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RADAR EVIDENCE THAT THE VELOCITY OF LIGHT IN SPACE IS NOT C

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ABSTRACT: Observed-computed residuals of Earth-Venus radar time-delay measurements from 1961 to 1966 show variations that range to over 30,000 % the expected error from the best possible general relativity fit the Lincoln Lab could generate. The variations are not random but are related to relative radial velocity and intervening plasma. These variations are evidence that the relative velocity of light in space is some form of c+v and not c as predicted by Einstein's general relativity theory.

In an earlier paper I presented interplanetary radar evidence that the velocity of light in space was c+v and not c as predicted by Einstein's general relativity theory.[1,2] When I wrote the paper I was puzzled by the fact that the G (c+v) curve of FIG. 1 did not show the major 30-day variations that were present in graphs of 1961 radar values of the a.u. Fig. 4 and Fig. 5 published by the Lincoln Lab.[3] It is now apparent that the Lab used computer methods to artificially rectify the 1961 radar data that I used.[4] They did this in order to remove large frequency-related variations that were obviously related to intervening plasma. I use the word artificial to denote the fact that the rectifications are not based on any accepted plasma theory. I first came to this conclusion when I tried to mix the data in Table I[4] with that of Table II[3] and found that they were obviously incompatable.

I did not use the data in Table II[3] for my first analysis because it did not contain the Doppler shifts that I needed to calculate the relative radial velocity. I later found I could eliminate the need for the radial velocity by using $D_E = tc/2$ for distance at the instant of radar reflection $(t/2)$ for the c theory, and $D_G = tc/2$ at the instant of reception for the c+v theory.[1] FIG. 1 shows graphs of the time of measurement and 1961 Newcomb radar values of the a.u. as listed in Table II.[3] The Lab's calculations were based on c . Perfect agreement between the radar measurements and the c theory would show only one value for the a.u. The radar data is theoretically capable of giving the distance to ± 1.5 km, yet it is obvious from the a.u. variations that the radar variations are far larger than this. They are not random and contain diurnal, lunar and synodic periodic components. One would expect that the variations related to the observed altitude of Venus would be due to the Earth's ionosphere. The delay due to the ionosphere in the c theory is

$$\frac{2}{c}\int_0^R \left(1 - \frac{Ne^2}{\pi m f^2}\right)^{-\frac{1}{2}} \cdot dr \text{ seconds}$$

and N rarely exceeds 10^6 electrons / cm^3.[6] My calculations show that the maximum 440 Mc delay due to a two-way passage would not exceed 2 μsec and since $\Delta D = \Delta tc/2$, this translates to $< .3$ km. Obviously the variations are much larger than .3 km ! The top graph of FIG. 2 shows the differences between the geocentric distances

