JOURNAL OF THE SCIENTIFIC AGRICULTURAL SOCIETY OF FINLAND
Maataloustieteellinen Aikakauskirja
Vol. 52: 393—402, 1980

Lunar and planetary periodicity of failure years in Finland and in Sweden

TAUNO MANNILA
Myllytie 3 A 7, 00140 Helsinki 14

Abstract. Of the 47 failure years in Finland between 1347—1929 40 % have occurred in years that correspond to the lunar period 4.9035 years. The result of a study of 77 failure years in Sweden during 1526—1772 was similar. When the positions of planets in a failure year have been repeated or the angular distances of the four giant planets have been isogonal the failure might also have been repeated. — The amount of spring wheat crop per hectare in Finland during the years 1920—1979 has been reduced in relation to the foregoing and/or the following year in years corresponding to the lunar periodicity of 4.9035 years as this scale LR—agr. has been started from a growth season during which the amount of rain has been below average. — Still greater reduction of crop and frequency of 9/10 years has occurred in Finland in the years corresponding to the planetary scale P32agr., which covers the period of 5.5613 years. Scale P32agr. represents a growth season in which the temperature was below average during 61 % of the time and the amount of rain in May and in July was below average but in August exceeded the average. A meteorological scale P32 completes scale P32agr. — With the scales predictions of years could be made in which reduction of crop can be expected.

1. Introduction

The numerous factors affecting the climate and the periodicity of changes have been clearly recorded by LAMB (1972). About the periods he writes as follows: »Cyclic tendencies around 30 days, 13—14 months, 2—3 years, 5 1/2, 11, 19, 22—23, 90, 100, 200 and 400 years (as well as some much longer cycles) may be accepted as playing an important part in the variations we observe — though most are only quasi-periodicities of somewhat variable period and amplitude.» These figures are indications of the many studies in which one has tried to find regularity in changes of the climate with the aid of mere statistics.

Among other studies should be mentioned the one that tries to deduce the later development of the weather during the period of growth from the spring weather based on earlier similar situations (CHICHASOV 1973); a comparison of the weather of the same month during several years (WRIGHT and FLOOD 1973) and an analysis of statistics of the length of rainy periods (FEKETE and SZEPESI 1974).

The leading idea of the following study is to find out the possible influence of the lunar and planetary mechanics through gravitation changes on weather variations and further due to them on variations in the amounts of crops.

2. Material and methods

The object of this study was first of all the 47 failure years during the years 1347—1929 in Finland (GROTENFELT 1919, 1934) and the 77 failure years during 1526—1772 in Sweden (EKMAN 1783).

The data of the areas of cultivation and the amounts of the yearly crop in Finland during the time 1920—1979 are obtained from the statistics of the National Board of Agriculture in Finland.

As a lunar period the time of 65 anomalous months i.e. 4.903 530 years has been used and as a planetary period the time of 5.561 343 years, which period is 1/32 of the planetary subperiod of 177.962 98 years (MANNILA 1980).

The lunar scale has been used first of all in the study of the appearance of failure years. In the second phase the start of the lunar LR—agr. has been a growth season during which the amount of rain has been below average.

The start of the planetary scale P32agr. is a growth season in which the temperature has been below average. However, another so-called meteorological planetary period P32 has also been used, the start of which is 0.997 years later than that of P32agr. The yearly temperatures in the years of the scale P32 are below average.

In the determination of the heliocentric position of the planets a hundredth part of a circle (abbreviated cc) has been used as the angle unit.

