218. **Coroll. 2.** Ducto arcu MR, quia ad utrumque quadrantem est normalis, resol triangulum sphaericum $☊MN$, in quo dantur latera $☊M = \sigma$, $☊N = \vartheta - \psi$ et angulus $M☊N =$ inventoque latere MN cum angulo $☊MN$, erit $\lambda = MN$ et $\sin\mu = \sin\lambda\cos ☊MN$.

219. **Coroll. 3.** Loco tempusculi dt spatium non solum aliquot horarum sed etiam saep dierum capi potest, nisi positio corporis N ratione ipsius M citissime varietur. Tum ex motu me pro hoc temporis spatio colligatur angulus $d\zeta$, indeque erit $vv\,d\varphi = cd\zeta\sqrt{cp}$, quem valorem in singulis perturbationibus momentaneis substitui oportet.

220. **Scholion.** Ex his principiis perturbationes motus cujusque planetae principalis defini poterunt, quatenus ab actione alius planetae vel etiam cometae oriuntur; ad planetas autem secundarios, seu satellites, haec methodus minus commode accommodari potest, quandoquidem assumsimus remoto corpore perturbante, motum futurum esse regularem; hinc itaque perturbationes in motu lunae, quae forte ab actione cujusdam planetae vel cometae proficiscuntur, determinare nequeunt. Sin autem ipse sol ut corpus perturbans consideretur, sine cujus actione luna motum regularem esset habitura, inaequalitates motus lunae hinc concludere licebit, sed quia actio solis est perennis collectio perturbationum momentanearum conclusionem nimis lubricam reddit. Maximum autem usum haec methodus praestabit, si actio cujuspiam cometae in motum planetae principalis, per cujus viciniam cometa transit, investigari debeat: quoniam enim actio cometae non diutius manet sensibilis quam dum ejus distantia a planeta fuerit valde parva, omnino superfluum foret, totam actionem quam cometa per totum suum tempus periodicum exerit, exquirere velle, quem in finem integrali nostrarum formularum exhiberi opus esset. Sufficiet igitur per breve tempus effectum cometae in orbita cujuspiam planetae perturbanda cognovisse, id quod ope formularum differentialium haud difficulter praestabitur. Casus autem, quibus cometae ad planetas tam prope accedunt, ut perturbationem notabilem efficere queant, vehementer raro accidunt. Ac si cometa anni 1682 secundum praedictionem Cel. Clairaut hoc anno 1759 revertatur, phaenomena imprimis singularia in motu terrae ab ejus actione expectari possent, propterea quod in satis exigua a terra distantia praeterlabatur. Operae ergo pretium erit, ope formularum traditarum in perturbationem motus terrae ejusque orbitae, ab actione hujus cometae oriundam, inquirere, ut deinceps, quando elementa motus istius cometae accuratius erunt definita, ad hoc exemplum plenior investigatio suscipi possit.

Digressio,

qua effectus Cometae A. 1759 expectati in motu terrae perturbando investigatur.

I. Primo quidem assumo hunc cometam secundum eadem elementa latum iri, quae pro ejus apparitione A. 1682 sunt determinata. Etsi enim ob actionem Jovis et Saturni ejus tempus periodicum quasi biennio fuit retardatum, ob eandemque rationem ejus reliqua motus elementa haud le mutationes subiisse probabile, tamen quia de eorum valore praesente nihil certi constat, antequ [illegible] ejus motu ea denuo definire licuerit, elementis superioris revolutionis utar. Posita ergo [illegible] a sole distantia = 100000, statuam pro hoc cometa

[illegible] 1. Distantiam perihelii a sole = 58328
2. Semiparametrum = 116656
3. Nodum ascendentem $1^s\, 21^0\, 16'$
Nodum descendentem $7^s\, 21^0\, 16'$
4. Distantiam nodi desc. a perih. $71^0\, 36'$
5. Inclinationem ad eclipticam $17^0\, 56'$
6. Longitudinem perihelii $10^s\, 2^0\, 52'$.

Motus autem hujus cometae est retrogradus, et a nodo ascendente ad perihelium, indeque ad nodum descendentem pergit.

II. Qui hunc cometam primum mense Januario hujus anni 1759 viderant, suspicantur eum die [illegible] Martii per perihelium suum transiisse, ex quo postquam per nodum descendentem fuerit progressus, ad terram proxime accedet. Nodum descendentem autem attinget circa d. 14 Aprilis, unde post hoc tempus loca cometae colligi conveniet. At ex mea theoria motus cometarum elapsis δ diebus post transitum per perihelium habetur $l\,(t + \frac{1}{3}t^3) = l\delta + 8{,}4362521$, unde anomalia vera seu angulus a perihelio confectus definitur, quae si vocetur $= \zeta$, erit distantia ejus a sole $= \frac{58328}{\cos^2 \frac{1}{2}\zeta}$.

III. Posito ergo cometam ipso meridie die 14 Martii per perihelium transiisse, die 14 Aprilis et sequentibus loca cometae ita se habebunt:

Diebus a perihelio	A. 1759	Anomalia vera	ejus semissis	distantia a sole	distantia a nodo descend.
31	April. 14^d	$71^0\, 37'$	$35^0\, 49'$	88705	$0^0\ \ 1'$
32	15	72 56	36 28	90187	1 20
33	16	74 13	37 7	91731	2 37
34	17	75 28	37 44	93254	3 52
35	18	76 41	38 21	94838	5 5
36	19	77 51	38 55	96349	6 15
37	20	78 58	39 29	97916	7 22
38	21	80 3	40 2	99493	8 29
39	22	81 7	40 34	101070	9 31
40	23	82 8	41 4	102611	10 32
41	24	83 8	41 34	104200	11 32
42	25	84 6	42 3	105782	12 30
43	26	85 2	42 31	107360	13 26
44	27	85 57	42 58	108931	14 21
45	28	86 50	43 25	110550	15 14
46	29	87 42	43 51	112155	16 6
47	30	88 32	44 16	113745	16 56
48	Maji 1	89 21	44 41	115380	17 45
49	2	90 8	45 4	116925	18 32
50	3	90 54	45 27	118517	19 18
51	4	91 39	45 50	120150	20 3
52	5	92 23	46 12	121754	20 47
53	6	93 5	46 34	123401	21 29

IV. Nunc quoque ad singulos hos dies loca terrae ex sole visa ex tabulis colligamus distantias ejus a nodo descendente orbitae cometae, qui cadit in $7^s\,21^0\,16'$ notemus. Pro hoc tempore erat locus perihelii terrae in $3^s\,8^0\,39'$, cujus ergo distantia a nodo descendente est $= 4$

A. 1759	Distantia terrae a sole	Longitudo terrae	Dist. terrae a nodo desc.
Aprilis 14^d	100400	$6^s\ 23^0\ 13'$	$0^s\ 28^0\ 3'$
15	100420	6 24 11	27 5
16	100450	25 10	26 6
17	100480	26 9	25 7
18	100510	27 7	24 9
19	100540	28 6	23 10
20	100565	29 4	22 12
21	100590	7 0 3	21 13
22	100620	1 1	20 15
23	100650	1 59	19 17
24	100675	2 58	18 18
25	100700	3 56	17 20
26	100725	4 55	16 21
27	100750	5 53	15 23
28	100775	6 51	14 25
29	100800	7 49	13 27
30	100825	8 47	12 29
Maji 1	100850	9 45	11 31
2	100875	10 43	10 33
3	100900	11 41	9 35
4	100925	12 40	8 36
5	100950	13 38	7 38
6	100975	14 36	6 40

V. Pro orbita terrae porro sumitur semiaxis transversus $= 100000$ et excentricitas $= 0,0169$ unde fit semiparameter $= 97144$. His elementis constitutis patet circa dies 27 et 28 Aprilis metam terrae fore proximum. Investigemus ergo perturbationes ab actione cometae oriundas in motu terrae ab 25 Aprilis usque ad 30 ejusdem, et constituamus quina intervalla spatio 24 horarum aequalia, ita tempus dt unum diem, et ex motu terrae medio $d\zeta$ angulum $59'\,8''$ denotet, unde elementum $d\varphi$ definiri debet. Cum autem terra continuo propius ad nodum descendentem progrediatur, dum cometa ab eo recedit, angulus $d\varphi$ negative capiendus est.

VI. Repraesentet ergo (Fig. 190) tabula planum orbitae cometae, in quo sit L sol, A perihelium cometae, a quo per arcum parabolicum AN progrediatur. $BM☊$ vero sit orbita terrae a perihelio B per M ad nodum ☊ progredientis, cujus motus respectu cometae ut retrogradus spectari debet, et $BM☊$ supra orbitam cometae versabitur. Erit ergo angulus $BL☊ = 132^0\,27'$ et inclinatio orbitae ad orbitam cometae $\omega = 17^0\,56'$. Quodsi nunc terra haereat in M, cometa vero in N, erit $LN = u$, $MN = w$, $BLM = -s$, $ALN = \vartheta$, $AL☊ = \psi = 71^0\,36'$ et $☊LN = \vartheta - \psi$; $☊LM = \sigma$, atque $r = 100000$, $p = 97144$ et $q = 0,0169$. Denique positis massis solis, terrae cometae L, M, N, sit $\frac{N}{L+M} = n$, unde calculi perturbationum pro singulis intervallis diurnis habebunt:

Calculus pro intervallo a 25 ad 26 Aprilis.

