Supplementary material

Fig.1S. Integrated sedimentological and petrophysical analysis workflow for Douleb carbonate reservoir study.

Table. 1S. Petrophysical properties of the studied sequence.

Table. 2S. P-Wave velocity and thermal conductivity of minerals (Clauser and Huenges, 1995).

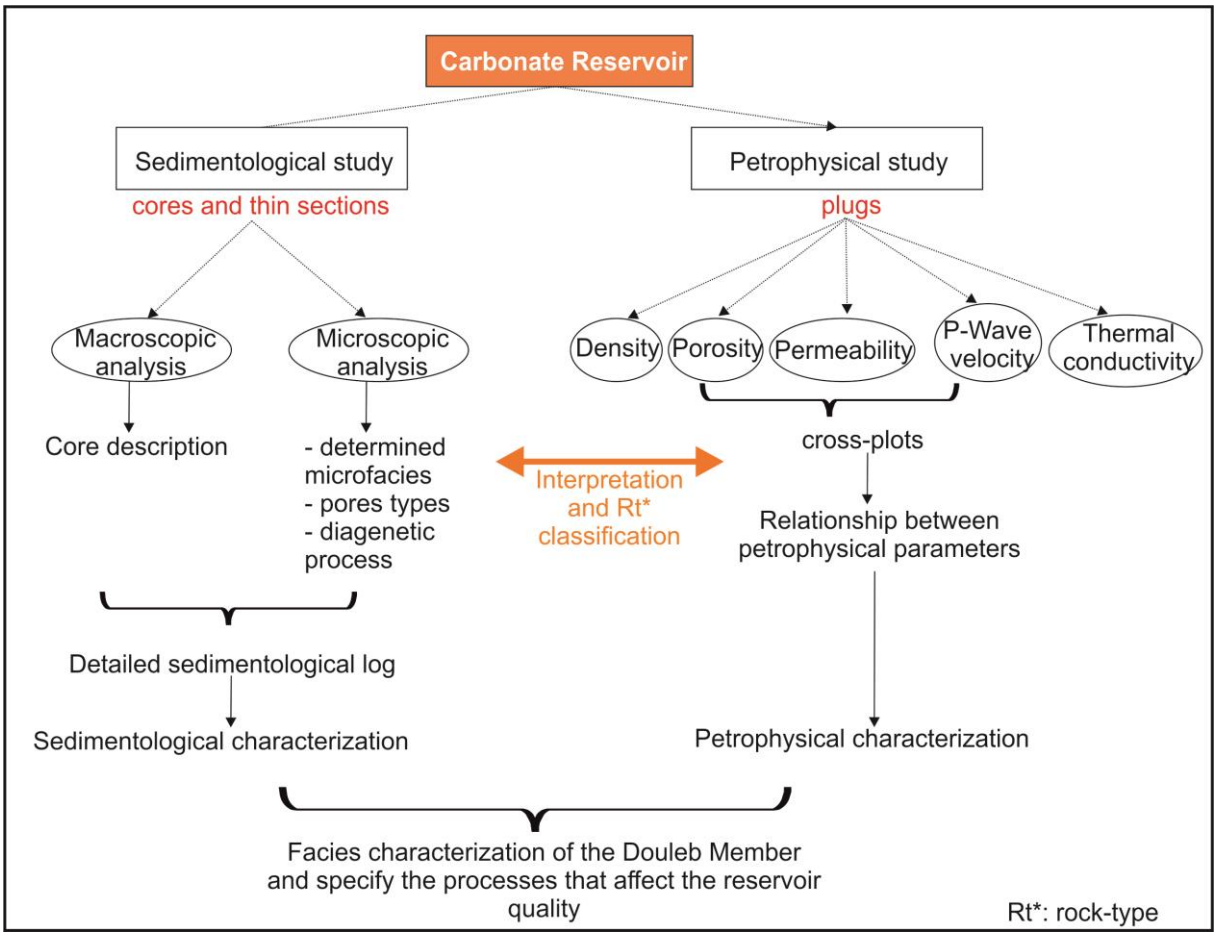

Fig.1S. Integrated sedimentological and petrophysical analysis workflow for Douleb carbonate reservoir study.

