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Observatory Apr 30 1896

Dear Prof. Rogers

I send the results for 1900 of the 30 S.P. Fundamental Stars. For comparison with the positions by Bohnenbergers Method I have put in the positions by Fabritius' Method, for 1° & 2° from South Pole Vol xviii X places and for the rest Dr Goulds places either A.G.C. or Cordoba Vol V as indicated. The Ephemerides of the 539 stars for 1879 cannot be found in the Observatory. Mr Winkley will send a few time blanks today and more later as the supply has given out.

Have you found any solution yet of the difficulty between the tabular and computed values of $z' - z_0^2 + i \sin \delta$? I should like to settle it before I compute the rectangular coordinates for 1900.

Sincerely yours
Anna Winlock

20
1°

Result 30 South Polar Fundamentals

R.A. 1900 Decl 1900

Gill 1885 3 22h 2 12m 30.087s −88° 10 55' 8.07" } [illegible]
U.S.F. 2 = A.G.C. 222 (23)* 28.680 (32) 8.39
H.C.O. Ann. XVIII X (39 obs) 28.9 μ+μ' included 8.6 Fabritius

Gill 1885 15 22 3 3 54.175 −88 10 34 20.31
A.G.C. 3715 9 (30) 53.514 9 20.44
H.C.O. Ann. XVIII X (18 obs) 54.4 20.2 Fabritius

Gill 1885 55 18 12 14 0.212 −89 14 15 1.20
A.G.C. 17241 13 1.971 13 0.77
H.C.O. Ann. XVIII X (22 obs) 1.0 0.7 Fabritius

Gill 1885 63 14 14 13 52.086 −88 19 55 14.11 6
A.G.C. 19098 4 (?) 57.629 4 14.56
H.C.O. Ann. XVIII X (20 obs) 54.6 14.0 Fabritius

Gill 1885 82 41 18 59 42.106 −89 28 15 16.09
U.S.F. [illegible] A.G.C. 25049 (29) 41.845 (34) 16.39
H.C.O. Ann. XVIII X (48 obs) 46.1 μ + μ' included 16.9 Fabritius

Gill 1885 91 39 21 37 38.253 −89 20 19 2.63
U.S.F. 49 = A.G.C. 29042 (31) 39.317 (31) 2.04
H.C.O. Ann. XVIII X (45 obs) 38.5 μ+μ' included 3.1 Fabritius.
* bracketed "no of obs" indicates no of authorities

Results

R.A. 1900 Decl. 1900

Gill 31 7h 5m 59s 12.886 −88° 32' 45.0" 35.00 Bohnenberger
A.G.C. 15.8097 48.24
Vol XVIII x (5 pl) 2.9 not in S.P. Cat. 35.1 [illegible]

Gill 37 18 7 53 1.875 −88 8 34 26.59 B
A.G.C. 11013 10 1.890 10 25.48
Vol XVIII x (30) 3.3 p.pl. included 27.248 [illegible]

not in Gill 22 1.592 −88 522 10.44 B
A.G.C. 15761 11 4 Sts 13 1.48.838 −88 (4) 41 1.3609
Vol XVIII x (14) 49.8 11.36.3 3

not in Gill 6 3.5 −88 17 4.99 B
A.G.C. 21067 20 2 36 5.45.183 −88 3 9 10.28
Vol XVIII x (:) 5.347.3 10.81 7

Gill 898 23 35 13 59.465 −88 24 4.53.95 B
A.G.C. 31530 33 8.59.160 35 4.52.92
Vol XVIII x (53) 5.9.5 p.pl. included 56.2.7 J.F.

not in Gill 23 29 45.889 −86 595 5.59.29 B
A.G.C. 31675 12 3 23 15 58.371 5 8 3 −88 8 4.10.82
Vol XVIII X (2) 16 4.14.6 J.

3

Results

		R.A. 1900			Decl. 1900		
	h	m	s	°	′	″	
Gill 5	3	57	16.[illegible]4	−86	35	45.01	[illegible]
A.G.C. 38.. 5			15.85897	5		45.211	
S.P.Cat.=A.G.C. rejected on chart ∴ not in S.P. Cat.						27.04	[illegible]
Gill 23	17 4	29	7.802	−86 2	29	27.30	} [illegible]
A.G.C. 5292	4		7.178	4		29.3693	
S.P.Cat.=A.G.C.			7.26			27.701	[illegible]
Gill 35	21 7	22	1.592	−86 6	52	10.764	
Ukl. 17=A.G.C. 9770 (24)			1.463	(29)		10.478	
S.P.Cat.=Ukl. rejected on chart			1.35			11.45	J
Gill 76	16 4	6	3.502	−87 7	17	45.998	
A.G.C. 23027	5		5.294	5		45.910	
S.P.Cat.=A.G.C.			5.324			45.863	J
Gill 86	32 17	52	5.765	−87 6	39	49.277	
Ukl. 18 = A.G.C. 24176 (28)			8.890	(30)		47.783	
Ukl. [illegible] (40 Rs.)			5.7 [illegible]			51.480	J
Gill 100	13 12 23	29	45.889	−86 8	57	5.3229	
A.G.C. 31870	4		44.220	4		4.9625	
S.P.Cat.=A.G.C.			44.27			4.9525	J

4°

Results

		R.A. 1900			Decl 1900		
Gill 5	1208	0 39	40.284	−86 12	14	56.10	[illegible]
A.G.C. 700	5		38.897	5		56.11	"
S.P. Cat A.G.C.			38.90			57.04	[illegible]
Gill 32	20	6 6	9.783	−85 5	55	52.82	
A.G.C. 7601	13		9.803	14		53.93	
S.P. Cat A.G.C.			9.81			53.90	
Gill 47	18	10 45	55.425	−86	22	22.84	
A.G.C. 14883, 4 obs			56.083	4		22.98	
Not in S.P. Cat. rejected on chart.							
Gill 73	29	16 23	34.518	−86 18	10	42.68	
A.G.C. 22180	8		34.570	8		42.60	
S.P. Cat A.G.C.			34.56			42.63	
Gill 94	32	22 12	35.614	−86 16	28	34.97	
Vol V 51 = A.G.C. 30380	(28)		36.245	(31)		35.83	
S.P. Cat Vol V			36.23			35.80	
Gill 99	13	23 19	12.579	−86 8	15	33.29	
A.G.C. 31672	4		12.664	4		33.25	
S.P. Cat = A.G.C.			12.58			33.25	

Results 5°

			Rt 1900		Observatory	Decl 1900/1896	
Gill 8	2 obs	43	7.871	−85 20 do	16	29.36	Bohnenbg
Vol V 6 = A.G.C. 1870	(28)		7.464	(31)		30.57	"
S.P. Cat. Vol V			7.39			30.61	Fabritius
Gill 29	5 26	49	33.936	−84 16	50	8.14	
A.G.C. 7097	8		33.834	8		9.36	
S.P. Cat. A.G.C.			33.79			8.60	
Gill 41	9 38	11	15.907	−85 14	15	47.42	
Vol V 20 = A.G.C. 12688	(36)		16.821	(32)		46.98	
S.P. Cat. Vol V			17.73			47.97	
Gill 53	11 17	57	19.503	−85 12	4	29.65	
Vol V 27 = A.G.C. 16428	(28)		20.503	(31)		29.91	
not in S.P. Cat ~~rejected on chart~~							
Gill 59	13 34	27	43.992	−85 26	16	23.32	
Vol V 32 = A.G.C. 18321	(29)		44.457	(30)		24.10	
S.P. Cat. Vol V [illegible]			44.46			24.12	
Gill 78	17 14	29	59.999	85 15	10	27.72	
A.G.C. 23696	17 7	30	0.309	8		32.34	
S.P. Cat. A.G.C.			0.32			32.03	

Observatory, May 8th 1896

Dear Prof. Rogers,

I have checked G.Z.C. 19098 & 31575 and found no errors in the 1900 places.

I understand that you wanted Dr Gills places from Vol V reduced to 1900 without proper motion, so why should we include proper motions for Dr. Gills stars?" or do you want proper motions applied for Dr. Gills Vol V places? Why not apply the proper motions directly to the 1900 places?

Dr Gill says in the Introduction that no proper motions have been applied to either the General or Special Cat., but he gives the corrections [illegible] for the General Catalogue places in 1875. There are only 10 of over 30 stars for which proper motions are given, and they are so small that I do not think there will be any changes in the final places. I think it would be better to [illegible] the General Cat: places separate, since the others are done.

yours &c A. Winlock

10 Gill Stars having μ & μ'

Stars no	Epoch	μ	RA 1885.0	tμ	= RA 1885.0+tμ	
Gen'l Cat 44		+.012	0h 12m 45s.008	+.028	0h 12m 45s.036	
prox = 3	84.40		44.84	−.02	44.82	diff. [illegible] [illegible]
Gen'l Cat 893		−.088	12 36 12.115	−.156	12 36 11.959	
prox = 55	85.41		10.63	+.04	10.67	
Gen'l Cat 1304		+.646	18 13 30.140	+.611	18 13 30.751	
prox = 82	85.41		28.65	−.23	28.42	" "
Gen'l Cat 1456		−.130	21 18 42.332	−.316	21 18 42.016	
prox = 91	84.60		44.20	−.05	44.15	" "
Gen'l Cat 563		−.014	8 3 46.553	−.044	8 3 46.509	
prox = 37	85.06		46.17	+.01	46.18	
Gen'l Cat 1657		+.036	23 10 18.649	+.068	23 10 18.717	
prox = 98	84.68		18.83	+.01	18.84	
Gen'l Cat 1108		.000	16 18 17.297	.000	16 18 17.297	
prox = 73			17.08		17.08	
Gen'l Cat 1562		−.035	22 9 18.846	−.079	22 9 18.767	
prox = 94	84.34		18.76	−.01	18.75	
Gen'l Cat 645		−.080	9 13 11.067	−.212	9 13 10.855	
prox = 41	84.76		10.52	−.02	10.50	
Gen'l Cat 927		−.052	13 22 31.471	−.085	13 22 31.386	
prox = 59	85.91		31.08	+.05	31.13	

Epoch	μ'	Decl. 1885.0			t μ'	Decl. 1885.0 at μ°			
	.02	−89	0	8.20	.00	−89	0	8.20	
		+179	0	8.41	.00			8.41	
	.00	−89	10	4.53	.00	−89	10	4.53	
		+179	10	4.66	.00			4.66	
81.50	−.021	−89	16	16.99	−.07	−89	16	17.06	diff greater with μ'!
86.61		+179	16	16.91	+.04			16.87	
	−.01	−89	23	0.15	−.02	−89	23	0.17	
86.36		+179	22	57.79	+.01		22	57.78	"
	+.02	−88	31	56.37	+.06	−88	31	56.31	
85.31		+178	31	56.97	−.02			56.99	"
	+.02	−88	6	47.36	+.03	−88	6	47.33	
85.28		+178	6	47.20	−.00			47.20	
	−.04	−86	8	36.99	−.07	−86	8	37.06	
86.60		+176	8	36.66	+.06			36.60	"
	+.05	−86	33	2.50	+.12	−86	33	2.38	
84.90		+176	33	2.35	+.01			2.34	
	+.02	−85	12	3.31	+.04	−85	12	3.27	
86.08		+175	12	3.69	−.02			3.71	"
	−.05	−85	11	43.51	−.07	−85	11	43.58	
86.03		+179	11	43.40	+.05			43.35	"

Note in regard to proper motions
of 10 Test Stars.

I have applied the μ and μ' correctly
I think, taking the sign as given in
the General Catalogue when going
forward to 1885, and reversing it when
going backward.

I have also reversed the sign of μ'
when applying it to N.P.D. because
it is given in the Catalogue for
Decl.

The differences between the positions
in the General Catalogue and the
Special Catalogue are greater in
most of the ten cases with the
proposed motions applied than
without.

1

May 11th 1896

Dear Prof. Rogers.

The difficulty with the constants cannot be because the stars are so close to the pole, for these constants are independent of the stars position as Chauvenet says in Art. 379., but there must be something wrong with the table on p 232 of the "Cat. 130 Pol. Stars" for the second differences will not be the constant if Δ_1 and Δ_2 are filled in between 1867 and 1875, 1875 and 1883, as the second differences should be. However I have never computed and used the tabular values of these constants.

Your letter of the 4th was received this morning.

I have only applied the proper motions proportional to the time to the old stars in order to bring the places to 1885.0 using the epoch of Precession as you will see from the sheet sent on the 9th containing the 10 Stars

Formulae with constants 1870.

stars which had proper motions.
I suppose 15 years is too long an interval to apply proper motion for such close polars.

I think I know what you want for the 4 closest polars but I want to ask these two questions.

1 are the values of μ $+\overset{s}{.}1367$ & μ' $-\overset{''}{.}058$ the right proper motions for σ Octantis?
I thought the values on p xxix of the Introduction to Vol V were the final values or the μ, μ' given in the catalogue corrected by $\Delta\mu$, $\Delta\mu'$.

2 Should not we use values of the precession constants for 1870.0 in Hill's formulae?

I have computed the constants for 1870.0 and send the formulae from your letter corrected
for what Epoch are your constants?

Sincerely yours
Anna Winlock.

(over)

Formulae with constants 1870.

$$\frac{d\alpha}{dt} = 3^{s}.072\overset{15}{\cancel{244}} + [0.126\,\overset{249}{\cancel{152}}]\sin\alpha\tan\delta + \mu \quad \cancel{\frac{\mu}{R}}$$

$$\frac{d\delta}{dt} = [1.30222\overset{162}{\cancel{066}}]\cos\alpha + \mu'$$

([illegible] Tan Tables p x x) → 3221

$$100\frac{d^2\alpha}{dt^2} = +.06\overset{3221}{\cancel{699}} - [6.632\overset{946}{\cancel{044}}]\frac{d\alpha}{dt}\mu$$

$$+ [7.987\overset{911}{\cancel{803}}]\left(\frac{d\alpha}{dt}+\mu\right)\cos\alpha\tan\delta$$

$$+ [0.811689\overset{8}{\cancel{x}}]\left(\frac{d\delta}{dt}+\mu'\right)\sin\alpha\sec^2\delta$$

$$+ [\overset{6.9866049}{6.98660}]\,\mu\mu'\tan\delta \times 2$$

* omit see below

not $\tan^2\delta$

$$100\frac{d^2\delta}{dt^2} = -[6.633\overset{7946}{\cancel{xxxx}}]\frac{d\alpha}{dt}\mu' + [9.16388\overset{2}{\cancel{xx}}](\mu'+\mu)$$

$$\overset{\text{* omit}}{\frac{15m}{R}}\sin\alpha - [\overset{8.7367274}{8.736727}]\,\mu^2\sin 2\delta \quad \overset{\text{* omit}}{\cancel{\frac{1125}{R}}}$$

---

* $\frac{2}{R}$ = constant		* $\frac{15m}{R}$ = constant		$\frac{1125}{R}$ = constant	
log 2 =	0.3010300	1870.0 log m	1.3022162		
" R =	5.3144251	log 15	1.1760913	log 1125 =	2.0511526
log 2/R	4.9866049	15m	2.4783075	" R =	5.3144251
" 100·2/R	6.9866049	R	5.3144251	$\frac{1125}{R}$	6.7367274
			7.1638824		
		$100\frac{15m}{R}$	9.1638824	$100\frac{1125}{R}$	8.7367274

May 1st 1896

Dear Prof. Rogers.