Cum sit $p = 97144$, $q = 0{,}0169$, $r = 100000$ et $\varpi = 17^0\,56'$, erit $\varrho = 100700$, $u = 105782$, ☊$LM = \sigma = 17^0\,20'$, $s = -115^0\,17'$, $\vartheta - \psi = 12^0\,30'$. Nunc ob $c = 100000$, ob $d\varphi = \frac{-cd\zeta\sqrt{cp}}{\varrho\varrho}$ et $d\zeta = 3548''$ colligitur

$$\begin{aligned} lcp &= 9{,}9874160 \\ l\sqrt{cp} &= 4{,}9937080 \\ lc &= \underline{5{,}0000000} \\ lc\sqrt{cp} &= 9{,}9937080 \\ l\varrho &= 5{,}0030295 \end{aligned}$$

$$\begin{aligned} lc\sqrt{cp} &= 9{,}9937080 \\ ld\zeta &= \underline{3{,}5499836} \\ &\ 13{,}5436916 \\ l\varrho\varrho &= \underline{10{,}0060590} \\ l - d\varphi &= 3{,}5376326 \\ &\ \underline{4{,}6855749} \\ l - d\varphi &= 8{,}2232075. \end{aligned}$$

Erit ergo pro terminis, ubi $d\varphi$ angulum denotat, $d\varphi = -3449''$, at pro terminis, ubi in partibus radii exprimi debet, $d\varphi = -0{,}016719$. Pro angulis autem λ et μ calculus ita se habebit:

$$\begin{aligned} l\cos(\vartheta - \psi) &= \underline{9{,}9895815} \\ l\cos\sigma &= 9{,}9798158 \\ l\sin\sigma &= \underline{9{,}4741146} \\ &\ 9{,}9693973 \\ &\ \underline{9{,}4636961} \\ &\ +0{,}93196 \\ &\ \underline{+0{,}06135} \\ \cos\lambda &= +0{,}99331 \\ \lambda &= 6^0,\, 38' \end{aligned}$$

$$\begin{aligned} l\sin(\vartheta - \psi) &= 9{,}3353368 \\ l\cos\omega &= \underline{9{,}9783702} \\ l\cos\omega.\sin(\vartheta - \psi) &= \underline{9{,}3137070} \\ l\sin\sigma &= 9{,}4741146 \\ l\cos\sigma &= \underline{9{,}9798158} \\ &\ 8{,}7878216 \\ &\ 9{,}2935228 \\ &\ +0{,}29087 \\ &\ \underline{-0{,}19657} \\ \sin\mu &= 0{,}09430 \\ \mu &= 5^0,\, 25'. \end{aligned}$$

Hinc pro distantia $LN = \varpi = \frac{\varrho\sin\lambda}{\sin\nu}$ existente $\tang\nu = \frac{\varrho\sin\lambda}{u - \varrho\cos\lambda}$.

$$\begin{aligned} l\varrho &= \underline{5{,}0030295} \\ l\sin\lambda &= 9{,}0626386 \\ l\cos\lambda &= \underline{9{,}9970829} \\ l\varrho\sin\lambda &= 4{,}0656681 \\ l\varrho\cos\lambda &= 5{,}0001124 \\ l\sin\nu &= \underline{9{,}9524188} \\ l\varpi &= 4{,}1132493 \\ lc &= \underline{5{,}0000000} \\ l\frac{c}{\varpi} &= 0{,}8867507 \\ l\frac{c^3}{\varpi^3} &= 2{,}6602521 \\ \frac{c^3}{\varpi^3} &= 457{,}354 \end{aligned}$$

$$\begin{aligned} u &= 105782 \\ \varrho\cos\lambda &= \underline{100026} \\ u - \varrho\cos\lambda &= \underline{5756} \\ l\varrho\sin\lambda &= 4{,}0656681 \\ l(u - \varrho\cos\lambda) &= \underline{3{,}7601208} \\ l\,\tang\nu &= 10{,}3055473 \\ \nu &= 63^0,\, 40' \\ \varpi &= \underline{12979} \\ lu &= 5{,}0244118 \\ l\frac{c}{u} &= 9{,}9755882 \\ l\frac{c^3}{u^3} &= \underline{9{,}9267646} \\ \frac{c^3}{u^3} &= 0{,}84482, \end{aligned}$$

ergo $\frac{c^3}{w^3} - \frac{c^3}{u^3} = 456,509$ et $lc^3\left(\frac{1}{w^3} - \frac{1}{u^3}\right) = 2,6594494.$

Cum nunc sit

$$dp = -\frac{2nuv^3}{c^3} d\varphi \sin \mu \left(\frac{c^3}{w^3} - \frac{c^3}{u^3}\right)$$

reperietur variatio semiparametri p;

$l\frac{v^3}{c^3} = 0,0090885$
$lu = 5,0244118$
$l \sin \mu = 8,9749624$
$l.A = 2,6594494$
$l - d\varphi = 8,2232075$
$4,8911196$

erit ergo
$dp = 2n . 77825$
seu $dp = 155650\, n.$

Unde si massa cometae aequalis esset massae terrae, foret $n = \frac{1}{227000}$, ideoque proxime $dp = \frac{2}{3}$; si autem cometa massam haberet Jovi aequalem, foret $n = \frac{1}{1033}$, ideoque $dp = 151$, qui effectus intervallo unius diei productus satis esset notabilis, cum sit $p = 97144$, ideoque abiret in 97295, sicque parte $\frac{1}{643}$ augeretur.

Pro variatione semiaxis transversi $r = 100000$ habemus hanc formulam:

$$dr = -\frac{2nqrr}{p} \cdot \frac{v^3}{c^3} \cdot \frac{c^3}{w^3} \cdot d\varphi \sin s - \frac{2nrruv}{c^3} d\varphi \left(\sin \mu - \frac{qv}{p} \cos \lambda \sin s\right) \left(\frac{c^3}{w^3} - \frac{c^3}{u^3}\right)$$

cujus formulae calculus ita se habet:

$lqr^2 = 8,2278867$
$lp = 4,9874160$
$3,2404707$
$l\frac{v^3}{c^3} = 0,0090885$
$l\frac{c^3}{w^3} = 2,6602521$
$l - d\varphi = 8,2232075$
$l - \sin s = 9,9562678$
$4,0892866$
pars I $= - 2n . 12283$
pars II $= + 2n . 89456$
$dr = + 2n . 77173$
$dr = + 154346 n$

$\sin \mu = 0,09430$
$l\frac{q}{p} = 3,2404707$
$lv = 5,0030295$
$l \cos \lambda = 9,9970829$
$l - \sin s = 9,9562678$
$8,1968509$
$-\frac{qv}{p} \cos \lambda \sin s = + 0,01573$
$\ldots\ldots\quad 0,11093$
$l \ldots\ldots\quad 9,0415111$
$lu = 5,0244118$
$l\frac{v}{c} = 0,0030295$
$l - d\varphi = 8,2232075$
$l\left(\frac{c^3}{w^3} - \frac{c^3}{u^3}\right) = 2,6594494$
$4,9516093.$

Semiaxis ergo transversus fere par augmentum accipit atque semiparameter, atque hac actione mpus periodicum augetur in ratione 1 ad $1+2{,}31519n$, seu annus augmentum capiet

$$= 845\,n \text{ dierum} = 18280\,n \text{ hor.} = 1096800\,n \text{ min.},$$

unde si cometa terrae esset aequalis, augmentum anni hinc natum foret $= 4', 50''$.

Pro excentricitate q, cum sit $p = (1 - qq)r$, erit

$$qq = 1 - \frac{p}{r} \qquad \text{et} \qquad 2qdq = \frac{-rdp + pdr}{rr} = -\frac{dp}{r} + \frac{pdr}{rr}:$$

fiat ergo hic calculus

$$\begin{array}{rl} ldp = & 5{,}1921491 \\ lqr = & \underline{3{,}2278867} \\ & 1{,}9642624 \\ & -92{,}100\,n \end{array} \qquad \begin{array}{rl} lp = & 4{,}9874160 \\ ldr = & \underline{5{,}1884954} \\ & 10{,}1759114 \\ lqn = & \underline{8{,}2278867} \\ & 1{,}9480247 \\ & +88{,}720\,n \end{array}$$

ergo $\qquad dq = -46{,}05\,n + 44{,}36\,n = -1{,}69\,n,$

unde patet excentricitatem fere nullam pati mutationem, nisi massa cometae plurimum superet massam terrae; si sit aequalis massae Jovis, fiet $dq = -0{,}00164$ et $q + dq = 0{,}01426$, unde aequatio centri valde imminueretur.

Pro variatione perihelii in orbita, si ponamus angulum ☊$LB = \alpha$, formula supra inventa ita exprimatur

$$d\alpha = \frac{n\upsilon^3 d\varphi}{qc^3}\left(\frac{c^3\cos s}{w^3} - \frac{u}{p}\left(\frac{c^3}{w^3} - \frac{c^3}{u^3}\right)\left((1+q\cos s)\cos\lambda\cos s + (2+q\cos s)\sin\mu\sin s\right)\right),$$

quae ergo ita evolvetur ob $1 + q\cos s = \frac{p}{\upsilon}$:

$$\begin{array}{rl} lp = & 4{,}9874160 \\ l\upsilon = & \underline{5{,}0030295} \\ l(1+q\cos s) = & 9{,}9843865 \\ l\cos\lambda = & 9{,}9970829 \\ l\cos s = & \underline{-9{,}6305243} \\ & -9{,}6119937 \end{array} \qquad \begin{array}{rl} 2+q\cos s = & 1{,}96469 \\ l(2+q\cos s) = & 0{,}2933161 \\ l\sin\mu = & 8{,}9749624 \\ l\sin s = & \underline{-9{,}9562678} \\ & -9{,}2245463 \end{array}$$

$$\text{pars postrema} = -0{,}40925 - 0{,}16770 = -0{,}57695$$

$$\begin{array}{rl} l\,\text{partis postr.} = & -9{,}7611382 \\ l\left(\frac{c^3}{w^3} - \frac{c^3}{u^3}\right) = & +2{,}6594494 \\ lu = & \underline{5{,}0244118} \\ & -7{,}4449994 \\ lp = & \underline{4{,}9874160} \\ & -2{,}4515834 \\ \\ \text{pars post.} = & +286{,}803 \\ \text{pars prior} = & \underline{-195{,}333} \\ \text{aggreg.} = & +\ 91{,}470 \end{array} \qquad \begin{array}{rl} l\frac{c^3}{w^3} = & 2{,}6602521 \\ l\cos s = & \underline{-9{,}6305243} \\ & -2{,}2907764 \\ l\,\text{aggr.} = & 1{,}9612787 \\ l\frac{\upsilon^3}{c^3} = & 0{,}0090885 \\ ld\varphi = & \underline{-3{,}5376326} \\ & -5{,}5079998 \\ lq = & \underline{8{,}2278867} \\ & -7{,}2801131 \end{array}$$

ergo erit $\qquad d\alpha = -19059570\,n$ min. sec.