3. Results

31. Failure of crops

311. Lunar periodicity

When 47 failure years from the period 1347—1929 in Finland are placed in a scale of four lunar periods (A—D), i.e. 19.61 years, we get a result according to Figure 1: 19/47 of the bad years occur in groups at intervals of 4.9035 years. The same result is shown in Figure 2, in which the above mentioned four

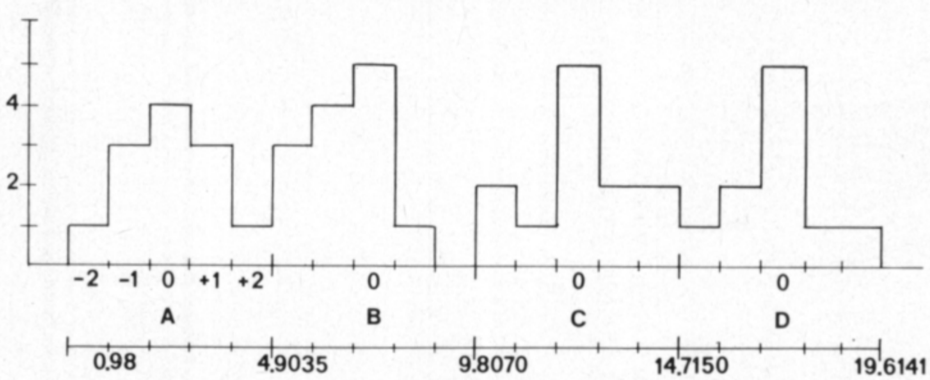

Fig. 1. 47 failure years during 1347—1929 in Finland are placed in a scale of four lunar periods (A—D), i.e. 19.61 years. 40 % of the bad years occur in groups in intervals of 4.9035 years.

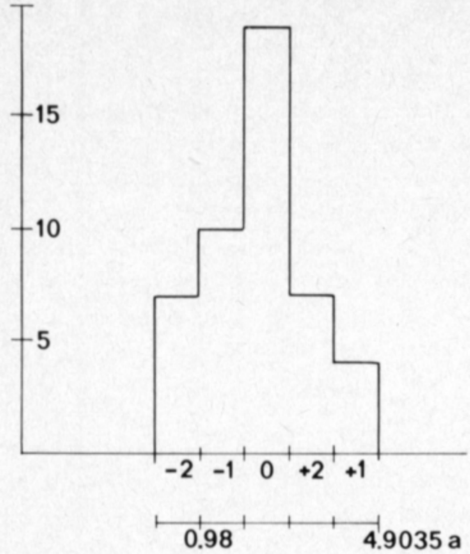

Fig. 2. The four lunar periods A–D (Fig. 1) have been combined.

Table 1. The failure years in Finland during 1347–1929. 47 bad years in a scale of four 4.90353 years period (A, B, C and D) i.e. 19.61 years. Start: 1866.63. – years before the scale time, + years after the scale time, 0 at the scale time.

Failure year	Scale	Group	Failure year	Scale	Group
1347	1346.85582	D 0	1726	1724.42763	A + 1
1352	1351.75937	A 0	1740	1739.13822	D 0
1391	1390.28761	A 0	1941		D + 1
1421	1420.40877	C 0	1756	1753.84881	C + 2
1445	1444.92642	D 0	1763	1763.65587	A – 1
1527	1528.28643	A – 2	1769	1768.5594	B 0
1528		A – 1	1776	1773.46293	C + 2
1542	1542.99702	D – 1	1783	1783.26999	A – 1
1543		D 0	1784		A 0
1600	1601.83938	D – 2	1785		A + 1
1601		D – 1	1833	1832.30529	C 0
1602		D 0	1862	1861.72647	A 0
1631	1631.26056	B – 1	1865	1866.63000	B –2
1632		B 0	1866		B – 1
1633		B + 1	1867		B 0
1635	1636.16409	C – 2	1892	1891.72647	C 0
1649	1650.87468	B – 2	1893		C + 1
1650		B – 1	1902	1900.95471	A + 1
1656	1655.77821	C 0	1918	1915.0653	D + 2
1695	1695.00645	C – 1	1923	1920.56883	A + 2
1696		C 0	1926	1925.47236	B 0
1697		C + 1	1929	1930.37589	C – 2
1708	1709.71704	B – 2			
1709		B – 1			
1710		B 0			

Summary:	–2	–1	0	+1	+2
	7	10	19	7	4

periods A, B, C and D have been combined. — The division of the failure years into the scale of 4.9035 year periods is presented in Table 1.

The result was similar when a corresponding investigation was made into 77 failure years from the period 1526—1772 in Sweden, shown in Figure 3.