I send the computation by Hill's formulae including proper motion for β Octantis $\frac{dA}{dt}$ $\frac{1}{2}\frac{d^2A}{dt^2}$ &c

I have used $\mu = +^{s}.166$ $\mu' = -''.125$

You will see that I do not get Dr. Gould's values of log A log A' log B and B' for 1870.0 as given in Vol V.

How do you want this computation made for every two years from 1870 to 1902? Or the 1872 place using these computed values of $\frac{d\alpha}{dt}$ &c then compute the constants over again, for 1872 with the new place?

I think $\frac{d^2\alpha}{dt^2} + \frac{d^2\delta}{dt^2}$ more convenient than $100\frac{d^2\alpha}{dt^2} + 100\frac{d^2\delta}{dt^2}$.

Sincerely yours

Anna Winlock.

Hill Formulae

Computation of Constants

Constants 1870.0

α 1870.0 $20^h\ 55^m\ 36^s.595$ δ $-89°\ 26'\ 38''.761$

$313°\ 54'\ 8''.925$

μ = $+''.166$ μ′ = $-''.125$

log n 0.1261249 2δ 178 53 17.822

log sin α 7.8576468n log sin 2δ 8.2888440

log tan δ 2.0131559n log cosδ 7.9868236

log n sin α tan δ 1.9969276 log sec δ 2.0131764

n sin α tan δ + 99.29504 log sec²δ 4.0263528

m 3.07215

$\Sigma = \frac{d\alpha}{dt}$ +102.36719 log 2.0101608

μ +.166 log μ 9.2201081 log μ² 8.4402162

$\frac{d\alpha}{dt} + \mu$ +102.53319 log 2.010 8645

$\frac{d\alpha}{dt} - \mu$ +102.20119 2.010 8657

log 2.0094984 −.0000003

log n 1.5522162

log cos α 9.8410045

(4) n cos α 1.1432207 1.1432344 log δ′

Constant +.0004 13.907

(1) μ′ = −''.125 log 9.0969100n

$\frac{d\delta}{dt} + \mu'$ +13.782 log 1.1393122

(3) $\frac{d\delta}{dt} - \mu'$ +14.032 1.1471196

+.0000 0074

−1.39686783

½ −.69843391

Computing values [illegible]
including [illegible] [illegible]

$\log \frac{d\alpha}{dt} \cdot \mu$	2.00949984	$\log \frac{d\delta}{dt} \cdot \mu$	1.1477196
.. constant	4.6337946_n	.. constant	4.6337946_n
.. (1)	5.6132930_n	.. (1)	5.7809142_n
.. $\frac{d\delta}{dt}\,\mu$	2.0108645	$\frac{d\alpha}{dt}\,\mu \times$	2.0108645
log cos α	9.8410045	.. sin α	9.8576468_n
.. tan δ	2.0131559_n	.. constant	7.1638824_n
.. constant	5.9877411	.. (2)	9.0323937
(2)	9.8528160_n	.. constant	6.7367270_n
.. $\frac{d\delta}{dt}\,\mu^2$	[illegible]	log μ^2	8.4462162
.. sin α	9.8576468_n	.. sin 2δ	8.2888440
.. cos²δ	4.0263528	.. (3)	3.4657876_n
.. constant	4.8116958		
.. (3)	9.6350116_n	(1)	−.000060
constant	4.9866049	(2)	+.107744
μ	7.2201081	(3)	−.0000003
μ'	4.0969100_n	$2\frac{d^2\delta}{dt^2}$	+.107684
.. tan δ	2.0131559_n	$\frac{1}{2}\frac{d^2\delta}{dt^2}$	+.053842
.. (4)	5.3167789	$\log \frac{1}{2}\frac{d^2\delta}{dt^2}$	8.7311212
Constant	+.00003221		8.7318068 - Dr. Gould's [illegible]
(1)	−.00043984		
(2)	−.71285116		
(3)	−.68892978		
(4)	+.00002074		
$\Sigma = \frac{d^2\alpha}{dt^2}$	−1.39686783		
$\frac{1}{2}\frac{d^2\alpha}{dt^2}$	−.69843391	$\log \frac{1}{2}\frac{d^2\alpha}{dt^2}$ 9.8440253_n	9.8442567_n Dr. Gould's log B

Observatory May 15 1896

Dear Prof. Rogers

I am sure that I ought to apply the proper motions in α and δ for 15 years to the [illegible] places for 1885.0 before I compute by the [illegible] method. Chauvenet on p623 Vol I gives Polaris done in this way, and I think the [illegible] stars except perhaps the 4 closest polars better be done like Polaris on p623? What do you think?

As to the 11 Vol V Stars of Dr Gould's which have proper motions, shall I not first apply the μ & μ' for 5 years to the places obtained by using the terms to the 4th term inclusive, then apply μ & μ' for 25 years and compute by the [illegible] for 1900, or else compute the constants Z', Σ', Z'r and [illegible] for 1870.0 apply μ & μ' for 30 years and then compute by the [illegible] for 1900.

2

For the 4 [illegible] Polaris Vol. V p. 44. 49 & p. 172, 41 I should use [illegible] formula (14) of the Star Tables for every 2 years would be suff. exact.

For 1872 I get α = 20h 55m 58s.867

" δ = −89° 20′ 11″.182

and these I will compute the [illegible] for 1872.

Your letter of the 14th came this morning. I enclose a copy of the computation of σ Octantis Yarnall's Position for 1885 and Gould's for 1875.0 reduced to 1900 by [illegible]'s method. without proof or [illegible].

Sincerely yours

Jos. Winlock.

β Octantis: reduction to 1900 without [illegible]

[illegible] Zone Cat. [illegible] 49 [illegible] 1894

α 1885.0	21 19 [illegible]	α 1875.0	21 3 52.239
δ 1885.0	−89 [illegible] 57.79	δ 1875.0	−89° 25 28.123
α 1885.0 in arc	319 41 3.00		315 53 3.585
z+λ 1885 to 1900	+0 5 43.575	z+λ 1875 to 1900	+0 9 34.182
A = α+(z+λ)	319 46 46.575		316 7 37.767
log tan δ	1.96830534n		1.5980466n
log cos A	9.8828467		9.8578628
log tan D = log tan δ cos A	2.0852067n		2.1401838n
D	89 31 44.848 270 28 15.152		−89 35 6.402 270 24 53.598
θ 1885 to 1900	+0 5 0.791	θ 1875 to 1900	+0 8 21.328
D+θ	270 33 15.943		270 33 14.926
log tan A	9.9272039n		9.9829082n
" cos D	7.9187757		7.8598049
" tan A cos D	7.8498826n		7.8427131n
" cos (D+θ)	7.9857162		7.9854949
" tan A cos D / cos (D+θ)	9.8562664n		9.8572182
= tan A'	−35 41 13.978		−35 44 48.250
A'	324 18 46.022		324 15 11.750
z'−λ' 1885 to 1900	+0 5 47.753	z'−λ' 1875 to 1900	+0 9 37.999
α' in arc 1900	324 24 33.775		324 24 49.749
α' in time 1900	21h 37m 38.253s		21 37 39.317
log tan (D+θ)	2.0142636n		2.0104848n
" cos A'	9.9094703		9.9093457
" tan (D+θ) cos A' = tan δ'	1.9237339n		1.9236630n
δ' 1900	−89° 19' 2.68"	δ' 1900	−89° 19' 2.005

Gould's Zonal Cat. | Gould's Ur. Ar. Z 47

Observatory May 16 1896

Dear Prof. Rogers:

It seems to me considering what is already done on the reductions of the 30 South Polar Stars (the reductions to 1900 are completed by the exact method without proper motion) that it would be better to compute the reductions for the proper motion as we proposed in our first paper and as I did do at the time for the second paper namely:

Separate the effects of precession and proper motions; that is compute by Hill's formulae (14) $\frac{1}{2}\frac{d^2\alpha}{dt^2}$ and $\frac{1}{2}\frac{d^2\delta}{dt^2}$ for proper motion alone.

This is my final scheme or, as I proposed in my last letter, reduce as Chauvenet has done for Polaris Vol II p623.

Perhaps both ways would be necessary for the closest polars.

It seems to me that the yearly computations which you propose, or even those for 5 years are going to be a

tremendous piece of work, for instance if
I should take even a 5 year interval
from 1870 to 1900 there would be seven
computations each of the precession
constants, the $\frac{d\alpha}{dt}$ and $\frac{d\delta}{dt}$, the $\frac{d^2\alpha}{dt^2}$ and
$\frac{d^2\delta}{dt^2}$ and of the reductions of the
proper motions from one epoch to the
next by Chauvenet Vol I p 620, there
would be forty nine computations
in order to reduce Dr Gould's positions
to 1900 for 6 Catalogues alone!
Which of these two ways do you approve
of? or do you want me to proceed
with the yearly computations?
Dr Gould's constants are Struve's for 1875
in Vol VII, the volume in which begins
his precession tables to 3 decimals
they were also used in Vol V, for 1870.
It is strange that our computation
of $\frac{d\alpha}{dt}$ etc gives his value of A for 1875
while our $\frac{d\delta}{dt}$ etc doesn't give his value of A'
but his value of A' is the same as our value
of $\frac{d\delta}{dt}$ without etc. This computation was
sent to you on Thursday to criticise. Sheets IV + V.
Anna Winlock

May 19th 1896

Dear Prof Rogers,

I have received your letter of May 16th.

The 1900 data you have, has been obtained as you directed last Feb. as follows:

1. Dr. Gill's places (Catalogue p102) have been reduced from 1885.0 to 1900 by the exact method (27 stars) for precession only.
2. Dr. Goulds places from Vol XIV have been reduced from 1875.0 to 1900 by the exact method (19 stars) for precession only.
3. Dr. Goulds Vol V places have been reduced from 1870.0 to 1875.0 with Dr. Goulds coefficients A. B. C. D, & A' B' C' D' 4 terms; the 1875.0 places thus obtained were reduced to 1900 by the exact method (11 stars) for precession only.

The two computations of β Octantis sent you were done as described above 1. & 3.

The A.G.C. that is Vol XIV places have been used for stars which are found in Vol V. I did not know before that you wanted to combine Vols XIV & V.

2-

as to the proper motions of these stars
& need of reducing them to the epoch
[illegible] I am going but only to the
epoch from which I start.
I should have referred to Chauvenet
Vol I 1863 not Vol II for this.
I should like to make the following
computations before I proceed to the
yearly reductions of β Octantis:

(1) Compute Z, z, 244 and C for 1900 from
[illegible] from 1870 [illegible]
For β Octantis:

(2) Reduce Dr Gould's Volk position $^{1870.0}$ to 1900 by
the exact method without p.m.

(3) Reduce the same position to 1900 with p.m.

(4) " " " from Weiss 1875 " "

(4) as a check on the place as obtained
from the differential coefficients to
the 4th term inclusive.

(5) Reduce the proper motion from 1870 to 1875
by 665 Chauvenet.

(6) Reduce the 1875 position with the 1875
proper motion applied, to 1900 by the
exact method.

Sincerely yours
Anna Winlock.

Observatory May 28 1896

Dear Prof. Rigge,

Prof Searle has found dupli-
cate copies of the Jahrbuch for the
years 1878 to 1882
I sent by mail yesterday the copy
for 1879 which you wanted some
time ago.

I have computed the constants i' k' n
for 1900 from 1870 and hope to send
you the 1900 positions for β Tauri
with this data in a few days.

Sincerely yours
Anna Winlock.

Observatory
June 7th 1886

Dear Prof Rogers,

I enclose the results for β Octantis.

My final place for 1900 from Dr. Gill's meridian including proper motion is:

α_{1900} $21^h\ 37^m\ 35^s.595$

δ_{1900} $-89°\ 14'\ 2''.90$

I think the sign of Dr. Gould's μ is wrong and should be $-\overset{s}{.}137$ not $+\overset{s}{.}137$

Dr. Gill's value of μ is $-\overset{s}{.}130$

Sincerely yours
Anna Winlock.

σ Octantis. Results

Dr. Gill's 1885 positions reduced to 1900 { p102 Cat 91 / Gill " 1456

1885 to 1900		α 1900	δ 1900	α 1900	δ 1900
By Exact Method without proper motion				with proper motion to 1885	
Cat. No.				1885 μ = $-^{s}.130$	1885 μ′ = $-^{\prime\prime}.01$
Cat. p102	91	$21^{h}\ 37^{m}\ 38^{s}.252$	$-89^{\circ}\ 19^{\prime}\ 2^{\prime\prime}.63$	$21^{h}\ 37^{m}\ 38^{s}.201$	$-89^{\circ}\ 19^{\prime}\ 2^{\prime\prime}.62$
Gill Cat	1456	36.641	2.81	36.364	2.84
Mean p102 and Gill Cats }					

Dr. Goulds 1870 position reduced to 1900 } Vol V 49

1870 to 1900	α 1900	δ 1900	α 1900	δ 1900
By Exact Method without proper motion			with proper motion to 1900 assumed values Vol V p xxix	
Vol V 49			1870 μ = $+^{s}.166$	1870 μ′ = $-^{\prime\prime}.125$
1870 to 1900	$21^{h}\ 37^{m}\ 38^{s}.540$	$-89^{\circ}\ 19^{\prime}\ 2^{\prime\prime}.31$	$21^{h}\ 37^{m}\ 46^{s}.221$	$-89^{\circ}\ 19^{\prime}\ 5^{\prime\prime}.64$
1870 to 1875 1875 to 1900 }	38.506	2.06		
1870 to 1875 Dr. Gould's A.B.C.D. and 1875 to 1900 Exact Method	39.317 A′B′C′D′	2.04		

Dr. Goulds 1870 position reduced to 1875

1870 to 1875	α 1875	δ 1875	α 1875	δ 1875
By Exact Method without proper motion)			with proper motion to 1875 assumed values Vol V p xxix	
Vol V 49			1870 μ = $+^{s}.166$	1870 μ′ = $-^{\prime\prime}.125$
	$21^{h}\ 3^{m}\ 51^{s}.269$	$-89^{\circ}\ 25^{\prime}\ 28^{\prime\prime}.12$	$21^{h}\ 3^{m}\ 52^{s}.284$	$-89^{\circ}\ 25^{\prime}\ 28^{\prime\prime}.75$
By Dr. Gould's A B C D and	53.239 A′B′C′D′	28.12	53.069	28.75

α1885 21h 18m 44s.20 [illegible] 1885 179° 22' 59".99 }
" 21 18 42.332 δ " −89 23 0.15 }

α1900 δ1900

with proper motion to 1900

1885 μ = −s.130 1885 μ' = −".01

21h 37m 36s.512 −89° 19' 2".79

34.674 3.01

*21 37 35.595 −89 19 2.90 = *Final Values from Dr. Gill's 1885 position

α1870 20h 55m 36s.595 δ1870 −89° 26' 38".961 ?

