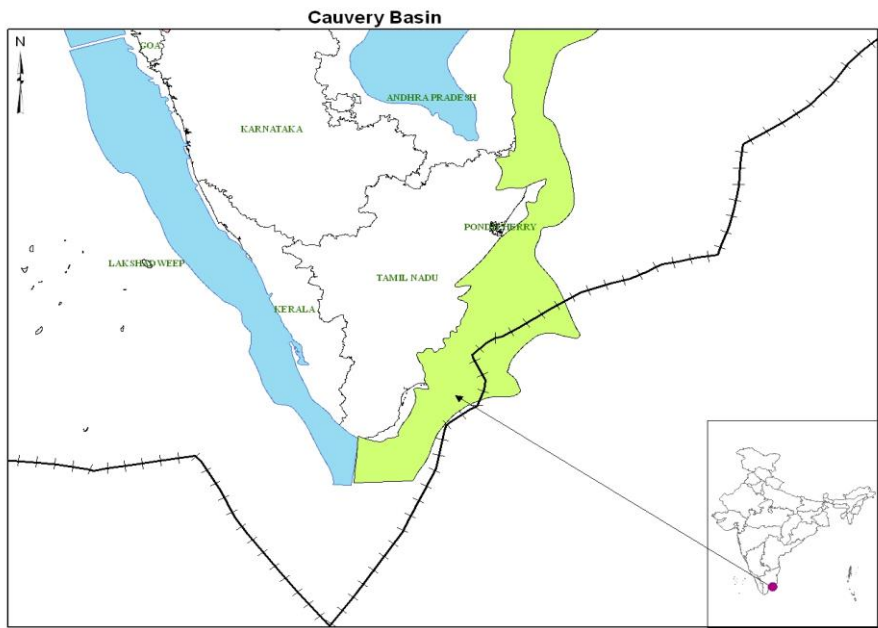
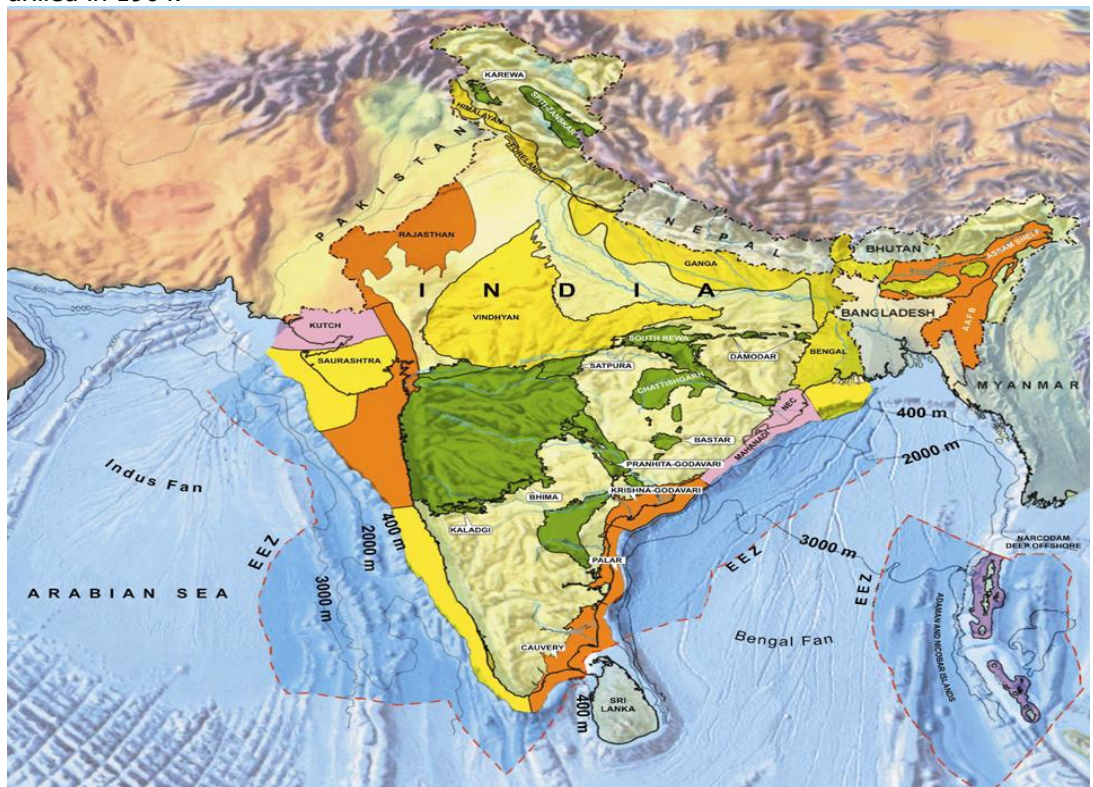


Basin Introduction :



The Cauvery Basin extends along the East Coast of India, bounded by - 08° - 12° 5' North Latitude, 78° - 80° East Longitude. It has been under hydrocarbon exploration since the late nineteen fifties. Application of CDP seismic in 1984 considerably increased the pace of exploration, resulting in the discovery of several small oil and gas fields. The first deep well for exploration was drilled in 1964.



