

**PROCEEDINGS**

GEOSEA XIV AND 45TH IAGI ANNUAL CONVENTION 2016 (GIC2016)

The Trans Luxury Hotel, Bandung, October 10 – 13, 2016



**PROCEEDINGS OF GEOSEA XIV AND 45th IAGI ANNUAL  
CONVENTION 2016**

*"ASEAN Earth Resources and Geoscientist Role in AEC Era".*

**10-13 October 2016, Bandung, Indonesia**



**IKATAN AHLI GEOLOGI INDONESIA (IAGI)**

Indonesia Association of Geologist

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Ikatan Ahli Geologi Indonesia (IAGI)

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## **PREFACE**

The 45<sup>th</sup> Annual Scientific Convention of the Indonesian Association of Geologists (IAGI) this year has been held in conjunction with the GEOSEA Congress XIV (abbreviated as GIC-2016). The GEOSEA is a communication forum for the geologists in Southeast Asia countries.

The main theme of the event which is the ASEAN Earth Resources and Geoscientist Role in AEC (ASEAN Economic Community) Era has made the papers submitted and presented in the event covering a wide range of variety. The main theme covering two main topics, i.e. earth resources and geoscientist development in ASEAN countries has also been represented by the papers presented in this event.

Although since several years ago, the earth resource industry situation has not been that bright, triggered by the declining of commodity prices, regulation uncertainty, and also other issues related to the local stakeholders; this GIC 2016 event has attracted significant numbers of participants including industry geologists, faculty staff from the universities, government agencies, contractor companies, and other experts. It is the IAGI's pride to present this GIC 2016 event for the benefit of geological society in both Indonesia and ASEAN countries.

The proceedings contain all papers presented in the GIC 2016, covering various topics including

1. Engineering Geology, Hydrogeology, Mitigation and Applied Geology
2. Geology and Geophysics Method and Application
3. Geotourism
4. Mineral And Energy Resources Management
5. Mineralogy, Petrology, Geochemistry
6. Sedimentology, Stratigraphy, and Petroleum Geology
7. Tectonic, Structural Geology and Geodynamic
8. Volcanology and Geothermal

They are written by experts from various geology background including industry, government institutions, and universities.

On behalf of IAGI, we would like to thank all authors, paper reviewers, editorial team, and also to all sponsors from industry and government for their contributions and involvements. Without all of them the GIC 2016 event and the publication of this proceeding will not happened.

Bandung, October 2016

### **Sukmandaru Prihatmoko**

Chairman of IAGI (Indonesian Association of Geologists)

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### Metamorphic Rocks in Bayah Complex, Banten Province: A Study in Tectonic Environment

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#### Abstract

Based on earlier research, metamorphic rocks in Bayah Complex and in its surrounding area are comprised of various types of rocks with different degrees of metamorphism (low to high grade metamorphism) and protolith. The focus of this research is to determine the tectonic environment for these rocks by petrographic and geochemical analysis. The petrographic analysis showed that the metamorphic rocks are comprised of muscovite biotiteschist, biotite schist, garnet muscovite biotite schist, actinolite schist, epidote amphibolite schist and hornblende schist. Most of them showed foliation, with poor foliation in some area. Based on mineral assemblages, they are dominated by greenschistfacies to greenschist at the upper part, with some epidote amphibolite facies. The geochemical analysis showed that metamorphic rocks in the research area is associated with calc – alkaline magma series, calc – alkali basalt and oceanic island alkali basalt, the magma type which characterized a subduction related magmatic origin. Based on these results, the metamorphic rocks in Bayah Complex is interpreted to have an association with subduction zone.

Keywords: protolith, degrees of metamorphism, metamorphic facies, calc alkali basalt, subduction

#### Introduction

Metamorphic rocks are rocks that has experienced metamorphism process and can be recognized by the textural, structural and mineralogical change of the pre-existing rock, as a response of either pressure, temperature or chemical changing on the earth crust (Ehlers & Blatt, 1982). Metamorphic rock is interesting to study because of its complexity

Java Island, together with Sumatera, is a part of Sundaland. The current shape of Java was considered to be the product of tectonic movement, that began at the Mesozoic era, when the oceanic Indian Plate (moving relatively northward) formed a slab beneath the continental Eurasian Plate (Liu et al, 1983) which now lies on west of Sumatera and south of Java. Therefore, it can be assumed that the metamorphic rock that appears in this area would be related to the subduction process.

The research area is located at the south of West Java, Indonesia at Bayah sub-district, Lebak District, Banten Province with about 6 km<sup>2</sup> wide.

This area is interesting to be studied because the metamorphic rock can be assumed as the product of subduction process. Based on previous research, the metamorphic rocks on this area were also considered as the basement of Bayah complex (Patonah, 2014). Research by Patonah (2014) has shown that the metamorphic rock has a relation to a regional-type metamorphism which can be traced by the existences of different (sedimentary and igneous) rock-type protolith at near-adjacent place and the variety of metamorphism degree (low to medium grade). This study will be focused on the determination of the tectonic environment of the metamorphic rocks by using chemical rock data to fill the gap of the result from the previous research with the hypothesis that the metamorphic rock was related with a regional (subduction related) metamorphism.

#### Data and Method

The objects of this study are metamorphic rocks in the research area, from an outcrop or floating sample. Field observation were carried out to understand the geological condition of the area, including rock identification, stratigraphic position and the structural geology identification (foliation, joint, fault etc). Furthermore, some of these metamorphic samples that were considered to represent the metamorphic rocks of the whole research area were put into petrographic and geochemical analysis. The petrographic analysis was conducted by using polarized microscope while the chemical analysis was using XRF (X-Ray Fluorescence) analysis method. From the petrographic analysis, the mineral assemblages, type of metamorphic rocks, metamorphic rock texture and structure, the protolith and the metamorphic facies can be examined. The type of the metamorphic rock can be deduced from its texture and mineralogical composition. The type of sedimentary-rock protolith is determined by plotting the mineral association identified by petrographic analysis into quartz-mica-feldspar classification diagram (Robertson, 1999). By using this diagram, the sedimentary-rock protolith can be identified whether it came from pelite, semipelite, psammite or quartzite sedimentary rock. Furthermore, the rock facies can be identified by using metamorphic facies classification from Barker (1990) based on its mineral