α 1900 δ1900

with proper motion to 1900
final values Vol V [illegible] ?

1870 μ = +s.13666 1870 μ' = −".0578

21 37 42.866 −89 19 3.67

42.680 3.40 } μ and μ' 1870 reduced to 1875 by Chauvenet (265)

42.492 3.38 } give: μ = +s.116 μ' = −".057

Note: In preface Vol I Dr Gould says "For six stars (of which σ Octantis is one) "it has appeared advisable to include approximate values of the proper motions with the computations of the precessions"

α1875 δ1875

with proper motions to 1875
final values Vol V preface ?

1870 μ = +s.13666 1870 μ' = −".0578

21h 3m 51s.998 −89° 23' 28".41

52.656 29.67

Observatory June 9th 1896

Dear Prof. Rogers,

Your letter was received this morning. I do not believe it will be necessary for me to come to Waterville after all at any rate for the present, if you will answer for me these questions relating to those stars of the 30 which have proper motions.

For the stars having no proper motions [illegible] sufficiently and I will send you the coordinates as soon as they are ready.

I enclose the list of stars having proper motions.

1) Should I not compute for each of these 21 cases the $\frac{d\alpha}{dt}$ and $\frac{d\alpha'}{dt}$ with 1875 constants for the Bradley stars and with 1885 constants for the Ell stars by the following formulae of Stills?

$\frac{d\alpha}{dt} = [6.28801]\,\mu\cos$ [illegible] $+ [5.112720]\,\mu'\sin$ [illegible] $\delta + [4.7866]\,\mu\,\mu'\tan\delta$

$\frac{d\alpha'}{dt} = -[7.464902]\,\mu\cos$ [illegible] $- [6.7367]\,\mu^2\sin 2\delta$

N.B. these constants are [illegible]

2) Should not the 7th, and the 8th be applied to the places for 1870 and 1885 respectively?

3) Should not the places for '70 and 1885 then corrected for proper motion be then reduced to verify the exact result?

Sincerely yours
Anna Winlock.

Proper Motions of 30 [illegible]

[illegible]	1870	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Vol. XIII.	No.
4	.016	-.007	+.012	-.006	+.030	+.001	.00	+.007	44
6		-.007				+.106			—
17		+.042				-.051			—
—			-.114				+.02		563
20		-.011	-.080			+.026	+.02		645
27		-.034				-.005			—
—			-.188				.00		898
32		-.065	-.052			-.024	-.05		927
43		-.106				-.113			—
—							-.04		1148
44	+.156	+.151	+.165	+.160	-.025	-.007	-.021	+.016	1304
49	+.166	+.167	-.130	-.031	-.125	-.058	-.01	+.032	1456
51		-.138	-.035			+.077	+.08		1564
53	[illegible]	[illegible]	+.036	+.016	+.014	+.016	+.02	-.015	1667

Computation sin γ and cos γ for reduction of Polar Motion (3 Oct. ather 1870 to 1875 Chauvenet I p621 (665)

θ = 0° 1′ 40.272 = 100.272

[illegible] = 813 5612.730 | L (7-27) = 1h 815 56 3.479

δ 1875 = 89 [illegible] 8.12 | δ 1870 = 89 76 38.461

[illegible] 6.6867545 | log sin θ 6.6867545

sin [illegible] 9.8573936 n | sin (7-27) 9.8412 2865 n

Σ 6.5441481 | Σ 6.5290410 n

cos δ 8.0019540 | cos δ 7.9868364

[illegible] 8.5421941 n | sin θ sin (7-27) / cos δ 8.5422046 n

log sin γ

log sin δ 9.9999796 n | log cos δ 7.9868364

log sin δ′ 9.9999781 n | cos δ′ 8.0019540

sin δ sin δ′ 9.9999577 | cos δ cos δ′ 5.9887904

log cos θ 9.9999999

cos θ + 0.9999998

0.9999825

+ 0.0000173

[illegible] = 5.988 1028

[illegible] 5.9887904

9.9993224

[illegible] cos γ

log sin γ = 8.5421941 n

log cos γ = 9.9993224

β Octantis: Computation μ + μ' 1875

$d\alpha = \mu\,1870 = +\overset{s}{.}13666$

log dα 9.1354507

" cos δ 7.9868364

" cos γ 9.9993224

" 15 1.1760913

log Σ (1) 8.2977008

$\Delta\delta = \mu'\,1870 = -\overset{\prime\prime}{.}0528$

log dδ 8.7619278n

" sin γ 8.5421941n

" Σ (2) 7.3041219

(1) +.01985

(2) +.00201

(1)+(2) = cos δ' dα' +.02186

log cos δ' dα' 8.3396502

" cos δ' 8.0219540

" dα' 0.3376962

" dα' in arc + 2.17619

μ 1875 = dα' in time + $\overset{s}{.}1458$

log dα 9.1354507n

" cos δ 7.9868364

" sin γ 8.5421941n

" 15 1.1760913

" Σ (1) 6.8405725

" dδ 8.7619278n

" cos γ 9.9993224

" Σ 8.7612502n

(1) $+\overset{\prime\prime}{.}00069$

(2) −.05771

(1)+(2) = dδ' −.05702 = μ' 1875

$\mu\,1875 = +\overset{s}{.}1458$

$\mu'\,1875 = -0\overset{\prime\prime}{.}057$

A. W.

Jan 16th 1846

Observatory
June 19th 1896

Dear Prof. Rogers,

Both of your letters have been received.

I hope to get the final 1900 places and the rectang polar coordinates from them before I go to Dublin which will be the last of July.

I enclose the details of the computation for β Octantis from Dr. Gould's Vol X position, and will send the same for Dr. Gill's position tomorrow.

You have the proper Southern papers. I have only the north polar catalogue.

Sincerely yours
Anna Winlock.

δ Octantis	1870 to 1900 without μ μ'	1870 to 1900	1870 to 1900
α 1870	20 55 36.595	20 55 41.675	20 55 40.695
δ 1870	−89 26 58.961	−89 26 42.711	−89 26 [illegible]
α 1870 in arc	313 54 8.925	313 55 23.626	313 55 10.425
λ	+0 11 29.525		
A = α + λ	314 5 38.450	314 6 53.150	314 6 39.9[illegible]
log tan δ	2.0131559n	2.0139707n	2.01[illegible]24n
cos A	9.8425280	9.8426702	9.8426416
tan δ / cos A = log tan M	2.1706479n	2.1713305n	2.1708909n
M	−89 36 47.5[illegible]	−89 36 49.669	−89 [illegible]
	270 23 12.411	270 [illegible] 10.331	270 [illegible] 11.643
θ	+0 11 1.631		
M + θ	270 3 14.022	270 33 11.932	270 33 15.244
tan A	0.0137368n	0.0134221n	0.0134777n
cos M	7.8193421	7.8286897	7.829[illegible]
tan A cos M	7.8420789n	7.8421118n	7.842577[illegible]n
cos (M + θ)	7.9852981	7.9848426	7.985128[illegible]
tan A cos M / cos (M + θ) = tan A'	9.8577808n	9.8572692n	9.8574484
A'	324 13 5.023	324 [illegible]	[illegible]
− λ	+0 11 33.072		
α in arc 1900	324 24 38.095	324 26 33.339	324 25 42.781
α in time 1900	21 37 38.540	21 37 46.223	21 37 42.866
log tan (M + θ)	2.0143817n	2.0151372n	2.0148511n
cos A'	9.9091963	9.9093285	9.9092674
tan (M + θ) cos A' = tan δ'	1.9235780n	1.9244657n	1.9241185n
δ' 1900	−89 19 2.31	−89 19 5.64	−89 19 3.67

30

[illegible] 1870 to 1900	(5) 1870 to 1875	(6) 1870 to 1875	(7) 1870 to 1875
μ 1870 − 1.3666 − 4.860	without μ & μ'	μ 1870 +.566 +.830	μ 1870 +1.3666 +6.83
μ' " − .0578 − 1.754	h m s	μ' [illegible] .185 [illegible] .625	μ' " −.0578 .39
20 55 33.495	20 55 36.595	20 55 37.425	20 55 37.278
−89 26 40.695	−89 26 38.961	−89 26 55.586	−89 26 39.250
313 53 7.425	313 54 8.945	313 54 4.375	313 54 19.170
[illegible]	+0 2 4.805	+0 2 4.805	+0 2 4.805
314 4 36.950	313 56 13.730	313 56 26.180	313 56 23.975
2.0135324n	2.0131659n	2.0132916n	2.0132187n
9.8428743	9.8412774	9.8413046	9.8412991
2.1711581n	2.1718785n	2.1719876n	2.1719190n
−89 36 49.217	−89 36 51.518	−89 36 51.865	−89 36 51.648
270 23 10.783	270 23 8.482	270 23 8.135	270 23 8.352
d	+0 1 40.272	+0 1 40.272	+0 1 40.272
270 33 12.384	270 24 48.754	270 24 48.407	270 24 48.624
0.0142487n	0.0161162n	0.0160638n	0.0160731n
7.8268311	7.8281118	7.8280033	7.8280702
7.8430798n	7.8442284n	7.8440671n	7.8441443n
7.8549411	7.8583940	7.8582928	7.8583561
9.8581387n	9.9858340n	9.9857743n	9.9857882n
−35 48 15.614	−44 3 56.571	−44 3 42.405	−44 3 45.714
324 11 44.386	315 56 3.429	315 56 17.595	315 56 14.286
d	+0 1 45.610	+0 1 45.610	+0 1 45.610
324 23 17.458	315 57 49.039	315 58 3.205	315 57 59.896
21 37 33.164	21575 21 3 51.269	21 3 52.214	21 3 51.93
2.0150387n	2.1415947n	2.1416959n	2.1416326n
9.9090313	9.8564525	9.8564814	9.8564747
1.9240700n	1.9980472n	1.9981773n	1.9981073n
−89 19 3.40	δ 1875 −89 25 28.12	−89 25 28.75	−89 25 28.41

	Const 1875 to 1900 without p.m. μ μ'	Const 1875 to 1900 μ 1875 +1.46 +3.650 μ' +3.25 .857 -1.425	1870 to 1875
α 1875.0	21 3 51.269	21 3 54.919	Ulr. Br. Gr. Jan
δ 1875.0	-89 25 28.82	-89 25 29.545	α 1870
α in arc 1875.0	315 57 49.035	315 58 43.785	A t
Z + λ	+0 9 34.182	+0 9 34.182	B t²
A = α + (Z + λ)	316 7 23.217	316 8 17.967	C t³
log tan δ	1.9980460 n	1.9983447 n	D t⁴
" cos A	9.8578333	9.8579441	α 1875.
" tan δ / cos A = log tan M	2.1402127 n	2.1404006 n	assumed μ × t +.166
M	-89 35 6.501 270 24 53.499	-89 35 7.147 270 24 52.853	α 1875 + t μ
θ	+0 8 21.328	+0 8 21.328	
M + θ	270 33 14.827	270 33 14.181	final μ × t +.3666
" tan A	9.9829695 n	9.9827387 n	α 1875 + t μ
" cos M	7.8597760	7.8595881	
" tan A cos M	7.8427455 n	7.8423268 n	α 1875
" cos (M + θ)	7.9854733	7.9853327	A μ to 1900
" tan A cos M / cos (M + θ) = log tan A'	9.8572722 n	9.8569941 n	α 1875 + t μ to 1900
A'	-35 45 0.409 324 14 59.591	-35 43 57.795 324 16 2.205	
Z' + λ'	+0 9 37.999	+0 9 37.999	
α in arc 1900	324 24 37.590	324 25 40.204	
α in time 1900	21 37 38.506	21 37 42.680	
" tan (M + θ)	2.0145064 n	2.0146471 n	
" cos A'	9.9093275	9.9094224	
" tan (M + θ) cos A' = log tan δ' 1900	1.9238339 n	1.9240695 n	
δ' 1900	-89° 19' 2".06	-89° 19' 3".40	

effect coeff 1875 to 1900
μ 1875 + 14.6 13.650
μ′ " + .057 − 1.425
t − 25 21 3 55.889

with coefficients to 4th term inclusive.