The Cauvery Basin covers an area of 1.5 lakh sq.km comprising onland (25,000 sq.km) and shallow offshore areas (30,000 sq km). In addition, there is about 95,000 sq km of deep-water offshore areas in the Cauvery Basin. Most of the offshore and onland basinal area is covered by gravity, magnetic and CDP Seismic surveys. Geological map for the outcrop terrain shows the exposed formations.

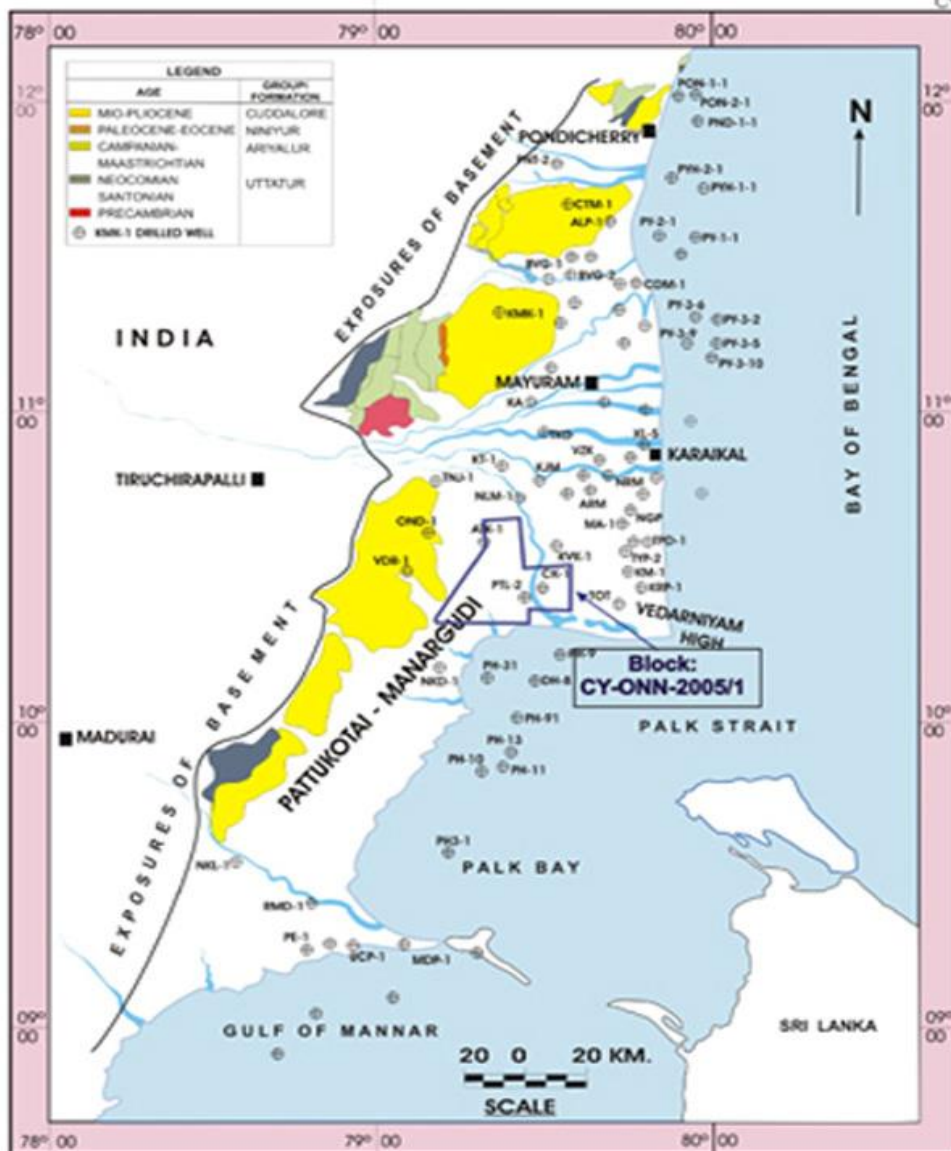


FIG. 2 GEOLOGICAL MAP OF CAUVERY BASIN

Category and Basin Type:

Cauvery basin is a pericratonic rift basin and comes under category first. (Basins with established to commercial production.)

