Computing Antarctic Ozone

Jonathan Shanklin

Head of MOMU

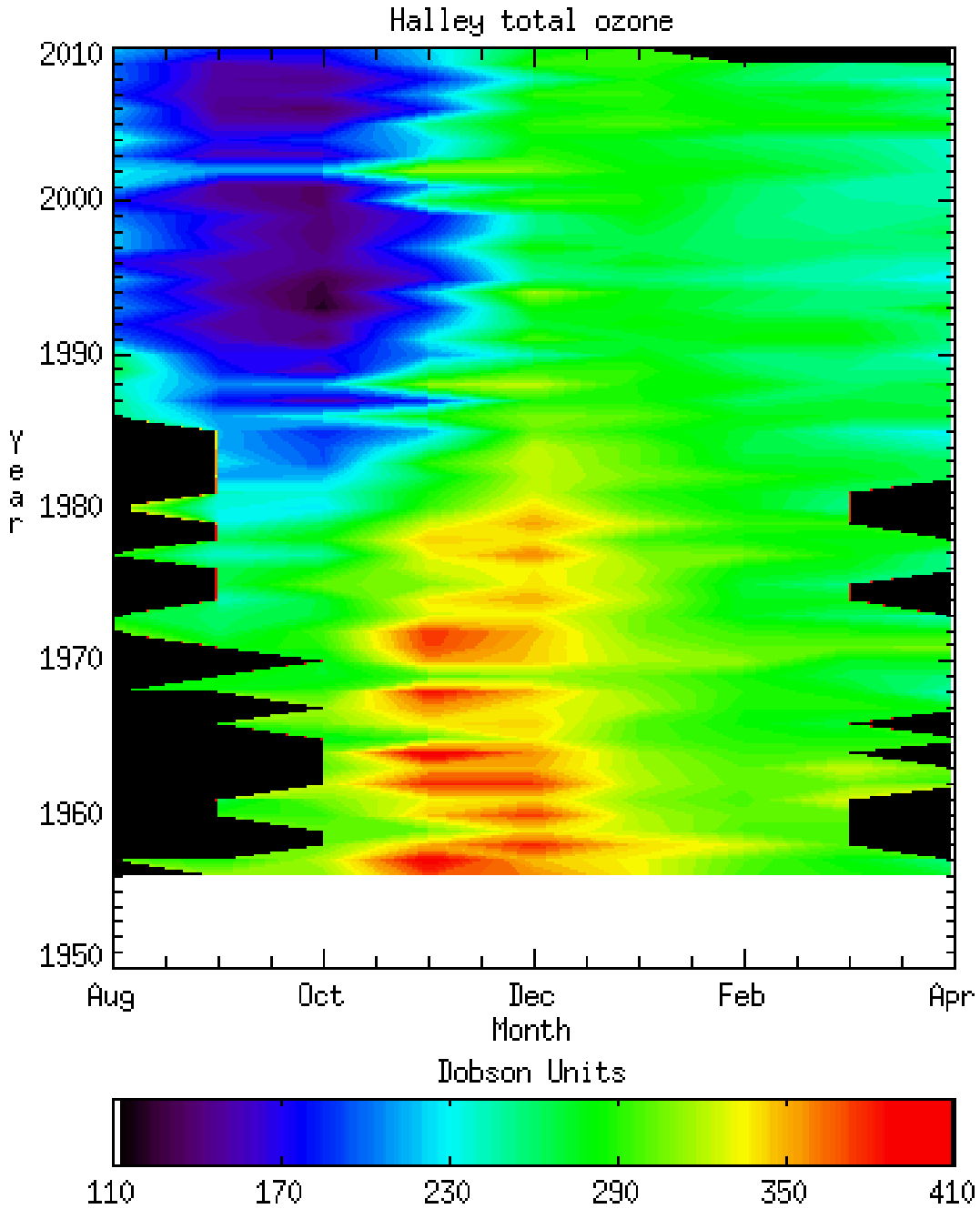
The Meteorology and Ozone Monitoring Unit of the