20 55 36.595 7.057	δ 1870 − 89° 26′ 38.964 .95″	− 89 25 29.548	
+ 8 32.667	A′t + 1	9.535	315 58 56.335
− 1 17.398	B′t² +	1.348	+ 0 9 34.182
+ .372	C′t³ −	.046	316 8 32.517
+ .003	D′t⁴ +	.001	1.998 38 54n
21 3 52.239	δ 1875 − 89 25 28.123		9.857 9736
+ .830	precession × t −	.625	2.140 8718

Corr for ~~.825~~ hours to ~~0~~ Obs. time

21 3 53.067	1875 + t, α − 89 25 28.748	− 89 35 7.048
		270 24 52.852
Dr. Gill's Spring Time 1885.0		+ 0 8 21.328
+ .683	Precession × t² − .289	270 33 14.280
21 3 52.922	μ 1885 − 85 78.13 · δ 1875 + t, μt 89 25 28.412	9.982 6774
	μ′ 1.40 78.4n	7.859 6169
21 3 52.239	δ 1875 − 89 25 28.123	7.842 2943n
+ 3.650	And Catalogue No. μ t 1900 − 1.425	7.985 3543
p 102		
21 3 55.889	δ 1875 + μ t 1900 − 89 25 29.548	9.886 9400n

α 1900 + ... δ 1900 + μt 1500

91 9 21 37 36.512	− 89 19 2.79	− 35 43	45.614
		324 16	14.386
1456 34.674		+ 0 9	37.999
Mean 21 37 35.583	− 89 19 2.90	324 25	52.385
21 37 35.595	− 89 19 2.90	21 37	43.492
			2.144 6256n
			9.909 4408
			1.924 0664n
			− 89° 19′ 2.38″

Computations β Octantis

Dr. Gill's positions 1885.0

μ 1885 = −.130 5

μ′ ″ = −.01

Oeul Catalogue no 1456

p 102 .. .. 9°

α 1900 + μt 1900 δ 1900 + μ′t 1900

91 21ʰ 37ᵐ 36ˢ.512 −89° 19′ 2″.79 Column 3

1456 34.674 3.01 6

Mean 21 37 35.593 −89 19 2.90

21 37 35.595 − 89 19 2.90 7

G. W. June 20th 1896

Reduction to 1900.	p.102 Cat. 91, without prop. [illegible]	p.102 Cat. 91 with [illegible] 1885 [illegible]	p.102 Cat. 91 [illegible] 1900 [illegible]
[illegible] 1885	21 18 [illegible]	[illegible]	21 18 [illegible]
M. [illegible] 1885	179 22 59.79	179 22 [illegible]	179 28 [illegible]
L 1885 [illegible]	319 41 3.00	319 41 2.75	319 40 53.00
Σ+λ	+0 5 43.578		
A = L + (Σ+λ)	319 46 46.578	319 46 45.328	319 46 16.578
log tan δ	1.9680583 n	1.9680595 n	1.9680708 n
.. cos A	9.8828467	9.8828452	9.8827903
.. tan / cos = log tan M	2.0852067 n	2.0852061 n	2.0852875 n
M	−89 31 44.848	−89 31 44.845	−89 31 45.183
θ	270 28 15.152	270 28 15.155	270 28 14.837
	+0 5 0.791		
M+θ	270 33 15.943	270 33 15.946	270 33 15.628
.. tan A	9.9272039 n	9.9272071 n	9.9273320 n
.. cot M	7.9147786	7.9147794	7.9146979
.. tan A cot M	7.8419825 n	7.8419865 n	7.8420299 n
.. cos M+θ	7.9857162	7.9857168	7.9856476
.. tan A cos M / cos(M+θ) = log tan A'	9.8562663 n	9.8562697 n	9.8563823 n
A'	−35 41 13.977	−35 41 14.733	−35 41 40.068
	324 18 46.023	324 18 45.267	324 18 19.932
Σ' λ'	+0 5 47.753		
L' mean 1900	324 24 33.776	324 24 33.020	324 24 7.685
L' in time 1900	21 37 38.252	21 37 38.201	21 37 36.512
log tan (M+θ)	2.0142634 n	2.0142628 n	2.0143320 n
.. cos A'	9.9096703	9.9096692	9.9096309
.. tan (M+θ) cos A' = tan δ' 1900	1.9239337 n	1.9239320 n	1.9239629
δ' 1900	−89 19 2.63 ✓	−89 19 2.62	−89 19 2.79

(4) [illegible] Cat. 1856 without proper [illegible]	(5) [illegible] Cat. 1856 with [illegible] to 1875.0 [illegible]	(6) [illegible] Cat. 1856 with [illegible] to 1900 [illegible]	(7) [illegible] 29 [illegible] to 1900 [illegible]
21h 18m 42s.332	Sept. 21 18 42.016	21 18 40.066	21 18 41.133
−89 23 0.15	−89 23 0.07	−89 23 0.32	−89 23 0.23
319 40 34.980	319 40 32.840	319 40 0.990	319 40 18.985
319 46 18.558	319 46 13.818	319 45 40.568	319 46 0.573
1.968 0848 n	1.968 0857 n	1.968 11[illegible] n	1.968 1006 n
9.882 7968	9.882 7884	9.882 7362	9.882 7648
2.085 2880 n	2.085 3003 n	2.085 3818 n	2.085 3356 n
−89 31 45.165 270 28 14.835	−89 31 45.213 270 28 14.787	−89 31 45.531 270 28 14.469	−89 31 45.357 270 28 14.643
270 33 15.626	270 33 15.578	270 33 15.260	270 33 15.490
9.927 3236 n	9.927 3439 n	9.927 4688 n	9.927 4004 n
7.914 6974	7.914 6851	7.914 6036	7.914 6498
7.842 0210 n	7.842 0290 n	7.842 0724 n	7.842 0502 n
7.985 6473	7.985 6368	7.985 5676	7.985 6068
9.856 3737 n	9.856 3922 n	9.856 5048 n	9.856 4434 n
−35 41 38.136 324 18 21.864	−35 41 42.295 324 18 17.705	−35 42 7.644 324 17 52.356	−35 41 53.822 324 18 6.178
324 24 9.617	324 24 5.458	324 23 40.109	324 23 53.931
21 37 36.641	21 37 36.364	21 37 34.674	21 37 35.595
2.014 3324 n	2.014 3429 n	2.014 4121 n	2.014 3729 n
9.909 6338	9.909 6274	9.909 5891	9.909 6084
1.923 9662 n	1.923 9703 n	1.924 0012 n	1.923 9813 n
−89 19 2.81	−89 19 2.84	−89 19 3.01	−89 19 2.90

Observatory
July 14th 1896

Dear Prof. Rogers,

I enclose some letters left among the papers which you brought from Waterville.

I also enclose your computation of the proper motion of β Ceti for 1755, and I should be glad if you would look at the sign and return it to me. I got $\overset{3}{-}.014$ instead of $+.0\overset{5}{1}4$ as you have it, which should it be?

Sincerely yours
Anna Winlock.

Observatory
July 23d 1896

Dear Prof. Rogers.

You did not take the North Polar Plate. Do you want it sent to Waterville? and do you want any stars identified upon it before sending?

Sincerely yours
Anna Winlock.

Nov 16th 1896

Dear Prof. Rogers,

I have computed the rectangular coordinates for 1900 for the 30 South Polar Stars except for the Melbourne Observations, but no proper motions have been applied to the Chile places though there are 11 stars for which proper motions are given in Vol. V.

Four of these eleven are among the seven stars for which you mentioned the proper motions computed from the Chile Gilliss and Melbourne data. I sent you two of these stars A.G.C. 2220 & 25049 on Sept 5th. Have you had time to check them yet? If not I will recompute them and then send you the results for all the seven stars.

After you have examined these values of the proper motions and decided if they are real and it is best to adopt them I think the easiest way will be to convert them into rectangular values both for these four stars and for the

remaining ones of Dr. Gould's; or if you prefer I will carry them forward by Chauvenet
2 from 1875 to 1900 by the formulae in Vol I (665); or else compute the secular
3 variation of the proper motion from this formula, the last will be the most troublesome as I shall have to compute the constants.

The last two ways will make it necessary to recompute the rectangular coordinates after the proper motions to 1900 have been applied to the right ascensions and declinations for 1900.

For the Gill observations I have applied the proper motions to the right ascensions and declinations before carrying them forward to 1900, and I was about to compute for the Melbourne observations in the same way.

I will send the rectangular coordinates for 1900 the final values of x + y for 1900 include proper motion when given in Gill's Catalogue.

Sincerely yours
Anna Winlock.

Nov 14th 1896

Dear Prof. Rogers,

I have received your letter of Nov 12th and from Professor Pickering the list of Chronograph sheets to be re-read.

Why for space 0 do you read wires 1 and 2 and for space 18 wires 17 and 18?

Why not wires 19 and 20 for space 18?

Will it be sufficient to read to tenths?

I think that I can come to Waterville later for a short time but I am afraid it will be impossible to stay three or four weeks.

I enclose the rectangular coordinates for 1900 for the 30 South Polar Fundamental Stars as far as completed.

Very sincerely yours

Anna Winlock

30 South Polar Fundamental Stars in zones 5° wide from 1° – 6° from South Pole.

The rectangular coordinates for 1900 have been computed from the right ascensions and declinations brought forward by Bauschinger's method to 1900, by the formulae:

$$x = \tan p \cos \alpha$$

$$y = \tan p \sin \alpha$$

$$p = \text{polar distance.}$$

Dr. Gould's data from Vol I for 1870 and from Vol XIV for 1875, has been brought forward without proper motions, although there are 11 stars for which proper motions are given in Vol I

Dr. Gill's data from the Catalogue on p 102 of the Cape Catalogue for 1885 has also been brought forward to 1900 without proper motions.

There are 10 stars in the General Catalogue for which proper motions are given but not applied to bring the observations forward to the epoch of the Catalogue 1885 see Introduction.

Final Values of x and y for 1900

For these 10 stars the proper motions have been applied to 1900 for both the Gould and p102 Catalogues and the mean right ascensions and declinations of the two Catalogues taken. This mean α and δ has been brought forward by Bohnenberger's method to 1900 and the rectangular coordinates computed from the resulting α and δ for 1900, giving the "Final Values" of x and y for 1900 from Gill's data.

For the Melbourne data, no reductions have yet been made. There are 21 stars in the Melbourne Catalogue for 1880 for which proper motions are given, and applied to bring the observations forward to 1880, the epoch of the Catalogue. see Introduction

	Without proper motion.		Final Values include μ & μ's		
	x 1900	y 1900	x 1900	y 1900	
Gould, XIII, 222	+3886.16	+211.79			μ + μ'
" V. 2	+3886.33	+211.88			
Gill Genl 424			+3886.70	+212.29	μ & μ'
" p.102 3 →	+3886.60	+212.22			
Melbourne, 17					has μ
3h					
Gould, XIV. 3716	+3572.72	+3696.17	+3572.72	+3696.17	no μ & μ'
Gill, Genl 235	+3572.44	+3696.54	+3572.44	+3696.54	no μ & μ'
" p 102 15					
Melbourne, 192					has μ'
10h					
Gould, XIII, 17241	−2656.23	−480.72	−2656.23	−480.72	no μ & μ'
Gill Genl 893			−2656.95	−480.16	μ & μ'
" p.102 55 →	−2655.87	−480.30			
Melbourne, 711					μ & μ'
14h					
Gould, XIII, 19098	−3240.67	−2144.15	−3240.67	−2144.15	no μ & μ'
Gill, Genl 968	−3241.80	−2143.40	−3241.80	−2143.40	no μ & μ'
" p 102 63					
Melbourne, 764					has μ
18h					
Gould, XIII, 25049	+690.48	−2593.30			μ & μ'
" V. 44	+691.04	−2592.78			
Gill. Genl, 1304			+691.90	−2593.05	μ & μ'
" p.102 82 →	+691.31	−2593.50			
Melbourne, 928					μ & μ'
21h β Octantis.					
Gould, XIII. 29042	+1998.81	−1430.22			μ & μ'
" V. 49	+1998.90	−1430.52			
Gill, Genl, 1456			+1997.92	−1430.46	μ & μ'
" p 102. 91 →	+1998.42	−1430.23			
Melbourne, 1045					μ & μ'

	without proper motion		"Final Values"		2°
	x 1900	y 1900	x 1900	y 1900	
5h					
Gould, not in			—	—	
Gill, 417 Gould " 31 p 102	+24.″45	+5906.″51	+24.″45	+5906.″51	no μ & μ′
Melbourne, not in			—	—	
7h					
Gould, XIV, 11013	−2431.39	+4523.55	−2431.39	+4523.55	no μ & μ′
Gill, Gould 563 " p 102 37 →	−2431.34	+4523.46	{ −2431.65	+4524.00	μ & μ′
Melbourne, 476			—	—	μ & μ′
10h					
Gould, XIV, 15761	−4646.21	+739.76	−4646.21	+739.75	no μ & μ′
Gill, not in			—	—	
Melbourne 666			—	—	has μ
20h					
Gould, XIV 28067	+4203.22	−5155.81	+4203.22	−5155.81	no μ & μ′
Gill, not in			—	—	
Melbourne not in			—	—	
13h					
Gould, XIV. 31530	+6941.″62	−1439.″15			μ & μ′
" V. 53	+6942.24	−1439.31			
Gill, Gould 1657			+6942.45	−1438.80	μ & μ′
" p 102 98 →	+6942.17	−1438.99			
Melbourne, 1145					μ & μ′
23h					
Gould, XIV, 31575	+6585.13	−1280.83	+6585.13	−1280.83	no μ & μ′
Gill. not in.			—	—	
Melbourne, not in			—	—	

3°

	without proper motion:		"Final Values"		
	x 1900	y 1900	x 1900	y 1900	
6^h					
Gould, XIV, 38	+12267.96	+174.74	+12267.98	+174.74	no μ & μ'
Gill, Genl. 8 } " p102 1 }	+12268.48	+175.13	+12268.48	+175.13	no μ & μ'
Melbourne, not in			—	—	
8^h					
Gould, XIV, 8292	+4885.10	+11666.72	+4885.10	+11666.72	no μ & μ'
Gill, Genl, 315 } " p102 23 }	+4884.96	+11667.38	+4884.95	+11667.38	no μ & μ'
Melbourne, not in			—	—	
11^h					
Gould, XIII 8770	−3951.43	+10565.21			μ & μ'
" V. 17	−3951.34	+10565.01			
Gill, Genl. 516 } " p102 35 }	−3951.60	+10565.36	−3951.60	+10565.36	no μ & μ'
Melbourne, 416			—	—	μ & μ'
17^h					
Gould, XIV. 23027	−2270.41	−9473.01	−2270.41	−9473.01	no μ & μ'
Gill, Genl. 11942 } " p102 76 }	−2271.32	−9472.77	−2271.32	−9472.77	no μ & μ'
Melbourne, 878					has μ
19^h					
Gould, XIV. 24176	+142.24	−8415.08			μ & μ'
" V. 43.	+141.94	−8415.18			
Gill, Genl, 12597 } " p102 80 }	+142.90	−8414.31	+142.90	−8414.31	no μ & μ'
Melbourne, 906					μ & μ'
20^h					
Gould, XIV, 31876	+10889.80	−1446.33	+10889.80	−1446.33	no μ & μ'
Gill, Genl. 16722 } " p102 100 }	+10889.82	−1445.18	+10889.82	−1445.18	no μ & μ'
Melbourne, not in			—	—	

	without proper motion.		"Final Values"		4°
	x 1900	y 1900	x 1900	y 1900	
6					
Gould, XIV, 700	+13326.38	+2327.67	+13326.38	+2327.67	no μ or μ'
Gill, Genl 923 " p.102 6	+13320.42	+2328.73	+13320.42	+2328.73	no μ or μ'
Melbourne, not in			—	—	
6ʰ					
Gould XIII, 7601	−394.49	+14665.43	−394.49	+14665.43	no μ or μ'
Gill, Genl 418 " p.102 30	−395.01	+14666.64	−395.01	+14666.64	no μ or μ'
Melbourne, 349					μ or μ'
10ʰ					
Gould, XIII, 14883	−12397.67	+4152.13	−12397.67	+4152.13	no μ or μ'
Gill, Genl 773 " p.102 47	−12397.82	+4152.72	−12397.82	+4152.72	no μ or μ'
Melbourne, not in			—	—	
16ʰ					
Gould, XIII, 22180	−5627.22	−12576.29	−5627.22	−12576.29	no μ or μ'
Gill, Genl 1148			−5626.80	−12575.55	has μ'
" p.102 73 →	−5627.23	−12576.20			
Melbourne, 850					has μ'
22ʰ					
Gould, XIV, [illegible]80	+11331.82	−5736.29			μ or μ'
V, [illegible]	+11331.10	−5735.92			
Gill, Genl, 562			+11332.24	−5738.00	μ or μ'
" p.102 [illegible]4 →	+11331.61	−5736.83			
Melbourne, 1085					μ or μ'
23ʰ					
Gould, XIII, 31672	+13272.89	−2387.51	+13272.89	−2387.51	no μ or μ'
Gill, Genl 1662 " p.102 99	+13272.72	−2387.63	+13272.72	−2387.63	no μ or μ'
Melbourne, not in			—	—	

