

PERIODICITY IN PETROLEUM DEVELOPMENT

1. In 1956, Knebel and Roderiguez-Eraso had produced an important paper on the Habitat of Some Oil (BAAPG, v.40, no.4). In this they had brought out a number of figures illustrating the interrelationship between the so-called "Free-World" oil occurrences discovered up to that point of time and a number of other factors like their depth, age, geotectonic setting and time.
2. In my A.M.N. Ghosh Memorial Lecture to ONGC's Institute of Petroleum Exploration in 1969, I had drawn attention to the importance of the correlations brought out by some of these figures and had singled out the discovery vs. time figure (Fig.1) for some additional comments (Bull. ONGC, v.6, no.2). This was because the figure had brought out a singularly striking rhythmic periodicity in the incidence of additional large discoveries of new reserves with time. In publishing this time vs. discovery data, Knebel and Rodriguez-Eraso had offered no explanations for the cyclic relationship. So, I had then speculated that this graph could be reflecting:

"the impact of incidence of new ideas on the discovery of oil. If one analyses it in detail, one would possibly find that a roughly 10-12 year interval a new idea has come forward (be it in basic concepts on where to look for oil or in instrumentation) which has been successful in locating a new class of oil accumulations.

After the initial spurt in the discovery rate, new ideas for the discovery of additional oil have progressively exhausted themselves, and the industry has had to wait for another new idea to come forward and give it a fresh spurt of new discoveries".

3. Furthermore, the 10-12 year periodicity reminded me of the Sun Spot Cycle which reflect the increased bursts of radiation and energy which the Sun sends out every 10-12 years (Fig.2). These affect many physical manifestations in the world – including its climate. The question is whether these also stimulate the human creativity every 10-12 years. The fact remains that there is a close parallelism between the Sun Spot cycle and discovery cycles.
4. More recently, I have had occasion to look at a time vs Global oil production plot, generated from data culled for me by Dr. K. Narayanan (Fig.3 and Table 1). This plot brings out another interesting periodicity, each of

roughly 40 year duration, in man's achievements in the domain of crude oil production.

5. For the first 40-year period (1850-1900 AD) following the Drake Well, the production rate remained fairly low. During the next 40 years (1900-1940 AD), it rose materially, but still remained at around only 0.7 to 0.9 billion barrels per annum. In the next 40 years (1940-1980 AD), after the advent of a number of new ideas on where to look for oil and what useful products could be derived from the produced oil, the production increased rapidly to around 23 billion barrels per annum. The end point of this coincided roughly with the last major new discovery (1978). Thereafter, the rate of growth has gone down substantially and the

Table 1. Longwell (2002) figures in billion barrels crude

Year	Additons of new oil in the year	Annual production
1900	0.7	0.7
1905	.5	0.5
1910	0.7	0.7
1915	0.7	0.7
1920	0.7	0.7
1925	4	0.7
1928	20.05	0.7
1930	3	0.8
1935	20	0.8
1938	31	0.9
1940	23	0.9
1943	6	1.2
1945	6	1.5
1947	40	1.9
1950	45	2.2
1952	21	3
1955	35	4.5
1960	48	6
1962	58	9
1964	43	10
1965	47	11.61
1970	29	17.54
1972	32	17.59
1975	38	20.38
1978	38	23.11
1980	22	22.97
1985	18	20.96
1990	11	23.86
1995	6	25.53
1997	7	26.75
2000	14	27.19
2001	0	0
2002	10	27.38

