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THE EXPERIMENTS OF DAYTON C. MILLER
1925-1926
AND THE THEORY OF RELATIVITY

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THE EXPERIMENTS OF DAYTON C. MILLER 1925-1926 AND THE THEORY OF RELATIVITY

Summary

- *The interferometric observations of Dayton C. Miller in 1925-1926 reveal a very real internal coherence, independent of any perverse effect ;*

- *They demonstrate that the velocity of light is not the same in all directions ;*

- *They demonstrate the possibility of determining the motion of the Earth on its orbit from purely terrestrial experiments ;*

- *Accordingly, Miller's experiments invalidate the very foundation of the Theory of Relativity.*

THE EXPERIMENTS OF DAYTON C. MILLER
1925-1926
AND THE THEORY OF RELATIVITY

1.- The Genesis of the Theory of Relativity

1- *In 1900 it was considered, as "well-established", that all attempts to detect, by purely terrestrial experiments, the motion of translation of the Earth had failed.*

To explain this *negative* outcome, Lorentz presented *his hypotheses of the contraction of bodies according to their velocities and of the local time,* and, following Lorentz, Einstein developed his *Special Theory of Relativity* (1905), and subsequently, his *General Theory of Relativity* (1916).

From the formulation of the *Special Theory of Relativity* stem both the impossibility of detecting the Earth's motion on its orbit and the invariance of the velocity of light in all directions.

2- Today, it is everywhere admitted without reservation, *as postulates,* that the velocity of light is independent of its direction, and that no *purely terrestrial* experiment can detect the velocity of translation of the Earth or even simply its position on its orbit.

2.- The reputedly "negative" outcome of Michelson's experiment and Miller's experiments

1- The principle of Miller's experiments* is the same as for Michelson's experiments.

(*) Dayton C. Miller : *The Ether-Drift Experiment and the Determination of the Absolute Motion of the Earth,* Reviews of Modern Physics, Vol. 5, July 1933, n° 3, p. 203-242

According to this principle, the interferometer makes it possible to measure *the difference of the velocity of the light for two perpendicular directions.*

2 - In his 1933 paper, Miller presented his observations in the form of eight Charts, *four for the azimuths and four for the velocities, in sidereal time, for four periods of continued observations during six or eight days* (1933, p. 229).

3 - *Any appreciation of the scope of Miller's observations boils down to three utterly fundamental questions :*

First Question : Do Miller's observations result from mere disturbances (of temperature, for example) or do they *present a very real internal coherence ?*

Second Question : Do they permit to detect variations in the velocity of the light according to its direction ?

Third Question : Is it possible to deduce the Earth's position on its orbit from these observations ?

3.- The very remarkable coherence underlying Miller's observations excluding any perverse effect

1 - *A very marked coherence* appears when one considers the variations in the azimuths and velocities, not in civil time, *but in sidereal time.*

2 - The fittings, with sinusoids *of a period of 24 hours,* of the curves representing velocities and azimuths *in sidereal time are on the whole very remarkable.*

The sidereal time θ^* for which the velocity is minimal and the sidereal time θ^{**} for which the azimuth A is equal to its $\bar{A}$ mean value and for which $dA/dt < 0$, are *very similar* for the four considered periods.

3 - If one represents the hodographs of velocities for the four periods on the basis of the hourly values of velocities and azimuths *in sidereal time,* it is remarkable that on the whole the figures representing the hodographs are approximately *perpendicular* to the directions of the $\bar{A}$ mean azimuths.

