

Original Article

e-ISSN: 2581-0545 - <https://journal.itera.ac.id/index.php/jsat/>



Sedimentary Facies of Seblat Formation Semaka Districts, Lampung, Indonesia

Received 27th January 2021
Accepted 20th February 2021
Published 11th March 2021

Open Access

DOI: 10.35472/isat.v5i1.401

Evan Rosyadi Ogara *a

^a Geological Engineering Department of Institute Teknologi Sumatera

* Corresponding E-mail: evan.ogaral@al.iterga.qc.id

Abstract: Seblat Formation had been exposed in Sedayu village, Lampung. Stratigraphic measurements and detailed descriptions at several outcrops were performed on Seblat Formation. Seblat formation based on sedimentological study can be divided into two facies: classical turbidites and slump. Classical turbidites in the study area characterized by monotonous sandstone intercalated with mudstone and slump facies consist of mudstone and fine-grained sandstone with total thickness around 5 meters and the thickness of each layer from 3-13 centimeters. Based on two sedimentary facies, the mid fan (smooth-channelled) and the inner fan is proposed for Seblat Formation.

Keywords: Seblat Formation, Sedayu village, Facies.

Introduction

This research aims to determine the facies of the Seblat Formation. The research area is located in Lampung. Lampung is located in the southern part of Sumatra island lies within the active tectonic plate of the India-Australia Plate and Eurasian Plate. There are two basins in Lampung, South Sumatra Basin as back-arc basin and Bengkulu Basin as a fore-arc basin. Seblat Formation is one of the formations in the Bengkulu Basin. Seblat Formation of Oligocene to Miocene age which is composed of interbedded claystone and sandstone, tuffaceous sandstone, shale, siltstone, and thin layer or nodules of limestone [1].

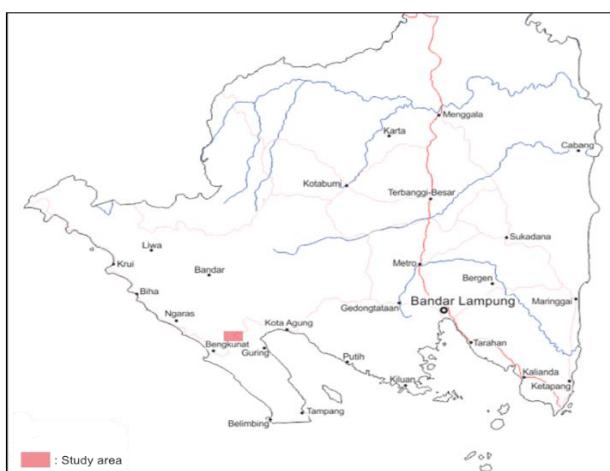


Figure 1. Map of research area in Lampung province (unscaled)

The research area's location is the administrative area of Tanggamus district, Semaka sub-district, Sedayu village (Fig.1). The outcrops at the west part of Tanggamus in Sedayu village will be used as the study area (Fig.2).

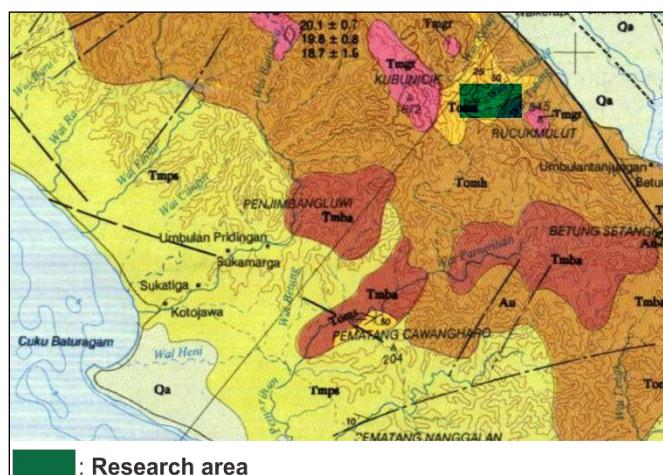


Figure 2. Geology regional map of Kotaagung (modified from Amin et al., 1993)

Bengkulu basin is located in the south-west part of Sumatera island. Two rock units occupy in Bengkulu area, namely Bengkulu zone and Barisan zone [2]. Barisan zone consist of Hulusimpang Formation, Bal Formation, Ranau Formation, Lakitan Formation and some intrusive rocks. Bengkulu zone consist of Seblat Formation, Lemau Formation, Simpangaur

Original Article

Journal of Science and Applicative Technology

Formation, Bintunan Formation and young quaternary volcanic (Fig.3).