5

		without proper motion.		"Final Values"		
		x 1900	y 1900	x 1900	y 1900	
1ʰ						
Gould, XV.	1800	+15251.87	+7416.98			no μ & μ'
V.	6	+15251.16	+7414.80			
Gill Geuil.	181 }	+15252.06	+7416.75	+15252.06	+7416.75	no μ & μ'
" p.102.	83 }					
Melbourne,	104					μ & μ'
5ʰ						
Gould, XIII,	7097	+848.55	+18621.82	+848.55	+18621.82	no μ & μ'
Gill. Geuil.	296 }	+848.38	+18623.08	+848.38	+18623.08	no μ & μ'
" p.102,	29 }					
Melbourne,	336					has μ'
9ʰ						
Gould, XV,	12688	−12665.49	+11475.85			μ & μ'
V.	20	−12665.83	+11475.18			
Gill. Geuil.	645 }			{ −12664.26	+11478.45	μ & μ'
" p.102	48 }	−12664.76	+11477.14			
Melbourne,	548					μ & μ'
11ʰ						
Gould XIII,	16438	−17772.82	+206.42			μ & μ'
" V.	27	−17772.79	+206.16			
Gill. Geuil,	846 }	−17772.72	+207.31	−17772.72	+207.31	no μ & μ'
" p.102	53 }					
Melbourne,	687					has μ
13ʰ						
Gould. XIX,	18321	−15902.22	−6162.76			μ & μ'
V.	82	−15902.00	−6163.27			
Gill. Geuil,	927 }			{ −15901.88	−6160.54	μ & μ'
" p.102,	59 }	−15903.39	−6161.86			
Melbourne,	789					μ & μ'
17ʰ						
Gould. XXI,	23196	−2271.92	−17259.93	−2271.92	−17259.98	no μ & μ'
Gill Geuil,	1221 }	−2271.87	−17260.58	−2271.89	−17260.58	no μ & μ'
" p.102	78 }					
Melbourne,	898					has μ'

Feb. 15th 1879 β Orionis 5^h 8^m $-8°$ $20'$

" 6. 10. 14. 15. 18 "

wires	R.A.		Decl
	h m s		m s
1	5 8 47.8	1	8 43.6
2	49.8	2	45.1
3	51.9	3	46.5
4	54.0	4	48.1
5	56.0	5	49.8
6	5 9 0.1	6	16.0
7	2.3	7	18.2
8	4.5	8	20.3
9	6.6	9	22.3
10	8.5	10	24.5
11	10.5		
12	12.8	11	42.6
13	14.9	12	45.0
14	17.0	13	46.8
		14	48.4
—	21.2	15	49.8
16	23.2		
17	25.2		
18	27.5		
19	29.5		

Please mark the wires wanted and return.

A.W.

Nov 22 1896

Dear Prof. Rogers

I began to read the chronograph sheets today. The first star on the list for Feb 15 1877 is "β Orionis; 5. 10. 14. 15. 18."
I suppose these are the places wanted?
What wires do you want in this case?
I find on the sheet, 15 declination taps 5 9 and 5 right ascension taps so there would be 19 right ascension wires and 18 places if numbered from 1 to 18.
Your letter of Nov. 14th says there are 18 places numbered from 0 to 18. How can that be with only 19 wires?
I enclose the readings of β Orionis in full.

Sincerely yours
Anna Winlock

Nov 25th 1896

Dear Prof. Rogers,

I send by express today the original computations to 1900 of the 80 South Polar Fundamental Stars 37 sheets pp 11–15 11,–15. 20–24. (omit 25) 43–47. & 50–65. I send also all the work on the computation of the proper motions for the 7 stars from the Gill Gould and Melbourne data. Of the two stars mentioned, 1. A.G.C 25049, the original computation was sent to you on Sept 5th 60 I have no compu-
2. tation of it. The other, A.G.C 222 you will find among the proper motion sheets the first Star ⑥.

I think a re-computation should be made of A.G.C 222, 3715 and 25049.

What do "you" want done with the Melbourne Observations? Shall I carry them forward to 1900 with- or with-out proper motion? Since proper motions have been applied in the Melbourne Catalogue to 1880 I should prefer to do them as I have done the Gill Observations.

Sincerely yours.
Anna Winlock.

Computation of Proper motions for 1875
for 7 of the 30 S.P. Zone Stars. from the data:
Gould 1870 & 1875
Gill 1885 and
Melbourne 1880 The 7 stars are:
A.G.C 282 3715 17241 19098 25049 29042 1° from the Pole
A.G.C. 24176 8° .. ..

Four separate determinations have been made for each star as follows:

1st (a) Means of different authorities taken after reduction to 1875 is made in RA and Decl.

(b) Residuals from the mean taken in α and δ

(c) Date of Observation minus 1875

$$\mu \;\&\; \mu' = \frac{\text{Residuals in } \alpha \text{ and } \delta}{\text{Date of Obs} - 1875}$$

2nd. Same as above rejecting A.G.C data

3rd. " " " solved by Least Squares

4th (a) Residuals in α and δ 1875 found by subtracting the A.G.C data from each authority for 1875.

(b) $\dfrac{\text{Residuals from A.G.C}}{\text{Date Obs} - 1875}$

$$\mu \;\&\; \mu' = \text{Mean } \frac{\text{Residuals from A.G.C}}{\text{Date Obs} - 1875}$$ see Chauvenet Vol I p620

Nov. 20th 1896

Dear Prof. Rogers:

I have received your letters of Nov. 23 and 24 and it is quite clear about the chronograph sheets which I [illegible] to read them at the Observatory. I asked about the Melbourne Observations in my last letter because I want to work on them at home and complete as far as I can the work on the 80 South Polar Fundamental stars.

Sincerely yours

Anna Winlock.

Nov 30th 1896

Dear Prof. Rogers:

I will send in a few days the [illegible] paper which contain the values [illegible] 8232 [illegible] used only as [illegible] the [illegible] equinox of 1875.0 [illegible]

I enclose the computed [illegible] constants from the equinoxes of 1870 1875 and 1885 to 1900 respectively.

The computed values of the constants are:

For reduction from	z+l		z′−l′			
1870 to 1900	+0 11	25.525	+0 [illegible]	33.3[illegible]	+0 10	[illegible]1.601
1875 to 1900	+0 9	44.182	+0 9	37.999	+0 8	21.328
1885 to 1900	+0 5	48.578	+0 5	47.752	+0 5	9.791

No tabular values were used in the reductions to 1900 on account of a difference of .019 in the constants z+l and z′−l′ mentioned to you last April.

Sincerely yours

Anna Winlock.

Nov 30th 1896

Dear Prof. Rogers:

I will send by express in a few days the two Catalogues and the paper which contains the values of the constants $z'-\lambda'$ $z+\lambda$ and θ inserted on p 232, but these are the values used only in the reductions for the proper motions and are referred to the equinox of 1875.0

I enclose the computations of the constants from the equinoxes of 1870. 1875. and 1885. to 1900 respectively.

The computed values of the constants are:

For reduction from	$z+\lambda$	$z'-\lambda'$	θ
1870 to 1900	+0° 11′ 25″.525	+0° 11′ 33″.072	+0° 10′ 1″.601
1875 to 1900	+0 9 24.182	+0 9 37.999	+0 8 21.328
1885 to 1900	+0 5 42.578	+0 5 47.752	+0 5 0.791

No tabular values were used in the reductions to 1900 on account of a difference of .01″ in the constants $z+\lambda$ and $z'-\lambda'$ mentioned to you last April.

Sincerely yours
Anna Winlock.

Dec. 2d 1896

Dear Prof Rogers.

I send by express today the Cape Catalogue for 1885 (Dr. Gill's) and the Melbourne Catalogue for 1880 also the number of the "Memoir" with the constants for 1870, 1880 and 1885 inserted on p 232.

I delayed sending them because I wanted some data from the Catalogues.

I have not yet computed the constants 2+λ &c for the reduction of the Melbourne Observations from 1880 to 1900 but I will leave them for the present.

I think the reductions for the proper motions are wrong for the 3 stars A.G.C 222 3715 and 25049.

I have not done anything further with the chronograph sheets but expected to take them up regularly next week. I will begin at once. It will be a convenience to have them at home.

Sincerely yours
Anna Winlock.

Feb 22 1879 α Bootis (Read all wires Dec 7th [illegible])

h m s
14 8 6.71
11.78
15.44

wires ↓	read Dec 3	read Dec 7 Dem	
5			36.55
			41.91
			49.86
2	6.35	6.[illegible]	6.33
	9.84	9.78	9.84
	14.45	14.32	14.46
			36.98
			42.57
			47.58
		10	8.41
			12.62
			18.08
			33.74
			41.66
			47.48
			6.06
			10.48
			15.25
			35.95
			42.05
			51.58
		12.	5.28
			11.69
			14.70
7 3.	37.78		37.69
4.	41.82		41.81
48.58	48.58		48.58
		13	0.78
			8.57
			12.41
			32.01
			38.82
			42.78

h m s
14 2.40
6.70
13.52

wires ↓	read Dec 3 ↓	read in Dec 7 Dem ↓	
13	33.12	33.20	33.08
	37.62	37.62	37.65
	41.95	41.98	41.98
		15	7.51
			10.55
			12.60
15	31.12	31.15	31.12
	33.78	33.81	33.78
	39.44	39.48	39.48
			59.30
		16	2.52
			11.32
			29.70
			37.60
			45.38
			59.50
		17	5.15
			12.25
			31.28
			35.68
			40.51
			58.38
		18	2.00
			8.76
			29.74
			38.24
			41.84
		18	54.14
		19	2.56
			6.35
			30.12
			36.81
			45.05

Note: The second breaks are from $\overset{s}{.1}$ to $\overset{s}{.2}$ of a second thick
Chronograph pen must have been very coarse.

Mar 10th 1896

Dear Prof. Rogers.

I send the readings in full of the right ascension wires for two stars.

Line very heavy Feb 22 1879 α Bootis			Mar 1st 1879 α Ceti		
14h	10m	17.86s	2h	56m	13.50s
		20.00			15.80
		22.00			17.65
		24.50			19.60
		26.66			21.70
		30.06			25.82
		32.28			27.80
		35.30			29.90
		37.68			32.00
		39.90			34.03
		41.98			36.00
		44.18			38.12
		46.26			40.20
		48.68			42.24
		52.80			46.45
		54.98			48.00
		57.30			50.56
		59.50			52.51
	11	6.60			54.65

Sincerely yours
A. Winlock

P.S. The readings last sent were probably for Polaris and not for α Bootis.

Feb 19th 1897

Dear Prof. Rogers,

Mr. Winkley will send you to day by express the book containing the readings of the chronograph sheets for the year 1879.

The dates, names of stars and wires are from your list which begins Feb 15th and ends Dec 31st 1879.

I found that I could have the other two years prepared here so I did not send them to you for this Bond.

If you will send me back the book containing the readings of the Bonn for 1879 I will finish it before going on with 1880.

Sincerely yours
Anna Winlock.

May 6th 1897

Dear Prof. Rogers,

I sent by mail yesterday the list of stars for 1879 containing the dates and corres pon- which the book was prepared for the Chronograph readings for 1879. The book was sent about two weeks ago.

Sincerely yours

Anna Winlock

12

Observatory, Febr 1st 1897

Dear Prof. Rogers,

I find that I have the right ascensions and declinations for 1900 for all but 3 of your 30 South Polar Fundamental Stars near 3° 4° and 5° from South Pole. The positions are from Dr. Goulds 1870 and 1875 values brought forward by Fabritius method to 1900, except for the single position from Dr. Gills 1885 Catalogue which has been brought forward by Fabritius method.

I omit the positions of A.G.C. 38, 14883 and 25438 with the 3 stars above mentioned because they were not included in the original South Polar Catalogue.

I enclose the positions for 1900 for the 30 stars and I should like a list of any that differ sensibly from your values.

Sincerely yours
Anna Winlock.

2

30 South Polar Fundamental Stars

Dr Goulds positions A.G.C. & [illegible] & by Tab. thes formulae to 1900

	A.G.C. no.	R.A. 1900	Decl. 1900
	322	6h 12m 28.9s	-88° 55′ 8.6″
		3 3 54.4	-88 34 20.2
	17241	12 41 11.0	-89 15 0.7
	19098	14 16 54.6	-88 55 14.0
	25049	18 59 46.1	-89 15 16.9
	29482	22 37 5.5	-89 19 3.1
		5 59 3.0	-88 21 35.0
	11013	7 53 3.3	-88 34 24.8
	15781	11 23 46.8	-88 41 36.3
	28067	20 26 42.3	-88 9 10.1
	31530	23 13 8.5	-88 1 52.7
	31575	23 16 5.1	-88 8 18.3

from Dr. Gills 1888 positions
Gen. Cat. No. 417
8102 " " 31
brought forward to 1900
by [illegible]
formulae

see rejected list of original S.P. Cat.

	3392	4 29	-86 29 27.8
6°	9714	7 22 1.75	-86 52 11.4
	22327	17 6 6.82	-87 17 45.8
	24176	17 58 5.7	-87 29 51.4
	31876	23 29 42.27	-86 57 4.9
	7000	0 39 38.90	-86 14 54.0
	7651	6 6 9.81	-85 55 [illegible]
4°	14823	see rejected list	
	22180	16 23 34.56	-86 10 40.6
	30280 S1	22 12 36.23	-86 28 8.58
	31672	23 19 12.58	-88 15 23.4
	1800 To	1 43 7.39	-85 16 30.6
	7077	5 49 33.79	-84 50 8.6
5°	12088 [illegible]	9 11 17.73	-88 15 48.0
	16438	see rejected list.	
from	18321 S2	13 34 44.46	-85 16 24.1
Publ.	23696	17 30 0.32	-85 10 33.0
Obs.			

Apr. 6th 1897

Dear Prof. Rogers,

I have checked the constants for 1850 and get the following values:

	z + A	θ
1850 −0° 9′ 35″.017	−0° 9′ 36″.984	−0° 8′ 21″.383

I think you sent −0° 8′ 21″.382 for the value of θ to Waterville on Mar 30th.