Basin Age & Sediment Thickness

- Result of Gondwanaland fragmentation during drifting of India- Srilanka landmass system away from Antarctica/ Australia plate in Late Jurassic/ Early Cretaceous.

- The basin is endowed with five to six kilometers of sediments ranging in age from Late Jurassic to Recent (mainly thick shale, sandstone & minor limestone).
- Prognosticated resources : 700 MMT (430 MMT: onland areas and 270 MMT: offshore)

Geology :.

The Geological history of the Cauvery Basin began with the rejuvenation of rifting, i.e., creation of a new rift basin during Late Jurassic and Early Cretaceous times

- Exploration efforts still young in Cauvery Offshore-confined mainly to land and close to coast.
- Cretaceous fan model (New discovery in CY-OS-2) promising for future exploration.
- Discovery by RIL (Dhirubhai-35) has opened a new corridor for exploration in Cauvery deep water
- Big size subtle features seen on GXT-DGH long offset lines at deeper levels

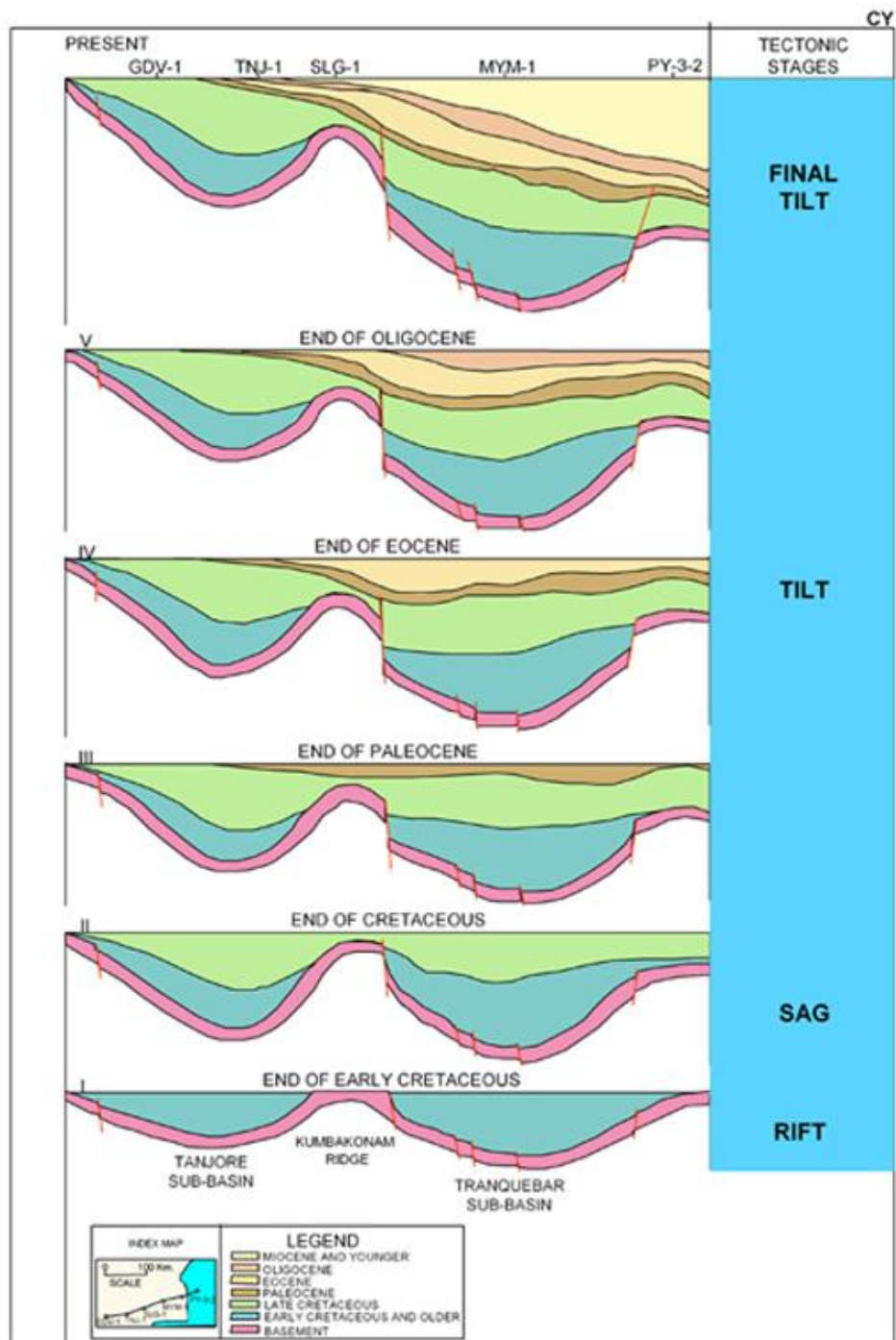


FIG. 27 TECTONIC EVOLUTION PROFILE, CAUVERY BASIN

Sedimentation History and Despositional Environment

Evolution of the Cauvery Basin is understood to have taken place through three distinct stages-

Late Jurassic-Early Cretaceous Rift Stage.

- Initiation of rifting have begun during the Late Jurassic/Early Cretaceous.
