

Hydrocarbons in Fractured and Weathered Basement - An Overlooked Exploration Play in West Africa

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Basement rocks are important oil and gas reservoirs in a number of countries and serve as a reminder that in areas where basement is not too deep, basement should be considered as a valid exploration objective.

Basement reservoirs include fractured or weathered granites, fractured quartzites, and metamorphic rocks such as fractured schists or argillites.

In South America, basement reservoirs produce oil in Venezuela & Brazil. Oil is produced in the USA from basement in California, Kansas & Texas. In North Africa, basement oil & gas production occurs in Libya, Algeria & Egypt. In the Middle East, in the last decade in Yemen, very important oil reservoirs have been discovered in granite basement. Significant hydrocarbon basement reservoirs occur in Russia's West Siberia Basin and also in China in "buried hill" basement structures. In Southeast Asia, very prolific basement reservoirs are the main contributor of oil production in Viet Nam. For example the Bach Ho (White Tiger) oil field has reserves of about 2 billion barrels oil in granite basement. In South Sumatra, the giant size (approximately 5 TCFG) Suban field produces gas from reservoirs in pre-Tertiary basement.

In West Africa, oil or gas has never been produced commercially from basement reservoirs. Only in the onshore area of Cabinda, Angola has oil been tested from basement in one or two wells (K.K.Landes, AAPG Bulletin, 1960). Very little information is known about the basement reservoirs in Cabinda.

In West Africa, there has been almost no effort to evaluate basement. Therefore it is possible that there are oil and gas fields "left behind" in areas in where basement was not evaluated by drilling but where the following conditions may exist: (1.) Basement is likely fractured or weathered. (2.) Basement occurs within structural closure. (3.) Mature oil or gas source rocks such as the Cretaceous Bucomazi must be close to basement to feed hydrocarbons into basement. (4.) Cap rocks must overlay the basement reservoir.