result that sub surface resistivity variation can be defined. Estimated time for MT measuring was 12 hours so data was affected by noise and caused decreasing grade of coherence around $0 \leq \psi \leq 1$. Increasing grade of coherence can be done by choosing proper *robust* technique and time series analysis at function transfer time series into frequency series, and then continued by selecting the correct XPR. Increasing grade of coherence analysis was done in 22 points of MT measuring on *Savu* Island, East *Nusa Tenggara* by *Pusat Survei Geologi* on 2014. The components parameter of coherence include electric field (*E*) and magnetic field (*H*) will increase by equal value or coheren value, so that errors in inversion part and interpretation part will decrease. Correct data processing by using parameter of coherence as standard of quality from data changing was proven increased quality of data by 25%. Increasing grade of coherence happened at whole MT measuring with average 90.66% or 0.9 excellent coherence. Impact of this increase is affecting the trend of resistivity value into more representative than before while the data was still affected by noise which means the grade of coherence is capable to be inverted and interpreted.

[Keywords]- Magnetotelluric, Coherence, Robust, Time series

[INTRODUCTION]

Background

Magnetotelluric (MT) is a passive geophysical method that utilizing natural electromagnetic wave source. This method measures electric field and magnetic field variation upright towardstime to define under surface resistivity variation (Vozzoff,1990). Source of MT' sarelightning (>1Hz) and solar wind (<1Hz) (Unsworth,2016). Data acquisition was done by *Pusat Survei Geologi* at Savu Island, East Nusa Tenggara. This research results on 22 sounding point (**SW01-SW22**) with frequency around(10kHz–10^{-4}Hz) (Junursyah,2014).

Problem on MT generally was caused by noise (outliers). The effect of noise causing value of resistivity variation on MT data become unrepresentative to process into inversion stage. Noise happens naturally or artificial, cultural noise caused by human activity and meteorogical disturbance caused by lightning activity and solar wind (Anugrah, 2015). Quality of data MT are reviewed and upgraded based on coherence parameter, where the MT coherence signals are electric field (E) and

magnetic field (H) from measuring result with assumption both have the same value. If the MT data is coherent, between both of the field have similarities in every data component (Hx, Ey, Ex and Hy). Parameter of coherence are detailingly defined and determined MT data processing technique. The result from processing data stage can be measured accurately. Degrading of coherence value happened because of noise and dead band. "*MT deadzone*" or "*Dead band*" is aphenomenon in frequencies around (5–0.5Hz) with more than 1 hz of effective depth caused by inductive source mechanism (Simpson, F., and Bahr, K., 2005). Upgrading of coherence value from MT data is done to obtain representative model and minimalize therisk of fault in MT modeling that very affecting in an interpretation stage. There are someflow processing torise of quality data with Robust technique, time series analysis, and selecting good crosspower (XPR).

Geological Research Area

Based on geological map with scale 1 : 250000 Kupang-Atambua (Rosidi, dkk., 1996; Suwitodirjo and Tjokrosapoetro, 1996) there are some formation on the research territory at **Qa**(Alluvium), **Ql** (Coral limestone), **QTn** (Noele Formation), **Tmb** (Whitestone formation), **Tko** (Ofu formation), **Fb** (Bisane formation). Measuring line explained on **Figure1** that was measured by *Pusat Survei Geologi* on 2014. There are 2 measuring lines where the line 1 had 12 km and line 2 had 14 km.