Table. 1S. Petrophysical properties of the studied sequence.

Sample ID	Microfacies	Depth (m)	Permeability (mD)	Helium porosity (%)	Water porosity (%)	Mercury porosity (%)	Grain density ($g.cm^{-3}$)	Bulk density ($g.cm^{-3}$)	P-Wave velocity ($m.s^{-1}$)	Thermal conductivity ($W.m^{-1}.K^{-1}$)
1	Mf1	5389.95	25.40	16.57	16.53	-	2.76	2.30	4040	1.94
2	Mf1	5383.27	15.60	17.67	16.46	13.50	2.77	2.28	3846	2.00
3	Mf2	5381.64	116.60	21.15	21.03	-	2.69	2.12	2797	1.70
4	Mf2	5379.96	21.30	22.89	21.94	20.80	2.72	2.09	2179	1.60
5	Mf2	5375.43	101.80	23.62	22.36	16.70	2.69	2.05	2228	1.43
6	Mf2	5373.94	117.00	21.30	21.20	-	2.69	2.11	2360	1.49
7	Mf2	5365.48	360.20	22.05	22.00	13.65	2.68	2.08	2060	1.63
8	Mf3	5362.06	34.20	13.83	13.60	-	2.82	2.42	3936	2.09
9	Mf3	5361.28	47.40	15.66	15.60	14.87	2.70	2.27	3509	1.92
10	Mf4	5304.40	<0.01	1.31	1.18	0.24	2.75	2.71	5063	2.23
11	Mf5	5336.26	<0.01	0.30	0.20	0.18	2.74	2.73	5541	2.24
12	Mf6	5373.06	329.20	17.34	17.04	-	2.70	2.23	3939	1.86
13	Mf6	5371.07	101.20	17.03	17.01	-	2.68	2.22	2966	2.04
14	Mf6	5368.27	3760.00	15.43	15.17	-	2.69	2.27	3101	1.86
15	Mf6	5367.10	1200.00	18.4	18.03	-	2.70	2.20	2364	1.89
16	Mf6	5366.95	763.80	19.43	19.20	11.63	2.69	2.16	2685	1.68
17	Mf7	5395.55	3.70	13.55	13.02	12.47	2.81	2.42	3942	2.00
18	Mf8	5322.40	<0.01	0.43	0.39	-	2.71	2.69	5932	2.41
19	Mf9	5385.97	64.80	18.25	17.83	-	2.86	2.33	3846	3.04
20	Mf9	5359.91	92.00	19.17	19.04	15.24	2.84	2.29	4762	2.96
21	Mf10	5357.43	<0.01	0.74	0.51	-	2.94	2.92	5781	3.77
22	Mf10	5350.95	<0.01	2.93	0.24	-	2.93	2.84	6094	3.58
23	Mf10	5344.60	<0.01	0.42	0.33	-	2.92	2.90	5063	3.52
24	Mf11	5353.88	0.90	14.3	12.31	-	2.71	2.32	4255	2.00
25	Mf11	5352.20	1.60	15.17	14.22	-	2.74	2.32	3761	1.93
26	Mf12	5316.48	<0.01	1.38	0.42	-	2.70	2.66	5942	2.53

Table. 2S. P-Wave velocity and thermal conductivity of minerals (Clauser and Huenges, 1995).

Mineralogy	**Quartz**	**Calcite**	**Dolomite**	**Anhydrite**	**Pyrite**	**Air**	**Water**
P-Wave Velocity (m/s)	6050	6600	7500	6100	8000	340	1500
Thermal conductivity (W/m/k)	6.5-11.3	4.2-5	4.9	5.3	37	0.015	0.59