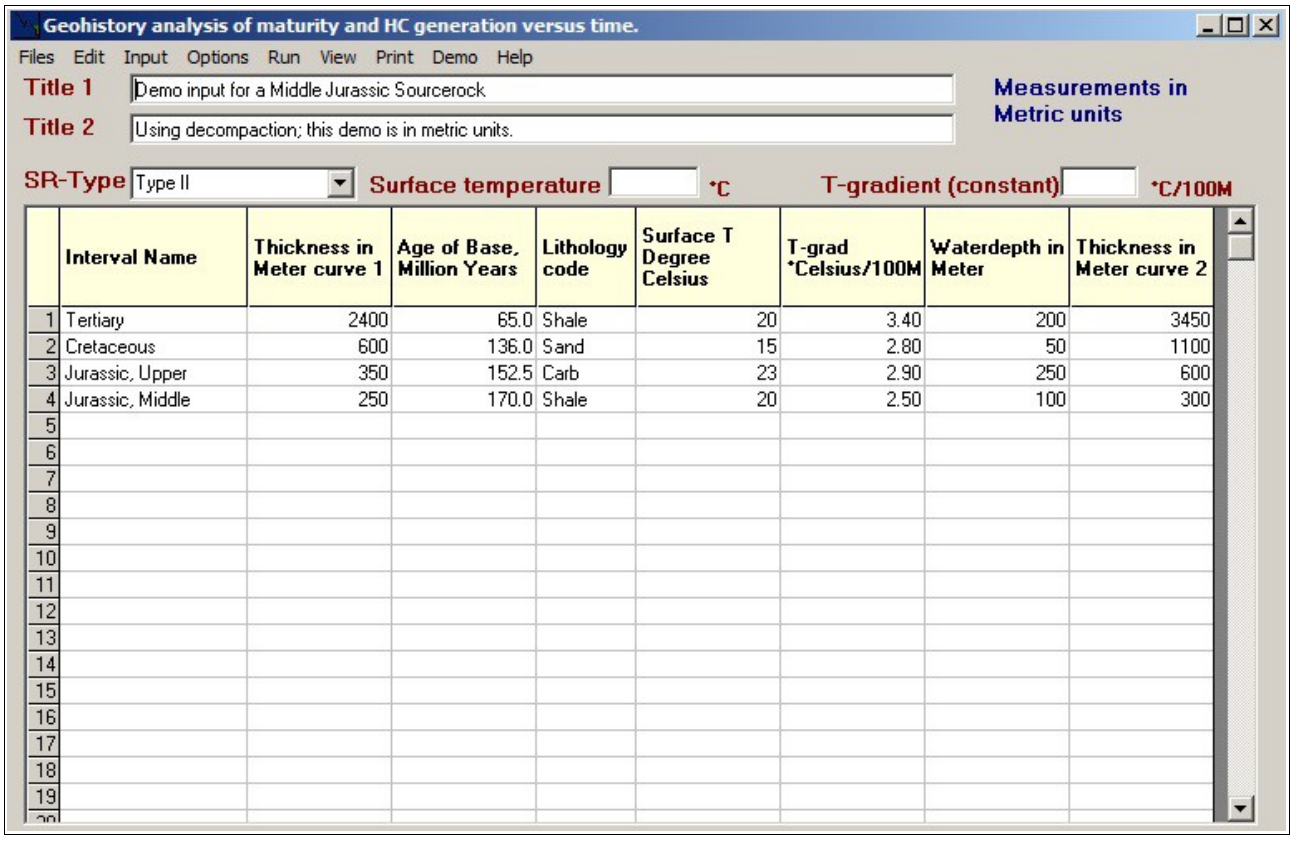
Dwindling fossil resources - Is oil continuously generated?

For many geologists it is quite clear that there is a finite resource of conventional oil. There is always some stretching of these resources by spending more on technology, but recovery efficiency above 100 % is simply not possible. Or is it? Is oil generation possibly fast enough to keep up with the production?