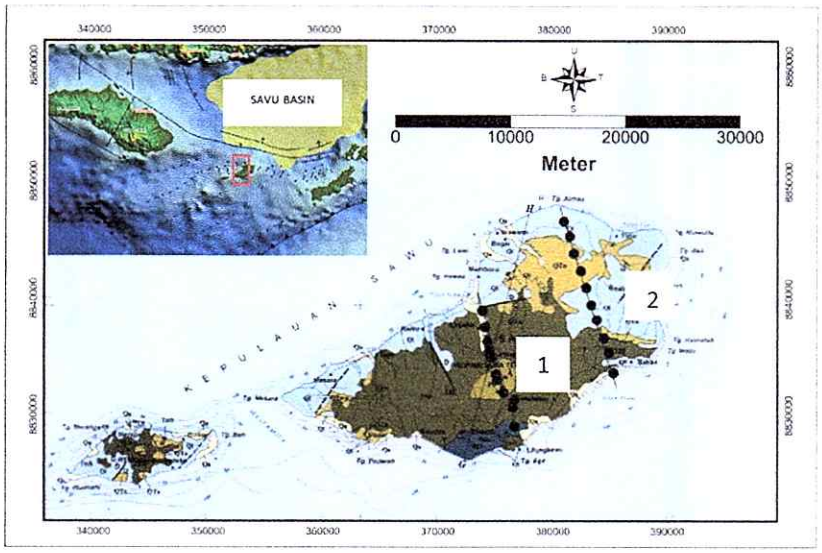

Figure.1 Modified Regional Geology Mapand correlation with MT measuring points(Rosidi, at all. 1996; Suwitodirjo and Tjokrosapoetro; Junursyah, 1996; 2014

[METHODS]

Background Processing MT

Signal coherence (**COH**) is real number with dimension by grade around $0 \leq \psi \leq 1$ stated by spectral ratio which composed by spectrum correlation electric and magnetic field <E*H> (*complex conjugation) to count transfer function, divided by two spectrum auto power. An excellent data have value ofcoherence approaching to 1 (Mwakirani,2012).

$$\psi = \frac{\langle E*H \rangle}{(\langle E*E \rangle \langle H*H \rangle)^{1/2}} \qquad (1)$$

Data measured with MTU – 5A (phoenixgeophysics) and obtained extension file: **AMT***.TBL, **AMT***.TS2, **AMT***.TS3, **AMT***.TS4, **MT***.TBL, **MT***.TS3, **MT***.TS4, and **MT***.TS5 which fromall of the data was used to data processing. Robust processing was done by detecting outliers. Outlier is a data that have value of resistivity far from whole value,so that data can be given lower weighing iteratively (EgbertandBooker,1986) stated:

$$\sum_{i=1}^{N2} w_i \, r_i^2 \qquad (2)$$

There are 3 different parameters on Robust technique composed by NW (noweight), RV (Rho variance) and OC (Ordinary coherence) where all of the separametershad typical trait towards data. NW parameter is a data parameter without weighing often called as "raw data" , RV is data weighing based on resistivity variation, OC is parameter that compares measuring data and reference data robust where processing only can be done for coherent data (Phoenix Geophysicist,2005). According to Hidayat (2016) and Maryani (2016) minimum standard of good coherence value is around 0.75 or 75%. Time series analysis is a kind of reduction noise process by analyzing coherent signal and cut the signal that coherent towards time. Excellent crosspower selection was done after it had coherence value above minimum standard. XPR selection was conducted for fixing grade of coherence in a quantitative or inaqualitative trend of resistivity value.

[RESULT AND ANALYSIS]

Result of Base Processing

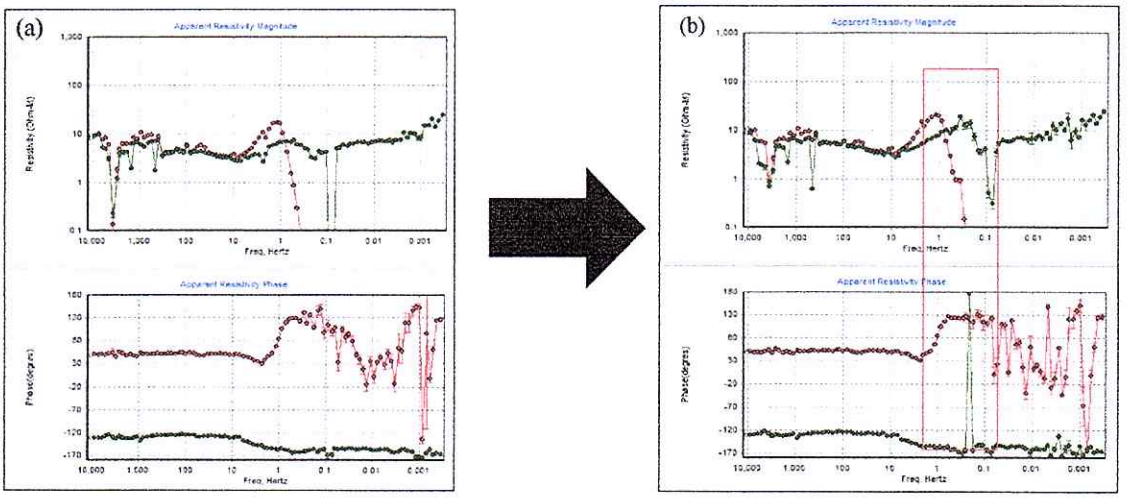

Figure1. Graphic of resistivity and phase vs frequency on point SW 01 after robust process. (A):Noweightparameter (NW) COH (66.23%); (B):Ordinary coherence parameter (OC) COH (70.42%). Redbox: Changing trend of graphics