The oldest to the youngest rocks in the study area are the Hulusimpang Formation, composed of lava, volcanic breccia, and tuff. The top of the Hulusimpang Formation is interfingered with the bottom part of the Seblat Formation, which is composed of interbedded claystone, siltstone, calcilutite, sandstone, and conglomerate

This Formation was deposited during the late Oligo-Miocene at shallow – deep marine [3]. There is an intrusion of Diorite breakthrough Hulusimpang and Seblat Formation [1].

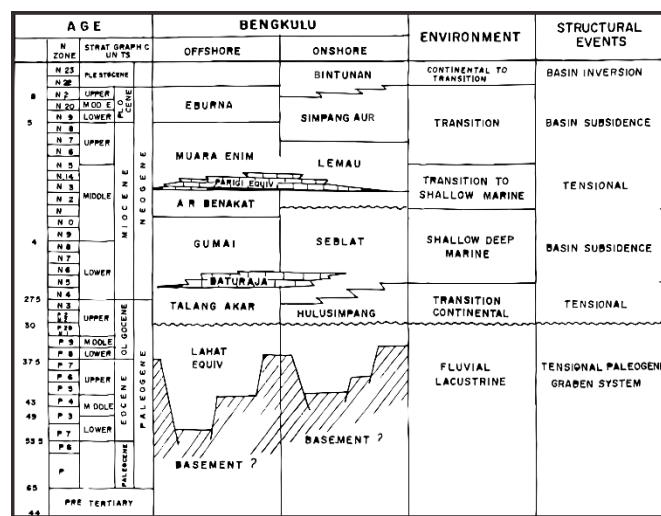


Figure 3. Regional stratigraphic correlation of the onshore and offshore areas of the Bengkulu Basin (modified from Yulihanto et al. 1995)

Seblat Formation is the result of turbidity current and deposited on the submarine fan. The facies of submarine fan can be divided into five facies (Fig.6.), 1) classical turbidites/CT, 2) massive sandstone/MS, 3) pebbly sandstone/PS, 4) conglomerates/CGL, and 5) pebbly mudstone, debris flow, slumps and slides/SL [7].

Method

The observation was documented with concern on the lithology, thickness, color, grain size, grain shape, sortation, fabric and sedimentology structure. These parameters will be used to interpret facies and depositional environment for the Seblat Formation on Semaka District, Tanggamus, Lampung.

Results and Discussion

Based on field data, facies on Seblat Formation can be divided into two sedimentary facies.

Classical Turbidites

Classical turbidites in study area characterized by monotonous sandstone intercalated with mudstone and Basal contact mostly sharp and locally erosive with rip-up mud clast. The sandstone has grain sizes very fine to medium with moderate sorted, and the thickness of each layer ranges from 2 - 10 centimeters (Fig. 4A). The sedimentary structure in these facies is cross lamination, rip-up mud clast, wavy and lenticular structure (Fig.5). The lack of convolution and rip-up mud clast indicates the current flow is low energy [4].



Figure 4. The facies in study area: A. classical turbidites; B. Slump

Based on the presence of thin layer fine grain (mud-very fine sand) dominated and erosional capacity is very low, it can be assumed these facies is low density turbidity current [5].

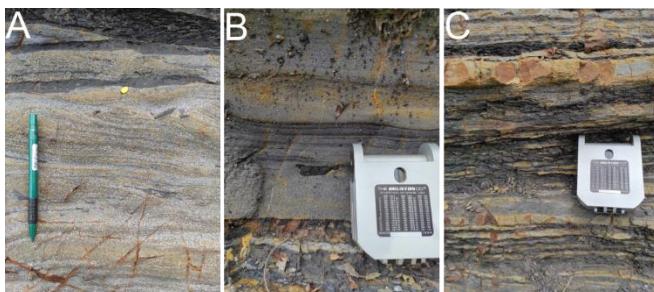


Figure 5. The sediment structure in the study area: A. cross lamination; B. Rip-up mud clast; C. Lenticular

Slump

These facies consist of mudstone and fine-grained sandstone with a total thickness of around 5 meters, and the thickness of each layer ranges from 3-13 centimeters. The sandstone shows yellowish color during the dark mudstone grey. The slump in the study area shows beds deformation with angular stratified layers (Fig. 4B). Slump with angular stratified layers can be assumed the movement of material is not far [4].

