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Contribution of geological deep-water systems to reservoirs of deep-water fields, and critical points for Petroleum system in deep water

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Abstract: E&P (exploration and production) activities in deep water (area with water depth more than 500m, today) have expanded greatly during the past 20 years, along with the innovation of offshore technology for drilling, development, and production. Water depth in exploration and production drillings reaches around 3,000m and 2,300m, respectively, and many fields in deep water have been discovered and developed in the Gulf of Mexico, Offshore Brazil, Offshore West Africa, etc. Today more extensive E&P activities in deep water are recognized throughout the world and exploration in deep water has become a valuable choice of the exploration strategy for oil companies.

Reviewing previous works in deep water, two geological settings have highly contributed to hydrocarbon occurrence. One is deposition of sandstone in deep-water systems such as turbidite with high porosity and high permeability as reservoir. Nearly 90% of discovered reserves so far in deep water fields are from turbidite sandstones. The other is movement of mobile strata such as salt and over-pressured shale. These mobile strata have contributed to formation of traps and also have induced faults, through which hydrocarbon migrated from source to reservoir.

Also deep-water projects are characterized by following aspects ; (1) Application of modern seismic technology such as Seismic Imaging and Direct Hydrocarbon Indicator (DHI), has increased geological and economical success ratio. (2) Productivity of reservoir is critical factor to justify huge investments, and a final decision for the investments is easier and faster for reservoirs with higher flow rate and higher ultimate recovery.

Exploration potential in deep water is still high, and further E&P activities will be continued. For the success in deep water, synthetic study carried by integrated teams with geologist, geophysicist, and specialized offshore engineers (reservoir, drilling, production and facility) is essential.

Key words: [deep water](#), [deep-water systems](#), [offshore technology](#), [turbidite](#), [salt](#), [over-pressured shale](#), [productivity](#), [integrated team](#)

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