

CONTINUATIO DISSERTATIONIS
 DE
 INVENIENDA
CORRECTIONE
MERIDIETI,

QUAM

Consensu Ampliss. Facult. Philos. in Reg. Acad.
 Aboënsi,

Publico examini modeste submittunt

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 SCHULTEEN,**

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ET

RESPONDENS

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In AUDITORIO MAJORI Die V. Maji
 Anni MDCCCLXXIII.

Tempore ante meridiem solito.

A B O Æ,

Typis JOHANNIS CHRISTOPHORI FRENCKELL.

VIRO Amplissimo atque Celeberrimo
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PATRUO OPTIMO.

Quum tot tantaque sint beneficia, quibus me, PA-
ut ne mente quidem, illa digne concipere va-
In servient modo haꝝ lineæ ad testandum inti-
mi, ad urnam usque prosequar mentis affectum. Ca-
quam desistat vota fundere sincerrima

AMPLISSIMORUM ATQUE CELEBERRI-

*Cultor
GABRIEL E.*

VIRO Maxime Reverendo atque Celeberrimo
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HAARTMAN,
S. S. Theol. ad Regiam Academiam Aboens. PROFESSO-
RI Ordinario, Confist. utriusque ADSESSORI
Æquissimo.

PATRUO OPTIMO.

VIRO Consultissimo atque Amplissimo
D: NO MAG. DANIELI
LITHANDER,
Reg. Collegii, quod rei metallicæ curam gerit, PROTO-
NOTARIO Ordinario.
AVUNCULO OPTIMO.

TRONI OPTIMI, per plures annos amplecti dignati estis,
leam, multo minus verbis eadem explicare aggredior.
num illum, quo Vos, VIRT AMPLISSIMI atque CELEBERRI-
TERUM pro perenni VESTRA & VESTRORUM felicitate nun-

MORUM NOMINUM VESTRORUM

devotissimus et sagittarius, que in nominata Disserta-
tione
HAARTMAN. GABRIEL E. LADDER

VICE LANDS-CAMERAREN OCH KRONO BEFALL.

NINGSMANNEN,

VÄLÄDDE

Herr GABRIEL HAARTMAN,

MIN HULDASTE FADER.

D e lifliga kånslor, som altid intagit mitt sinne, då jag öfvervägat de många välgjärningar och den ömhet för min välfärd, hvarmed jag så ymnigt, som af en Fader kan ske, blifvit öfverhopad, skulle ännu inom mitt inre fördölias, om jag icke nu, då jag skall förlvara detta Academiska arbete, hade fått tilfälle, at dem offenteligen å daga lägga. Förläten mig dock, Min Huldaste Fader, at jag icke få tydeligen kan tala, som mitt hjerta menar, och eburu jag aldrig förmår astjena den minsta del af Min Huldaste Faders emot mig be Vista godhet; så antagen dock til afbetaoning, den brinnande och barnsliga vördnad, som jag emot Mine Huldaste Föräldrar, icke förr än med sic'va lifvet skall upphöra at hysa. Hvad som annors i min förmåga brister, skall et ständigt begår, at upfylla Eder önskan, och flitiga böner årfätta. Den Allsmägtige GUDen, som alt förmår, tildele Mine Huldaste Föräldrar alt det goda, som kan gjöra Eder sälla, både här i tiden och sedan i evigheten. Så önskar oafslateligen och med barnslig vördnad till mitt yttersta framhärdar.

MIN HULDASTE FADERS

Ödmjukligste Son
GABRIEL E. HAARTMANI



In Dissertatione, de *Invenienda Corre-*
ctione Meridiei, ante duos circiter an-

nos ventilata, a Cel. Profess. WALLENIO excogi-

tatam & usitata, saltim in Theoria, adcuratiorem

methodum, momentum meridiei, altitudinibus cor-

respondentibus determinandum, corrigendi, orbi e-

rudito exhibuimus. Angustia temporis vero tum

impeditis, non licuit nobis, singula ad illud argu-

mentum & in primis praxin regularum allatarum

spectantia, plenius persequi. Quæ itaque ibi desi-

derari possunt, eorum partem saltim Tuis, Bene-

vole Lector, oculis subjecere nobis nunc permittas.

Fatemur equidem, pleraque in pagellis hisce occur-

rentia ex consideratione ipsius Problematis, medio-

cri adhibita attentione posse deduci; quum tamen

ad usum formularum, quæ in nominata Disserta-

tione

tione continentur, omnino sint necessaria, neque ea plane intermittere potuimus. Quod autem præ cæteris mitiorem candi Lectoris censuram hisce metematibus nostris conciliaturum fore speramus, sunt illæ, quæ postremo sequuntur, tabulæ, quas in usum observatorum, calculo, in quantum fieri potuit, accurato elaboravimus. Cæterum, ne solutionem ipsius Problematis ex antecedentibus evolvere necesse habeat Lector, aliam a nostra plane diversam & quidem pure Geometricam, a Cel. Professore LEXELL, pro singulari, quo nos amplexus est, favore communicatam, heic adferemus, cui vel ex eo capite prærogativa concedenda est, quod absque analyticis expressionibus eandem simplicissimam tradat formulam, quæ §. V. Reg. 2. etjam comparet.

§. X. Fig. I.

LEMMA I. Si in triangulo sphærico ABC , latus $BC = 90^\circ$, erit radius ad sinum alterutrius reliquorum laterum AB , ut cosinus anguli intercepti ABC ad cosinum oppositi lateris AC . Sit D centrum Sphæræ, BD, CD intersectiones planorum laterum AB , AC cum piano lateris BC , erit, (per hyp.) angulus BDC rectus. Ducantur AH , AF normales ad radios BD , DC , erit $AH = \sin AB$ & $DF = \cos AC$. Demittatur porro ex A recta perpendicularis ad planum DBC , occurrens huic in G & junctis GH, GF, erit recta BD perpendicularis ad planum AGH & CD ad

CD ad AGF; adeoque ang. AHG = ang. Sphærico ABC & GF perpendicularis ad CD sive parallela ipsi BD, adeoque DF ($\cos AC$) = HG. Sed in triangulo AGH rectangulo ad G est (per element. Trig. Pl.) $R : AH :: \cos AHG : GH (DF)$ & si valores substituuntur, $R : \sin AB : \cos ABC : \cos AC$. Q. e. d.