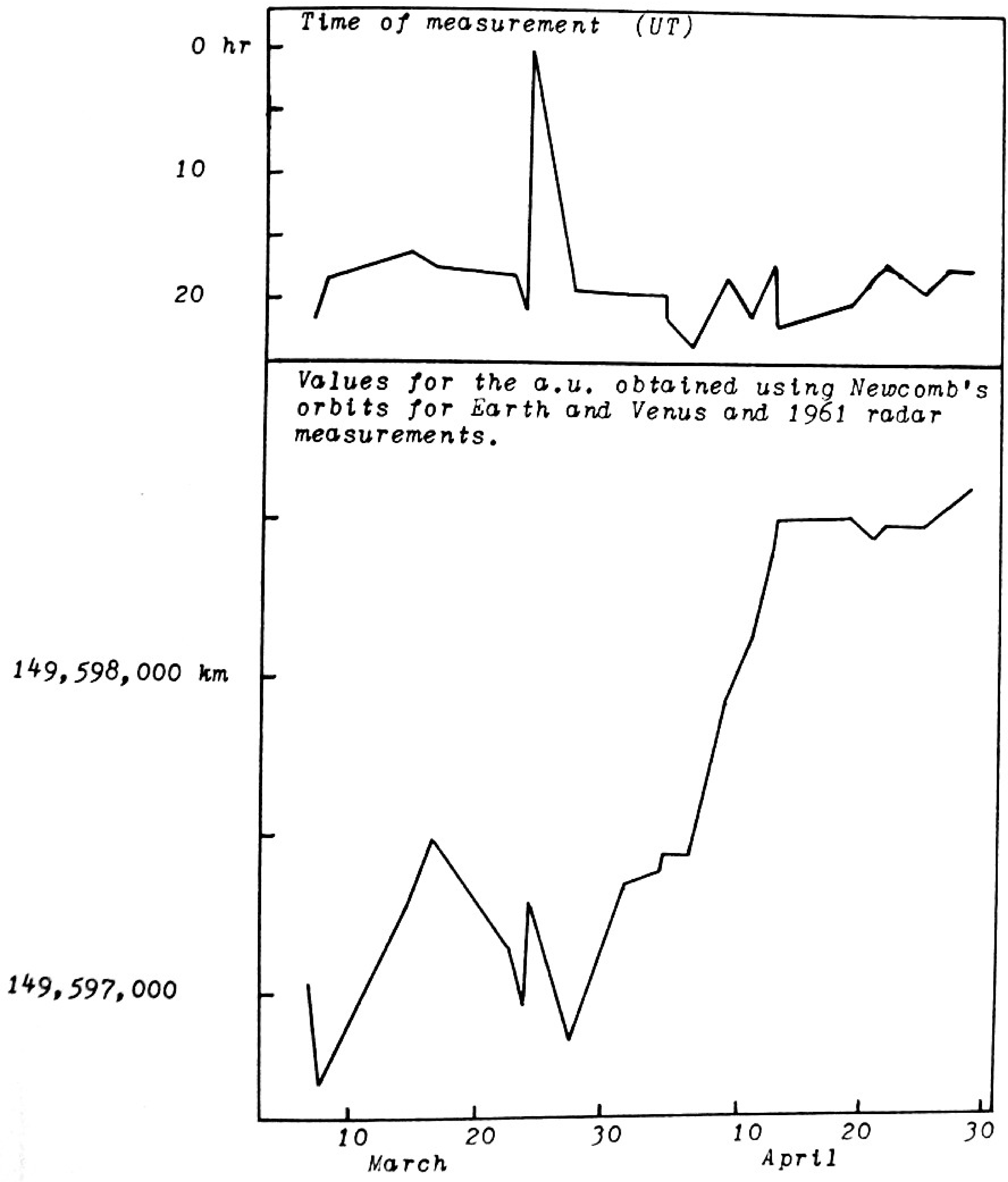
Time of measurement (UT)
0 hr
10
20
Values for the a.u. obtained using Newcomb's orbits for Earth and Venus and 1961 radar measurements.
149,598,000 km
149,597,000
10
20
30
10
20
30
March
April