In this material, however, there are many »weak years». In this case the failure was obviously caused by other than meteorological factors such as the lack of seed corn, the weakness of technical methods, and illnesses in the population, such as pestilence and other contagious diseases. For these reasons probably the base of the diagram in Figure 3 is higher than in Figure 2.

212. Planetary periodicity

The relation of the failure of crop to the planetary periodicity is shown in Figure 4. In this figure are presented the mutual heliocentric positions of the four giant planets, Jupiter, Saturn, Uranus and Neptune at the twelve years of failure times in Finland. It can be ascertained that when the angular distances between the planets are repeated, in these cases also the failure is repeated, even if the positions of the planets are the same or there is a mirror image of the positions in question.

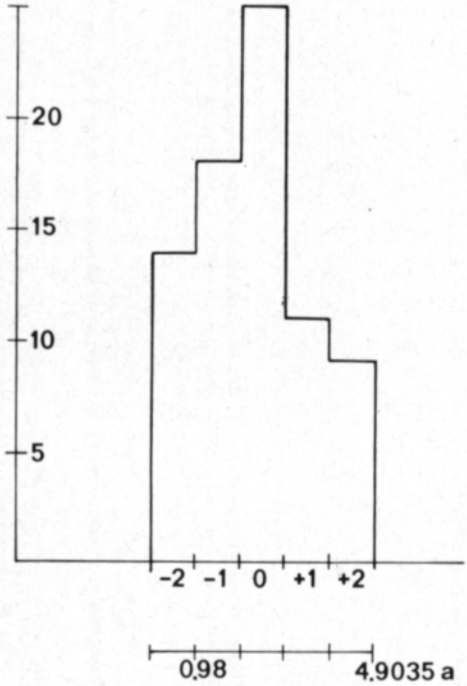

Fig. 3. 77 failure years during 1526—1780 in Sweden are placed in a scale of one lunar period i.e. 4.9035 years.

32. The crops of the spring wheat

The relations of the crops of spring wheat in Finland to a lunar period and to two planetary periods can be seen in Figure 5.