BRITISH ANTARCTIC SURVEY

OZONE

Observatory HALLEY BAY *No. of Instrument* 31

OBSERVATIONS	Date	21 Nov 77								
	Wavelengths	CC'	ADZC	CDAADC	AD2B	CDAADC	CC'2B			
	Time	0829.10	1043.10	1452.20	1455.40	1644.20	1648.20			
	Sun or Sky	ZC								
	R_A or R_C	122.9	193.5	129.2	193.3	154.1	118.3			
		122.1	191.8	130.0	193.5	156.1	118.4			
		122.2	190.8	218.2 218.5	193.6	257.7 257.9	118.8			
	R_D or $R_{C'}$	182.7	50.2	84.5	51.5	100.5	215.8			
		183.1	54.0	84.8	51.7	100.8	215.8			
CALC. OF N	Mean R_A or R_C									
	n_A or n_C									
	N_A or N_C									
	Mean R_D or $R_{C'}$									
	n_D or $n_{C'}$									
	N_D or $N_{C'}$									
CALCULATION OF μ	Decl. $=\delta$									
	L.A.N.									
	Hr. Angle $=\theta$									
	Cos θ									
	Cos δ Cos ϕ									
	Cos δ Cos ϕ Cos θ									
	Sin δ Sin θ									
	Cos Z									
	μ									
	$(N_A - N_D)$ or N_Z'									
	$\Delta N'$									
	ΔN									
	Corrected N									
SUN	$N/(\alpha - \alpha')\mu$									
	Atmo. Corr.									
OZONE	x cms.									
	x %									
NOTES		15.6°C 78%	14.5 Patchy So	17.1°C	17.1°C	17.6°C	17.6°C			


Halley total ozone
2010
2000
1990
1980
1970
1960
1950
Year
Aug
Oct
Dec
Feb
Apr
Month
Dobson Units
110
170
230
290
350
410

BRITISH ANTARCTIC SURVEY

SCIENTIFIC REPORTS

No. 90

MEASUREMENTS OF ATMOSPHERIC OZONE AT THE ARGENTINE ISLANDS AND HALLEY BAY, 1957-72

By

J. C. FARMAN, M.A.

and

R. A. HAMILTON, M.A.

British Antarctic Survey Atmospheric Sciences Division
at Department of Natural Philosophy, University of Edinburgh