Cum igitur angulus α minuatur, perihelium in orbita secundum seriem signorum promov et quidem hoc die, si cometa terrae esset aequalis, per $84''$.

Porro pro variatione nodi ☊ posito angulo $AL☊ = \psi$, erit

$$d\psi = -\frac{nu}{p} \cdot \frac{\nu^3}{c^3}\left(\frac{c^3}{w^3} - \frac{c^3}{u^3}\right) d\varphi \sin\sigma \sin(\vartheta - \psi)$$

et pro variatione inclinationis $$d\omega = \frac{d\psi \sin\omega}{\operatorname{tang}\sigma};$$

calculus ergo instituatur ut sequitur:

$$\begin{array}{rr} l\frac{u}{p} = & 0,0369958 \\ l\frac{\nu^3}{c^3} = & 0,0090885 \\ l\left(\frac{c^3}{w^3} - \frac{c^3}{u^3}\right) = & 2,6594494 \\ ld\varphi = & -3,5376326 \\ l\sin\sigma = & 9,4741146 \\ l\sin(\vartheta - \psi) = & 9,3353368 \\ \hline & -5,0526177 \end{array}$$

$$\begin{array}{lrr} \text{ergo} & d\psi = & +112880\,n \text{ min. sec.} \\ \hline & ld\psi = & 5,0526177 \\ & l\sin\omega = & 9,4884240 \\ \hline & & 4,5410417 \\ & l\operatorname{tang}\sigma = & 9,4942988 \\ \hline & ld\omega = & 5,0467429 \\ \text{ergo} & d\omega = & +111364\,n \text{ min. sec.} \end{array}$$

unde linea nodorum $L☊$ in orbita cometae promovetur angulo $d\psi = 112880\,n$ min. sec. et inclinatio orbitae terrestris augetur angulo $d\omega = 111364\,n$ min. sec., quae mutationes circiter 170 vicibus su minores ea, quam linea absidum terrae experitur.

Calculus pro intervallo a 26 ad 27 Aprilis.

Cum sit $p = 97144$; $q = 0,0169$; $r = 100000$, et $\omega = 17^0, 56'$, erit $\nu = 100725$; $u = 107360$ $☊LM = \sigma = 16^0, 21'$; $s = -116^0, 16'$; $\vartheta - \psi = 13^0, 26'$. Nunc pro $d\varphi$ inveniendo

$$l\nu = 5,0031373$$

$$\begin{array}{rr} lcd\zeta\sqrt{cp} = & 13,5436916 \\ l\nu\nu = & 10,0062746 \\ \hline l - d\varphi = & 3,5374170 \\ & 4,6855749 \\ \hline l - d\varphi = & 8,2229919 \end{array}$$

priori valore in mutatione angulorum, posteriori longitudinum est utendum.

Nunc pro angulis λ et μ inveniendis erit

$$\begin{array}{rr} l\cos(\vartheta - \psi) = & 9,9879525 \\ \hline l\cos\sigma = & 9,9820721 \\ l\sin\sigma = & 9,4494849 \\ \hline & 9,9700246 \\ & 9,4374374 \end{array}$$

$$\begin{array}{rr} l\sin(\vartheta - \psi) = & 9,3660750 \\ l\cos\omega = & 9,9783702 \\ \hline & 9,3444452 \\ \hline l\sin\sigma = & 9,4494849 \\ l\cos\sigma = & 9,9820721 \\ \hline & 8,7939301 \\ & 9,3265173 \end{array}$$

$$
\begin{aligned}
& +0{,}93331 \\
& \underline{+0{,}06222} \\
\cos\lambda &= 0{,}99553 \\
\lambda &= 5^0,\ 25'
\end{aligned}
\qquad\qquad
\begin{aligned}
& +0{,}27380 \\
& \underline{-0{,}21209} \\
\sin\mu &= 0{,}06171 \\
\mu &= 3^0,\ 32',
\end{aligned}
$$

unde distantia $MN = \varpi$ ita invenitur

$$
\left.\begin{aligned}
l\varrho &= \underline{5{,}0031373} \\
l\sin\lambda &= 8{,}9749624 \\
l\cos\lambda &= \underline{9{,}9980563} \\
l\varrho\sin\lambda &= 3{,}9780997 \\
l\varrho\cos\lambda &= \underline{5{,}0011936} \\
l\sin\nu &= \underline{9{,}9040529}
\end{aligned}\right)
$$

$$
\begin{aligned}
l\varpi &= 4{,}0740468 \\
l\frac{c}{w} &= 0{,}9259532 \\
l\frac{c^3}{w^3} &= 2{,}7778596 \\
\frac{c^3}{w^3} &= 599{,}597
\end{aligned}
$$

$$
\begin{aligned}
u &= 107360 \\
\varrho\cos\lambda &= \underline{100275} \\
u - \varrho\cos\lambda &= \underline{7085} \\
l\varrho\sin\lambda &= 3{,}9780997 \\
l(u - \varrho\cos\lambda) &= \underline{3{,}8503399} \\
l\operatorname{tang}\nu &= 10{,}1277598 \\
\nu &= 53^0,\ 18' \\
\varpi &= \underline{11859} \\
lu &= 5{,}0308425 \\
l\frac{c}{u} &= 9{,}9691575 \\
l\frac{c^3}{u^3} &= \underline{9{,}9074725} \\
\frac{c^3}{u^3} &= 0{,}8081.
\end{aligned}
$$

ergo $\frac{c^3}{w^3} - \frac{c^3}{u^3} = 598{,}789$ et $l\left(\frac{c^3}{w^3} - \frac{c^3}{u^3}\right) = 2{,}7772738.$

Pro variatione parametri p:

$$
\begin{aligned}
l\frac{\varrho^3}{c^3} &= 0{,}0094179 \\
lu &= 5{,}0308425 \\
l\sin\mu &= 8{,}7897867 \\
l\ldots & - 2{,}7772738 \\
l - d\varphi &= \underline{8{,}2229919} \\
& \ 4{,}8303128
\end{aligned}
$$

erit ergo

$$dp = 2n\,.\,67657$$

seu $dp = +135314n$

minor quam die praecedente.

Pro variatione semiaxis transversi r:

$$
\begin{aligned}
l\frac{qrr}{p} &= 3{,}2404707 \\
l\frac{\varrho^3}{c^3} &= 0{,}0094119 \\
l\frac{c^3}{w^3} &= 2{,}7778596 \\
l - d\varphi &= 8{,}2229919 \\
l - \sin s &= \underline{9{,}9526685} \\
& \ 4{,}2034026 \\
\text{pars I} &= -2n\,.\,15963 \\
\text{pars II} &= \underline{+2n\,.\,83696} \\
dr &= +2n\,.\,67733 \\
dr &= 135466n
\end{aligned}
$$

$$
\begin{aligned}
l\frac{q}{p} &= 3{,}2404707 \\
l\varrho &= 5{,}0031373 \\
l\cos\lambda &= 9{,}4980563 \\
l - \sin s &= \underline{9{,}9526685} \\
& \ \underline{8{,}1943328} \\
-\frac{q\varrho}{p}\cos\lambda\sin s &= +0{,}01564 \\
\sin\mu &= \underline{0{,}06171} \\
\ldots\ldots & \ \underline{0{,}07735} \\
l\ldots & \ 8{,}8884603 \\
lu &= 5{,}0308425 \\
l\frac{\varrho}{c} &= 0{,}0031373 \\
l - d\varphi\,() &= \underline{1{,}0002657} \\
& \ 4{,}9227058
\end{aligned}
$$

Pro excentricitatis q variatione,

$$\begin{array}{rr}
ldp = & 5,1313428 \\
lqr = & 3,2278867 \\ \hline
 & 1,9034541 \\ \hline
 & -80,067 \\
 & +79,681 \\ \hline
\end{array}$$

$$2dq = -0,386n \quad \text{et} \quad dq = -0,193n.$$

$$\begin{array}{rr}
lp = & 4,9874160 \\
ldr = & 5,1318304 \\ \hline
 & 0,1192464 \\
lqrr = & 8,2278867 \\ \hline
 & 1,9013597
\end{array}$$

Pro variatione anguli $☊ LB = \alpha$:

$$\begin{array}{rr}
lp = & 4,9874160 \\
l\upsilon = & 5,0031373 \\ \hline
l(1+q\cos s) = & 9,9842787 \\
l\cos\lambda = & 9,9980563 \\
l\cos s = & -9,6459619 \\ \hline
 & -9,6282969
\end{array}$$

$$\begin{array}{rr}
2+q\cos s = & 1,96445 \\ \hline
l(2+q\cos s) = & 0,2932409 \\
l\sin\mu = & 8,7897867 \\
l\sin s = & -0,9526685 \\ \hline
 & -9,0356961
\end{array}$$

$$\text{pars postrema} = -0,42491 - 0,10857 = -0,53348$$

$$\begin{array}{rr}
l\,\text{part. postr.} = & -9,7271181 \\
l\left(\frac{c^3}{w^3}-\frac{c^3}{u^3}\right) = & 2,7772738 \\
lu = & 5,0308425 \\ \hline
 & -7,5352344 \\
lp = & 4,9874160 \\ \hline
 & -2,5478184
\end{array}$$

$$\begin{array}{rr}
\text{pars posterior} = & +353,85 \\
\text{pars prior} = & -265,35 \\ \hline
\text{aggreg.} = & +88,50
\end{array}$$

$$\begin{array}{rr}
l\frac{c^3}{w^3} = & 2,7778596 \\
l\cos s = & -9,6459619 \\ \hline
 & -2,4238215 \\ \hline
l\,\text{aggr.} = & 1,9469433 \\
l\frac{\upsilon^3}{c^3} = & 0,0094119 \\
ld\varphi = & -3,5374170 \\ \hline
 & -5,4937722 \\
lq = & 8,2278867 \\ \hline
 & -7,2658859.
\end{array}$$

Ergo $d\alpha = -18445310n$ min. sec.