- Rift stage sediments (Shivganga and Therani formations) of Upper Gondwana affinity are known from exposures.

- These were deposited in fluvial environments.
- The Kallakudi Limestone, younger to the Shivganga Formation, may represent an episode of basinal deepening and paucity of clastic supply.
- In the subsurface, the Andimadam Formation, overlain by the Sattapadi Shale, appears to mark the peak of this transgressive episode during Cenomanian.

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Post Cretaceous

- Towards the end of the Cretaceous, the basin experienced a phase of upliftment and erosion and a gradual basinward tilt of the shelf.
- The Tertiary sequence was deposited in a general prograding environment with gradual subsidence of the shelf.
- This sequence can be subdivided into two groups, the Nagore and Narimanam. The Nagore Group is well developed in the south, whereas the Narimanam Group attains its full development north of Karaikal High.
- The Kallakudi Limestone, younger to the Shivganga Formation, may represent an episode of basinal deepening and paucity of clastic supply.
- – By this time, Tertiary deltaic environment appears to have considerably progressed eastwards.

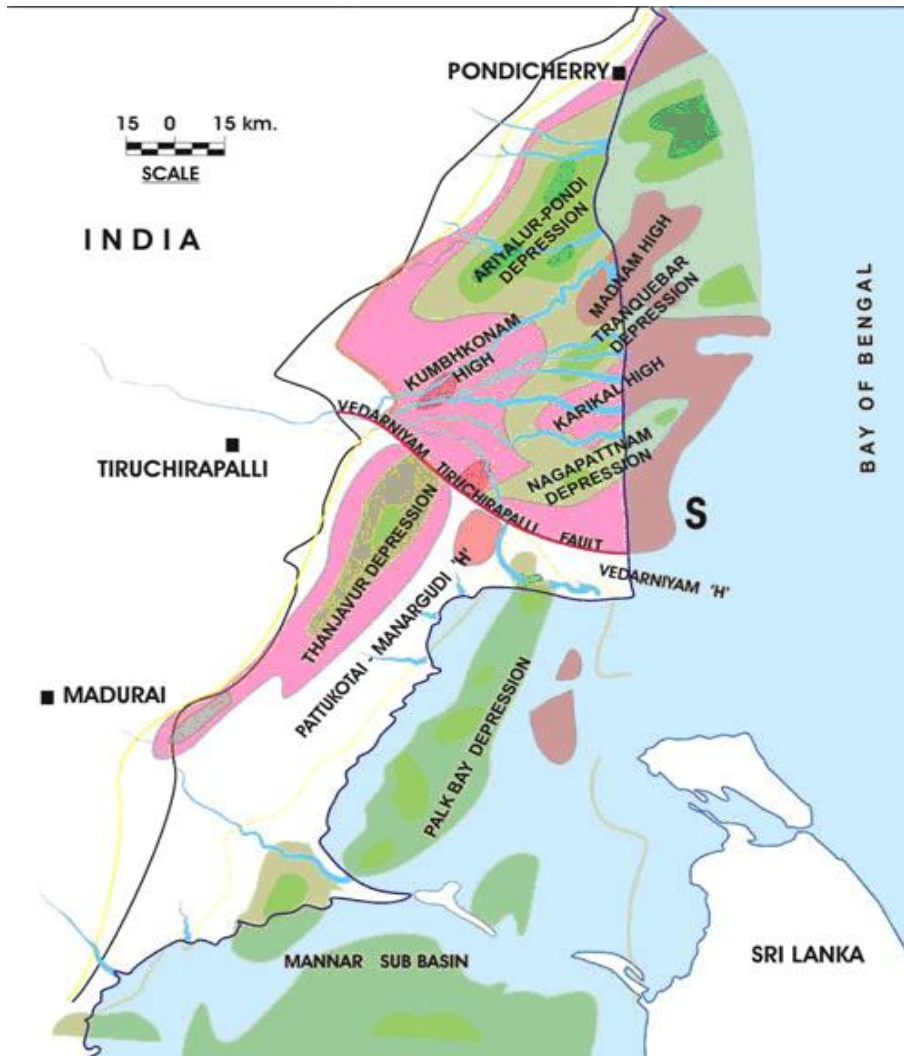
Tectonic History :