I also take the α and δ 1900 by Brünnow's formulae for Dr Gould's 1870 place of B Octantis with and without his values of the proper motion applied, e.g. for,

α 1870 20h 55m 36s.595 and α1870+30μ 20h 55m 40s.695

δ 1870 −89° 26′ 38″.961 δ1870+30μ′ −89° 26′ 40″.695

I think you said that you had them already computed.

Sincerely yours,

Anna Winlock.

April 10th 1897

Dear Prof. Rogers

I send a copy of the [illegible] Polar Catalogue Vol XVIII and also another copy of the list of positions for 1900 of the 30 [illegible] Polar Distances that Stars.

I do not think any of the authorities give values of the proper motions except the later Catalogues, Dr Goulds or Dr. Gills and the Melbourne, the two latter you have, also the data from Dr Goulds Vol V. I will examine the older Catalogues and let you know if any are given. What 1860 places do you want? There are 3 Catalogues: viz

The Cape S[illegible]

Williamstown Cat. 18[illegible]

Santiago Catalogue 1860

I enclose the Gould Gill & Melb. proper motions for the 30 Stars. I have also added your Values, and many from [illegible] for comparison. Are you ready for the [illegible] sheets?

Sincerely Yours,

Anna Winlock.

30 S.P. Fund. Stars

Proper Motions

A.G.C. no	Gould 1870 μ	μ'	Melb. 1880 μ	μ'	Yale 1885 μ	μ'	Valentiner 1900 μ	μ'	Weiss's 1875 μ	μ'
1st [illegible]	s	"	s	"	s	"	s	"	s	"
222	−.009	+.021	+.005	−.07	+.012	+.022	−.006	−.07	+.124?	+.04
5715	—	—	.000	+.05	—				+.029	+.03
241	—	—	−.079	−.01	−.088	.00			−.070	.05
19098	—	—	−.12	.00	—					
25049	—	—			+.165	−.021	+.160	−.016	+.114	+.02
19042	+.151 +.187	−.007 −.058	+.133 +.156	−.05 +.06	−.130	−.019	−.031	−.032	−.152	+.05
2nd [illegible]										
—			−.012	+.01	−.014	+.02	+.023?	+.010	−.052?	−.03
11013			−.100	.000					—	—
15761									—	—
28067										
31530	+.021	+.016	+.020	−.02	+.026	+.02	+.016	+.015	+.065	−.02
31575										
3rd									+.044	+.12
38									+.058	+.20
5292									+.026?	+.14
9770	+.042	−.051	+.041 −.080	+.05 .000					+.086	+.01
23027							−.103	−.122	+.100	−.08
24176	−.106	+.113	−.102	+.11						
31876										
4th									+.164	+.00
1500									+.092	+.10
5601			−.010	+.03					−.082	+.03
7883									.000	+.01
8180			.000	+.04					−.087	+.05
7558	−.038	+.077	−.038	−.08	−.035	−.08			−.023	−.01
8672										
5th									+.028?	+.11
9220	−.007	+.106	−.007 .000	−.11 −.02					+.023	−.06
297									−.150?	−.07
12638	−.091	+.026	−.092	−.03	−.080	+.02			−.065?	.00
16438	−.034	−.005	−.034	.000					+.087?	−.02
18321	−.065	−.024	.066 .000	+.02 +.08	−.092	−.05			.00	+.02
23656										

& Melbourne
proper motions
for [illegible]

30 South Polar Fundamental Stars

Dr. Gould's positions A.G.C. & Vol. V by [illegible] formulae to 1900

	A.G.C. No.	[illegible]	R.A. 1900	Dec. 1900	
	222		$6^h\ 12^m\ 28.^s9$	−88° 55′ 8.6″	H.C.O. Vol. VIII × positions
	3715		3 3 54.4	−88 34 20.2	" "
1°	17241		12 41 1.0	−89 15 0.7	" "
Sculr	19098		14 18 54.6	−88 55 14.0	" "
46	25047	44	18 59 46.1	−89 15 16.9	" "
	29042	49	21 37 38.5	−89 19 3.1	" "
	20		5 59 3.0	−88 21 35.0	from Dr. Gill's 1885
	11013		7 53 3.3	−88 34 24.8	positions.
2	15781		11 23 47.8	−88 41 36.3	General Cat. No. 417
	25567		20 36 44.3	−88 9 10.1	No. 182 " " 31 brought forward to 1900
	31530	53	23 13 9.5	−88 1 52.7	by Bohnenberger's formulae
	31575		23 16 5.1	−88 8 14.3	Vol. VIII × positions all [illegible] 2° from South Pole.
	38	See rejected list of original S.P. Cat.			
	5092^2		4 29 7.30	−86 29 27.7	A.G.C. positions
	9770	17	7 22 1.35	−86 52 11.4	Vol. V positions only
3°	23067		17 6 5.82	−87 17 45.8	A.G.C. "
	24476	63	17 56 5.7	−87 39 51.4	" "
	31876		23 27 45.27	−86 57 4.9	" "

A.G.C. No	Vol. I. No	[illegible]			[illegible]			
		h	m	s	°	′	″	
7 0		0	39	38.90	−86	14	57.0	A.G.C. position only
7601		6	6	9.81	−85	55	5.9	" " "
10 80		see rejected list						
2 180		16	23	34.56	−86	18	42.6	" " "
30380	51	22	12	36.23	−86	28	25.8	Vol. I position only
31672		23	19	12.58	−86	15	33.2	A.G.C. " "
1.00	6	1	43	7.39	−85	16	30.6	Vol. I position only
7097		5	49	33.79	−84	50	8.6	A.G.C. " "
1 688	20	9	11	17.73	−85	15	48.0	Vol. I. " "
1438	27	see rejected list						
18321	32.	13	24	44.46	−85	16	24.1	Vol. I. " "
23 496		17	30	1.32	−85	10	32.	A.G.C. " "

Apr. 15th 1897

Dear Prof. Rogers.

I enclose the data for 1860 from the Williamstown and Santiago Catalogues for the 80 S. P. Fund Stars. [illegible] first the Cape Catalogue for 1860 that the Vol. XVIII x contains the data for 1° and 2° from the South Pole from this Catalogue under the Catalogue number 2451. As soon as I finish the Catalogue I will send the data for 3° 4° & 5°.

I understand about the proper motions, but for what Catalogues do you want them? all the 24 mentioned in Vol XVIII x or only those examined when you were here last winter?

For the Williamstown Catalogue the proper motions are for N. P. D. not Decl.

Sincerely yours
Anna Winlock

1860 Data

2

Williamstown Catalogue Melbourne Obs Vol I

30 South Polar Fundamental Stars.

No	Cat. No	R.A. 1860			no. obs.	Mean Year 1862+	adopted Proper Motion	N.P.D. 1860			no. obs.	Mean Year 1864	adopted Proper Motion
		h	m	s			s	°	'	"			"
2	10	0	13	23.88	4	62.5	+.037	179	8	29.58	3	62.5	-.025
49	432	17	48	7.39	26	62.2	+.132	179	16	40.85	40	62.2	-.018
42	480	20	37	23.09	11	62.3	.000	179	28	57.61	10	62.3	-.038
413	233	8	20	16.46	11	62.3	+.010	178	27	23.92	10	62.3	-.068
30	528	23	5	3.88	15	62.3	+.090	178	14	55.46	17	62.3	-.019
170	217	7	34	52.06	12	62.4	—	176	47	8.316	9	62.4	—
176	430	17	32	2.64	4	62.6	-.130	177	38	50.53	5	62.4	+.100
301	182	6	16	37.47	9	62.5 (+.118)*		175	55	13.52	8	62.8 (-.320)	
180	408	16	9	39.73	6	62.6	+.002	176	4	52.75	17	62.6	-.083
70	74	1	45	55.97	3	62.5	(-.320)	175	28	29.61	4	62.5	(-.311)
188	260	9	16	15.67	16	62.3	(-.108)	175	5	47.73	17	62.3	-.018
438	314	11	55	27.03	8	62.4	(-.041)	174	51	7.24	7	62.5	(-.322)
321	342	13	19	0.53	33	62.1	-.094	175	3	51.73	40	62.3	-.040

Note from Introduction to Williamstown Cat. p xxvi:

The adopted Proper motions when in brackets have not been used in reducing from the mean year to 1860 not being considered sufficiently well determined.

3

1860 Mats.

Santiago Catalogue Zone III

30 S.P. Zone Stars.

	G.B.S. No.	Cat. No.	mean R.A. 1860 h m		mean N.P.D. 1860 ° ′	″		
1°	25049	1670	17 46		179 16	48.72	26	58.5
		1670	17 48			41.87	12	56.2 S.P.
2°	31530	2260	22 5	1.96 2 59.8	177 14	55.66	2	59.8 = 12.40 11

No proper motions given in this Catalogue.
I send the mean values in R.A. and N.P.D.
and of the Clocks, if you want the separate
values please let me know.

4

Note: Mar 15th [illegible]

The catalogues examined when you are done are

Cape 1850 no proper motions given

White 1880 " " " "

Stone 1878 " " " "

Melbourne 1870 values of " " "

Stone 1880 " " " " "

New Gillis 1850 " " " and " " in a letter in the Preface.

I will examine the last three and see if any values of the proper motion are given for any of the 30 S P Stars and applied to epoch of Catalogue. Please let me know if there are all you want examined for Proper Motions.

A. C. W.

Apr 21st 1897

[illegible]

Sending the results of the ex-amination for proper motions of the 30 [illegible] stars [illegible] from the [illegible] Gillis Catalogue 1850 [illegible] 1850) [illegible]

[illegible] the current numbers [illegible]

In the New Gillis Cat., 25 of the 30 stars are given but only one has a proper motion and that is given in the Preface p LXII and it has been used in bringing the star forward to the epoch of the Catalogue, 1850.

In the Melbourne Cat. 1870, 15 of the 30

Apr 21st 1897

Dear Prof. Rogers,

I enclose the results of the examination for Proper Motions of the 30 South Polar Fund. Stars from the new Gilliss Catalogue 1850 (Washington Obs. 1890) the Melbourne 1870 and the Stone 1880 Catalogues.

If you had sent me the current numbers of the stars in these Catalogues I would not have had to identify the stars again.

I wish you would compare them with yours (which we picked out when you were here) for 3° 4° and 5° from the South Pole, and let me know if any disagree.

In the new Gilliss Cat., 28 of the 30 stars are given but only one has a proper motion and that is given in the Preface p LXII and it has been used in bringing the star forward to the epoch of the Catalogue, 1850.

In the Melbourne Cat. 1870, 15 of the 30

Stars are given of which 12 have proper motions used in the Catalogue. In the Stone 1880 Cat. 28 of the 30 are given of which only 10 have proper motions used.

The Cape Catalogue for 1860 has not been found yet. Can you have it?

You said I think, when you were here that for A.G.C 222 you get for 1900 R.A 0h 12m 32s.

My values are: for 1900 (by Romberg's method)

R.A = 0h 12m 30s.087 from Dr Gill's data Cat on p 102 No 3, 1885–1902
0 12 28.761 " A.G. Gould's " Vol. I No. 2 1870–1900
0 12 28.680 " " " " " " 1875–1900
0 12 28.669 " " " " A.G.C 222 1875–1900

Sincerely yours
Anna Winlock.

Proper Motions from New Gilliss 1850 Melbourne 1870 and Stone 1880 for 30 S.P. Stars 1° to 5° from South Pole.

	A.G.C. no.	Melbourne 1870 no.	μ	μ'	Stone 1880 no.	μ	μ'	New Gilliss 1850 no.	μ	μ'
1°	222	18	+.027	+.02	100	+.012	.00	137	—	—
	5715	178	—	—	1396	—	—	2097	—	—
	17241	—						14	—	—
	19098	—						574	—	—
	26949	922	+.180						—	
	29042	1067	−.016					603	—	—
2°	—	—						184	—	—
	11013	408	+.028					582	—	—
	15761	—						433	—	—
	28067	—						—		—
	31550	1182	+.022					417	—	—
	31575	—						249	—	—
3°	38	—			20	—	—	9	—	—
	5292	—			2026	—	—	2717	—	—
	9770	356	—	—	3713	—	—	4006	—	—
	23027	—			9270	—	—	12136	—	—
	24176	895	−.013	+.013	9725	—	—	12702	−.103	+.13
	31876	—			12199	—	—	16408	—	—

Letter Book
p77 correction

3° A.G.C. 23027
= Stone 9273 (1880)
= New Gilliss 12131 (1850)
not as given on p77
see Postal July 10 1897
p95 Letter Book

Proper Motions from New Gilliss 1850 Melbourne 1870 and Stone 1880 for 30 S.P. Transits 1° to 5° from South Pole.

	AGC no	Melbourne 1870 no.	μ	μ'	Stone 1880 no.	μ	μ'	New Gilliss 1850 no.	μ	μ'
1°	222	18	+.027	+.02	100	+.012	.00	137	—	—
	6715	178	—	—	1396	—	—	2097	—	—
	17241	—			7017	−.088	.00	8714	—	—
	19098	—			7731	—	—	9674	—	—
	26949	922	+.180	+.03	10085	+.075	+.02	—		
	29042	1067	−.016	+.03	11301	−.130	+.01	14603	—	—
2°	—	—			2901	—	—	4184	—	—
	11013	408	+.028	−.03	4497	−.014	−.02	5582	—	—
	15761	—			6404	—	—	7433	—	—
	28067	—						—		
	31530	1182	+.022	−.01	12069	+.036	−.02	16217	—	—
	31575	—			—			16249	—	—
3°	38	—			20	—	—	9	—	—
	5292	—			2026	—	—	2717	—	—
	9770	356	—	—	2713	—	—	5206	—	—
	23027	—			9270	—	—	12136	—	—
	24176	895	−.103	+.013	9725	—	—	12702	−.103	+.13
	31876	—			12199	—	—	16408	—	—

Observatory
Nov 22

Melbourne 1870				Stone 1880			[illegible] 1850		
Argt no	no.	μ	μ'	no.	μ	μ'	no.	μ	μ'
700	—			300	—	—	399	—	—
7601	301	+.034	+.04	2881	—	—	3948	—	—
14883	—			6011	—	—	7431	—	—
22180	825	+.015	+.05	8912	.000	+.04	11664	—	—
30380	1123	+.040	+.09	11665	.035	.08	15516	—	—
31672	—			12124	—	—	16321	—	—
1800	113	.000	.00	725	—		997		—
7097	—			2724	—		3670	—	—
12688	467	-.110	-.03	4967	-.080	-.2	6148	—	—
16438	590			6703	—		8329	—	—
18321	673	-.075	.0011	7387	-.252	+.05	9338		—
23696	—			9538	—	—	12559	—	—

Proper Motions for N.P.D. not Decl. Proper Motions for N.P.D. not Decl.