To answer this question we use an example of a middle Jurassic source rock type **II** with 7 % TOC (Total Organic Carbon) in a drainage area (also called " fetch area") for a trap of some 3 by 4 sq. Km (~10 Km2). The "Potential Ultimate Oil Yield" (PUYO) is **19.6 liters oil/% TOC/M3.** This source rock is buried as documented in the table below:

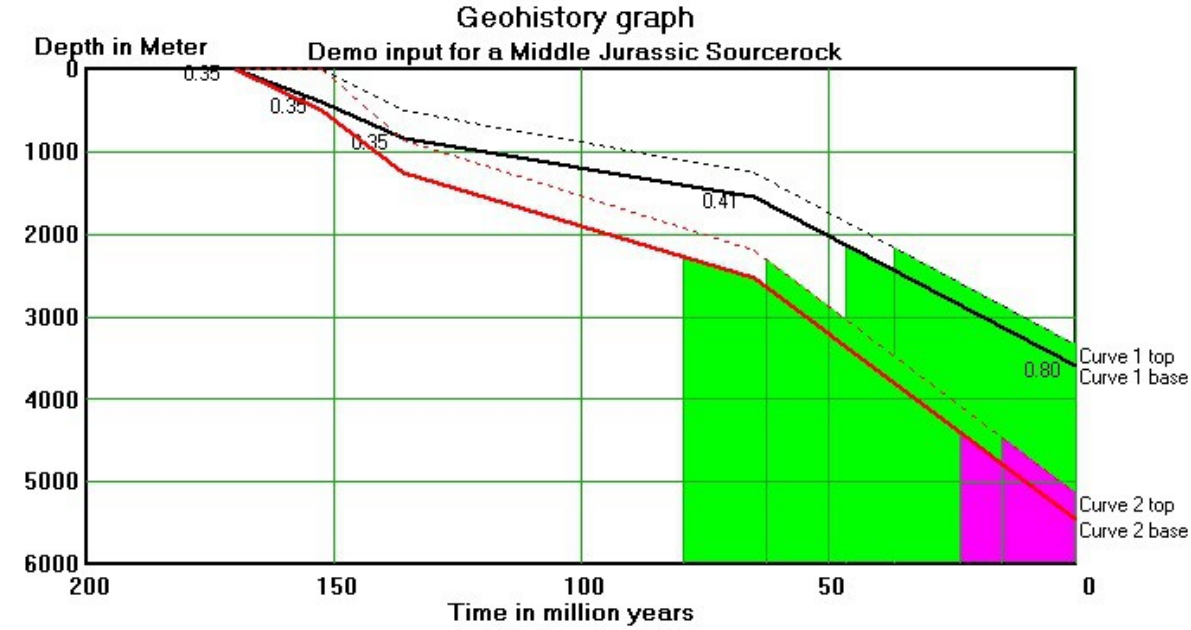


	Interval Name	Thickness in Meter curve 1	Age of Base, Million Years	Lithology code	Surface T Degree Celsius	T-grad °Celsius/100M	Waterdepth in Meter	Thickness in Meter curve 2
1	Tertiary	2400	65.0	Shale	20	3.40	200	3450
2	Cretaceous	600	136.0	Sand	15	2.80	50	1100
3	Jurassic, Upper	350	152.5	Carb	23	2.90	250	600
4	Jurassic, Middle	250	170.0	Shale	20	2.50	100	300
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								

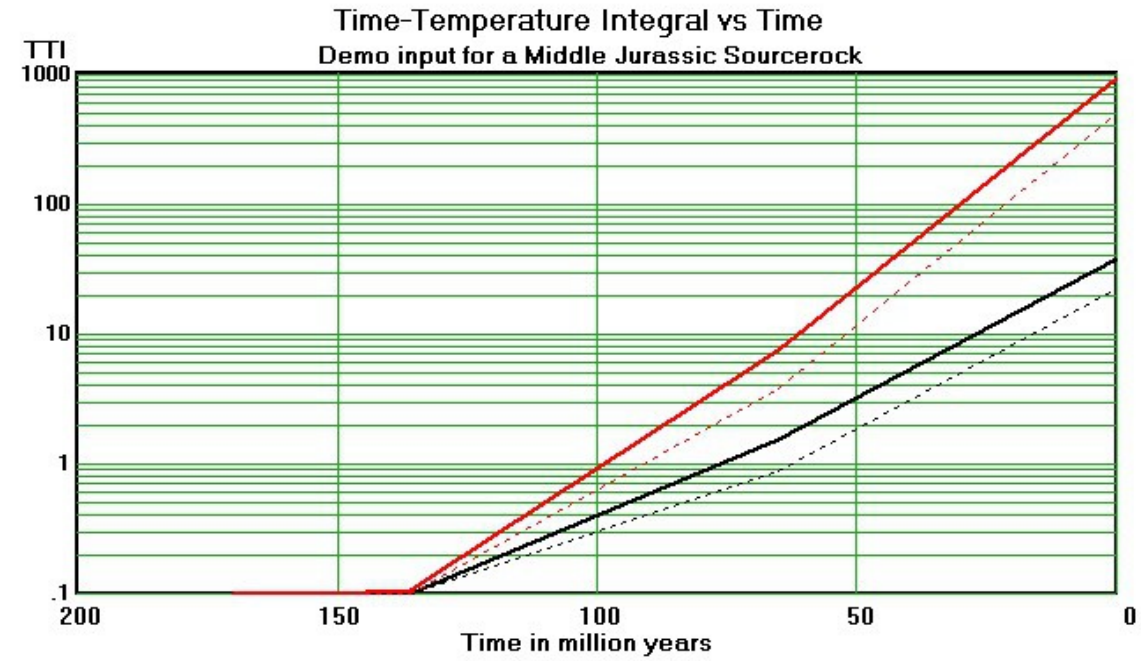
The geohistory graph is shown on next page.