Pro variatione nodi et inclinationis:

$$\begin{array}{rr}
l\frac{u}{p} = & 0,0434265 \\
l\frac{\upsilon^3}{c^3} = & 0,0094119 \\
l\left(\frac{c^3}{w^3}-\frac{c^3}{u^3}\right) = & 2,7772738 \\
ld\varphi = & -3,5374170 \\
l\sin\sigma = & 9,4494849 \\
l\sin(\vartheta-\psi) = & 9,3660750 \\ \hline
 & -5,1830891
\end{array}$$

Ergo $d\psi = +152436n$ min. sec.

$$\begin{array}{rr}
ld\psi = & +5,1830891 \\
l\sin\omega = & 9,4884240 \\
l\cos\sigma = & 0,5325872 \\ \hline
 & +6,2041003
\end{array}$$

ergo $d\omega = +1599927n$ min. sec.

Calculus pro intervallo a 27 ad 28 Aprilis.

Cum sit $p = 97144$, $q = 0{,}0169$; $r = 100000$, et $\omega = 17^0,\ 56'$, erit $\varrho = 100750$; $u = 108931$; $\sigma = 15^0, 23'$, $s = -117^0, 14'$; $\vartheta - \psi = 14^0, 21'$.

$$\begin{aligned} l\varrho &= 5{,}0032451 \\ lu &= 5{,}0371515 \\ lp &= \underline{4{,}9874160} \\ l\frac{u}{p} &= 0.0497355 \end{aligned}$$

$$\begin{aligned} lcd\zeta\sqrt{cp} &= 13{,}5436916 \\ l\varrho\varrho &= \underline{10{,}0064902} \\ l - d\varphi &= 3{,}5372014 \\ & \underline{4{,}6855749} \\ l - d\varphi &= 8{,}2227763 \end{aligned}$$

Hinc pro angulis λ et μ

$$\begin{aligned} &\underline{l\cos(\vartheta - \psi) = 9{,}9862340;} \\ l\cos\sigma &= 9{,}9841548 \\ l\sin\sigma &= \underline{9{,}4236974} \\ & 9{,}9703888 \\ & 9{,}4099314 \end{aligned}$$

$$\begin{aligned} l\sin(\vartheta - \psi) &= 9{,}3941794 \\ l\cos\omega &= \underline{9{,}9783702} \\ & \underline{9{,}3725496} \\ l\sin\sigma &= 9{,}4236974 \\ l\cos\sigma &= \underline{9{,}9841548} \\ & 8{,}7962470 \\ & 9{,}3567044 \end{aligned}$$

$$\begin{aligned} & +0{,}93409 \\ & \underline{+0{,}06255} \\ \cos\lambda &= 0{,}99664 \\ \lambda &= 4^0, 42' \end{aligned}$$

$$\begin{aligned} & +0{,}25700 \\ & \underline{-0{,}22735} \\ \sin\mu &= 0{,}02965 \\ l\sin\mu &= 8{,}4720247, \end{aligned}$$

unde colligitur distantia ϖ

$$\begin{aligned} l\varrho &= \underline{5{,}0032451} \\ l\sin\lambda &= 8{,}9134881 \\ l\cos\lambda &= \underline{9{,}9985372} \\ l\varrho\sin\lambda &= 3{,}9167332 \\ l\varrho\cos\lambda &= \underline{5{,}0017823} \\ l\sin\nu &= \underline{9{,}8425548} \\ l\varpi &= 4{,}0741784 \\ l\frac{c}{w} &= 0{,}9258216 \\ l\frac{c^3}{w^3} &= 2{,}7774648 \\ \frac{c^3}{w^3} &= 599{,}05 \end{aligned}$$

$$\begin{aligned} u &= 108931 \\ \varrho\cos\lambda &= \underline{100411} \\ u - \varrho\cos\lambda &= \underline{8520} \\ l\varrho\sin\lambda &= 3{,}9167332 \\ l(u - \varrho\cos\lambda) &= \underline{3{,}9304396} \\ l\,\mathrm{tang}\,\nu &= 9{,}9862936 \\ \nu &= 44^0, 6' \\ l\frac{c}{u} &= 9{,}9628485 \\ l\frac{c^3}{u^3} &= \underline{9{,}8885455} \\ \frac{c^3}{u^3} &= 0{,}7706 \\ \frac{c^3}{w^3} - \frac{c^3}{u^3} &= 598{,}27 \\ l\left(\frac{c^3}{w^3} - \frac{c^3}{u^3}\right) &= 2{,}7768972 \end{aligned}$$

Pro variatione parametri p:

$$\begin{array}{rl}
l\frac{\varrho^3}{c^3} = & 0{,}0097353 \\
lu = & 5{,}0371515 \\
l\sin\mu = & 8{,}4720247 \\
l \ldots = & 2{,}7768972 \\
l - d\varphi = & -8{,}2227763 \\
\hline
 & +4{,}5185851
\end{array}$$

Ergo

$$dp = 2n\,.\,33005$$

seu $dp = +66010n$

$$ldp = 4{,}8196097 + ln$$

Pro variatione semiaxis transversi r:

$$\begin{array}{rl}
l\frac{qrr}{p} = & 3{,}2404707 \\
l(\varrho^3 : c^3) = & 0{,}0097353 \\
l(c^3 : w^3) = & 2{,}7774648 \\
ld\varphi = & -8{,}2227763 \\
l\sin s = & -9{,}9489752 \\
\hline
 & +4{,}1994223
\end{array}$$

$$\begin{array}{rl}
\text{pars I} = & -2n\,.\,15828 \\
\text{pars II} = & +2n\,.\,49547 \\
\hline
dr = & +2n\,.\,33719 \\
dr = & +67438n
\end{array}$$

$$\begin{array}{rl}
l\frac{q}{p} = & 3{,}2404707 \\
l\varrho = & 5{,}0032451 \\
-l\cos\lambda = & -9{,}9985372 \\
l\sin s = & -9{,}9489752 \\
\hline
 & -8{,}1912282 \\
\hline
 & +0{,}01553 \\
\sin\mu = & 0{,}02965 \\
\hline
\ldots\ldots & 0{,}04518 \\
\hline
l\ldots\ldots & 8{,}6549462 \\
lu = & 5{,}0371515 \\
l\frac{\varrho}{c} = & 0{,}0032451 \\
ld\varphi\,(\ldots) = & -0{,}9996735 \\
\hline
 & -4{,}6950163
\end{array}$$

Pro variatione excentricitatis q:

$$\begin{array}{rl}
ldp = & 4{,}8196097 \\
lqr = & 3{,}2278867 \\
\hline
 & 1{,}5917230 \\
 & -39{,}059n \\
 & +38{,}764n \\
\hline
2dq = & -\ 0{,}295n \quad \text{et} \quad dq = -0{,}148n.
\end{array}$$

$$\begin{array}{rl}
lp = & 4{,}9874160 \\
ldr = & 4{,}8289047 \\
\hline
 & 9{,}8163207 \\
lqrr = & 8{,}2278867 \\
\hline
 & 1{,}5884340
\end{array}$$

Pro variatione anguli ☊$LB = \alpha$:

$$\begin{array}{rl}
lp = & 4{,}9874160 \\
l\varrho = & 5{,}0032451 \\
\hline
l(1 + q\cos s) = & 9{,}9841709 \\
l\cos\lambda = & 9{,}9985372 \\
l\cos s = & -9{,}6605005 \\
\hline
 & -9{,}6432086
\end{array}$$

$$\begin{array}{rl}
2 + q\cos s = & 1{,}96421 \\
\hline
l(2 + q\cos s) = & 0{,}2931857 \\
l\sin\mu = & 8{,}4720247 \\
l\sin s = & -9{,}9489752 \\
\hline
 & -8{,}7141856
\end{array}$$

pars postrema $= -0{,}43975 - 0{,}05178 = -0{,}49153$.

$l\,\text{pars postr.} = -9{,}6915500$

$l\left(\frac{v^3}{w^3} - \frac{v^3}{u^3}\right) = 2{,}7768972$

$l\frac{u}{p} = -0{,}0497355$

$2{,}5181827$

pars posterior $= +329{,}748$

pars prior $= -274{,}136$

aggreg. $= +55{,}612$

$l\frac{v^3}{w^3} = 2{,}7774648$

$l\cos s = -9{,}6605005$

$-2{,}4379653$

$l\,\text{aggr.} = 1{,}7451685$

$l\frac{v^3}{c^3} = 0{,}0097353$

$l - d\varphi = -3{,}5372014$

$l\frac{1}{q} = 1{,}7721133$

$-7{,}0642185$

$d\alpha = -11593600n$ min. sec.

