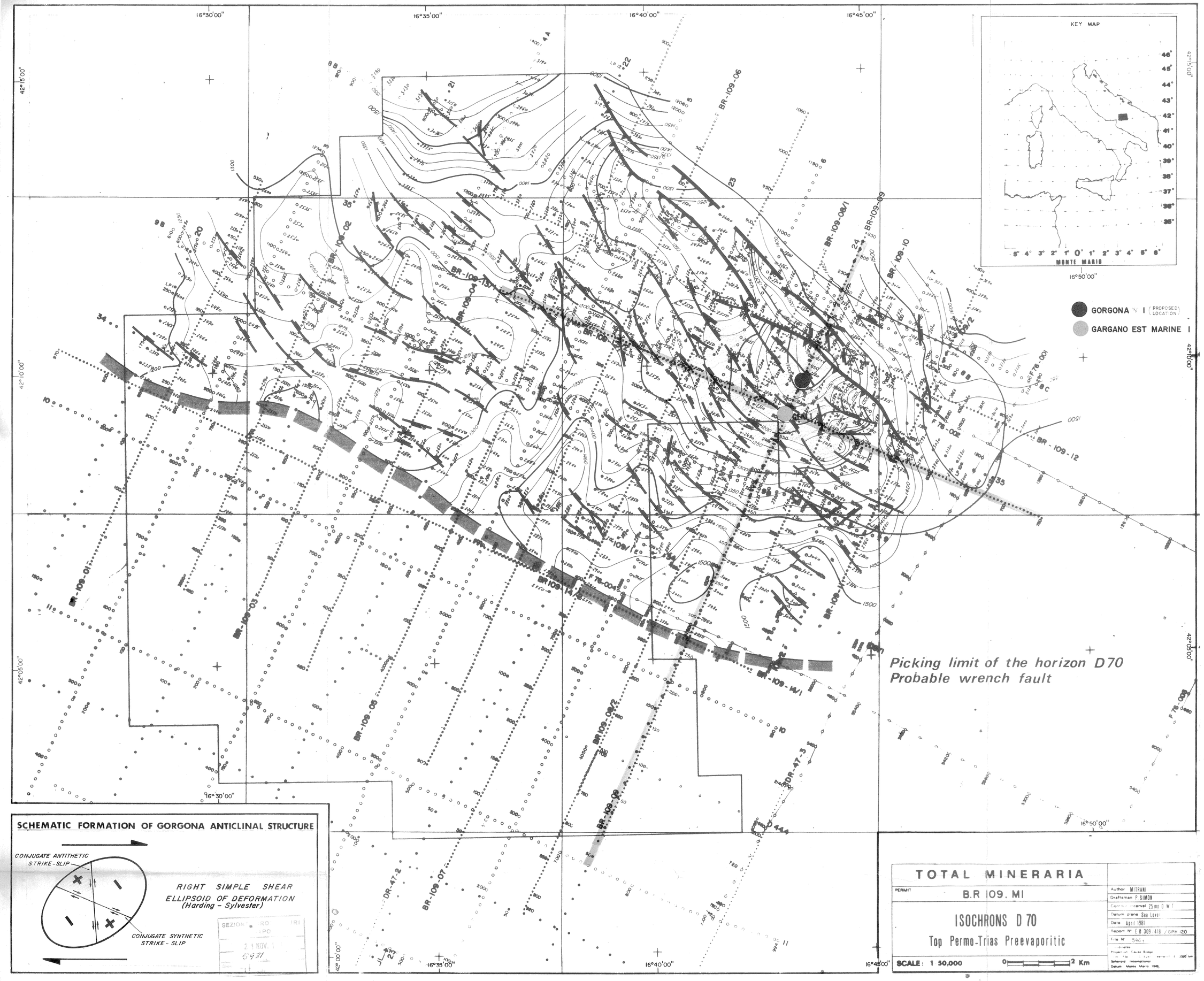
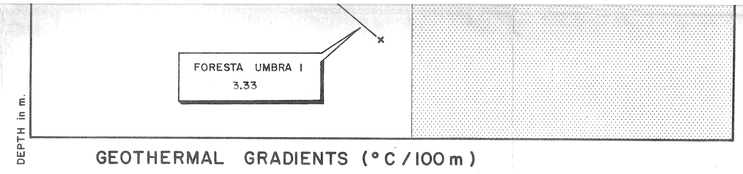




GEOTHERMAL GRADIENTS (°C/100m)

BLOCK BR 109-MI EVALUATION

1. INTRODUCTION

The block BR 109-MI is located offshore Adriatic Sea in southern "B" zone, 40 Km from Gargano coast, in water depth 170 ÷ 210 meters.
The current evaluation of the block defined the excellent deep sealed structure of GORGONA. The shallow terms of the same structure were explored on its SW flank by the wildcat GARGANO EST MARINE 1, drilled on 1975.
The permit of BR 109-MI was decreed on October 1970 and has an acreage of 422.42 Km2. TOTAL MINERARIA holds 60% interest, AGIP and UNION REINISCHE 20% respectively.
The seismic commitment to Ministry was satisfied.
The drilling commitment has been satisfied as well by GARGANO EST MARINE 1.
The deadline to complete drilling of a second, non compulsory well, is therefore the permit expiration, October 23rd, 1982.

