CINEST

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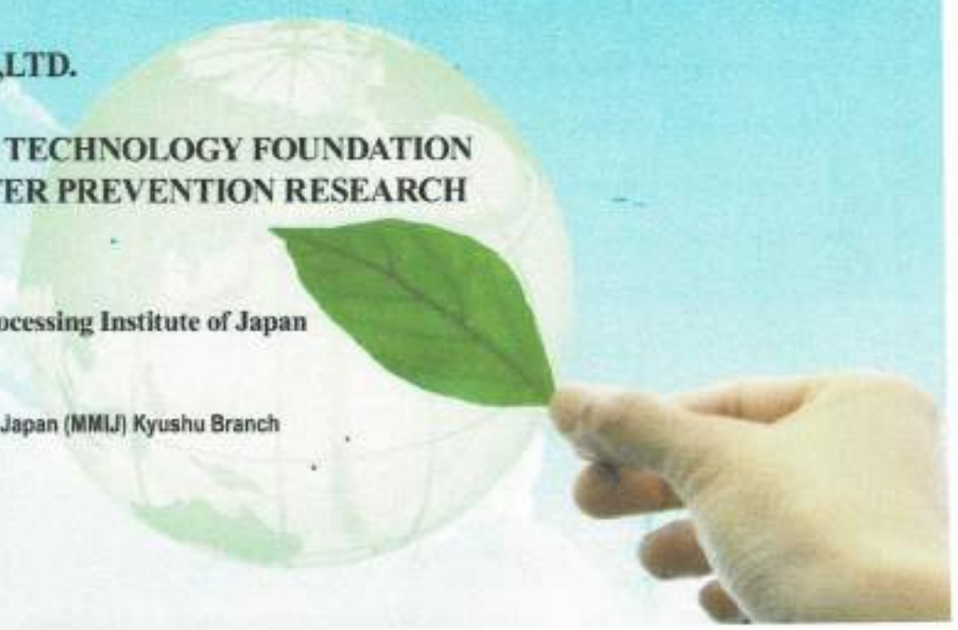

International Symposium on Earth Science and Technology 2019

Greetings from Cooperative International Network for Earth Science and Technology (CINEST)

We are facing with global environmental problems with problems on resources depletion at behind. In particular, the rapid increases in mineral resources and energy consumptions have cast a shadow over the sustainability of human activities. The CINEST was founded in 2008 to enhance cooperative studies and activities by young researchers and engineers, because their boldly tackles must be keys and absolute foundation to solve problems found on the earth, especially in Asia and Africa. I would like to emphasize to young researchers that performing research "by hand" rather than "by manual" may develop their potential to find new solutions.

This international symposium started from 2008 cooperating with The JSPS International Training Program during 2008 to 2012, and has been supported by Mitsui-Matsushima Co., Ltd. from 2013. The important objective of the symposium is strong networking of young researchers to enhance international collaboration to solve both of global and domestic problems on mineral resource and environment.

Finally, I would like to sincerely thank all of the organizations and participants, and believe the symposium will provide fruitful successes for all.

Welcome to "International Symposium on Earth Science and Engineering 2019."

K Sasaki

Kyuro Sasaki
CINEST Chair

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Saturday, 7th of December, Field Trip "Study Tour of Earthquake in Kumamoto 2016"

(Registration is still opened)

8:50 Meet at the meeting place, JR Hakata Station (Chikushi ext.)

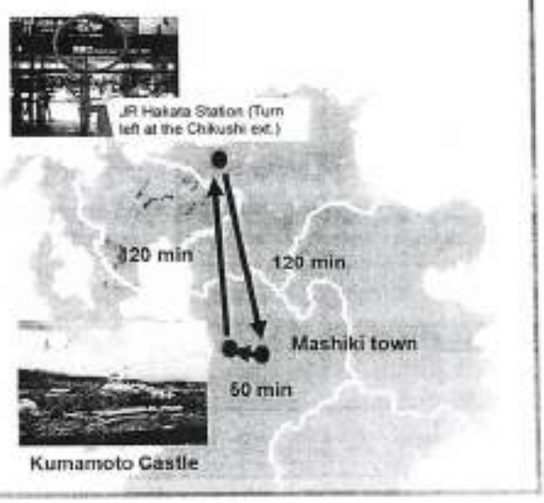
9:00 Depart from JR Hakata Station by bus (One brief stop on the way)

11:00 - 12:00 **Mashiki town, Kumamoto Pref.** (study tuar about the earthquake disaster, Kamimashiki-gun, Kumamoto pref.)

