Application of Satellite-based Analog Studies to Resolving Reservoir Complexity in the North Malay Basin

Kuenphan, Natapol [1]; Kaenmee, Kwanjai [1]; Gonecome, Yutthorn [1]; Shoup, Robert [1] (1) PTTEP, Bangkok, Thailand.

Reservoirs in the northern portion of the North Malay Basin consist of both coarsening upward and fining upward sequences and were deposited in a fluvial system. Modern fluvial systems as described in the literature fail to provide a reasonable model for understanding the observed complexity and distribution of reservoirs in the North Malay Basin. However, the modern fluvial analogs described in the literature are found in temperate climates, whereas North Malay Basin reservoirs were deposited in a tropical climate. In order to better understand tropical fluvial systems a study of modern rivers in northern Thailand was conducted using Landsat satellite imagery.

It was observed that as tropical rivers flowed into wide valleys, the channel began to branch into multiple anastomosing channels. Extensive areas of wetlands formed between the channels and crevasse splay deposits were prevalent. Tributary rivers flowing into these wide valleys formed fluvial-fan deltas along the valley margins. Four depositional facies were recognized: channels, crevasse splays, fluvial-fan deltas, and wetlands. Channels comprise less than 10% of the total system, Crevasse splays and fluvial-fan deltas comprised 20 - 45% of the total system. Shale-prone wetlands ranged from 25 to 60% of the total.

Clean channel sandstones, laminated crevasse-splay and fluvial-fan delta sandstones, and organic-rich shales, are observed in cores from several wells drilled in the North Malay Basin. The well logs were calibrated to the core facies and the vertical distribution of these facies were measured and found to be consistent with the lateral distribution of the facies observed in the modern analog study.

The analysis of modern tropical rivers has provided an excellent analog to the North Malay Basin reservoirs, both at an exploration-scale and at a development-scale. At the exploration-scale we can better predict reservoir occurrence. At the development scale, we can apply the analog study to better understand reservoir distribution in order to calculate gas-in-place and to define the optimal drainage points for infill drilling.