Sint A & B duo anguli acuti vel arcus quadrante minores, quorum A > B & posito sinu toto = 1, erit

$$\text{LEM. II. } \frac{\sin A - \sin B}{\sin A + \sin B} = \cot \left(\frac{A + B}{2} \right)$$

$$\times \text{Tang.} \left(\frac{A - B}{2} \right) \text{ Si } B \text{ poteret esse }\pi \text{ propositio de ceteris secundum rationem solum bis inter duas secundum ratios.}$$

$$\text{LEM. III. } \frac{\cos B - \cos A}{\cos B + \cos A} = \text{Tang.} \left(\frac{A + B}{2} \right)$$

$$\times \text{Tang.} \left(\frac{A - B}{2} \right) \text{ Inter duas secundum ratios.}$$

$$\text{LEM. IV. } \frac{\sin A - \sin B}{\cos B - \cos A} = \cot \left(\frac{A + B}{2} \right)$$

SCHOLIUM. Quum illa propositio, quæ Lemma primo continetur, nullibi, quantum mihi constat, seorsim sit demonstrata, illud hac occasione, & quidem modo, quo fieri potuit, simplicissimo,

præstitimus; sequentia vero Lemmata indicare tam
tum voluimus, quoniam apud D^e LA CAILLE in
Astron. & Tract. Præl. aliosque singulatim suffici-
enter probata sunt. Cæterum illa nota, quæ §. II.
ad calcem pag. 4. habetur, circa hanc paragraphum
quoque est notanda.

§. XI. Fig. 2.

Problema

Datis declinatione solis, variatione declinationis
atque intervallo temporis inter binas correspondentes
observationes cum latitudine loci, invenire correctio-
nen Meridier. Sit P polus æquatoris, PS, PG com-
plementa declinationum Solis pro binis obserватio-
nibus correspondentibus, inter quæ angulus hora-
rius est SPS, sitque PS $>$ PG; Jungantur S, G ar-
cu circuli maximi, qui bisecetur in F, per quod
punctum etjam aliis circulus maximus ZFNL de-
scribatur, SG ad angulos rectos insitens, habebit-
que quodvis circuli ZFNL punctum eandem distan-
tiā ab S & G, seu quod idem est, omnia loca,
quorum respectu Sol, iisdem momentis observatio-
num, habet eandem altitudinem, habebunt sua Ze-
nith sita in circulo ZFNL. Sit itaque Zenith ali-
cujus obſervatoris in Z, erit illius meridiani pars
PZ = Compl. Elevationis Poli; Bisecetur angulus
horarius SPS arcu circuli maximi PN & sit L in-
tersectio circuli ZFNL cum æquatore, junctisque
PL, LS,

PL, LS, LG, NS, NG arcubus circulorum maximorum, erit PL = 90° , $\frac{PS + PS}{2}$ = complemento Declinationis pro momento inter observationes medio fere (Cfr. §. V.) = D, $\frac{PS - PS}{2}$ = dimidiæ variationi Declinat. Solis inter easdem = δ , SPN = SPN = H & ZPN = ang. Correctio-
nis = Y.

$$\text{Dicatur ang. LPN} = \frac{LPS - LG}{2} = \alpha \text{ & ZPL} \beta.$$

Quoniam PL = 90° & LS = LG, erit (§. X. Lem. I.) $\cos LS = \cos LG = \cos LPS$. $\sin PS = \cos LPS$. $\sin PS$, unde $\cos LPS : \cos LPS :: \sin LS : \sin PS$, ideoque $\frac{\cos LPS - \cos LPS}{\cos LPS + \cos LPS} = \frac{\sin PS - \sin PS}{\sin PS + \sin PS}$

Sed $\frac{\cos LPS - \cos LPS}{\cos LPS + \cos LPS}$ (<§. X. Lem. III.) = Tang $(\frac{LPS + LPS}{2}) \times \tan(\frac{LPS - LPS}{2}) = \tan H \times \tan$
 $\alpha \text{ & } \frac{\sin PS - \sin PS}{\sin PS + \sin PS}$ (<§. X. Lem. II.) = Cor $(\frac{PS + PS}{2})$
 $\tan. (\frac{PS - PS}{2}) = \cot D \cdot \tan \delta$, ideoque \tan

$$\alpha = \cot D \cdot \tan. \delta \cdot \cot H.$$

Sed in triangulis SPN, SPN est (§. II. & IV.)

**) & (**

$$\begin{aligned}
 (\cos P\bar{S} - \cos PS) \cos PN &= (\sin PS - \sin P\bar{S}) \\
 \sin PN, \cos H \text{ sive } \cot PN &\equiv \cos H. \quad (\sin PS - \sin P\bar{S}) \\
 &\equiv \cos H. \cot D. \quad (\S. X. \text{ Lem. IV.})
 \end{aligned}$$

Ex triangulis ZPL, NPL vero habetur

$$\begin{aligned}
 \sin ZPL : \tan ZLP &:: 1 : \tan PZ \\
 \tan ZLP : \sin NPL &:: \tan PN : 1, \text{ quare ex aequo} \\
 \sin ZPL : \sin NPL &:: \tan PN : \tan PZ \& \text{ denique sin} \\
 ZPL &= \sin \mathfrak{B} = \frac{\sin NPL \cot PZ}{\cot PN} = \frac{\sin \mathfrak{A} \cot PZ \tan D}{\cos H}
 \end{aligned}$$

si valor $\cot PN = \cos H. \cot D$ antea inventus substituitur. Inventis \mathfrak{A} & \mathfrak{B} , ang. Y quoque inventur, nam in *Casu I.* declinante nimirum versus Polum elevatum Sole, est $Y = \mathfrak{B} - \mathfrak{A}$ ($\S. IV.$) & in *Casu II.* sive quando Sol versus Polum infra horizontem depresso fertur, est $D > 90^\circ$, adeoque etiam $PN > 90^\circ$, quare L cadet inter N & Z & $Y = \mathfrak{B} + \mathfrak{A}$, adeoque pro utroque *Casu* $Y = \mathfrak{B} \mp \mathfrak{A}$, plane ut habet Reg. 2. ($\S. V.$)