12:50 - 13:50 **Lunch in Josaien in Kumamoto Castle** (Kamimashiki-gun, Kumamoto pref.) *Self-pay meal for lunch in here.

13:50 - 15:30 **Kumamoto Castle** (**Beautiful reconstruction of the original castle,** Kumamotoa city, Kumamoto pref.) (One brief stop on the way back)

17:30 Arrived at JR Hakata station



Coal Geology and Coal Depositional Environtmental of Keban Area, Lahat Sub-District, South Sumatera, Indonesia

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ABSTRACT

Regionally, the study area belongs to the Syn Orogenic tectonic phase (Ginger and Fielding, 2005). This phase causes the formation of structural traps for hydrocarbons in the South Sumatra Basin. Coal bearing formation in the research area is the Late Miocene - Pliocene included Muara Enim Formation. In the Late Miocene Period there was an increase in volcanic activity in the Bukit Barisan Mountains where most of the vukanic sediment material in the form of tuffaceous sandstone and tuffs filled the Muara Enim formation. The structure that develops in the study area is the plunging anticline which is relatively E-W with a bedding of dipping of the southern between 37°-58° and north wing between 28°-37° with angle of plunging 24°. Coal distribution pattern of the study area follows of the plunging anticline pattern.

The geological map of the study area consists of 2 rock units are: Muara Enim Sandstone Unit with sandstone lithology, carbonaceous sandstone and tuffaceous sandstone, massive structure, wavy laminated, intercalation of thin coal (0.2m - 0.6m). The Muara Enim Claystone Unit consists of interbedded of carbonaceous claystone, claystone, intercalation of coal, sandstone and tuffaceous sandstone, cross-lamination structure, bedding flaser, coal thickness between 3 - 10 meters. The coal depositional environmental of the Keban area and its surroundings is deposited in delta plain through a regression phase with the presence of multiple seam coal.

The coal quality of the Keban Area: Caloric Value 5347-5504 kcal / kg, Inherent Moisture (23.6%), Ash (4%), Volatile Matter (32.1%), Fixed Carbon (40%), Total Sulphur (0.5%) including Sub-Bituminous Coal.

***Keywords**: syn-orogenic, plunging anticline, flaser bedding, delta plain, multiple seam, sub-bituminous coal.*

INTRODUCTION

Physiographically, the South Sumatra Basin is a northwest-southeast trending Tertiary basin, bordered by the Semangko Fault and Bukit Barisan to the southwest, Sunda Exposure to the northeast, Lampung Height to the southeast that separates the basin from the Sunda Basin, and the Twelve Mountains and The Thirty Mountains to the northwest separating the South Sumatra Basin from the Central Sumatra Basin (Van Bemmelen, 1949). The South Sumatra Basin is a Tertiary-aged back arc basin formed as a result of an interaction between the Sundanese Exposure (as part of the Asian mainland plate) and the Indian Ocean plate. This basin area covers an area of 330 x 510 km2, where the southwest is bounded by the Bukit Barisan Pre-Tertiary outcrop, to the east by the Sunda Shield (Sunda Shield), to the west is bounded by the Tigapuluh Mountains and to the southeast is bounded by Lampung High (Wisnu & Nazirman, 1997).

According to Ginger & Fielding (2005), the history of the South Sumatra Basin is divided into three tectonic Megasequences that form the structural framework of the South Sumatra Basin region, namely the Megasekuen Syn-Rift, Megasekuen Post-Rift, and Megasequences Inversion / Syn Orogenic. Stratigraphy The South Sumatra Basin is generally known as a megacycle consisting of a transition and regression. Formations formed during the transgression phase are grouped into the Telisa Group (Talangakar Formation, Baturaja Formation, and Gumai Formation). The Palembang group was deposited during the regression phase (Airbenakat Formation, Muaraenim Formation, and Kasai Formation).

while the Lemat Formation and Old Lemat Formation were deposited before the main transgression phase (Ginger, 2005).