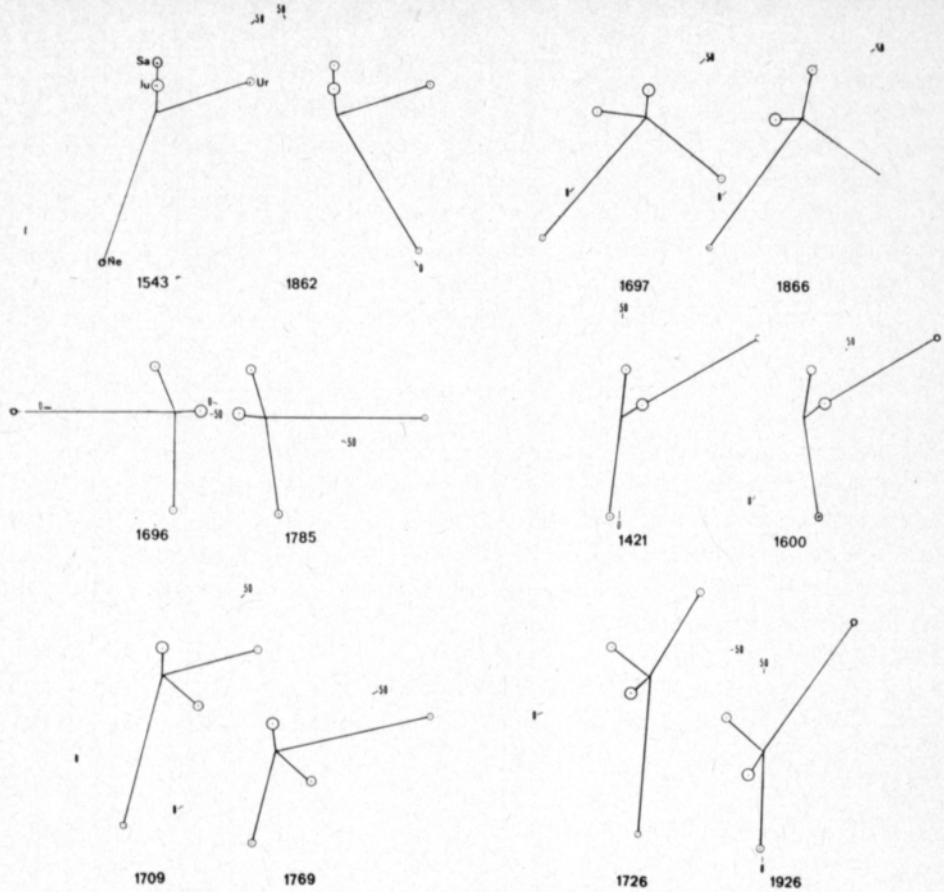

Fig. 4. The mutual heliocentric positions of the giant planets Jupiter (Ju), Saturn (Sa), Uranus (Ur) and Neptune (Ne) at the times of twelve years of failure in Finland.

321. Lunar periodicity

As a lunar period there is the meteorological scale LR— (MANNILA 1980), which represents a poor amount of rain, less than average in a year. However, the start of the scale is 0.23 year earlier than the start of the meteorological scale, and the name of the scale is therefore LR—agr.

From Table 2 it can be seen that the amounts of rain in Helsinki in the year of the scale LR—agr. have been below average in May and July in eight years out of twelve, and also that the amount of rain in all four months of the season has been below average in 60 per cent of the time.

It can be ascertained from Figure 5 that *in the years of the lunar scale LR—agr. the amount of crop of spring wheat* in kilogrammes per hectare in Finland *has been reduced* to some degree in relation to the amount of crop in the foregoing and/or the following year. This reduction can be clearly seen e.g. from the amount of crop in the years 1941, 1946, 1951, 1956 and in 1975.

322. Planetary periodicity

The planetary scale P32agr., in which the periods are 5.5613 years, is placed in Figure 5 below the diagram so that the start of the scale is in the mathematical time 1961.2578, which corresponds to the crop failure in the year 1962. It can be seen that in the years of this period *the harvest per hectare has been less than in the foregoing years in 9 out of 10 years.*

The relation of the monthly temperature of the growth season to the monthly temperature average can be ascertained from Table 3. In the years of the scale during 1923—1978 the *temperature* in May and June was *below average* in 6 out of 11 years, in July in 7 and in August in 8 out of 11 years.

The relative amount of rain in the years of the same scale is shown in Table 4. From May to the end of August the amount of rainy days has been variable. However, *the amount of rain* in the groups of Mays and Julys has been below average in 7 out of 11 years, while in the group of Augusts it has been above average in the same ratio, even over 100 mm in 5 out of 11 years.

The *meteorological scale P32* as well completes the scale P 32 agr. This meteorological scale P32, the start of which is the mathematical time 1856. 5895 (MANNILA 1980), represents years in which the temperature is below average especially in summertime, and particularly August, September and October are rich in rain.

The amount of crop per hectare in the years of the scale P32 has been less than the amount in the foregoing year in a ratio of 5 to 10, and in the years of the last 5/10 the amount of crop has often been rather poor. This meteorological scale P32 may be found also under the diagram in Figure 5.

Table 2. Lunar Scale LR—agr. Amount of rain in the growth season compared with average. Helsinki 1921—1975. Period: 4.903 530 y. Start: 1920.773 835. — below average, +— average, + above average, ++ >70 mm, +++ >100 mm.

1931—1960 average, mm.:		42	37	47	62	66	66	647
Scale	Year	(Apr.)	May	June	July	Aug.	(Sept.)	Year
1920.7738	1921	—	—	+	—	—	—	705.8
1925.6773	1926	—	++	—	—	+	—	563.2
1930.5808	1931	—	+	+	—	—	++	701.5
1935.4844	1936	—	++	—	+	—	—	640.5
1940.3879	1941	—	—	—	—	+++	—	496
1945.2914	1946	—	+	+	—	—	++	578
1950.1950	1951	+	—	+	—	—	—	556
1955.0985	1956	+	—	—	+++	+++	—	711
1960.0020	1961	—	—	+	+	++	—	580
1964.9056	1965	—	—	+	—	++	++	605
1969.8091	1970	++	—	—	+++	—	++	711
1974.7126	1975	+	—	—	—	—	—	435
	Summary:	+	4	6	4	5		
		—	8	6	8	7		

Amount of rain below average in 29/48 months (60 %).