I received [illegible] to-day [illegible] that the [illegible] Stone 1880 in [illegible] have [illegible] your last was written

On receiving [illegible] the [illegible] Cat. is [illegible]

[illegible] the South [illegible] for your 3 [illegible] I find the [illegible] Cape Cat. for 1860 [illegible] the data [illegible]

If the Cape Cat. 1860 is in the College library I will examine it and send you the results.

Sincerely yours
Anna Winlock

Observatory
Mar 2d 1887

Dear Prof. Rogers,

I received both of your letters yesterday, I had already sent the Proper Motion data from Stone 1880 in my last letter which must have reached you just after your last letter was written.

Mr Kiernan sent me up the 1840 Cape Cat. this morning and I am afraid the 1860 Cat. is not in the College Library either.

I enclose the Cape 1860 data taken from A.G.C. VII & VIII & for 1° 2 and 3° from the South Pole for your 30 stars and I find the _yearly_ Cape Cat. for 1860 from which I have taken the data from 4 and 5° which I also enclose.

If the Cape Cat. 1860 is in the College Library I will examine it and send you the results.

Sincerely yours
Anna Winlock

2

Cape data 1860 = Cat. no. [illegible]

30. S. P. Pencil. [illegible]

	A.G.C. no.	1860 Cape No.	R.A. 1860	No. obs.	Date 1800+	Decl. 1860	No. obs.	Date 1800+
1°	202	9	0 13 21.58	42	53.1	-89° 8′ 29″.15	46	53.0
	17221	187	12 29 50.92	57	58.5	-89 1 48.30	59	58.4
	25049	794	17 48 7.95	27	58.0	-89 16 40.87	86	57.5
	29092	982	20 37 20.79	50	60.5	-89 28 57.96	64	60.6
2°	11013	324	8 20 17.23	7	61.3	-88 27 23.32	24	57.8
	31530	1125	23 5 33.30	104	58.5	-88 14 55.73	126	58.2
3°	24176	766	17 32 22.69	16	57.1	-87 38 51.45	25	57.8

Yearly Cat. 1860 data for 4° and 5°

	A.G.C. no.	Yearly Cat. No.	RA 1860	Date 1860+	No. obs.	N.P.D. 1860	Date 1860+	No. obs.
4°	22180	391	16 9 40.12	0.63	10.	176° 4′ 52″.23	0.62	7.
	80360	581	~~22 3 34.58~~	~~0.37~~	~~15~~	176 4 58.25	0.63	5.
	30360	581	22 3 34.58	0.37	15	176 40 24.78	0.40	8.
						176 40 25.06	0.38	8.
5°	18320	311	13 19 1.18	0.53	1	175 3 53.27	0.53	1.

Observatory
Aug 24 1897

Dear Prof. Rogers,

I enclose the data from the Cape Catalogue for 1860 which was found at the College Library after my letter with the data from the Yarnall 1860 Cat. had been sent.

The Proper motions have been used in bringing the places forward to 1860 and are given for N.P.D. not Decl.

For A.G.C. 31530 from the Santiago Cat. 1860 I gave you $22^{h}\ 5^{m}\ 1^{s}.96$ it should be 23$^{h}\ 5^{m}\ 1^{s}.96$ Star no. 2260 Santiago Cat.

Sincerely yours
Anna Winlock

Cape Catalogue 1860

A.G.C. no.	Cape No.	R.A. 1860 h	m	s	No. obs.	Date Obs.	μ	N.P.D. 1860 °	′	″	No. obs.	Date Obs.	μ′
1°													
222	9	0	13	24.98	42	58.13	+.040	179	8	29.15	46	58.14	.00
17241	497	12	29	50.92	57	58.48	-.020	179	1	48.30	59	58.35	-.04
28049	784	17	48	7.95	27	58.05	+.104	179	16	40.89	86	57.82	.00
29042	982	20	37	20.79	50	59.36	-.146	179	28	51.96	64	58.99	+.01
2°													
11013	324	8	20	17.23	7	61.32	-.014	178	37	13.32	24	57.75	.00
31530	1125	23	5	3.30	104	58.62	+.037	178	14	55.73	126	58.25	-.02
3°													
24176	766	17	32	22.69	16	57.06	-.107	87	38	51.45	25	57.77	+.11
4°													
7601	235	6	16	37.44	6	56.21	-.008	175	55	12.70	6	56.27	+.04
22180	674	16	9	40.31	22	58.44	+.018	176	4	52.81	22	58.44	.00
30380	1064	22	3	34.83	50	58.69	-.030	176	40	24.79	57	58.46	-.08
5°													
1800	61	1	45	55.72	8	56.54	+.026	175	28	30.09	8	56.53	-.01
12688	377	9	16	16.33	10	56.33	-.069	175	5	48.85	10	56.33	-.01
18321	536	13	19	1.07	28	56.64	—	175	3	52.49	28	56.64	+.04

Data for 30. S. P. Fund. Stars.

1

Observatory
Apr 26 1897

Dear Prof. Rogers

I have understood about the proper motions and examined the Introductions of the different Catalogues and I have already sent you notes as to whether the proper motions were used or not in bringing the data forward from the mean year of observation to the epochs of the different Catalogues. Proper motions are given in the Stone Catalogue for 1880 and have been used in bringing the data forward to 1880. I send a list of the other Catalogues for which the Catalogue proper motions have been used in the same way, in the printed Catalogues.

Sincerely yours.

Anna Winlock.

2

S. P. Catalogues for which proper motions are given and used in bringing the data forward from the mean year of obs. to the Epoch of the Catalogue.

Gilliss 1850 (Washington Ob. 1880)
Cape 1880
Melbourne 1870
Stone 1880
and Williamstown 1860 except for bracketed values which have not been used in bringing the data forward from their mean year to 1860, because the bracketed values were not sufficiently well determined.

I will put the proper motions together for the above Catalogues and send you the list, and also look up the doubtful observations received this morning.

C. E.

Apr 28 1897

Dear Prof. Hagen,

I have put together the proper motions which have been used in bringing the stars forward to the epochs of the new Fellers 1850, Cape 1860 Williamstown 1860 Melbourne 1870 and Stone 1880 Catalogues.

I enclose also the result of the examination of the doubtful observations received on Apr 26th The bracketed values you sent appear to be the wrong star. I send the correct data for these cases when the star occurs in the Catalogue indicated.

Sincerely yours
Anna Winlock.

[illegible] [illegible] used in the Catalogues for bringing [illegible] [illegible] the [illegible] to [illegible] of Catalogues. 30. S. P. Stars

New Yellow 1850 · Cooper 1860 · Armagh · Yarnstone Melbourne 1860 · 1870 · Stone 1880

[illegible] No. μ μ' No. [illegible] μ No. μ μ' No. μ μ' No. [illegible]

12. [illegible] +037 −025 18 +027 +02 110 +012 [illegible]

41 [illegible] −016 −0 [illegible] 727 −050 [illegible]

779 784 −014 [illegible] +132 −018 922 +180 +03 1073 +075 [illegible]

94 −145 [illegible] 1080 500 −038 1067 −016 +03 1136 130 [illegible]

01 324 −014 [illegible] 83 +010 000 408 +028 −03 4491 [illegible]

5.2 1125 +02 −02 [illegible] +010 −019 1182 +022 −01 12063 [illegible]

7.30

76 12702 [illegible] −13 [illegible] −107 [illegible] 11 450 −130 +100 895 −103 +13

$\mu + \mu'$

01 [illegible] 18 not used 301 −034 +04

2150 672 +014 .00 408 +002 −083 825 +015 −05 5915 000 +04

3.90 1011 .030 [illegible] 1123 −040 −09 11655 −035 [illegible]

$\mu + \mu'$

[illegible] 61 +021 [illegible] 74 not used 113 000 00

μ

8 277 −40 [illegible] 160 not used −018 467 −110 −03 4967 −050 [illegible]

8 [illegible] μ & μ' not used

7 323 — [illegible] 044 642 −094 −040 673 −075 .00 7387 −052 [illegible]

Data for doubtful observations

Cata. R.A. Mag. Date of Obs. Decl. or N.P.D. No. obs. Mag.

C 25049 not in New Gilliss (Wash. Obs. 1890)

Gilliss 1850 (old) 1700 17h 30m 2.68s 89* 51.7 −89° 16′ 22.6″ 88

Gilliss 1850 3348 17 30 2.75 7 52.70 −89 16 —

Cape (Stone) 1860 784 17 48 7.95 27 58.05 +.04 179 16 40.89 86 57.52 u .00

1860 432 17 48 7.39 26 62.2 +.32 179 16 40.75 40 62.2 u .018

C 23715 not in old Gilliss (Wash. Obs. 1868)

Gilliss 1850 2077 3 38 6.45 4* 51.44 −88 45 2.4

C 28042 not in old Gilliss

Gilliss 1850 14603 20 16 34.71 9* 51.14 −89 30 52.3

C 15761 not in old Gilliss

Gilliss 1850 7933 11 27 51.57 5* 51.33 −88 25 5.0

1870 36 11 26 22.86 4 71.5 178 32 18.6

C 31575 not in (Stone) Cape Cat. 1860

C 9772 not in old Gilliss

Gilliss 1850 5006 7 37 5.08 7* 51.15 −86 45 46.7

rence 1870 356 7 31 43.84 30 67.2 — 176 48 28.52 69 67.5 —

the New Gilliss Cat. only 1 date of Obs. and 1 column of "no. of obs." given

Observatory
May 7th 1897

Dear Prof. Rogers,

I enclose values of the proper motions of 6 of your 30 stars from a paper by E. J. Stone published in the Trans. Roy. Ast. Soc. Vol XLII p136.

The proper motions in R.A. were determined from Fallows Johnson Henderson and Cape 1840 and in N.P.D. from the same authorities including Brisbane and they are uncertain in the 3d decimal place in RA and in the 2d decimal place in N.P.D.

The Cape Catalogue 1860 was published in 1873 and this volume of the Roy. Ast. Soc. Trans. in 1875.

A.G.C. no.	R.A.	N.P.D.	adopted proper motions in R.A.	in N.P.D.	Cape 1860 no.
11083	$8^h 20^m$	$178° 27'$	$-^s.014$	$-^{''}.02$	324
24176	17 32	177 38		+.11	766
25049	17 48	179 16	+.075	+.02	784
29042	20 37	177 28	−.130	+.01	982
30380	22 3	176 40	−.029	−.08	1064
31530	23 5	178 15	+.036	−.02	1125

R. Wm Cook

Observatory
May 28 1897

Dear Prof. Rogers

Three boxes of record books and MSS were received about two weeks ago.

I enclose a list of the record books received.

The series are now complete except for the following which are missing from the shelves. Are they not in Waterville?

A 20-34 36-40 43,
B 3-9,
D 17, 11-28,
E 1-5, 8, all of series G.
J 7 20-27, all of series L.
M 22 23 25 28 33 40 42.

Series L and 5 books of series M were sent to you in Apr. 1896

Sincerely yours
Anna Winlock.

List of record boxes
received from Waterville May 1897

A 35, 41, 42 = 3 boxes
C 1 – 28 including C6' = 24 ..
D 3, 4, 6 – 16, 18, 19, 29 – 33 = 20 ..
E 6 7, 9 = 3 ..
F 1 – 6, 8 – 9, 28 – 30 = 21 ..
H 1 – 49 = 49 ..
unlettered record boxes (see p. 3) = 6 ..

Bound vols of H.C.O Annals
XV part II
XXV
XXXV

List of 6 unlettered record books
received from Waterville May 1897
designated and labelled as follows after
examination of contents.

O 20 Stars to be observed with East Transit
R.A. and Dec 1870 (Prof. Searle says it belongs to
this old series O)

P1 Observations of Tempels Comet May 14 – July 22
1873 and of Asteroids Nos 109, 112, 121 & 33 (Polyhymnia,
May 18 to Dec 22 1873
Periodicity of Ruling Machine Screw
Apr 9 1877 to May 10 1877.

P2 Preliminary Investigation of Ruling
Machine Screw.
Discussion of asteroid No 112 Iphigenia
Elements & Ephemerides 1873 1874, and
of No 109 (Felicitas) Ephemeris 1875 &

P3 Asteroid No 109 Elements and Ephemerides
1877 1878

P4 Reduction of Bonn 1855 Groombridge 1810
and Lalande 1800 to 1875.0

P5 Readings of Thermometers G1 G2, U Bar ~~st~~standard
Half Metre from Jan 30 to Apr 19 (year not given)

5 June 1887

Dear Mr. Rogers,

I enclose a list of the Zone MSS. received with the Record Books last month. I have kept it in a paper box labelled according to the enclosed list. The Chronograph readings for 188- will be ready the first of next week. Shall I send them to you?

How are the proper motions for the 80 South Polar Stars?

Have you seen Mr. J. G. Porter's criticism of Zone Cat. proper motions exceeding .12 s in the Ast. Journ. 398. There are cases of precession

3181 " precess should be $4^s.5581$ not $4^s.4581$"

3891 " " minus ^{s} too great"

6486-7 " ^{s}

Sincerely yours
Anna Winlock

14 June 1897

List of MSS Zone 50°–55°

[illegible] [illegible] [illegible] in May 97

Sup [Letters "[illegible]" introduced by Prof. R. [illegible] [illegible] [illegible]

I [MSS. Vol. XV part II "The Cat. Stars" 50°–55°]

II [MSS Vol XXV Proper Motions 50°–55°] contains:

1. "Provisional Proper Motion Discussion"
2. "Proper Motion Discussion"
3. "Preliminary List of Proper Motions" 2 packages, one of them also [illegible] Separate Results for R.A. and Decl. for 1875.0

Comparison of [illegible] [illegible]

III [MSS Vols. XXXV, XXXVI 50°–55°] contains:

1. "Journal of Zones"
2. MSS relating to Journal of Zones
3. Printed copy of Vol XXXVI (unbound)

IV [MSS. relating to Vols XV, XXV, XXXV, XXXVI, Errata, Table from Pub. XIV & XVII of Ast. Gesell.]

Contains besides the Errata (4 pp) and Tafeln zur Reduction von Sternorten auf das System Fundamentalcatalogs für die Zonenbeobachtungen der Ast. Gesell. Vols XIV & XVII von A. Auwers Separat-Abdruck aus den Astr. Nachr. Bd 134,

1. "Reduction of Inclination Threads by Miss Bond"
2. "Checking of Work" relates chiefly to Vols. XV & XXV

14 June 1897

Dear Mr. Rogers,

I received on the 10th the blank paper and also the sheets relating to the proper motions of the 30 South Polar Stars namely:

"Comparison of Series I with Series II" 1875.0 places 10 sheets

"Results in α and δ for 1900" 1 sheet.