CAMBRIDGE: PUBLISHED BY THE BRITISH ANTARCTIC SURVEY: 1975
NATURAL ENVIRONMENT RESEARCH COUNCIL

PRICE £2.90 NET

www.antarctica.ac.uk/documents/scientific_reports/rep090.zip

C:\ozone\FARADAY\FOZ0910.DAT

2009	7	21	14	59	0	24	1378	1385	1386	884	883	0
2009	7	22	15	0	0	23	1326	1327	1332	872	873	0
2009	7	23	14	59	30	25	1503	1504	1506	948	949	0
2009	7	23	16	20	30	25	1494	1497	1498	908	910	0
2009	7	24	15	0	0	25	1550	1556	1558	1031	1035	0
2009	7	24	16	20	0	25	1553	1556	1557	993	992	0
2009	7	25	14	59	30	25	1407	1410	1412	933	936	0
2009	7	25	16	16	0	25	1487	1488	1492	943	944	0
2009	7	26	15	0	0	25	1310	1313	1315	827	826	0
2009	7	26	16	14	30	25	1288	1287	1290	787	788	0
2009	7	27	14	59	0	23	1330	1334	1339	847	849	0
2009	7	27	16	14	0	23	1288	1294	1296	784	785	0
2009	7	28	14	59	30	22	1277	1284	1282	802	805	0
2009	7	28	15	15	0	23	1268	1273	1272	778	776	0
2009	7	28	15	25	0	22	1263	1265	1265	767	766	0
2009	7	28	16	21	0	22	1248	1249	1250	735	736	0
2009	7	28	17	25	0	22	1244	1247	1252	758	759	0
2009	7	28	18	0	0	22	1267	1273	1275	817	816	0
2009	7	29	15	0	30	23	1167	1168	1170	697	698	0
2009	7	29	15	16	0	23	1151	1154	1156	685	684	0
2009	7	29	15	44	30	23	1136	1141	1141	672	671	0
2009	7	29	16	19	0	23	1137	1140	1139	650	651	0
2009	7	29	17	0	0	23	1136	1135	1135	652	655	0
2009	7	29	17	30	0	23	1148	1150	1153	662	663	0
2009	7	29	18	0	0	22	1192	1196	1200	717	720	0
2009	7	30	15	0	0	25	1273	1276	1282	752	753	0
2009	7	30	17	59	30	25	1334	1336	1341	812	814	0
2009	7	31	15	0	0	25	1315	1317	1322	783	786	0
2009	7	31	18	0	0	25	1346	1347	1347	797	800	0
2009	8	1	15	1	0	25	1304	1307	1315	761	762	0
2009	8	1	17	59	30	25	1307	1310	1315	763	764	0
2009	8	2	15	0	30	24	1246	1251	1255	712	713	0
2009	8	2	17	59	30	24	1290	1294	1293	742	744	0
2009	8	3	14	59	0	23	1302	1306	1310	760	758	0
2009	8	3	18	0	0	23	1289	1291	1293	753	755	0
2009	8	4	15	0	30	24	1345	1346	1349	787	786	0
2009	8	4	17	59	30	24	1341	1345	1348	779	782	0
2009	8	5	15	0	0	25	1379	1378	1377	800	801	0
2009	8	5	18	0	0	25	1357	1355	1357	794	794	0
2009	8	6	15	0	0	23	1306	1308	1307	778	777	0
2009	8	6	17	59	30	25	1296	1302	1304	787	789	0
2009	8	7	15	1	0	23	1267	1274	1279	739	743	0
2009	8	7	17	59	0	23	1218	1224	1227	716	720	0
2009	8	8	15	0	0	23	1207	1212	1215	704	700	0

ZTreeWin v1.51

C:\ozone\DOBSONS\D123C.DAT

```
Constant file for Dobson 123 at Vernadsky
1.806 0.833 0.374 0.114 0.109 0.104 0
0 0 0 0
0 46.33 0 1836 -1752 0
0 147.9 1559 0 0 54.04
0 117.1 884.5 0 0 145.9
0  1594  313.8 0     0 0
-0.251 -0.146 -0.041 0.064 0.167 0.270 0.369 0.467 0.565 0.662
0.759 0.859 0.961 1.062 1.166 1.270 1.374 1.478 1.582 1.685
1.786 1.891 1.996 2.101 2.210 2.320 2.430 2.544 2.657 2.773 2.892
-0.230 -0.125 -0.019 0.086 0.190 0.292 0.392 0.491 0.588 0.684
0.782 0.881 0.982 1.084 1.187 1.290 1.395 1.498 1.600 1.703
1.805 1.909 2.014 2.119 2.226 2.335 2.445 2.557 2.669 2.784 2.899
-0.229 -0.122 -0.016 0.089 0.194 0.296 0.396 0.495 0.592 0.688
0.785 0.884 0.984 1.086 1.189 1.292 1.396 1.498 1.601 1.702
1.805 1.908 2.011 2.117 2.224 2.331 2.441 2.552 2.662 2.777 2.892
Note that this is a preliminary file.  The R-N table is from the
Hoenpeissenberg intercomparison on 2004 June 22.  The zenith sky
equations need further refining once sufficient observations are
availble.
```

ZTreeWin v1.51

C:\ozone\DOBSONS\DN123C09.DAT

```
-65.25 64.27  123c
0.0 0.0 -0.005
-0.035 -0.035 0 0.220 0.390 0 0.505
0 0
37 -36 -26 -19
2010 06 31 0 0
```