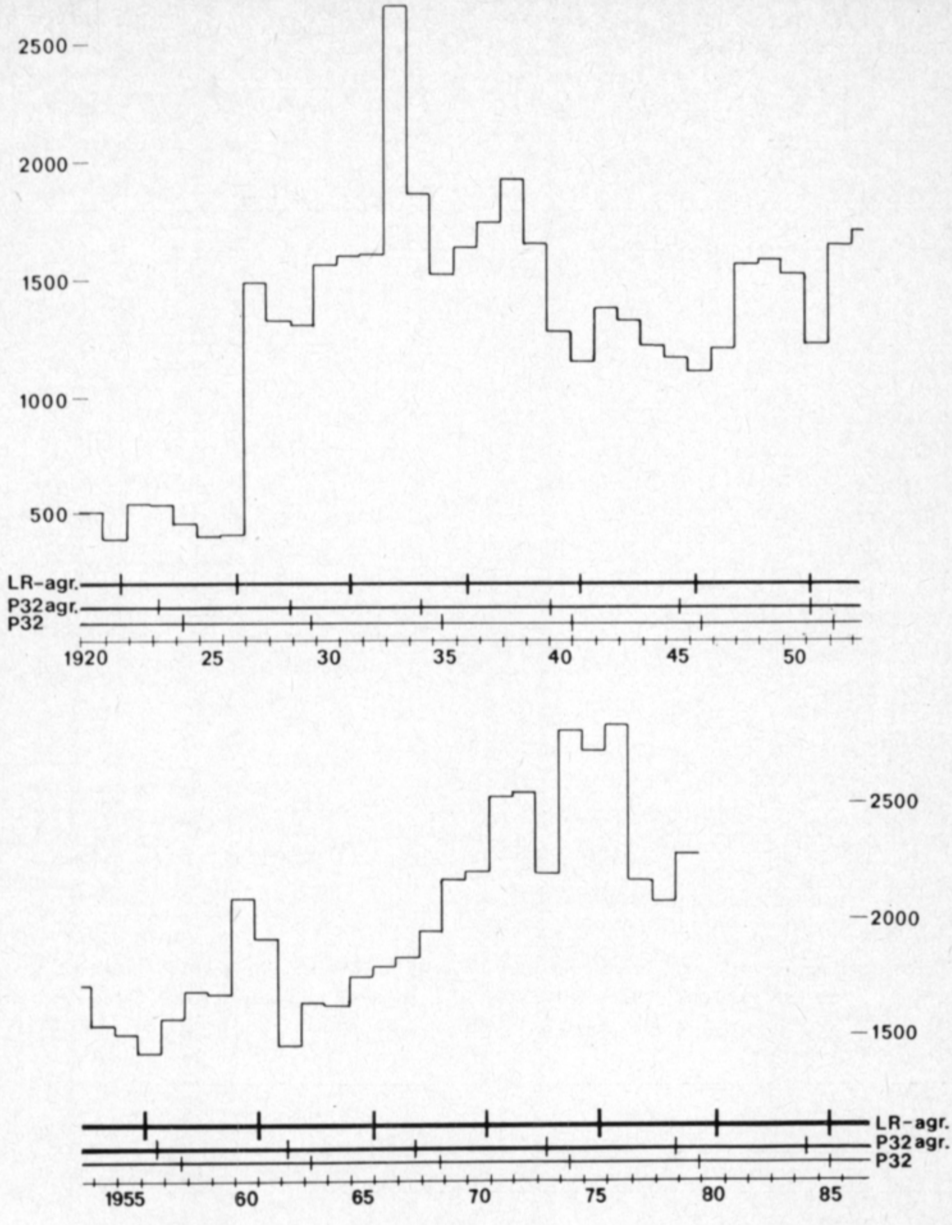

Fig. 5. Diagram of the yearly amount of crops of spring wheat in kilogrammes per hectare during the years 1920–1979 in Finland. Below the diagram are shown the lunar scale LR-agr. (period 4.9035 years) and two planetary scales P32agr. and P32 (period 5.5613 years).