Figure 1 shows Robust result in resistivity, phase vs frequency graphic Fig.1 (a) with No weight parameter and (b) Ordinary coherence (OC). Based on coherence value it was defined that (OC) ordinary coherence is the best parameter with coherence 70.42 % on SW01 eventhough below the standard of coherence. A good data generally have coherence value above 75% after robust process.

Time series analysis was done on SW-01 to reduce noise. Time series data (TS3, TS4, and TS5) contained 3 frequencies: TS3 (40-78Hz), TS4 (5.6–33Hz) and TS5 (0.00034 Hz -4.7 Hz). Both TS3 and TS4 had high frequencies with assumption that the energy of MT in that range is close to lightning source surface (Jiracek, 2016), then itweakened to low frequency and reached resistive layer. TS5 contain noise that caused by lightning or local noise. It could be seen while amplitude getting stronger between component E and H at the same time. This analysiswould be explained on **Figure 2.**

Reduction of Noise with Time Series Analysis

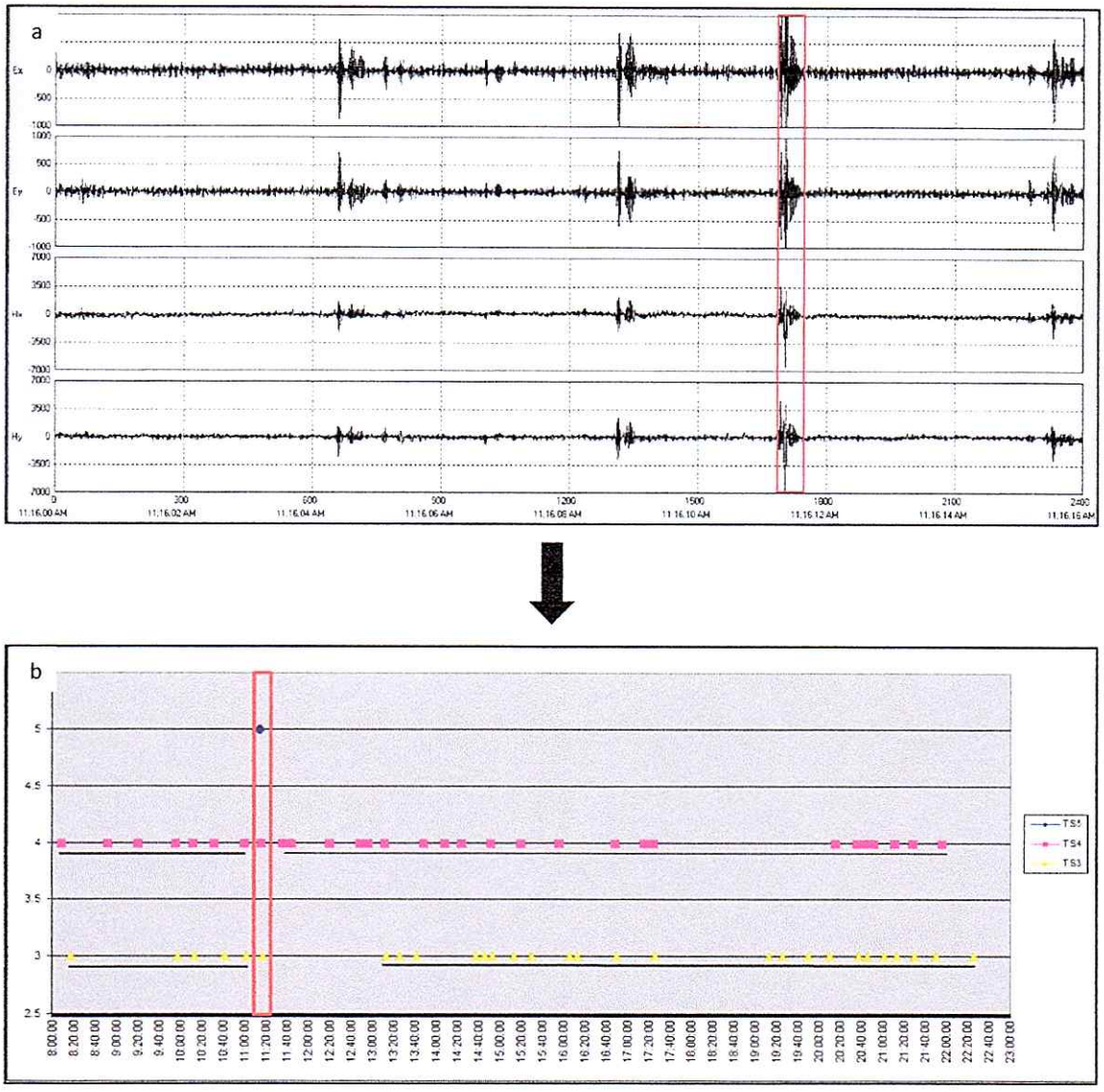

Figure2. Time series Analysis (TS4) Red box: Coherent signal (a) and signaltimerecording. (b) Bluepoint: TS5; Pinkpoint: TS4; Yellowpoint:TS3; Red box:Noise

Based on time seriesanalysis,robustprocesswasdoneat differentdurationbecausethere was signal cut at 11.00 WITA – 11.20 WITA. Result of time series analysis process was reduced noise and minimalized deadzone phenomenon (5Hz–1Hz) into lowest frequency (10^{-4} Hz) the information was obtained for ρxy. Quantitatively value of coherence was step up 16.71% based on phase graphic or resistivity shown that the curve becames or representative both ρ xy and ρyx.