Pro variatione nodi et inclinationis:

$l\frac{u}{p} = 0{,}0497355$

$l\frac{v^3}{c^3} = 0{,}0097353$

$l\left(\frac{c^3}{w^3} - \frac{c^3}{u^3}\right) = 2{,}7768972$

$ld\varphi = -3{,}5372014$

$l\sin\sigma = 9{,}4236974$

$l\sin(\vartheta - \psi) = 9{,}3941794$

$-5{,}1914462$

Ergo $d\psi = +155398n$ min. sec.

$ld\psi = 5{,}1914462$

$l\sin\omega = 9{,}4884240$

$4{,}6798702$

$l\tang\varpi = 9{,}4395426$

$5{,}2403276$

ergo $d\omega = 173911n$ min. sec.

Calculus pro intervallo a 28 ad 29 Aprillis.

Hic erit $v = 100775$; $u = 110550$; $\sigma = 14^0\,25'$; $s = -118^0\,12''$ et $\vartheta - \psi = 15^0 14'$, unde pro $d\varphi$ inveniendo

$lv = 5{,}0033528$

$lu = 5{,}0435587$

$lp = 4{,}9874160$

$l\frac{u}{p} = 0{,}0561427$

$l\,cd\zeta\sqrt{\varphi} = 13{,}5436916$

$l\varphi = 10{,}0067056$

$ld\varphi = -3{,}5369860$

$4{,}6855709$

$ld\varphi = -8{,}2225609$

nunc pro angulis λ et μ

$l\cos(\vartheta - \psi) = 9{,}9844660$

$l\cos\sigma = 9{,}9861045$

$l\sin\sigma = 9{,}3961499$

$9{,}9705705$

$9{,}3806159$

$+0{,}93448$

$+0{,}06224$

$\cos\lambda = 0{,}99672$

$\lambda = 4^0\,38'$

$l\sin(\vartheta - \psi) = 9{,}4195436$

$l\cos\omega = 9{,}9783702$

$9{,}3979138$

$l\sin\sigma = 9{,}3961499$

$l\cos\sigma = 9{,}9861045$

$8{,}7940637$

$9{,}3840183$

$+0{,}24022$

$-0{,}24211$

$\sin\mu = -0{,}00189$

$l\sin\mu = -7{,}2764618$

unde colligitur distantia $MN = \varpi$ hoc modo

$$\begin{aligned}
l\upsilon &= 5{,}0033528 \\
l\sin\lambda &= 8{,}9072975 \\
l\cos\lambda &= 9{,}9985784 \\
l\upsilon\sin\lambda &= 3{,}9106503 \\
l\upsilon\cos\lambda &= 5{,}0019312 \\
l\sin\nu &= 9{,}7974640 \\
l\varpi &= 4{,}1131863 \\
l\frac{c}{w} &= 0{,}8868136 \\
l\frac{c^3}{w^3} &= 2{,}6604408 \\
\frac{c^3}{w^3} &= 457{,}55
\end{aligned}$$

$$\begin{aligned}
u &= 110550 \\
\upsilon\cos\lambda &= 100446 \\
\cdots &= 10104 \\
l\upsilon\sin\lambda &= 3{,}9106503 \\
l\cdots &= 4{,}0044933 \\
l\,\mathrm{tang}\,\nu &= 9{,}9061570 \\
\nu &= 38^0\,51' \\
l\frac{c}{u} &= 9{,}9564413 \\
l\frac{c^3}{u^3} &= 9{,}8693239 \\
\frac{c^3}{u^3} &= 0{,}740. \\
\frac{c^3}{w^3}-\frac{c^3}{u^3} &= 456{,}81 \\
l\left(\frac{c^3}{w^3}-\frac{c^3}{u^3}\right) &= 2{,}6597356
\end{aligned}$$

Pro variatione parametri p:

$$\begin{aligned}
l\frac{\upsilon^3}{c^3} &= 0{,}0100584 \\
lu &= 5{,}0435587 \\
l\sin\mu &= -7{,}2764618 \\
l\cdots &= 2{,}6597356 \\
ld\varphi &= -9{,}2225609 \\
& +3{,}2123754
\end{aligned}$$

Ergo $dp = -2n \cdot 1631$

seu $dp = -3262n$

$$ldp = -3{,}5134054$$

Pro variatione semiaxis transversi r:

$$\begin{aligned}
l\frac{qrr}{p} &= 3{,}2404707 \\
l\frac{\upsilon^3}{c^3} &= 0{,}0100584 \\
l\frac{c^3}{w^3} &= 2{,}6604408 \\
ld\varphi &= -8{,}2225609 \\
l\sin s &= -9{,}9451255 \\
& +4{,}0786563 \\
\text{pars I} &= -2n \cdot 11985 \\
\text{pars II} &= +2n \cdot 11478 \\
dr &= -2n \cdot 507
\end{aligned}$$

seu $dr = -1014n$

$$\begin{aligned}
ldp &= -3{,}5134054 \\
lqr &= 3{,}2278867 \\
& -0{,}2855187 \\
& +1{,}9298 \\
& -0{,}5829
\end{aligned}$$

$$\begin{aligned}
l\frac{q}{p} &= 3{,}2404707 \\
l\upsilon\cos\lambda &= 5{,}0019312 \\
l\sin s &= -9{,}9451255 \\
& -8{,}1875274 \\
\cdots\; & +0{,}01540 \\
\sin\mu &= -0{,}00189 \\
\cdots\; & 0{,}01351 \\
l\cdots\; & 8{,}1306553 \\
lu &= 5{,}0435587 \\
l\frac{\upsilon}{c} &= 0{,}0033528 \\
ld\varphi &= -8{,}2225609 \\
l\left(\frac{c^3}{\upsilon^3}-\frac{c^3}{u^3}\right) &= 2{,}6597356 \\
& -4{,}0598633 \\
lp &= 4{,}9874160 \\
ldr &= 3{,}0060380 \\
& -7{,}9934540 \\
lqrr &= 8{,}2278867 \\
& -9{,}7655673
\end{aligned}$$

$2\,dq = +1{,}3469n$ et $dq = +0{,}6735n.$

Pro variatione anguli $\Omega LB = \alpha$:

$l p = 4,9874160$

$l v = 5,0033528$

$l(1 + q \cos s) = 9,9840632$

$l \cos \lambda = 9,9985784$

$l \cos s = -9,6744485$

$-9,6570901$

$2 + q \cos s = 1,96397$

$l(2 + q \cos s) = 0,2931349$

$l \sin \mu = -7,2764618$

$l \sin s = -9,9451255$

$+7,5147222$

pars postrema $= -0,45404 + 0,00327 = -0,45077$

l partis postr. $= -9,6539550$

$l\left(\frac{c^3}{w^3} - \frac{c^3}{u^3}\right) = +2,6597356$

$l\frac{u}{p} = 0,0561427$

$-2,3698333$

pars post. $= +234,33$

pars prior $= -216,21$

aggreg. $= +18,12$

$l\frac{c^3}{w^3} = 2,6604408$

$l \cos s = -9,6744485$

$-2,3348893$

l aggr. $= 1,2581582$

$l\frac{v^3}{c^3} = 0,0100584$

$l d\varphi = -3,5369860$

$l\frac{1}{q} = 1,7721133$

$-6,5773159.$

Ergo $d\alpha = -3778470 n$ min. sec.

Pro variatione nodi et inclinationis:

$l\frac{u}{p} = 0,0561427$

$l\frac{v^3}{c^3} = 0,0100584$

$l \ldots = 2,6597356$

$l d\varphi = -3,5369860$

$l \sin \sigma \sin(\vartheta - \psi) = 8,8156935$

$l - d\psi = -5,0786162$

Ergo $d\psi = +119840 n$ min. sec.

$l d\psi = +5,0786162$

$l \sin \omega = 9,4884240$

$l \cot \sigma = 0,5899546$

$+5,1569948$

ergo $d\omega = 143550 n$ min. sec.

Calculus pro intervallo a 29 ad 30 Aprilis.

Hic erit $v = 100800$; $u = 112155$; $\sigma = 13^0\,23'$, $s = -119^0\,10'$ et $\vartheta - \psi = 16^0\,6'$, unde pro $d\varphi$ inveniendo

$l v = 5,0034605$

$l u = 5,0498200$

$l p = 4,9874160$

$l\frac{u}{p} = 0,0624040$

$l c d \zeta \sqrt{cp} = 13,5436916$

$l v v = 10,0069210$

$l d\varphi = -3,5367706$

$4,6855749$

$l d\varphi = -8,2223455$

*

nunc pro angulis λ et μ

$$\begin{aligned}
l\cos(\vartheta-\psi) &= 9{,}9826236\\
l\cos\sigma &= 9{,}9879223\\
l\sin\sigma &= 9{,}3666036\\
&\ 9{,}9705459\\
&\ 9{,}3492272
\end{aligned}$$

$$\begin{aligned}
&+0{,}93443\\
&+0{,}06137\\
\cos\lambda &= 0{,}99580\\
\lambda &= 5^0\,15'
\end{aligned}$$

$$\begin{aligned}
l\sin(\vartheta-\psi) &= 9{,}4429728\\
l\cos\varpi &= 9{,}9783702\\
&\ 9{,}4213430\\
l\sin\sigma &= 9{,}3666036\\
l\cos\sigma &= 9{,}9879223\\
&\ 8{,}7879466\\
&\ 9{,}4092653
\end{aligned}$$

$$\begin{aligned}
&+0{,}22347\\
&-0{,}25660\\
\sin\mu &= -0{,}03313\\
l\sin\mu &= -8{,}5203525,
\end{aligned}$$

unde colligitur distantia $MN = \varpi$

$$\begin{aligned}
l\varrho &= 5{,}0034605\\
l\sin\lambda &= 8{,}9614288\\
l\cos\lambda &= 9{,}9981743\\
l\varrho\sin\lambda &= 3{,}9648893\\
l\varrho\cos\lambda &= 5{,}0016348\\
l\sin\nu &= 9{,}7899880\\
l\varpi &= 4{,}1749013\\
l\frac{c}{w} &= 0{,}8250987\\
l\frac{c^3}{w^3} &= 2{,}4752961\\
\frac{c^3}{w^3} &= 298{,}74\\
\frac{c^3}{w^3}-\frac{c^3}{u^3} &= 298{,}03
\end{aligned}$$

$$\begin{aligned}
u &= 112155\\
\varrho\cos\lambda &= 100377\\
\ldots\ldots &\ 11778\\
l\varrho\sin\lambda &= 3{,}9648893\\
l\ldots\ldots &\ 4{,}0710715\\
l\,\mathrm{tang}\,\nu &= 9{,}8938178\\
\nu &= 38^0\,4'\\
l\frac{c}{u} &= 9{,}9501800\\
l\frac{c^3}{u^3} &= 9{,}8505400\\
\frac{c^3}{u^3} &= 0{,}7088\\
l\left(\frac{c^3}{w^3}-\frac{c^3}{u^3}\right) &= 2{,}4742600.
\end{aligned}$$