Table 3. Planetary Scale P32agr. Monthly temperature in the growth season compared with average. Helsinki 1923–1978. Period: 5.561 343 y. Start: 1961.257 88 – below average, + – average, + above average.

1931–1960 average, C:		2.9	9.3	14.5	17.8	16.5	11.7	5.4
Scale	Year	(Apr.)	May	June	July	Aug.	(Sept.)	Year
1922.3284	1923	–	–	–	–	–	–	4.1
1927.8898	1928	+–	–	–	–	–	–	4.6
1933.4516	1934	+	+	+	+	+	+	7.2
1939.0125	1940	–	+	+	+	–	–	3.6
1944.5738	1945	+	–	–	+	+	–	5.6
1950.1351	1951	+	–	–	–	+	+	5.5
1955.6965	1956	–	–	+	–	–	–	3.8
1961.2578	1962	+	–	–	–	–	–	4.7
1966.8192	1967	+	+	–	–	–	+	5.5
1972.3805	1973	+	+	+	+	–	–	5.6
1977.9419	1978	–	+	+–	–	–	–	2.9
	Summary:	+	5	4	4	3		
		–	6	6	7	8		
		+–		1				

Monthly temperature below average in 27/44 months (61 %).

Table 4. Planetary Scale P32agr. Amount of rain in the growth season compared with average. Helsinki 1923–1978. Period: 5.561 343 y. Start: 1961.257 88. Scale in Table 3. – below average, +– average, + above average, ++ >70 mm., +++ >100 mm.

1931–1960 average, mm.:	42	37	47	62	66	66	647
Year	(Apr.)	May	June	July	Aug.	(Sept.)	Year
1923	–	+	+	–	+++	++	798.6
1928	–	+++	++	–	+++	+	783.4
1934	+–	–	–	+	–	+	629.4
1940	–	–	+	–	–	+++	592.2
1945	+	–	+	++	++	–	707
1951	+	–	+	–	–	–	556.6
1956	++	–	–	+++	+++	–	711.4
1062	+	+	+	–	++	+++	758
1967	–	+	–	–	+++	–	699
1973	+	–	–	–	–	+++	549
1978	–	–	–	++	+++	+++	605
Summary:	+	4	6	4	7		
	–	7	5	7	4		

Table 5. Scales and the near future.

Scale LR—agr.	Calendar Year	Scales P32agr.	P32
1979.6162	1980		
	1984	1983.5032	
1984.5197	1985		1984.5003
1989.4232	1990	1989.0645	
	1991		1990.0617
1994.3267	1995	1994.6259	
	1996		1995.6230
1999 2303	2000		
	2001	2000.1872	
	2002		2001.1844
2004.1338	2005		
	2006	2005.7486	

4. Scales and the near future

Table 5 shows the years in the near future in Finland when there can be expected a reduction in the crop of spring wheat because of drought (LR—agr.), or cool weather in the growth season and abundant rain in time of the harvest (P32agr. and P32).

5. Discussion

What is the reason for this ascertained lunar and planetary periodicity? The changing of gravitation according to the periodical changing of the positions of the planets is the evident reason for the meteorological changes even if Baur (1951) has contested it. But the lunar gravitation in relation to the earth is changing in intervals other than planetary ones. Therefore it must be kept in mind that the changing may also be the result of simultaneous lunar and planetary influence.

As regards the area of influence there are some signs of it being relatively large.

For instance in the years 1965 and 1975 of the lunar scale, the amount of crop was also reduced in the Soviet Union (Ryan 1966, Raymond 1976). And in 1970 the amount of wheat crop in Europe decreased 5 % in relation to the amount in 1969. The reason for this reduction in all cases was the drought, in 1970 in Britain, Argentina and Australia (Bell 1971) as well. It seems that for countries lying more to the south than Finland the importance of the lunar periodicity could be greater than that of the planetary one.