FIG. 1

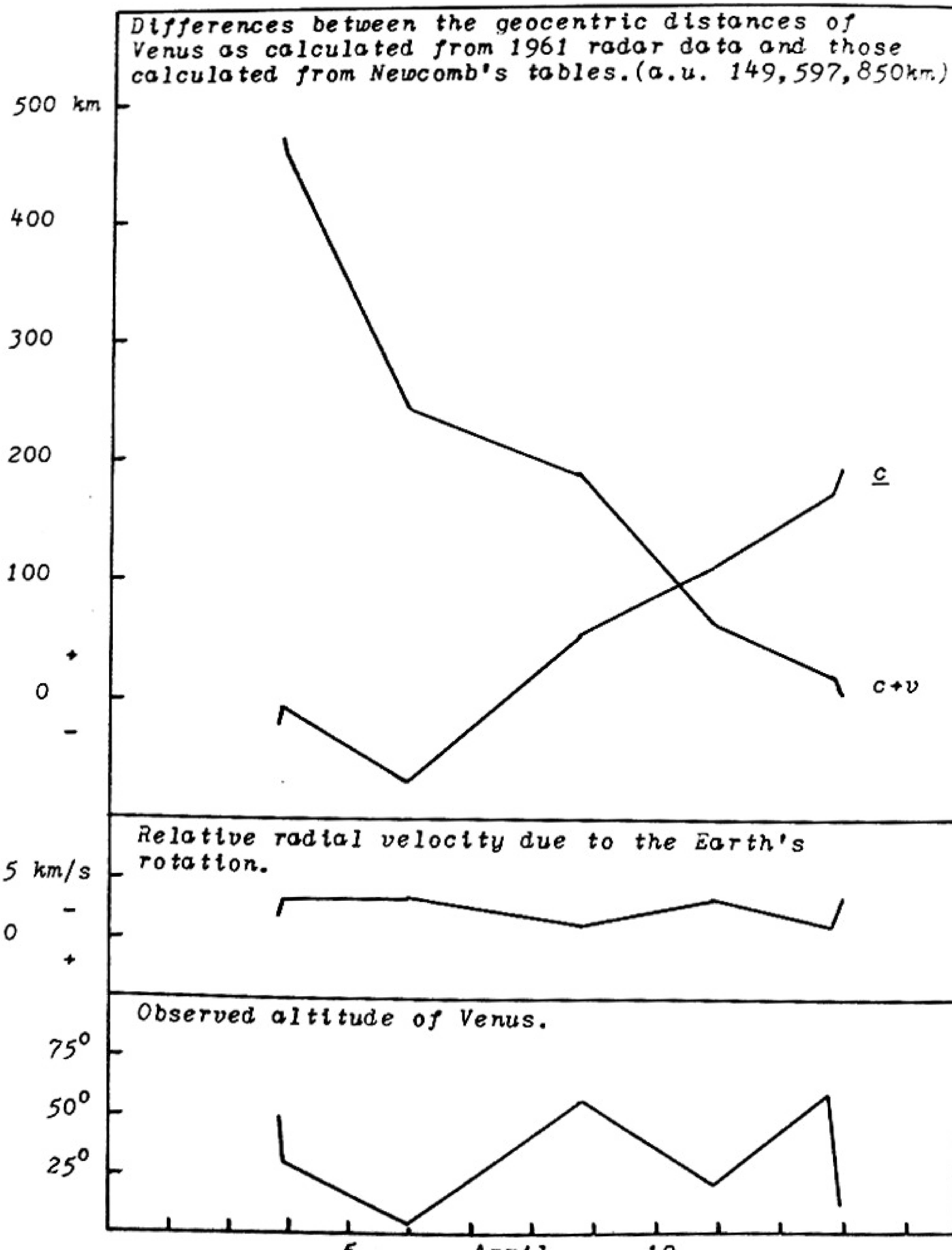
Differences between the geocentric distances of Venus as calculated from 1961 radar data and those calculated from Newcomb's tables.(a.u. 149,597,850km.)
500 km
400
300
200
100
+
0
-
c
c+v
Relative radial velocity due to the Earth's rotation.
.5 km/s
-
0
+
Observed altitude of Venus.
75°
50°
25°
5
April
10

FIG. 2

of Venus as calculated from the radar flight times listed in Table II[3] (t) and those calculated from Newcomb's tables. The middle graph shows relative radial velocity due to the Earth's rotation and the bottom graph shows the altitude of Venus. By limiting the analysis to a short period near the inferior conjunction of Venus, we can tend to elimiate the lunar and synodic variations and concentrate on the diurnal variations. Note that the c curve shows variations related to the Earth's rotation and the altitude of Venus, while the variations of the c+v curve are related only to the altitude of Venus. Since the c+v change velocity would be expected to continue for the full journey while the c change is supposed to exist only during passage through the plasma, the large amplitude of the altitude variations and the lack of rotation velocity variations for c+v should be considered as evidence against c and for c+v.

I.I. Shapiro was supposed to give a talk on tests of general relativity to the Fifth Texas Symposium on Relativistic Astrophysics. Because of illness in Shapiro's family, R.H. Dicke gave the talk in his place. Dicke stated that because of systematic variations in the radar data, Shapiro had doubts about the solar interplanetary radar test of general relativity. I showed the symposium a 35 mm slide of a graph (Fig. 4)[7] showing residuals (observed-computed) of the Earth-Venus time-delay measurements from 1961 to 1966 from four different radar stations. I explained that the best general relativity fit that the Lincoln Lab could generate contained observed-computed variations that ranged to over

3 msec, yet the radar was supposed to be accurate to within 10 μsec on much of the data. A variation range of over 30,000 % the expected error from the best possible general relativity fit the Lincoln Lab could generate ! I explained that the apparent improvement in the residuals for later years was due to the fact that computer methods were used to rectify the data to a constant time of measurement.[5,8]

The facts I have stated can easily be verified by consulting the mentioned references and performing the relatively simple calculations. Anyone who still believes Einstein's general relativity prediction of the relative velocity of light in space should seriously consider the possibility that they lack objectivity on this question.

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