I shall be glad to keep them until you need them.

No other copy of the 539 Star list for 1875.0 can be found.

One South Polar plate has been marked and ready for some time to send to you, but since you do not need it at present and better plates are expected I will delay sending one until the fall. I am sorry to hear that you are not well.

Sincerely yours

Anna Winlock

28 June 1897

[illegible] Mr. Rogers

What do you want done with the Chronograph Reading for 1881? and also the Sun Sheets which have not been read?

Are you coming and when? I am not going away until July 28

A. W.

July 10th 1897

I find that I sent you the Stone (1880) & New Gillis (1850) correct numbers for A.G.C 23025 instead of for A.G.C 23027.

A.G.C 23027 = Stone 9273 = Gillis 12131
A.G.C 23025 = Stone 9270 = Gillis 12136

as no proper motions are given in either Stone or Gillis A.G.C 23027 the data was sent.

A. W.

August 2, 1897.

Dear Miss Kinlock:

I returned to Cambridge to-day and found your postal. I will give the values below.

	D4849								D4885.							
	x	y	A	B	C	D			x	y	A	B	C	D		
1	—								15.3	48.8	99	98	30	32	-1835.0	-68.6
2	—								15.4	47.7	72	21	55	108	-1824.5	-90.1
3	—								15.8	56.7	15	25	115	105	-1800.7	+381.8
4	16.2	47.4	105	87	25	43	-1784.6	-116.7	16.2	47.3	114	81	15	18	-1788.5	-114.5
5	16.4	44.8	98	17	32	111	-1781.8	-246.5	16.4	44.9	81	04	45	125	-1775.7	-241.0
6	16.6	51.4	36	79	93	50	-1756.8	+96.7	16.6	51.4	45	75	88	55	-1759.7	+98.5
7	—								17.1	56.2	115	105	15	25	-1736.1	+349.4
8	17.8	47.3	10	84	120	45	-1693.5	-115.7	17.8	47.4	19	79	109	50	-1697.5	-113.7
9	18.0	46.4	127	60	02	70	-1688.6	-158.4	17.9	46.5	05	55	125	71	-1691.4	-157.2
10	18.5	53.4	66	80	65	50	-1663.4	+201.7	18.4	53.4	70	75	58	55	-1665.6	+208.7

Sincerely,

S. E. Woode

Sept 29 1897

Dear Mr. Rogers,

Mr. Gerrish will send you by express the books and chronograph sheets you wanted which relate to the absolute work.

The box contains:

1. The Chronograph Sheets on which observations of the Sun are found from Sept 5 1879 to Dec 31 1881
(I enclose a list of the sheet numbers.)

2 The record book in which ~~the~~ the reading of the Sun for Sept 5 1879 has been recorded

3. The record book in which the readings of the Stars for 1881 were made 'with-

4 The list received from Waterville of the Stars and dates for which readings were desired for 1881.

5 Long note book of "Waterville Measures of Plate B 5721 (?)" made from Nov 15 to 26 1895

The heavy plates have not been received from Arequipa yet. The other B1607 will be sent to you in a few days,

Sincerely yours
Anna Winlock.

1.

Dates of Observations of Sun

From Sept. 5, 1877 to Dec. 31, 1881. Following are sheets sent Prof. Rogers.

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Oct 29 1897

Dear Mr. Rogers

Mr. Gerrish will send by express the book containing the chronograph readings for 1880, the original list of dates for 1880 received from you and the 539 star list for 1878 which you wanted some time ago, none nearer 875 can be found.

Sincerely yours
Anna Winlock

Copies of the American Ephemeris for 1879, 1880 and 1881 have been sent to you today.

A. Winlock

23 Nov. 1897

Mar 21 1898

Dear Mrs Rogers

The five boxes came safely on Saturday Mar 19th.
Prof Pickering says that it will not be necessary for Mr. Backliffe to come down and set up the machine, and that it will be quite satisfactory to put the $4.25 on your bill.
I will write again and will let you know when the machine has been received.

Sincerely yours
Anna Winlock.

16 July

My dear Miss Bond,

I received today and the copy of the Journal pp 1-16 with notes pp 1-3. I will let you know if any changes are necessary.

Mr Gerrish will send by express the ten Books F 68-77 on Monday the 15th and al about 200 sheets of paper.

Sincerely yours

Anna Winlock

---

15 June 1888

Dear Miss Rogers,

Do you remember anything about a correction that has been applied in red ink in the Books (F 67-85) to the mean of the R. A. wires for a few stars or do you know where it was obtained? Will you please ask the assistants in Waterville if they can give you any information in regard to it.

Sincerely yours

Anna Winlock

23 July 1898

My dear Miss Bond,

I have examined parts of the copy of the Journal of the 1879–1881 Observations from #67 and I would make the following suggestions in regard to the copy and notes.

1. Enter in Journal the Circle Readings where given even if the Rt wires are not given.
2. Repeat the minute of Circle Readings
3. Enter means of 9 wires only when given and do not make notes; do not enter if mean of 9 wires and one other group are given but make notes.
4. Where there are 1 decl wire and 2 Circle Readings which differ 1". or less, take mean of the 2 Circle Readings in books and enter same in Journal.
5. Have a note for every blank in copy.

I will send you the corrected notes.

Sincerely yours

Anna Winlock.

Sept 20
8

My dear Miss Bond,

The ten books #68-77 have been received and also the copy of the Journal.

The remaining books #78-88 will be sent by express today with about two sheets of ruled paper.

Sincerely yours
Anna Winlock.

Nov 5 1900

Dear Miss Bond

I have examined the first part of the 6 Coast Tables for Red. [illegible] and return it with notes. [illegible] anything [illegible] to interpolate [illegible] I send some double sheets to be used for the [illegible] values. The constants a b c &c used [illegible]

I'm preparing [illegible] the fraction of day will be .5 [illegible] same date, I think we can leave the fraction of day for the 1882 observations for the present.

Please [illegible] all the figures entered in the a b c Book and also the cases of disagreement of constants mentioned in your letter of Oct. 17 which you have corrected. The list of [illegible] cases of constants to be examined, if not already entered, need not be, if you will keep the notes.

I enclose the computation of Red. to App. Pl. for 9 H Draco and a note on 7 [illegible] for use in the computation of the constants [illegible] be checked. If the work in Book I is clear, it can go on.

Sincerely yours
[illegible] Winlock

Miss S. C. Bond
[illegible]

Nov 5 1900

Dear Miss Bond,

I have examined the first part of the β Cass. Table for Red. to App. Place and return it with notes. Wherever the 2d difference amounts to anything, as it does in this case, we ought to interpolate into the middle first. I send some double sheets to be used for the Interpolated Values. The constants a b c &c used should be for 1880.

In regard to DC Obs, the fraction of day will be .5 later than for the Rt. Asc. on same date. I think we can leave the fraction of day for the 1882 observations for the present.

Please save all the papers connected with the a b c Book and send me the cases of disagreement of constants mentioned in your letter of Oct. 17 which you have corrected.

The list of N.A. cases of constants to be examined, if not already covered, need not be, if you will keep the notes.

I enclose the computation of Red. to App. Pl. for 9 H Draco and a note on 7 Andromedae for which the computation of the constants better be checked. If the work in Book I is clear, it can go on.

Sincerely yours
Anna Winlock

Miss S. C. Bond
Owls Head Me.

Observatory Jan. 30 1901

Dear Miss Bond,

I find these questions, in your letters, on the reductions to apparent place which I have not answered before.

When a date comes at the end of a year, do not use the next date in January of the following year, but go back a few dates and keep in the same year.

For the dates not in Ledger and in Harbeit or vice versa for which you used Ledger, (they ought to agree but cover all dates in the red. to app. pl.

Send book of reductions when it is finished.

Omit all reductions on the Tabular values for the present.

The reductions for the N. A. Mars may be continued after the book of reductions is finished.

There is an error in Naut. Alm. Nov 4 1881 N 251 log A should be .0582 not .0882 as you have pointed out, but I do not find it given in the Errata in 1882.

Sincerely yours
Anna Winlock.

Mar 13 1901

Observatory 5 Mar. 1901

Dear Miss Bond,

I find, in order to check the reductions to apparent place in Book I, which was received on Feb. 16th, that I shall need the Star-list Book to check the dates, and the book of Constants a, b, c &c. Please send these two books to the Observatory by express. Perhaps it would be a good place to start a new book, Book II, before sending these. When you begin on the new book please omit the last step of the reduction, the multiplication of the daily difference by the fraction of the day, as this will be done to better advantage by tabulating the results. Please send me also for examination a page of the Ledger containing the reduction to apparent place taken from the Nautical Almanac for a star with declination which you have done.

Sincerely yours
Anna Winlock

Miss S. C. Bond
Old Head Pike.

Mar 13 1901

Dear Miss Bond

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9 H Cannell … letter

errors you h … + p251

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over $.2^d$ … sport

N.A. facts. … Apps

be given … in all

cases. Use fract. 8.9^d as it stands + do not use nearest $\overset{d}{\text{day}}$

Sincerely Anna Winlock.

ARCHIVES?

Anna Winlock

Inter - Observatory
Correspondence
1896 - 1901

including instructions
from her (descendent of
3rd director of Observatory)
to Miss Bond, a descendent
of the first director.

D.H.

Mar 13 1901

Dear Miss Bond

Have chk'd the app's of Ledger 48 Ceph + 9 H Camel + return them. Have corrected the two errors you have found in N.A. 1881 p 249 Apr 16 by D + p 251 in by A. The Star List + Constant abc books came safely. To find whether the L.C. obs precedes or follows the U.C., take the Sidereal time mean noon T, from pp 324–329 N.A., add 12^h to the Rt to get the L.C., if this precedes T subtract $.5^d$, if it follows T add $.5^d$ e.g. Mar 3 '79 9 Camel Rt = $4^h 42^m$ T = $22^h 47^m$ Rt–T = $0^d.2$ = UC LC obs at 16^h which follows UC $.5^d$ ∴ LC = $.7^d$

The App Pl on pp 275–323 N.A is the same for an upper transit in Camb. as in Wash., except for the diff in long. $0^d.2$ and may be taken out regardless of the fract. of day in margin except for dates on which there are two transits of sidereal 0^h, indicated by a 9 day interval in the margin. Regard the fract. of day in these cases + also when Ledger + N.A fract's differ but a lt, as I concluded in Apr $13^d.9$ $4^d.9$ was the corr'n multiplier; look up cases where differ over $.2^d$ Disregard the fract of day when the Ledger + N.A fracts. agree exactly. The differences of the App Pl given in cols 2 + 3 are for 10 day intervals in all cases. Use fract. $8^d.9$ as it stands + do not use nearest day 9^d

Sincerely Anna Winlock.

Pg 1

Directions to Miss Bond.

(Absolute work.)

Determination of hourly rate of the clock.

For this purpose we will deal directly with the reduced times of transit of the stars, that is to say, for any individual star the mean of the transits over the wires reduced to the fictitious "mean wire" which mean reduced time we term T.

We will use only those stars which are within the limits in declination of +20° to -20°.

There are about fifty two stars which have been observed and are available for this purpose, a list of which will be found accompanying this paper.

In preparing for this work it will be necessary to use one or half-sheet for each of the fifty two stars, or more, if necessary, rather than crowd a sheet.

The order of the work will be as follows:-

First:- From list of stars given you put designation and declination (approximate to tenth of degree) for each star at top of paper.

Second:- Put in ledger form, for each star the dates of observation to hundredths of a day.

Hourly rate—continued. May 2

[illegible] in mean time. For getting this material you will [illegible] two sources. In book designated M25 will be found [illegible] each star the dates of observation from [illegible] to Jan 1882 inclusive. The hundredths of a day are given on half-sheets in four envelopes designated "Ledger of observations of each star." As these half-sheets will of course be the dates also found in M25 so that at first sight it may appear to be unnecessary to use M25, but I think it is better to do so, so that there may be no omission of dates in the accidental loss of any of the sheets, and that in procuring the hundredths from the half sheets you really check the date taken from book M25

See remark on Sept 5

Third:— In the next column write for the [illegible] dates of observation for each star the corresponding value of T referred to in the opening paragraph.

We will investigate and finally determine the rate of the clock by comparing, for each star individually, the successive values of T. On account of the fact that owing to effects of precession, nutation, and aberration the star's apparent place is constantly changing from day to day, and that consequently the interval between two consecutive transits of a

between two consecutive transits of a

star do not represent exactly a whole sidereal day, we must, in comparing two consecutive values of T, allow for change in the star's place in the sky. This will be the next step.

[illegible]

rate with sign obtained by dividing the value given in the previous column by hourly form

Fourth:

On the half sheet, "Ledger of observations of each star", in addition to the hour readings of the day already alluded to, will be found the correction for mean to apparent place, which represents the change of position of each star. By changing the sign, we have the correction of apparent to mean place. For each star correct T by the value of apparent place to mean place, which resulting quantity will be placed in the column to the right of T. [One meant that it / it will be better to write down first this [illegible]] The nearest hundredth of a second will be sufficient for determining hourly rate.

~~See remark on page~~

See remark on page 5

Fifth: The next column will contain the successive differences, with proper sign, of the corrected T's for the various dates of observation, for each star.

Sixth: The next column will contain the resulting daily rate, after dividing the difference in previous column by the elapsed number and fraction of days between successive dates of observation.

[illegible]

next column will contain the hourly

Eleventh: The [illegible] column [illegible] the hourly rate with [illegible] in the previous [illegible].

rate with sign as determined by dividing the value given in the previous column by twenty four

Remarks:

In filling out the last column do not use results determined from any period longer than three days. This is important because the instrument, the meridian circle, can not be assumed to be steady enough for this purpose, longer than this period.

Remark. When the work is finished, it will be necessary to collect all the results in Ledger form for each day of observation, which may be done, using one half-sheet for each date. In doing this write name of star and approximate declination to tenths of degree. No means need be taken. When the work has progressed as far as this, the results and material, can be sent to Cambridge.

J. H. Dunne

See page 114
was improperly
removed.

[illegible]

[illegible] date of observation in [illegible] the first in [illegible]
[illegible] date of observation in 1881 and the first in 1882.
For these the rates must be determined
in Cambridge.

Remark:

The print of "T" will
be found on mss. in the twelve envelopes
called "Journal".

J. A. D.

Hourly rate continued

Remark

With regard to directions given on page 3 under heading
Fourth there will be the following exceptions.
The rate by the method indicated will not
be determined for
The last date of observation in 1879 and the first in 1880
" " " 1880 " 1881
" " " 1881 " 1882
for these the rates will be determined
in Cambridge

The page 114
was purposely
removed.

AUG 2 1896