Coroll. I. Quoniam $\tan \mathfrak{A} = \frac{\sin \mathfrak{A}}{\cos \mathfrak{A}} = \tan \delta$

$\delta. \cot D. \cot H$, erit $\sin \mathfrak{A} = \frac{\tan \delta. \cos \mathfrak{A}. \cot D}{\tan H}$

qui valor in valore ipsius $\sin \mathfrak{B}$ antea invento substitutus dat $\sin \mathfrak{B} = \frac{\cot PZ. \cos \mathfrak{A}. \tan \delta}{\sin H}$ quæ formula etiam Regulam nostram secundam facilitate præceos superat, propterea quod illam non ingrediatur

E A

atur tang D, & præterea cos A nunquam fere sensibiliter differat a radio.

Coroll. 2. Sub æquatore puncta L & Z coincidunt vel Y = A, unde tang Y = tang d. cot D. cot H.

Coroll. 3. In æquinoctiis D = 90°, adeoque A = 0, unde ex formula Coroll. I. allata deducitur sin Y = cot PZ. tang d.

sin H.

§. XII. Fig. 2.

Dum Sol in signis ascendentibus versatur, ex solstitio nimirum hiemali ad æstivum, pervenit tardius post meridiem ad illam altitudinem, in qua ante meridiem fuit observatus, eamque ob causam *Correctione* tum erit *subtrahenda*. Sed in signis descendentibus, ubi quippe Sol a Polo elevato sensim recedit, momentum temporis inter observata medium utique cadet ante meridiem, qui itaque *Correctionis Additione* determinatur. Et hæc quidem regula in *Casu II.* semper obtinet; sed in *Casu I.* tum solum quando cot PZ est major quam cos H. cot D = cot PN, sive PZ < PN, quia N tum cadet inter Z & L & Y = B - A. Si vero PZ > PN, loco A + Y = B erit A - Y = B, sive -Y = B - A, quod docet correctionem \mp Y mutasse signum in \pm Y. Nulla tamen difficultas circa usum Tabularum

larum sequentium inde est metuenda; nam in hoc casu $B > A$, adeoque $Y = B - A$ dat valorem ipsius Y negativum, unde mox patet, correctionem fore additivam, si alias subtractiva fuisset & vicissim. Si itaque ambæ correctionis partes, secundum signa in columna prima notata, jungantur, signum resultati sive integræ correctionis \mp docebit, an addenda vel subtrahenda sit.

Obs. Si in *Casu I.* $H > 90^\circ$, (quod tamen ob refractionem, in tanta horizontis vicinia satis sensibilem, simulque perpetuo variantem, nūquam fieri solet) foret cot H negata & loco $Y = B - A$ foret $Y = B + A$.

§. XIII.

Quum in ea opinione antea fuissemus, quod nostra methodus in certis saltē casibus daret correctionem notabiliter diversam ab usitata, tabulas generales, quæ vulgatis exactiores essent, condere animus erat. Pluribus vero exemplis pro utroque *Casu* calculatis, rigorem methodi receptæ tantum deprehendimus, ut ne quidem in centesimis minutis secundi partibus, saltim si de Sole ejusque transitu diurno per meridianum quæstio sit, a nostra discrepet. Hinc propositum ita mutavimus, ut formu-

lam EULERIANAM $Y = \delta \left(\frac{\cot PZ}{\sin H} \mp \frac{\tan \text{Declin.} \odot}{\tan H} \right)$ utpote in praxi magis commodam adhiberemus, secundum

* * D o C * *

cundum quam, pro singulis quinis gradibus Longitudinis Solis, correctionem Meridiei, ab unius horæ & quadraginta minutorum dimidio inter observationes intervallo, ad quinque horarum dimidiā distantiā inter easdem, pro singulis vicenis minutis primi temporis, calculavimus. Constitutio Tabularum nostrarum eadem præterea est ac illarum, quæ apud Cel. DE LA LANDE Astron. Tom. I pag. 279 & 280 & Connois. des Temps pour l'année 1769 pag. 95 & 96 reperiuntur, nec ab illis in ulla re differunt, quam quod nostræ duplo sint frequentiores, & ad longius inter momenta observationum intervallum extensæ sint. Tabulæ A constituuntur his quantitatibus
 δ cot D. cot H., B vero $\frac{\delta}{15}$ in H, quæ itaque du-

$\frac{15}{15}$ cenda est in tangentem latitudinis loci, antequam usui applicari potest. Præterea usus harum Tabularum admodum expeditus est; nam ad datum locum Solis in longitudine, invenitur respondens correctio in Tabulis, quo denique signo notanda sit, illud columna prima ostendit. Tabula B est subtrahetiva in signis X. XI. XII. I. II. III. & additiva in reliquis, prout §. XII. docet, si latitudo loci fuerit borealis, si australis vero, signa hujus Tabulæ mutanda sunt in contrarium. Sed A = $\frac{\delta}{15}$ cot D. cot H.

per integrum Casum I. præterea signo \leftarrow & per Cas. II. signo \rightarrow afficitur, quorum concursu cum signis totius correctionis (§. XII.) fit additiva in prima & tertia quadrante, sive tempore vernali & autuminali,

mnali, sed in secunda & quarta, & state scilicet & hie me, subtractiva.

Exemplum. Aboæ, cuius latitudo $60^{\circ} 27' 13''$, sumtæ sint correspondentes altitudines Solis die 24 Aprilis hujus anni, h. $8\frac{1}{2}$ a. m. & $3\frac{1}{2}$ p. m., Circa meridiem illius diei erat Sol in $1^{\circ} 4^{\circ} 33'$, contra quam longitudinem in Tab. A respondet $+ 2'', 04$, & in Tab. B $- 14'', 42$, quæ ducta in tang $60^{\circ} 27' 13'' = 1764$, vel quod idem est, log. $14'', 42 + \log. \text{tang. lat. loci} = 1. 1589 + 10. 2465 = 1. 4054 = \log. 25'', 44$, unde tota correctio $= - 23'', 4$, signo minus notata, quæ proinde a momento medio subtrahenda est.