Figure 1. Research area based on Lahat District infrastructural map

This research was conducted to determine the microscopic composition of coal based on the mecerals composition and changes in maturity (coal rank), so that by microscopy can be known organic components of coal as additional data that will support the use of coal, especially the potential of coal methane gas resources.

GEOLOGICAL LOCAL CONDITIONS

Stratigraphically the Keban Area is included in the Muaraenim Formation which is composed of 2 successive rock units from old age, namely the Muara Enim sandstone unit and the Muara Enim claystone unit. The top and bottom are characterized by the appearance of a continuous layer of coal laterally. This formation has a thickness of between 263 m which is calculated using logs in the study area. This rock unit has the age of Late Miocene - Pliocene which was determined using palinological analysis with the characteristic Fossil Pollen *Florzchuetzia meridionalis* (Rahardjo,et,al 1994). Based on the sedimentary structure developed in this rock unit and the interpretation of drill log data, this unit was deposited in the Lower Delta Plain environment with a tidal distributary channel sub-environment, referring to Allen & Chambers in 1998. Image of the depositional environment The Muaraenim sandstone unit refers to the Allen & model Chambers (1998). The research area is composed of Muara Enim Sandstone Unit consist of sandstone with flaser structure, sandstone with carbon laminae, glauconitic sandstone, with coal inserts and Muaraenim claystone unit consist of carbonaceous sandstone, claystone with lenticular structure, lamination of claystone, tuffaceous sandstone, with coal inserts. In the research area there are 3 coal seams, namely seam coal A (A upper and A lower), seam coal B, and seam coal C. Coal in the study area is included in the Subbituminous rank.

The major geological structure that developed in the Keban Area is an anticline that has a relatively west-east direction with a north-south relative direction flank.

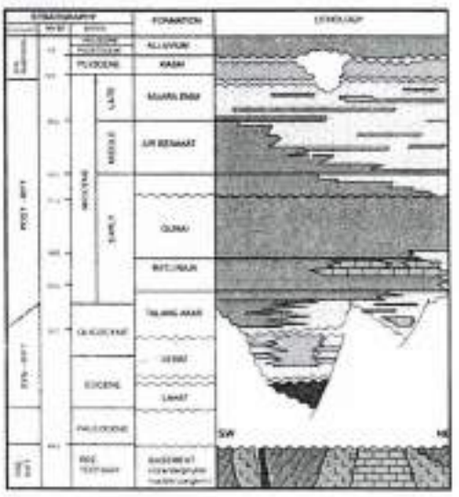

Figure 2. Stratigraphic of South Sumatera Basin (Ginger and Fielding, 2005)

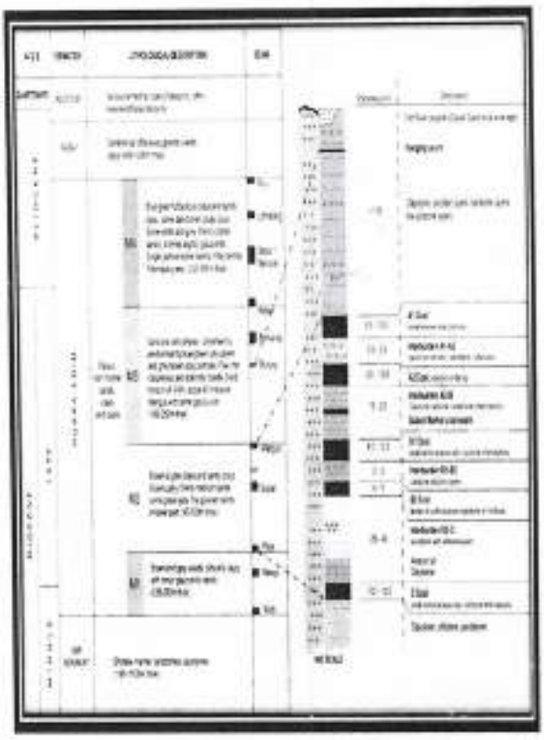

Figure 3. Stratigraphic of Muara Enim Formation (Shell Mijnbouw, 1978)