The Cauvery Basin is an intra-cratonic rift basin, divided into a number of sub-parallel horsts and grabens, trending in a general NE-SW direction. The basin came into being as a result of fragmentation of the Gondwana land during drifting of India-SriLanka landmass system away from Antarctica/Australia continental plate in Late Jurassic / Early Cretaceous. The initial rifting caused the formation of NE-SW horst-graben features. Subsequent drifting and rotation caused the development of NW-SE cross faults.

The Cauvery Basin contains the following major tectonic elements

- Ariyalur-Pondicherry Depression
- Kumbhkonam-Madnam-Portonovo High
- Tranquebar Depression
- Karaikal High
- Nagapattinam Depression

- Vedarniyam High
- Thanjavur Depression
- Pattukuttai-Manargudi Ridge
- Mandapam Ridge
- Mannar Depression
- Vedarniyam – Tiruchirapally Fault



Generalized Stratigraphy ::

The stratigraphy is worked out from outcrop geology and sub-surface information gathered from seismic and drilling data.

- **Precambrian:**
Precambrian cratonic rocks comprising granites and gneisses are exposed all along the western margin of the basin.
- **Late Jurassic-Early Cretaceous:**
Overlying the Cratonic basement along the margin of the basin are exposures of sedimentary rocks of Gondwanic affinity identified as the Shivganga Beds and Therani Formation. The Therani Formation contains index Gondwana plant fossils (*Ptilophyllum acutifolium*). These rocks are feldspathic, gritty and kaolinitic.

- **Early Cretaceous:**
The rocks of the Uttatur Group is made up of Kalakundi, Karai Shale and Maruvathur Clay formations in the outcrops and the Andimadam, Sattapadi and Bhuvanagiri formations in the sub-surface. These formations overlie the older Gondwana rocks and basement granites and gneisses.
- **Andimadam Formation:**
In the subsurface, the formation is developed in grabens, namely, the Ramnad, Tanjore, Tranquebar and Ariyalur Pondicherry grabens. The lower boundary of the formation is marked by Archaean Basement rocks, while the upper boundary is defined by an argillaceous section. It comprises pale grey, fine to coarse grained, micaceous sandstone and micaceous silty shale.
- **Sattapadi Shale:**
This formation is widely distributed in the basin. It is absent in the southeastern part of the basin. The Andimadam Formation marks its lower boundary and an arenaceous facies of the Bhuvanagiri Formation marks its upper contact. It comprises mainly silty shale and thin calcareous sandstone. The environment of deposition is inferred to be marine. The age assigned is Albian-Cenomanian. This is one of the important source sequences for HC generation.
- **Bhuvanagiri Formation:**
The formation is developed mostly in the northern and central parts of the basin. The formation is predominantly sandstone with minor claystone and shale. A Cenomanian-Turonian age can be assigned to this formation. It is inferred to have been deposited in middle shelf to upper bathyal environment.
- **Palk Bay Formation:**
The occurrence of this formation is restricted to the Palk Bay. The lithology is dominantly calcareous sandstone with a few bands of sandy claystone. The depositional environment is inferred to be shallow marine in a fan delta setting.
- **Late Cretaceous:**
The sediments in the outcrops are classified under two groups, namely, the Trichinopoly and Ariyalur groups. The Trichinopoly and Ariyalur groups in outcrops consist of Sandstones and Limestone formations.
- **Kudavasal Shale Formation:**
It is present all along the eastern part of the basin. The formation consists of shale/calcareous silty shale with occasional calcareous sandstone bands.
- **Nannilam Formation:**
It is conformably overlain and underlain by the Porto-Novo and Kudavasal formations respectively. The formation consists of alternations of shale, calcareous silty shales and occasional calcareous sandstones. The formation age ranges from Santonian to Campanian.
- **Porto-Novo Shale:**
Predominantly developed in the northern part of the Ariyalur-Pondicherry Sub-basin, west of Karaikal Ridge and Palk Bay Sub-basin. It is predominantly argillaceous with minor siltstone. The age of the formation is Campanian to Maastrichtian.
- **Komarakshi Shale:**
The formation has developed towards the eastern part of the basin. It unconformably overlies the Bhuvanagiri/ Palk Bay Formation and underlies the Karaikal/Kamalapuram formations. The formation consists mainly of calcareous silty shale. The age of the formation is Coniacian to Maastrichtian.
- **Tertiary:**
A complete sequence of Tertiary sediments is encountered in the sub-surface. The exposed rocks are represented by the Niniyur Formation of Paleocene age and the Cuddalore Sandstone of Mio-Pliocene age. The sub-surface section of Tertiary rocks is considerably thick and has been classified into two groups, the lower part is named as the Nagaur Group and the upper part, as the Narimanam Group.
- **Nagore Group:**
The formations of this group overlie the Ariyalur Group. The base and top of the group is marked by pronounced unconformities. The four formations recognized in this group are described below.