For the four periods the *calculated* hodographs, deduced from the sinusoidal fittings of the velocities and azimuths, are *almost exactly perpendicular* to the mean $\bar{A}$ directions of the azimuths *and symmetrical relatively to those directions.* Indeed that is an *even more remarkable circumstance.*

4 - Finally, the figures change gradually from one period to another. They attain their maximum dimensions around September 21 which corresponds to the autumn equinox, and their minimum dimensions around March 21 corresponding to the spring equinox. *They are therefore dependent on the Earth's position on its orbit.*

5. *All these properties which indisputably correspond to a very marked coherence underlying Miller's observations allow to give an unquestionably affirmative answer to the first two fundamental questions of § 2.3 above.*

It is therefore *absolutely wrong* to consider that Michelson's experiment, as taken up by Miller, gives a negative outcome.

4.- The very significant Correlation of Miller's Observations with the Earth's Position on its Orbit

1 - *The most significant* parameters characterizing Miller's eight fundamental Charts are the maximum and minimum velocities v_M and v_m, the $\bar{A}$ mean values of the A azimuths, and the amplitudes A_M^* of their variations around their mean values.

I made graphically direct estimations of these parameters through the photographic enlargement of Miller's eight fundamental Charts, *quite independently* of any hypothesis or any theoretical interpretation whatsoever.

2 - A thorough harmonic analysis of these parameters shows that *all have a marked semi-annual or annual periodical structure.*

The maximum and minimum values of the corresponding sinusoidal fittings all occur around the March 21 equinox.

3 - *For lack of space,* I must limit myself to commenting on the fittings of the observed data with sinusoids for a period of six or twelve months, *all having their maximum on March 21.*

Although each of the two groups of fittings corresponding to six or twelve-month periods relates to *only one reference sinusoid with a maximum on March 21,* all the correlation coefficients are relatively high.

4 - They are all the more significant as the considered parameters do not correspond to isolated observations *but to the averages of very numerous observations.*

The statistical significance *of the whole* of these results for semi-annual or annual periods corresponding to fittings *to the same functions is very high* and amounts to a quasi-certainty.

5 - *Thus it may be considered as perfectly established that the observations corresponding to the four series of experiments have a semi-annual or annual periodicity centered on March 21, the date of the spring equinox, and that it is possible, through purely terrestrial experiments, to determine the Earth's position on its orbit.*

An affirmative answer must therefore be given, *in all certainty,* to the *Third Question* of § 2.3 above.

5.- Interpretation of Miller's observations

1 - The above analysis leads to a fourfold conclusion :

- *Firstly,* there is *a considerable and absolutely indisputable coherence* between Miller's interferometric observations, and it *corresponds to a very real phenomenon.*

- *Secondly, it is quite impossible* to attribute this very marked coherence to fortuitous causes or to perverse effects (of temperature, for example).

- *Thirdly, the velocity of the light is not invariant in all directions.*

- *Fourthly,* all Miller's observations display *a very marked correlation* with the Earth's position on its orbit.

2 - These conclusions are *independent* of any hypothesis and of any theoretical analysis whatsoever.

Most of the results, on which these conclusions are founded, particularly the most significant ones, *were not perceived by Miller.*

3 - On the basis of his own analysis, Miller considered it possible to provide an estimation of the cosmic velocity of the Earth in relation to its orbital velocity (Miller, 1933, p. 230-237).

However, Miller's analysis only considers the $A - \bar{A}$ *differences, and does not provide any explanation for the mean deviations* $\bar{A}$ *of the azimuths and their variations from one period to another* (Miller, 1933, p. 234-235).

Consequently, the interpretation given by Miller to his observations cannot be considered as valid.

4 - In fact, it is possible to show that the observed velocities and azimuths can be explained by the conjunction of two effects :

- *an optical anisotropy of the space* of direction $\bar{A}$;
- *an effect proportional* to the total velocity of the Earth (orbital velocity + cosmic velocity toward the Hercules Constellation).

6.- The Significance and Scope of Miller's Observations

1 - *The very basis of the Special and General Relativity Theory rests on a triple postulate: the reputedly "negative" result of Michelson's experiment, the invariance of the speed of light in all directions, and the impossibility to detect the absolute motion of the Earth through any purely terrestrial experiment.*

However, *with regard to the analysis above,* it is certain that *it is impossible* to maintain that interferometric experiments provide a *"negative"* outcome, that the velocity of the light is *invariant in all directions,* and that any purely terrestrial experiment *cannot determine* the motion of translation of the Earth.