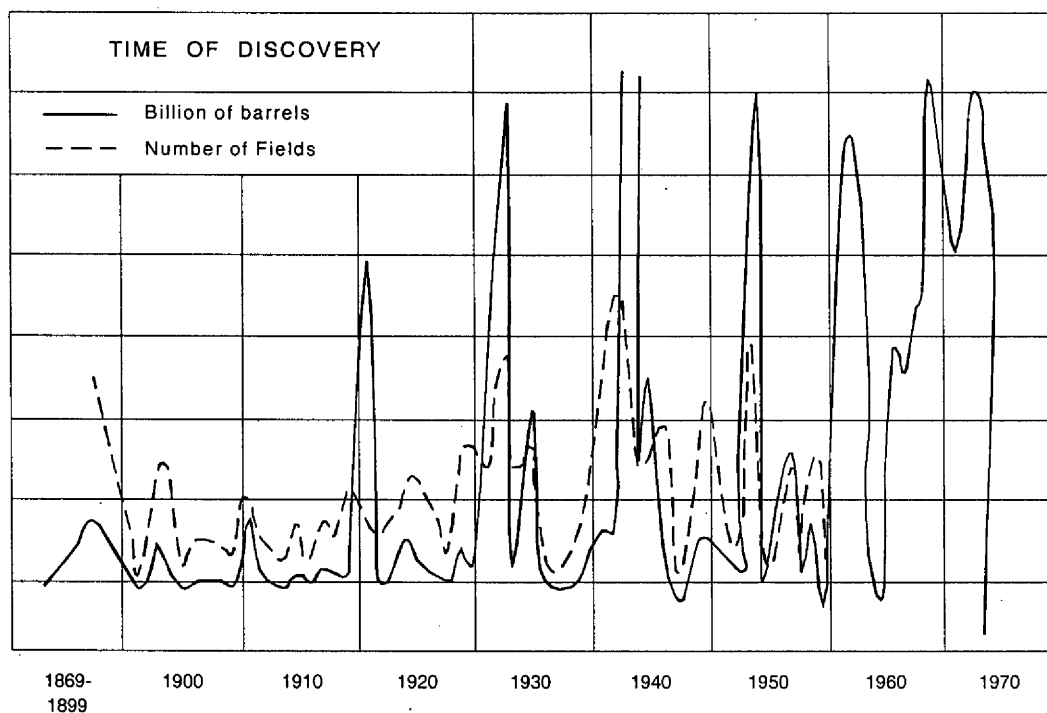


Fig.1. Chronological record of discovery of free-world's minor oil fields (*after* Knebel and Rodriguez-Eraso, 1956). Post-1955 figures based on rough estimation from World Oil and Petroleum Information Sources.

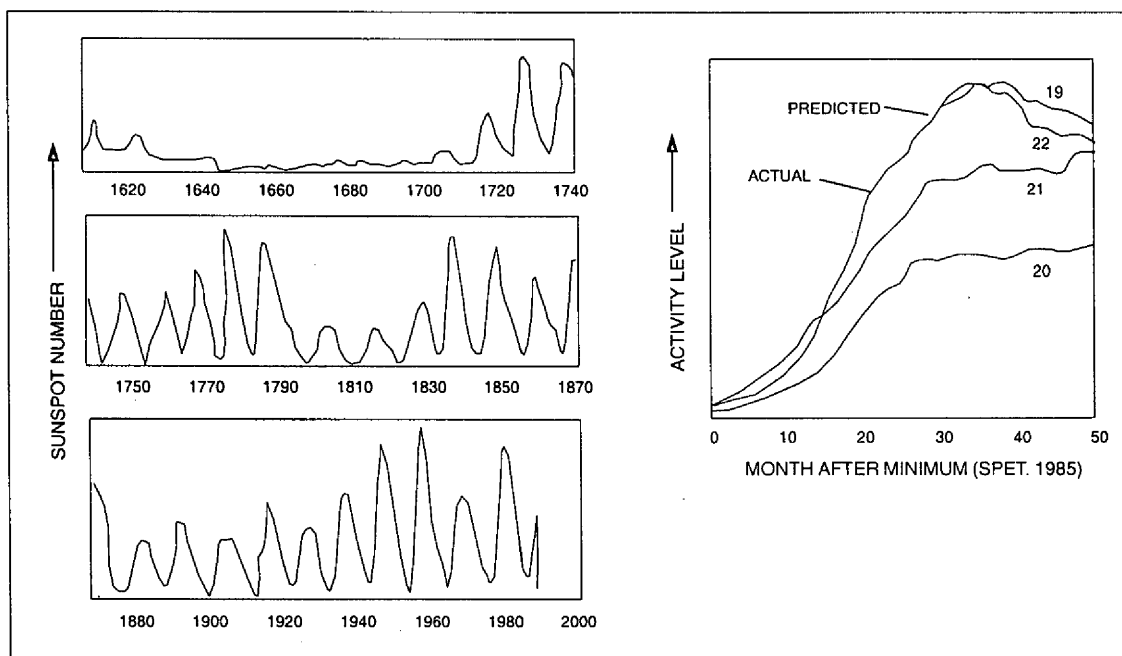


Fig.2. Sun Spot Cycles.

