

Seapex Field Trip Fractured basement reservoir along the coast of South Vietnam

22nd- 25th March 2012

Led by Dr. Trinh Van Long

The objectives of this fieldtrip will be to give participants an overview of the reservoir plays of the South Coast of Vietnam by visiting outcrops that demonstrates part of the elements of the petroleum system analogue to offshore Cuu Long basin. There will be opportunities to review several episodes of structural deformation leading to fractured reservoirs.

The trip will start in Ho Chi Minh City and continuous to the coast at Vung Tau, Phan Thiet and then Phan Rang. After that will head towards the west to get back to Ho Chi Minh City as shown on the map below.



Geological structure characteristics of Vung Tau-Phan Rang region located in southeast Da Lat zone of South Vietnam (Early-Middle Jurassic late orogenic basin reactivated as active continental margin during Late Mesozoic time with intensive magmatism) are similar to those of Pre-Cenozoic basement of Cuu Long basin. The rocks comprising above mentioned two geological structures are similar in term of mineral composition, age and tectonic features because they were formed and deformed in the same geodynamic setting.

The past geological events affecting Pre-Cenozoic basement of Cuu Long basin left impressions on geological structure of Vung Tau-Phan Rang region which are illustrated clearly in many outcrops along littoral zone of South Vietnam especially Long Hai-Phan Rang coastal region.

In this area we can observe principal northeast-southwest striking tectonic damage system (faults and fractures) which is typical kind of deformation from Pre-Cenozoic Cuu Long basin basement. The distribution characteristics of macrofractures, pores and structure of undeformed compact rocks are also observed. The igneous rock associations as well as dike rocks developing in different stages are typically presented in this fieldtrip.

The Pre-Cenozoic geological structure of Cuu Long basin is lively illustrated in the Long Hai-Phan Rang fieldtrip route.

The basement rocks of South Vietnam are composed mainly of Cretaceous igneous intrusive and extrusive rocks and subordinately Early Tertiary dike swarm. All these rocks outcrop well along the coast from Long Hai to Phan Rang and are subjected to visit in this fieldtrip. Geologically and tectonically, Long Hai-Phan Rang area is the southeast part of Da Lat zone.

Within Da Lat zone, the rocks occurring along the coast from Long Hai to Phan Rang are classified into the following units:

- Early Cretaceous: Dinh Quan complex consisting of gabbrodiorite, diorite, granodiorite.
- Cretaceous: Deo ca complex composed of granodiorite, biotite granite.
- Late Cretaceous: Ankroet complex composed of leucogranite, biotite granite.
- Cretaceous: Nha Trang Formation composed of rhyolite, subvolcanic and pyroclastic rocks.
- Paleogene: Phan Rang complex consisted of granite porphyry, granosyenite porphyry.
- Paleogene: Cu Mong complex composed of diabase, diabase porphyry, gabbrodiabase.

The onshore mentioned above rocks are very similar to fractured basement rocks of Cuu Long basin especially granitic ones. They have the same petrographic, mineralogic, chemical and isotopic composition and age. In addition, the principal properties of deformation of Cretaceous onshore granitic rocks are similar to those of Cuu Long basin basement. Before Tertiary rifting to form Cuu Long basin Da Lat zone occupied a large area including the present Da Lat zone and Cuu Long basin. Thus, understanding geology and deformation of rock onshore is the key to understand basement rocks of Cuu Long basin.

Basement rocks throughout South Vietnam have two main fault and fracture sets that formed before Tertiary rifting: NE- and NW-striking among which the NE striking faults are dominated. In some places fracture swarms are present. The dikes are general several to ten meters wide and hundreds meters long. The best displayed fracture sets were observed at Ke Ga and Vinh Hy stops in leucogranite of Ankroet complex and biotite granite of Deo Ca complex respectively.

The geological formations of Da Lat zone and Cuu Long basin were strongly deformed during Mesozoic and Cenozoic times.

Program:

Thursday 22nd March 2012:

HCMC-Vung Tau-Phan Thiet, Visit outcrops No, 1, 2 and 3. Stay overnight in Phan Thiet.

Friday 23rd March 2012:

Phan Thiet- Phan Rang, Visit outcrops No. 4, 5. Stay overnight in Phan Rang

Saturday 24th March 2012:

Phan Rang – Phan Thiet. Visit outcrops No. 6, 7, 8 and 9. Stay overnight in Phan Thiet.

Sunday 25th March 2012:

Phan Thiet – HCMC. Visit outcrop No.10



Logistics- What to expect

Anticipate 20 participants max. Transportation will be in 15 seat minibuses. Hotels are all of a good 3-4 star standard. Fieldtrip cost will include hotels, three meals a day. There will be some walking required but not difficult terrain. Soft drinks and water will be available during the day. Shoes with reasonable grip will be required but boots are not necessary.

March is in dry season in South Vietnam so rain will not be expected, weather is generally hot with temperature ranging from 30 to 35 degree at day time, but it is cool and quite pleasant late evening and at night time. Protection from the sun is highly recommended.

Geological hammers are actively discouraged and are forbidden in some parts of the natural areas that we will be visiting.

Price: **SGD 1,050.00** includes meals, accommodation and transport



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