Consequently, the Special and General Theory of Relativity resting on postulates invalidated by the observation data cannot be considered as scientifically valid.

As Einstein himself wrote in 1925 in the"*Science*" review :

> *"If Dr Miller's observations were confirmed, the Theory of Relativity would be at fault. Experience is the ultimate judge".*

2 - The *"positive"* outcome of Miller's experiments means that *there is no distinction to be made between the rotation of the Earth and its translation* as maintained by the *Theory of Relativity. Both* can be detected through purely terrestrial experiments.

3 - Rejection of the *Special and General Theory of Relativity* as being incompatible with observation data *cannot in any way mean that all Einstein's contributions should be rejected.*

It only means that *all* theoretical developments based on data invalidated by experimental data should be discarded *as such.*

Those contributions of Einstein *that appear to have been confirmed by experience* should naturally be preserved, *but, quite obviously, they must be given a theoretical justification other than that of the Theory of Relativity.*

4 - *A theory is only worth what its premises are worth. If the premises are wrong, the theory has no real scientific value. Indeed, the only scientific criterion of the scientific validity of a theory is its confrontation with experimental data.*

CALCULATIONS

CORRESPONDING TO SECTIONS 3 AND 4

OF THE ESSAY

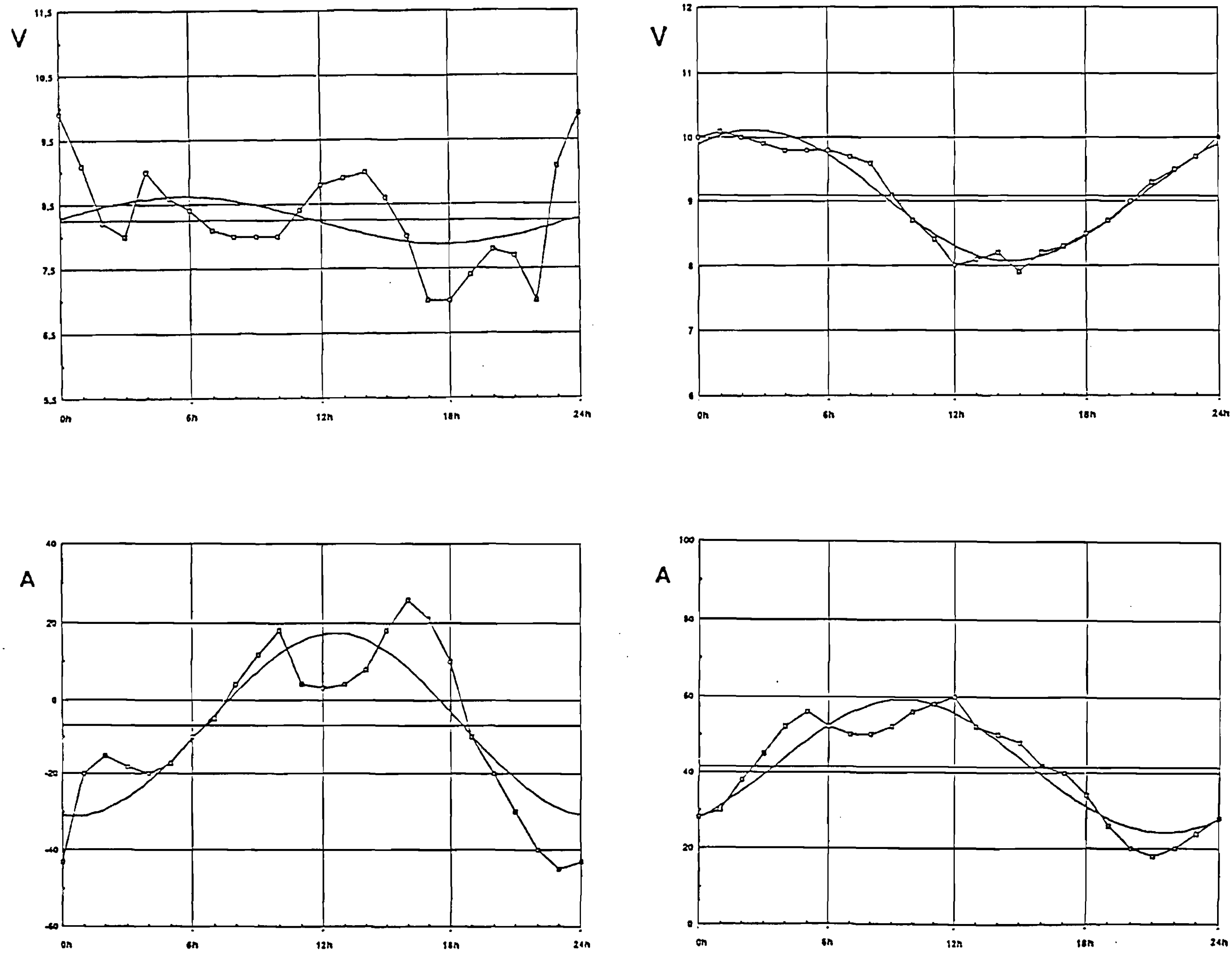
AND REFERENCES

HOURLY OBSERVATIONS OF MILLER
DAILY VELOCITY AND AZIMUTH CURVES

in sidereal time

(§ 3.2)

February 8 *April 1*



Legend :

observed values : —▫—▫— sinusoidal fitting : ———

V = velocity in km per sec. A = azimuth in degrees

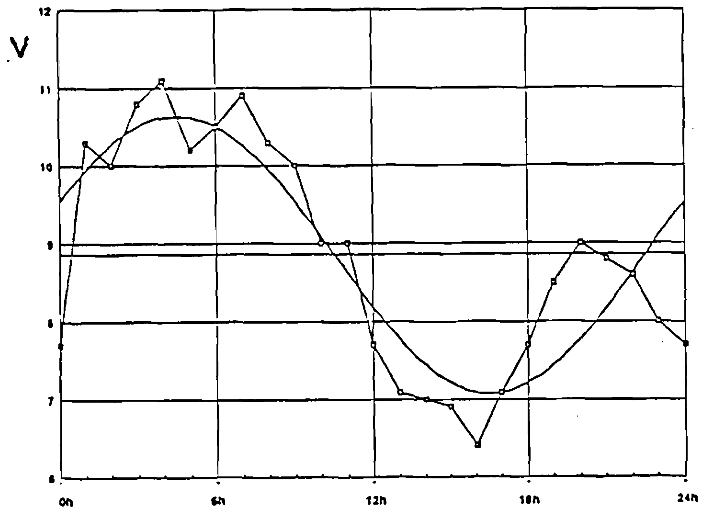
Sources :

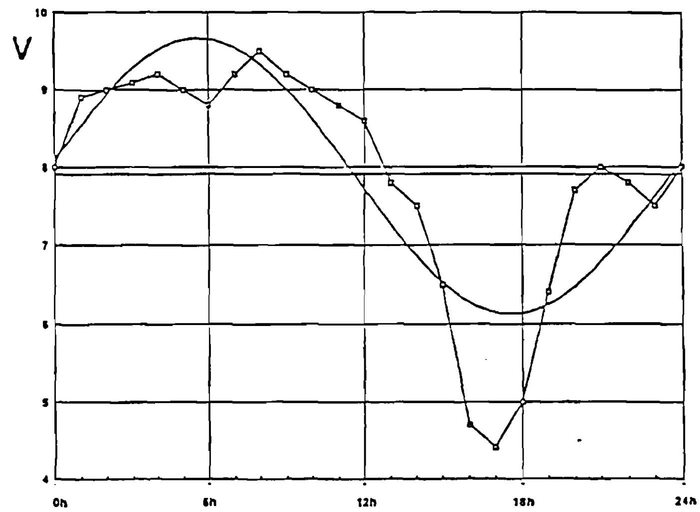
Hour by hour values of the running averages of *Miller's Charts* (Miller, 1933, p. 229)
The fittings were calculated in February 1996.