Figure3 shown coherence value changes on SW01 after time series analysis process. Coherence result for both modes stated by redpoint (TE) and green point (TM) at coherence graphic result qualitatively, trend of data stepped up for (ρxyand ρyx). Based on that pattern it is proven that time series analysis increase the quality of dataand minimalize the effect of "MT deadzone" or noise. High frequency segment at coherence curve were slightly stepping up at 5400 Hz to 7200 Hz with average10%. Meanwhile, for intermediate frequency segment (1Hz–1000Hz) the data stepped up with average 5% and on low frequency (<1 Hz) both modes got coherence value changing significantly.

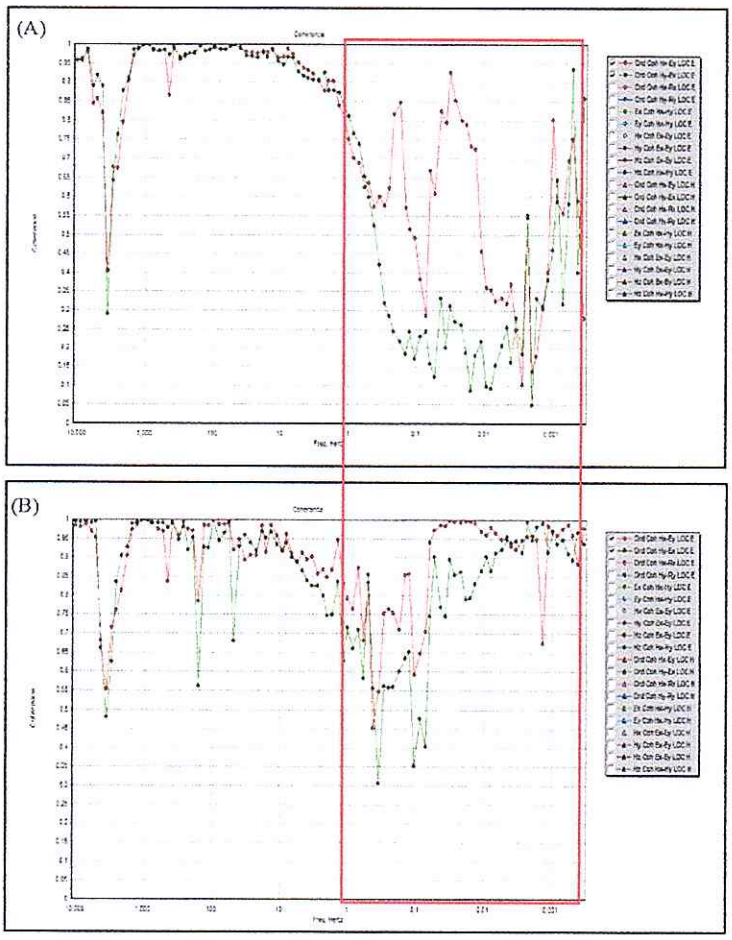

Figure 3.Coherence graphic compared to frequency onSW01. (A): Robust OC COH (70.42%); (B): Time series analysis COH (87.13%)

Final processing with selecting good XPR (Edit XPR)

XPR selection is the last step of processing to improve the quality of data. This selection is to improve coherence value and fix the trend from resistivity value that random from MT data by giving it more weighing at the data that match with pattern and reducing outlier that disturb MT pattern. **Figure 4** shows comparison of all process results on SW01.