PROCV10B.EXE

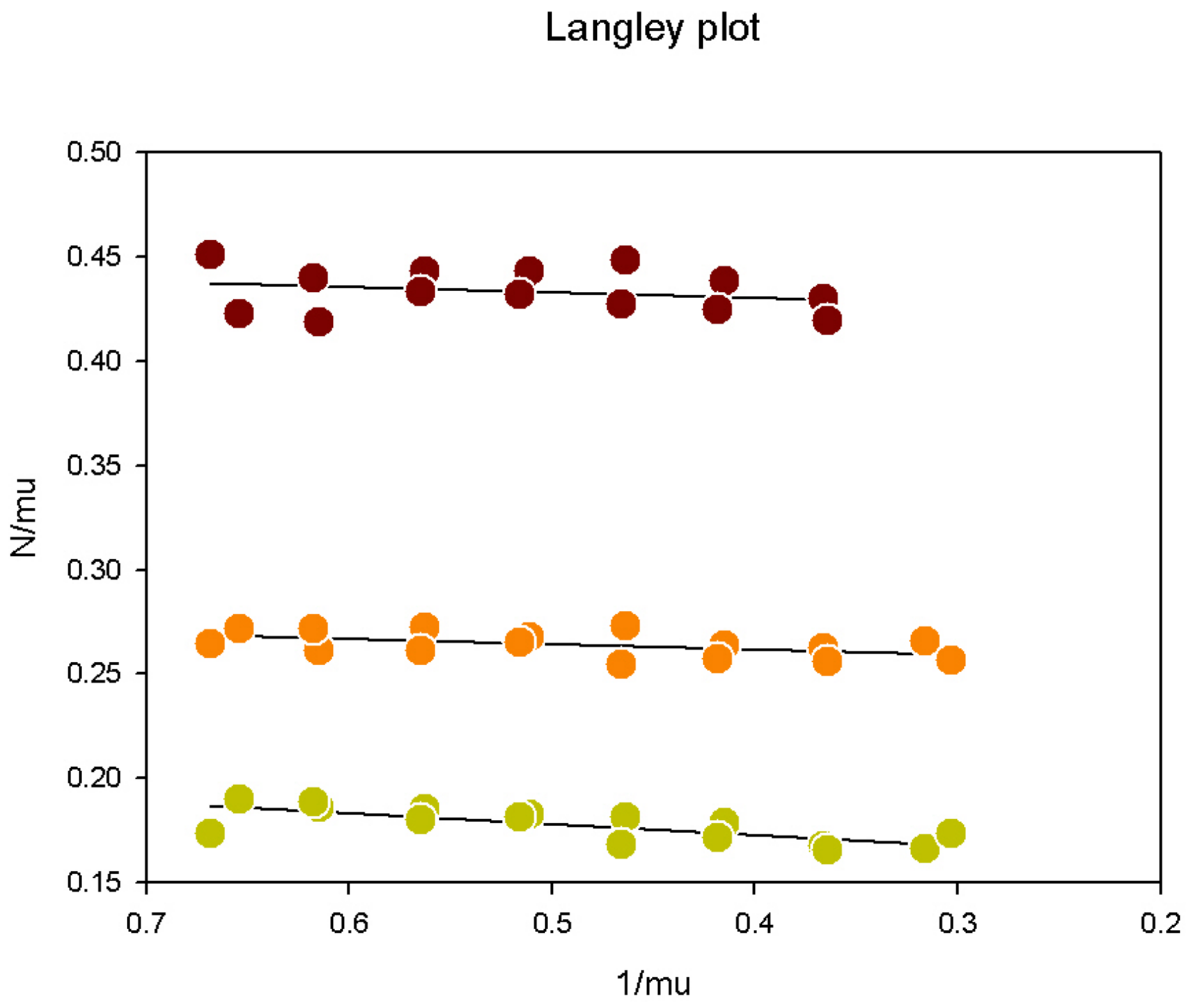
```
Station f in 0910 will use dobson year data dn123c09
Data file in use is c:\ozone\faraday\foz0910.dat
Available data files are :
FOZ0910.DAT
If you would like to use another datafile type 'yes' now
   1 Delta N 0.056 median 0.056 from  15 obs.  variance 0.050
   2 Delta N 0.031 median 0.031 from  19 obs.  variance 0.027
   3 Delta N 0.042 median 0.049 from  21 obs.  variance 0.022
   4 Delta N 0.010 median 0.012 from  15 obs.  variance 0.043
   5 Delta N-0.011 median-0.012 from  20 obs.  variance 0.019
  1  Median     0  Mean    -0  Sdev     6 No   191
  2  Median     4  Mean     5  Sdev    10 No   225
  5  Median    -5  Mean    -5  Sdev     8 No   245
  6  Median    -1  Mean     0  Sdev     9 No   388
  7  Median     3  Mean     3  Sdev     5 No   188
  8  Median     7  Mean     6  Sdev    13 No     9
 10  Median     9  Mean     6  Sdev    12 No    37
  1  Median    -5  Mean    -5  Sdev     8 No   191
  2  Median     0  Mean     0  Sdev     8 No   237
  5  Median   -10  Mean   -10  Sdev     9 No   240
  6  Median    -6  Mean    -5  Sdev    10 No   404
  7  Median    -3  Mean    -2  Sdev     6 No   193
  8  Median     9  Mean     7  Sdev    14 No    10
 10  Median     2  Mean     0  Sdev    11 No    41
```