- **Kamalapuram Formation:**
The Porto-Novo---Komarakshi Shale unconformably underlies the formation, whereas the overlying Karaikal Shale has conformable contact. It consists of alternations of shaly sandstones and shales.
- **Karaikal Shale:**
The formation conformably overlies the Kamalapuram Formation. The formation comprises shales, which are occasionally calcareous/pyritic. The age of the formation ranges from Paleocene to Eocene.
- **Pandanallur Formation:**
It has a restricted areal extension. It consists of claystone sandstone, deposited in middle shelf environment. Age of the formation is Lower Eocene.
- **Tiruppundi Formation:**
The formation is present in Pondicherry offshore, Nagapattinam Sub-basin, and south of Palk Bay Sub-basin. The formation comprises limestone, siltstone and sandstone. It is of Middle Eocene to Early Miocene age.
- **Narimanam Group:**
The youngest sedimentary sequence comprising sandstone, clay/claystone and limestone which are well recognized with distinct character is designated as a Group. This group comprises eight formations.
- **Niravi Formation:**
The formation unconformably overlies the Tiruppundi Formation/Karaikal Shale. The formation consists of grey coloured, fine to medium grained, calcareous sandstone with occasional pyrite and garnet.
- **Kovilkalappal Formation:**
It occurs in Tanjore and Nagapattinam Sub-basins and overlies the Niravi Formation, and underlies the Shiyali Claystone. It is argillaceous in nature with a dominant presence of limestone.
- **Shiyali Claystone Formation:**
: It is observed to occur in Madanam and Karaikal area. The age of the formation ranges from Oligocene to Lower Miocene.
- **Vanjiyur Sandstone Formation:**
The formation has limited areal extent. It is predominantly arenaceous in character and comprises dark grey, calcareous sandstone and siltstone.
- **Tirutaraipundi Sandstone Formation:**
The formation is present in the southern part of the Nagapattinam Sub-basin towards Palk Bay. It comprises mainly sandstones with minor limestone.
- **Madanam Limestone Formation:**
The formation is unconformably underlain by the Tirutaraipundi Sandstone and Vanjiyur Sandstone. It comprises mainly limestone with minor silty clays.
- **Vedaranniyam Limestone Formation:**
The formation occurs only in the southeastern part of the basin. It consists of predominantly coral limestone and minor grainstone.
- **Tittacheri Formation:**
The formation is present in a large part of the basin. It grades into the Cuddalore Sandstone Formation near the outcrops. This consists of unconsolidated gravely sandstone and earthy clays. The age of the formation is Lower Miocene to Pliocene.

Petroleum System .:

Petroleum System and Generalized Stratigraphy

AGE	GROUP	LITHO UNITS	FORMATION		SOURCE	RES.	SEAL	OIL/ GAS SHOWS	SOURCE ROCK CHARACTERISTICS	
			WEST	EAST						
POST BURDIGALIAN	NARIMANAM GROUP		CUDDALORE Fm	TITTACHERI Fm					TOC : 1-3% Vro : 0.6-1.13% KEROGEN : Type - II & III	
BURDIGALIAN			MADANAM LIMESTONE							
AQUITANIAN			SHIVALI	SHIVALI SANDSTONE	CLAYSTONE	TTP Sst.	★	★		★
CHATTIAN				NIRAVI SANDSTONE						
RUPELIAN				TIRUPUNDI FORMATION						
PRIABONIAN	NAGORE GROUP		PANDANALLUR Fm							
BARTONIAN			KARAIKAL SHALE							
LUTETIAN										
YPRESIAN				KAMALAPURAM FORMATION			★	★		★
THANETIAN	ARIYALUR GROUP		APUR GROUP	PORTO-NOVO SHALE						
DANIAN						★	★	★		
MAASTRICHTIAN				NANNILAM FORMATION						
CAMPANIAN	UTTATUR GROUP			KUDAVASAL SHALE						
SANTONIAN				BHUVANAGIRI Fm			★	★	★	
TURONIAN				SATTAPADI Fm	PALK BAY FORMATION	★	★	★	★	
CENOMANIAN										
ALBIAN			ANDIMADAM Fm			★	★	★		
PRE-ALBIAN										
ARCHAEOAN			BASEMENT			★	★	★		