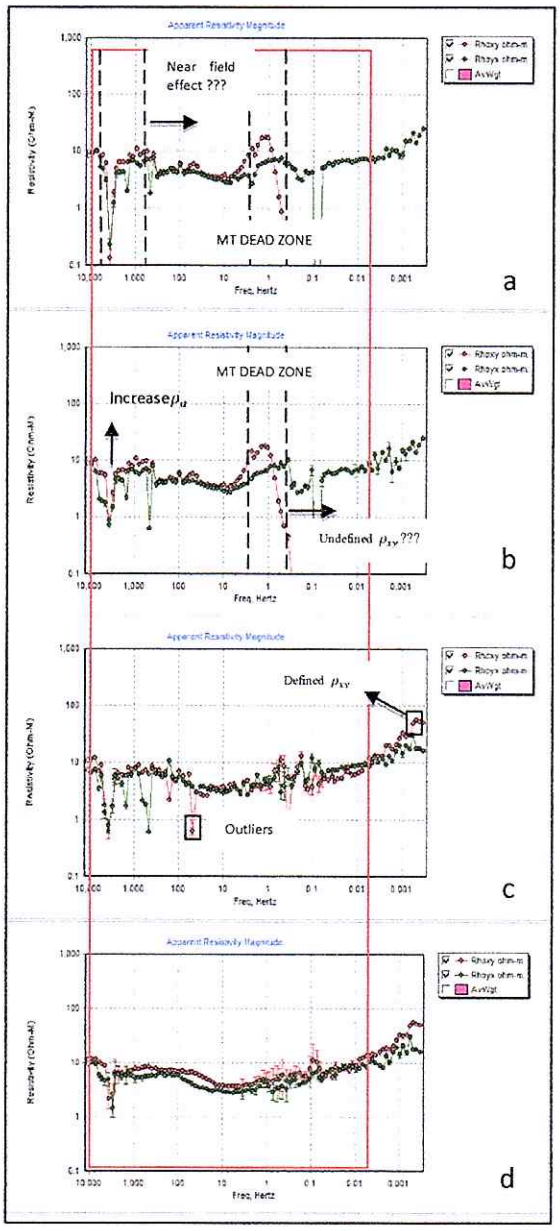

Figure 4.Resistivity graphic compared to frequency on SW01(a): Raw. COH (66.23%) ; (b): Robust OC COH (70.42%) ; (c):Timeseries COH (87.13%); (d):XPRselection COH (91.93%) ;Redbox:graphic change pattern.

Trend of resistivity value qualitatively changed too significant and smooth, so the pattern of SW 01 became :high, low; high. It shown on high frequency (10^4-10^2Hz) there were some changes of resistivity value composition for ρxy and ρyx which become more resistive based on XPR selection results. There was a difference on time series analysis which the data look more conductive on high frequency.

Figure 4 shows on deadzone frequency from MT (5Hz–1Hz) trend of resistivity graphic and phase divided by frequency became smoother based on XPR selection results and became more conductive than the result of time series analysis for frequency10^1Hz– 10^{-2} Hz at both of the result (XPR selection and time series analysis) data got the same pattern, it shown there was some reversal from TE and TM pattern on those frequency range. These things prove that there was geological disturbance which was structure that caused the data got difference of resistivity contrast. Quantitatively, MT data from time series analysis got coherence grade 87.73% inaverage but stepped up by4.8 so the value of coherence on SW01 became 91.93%. Since the value is almost 100%,SW01is the best to be modeled.

[DISCUSSION]

Discussion

Based on **base processing results** there were 2 points that below coherence standard (75%) and the point was SW01 and SW11. Rise of coherence was happened again with rising average from whole point is 21.66%. Time series analysis reduced noise significantly on SW01 and SW11 and it is proven that the coherence value was increased to 86.83% on average.