2. REGIONAL STRUCTURE SETTING

Block BR 109 is located within the Southern Adriatic basin in the foreland of Apennine compressive fold belt, on a carbonate deep platform subject to a series of transcurrent movements. Two main wrench systems can be recognized: one broadly trending East-West, right lateral, active since Lower Cretaceous; the other Northeast-Southwest oriented, either right or left lateral. The latter is a composite system of cross strike discontinuities of the Apenine fold belt, older in age than the previous one but rejuvenated recently.
The anticlinal structure, pesudo-conical fold of GORGONA was created by converging compressive sectors caused by coupling of conjugate strike-slip faults, according to the model herewith. Conjugate faults in question are related to the right lateral E-W wrenching.

3. GEOPHYSICAL DISCUSSION

a) Data quality
Several surveys have been shot on BR 109, the most significant are DIGICON 1971, SEFEL 1978 and CGG 1980. The general quality is good to excellent for the post Triassic events (with an exception for the data under the "reefs" which are very poor). As per the Triassic (evaporitic and preevaporitic) data are generally poor. However, on the GEM anomaly, 1980 data are generally fair and migration is satisfactory.

b) Horizons mapped
D 10 (Top Pre-Quaternary) and D 20 (Top Pre-Pliocene) have been mapped in 1979; in 1981, 32 (Top Scaglia Calcarea), D 40 (new Fucoid Marls, Top Maiolica), D 50 (Top Liassic Dolomite) and D 70 (top preevaporitic Triassic) have been picked and contoured utilizing all available surveys. Horizon calibration is from GEM 1, but for D 70 which has not been reached. Isobaths have been completed from well and seismic velocities. The structural pattern has been done utilizing the geological pattern known on land and accordingly the NW-SE fractures trend noticed on GEM anomaly is related to a strike slip fault system.

c) Structure definition
The structure is well defined at all horizons, including same still active faulting and/or differential compaction. Comparison of isopach and structure maps show the anomaly existed since Cretaceous and eventually Jurassic.
The evaporitic sequence is characterized by some internal strong reflections; its base D 70 has been picked as the top of unconformable events; the D 70 isochrons map enhances under the post-evaporitic GEM anomaly, an highly faulted NW-SE structural axis which culminates at 2200 mstwt (5000 m approximately).

4. STRATIGRAPHY

A satisfactory geological control is provided from the well GARGANO EST MARINE 1 down to the top of Triassic evaporite (Burano, evaporitic member) and from the deep deep test FORESTA UMBRA 1, drilled about 50 Km apart on shore of GARGANO peninsula, bottomed within the dolomitic Burano Lower member.
The sequence encountered by those wildcats as well as the drilling of GORGONA 1 is displayed on the well lithology herewith.

5. RESERVOIRS

The main reservoir objective is an excellent, highly fractured and occasionally vuggy, fine grained dolomite of Burano dolomitic member. In FORESTA UMBRA 1 it produced hypersaline gassy water (178 gr/lt) in an open hole DST (5093-5149 m) and showed oil giving a solvent cut in cores and cutting samples. Over 800 meters of this section was penetrated, most of it with lost circulation occurrence. A secondary reservoir is provided by the dolomicritic and calcareo-dolomitic sequence, Middle to Upper Liassic in age, explored off culmination by GARGANO EST MARINE 1, showing widespread and locally significant bitumen impregnation.