C:\ozone\FARADAY\QUERIES.DAT

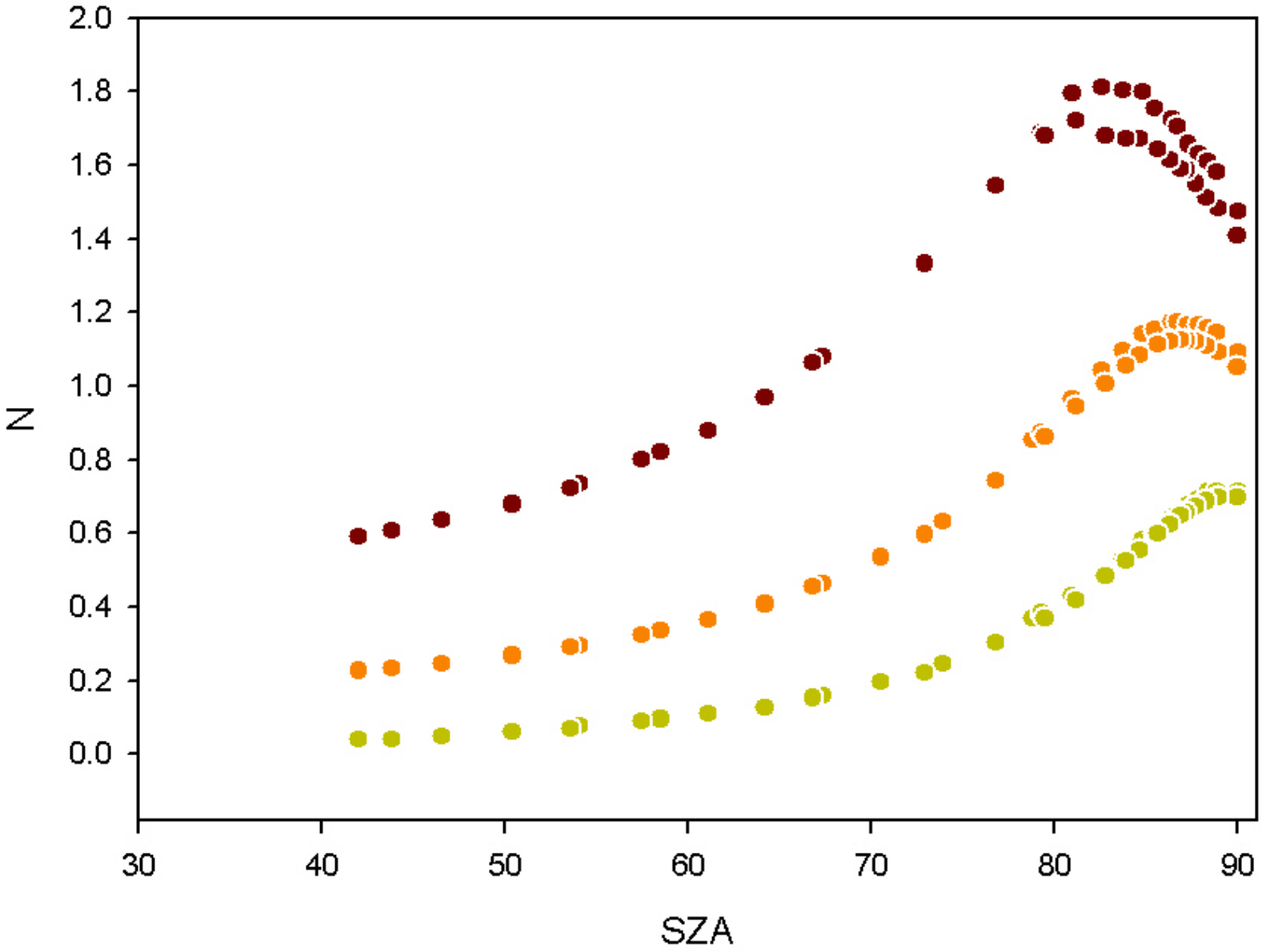
```
 11   4 21   2 MU too high ?   90   2.823
Check    9 17 11 59
Check    9 17 15 33
Check   10  2 12  0
Check   10 20  9 58
Check   10 20 10  5
Check   10 20 19 35
Check   10 20 20  3
Check   10 22 20  6
Check   10 23 21  0
Check   10 23 22 30
Check   10 27 12  1
Check   10 27 12  1
Check   10 27 21  0
Check   10 28  9  0
Check   10 28 11 59
Check   10 28 18  3
Check   10 28 20  7
Check   10 29 11 25
Check   10 31 14 59
Check   10 31 18 50
Check   10 31 20 34
Check   10 31 21 35
Check   11  4 18  1
Check   11  4 23 25
Check   11  4 23 35
Check   11  6  9  3
Check   11  6 17 59
Check   11  8  9  0
Check   11  9  9  3
Check   11  9 10 25
Check   11  9 10 55
Check   11  9 13 50
Check   11  9 15 55
Check   11 10 10 54
Check   11 10 12 30
Check   11 10 15  0
Check   11 10 15 56
Check   11 14 21  1
Check   11 15  7 54
Check   11 15  9 54
Check   12  1 11 59
Check   12  1 11 59
Check   12  2 14 57
```