Depositional environment

Determination of depositional environment in the research area based on physical properties such as color, grain size, sedimentary structure, and facies association. Seblat Formation characterized by a mixed mud-sand with thin-bedded layers. Diverse mud-sand shows the body fan relatively large, around tens to hundreds of kilometers in diameter, and channel levee, lobes are well developed [6]. Based on two sedimentary facies, the mid fan (a smooth portion of superfan lobes) and the inner fan are proposed for Seblat Formation, as following [7].

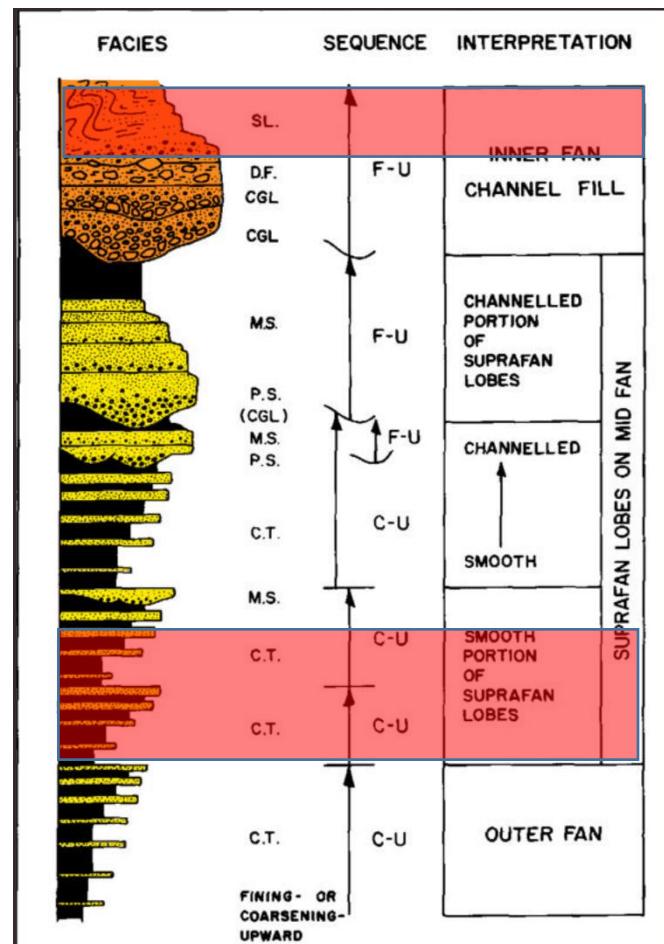


Figure 6. The vertical succession of submarine fan (modified from Walker, 1978).

Conclusions

- 1) Based on lithology, grain size, sedimentary structure, and facies association, there are two facies 1) thin-bedded classical turbidite and 2) slump with angular stratified bedded.
- 2) The Seblat Formation was deposited at the mid fan and inner fan.

Conflicts of interest

There are no conflicts to declare.

Acknowledgments

I would like to say thank to ITERA and Geological Engineering Department for their support

References

- [1] Amin et al., 1993, Geological Research and Development Center, Bandung
- [2] R. Heryanto, "Karakteristik Formasi Seblat di Daerah Bengkulu Selatan" Jurnal Geologi dan Sumberdaya Mineral, vol. XVI no. 3, pp. 179-195, May 2006.
- [3] B. Yulihanto, B. Situmorang, A. Nurdjajadi, B. Sain, "Structural Analysis of The Onshore Bengkulu Forearc Basin and Its Implication For Future Hydrocarbon Exploration Activity" Proceedings Indonesia Petroleum Association Twenty Fourth Annual Convention, October 1995, pp 85-96.
- [4] R.G Walker and N.P James, *Facies Models Response To Sea Level Change*. Canada: Geological Association of Canada, 1992.
- [5] G. Einsele, *Sedimentary Basins: Evolution, Facies and Sediment Budget*. Germany: Springer-Verlag, 1992.
- [6] G. Nichols, *Sedimentology and Stratigraphy, Second Edition*. United Kingdom: Wiley-Blackwell, 2009.
- [7] R.G Walker, "Deep water sandstone facies and ancient submarine fans: models for exploration for stratigraphic traps" American Association of Petroleum Geologist Bulletin, vol. 62, pp. 932-966, 1978.