§. XIV. Fig. 3.

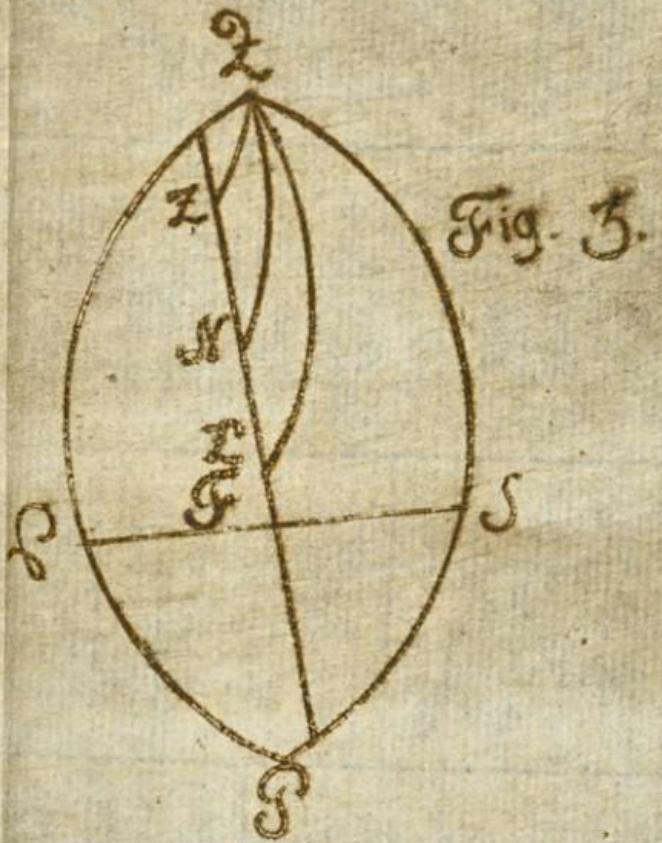
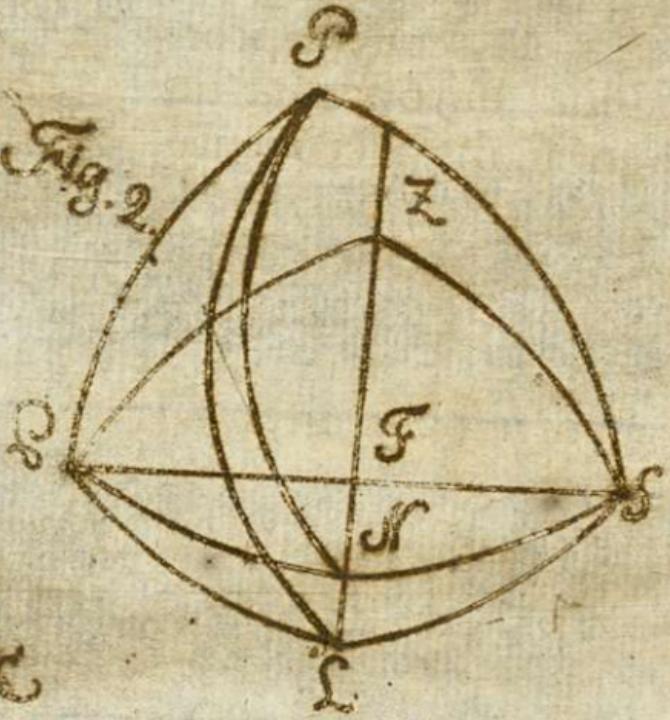
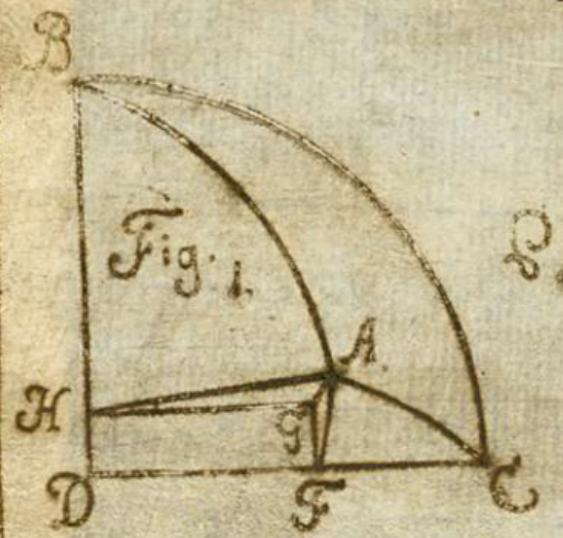
Si ille transitus Solis per meridianum, qui media nocte peragitur, desideraretur, ille, sumtis correspondentibus altitudinibus, pomeridiana præcedentis diei & antemeridiana sequentis, eadem formula $Y = B - A$ corrigitur, ea tamen mutatione, quod $Z - Y$ accipiat signa contraria \pm , hoc est, si at additiva in signis ascendentibus & subtractiva in descendenteribus. Si enim Sphæra concipiatur conversa, ut Q sit Polus infra horizontem depresso, Z Nadir, S & G loca Solis correspondentia, inter quæ angulus horarius SQS & eadem præterea retineatur constructio ac §. XI erit ZQN $= Y$, NQL $= A$ & ZQL $= B$. Demonstratur vero nunc eodem

endem prorsus modo, ac antea, quod cot QN = cot $\left(\frac{QS + QS}{2}\right) \times \cos H$; sed quia H nunc perumque major 90° (*), erit illius cosinus etiam negativus. Sed in *Casu I.* est $\frac{QS + QS}{2}$ etiam $> 90^\circ$, adeoque illius Cotangens negativa, unde concurrentibus duobus signis negativis sit Cot QN positiva sive QN $< 90^\circ$; habitur itaque punctum N inter L & Z, quoties QZ $<$ QN & Y = $\mathfrak{B} - \mathfrak{A}$. Eodem modo ostenditur, quod in *Casu II.* sit Y = $\mathfrak{B} + \mathfrak{A}$; adeoque pro utroque *Casu* Y = $\mathfrak{B} \mp \mathfrak{A}$, eodem prorsus modo, ac quando de transitu diurno quæstio habetur. Correctionem vero in signis ascendentibus esse addendam & in descendentibus subtrahendam, vel exinde patet, quod Sol eo ipso recedat a Polo Q, quo ad P accedit & vicissim. (Cfr. §. XII.)