Maturity for the deepest part of the drainage area starts only in the Upper Cretaceous.
The deepest curve goes through the entire oil window and hence reaches the PUYO.
So: how many barrels have been generated within this drainage area, using the above assumptions?
Per M3 it is at PUYO: 7 * 19.6 = 137.2 liter oil = 0.86 barrel.
We have 20 * 10 * 10^6 m3, hence a total of 172 miillion barrels. These have been generated in a timespan of 70 million years. This calculation is depicting the history of this source rock, but it is valid for estimating the rate of generation that may occur right now elsewhere. **Conclusion: a generation rate of some 2.5 barrels per year!**

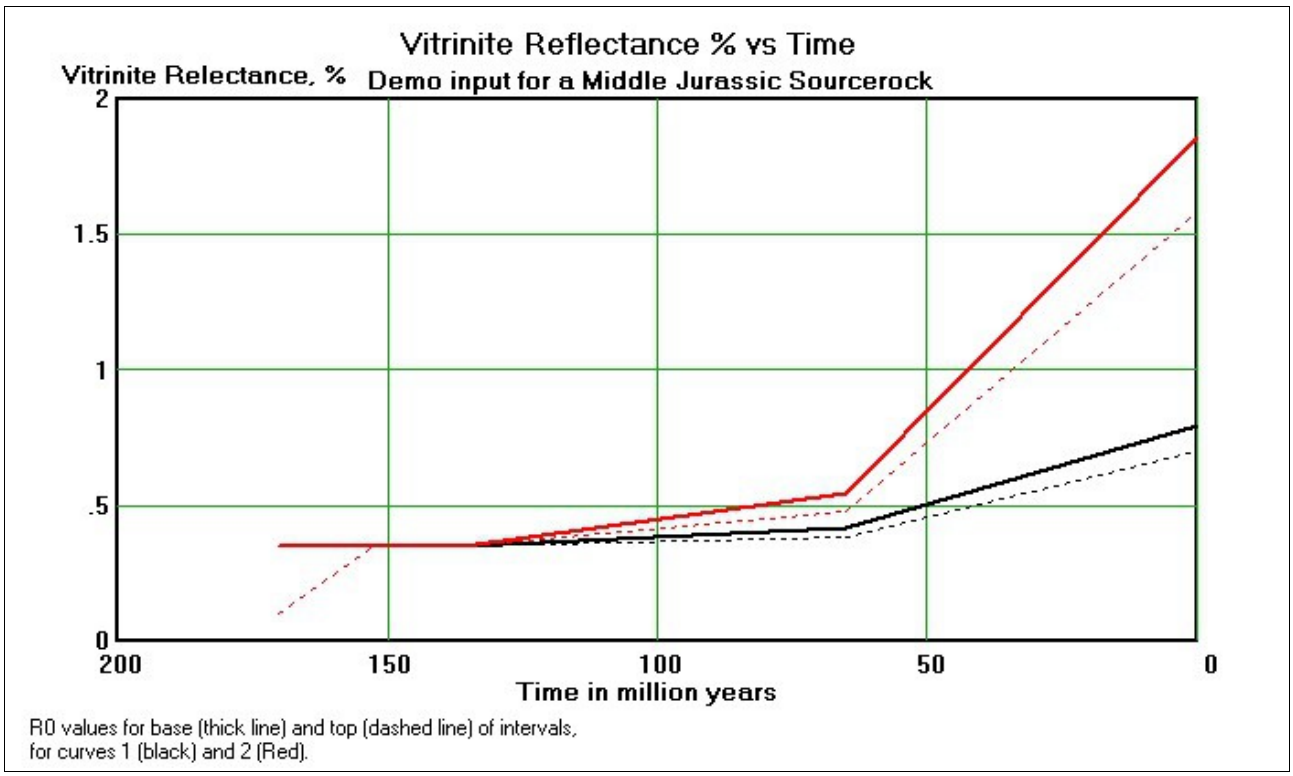
This is only an order of magnitude calculation, but it is clear that we can hardly wait for a depleted field to be replenished by natural means.