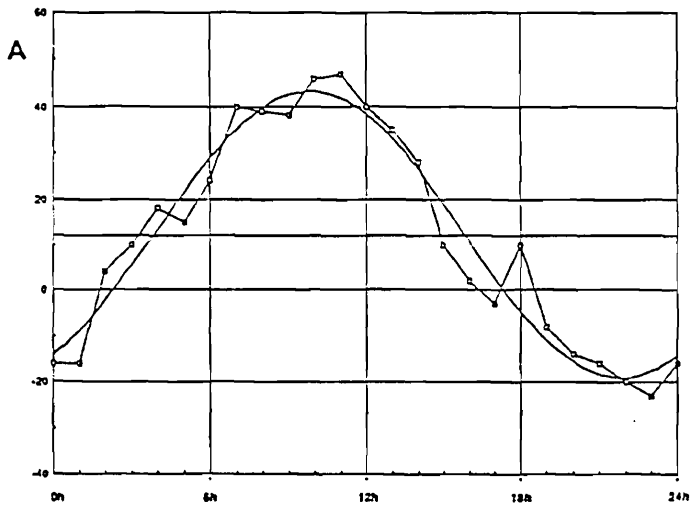
HOURLY OBSERVATIONS OF MILLER
DAILY VELOCITY AND AZIMUTH CURVES
in sidereal time

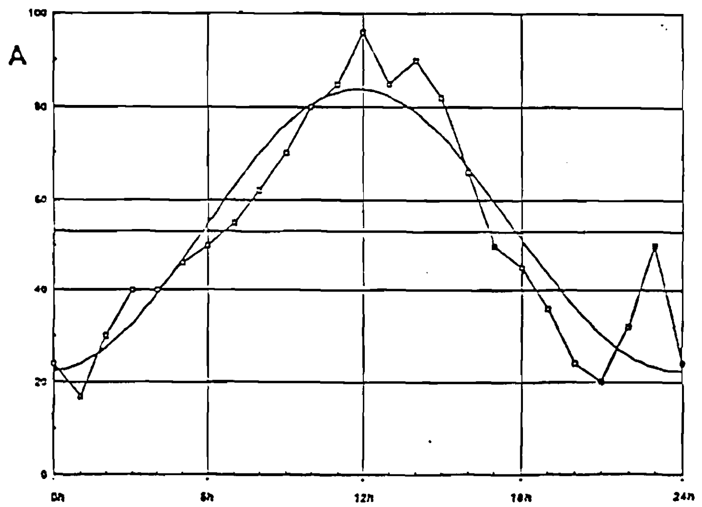
(§ 3.2)

August 1 | *September 15*









Legend :

observed values : —□—■—
V = velocity in km per sec.

sinusoidal fitting : ———
A = azimuth in degrees

Sources :

Hour by hour values of the running averages of *Miller's Charts* (Miller, 1933, p. 229)
The fittings were calculated in February 1996.