Exempl. Sint Aboæ sumtæ correspondentes altitudines Solis die 23 Aprilis hujus anni h. 2. p. m. & h. 10. a. m. die sequenti, erunt compl. QZ = $60^\circ 27' 13''$, $\frac{QS + QS}{2} = D = 102^\circ 53' 15''$, H = 150° & $\delta = 8' 13'' 29$ eritque

log.

(*) Quoties H $< 90^\circ$, loco Y = $\mathfrak{B} \mp \mathfrak{A}$ semper accipiendum est Y = $\mathfrak{B} \pm \mathfrak{A}$. (Cfr. Obs. ad §. XII.)



log. tang. δ = 7. 3786785. log. tang. δ = 7. 3786785.
 log. cot D = 9. 3594590. log. cot. PZ = 10. 2465379.
 log. cot H = 10. 2385606. log. cos A = 9. 9999998.
 log. sin A = 6. 9766981. 7. 6252162.
 log. Const. = 4. 1383338. log. sin H = 9. 6989700. subtri
 log. N = 1. 1150319. log. sin. B = 7. 9262462.

N = 13, 033 B = 29', 0'', 50982,
 unde M = 1', 56'', 034. adeoque ipsa Correctio M =
 N = 1', 43'' temporis, additiva.



TAB. A.

Dimidium intervallum inter observations.

Longit.	○.	1. h 40'	2. h	2. h 20'	2. h 40'	3. h	3. h 20'	4. h 40''	4. h	4. h 20'	4. h 40'	5. h
O.s.	0°,	0'',00	0'',00	0'',00	0'',00	0'',00	0'',00	0'',00	0'',00	0'',00	0'',00	0'',00
	5.	0, 50	0, 47	0, 45	0, 43	0, 41	0, 38	0, 35	0, 31	0, 27	0, 23	0, 18
	10.	0, 96	0, 93	0, 89	0, 85	0, 81	0, 75	0, 69	0, 62	0, 54	0, 46	0, 36
Add.	15.	1, 41	1, 36	1, 31	1, 25	1, 18	1, 10	1, 01	0, 91	0, 80	0, 67	0, 53
	20.	1, 82	1, 76	1, 70	1, 62	1, 52	1, 42	1, 31	1, 18	1, 03	0, 86	0, 67
	25.	2, 19	2, 11	2, 03	1, 94	1, 83	1, 71	1, 56	1, 41	1, 24	1, 04	0, 82
I.s.	0.	2, 49	2, 41	2, 32	2, 21	2, 09	1, 94	1, 79	1, 61	1, 41	1, 18	0, 93
	5.	2, 73	2, 64	2, 54	2, 43	2, 29	2, 14	1, 96	1, 76	1, 54	1, 30	1, 02
	10.	2, 90	2, 81	2, 70	2, 57	2, 43	2, 27	2, 08	1, 87	1, 64	1, 38	1, 09
Add.	15.	2, 97	2, 88	2, 77	2, 65	2, 50	2, 33	2, 14	1, 92	1, 68	1, 41	1, 12
	20.	2, 97	2, 88	2, 77	2, 65	2, 50	2, 33	2, 14	1, 92	1, 68	1, 41	1, 12
	25.	2, 86	2, 78	2, 67	2, 55	2, 40	2, 24	2, 06	1, 86	1, 62	1, 36	1, 07
II.s.	0.	2, 67	2, 59	2, 49	2, 38	2, 24	2, 09	1, 92	1, 73	1, 51	1, 27	1, 00
	5.	2, 40	2, 32	2, 24	2, 13	2, 01	1, 88	1, 72	1, 55	1, 36	1, 14	0, 90
	10.	2, 02	1, 96	1, 88	1, 80	1, 70	1, 58	1, 45	1, 30	1, 14	0, 96	0, 76
Add.	15.	1, 59	1, 54	1, 45	1, 42	1, 34	1, 25	1, 14	1, 03	0, 90	0, 76	0, 60
	20.	1, 09	1, 05	1, 01	0, 97	0, 91	0, 85	0, 78	0, 70	0, 61	0, 52	0, 41
	25.	0, 56	0, 54	0, 52	0, 50	0, 47	0, 44	0, 40	0, 36	0, 32	0, 27	0, 21
III.s.	0.	0, 00	0, 00	0, 00	0, 00	0, 00	0, 00	0, 00	0, 00	0, 00	0, 00	0, 00
	5.	0, 56	0, 54	0, 52	0, 50	0, 47	0, 44	0, 40	0, 36	0, 32	0, 27	0, 21
	10.	1, 09	1, 06	1, 02	0, 97	0, 92	0, 85	0, 78	0, 71	0, 62	0, 52	0, 41
Subtr.	15.	1, 59	1, 54	1, 49	1, 42	1, 34	1, 25	1, 14	1, 03	0, 90	0, 76	0, 60
	20.	2, 02	1, 96	1, 88	1, 80	1, 70	1, 58	1, 45	1, 31	1, 14	0, 96	0, 76
	25.	2, 38	2, 31	2, 22	2, 12	2, 00	1, 86	1, 71	1, 54	1, 35	1, 13	0, 89
IV.s.	0.	2, 66	2, 58	2, 48	2, 36	2, 23	2, 08	1, 91	1, 72	1, 50	1, 26	1, 00
	5.	2, 85	2, 76	2, 66	2, 53	2, 39	2, 23	2, 05	1, 84	1, 61	1, 35	1, 07
	10.	2, 95	2, 86	2, 75	2, 62	2, 47	2, 31	2, 12	1, 90	1, 67	1, 40	1, 11
Subtr.	15.	2, 95	2, 86	2, 75	2, 63	2, 48	2, 31	2, 12	1, 91	1, 67	1, 40	1, 11
	20.	2, 87	2, 78	2, 68	2, 55	2, 41	2, 25	2, 06	1, 85	1, 62	1, 36	1, 08
	25.	2, 70	2, 62	2, 52	2, 40	2, 27	2, 12	1, 94	1, 75	1, 53	1, 28	1, 01
V.s.	0.	2, 47	2, 39	2, 30	2, 19	2, 07	1, 93	1, 77	1, 59	1, 39	1, 17	0, 92
	5.	2, 16	2, 10	2, 02	1, 92	1, 81	1, 69	1, 55	1, 40	1, 22	1, 03	0, 81
	10.	1, 80	1, 75	1, 68	1, 60	1, 51	1, 41	1, 29	1, 16	1, 02	0, 86	0, 67
Subtr.	15.	1, 39	1, 35	1, 30	1, 24	1, 17	1, 09	1, 00	0, 90	0, 79	0, 66	0, 52
	20.	0, 95	0, 92	0, 89	0, 84	0, 80	0, 74	0, 68	0, 61	0, 54	0, 45	0, 36
	25.	0, 48	0, 47	0, 45	0, 43	0, 40	0, 38	0, 35	0, 31	0, 27	0, 23	0, 18

