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Exploration for "Sweet Spots" in Cretaceous Reservoirs, Western Venezuela

Cretaceous carbonate reservoirs in Western Venezuela have produced over 2.5 BBO in the last 60 years. These reservoirs are located along fault corridors that relate their production to fracture haloes. Therefore, previous studies had focused on fracture types and distribution and not much attention have been paid to the hydrocarbon containers or sweet spots. This paper present new ideas about the relationship between facies, porosity development and hydrocarbon migration in these reservoirs.

The sedimentation pattern of the Cretaceous section, based on cores and cutting samples, shows three Second Order Cycles (regressive-transgressive) characterized by infilling, aggradating and backstepping genetic sequences. The stacking pattern of these sequences shows new prospective areas, represented by shoal complexes that are characterized by oolite grainstones/packstones and skeletal packstones facies, all embedded in mud-rich sealing facies. The geometry and dimension of the complexes range from 5-10 Km long and up to 4 Km wide and thickness varies from 15 to 30 feet.

The main diagenetic processes, related to a regional tectonic unconformity, are dolomitization and dissolution. These processes modified the previous porosity depending upon the tectonic evolution. Dolomitization affected mainly the lower infilling sequence of the second cycle. Dissolution modified the porosity throughout the stratigraphic cycles. The remaining porosity ranges from 5 to 15 % and pore types are intercrystalline, well interconnected vugs, microfractures and moldic pores.

Hydrocarbon Sweet Spots are present where shoals complexes are developed and cross cut by the regional tectonic unconformity. Mapping these interception areas is our new exploration challenge.