Pro variatione semiparametri p:

$$\begin{aligned}
l\frac{\varrho^3}{c^3} &= 0{,}0103815\\
l\left(\frac{c^3}{w^3}-\frac{c^3}{u^3}\right) &= 2{,}4742600\\
lu &= 5{,}0498200\\
l\sin\mu &= -8{,}5203525\\
ld\varphi &= -8{,}2223455\\
&+4{,}2771595
\end{aligned}$$

Ergo $dp = -2n\,.\,18930$

seu $dp = -37860\,n$

et $ldp = -4{,}5781895$

Pro variatione semiaxis transversi r:

$l\frac{q}{p} = 3,2404707$

$l\frac{v^3}{p^3} = 0,0103815$

$l\frac{c^3}{w^3} = 2,4752961$

$ld\varphi = -8,2223455$

$l\sin s = -9,9411166$

$+3,8896104$

pars I $= -2n.7756$

pars II $= -2n.10052$

$dr = -2n.17808$

$dr = -35616n$

$l\frac{q}{p} = 3,2404707$

$lv\cos\lambda = 5,0016348$

$l\sin s = -9,9411166$

$-8,1832221$

$l\cos s = -9,6878425$

$\frac{-qv\cos\lambda\sin s}{p} = +0,01525$

$\sin\mu = -0,03313$

aggreg. $-0,01788$

l aggreg. $= -8,2523675$

$l\frac{u}{c} = 5,0532805$

$l - d\varphi = 8,2223455$

$l\left(\frac{c^3}{w^3} - \frac{c^3}{u^3}\right) = 2,4742600$

$-4,0022535.$

Cum ex p et r datur $q = \sqrt{\left(1 - \frac{p}{r}\right)}$, non opus est quaerere dq.

Pro variatione anguli $\Omega LB = \alpha$:

$lp = 4,9874160$

$lv = 5,0034605$

$l(1+q\cos s) = 9,9839555$

$l\cos\lambda = 9,9981743$

$l\cos s = -9,6878425$

$-9,6699723$

$2 + q\cos s = 1,96373$

$l(2 + q\cos s) = 0,2930751$

$l\sin\mu = -8,5203525$

$l\sin s = -9,9411166$

$+8,7545442$

pars postrema $= \frac{-0,46771}{+0,05683} = -0,41088$

l pars postr. $= -9,6137150$

$l\frac{u}{p} = -0,0624040$

$l\left(\frac{c^3}{w^3} - \frac{c^3}{u^3}\right) = 2,4742600$

$+2,1503790$

pars posterior $= +141,38$

pars prior $= -145,59$

aggreg. $= -4,21$

$l\frac{c^3}{w^3} = 2,4752961$

$l\cos s = -9,6878425$

$-2,1631386$

l aggr. $= -0,6242821$

$l\frac{v^3}{c^3} = 0,0103815$

$ld\varphi = -3,5367706$

$l\frac{1}{q} = 1,7721133$

$+5,9435475$

$d\alpha = +878107n$ min. sec.

Pro variatione nodi et inclinationis:

$$\begin{aligned}
l\frac{u}{p} &= 0{,}0624040\\
l\frac{v^3}{c^3}\left(\frac{c^3}{w^3}-\frac{c^3}{u^3}\right) &= 2{,}4846415\\
ld\varphi &= -3{,}5367706\\
l\sin\sigma\sin(\vartheta-\psi) &= \underline{8{,}8095764}\\
&\ -4{,}8933925
\end{aligned}$$

$$\begin{aligned}
\text{ergo}\quad d\psi &= \underline{+78234\,n\ \text{min. sec.}}\\
ld\psi &= 4{,}8933925\\
l\sin\omega &= 9{,}4884240\\
l\cot\sigma &= \underline{0{,}6213187}\\
ld\omega &= 5{,}0031352\\
\text{ergo}\quad d\omega &= +100724\,n\ \text{min. sec.}
\end{aligned}$$

Calculus pro intervallo a 30 Aprilis ad 1 Maji.

Hic erit $v = 100825$; $u = 113745$; $\sigma = 12^0\,29'$; $s = -120^0\,8'$ et $\vartheta - \psi = 16^0\,56'$, unde pro $d\varphi$ inveniendo

$$\begin{aligned}
lv &= 5{,}0035682\\
lu &= 5{,}0559323\\
lp &= \underline{4{,}9874160}\\
l\frac{u}{p} &= 0{,}0685163
\end{aligned}$$

$$\begin{aligned}
lcd\zeta\sqrt{cp} &= 13{,}5436916\\
lvv &= \underline{10{,}0071364}\\
ld\varphi &= -\ 3{,}5365552\\
&\ \ \underline{4{,}6855749}\\
ld\varphi &= -\ 8{,}2221301.
\end{aligned}$$

Nunc pro angulis λ et μ

$$\begin{aligned}
\underline{l\cos(\vartheta-\psi)} &= \underline{9{,}9807505}\\
l\cos\sigma &= 9{,}9896095\\
l\sin\sigma &= \underline{9{,}3347665}\\
&\ 9{,}9703600\\
&\ 9{,}3155170\\
&\ +0{,}93403\\
&\ \underline{+0{,}05990}\\
\cos\lambda &= +0{,}99393\\
\lambda &= 6^0\,38'
\end{aligned}$$

$$\begin{aligned}
l\sin(\vartheta-\psi) &= 9{,}4642790\\
l\cos\omega &= \underline{9{,}9783702}\\
&\ \underline{9{,}4426492}\\
l\sin\sigma &= 9{,}3347665\\
l\cos\sigma &= \underline{9{,}9896095}\\
&\ 8{,}7774157\\
&\ 9{,}4322587\\
&\ +0{,}20678\\
&\ \underline{-0{,}27055}\\
\sin\mu &= -0{,}06377\\
l\sin\mu &= -8{,}8046164,
\end{aligned}$$

unde colligitur distantia $MN = w$

$$\begin{aligned}
lv &= \underline{5{,}0035682}\\
l\cos\lambda &= 9{,}9973554\\
l\sin\lambda &= \underline{9{,}0414852}\\
lv\cos\lambda &= 5{,}0009236\\
lv\sin\lambda &= \underline{4{,}0450534}\\
l\sin\nu &= \underline{9{,}8019735}\\
lw &= \underline{4{,}2430799}\\
l\frac{c}{w} &= 0{,}7569201\\
l\frac{c^3}{w^3} &= 2{,}2707603\\
\frac{c^3}{w^3} &= 186{,}536
\end{aligned}$$

$$\begin{aligned}
u &= 113745\\
v\cos\lambda &= \underline{100213}\\
u - v\cos\lambda &= \underline{13532}\\
lv\sin\lambda &= 4{,}0450534\\
l(u - v\cos\lambda) &= \underline{4{,}1313620}\\
l\,\mathrm{tang}\,\nu &= 9{,}9136914\\
\nu &= 39^0\,20'\\
l\frac{c}{u} &= 9{,}9440677\\
l\frac{c^3}{u^3} &= \underline{9{,}8322031}\\
\frac{c^3}{u^3} &= 0{,}680.
\end{aligned}$$

ergo $\frac{c^3}{w^3} - \frac{c^3}{u^3} = 185{,}856$ et $l\left(\frac{c^3}{w^3} - \frac{c^3}{u^3}\right) = 2{,}2691700.$

ro variatione semiparametri p:

$$\begin{aligned} l\frac{v^3}{c^3} &= 0,0107046 \\ l\left(\frac{c^3}{w^3}-\frac{c^3}{u^3}\right) &= 2,2691700 \\ lu &= 5,0559323 \\ l\sin\mu &= -8,8046164 \\ ld\varphi &= -8,2221301 \\ \hline & +4,3625534 \end{aligned}$$