Table I

OBSERVATIONS OF MILLER

Sinusoidal fittings with a 24 hour period

(§ 3.2)

Velocities

	R	$1-R^2$
February 8	0,361	0,869
April 1	0,981	0,0377
August 1	0,882	0,223
September 15	0,854	0,271

Azimuths

	R	$1-R^2$
February 8	0,856	0,267
April 1	0,939	0,118
August 1	0,970	0,0593
September 15	0,927	0,141

***Estimations of θ^* and θ^{**}* (in sidereal time)**

	θ^*	θ^{**}	$\theta^{**} - \theta^*$
February 8	17,65	18,56	0,91
April 1	14,55	15,48	0,93
August 1	16,50	15,83	-0,67
September 15	17,59	17,78	0,29

Legend :

R = correlation coefficient
θ^* = sidereal time of the velocity minimum

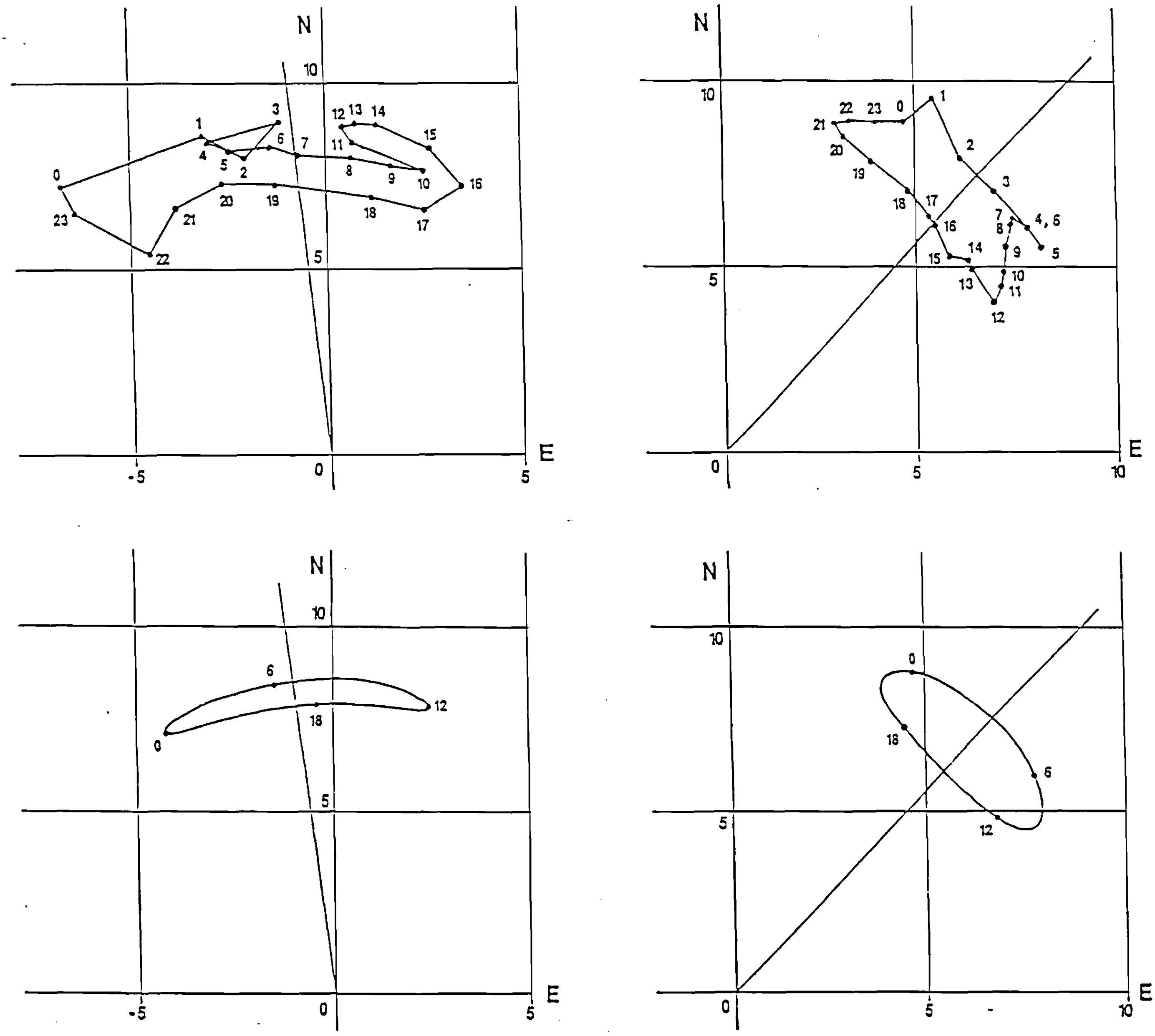
θ^{**} = sidereal time of the equality $A = \bar{A}$ with $dA/dt < 0$