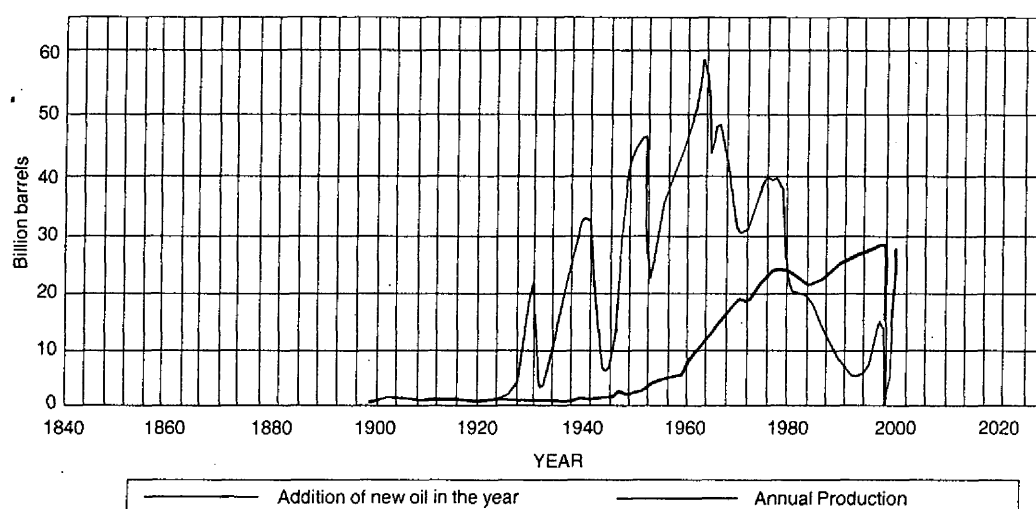


Fig.3. Crude oil produced and "New" oil resources added during the year (Longwell explicitly states that all reserve additions other than "new oil" have been backdated to date of discovery of the field; From data culled by Dr. K. Narayanan).

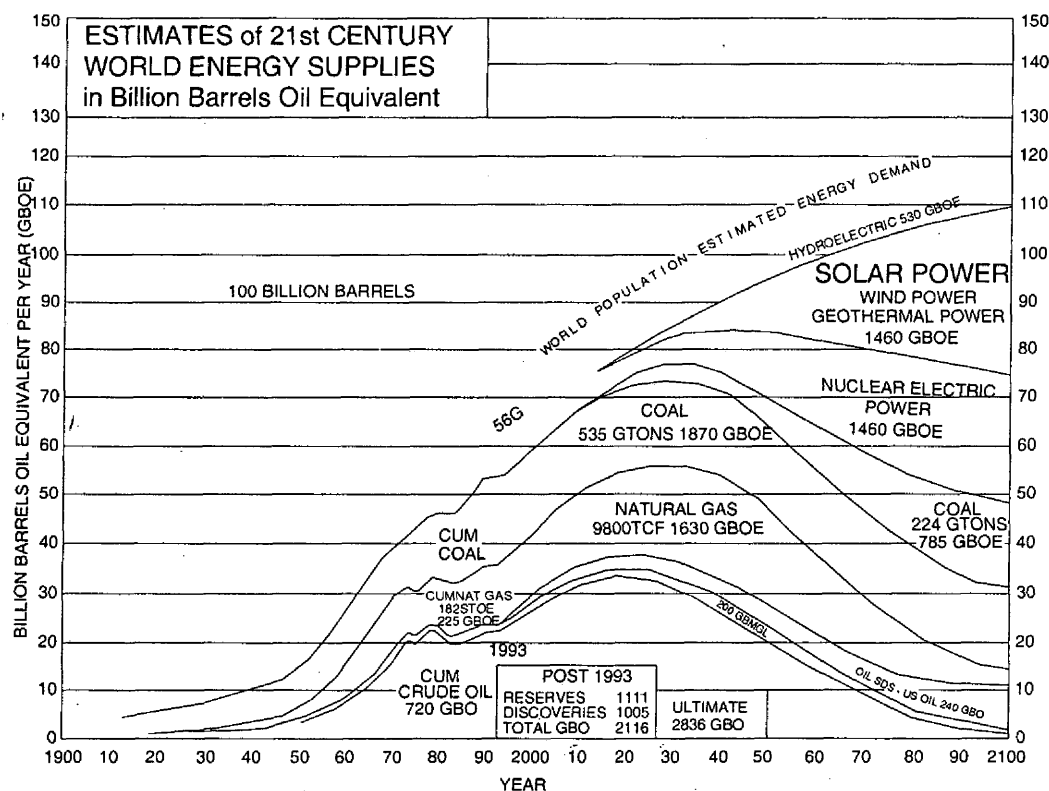


Fig.4. Estimates of 21st century world energy supplies (after J.D. Edwards, AAPG Bulletin, v.81, no.8, August, 1997).

production has hovered round only 27.50 billion barrels per annum in 2002. The end of this 40 year period will be in 2020 AD, when, according to many of the prognosticators, the production of conventional oil is expected to settle down on a permanent long term decline (Fig.4). What has been behind this 40 year periodicity could be the subject matter of an interesting

study. Much more important however would be to take steps to ensure that the present period ends with and is followed by a yet another 40-year spell of increasing growth in petroleum discoveries, production and use.

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