Ergo

$$dp = -2n\,.\,23044$$

seu $dp = -46088n$

ro variatione semiaxis transversi r:

$$\begin{aligned} l\frac{qrr}{p} &= 3,2404707 \\ l\frac{v^3}{c^3} &= 0,0107046 \\ l\frac{c^3}{w^3} &= 2,2707603 \\ ld\varphi &= -8,2221301 \\ l\sin s &= -9,9369456 \\ \hline & +3,6810113 \end{aligned}$$

$$\begin{aligned} l\frac{q}{p} &= 3,2404707 \\ lv\cos\lambda &= 0,0009236 \\ l\sin s &= -9,9369456 \\ \hline & -8,1783399 \\ \hline & +0,01508 \\ \sin\mu &= -0,06377 \\ \hline \ldots &= -0,04869 \\ \hline l\ldots &= -8,6874398 \\ lu &= 5,0559323 \\ l\left(\frac{c^3}{w^3}-\frac{c^3}{u^3}\right) &= 2,2691700 \\ ld\varphi &= -8,2221301 \\ l\frac{v}{c} &= 0,0035682 \\ \hline & +4,2382404 \end{aligned}$$

$$\begin{aligned} \text{pars I} &= -2n\,.\;\;4797,5 \\ \text{pars II} &= -2n\,.\,17308 \\ \hline dr &= -2n\,.\,22105 \\ dr &= -44210n \end{aligned}$$

ro variatione anguli $\Omega LB = \alpha$:

$$\begin{aligned} lp &= 4,9874160 \\ lv &= 5,0035682 \\ \hline (1+q\cos s) &= 9,9838478 \\ l\cos\lambda &= 9,9973554 \\ l\cos s &= -9,7007158 \\ \hline & -9,6819190 \end{aligned}$$

$$\begin{aligned} \underline{2+q\cos s} &= 1,9635 \\ \hline l(2+q\cos s) &= 0,2930309 \\ l\sin\mu &= -8,8046164 \\ l\sin s &= -9,9369456 \\ \hline & +9,0345929 \end{aligned}$$

$$\text{pars postrema} = \frac{-0,48075}{+0,10829} = -0,37246.$$

$$\begin{aligned} l\,\text{part. postr.} &= -9,5710796 \\ l\frac{u}{p} &= 0,0685163 \\ l\left(\frac{c^3}{w^3}-\frac{c^3}{u^3}\right) &= 2,2691700 \\ \hline l\,\text{part. post.} &= -1,9087659 \\ \text{pars posterior} &= +81,052 \\ \text{pars prior} &= -89,676 \\ \hline \text{aggreg.} &= -\;\;8,624 \end{aligned}$$

$$\begin{aligned} l\frac{c^3}{w^3} &= 2,2707603 \\ l\cos s &= -9,6819190 \\ \hline l\,\text{part. I} &= -1,9526793 \\ \hline l\,\text{aggreg.} &= -0,9357087 \\ l\frac{v^3}{c^3} &= 0,0107046 \\ ld\varphi &= -3,5365552 \\ l\frac{1}{q} &= 1,7721133 \\ \hline & +6,2550818 \end{aligned}$$

$$d\alpha = +1799210n \text{ min. sec.}$$

Pro variatione nodi et inclinationis

$$l\frac{u}{p} = 0{,}0685163$$
$$l\varphi^3\left(\frac{1}{w^3}-\frac{1}{u^3}\right) = 2{,}2798746$$
$$ld\varphi = -3{,}5365552$$
$$l\sin\sigma\sin(\vartheta-\psi) = 8{,}7990455$$
$$l - d\psi = -4{,}6839916$$

Ergo

$$d\psi = +48305\,n \text{ min sec}$$
$$ld\psi = 4{,}6839916$$
$$l\sin\omega = 9{,}4884240$$
$$l\cos\sigma = 0{,}6548430$$
$$ld\omega = 4{,}8272586$$
$$d\omega = 67183\,n \text{ min. sec}$$

Calculus pro intervallo a 1 ad 2 Maji.

Hic erit $\varrho = 100850$; $u = 115380$; $\sigma = 11^0\,31'$, $s = -121^0\,6'$, et $\vartheta - \psi = 17^0\,45'$, unde pro $d\varphi$ inveniendo

$$l\varrho = 5{,}0036759$$
$$lu = 5{,}0621305$$
$$lp = 4{,}9874160$$
$$l\frac{u}{p} = 0{,}0747145$$

$$lcd\zeta\sqrt{cp} = 13{,}5436916$$
$$l\varrho\varrho = 10{,}0073518$$
$$ld\varphi = -3{,}5363398$$
$$4{,}6855749$$
$$ld\varphi = -8{,}2219147.$$

Nunc pro angulis λ et μ

$$l\cos(\vartheta-\psi) = 9{,}9788175$$
$$l\cos\sigma = 9{,}9911670$$
$$l\sin\sigma = 9{,}3002758$$
$$9{,}9699845$$
$$9{,}2790933$$

$$+0{,}93322$$
$$+0{,}05791$$
$$\cos\lambda = 0{,}99113$$
$$\lambda = 7^0\,38'$$

$$l\sin(\vartheta-\psi) = 9{,}4841066$$
$$l\cos\omega = 9{,}9783702$$
$$9{,}4624768$$
$$l\sin\sigma = 9{,}3002758$$
$$l\cos\sigma = 9{,}9911670$$
$$8{,}7627526$$
$$9{,}4536438$$

$$+0{,}19015$$
$$-0{,}28421$$
$$\sin\mu = -0{,}09406$$
$$l\sin\mu = -8{,}9734050.$$

unde colligitur distantia $MN = w$:

$$l\varrho = 5{,}0036759$$
$$l\cos\lambda = 9{,}9961343$$
$$l\sin\lambda = 9{,}1233061$$
$$l\varrho\cos\lambda = 4{,}9998102$$
$$l\varrho\sin\lambda = 4{,}1269820$$
$$l\sin\nu = 9{,}8166521$$
$$lw = 4{,}3103299$$
$$l\frac{c}{w} = 0{,}6896701$$
$$l\frac{c^3}{w^3} = 2{,}0690103$$
$$\frac{c^3}{w^3} = 117{,}22$$
$$\frac{c^3}{w^3} - \frac{c^3}{u^3} = 116{,}75$$

$$u = 115380$$
$$\varrho\cos\lambda = 99956$$
$$u - \varrho\cos\lambda = 15424$$
$$l\varrho\sin\lambda = 4{,}1269820$$
$$l(u-\varrho\cos\lambda) = 4{,}1881970$$
$$l\tang\nu = 9{,}9387850$$
$$\nu = 40^0\,58'$$
$$l\frac{c}{u} = 9{,}9378695$$
$$l\frac{c^3}{u^3} = 9{,}8136085$$
$$\frac{c^3}{u^3} = 0{,}65$$

et

$$l\left(\frac{c^3}{w^3} - \frac{c^3}{u^3}\right) = 2{,}0665868.$$

Pro variatione semiparametri p:

$$\begin{aligned} l\frac{v^3}{c^3} &= 0{,}0110277 \\ l\ldots &= 2{,}0665868 \\ lu &= 5{,}0621305 \\ l\sin\mu &= -8{,}9734050 \\ ld\varphi &= \underline{-8{,}2219147} \\ &+4{,}3350647 \end{aligned}$$

Ergo

$$dp = -2n\,.\,21630$$

seu $dp = -43260n$

Pro variatione semiaxis r:

$$\begin{aligned} l\frac{qrr}{p} &= 3{,}2404707 \\ l\frac{v^3}{c^3} &= 0{,}0110277 \\ l\frac{c^3}{w^3} &= 2{,}0690103 \\ ld\varphi &= -8{,}2219147 \\ l\sin s &= \underline{-9{,}9326092} \\ &+3{,}4750326 \end{aligned}$$

$$\begin{aligned} \text{pars I} &= -2n\,.\,2985{,}6 \\ \text{pars II} &= \underline{-2n\,.\,17900} \\ dr &= -2n\,.\,20886 \\ dr &= -41772n \end{aligned}$$

Pro variatione anguli ☊$LB = \alpha$:

$$\begin{aligned} lp &= 4{,}9874160 \\ lv &= \underline{5{,}0036759} \\ l(1+q\cos s) &= 9{,}9837401 \\ l\cos\lambda &= 9{,}9961343 \\ l\cos s &= \underline{-9{,}7130983} \\ &-9{,}6929727 \end{aligned}$$

$$\begin{aligned} l\frac{q}{p} &= 3{,}2404707 \\ lv\cos\lambda &= 4{,}9998102 \\ l\sin s &= \underline{-9{,}9326092} \\ &\underline{-8{,}1728901} \\ &+0{,}01489 \\ \sin\mu &= \underline{-0{,}09406} \\ &\underline{-0{,}07917} \\ l\ldots &= -8{,}8985606 \\ l\frac{uv}{c} &= 5{,}0658064 \\ ld\varphi &= -8{,}2219147 \\ l\ldots &= \underline{2{,}0665868} \\ &+4{,}2528685 \end{aligned}$$

$$\begin{aligned} \underline{2+q\cos s} &= \underline{1{,}9633} \\ l(2+q\cos s) &= 0{,}2929867 \\ l\sin\mu &= -8{,}9734050 \\ l\sin s &= \underline{-9{,}9326092} \\ &+9{,}1990009 \end{aligned}$$

$$\text{pars postrema} = \frac{-0{,}49314}{+0{,}15812} = -0{,}33502.$$

$$\begin{aligned} l\,\text{part. postr.} &= -9{,}5250707 \\ l\ldots &= 2{,}0665868 \\ l\frac{u}{p} &= \underline{0{,}0747145} \\ &-1{,}6662720 \end{aligned}$$

$$\begin{aligned} \text{pars posterior} &= +46{,}373 \\ \text{pars prior} &= \underline{-60{,}549} \\ \text{aggreg.} &= -14{,}176 \end{aligned}$$

$$\begin{aligned} l\frac{c^3}{w^3} &= 2{,}0690103 \\ l\cos s &= \underline{-9{,}7130983} \\ &\underline{-1{,}7821086} \\ l\,\text{aggreg.} &= -1{,}1515537 \\ l\frac{v^3}{c^3} &= 0{,}0110277 \\ ld\varphi &= -3{,}5365398 \\ l\frac{1}{q} &= \underline{1{,}7721133} \\ &+6{,}4712345 \end{aligned}$$

Ergo $d\alpha = +2959610n$ min. sec.