REFERENCES

ANON. The statistics of the National Board of Agriculture in Finland, 1920–1978. Helsinki

BAUR, F. 1951. Extended-Range Weather Forecasting. Compendium of Meteorology p. 814–833. Am. Met. Soc., Boston.

BELL, P. 1971. The Year Book 1971 p. 149. Grolier. London.

CHICHASOV, G. N. 1973. Experiment in the classification of spring seasons in the northern Kazakhstan. Tr. glav. geofiz. Obs. 299: 152–158. Refer. in Agrarmeteorol. Bibliographie, Offenbach a.M. 1977 p. 491.

EKMAN, E. 1783. Undersökning om Årsväxtens förhållande och i synnerhet Missvärt–Åren i Swerige från år 1523 till år 1781. Samling af rön och avhandlingar rörande Landbruket. IV: 123–182. Stockholm.

FEKETE, L. & SZEPESI, K. 1974. A stastical analysis of the length of rainy periods and their quantity of precipitation. Acta Climatol. 13: 25–40.

GROTENFELT, K. 1919. Aikaisemmista katovuosista Suomessa. Juhlajulkaisu E. G. Palménin 70-vuotispäiväksi. Porvoo.

— 1934. Katovuodet. Iso Tietosanakirja VI: 328–329. Otava. Helsinki.

LAMB, H. H. 1972. Problems and Practice in Longer-Range Weather and Climate Forecasting. Weather Forecasting for Agriculture and Industry. A Symposium. Ed. J. A. Taylor. p. 34–43. David & Charles. Newton Abbot.

MANNILA, T. 1980. Lunar and planetary periodicity of temperature and rainfall in Helsinki 1902–77. Geophysica, In print.

RAYMOND, E. 1976. Encyclopedia Year Book 1976. p. 519. Grolier incorp. New York.

RYAN, W. L. 1966. Encyclopedia Year Book 1966. p. 453. Grolier incorp. New York.

WRIGHT, P. B. & FLOOD, C. R. 1973. Method of assessing long range forecasts. Weather 28, 5: 178–187.

Ms received March 19, 1980.

SELOSTUS

Katovuosien lunarinen ja planetarinen jaksollisuus Suomessa ja Ruotsissa

TAUNO MANNILA
Myllytie 3 A 7, 00140 Helsinki 14

47:stä katovuodesta Suomessa vuosilta 1347–1929 on 40 % esiintynyt 4.9035 vuotta käsittävää lunarista jaksoa vastaavin väliajoin. Samankaltainen tulos saatiin Ruotsissa 1526–1772 olleen 77 katovuoden suhteen. — Kun katovuonna todetun neljän jättiplaneetan asemat tai niiden keskinäiset kulmaetäisyydet ovat uusiutuneet, on myös katovuosi saattanut uusiutua.

Kevätvehnän keskimääräinen hehtaarisato Suomessa 1920–1979 on vähentynyt edelliseen ja/tai seuraavaan vuoteen verrattuna lunarisen jakson, 4.9035 vuoden, väliajoin, kun tämä skaala LR–agr. on aloitettu kasvukaudesta, jolloin kuukautiset sademäärät ovat olleet keskimääräistä vähäisemmät. — Vielä suurempi kevätvehnän satomäärän vähentyminen ja esiintymistiheys 9 vuotta 10:stä on Suomessa todettavissa planetarisen skaalan P32agr.:n jaksolla, joka on 5.5613 vuotta. Skaala P32 agr. edustaa kasvukautta, jolloin ilman lämpötila on 61 % ajasta keskimäärää alhaisempi ja sademäärä touko- ja heinäkuussa keskimääräistä vähäisempi kun taas elokuussa sademäärä ylittää keskimäärän. — Toinen meteorologinen skaala P32täydentää skaalaa P32agr. — Skaalojen avulla voidaan tehdä ennusteita.