GEOPHYSICS PAPER 4

DETERMINATION OF AVO ATTRIBUTES FOR HYDROCARBON RESOURCES REGION OF MALAY BASIN: THE FLUID FACTORS

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Fluid factor is one of the most important AVO attributes in seismic for reservoir hydrocarbon prediction. The typical published fluid factor, $\Delta F = 1.252A + 0.580B$ was derived based on Castagna's mudrock equation (Castagna et al. 1985), $Vp = 1.16Vs + 1360$ and Gardner's relation (Gardner el al.1974), $\Delta = 0.23Vp0.25$ and was developed based on brine saturated siliciclastics data obtained from Gulf of Mexico. These are true as hydrocarbon indicator for reservoirs of Gulf of Mexico. Since the geological settings for Malay basin are different with Gulf of Mexico, therefore the determination of fluid factor for Malay Basin is very crucial. The respective values of A and B were the intercept and the gradient attribute of reflection amplitude versus $\sin 2\Delta$ plot. Castagna and Smith (1994) reported that the respective value of fluid factors for background (nonpay) and shale/gas-sand interfaces are zero and negative. In this paper, the fluid factor equations based on local mud rock equations as outlined in Table 1 (Vp versus Vs and density versus Vp plot), which were obtained from brine saturated siliciclastics data of 48 wells, were established for respective six petroleum resources regions, Malay Basin. The six petroleum resources regions as illustrated in Figure 1 were divided based on geographical locations and play types, namely region 1 - North Malay Region;

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region 2 - West Malay Region; region 3 - South Malay Region; region 4 - Southeast Malay Region; region 5 - Northeast Malay Region and region 6 - Central Malay Region. The rock physical trend lines for region 1, 2, 3, 4, 5 and 6 were established based on 7, 3, 7, 5, 14 and 12 wells data respectively. The respective fluid factor equations for six petroleum resources region 1, 2, 3, 4, 5 and 6 were ΔF=1.235A+0.568B, ΔF=1.219A+0.563B, ΔF=1.238A+0.586B, ΔF=1.222A+0.608B, ΔF=1.228A+0.573B and ΔF=1.263A+0.536B.

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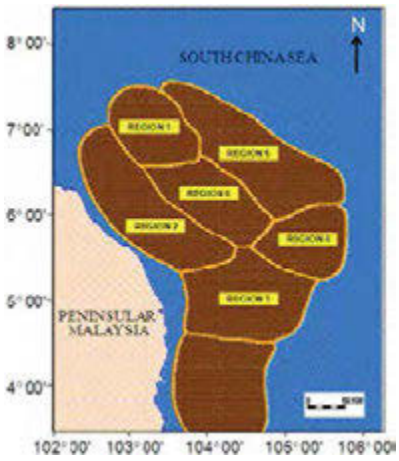

Figure 1: Six petroleum resources regions, Malay Basin

Table 1: Vp-Vs and density-Vp and fluid factor equations for six petroleum resources region.

Region	Number of wells	Vp-Vs equation	Density(Δ)-Vp equation	Fluid factor (ΔF) equation
1	7	Vp=1.1373Vs+1140.6	Δ=0.2141Vp0.2949	ΔF=1.235A+0.568B
2	3	Vp=1.1257Vs+1214.4	Δ=0.1550Vp0.3328	ΔF=1.219A+0.563B
3	7	Vp=1.1720Vs+1133.2	Δ=0.2627Vp0.2689	ΔF=1.238A+0.586B
4	5	Vp=1.2168Vs+1100.7	Δ=0.2491Vp0.2769	ΔF=1.222A+0.608B
5	14	Vp=1.1457Vs+1181.7	Δ=0.1967Vp0.3049	ΔF=1.228A+0.573B
6	12	Vp=1.0720Vs+1250.5	Δ=0.2480Vp0.2768	ΔF=1.263A+0.536B