Sources : Calculations of *Charts I and II.*
The correlations were calculated in February 1996

OBSERVATIONS OF MILLER
OBSERVED HODOGRAPHS OF HOURLY VALUES
AND CALCULATED HODOGRAPHS DEDUCED FROM THE FITTINGS
OF VELOCITIES AND AZIMUTHS

(§ 3.3)

February 8 *April 1*



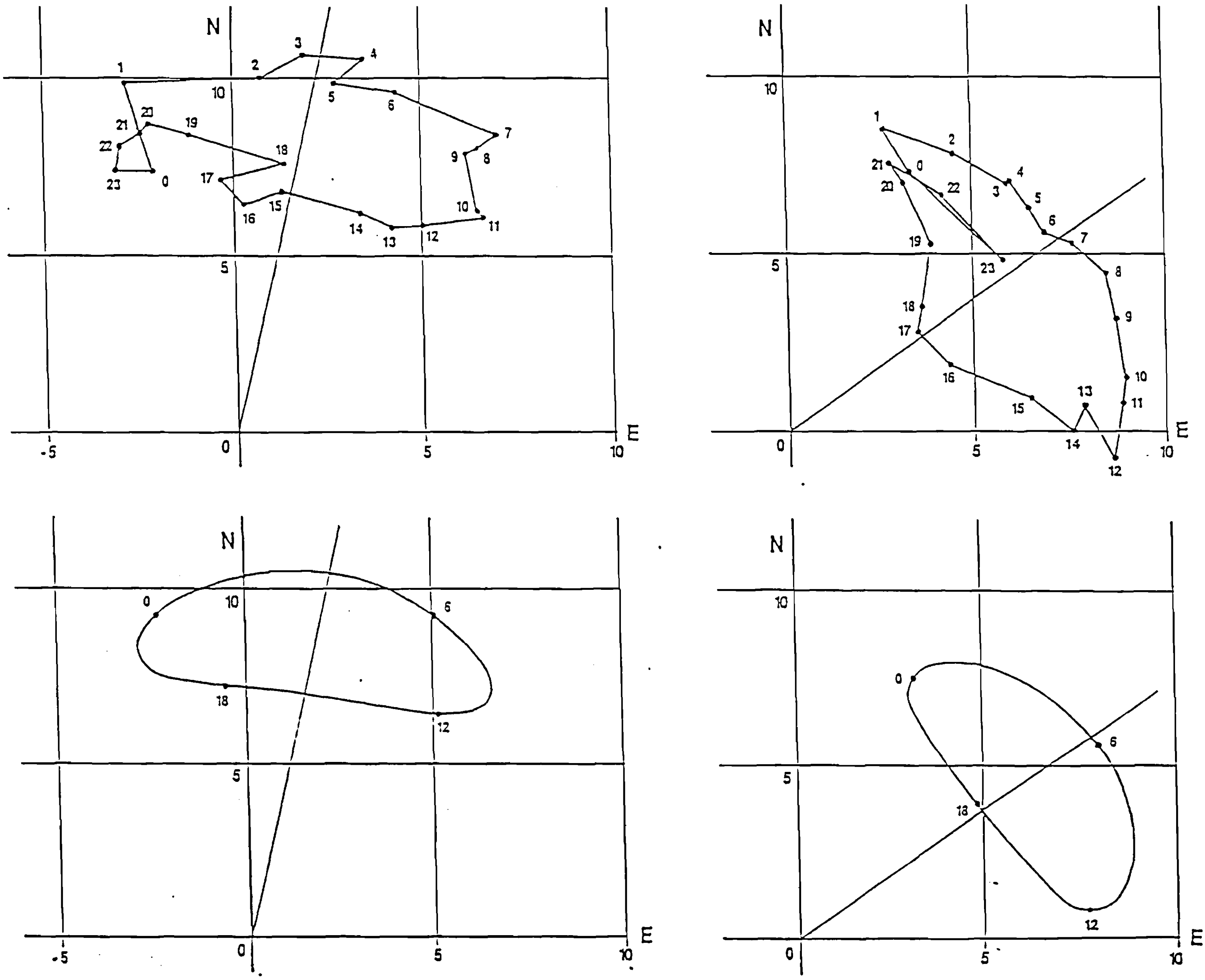
Legend : •—•—• observed values ——— calculated values from the sinusoidal fittings of Charts I