6. SEAL

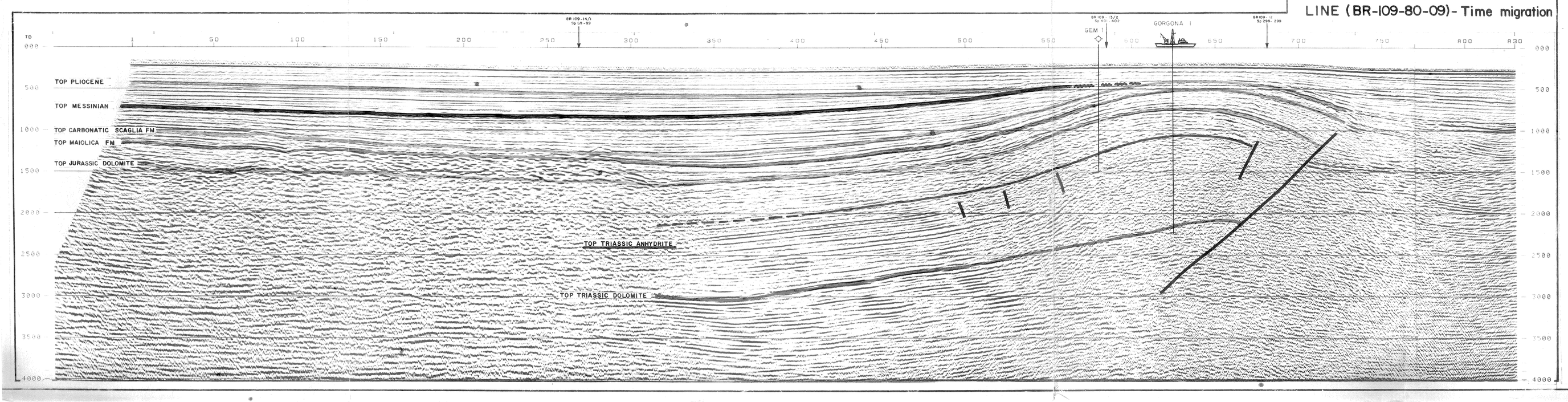
The principal reservoir is sealed by the thick (FORESTA UMBRA 2100 m, GORGONA prognosis about 3000 m). section of Burano evaporitic member, Upper Triassic in age. This sequence is composed of crystalline anhydrite and contains minor interbeds of dark shale, increasing towards the base. The Middle-Upper Liassic
dolomitic sequence, secondary reservoir, is presumably sealed by the topmost portion of the formation itself in G.E.M. 1.

7. SOURCE ROCK AND MATURATION

The hydrocarbon source rocks are very presumably Triassic. The above mentioned dark, bituminous shale interbedded within the basal part of Upper Triassic evaporitic section, looks to provide the Southern Adriatic basin with a large volume of source material. Striking proof of it is provided by the recent oil discoveries of AQUILA, ROVESTI and FALCO and by the widespread presence of live oil, intergranular or in fractures, within the Upper Triassic evaporitic sequence of FORESTA UMBRA 1 (cores m.4315-4316, 4480-4481, 4536-4537, 4625-4626, 4831-4832, 5016-5017,50, 5067-5071) and GARGANO EST MARINE 1 (cuttings). Moreover analysis carried on FORESTA UMBRA well samples of dark shale disclosed very high organic content (4 to 9%).
These hydrocarbon source rocks are mature at depths in excess of 4000 meters in the temperature range suitable for light oil generation as shown on hydrocarbon maturity plate herewith.
The down thrown panels caused by coupling of conjugate strike slip faults beside the compressive sectors allowed a reservoir/source relationship favourable to continued entrapment.

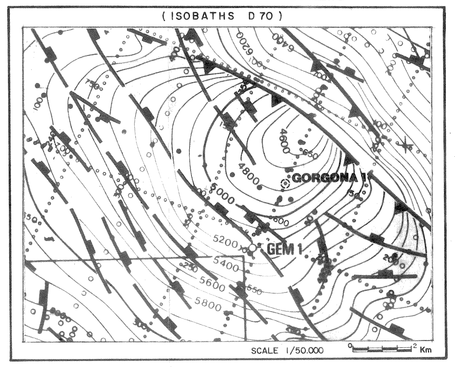
SCHEMATIC FORMATION OF GORGONA ANTICLINAL STRUCTURE

TOTAL MINERARIA	
PERMIT B.R 109. MI	Author MITRANI
	Draftsman P. SIMON
ISOCHRONS D 70	Contour interval 25 ms D W T
	Datum plane Sea Level
Top Permo-Trias Preevaporitic	Date April 1981
	Report N° E 0 385 416 / GPH 120
SCALE: 1 50,000 (0 — 2 Km)	File N° 540 c
	Grades: Projection Fascia Bianca; Spheroid International; Datum Monte Mario 1940.



BR 109

VOLUMETRY OF GORGONA PROSPECT



Acreage: 16 Km² (inside fault system)

Vertical closure: 1200m

Rock volume ≃ 6,4 X 10^9 m^3

Assuming Sw = 30%

Accumulation is for

	Ø = 10%		Ø = 20%	
Net/gross	10%	50%	10%	50%
HC in place (10^6 m^3)	45	225	90	450