Rise of data quality happened on SW16 and it was the highest rise with grade 41.42% and it was predicted the rise was caused by noise from human activity or lightning. Meanwhile, SW02 got the best quality of data with coherence grade 95.55%. Coherence value average from benchmark 25.66% (Raw) after all the process there was rising of data quality 25% that change the coherence grade become 90.66%. Based on MT data quality rise the whole point is capable tobe modeled.

Table.1 Final Coherency of Savu Basin

NO STAT.	TOTAL DATA	RAW DATA	COHERENCY (%)		AVERAGE (%)	ROBUST	COHERENCY (%)		AVERAGE (%)	TIMESERIES (%)		AVERAGE (%)	EDIT XPR		AVERAGE (%)
			RHO XY	RHO YX			RHO XY	RHO YX		RHO XY	RHO YX		RHO XY	RHO YX	
SW01	100	NW	70.74	61.73	66.23	OC UP AUTO	77.38	70.70	74.04	89.85	84.40	87.13	93.21	90.66	91.93
SW02	100	NW	75.99	58.32	67.16	OC AUTO	94.71	93.45	94.08	>75%			96.44	94.66	95.55
SW03	100	NW	56.26	49.75	53.01	OC AUTO	82.63	75.63	79.13	>75%			94.77	92.69	93.73
SW04	100	NW	85.31	90.18	87.75	RV AUTO	87.01	91.72	89.36	>75%			88.61	93.23	90.92
SW05	100	NW	72.01	74.30	73.15	OC AUTO	86.03	90.97	88.50	>75%			91.37	92.60	91.99
SW06	100	NW	57.61	43.37	50.49	OC UP AUTO	88.79	86.04	87.42	>75%			91.91	89.14	90.52
SW07	100	NW	88.92	70.94	79.93	OC	89.29	76.84	83.06	>75%			92.90	73.54	83.22
SW08	100	NW	85.56	48.04	66.80	RV AUTO	88.79	86.04	87.42	>75%			93.94	92.18	93.06
SW09	100	NW	88.19	87.88	88.04	OC AUTO	91.09	89.40	90.24	>75%			93.62	92.48	93.05
SW10	100	NW	82.98	78.66	80.82	RV AUTO	87.11	87.00	87.06	>75%			90.00	90.31	90.16
SW11	100	NW	55.73	50.66	53.19	OC UP AUTO	68.53	65.60	67.07	84.09	77.45	80.77	89.52	84.39	86.95
SW12	100	NW	63.59	50.33	56.96	OC UP AUTO	86.37	83.82	85.09	>75%			88.92	88.06	88.49
SW13	100	NW	85.24	89.77	87.51	RV UP AUTO	89.23	90.90	90.06	>75%			92.34	93.26	92.80
SW14	100	NW	44.10	47.90	46.00	OC UP AUTO	81.94	84.67	83.31	>75%			86.97	86.82	86.89
SW15	100	NW	62.47	83.54	73.00	OC UP AUTO	86.94	89.26	88.10	>75%			90.28	91.38	90.83
SW16	100	NW	53.55	42.58	48.06	OC UP AUTO	85.40	84.79	85.10	>75%			90.85	90.24	90.54
SW17	100	NW	39.40	62.24	50.82	RV UP AUTO	88.40	90.04	89.22	>75%			91.46	93.03	92.24
SW18	100	NW	72.56	75.75	74.15	RV AUTO	88.10	93.16	90.63	>75%			91.94	95.49	93.72
SW19	100	NW	62.28	51.85	57.07	OC AUTO	82.33	84.83	83.58	>75%			85.87	88.49	87.18
SW20	100	NW	56.60	43.30	49.95	OC AUTO	86.40	87.66	87.03	>75%			89.41	90.73	90.07
SW21	100	NW	79.59	86.89	83.24	OC AUTO	88.49	89.27	88.88	>75%			91.30	92.06	91.68
SW22	100	NW	55.24	47.16	51.20	OC UP AUTO	84.43	85.76	85.10	>75%			88.62	89.21	88.91
RAW DATA						ROBUST				TIME SERIES			EDIT XPR		

[CONCLUSIONS]

Conclusions

1. The whole measuring point got increased on the coherence value.
2. Coherence analysis effective to indicate the character of MT data noise and become the bench mark on deciding the dataprocessingtechnique.
3. Based on robust process, time series analysis and XPR selection, the whole trend resistivity on the data could be significantly corrected.
4. MT data was already representative tobe modeling and to interpretation based on coherence grade rise is 90.66 % and affected by few noises.

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