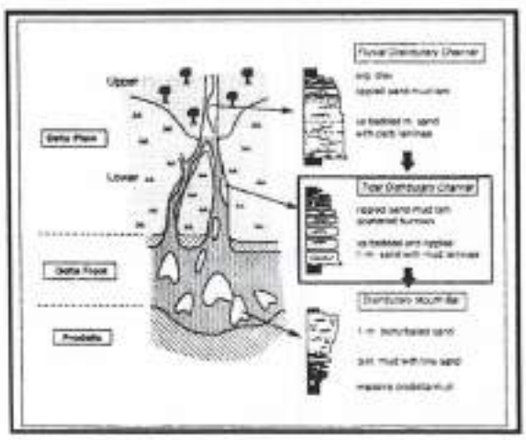

Figure 4. Muaraenim Formation's Sedimentary Environment (Allen & Chambers, 1998)

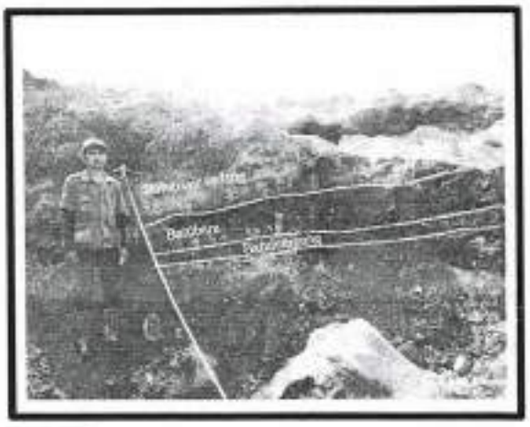

Figure 5. outcrop photo of coal seam in Keban Area.(Camera's direction N 355° E)

Figure 6. age determination based on Rahardjo, et. al, 1994.

Tectono-Stratigraphy Of Tertiary Coal Deposits

In a previous publication (Koesoemadinata, et al, 1978), the author classified coal deposits in transgressive phase of the early stage of the Neogene basin development which is Oligocene-Miocene also as Paleogene Coal. However, in view of recent knowledge it is more appropriate utilize tectono-stratigraphic setting.

From tectono-stratigraphic point of view

the following depositional episodes can be recognized:1) Syn-rift and Associated Rift-valley Depositional (Eocene-Oligocene), 2) 'Post-rift' Transgressive Phase Deposition (Oligocene-Early Miocene), 3) Syn-orogenic Regressive Phase Deposition The term syn-rift depositional is limited to deposition of the rift-valley basin during active rifting (initial and climatic phase of posser, 1993, syn-rift of Lambiase, 1990, Lambiase & Morley, 1999) while subsequent filling of the Rift-Valley basin is reffered to as post-rift deposition. Lambiase (1990) shows in his diagram that fluviatile deposition took place at the end of syn-rift fill as well as in the subsequent post-rift fill of the rift-valley. This is presumably what is referred to as Early Post-rift and Late Post-rift deposition of Prosser. Coal is deposited in the deltaic environment in the flexural side of the half grabben and the fluviatile environment toward the end of active rifting as well as in the post-rift fluviatile environment. In this paper the term syn-rift and associated rift-valley deposition will be refered to as 'syn-rift deposition', while the term post-rift will be used in the subsequent tectonic environment of wide-spread general subsidence, often called 'sag' in the Indonesian geology literature.

Back-arc Basin Setting: In South Sumatera, syn-orogenic regression-related coal seams are extensively developed in the deltaic deposition of the Miocene-Pliocene Muara Enim Formation, where over 10 coal seams are present, with maximum thickness exceeding 20 m (Suban Coal Seam) (Taupitz, 1988). Over 20 coal occurences have been discovered around the Tanjung Enim field where the coal is being mined. Average calorific value is 5504 to 5347 kcal/kg (as received) and total moisture content: 23.6% (as received), sulphur content of 0.5% Ash 4%, VM 32.1% and FC: 40.3% at Tanjung Enim some of the coal has been ameliorated by andesitic intrusion into anthracite with CV of 8000 kcal/kg.

CONCLUSION

Based on the developing sedimentary structure and interpretation of the drilling log carried out in the Muara Enim sandstone unit, the unit is deposited in the Lower Delta Plain environment in the tidal distributary channel sub-environment. Age of Muaraenim Sandstone Unit based on palinological analysis has Late Pliocene-Miocene age.There are 4 coal seams in Keban Area, namely seam coal A (A upper and A lower), seam coal B, seam coal C that including in SubBituminous rank.

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