TAB. A.

Dimidium intervallum inter observations.

Longit.	○.	1.h 40'	2.h	2.h 20'	2.h 40'	3.h	3.h 20'	3.h 40'	4.h	4.h 20'	4.h 40'	5.h
VI. ^s	○.	0'',00	0'',00	0'',00	0'',00	0'',00	0'',00	0'',00	0'',00	0'',00	0'',00	0'',00
	5.	0, 48	0, 47	0, 45	0, 43	0, 41	0, 38	0, 35	0, 31	0, 27	0, 23	0, 18
	10.	0, 96	0, 93	0, 89	0, 85	0, 81	0, 75	0, 69	0, 62	0, 54	0, 46	0, 36
Add.	15.	1, 42	1, 37	1, 32	1, 26	1, 19	1, 11	1, 02	0, 91	0, 80	0, 67	0, 53
	20.	1, 84	1, 78	1, 72	1, 64	1, 55	1, 44	1, 32	1, 19	1, 04	0, 88	0, 69
	25.	2, 22	2, 15	2, 07	1, 97	1, 86	1, 74	1, 59	1, 43	1, 23	1, 05	0, 83
VII. ^s	○.	2, 55	2, 47	2, 37	2, 26	2, 14	1, 99	1, 83	1, 65	1, 44	1, 21	0, 95
	5.	2, 81	2, 72	2, 62	2, 50	2, 36	2, 20	2, 02	1, 81	1, 59	1, 33	1, 05
	10.	2, 99	2, 90	2, 79	2, 66	2, 51	2, 34	2, 15	1, 93	1, 69	1, 42	1, 12
Add.	15.	3, 09	3, 00	2, 88	2, 75	2, 60	2, 42	2, 22	2, 00	1, 75	1, 47	1, 16
	20.	3, 10	3, 01	2, 89	2, 76	2, 60	2, 43	2, 23	2, 00	1, 75	1, 47	1, 16
	25.	3, 01	2, 92	2, 81	2, 68	2, 53	2, 35	2, 16	1, 94	1, 70	1, 43	1, 13
VIII. ^s	○.	2, 82	2, 73	2, 63	2, 51	2, 37	2, 21	2, 02	1, 82	1, 59	1, 34	1, 07
	5.	2, 53	2, 45	2, 35	2, 25	2, 12	1, 98	1, 81	1, 63	1, 43	1, 20	0, 95
	10.	2, 15	2, 08	2, 00	1, 91	1, 80	1, 68	1, 54	1, 39	1, 22	1, 02	0, 81
Add.	15.	1, 69	1, 64	1, 58	1, 50	1, 42	1, 32	1, 21	1, 09	0, 96	0, 80	0, 63
	20.	1, 17	1, 13	1, 09	1, 04	0, 98	0, 91	0, 84	0, 75	0, 66	0, 55	0, 44
	25.	0, 59	0, 58	0, 55	0, 53	0, 50	0, 47	0, 43	0, 38	0, 34	0, 28	0, 22
IX. ^s	○.	0, 00	0, 00	0, 00	0, 00	0, 00	0, 00	0, 00	0, 00	0, 00	0, 00	0, 00
	5.	0, 60	0, 58	0, 56	0, 53	0, 50	0, 47	0, 43	0, 38	0, 34	0, 28	0, 22
	10.	1, 17	1, 13	1, 09	1, 04	0, 98	0, 91	0, 84	0, 75	0, 66	0, 56	0, 44
Subtr.	15.	1, 70	1, 64	1, 58	1, 51	1, 42	1, 33	1, 22	1, 10	0, 96	0, 81	0, 64
	20.	2, 16	2, 09	2, 01	1, 92	1, 81	1, 69	1, 55	1, 39	1, 22	1, 03	0, 81
	25.	2, 54	2, 47	2, 37	2, 26	2, 14	1, 99	1, 83	1, 64	1, 44	1, 21	0, 95
X. ^s	○.	2, 84	2, 75	2, 64	2, 52	2, 38	2, 22	2, 04	1, 83	1, 60	1, 35	1, 06
	5.	3, 03	2, 94	2, 83	2, 69	2, 54	2, 37	2, 18	1, 96	1, 71	1, 44	1, 14
	10.	3, 13	3, 03	2, 91	2, 78	2, 62	2, 45	2, 24	2, 02	1, 78	1, 49	1, 17
Subtr.	15.	3, 12	3, 02	2, 91	2, 77	2, 62	2, 44	2, 24	2, 02	1, 77	1, 48	1, 17
	20.	3, 02	2, 93	2, 82	2, 69	2, 54	2, 36	2, 17	1, 95	1, 71	1, 44	1, 13
	25.	2, 84	2, 75	2, 64	2, 52	2, 38	2, 22	2, 04	1, 83	1, 60	1, 35	1, 06
XI. ^s	○.	2, 57	2, 49	2, 40	2, 29	2, 16	2, 01	1, 85	1, 66	1, 46	1, 22	0, 96
	5.	2, 24	2, 17	2, 09	2, 00	1, 88	1, 76	1, 61	1, 45	1, 27	1, 09	0, 84
	10.	1, 86	1, 80	1, 73	1, 65	1, 56	1, 46	1, 34	1, 20	1, 05	0, 88	0, 70
Subtr.	15.	1, 43	1, 39	1, 33	1, 27	1, 20	1, 12	1, 05	0, 92	0, 81	0, 68	0, 54
	20.	0, 97	0, 94	0, 90	0, 86	0, 81	0, 76	0, 70	0, 63	0, 55	0, 46	0, 36
	25.	0, 49	0, 47	0, 46	0, 44	0, 41	0, 38	0, 35	0, 32	0, 28	0, 23	0, 18