C:\ozone\FARADAY\YDATA.DAT

7	23	40016	307	0	1	8.70
7	24	40017	331	0	1	8.51
7	25	40018	315	0	1	8.32
7	26	40019	259	0	1	8.12
7	27	40020	262	0	1	7.93
7	28	40021	248	2	5	8.45
7	29	40022	218	2	6	8.11
7	30	40023	254	7	2	8.85
7	31	40024	262	1	2	8.63
8	1	40025	257	2	2	8.37
8	2	40026	248	3	2	8.15
8	3	40027	260	4	2	7.96
8	4	40028	276	4	2	7.71
8	5	40029	285	6	2	7.51
8	6	40030	273	3	2	7.29
8	7	40031	259	10	2	7.07
8	8	40032	258	4	2	6.90
8	9	40033	252	3	2	6.72
8	10	40034	228	5	2	6.53
8	11	40035	224	10	2	6.33
8	12	40036	211	5	2	6.16
8	13	40037	208	2	2	6.00
8	14	40038	216	6	3	5.77
8	15	40039	215	2	2	5.67
8	16	40040	205	14	8	6.52
8	17	40041	214	14	2	5.39
8	18	40042	215	4	2	5.25
8	19	40043	211	5	2	5.13
8	20	40044	215	0	2	4.98
8	21	40045	198	0	2	4.87
8	22	40046	205	4	2	4.73
8	23	40047	225	6	2	4.62
8	24	40048	225	0	2	4.51
8	25	40049	205	3	2	4.40
8	26	40050	218	2	2	4.30
8	27	40051	204	20	4	4.21
8	28	40052	198	0	2	4.10
8	29	40053	216	4	2	4.01
8	30	40054	231	5	2	3.92
8	31	40055	241	6	3	3.79
9	1	40056	190	16	4	3.76
9	2	40057	184	2	10	3.92