Prognosticated Resources/Proved Reserve

- The Cauvery Basin is an established hydrocarbon province with a resource base of 700 MMT.
- 430 MMT for onland areas and 270 MMT in the offshore.

Proven / Expected Play Types

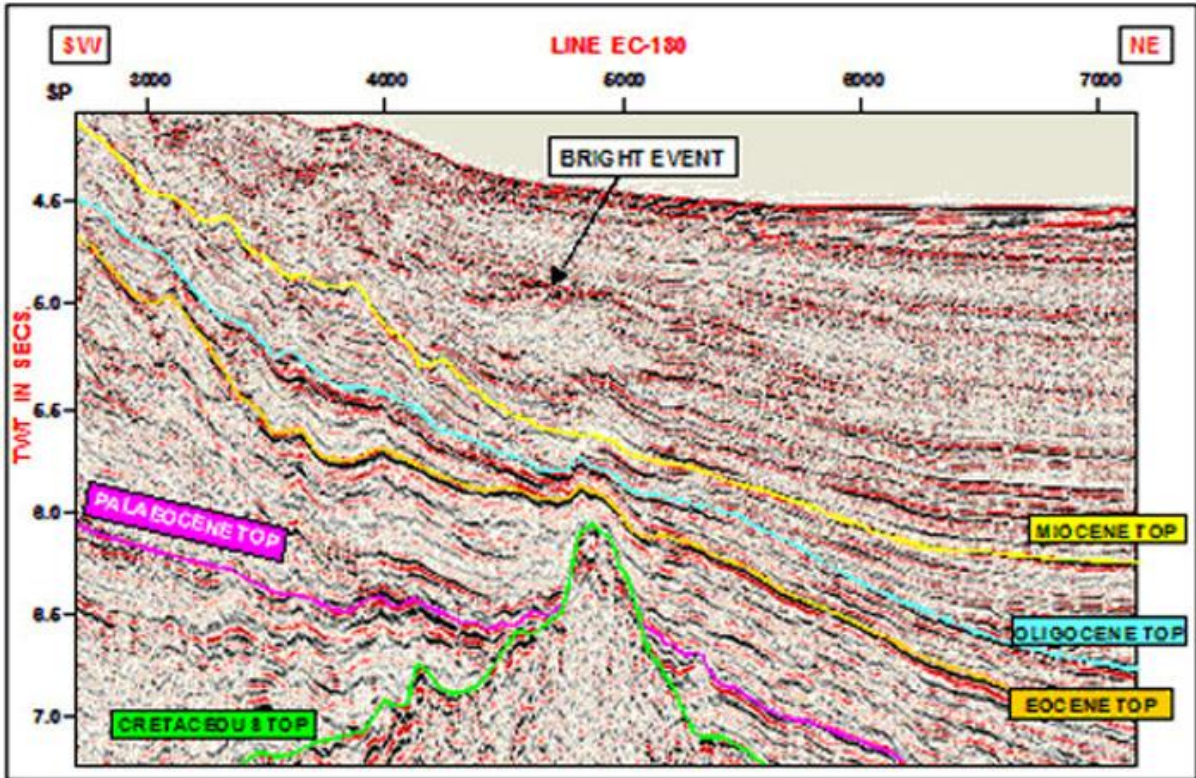
- TStructural and combination traps in Early Cretaceous to Paleocene sequences.
- Stratigraphic traps such as pinch-outs / wedge-outs and lenticular sand bodies in Early to Late Cretaceous sequences.

Source	Sattapadi shale within Cretaceous– main source Kudavasal Shale within Cretaceous Basal part of Kamalapuram Fm (Paleocene).
Reservoir	Andimadam, Bhuvanagiri & Nannilam Formations within Cretaceous Kamlapuram and Niravi Formations within Paleocene Precambrian Fractured Basement.
Cap Rock	Sattapadi shale within Cretaceous Post unconformity shales like Kudavasal and Kamlapuram.
Entrapment	Structural/ Stratigraphic, Combination traps.