T A B A B.

Dimidium intervallum inter observationes.

Longit. ◎.	1. h 40'	2. h	2. h 20'	2. h 40'	3. h	3. h 20'	3. h 40''	4. h	4. h 20'	4. h 40'	5. h
O.s.	0° 15'', 55	15'', 78	16'', 05	16'', 36	16'', 74	17'', 16	17'', 66	18'', 22	18'', 86	19'', 59	20'', 42
5.	15, 46	15, 68	15, 95	16, 26	16, 63	17, 06	17, 55	18, 11	18, 74	19, 47	20, 32
10.	15, 27	15, 49	15, 75	16, 07	16, 43	16, 85	17, 33	17, 89	18, 52	19, 23	20, 05
Subtr.	15. 14, 98	15. 19	15. 45	15. 76	16. 11	16. 53	17. 00	17. 54	18. 16	18. 86	19. 66
20.	14, 58	14, 79	15, 04	15, 34	15, 69	16, 09	16, 55	17, 08	17, 68	18, 37	19, 14
25.	14, 13	14, 30	14, 54	14, 83	15, 17	15, 55	16, 00	16, 51	17, 09	17, 76	18, 51
I.s.	0. 13, 51	13, 72	13, 94	14, 22	14, 54	14, 91	15, 34	15, 83	16, 38	17, 02	17, 74
5.	12, 83	13, 01	13, 23	13, 49	13, 80	14, 15	14, 56	15, 02	15, 55	16, 16	16, 57
10.	12, 06	12, 23	12, 44	12, 69	12, 98	13, 34	13, 69	14, 12	14, 62	15, 18	15, 83
Subtr.	15. 11, 19	11, 34	11, 56	11, 77	12, 03	12, 31	12, 69	13, 10	13, 56	14, 08	14, 68
20.	10, 22	10, 37	10, 54	10, 75	11, 00	11, 28	11, 60	11, 97	12, 39	12, 87	13, 42
25.	9, 17	9, 29	9, 45	9, 63	9, 85	10, 11	10, 40	10, 73	11, 10	11, 53	12, 02
II.s	0. 8, 03	8, 14	8, 28	8, 45	8, 64	8, 86	9, 11	9, 40	9, 74	10, 11	10, 54
5.	6, 82	6, 92	7, 04	7, 17	7, 34	7, 53	7, 74	7, 99	8, 27	8, 59	8, 95
10.	5, 55	5, 62	5, 72	5, 83	5, 97	6, 12	6, 29	6, 49	6, 72	6, 98	7, 28
Subtr.	15. 4, 21	4, 27	4, 34	4, 43	4, 53	4, 65	4, 78	4, 93	5, 11	5, 30	5, 53
20.	2, 83	2, 87	2, 92	2, 98	3, 05	3, 12	3, 21	3, 31	3, 43	3, 57	3, 72
25.	1, 42	1, 44	1, 47	1, 50	1, 53	1, 57	1, 62	1, 67	1, 73	1, 79	1, 87
III.s	0. 00	0, 00	0, 00	0, 00	0, 00	0, 00	0, 00	0, 00	0, 00	0, 00	0, 00
5.	1, 42	1, 44	1, 47	1, 50	1, 53	1, 57	1, 62	1, 67	1, 73	1, 79	1, 87
10.	2, 83	2, 87	2, 92	2, 97	3, 04	3, 12	3, 21	3, 31	3, 43	3, 56	3, 71
Add.	15. 4, 20	4, 26	4, 33	4, 42	4, 52	4, 63	4, 77	4, 92	5, 09	5, 29	5, 52
20.	5, 52	5, 60	5, 70	5, 81	5, 94	6, 09	6, 27	6, 47	6, 69	6, 95	7, 25
25.	6, 79	6, 89	7, 01	7, 15	7, 31	7, 49	7, 71	7, 95	8, 23	8, 55	8, 92
IV.s	0. 7, 99	8, 10	8, 24	8, 40	8, 59	8, 81	9, 06	9, 35	9, 68	10, 06	10, 48
5.	9, 11	9, 24	9, 40	9, 59	9, 80	10, 06	10, 35	10, 68	11, 05	11, 48	11, 96
10.	10, 15	10, 29	10, 47	10, 67	10, 91	11, 19	11, 51	11, 88	12, 30	12, 78	13, 32
Add.	15. 11, 09	11, 25	11, 44	11, 67	11, 93	12, 24	12, 59	12, 99	13, 45	13, 97	14, 36
20.	11, 96	12, 13	12, 33	12, 58	12, 86	13, 19	13, 57	14, 00	14, 50	15, 06	15, 70
25.	12, 71	12, 90	13, 12	13, 38	13, 68	14, 03	14, 43	14, 89	15, 42	16, 01	16, 69
V.s.	0. 13, 40	13, 59	13, 82	14, 10	14, 41	14, 78	15, 21	15, 69	16, 24	16, 87	17, 58
5.	13, 97	14, 17	14, 41	14, 70	15, 03	15, 42	15, 86	16, 37	16, 94	17, 60	18, 34
10.	14, 45	14, 66	14, 91	15, 20	15, 55	15, 94	16, 40	16, 92	17, 52	18, 20	18, 97
Add.	15. 14, 83	15, 04	15, 29	15, 60	15, 95	16, 36	16, 83	17, 37	17, 98	18, 67	19, 46
20.	15, 12	15, 33	15, 60	15, 90	16, 26	16, 68	17, 16	17, 70	18, 33	19, 03	19, 84
25.	15, 31	15, 52	15, 79	16, 10	16, 47	16, 89	17, 37	17, 93	18, 56	19, 27	20, 09

TAB. B.