Sources : Charts I

OBSERVATIONS OF MILLER
OBSERVED HODOGRAPHS OF HOURLY VALUES AND CALCULATED HODOGRAPHS DEDUCED FROM THE FITTINGS OF VELOCITIES AND AZIMUTHS

(§ 3.3)

August 1 *September 15*



Legend : ●—●—● observed values ——— calculated values from the sinusoidal fittings of Charts II

Sources : Charts II

Table II

FUNDAMENTAL CHARTS OF MILLER

GRAPHICAL ESTIMATIONS OF VELOCITIES AND AZIMUTHS

(§ 4.1)

Velocities (in km per sec.)

	v_M	v_m
April 1, 1925	10	7,8
August 1, 1925	11,6	6,5
September 15, 1925	9,8	4,2
February 8, 1926	10	7,3

Azimuths (in degrees)

	A_M	A_m	$\overline{A}$	A_M^*
April 1, 1925	60	20	40	20
August 1, 1925	45	- 20	12,5	32,5
September 15, 1925	90	20	55	35
February 8, 1926	15	- 40	-12,5	27,5

Legend : v_M and v_m : maximum and minimum values of velocities

A_M and A_m : maximum and minimum values of azimuths

$\overline{A} = (A_M + A_m)/2$

$A_M^* = (A_M - A_m)/2$

$A^* = A - \overline{A}$

Sources : These estimations of v_M , v_m , A_M , and A_m were deduced *graphically* from photographic enlargements of the *Charts* of Miller (1933, p. 229), *independently of any hypothesis.*
These estimations were made in June 1995, and have been used for all the calculations of *Table III.*

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Table III

OBSERVATIONS OF MILLER
SEMI-ANNUAL OR ANNUAL DOMINANT PERIODICITIES

Fittings to a sinusoid of a period of 6 or 12 months
with its maximum on March 21

(§ 4.3)

Series	P	R	$1-R^2$
v_M	6	- 0,772	0,404
$(v_M + v_m)/2$	6	- 0,607	0,632
$\overline{A}$	6	+ 0,834	0,305
$\overline{A} + A^*_M$	6	+ 0,744	0,447
$\overline{A} - A^*_M$	6	+ 0,880	0,225
Averages : $\overline{\lvert R \rvert}$ = 0,767		$\overline{1-R^2}$ = 0,403	
v_m	12	+ 0,880	0,225
$v_M - v_m$	12	- 0,9994	0,0012
v_m / v_M	12	+ 0,980	0,041
A^*_M	12	- 0,924	0,145
Averages : $\overline{\lvert R \rvert}$ = 0,946		$\overline{1-R^2}$ = 0,103	
Overall averages : $\overline{\lvert R \rvert}$ = 0,847		$\overline{1-R^2}$ = 0,269	

Legend

P = period in months

R = correlation coefficient

Sources : Estimations of *Table II.*