Petroleum Plays :

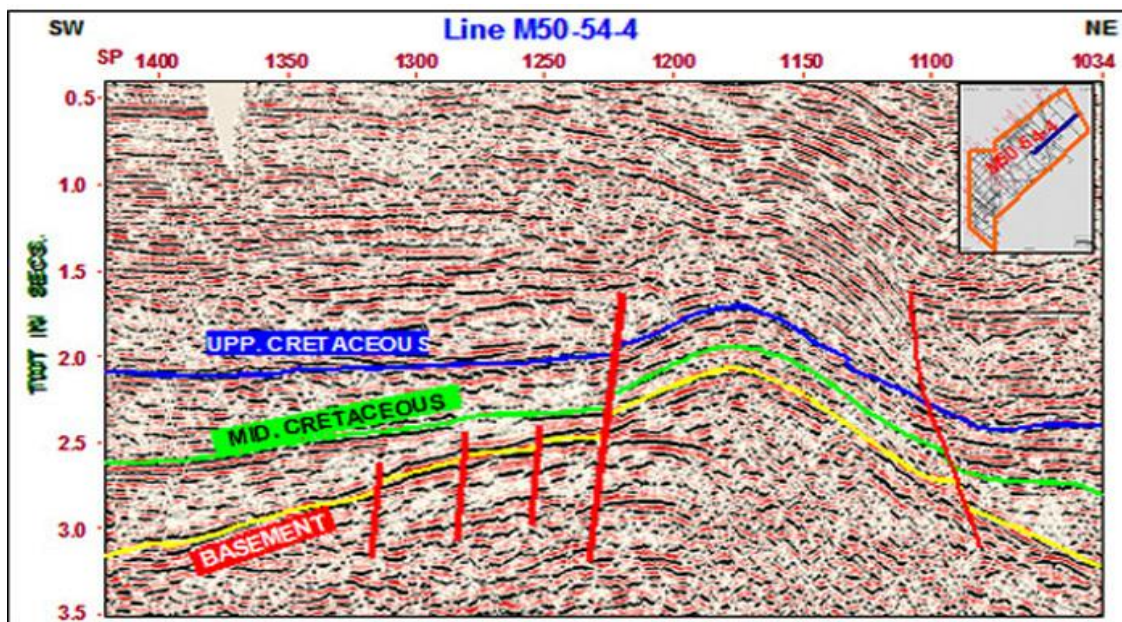
Cauvery Deep Water

Pliocene Play Types, Bright Event With Shadow Zone



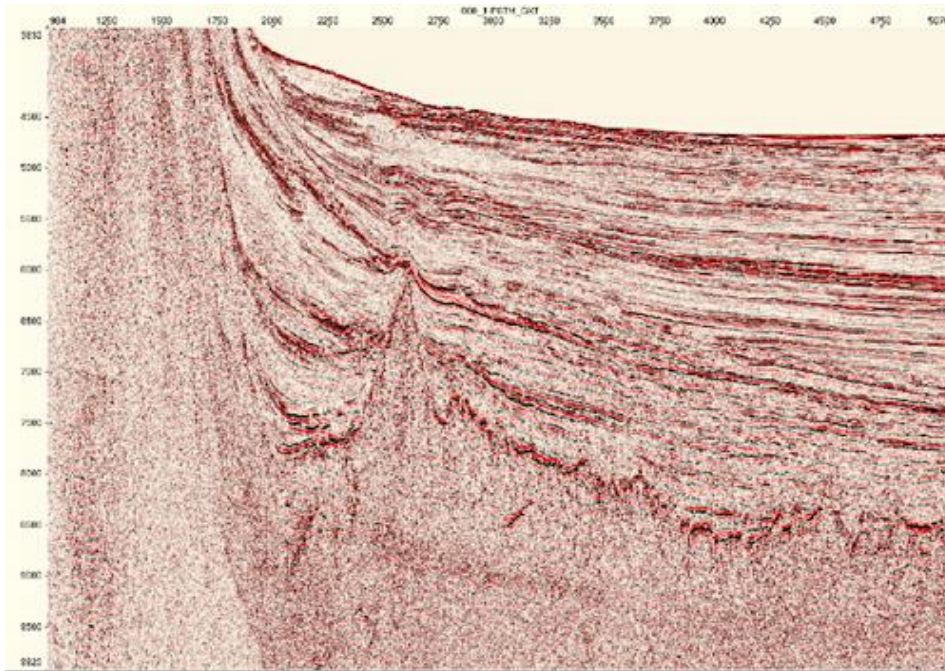
Onland Cauvery Basin

Onland Basin



India span Survey .:

Line No. E-860



Line No. E-700-1