Dimidium intervallum inter observationes.

Longit.	○.	1.h 40'	2.h 20'	2.h 40'	3.h	3.h 20'	3.h 40'	4.h	4.h 20'	4.h 40'	5.h
VI.s	○.	15'', 40	15'', 62	15'', 89	16'', 20	16'', 57	16'', 95	17'', 48	18, 04	18'', 67	19'', 40
	5.	15, 40	15, 62	15, 88	16, 20	16, 56	16, 99	17, 48	18, 03	18, 67	19, 39
	10.	15, 29	15, 51	15, 77	16, 08	16, 45	16, 87	17, 35	17, 91	18, 54	19, 25
Add.	15.	15, 09	15, 31	15, 57	15, 87	16, 23	16, 60	17, 13	17, 67	18, 30	19, 00
	20.	14, 78	14, 99	15, 25	15, 55	15, 90	16, 31	16, 78	17, 31	17, 92	18, 61
	25.	14, 37	14, 58	14, 82	15, 12	15, 46	15, 86	16, 31	16, 83	17, 42	18, 10
VII.s	○.	13, 84	14, 05	14, 29	14, 57	14, 90	15, 28	15, 72	16, 22	16, 79	17, 44
	5.	13, 22	13, 41	13, 63	13, 90	14, 22	14, 58	15, 00	15, 48	16, 02	16, 64
	10.	12, 48	12, 66	12, 87	13, 13	13, 43	13, 77	14, 16	14, 62	15, 13	15, 72
Add.	15.	11, 64	11, 80	12, 00	12, 24	12, 52	12, 84	13, 21	13, 63	14, 10	14, 65
	20.	10, 68	10, 83	11, 02	11, 24	11, 49	11, 79	12, 12	12, 51	12, 95	13, 45
	25.	9, 62	9, 46	9, 92	10, 12	10, 35	10, 61	10, 92	11, 27	11, 66	12, 11
VIII.s	○.	8, 46	8, 58	8, 73	8, 90	9, 10	9, 34	9, 61	9, 91	10, 03	10, 66
	5.	7, 21	7, 32	7, 44	7, 59	7, 76	7, 96	8, 19	8, 45	8, 75	9, 08
	10.	5, 88	5, 96	6, 06	6, 18	6, 32	6, 49	6, 67	6, 89	7, 13	7, 40
Add.	15.	4, 48	4, 54	4, 62	4, 71	4, 82	4, 94	5, 08	5, 24	5, 43	5, 64
	20.	3, 02	3, 06	3, 11	3, 17	3, 24	3, 33	3, 42	3, 53	3, 66	3, 80
	25.	1, 52	1, 54	1, 57	1, 60	1, 63	1, 68	1, 72	1, 78	1, 84	1, 91
IX.s	○.	0, 00	0, 00	0, 00	0, 00	0, 00	0, 00	0, 00	0, 00	0, 00	0, 00
	5.	1, 52	1, 54	1, 57	1, 60	1, 64	1, 68	1, 73	1, 78	1, 84	1, 92
	10.	3, 02	3, 08	3, 12	3, 18	3, 25	3, 34	3, 43	3, 54	3, 67	3, 81
Subtr.	15.	4, 49	4, 56	4, 63	4, 72	4, 83	4, 96	5, 10	5, 26	5, 45	5, 66
	20.	5, 90	5, 99	6, 07	6, 21	6, 35	6, 51	6, 70	6, 91	7, 16	7, 43
	25.	7, 25	7, 36	7, 48	7, 63	7, 80	8, 00	8, 23	8, 49	8, 79	9, 13
X.s	○.	8, 51	8, 63	8, 78	8, 95	9, 15	9, 39	9, 66	9, 97	10, 32	10, 72
	5.	9, 68	9, 82	9, 98	10, 18	10, 41	10, 68	10, 99	11, 34	11, 74	12, 19
	10.	10, 75	10, 91	11, 09	11, 31	11, 57	11, 87	12, 21	12, 60	13, 04	13, 54
Subtr.	15.	11, 72	11, 89	12, 09	12, 33	12, 61	12, 94	13, 31	13, 73	14, 22	14, 77
	20.	12, 59	12, 77	12, 98	13, 24	13, 54	13, 89	14, 29	14, 74	15, 26	15, 85
	25.	13, 38	13, 53	13, 76	14, 03	14, 35	14, 72	15, 14	15, 62	16, 17	16, 80
XI.s	○.	13, 98	14, 18	14, 42	14, 70	15, 04	15, 42	15, 86	16, 37	16, 95	17, 60
	5.	14, 50	14, 71	14, 96	15, 26	15, 60	16, 00	16, 46	16, 98	17, 58	18, 26
	10.	14, 93	15, 14	15, 40	15, 70	16, 06	16, 47	16, 94	17, 48	18, 10	18, 80
Subtr.	15.	15, 24	15, 46	15, 72	16, 03	16, 40	16, 82	17, 30	17, 85	18, 48	19, 19
	20.	15, 46	15, 68	15, 95	16, 26	16, 63	17, 06	17, 55	18, 11	18, 74	19, 47
	25.	15, 56	15, 78	16, 05	16, 37	16, 74	17, 17	17, 66	18, 22	18, 86	19, 59