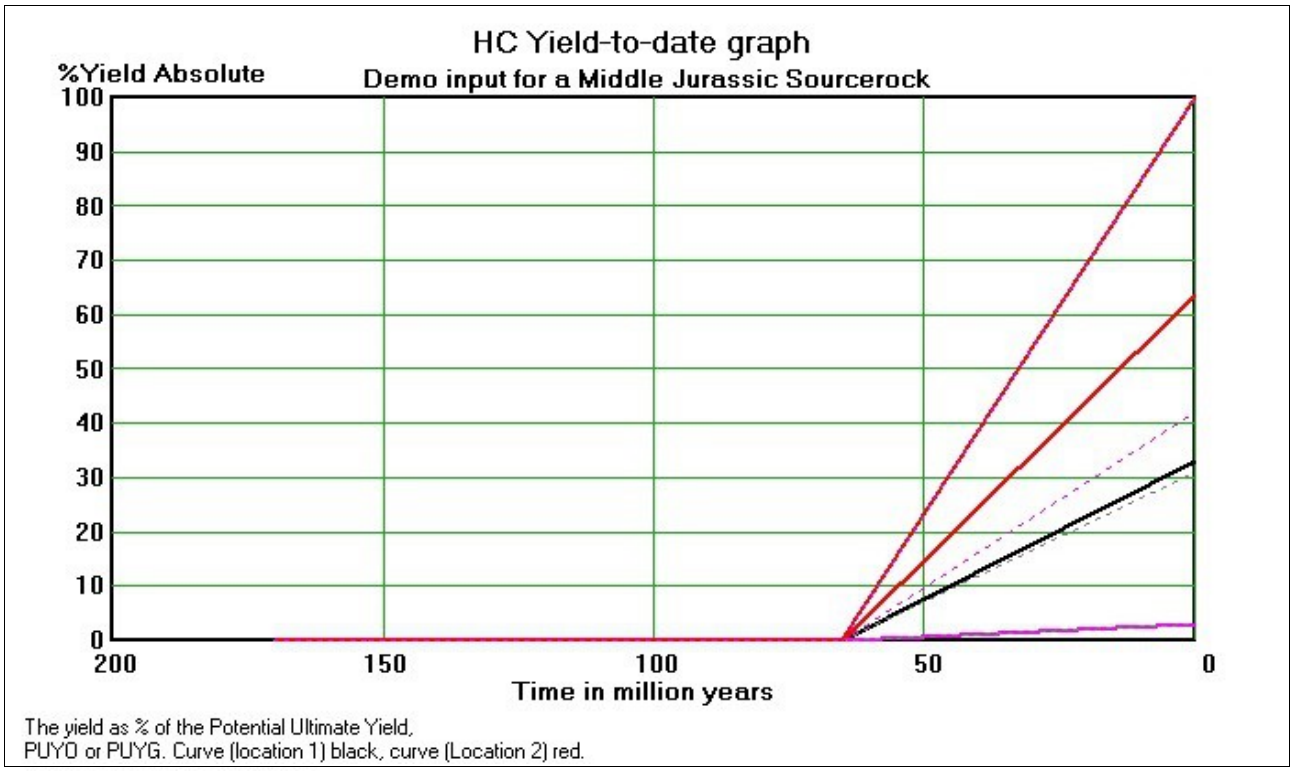
Paleo-depth of base (heavy line) and of top (dotted line) of target interval. Numbers along curve are VR/E%.
Curve 1 black, curve 2 red. Green: Oil window (VR 0.50 - 1.20), Magenta: Gas window (VR > 1.20).



TTI values for base (heavy line) and top (dashed line) of intervals,
for curves 1 (black) and 2 (red).



R0 values for base (thick line) and top (dashed line) of intervals,
for curves 1 (black) and 2 (Red).



The yield as % of the Potential Ultimate Yield,
PUYO or PUYG. Curve (location 1) black, curve (Location 2) red.