Pro variatione nodi et inclinationis:

$$\begin{array}{rll} l\frac{u}{p}\left(\frac{c^3}{w^3}-\frac{c^3}{u^3}\right) = & 2,1413013 & \qquad \text{ergo} \qquad d\psi = +29734n \text{ min. sec.} \\ l\frac{\nu^3}{c^3} = & 0,0110277 & \qquad\qquad\qquad ld\psi = 4,4732512 \\ ld\varphi = & -3,5365398 & \qquad\qquad\qquad l\sin\omega = 9,4889240 \\ l\sin\sigma\sin(\vartheta-\psi) = & 8,7843824 & \qquad\qquad\qquad l\cot\sigma = 0,6908912 \\ \hline & -4,4732512 & \qquad\qquad\qquad\qquad\qquad 4,6525664 \\ & & \qquad \text{ergo} \qquad d\omega = 44933n \text{ min. sec.} \end{array}$$

Conclusio.

Cum variationes inventae sint admodum notabiles, simili modo tam ante terminum 25 Aprilis quam post 2 Maj. definiri debent. Quas igitur computavi hic simul aspectui exponam:

Intervallum Aprilis	dp	dr	da	$d\psi$	$d\omega$
15 — 16					
16 — 17					
17 — 18					
18 — 19					
19 — 20					
20 — 21	$+45310n$	$+144570n$	$-4937360n$	$+8903n$	$+6717n$
21 — 22					
22 — 23					
23 — 24					
24 — 25					
25 — 26	$+155650n$	$+154346n$	$-19059570n$	$+112880n$	$+111364n$
26 — 27	$+135314n$	$+135466n$	$-18445310n$	$+152436n$	$+159996n$
27 — 28	$+66010n$	$+67438n$	$-11593600n$	$+155398n$	$+173911n$
28 — 29	$-3262n$	$-1014n$	$-3778470n$	$+119840n$	$+143550n$
29 — 30	$-37860n$	$-35616n$	$+878107n$	$+78234n$	$+100724n$
30 — 1 Maj.	$-46088n$	$-44210n$	$+1799210n$	$+48305n$	$+67183n$
1 — 2	$-43260n$	$-41772n$	$+2959610n$	$+29734n$	$+44933n$
2 — 3					
3 — 4					
4 — 5					
5 — 6					
6 — 7	$-19031n$	$-17736n$	$+1554230n$	$+3608n$	$+9506n$

Si certiores essemus de elementis motus hujus cometae, operae pretium esset hunc calculum ulterius tam in antecedentia quam consequentia extendere; nunc autem sufficiat conjectura tantum perturbationes in motu terrae ortas crassa minerva colligere.

De variatione parametri.

Semiparameter p usque ad 28 Aprilis augetur, tum vero iterum minuitur; verumtamen augmenta multum praevalent. Videtur autem totum augmentum exsurgere ad $700000\,n$, unde cum ante cometae adventum fuerit semiparameter $p = 97144$, is deinceps erit $= 97144 + 700000\,n$. Quare si massa cometae aequalis esset massae terrae, ob $n = \frac{1}{200000}$, fieret is $= 97144 + 3\frac{1}{2}$; ac si massa cometae ad massam terrae rationem $= m : 1$ habere ponatur, in postremum erit semiparameter $= 97144 + \frac{7m}{2}$.

De variatione axis transversi.

Semiaxis transversus r, qui ante cometae adventum sumtus est $= 100000$, fere similes mutationes patitur, quae autem aliquantillum erunt minores, ita ut augmentum totum aestimari queat quasi $= 690000\,n$, et semiaxis post discessum cometae $= 100000 + 690000\,n$. Hinc posita ratione massae cometae ad massam terrae $= m : 1$, erit semiaxis in posterum $= 100000 + \frac{69m}{20}$.

De variatione excentricitatis.

Cum sit in genere excentricitas $q = \sqrt{\left(1 - \frac{p}{r}\right)}$, eaque ante cometae adventum fuerit $= 0{,}0169$,

erit ea deinceps $\quad = \sqrt{\left(1 - \frac{97144 - 3{,}5m}{100000 + 3{,}45m}\right)} = \sqrt{(0{,}01856 - 0{,}0000015m)}$,

ideoque fiet excentricitas $\quad = 0{,}0169 - 0{,}000044m$

hoc est aliquanto minor quam ante. Quare si massa cometae centies superaret massam terrae, ut esset $m = 100$, foret excentricitas $= 0{,}0125$, maximaque solis aequatio multo minor esset futura.

De variatione anni solaris.

Ob auctum axem transversum quantitas anni solaris augebitur in ratione

$$1 : \left(1 + \frac{69m}{2000000}\right)^{\frac{3}{2}} = 1 : 1 + \frac{207m}{4000000}.$$

Cum igitur ante adventum cometae annus fuerit $365^d\,5^h\,49' = 525949'$, annus in posterum augmentum capiet $= 27m$ min. primorum. Dum ergo cometa esset terrae aequalis, annus 27 min. primis produceretur, fieretque $= 365^d\,6^h\,16'$. Ac si cometa adeo centies terram superaret, anni quantitas augmentum caperet 45 horarum, qui effectus sane foret stupendus.

De variatione lineae absidum.

Usque ad diem 29 Aprilis linea absidum maxime promovetur, tum vero iterum repellitur; sed promotio plurimum praevalet atque ad minimum $100000000\,n$ aestimanda videtur. Hinc si ut hactenus massa cometae m vicibus major ponatur, quam massa terrae, ab actione cometae linea absidum orbitae terrae per spatium $500\,m$ min. sec. promovebitur. Ergo si cometa terrae esset aequalis, haec promotio esset $= 8'\,20''$, sin autem centies esset major, foret ea $13^0\,23'\,20''$.

*

De variatione lineae nodorum et inclinationis.

Linea nodorum seu intersectio L☊ ab actione cometae super ejus orbita ad minimum pro vebitur per spatium $950000\,n$ min. sec. et inclinatio fere tantundem augebitur: unde utraque turbatio erit $47\frac{1}{2}m$ min. sec., quae eo minus est dubia, cum actio cometae perpetuo producat.

Fig. 191. Consideremus haec elementa in coelo, sitque ☊C via cometae, ☊♎♋ ecliptica adventum cometae, erit angulus ♎☊$C = 17^0\ 56'$ = ☊, et arcus ☊♎ $= 51^0\ 16'$, per transibit aequator $Æ$♎Q faciens cum ecliptica angulum $Æ$♎♋ $= 23^0\,28\frac{1}{2}'$. Post effectum autem cometae sit circulus $\varepsilon o \lambda \omega$ ecliptica secans priorem in o, erit ☊$\omega = d\psi$ et $C\omega o =$ ☊ $+ d\omega$. Ducatur arculus ωu ad ☊o normalis, erit ☊$u = d\psi \cos$ ☊ et $\omega u = d\psi \sin$ ☊; ponatur ☊$o = z$, erit $\sin z : \sin(z - d\psi \cos$ ☊$) = \sin($☊ $+ d\omega) : \sin$ ☊, unde fit $\text{tang}\, z = \frac{d\psi \sin \text{☊}}{d\omega}$ ergo $d\omega = d\psi$, erit $l\,\text{tang}\, z = l \sin$ ☊ $= 9{,}4884240$, ac propterea $z =$ ☊$o = 17^0\ 7'$; tum vero $o \sin z = d\psi \sin$ ☊ erit $o = \frac{d\psi \sin \text{☊}}{\sin z} = 1{,}0512 d\psi = 50m$ min. sec., ob $d\psi = d\omega = 47\frac{1}{2}m$. Cum sit ♎$o = -34^0\ 9'$, ecliptica quasi gyratur circa punctum ♏ $4^0\ 9'$ per angulum $50m$ min. sec., ut punctum solstitiale ♋ magis ab aequatore removeatur et obliquitas eclipticae augeatur. ♎μ ad $o\omega$ normali, erit ♎$\mu = -50m \sin 34^0\ 9'$,

hincque
$$\text{♎}\lambda = \frac{-50m \cdot \sin 34^0\,9'}{\sin 23^0\,28\frac{1}{2}'}, \qquad \text{et} \qquad \mu\lambda = \frac{-50m \cdot \sin 34^0\,9'}{\text{tang}\, 23^0\,28\frac{1}{2}'}.$$

Unde si obliquitas eclipticae pristina vocetur $= \varepsilon$ et nova $= \varepsilon + d\varepsilon$, erit
$$\sin \varepsilon : \sin(\varepsilon + d\varepsilon) = \sin(-34^0\ 9' - \mu\lambda) : \sin - 34^0\ 9' \quad \text{seu} \quad d\varepsilon = 50m \cos 34^0\ 9' = 41m\ \text{sec.}$$
et cum sit $\mu\lambda = -63m$ sec. puncta aequinoctialia super ecliptica per $63m$ sec. promota erunt senda, super aequatore autem per spatium $70m$ sec. In latitudine igitur stellarum, quarum tudo est ♌ $4^0\ 9'$, iste effectus maximé spectabitur, dum stellarum borealium latitudo minuetur, australium vero augebitur particula $50m$ sec. In stellis vero sub longitudine ♒ $4^0\ 9'$ sitis contrarium eveniet.

Si massa cometae multum superet massam terrae, hae perturbationes ad enormem quantitatem exsurgere poterunt, ita ut effectum non solum in Astronomia, sed etiam in vita communi simus sensuri. Quin etiam, cum de elementis orbitae cometae non simus satis certi, error in eam partem incidere posset, ut omnes hae perturbationes multo adeo majores essent prodituri, quam hic invenimus. Omnino autem etiamsi ob errores has perturbationes minui oporteret, et massa cometae minor esset quam terrae, tamen ab hoc tempore novam quasi epocham constitui conveniet, pro qua novae tabulae solares ante omnia essent condendae, quod negotium nonnisi pluribus elapsis annis perfici poterit. Lunares autem tabulae multo majorem ac difficiliorem emendationem requisiturae videntur.