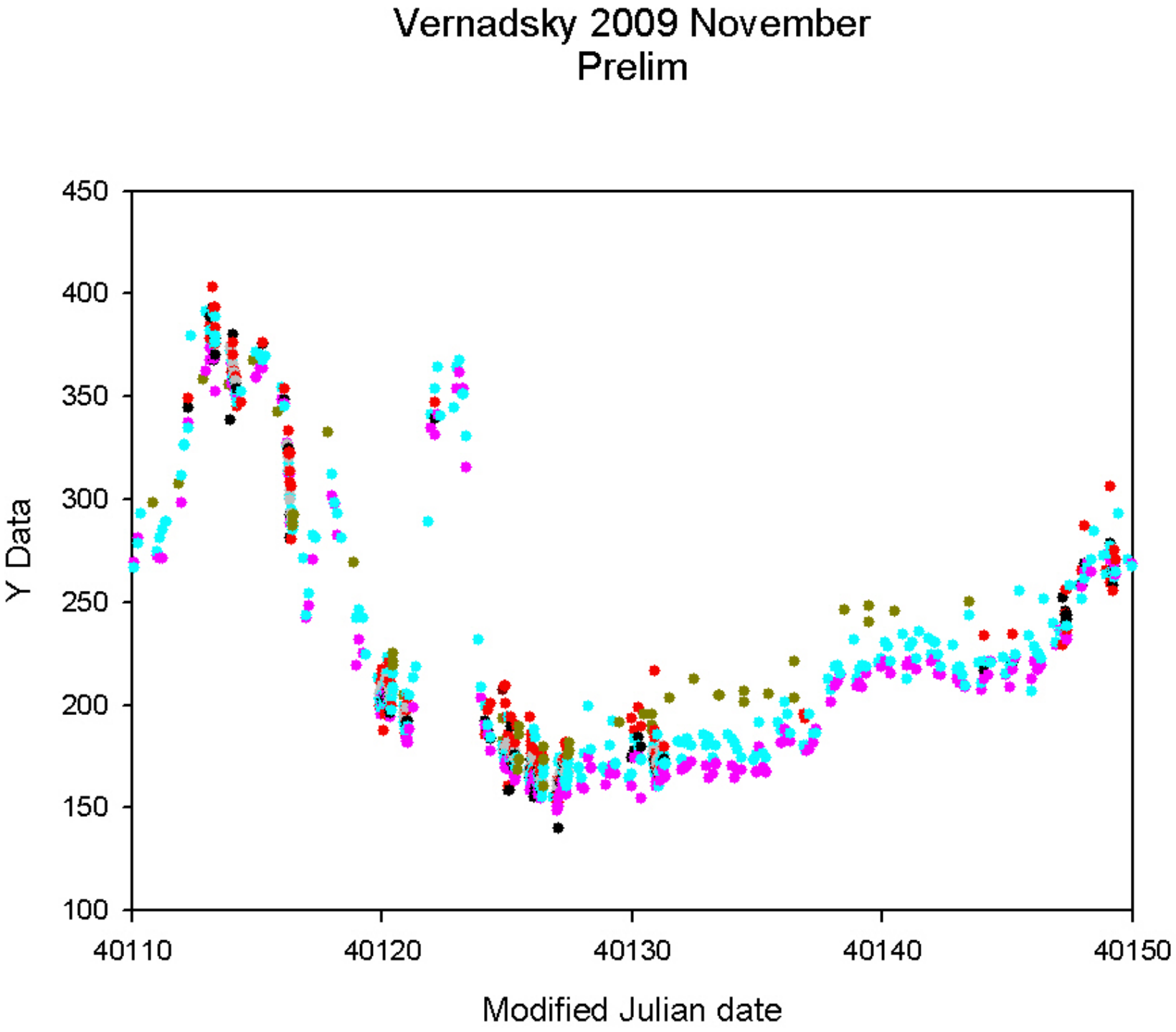

Langley plot
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
N/mu
0.7
0.6
0.5
0.4
0.3
0.2
1/mu

Umkehr



C:\ozone\FARADAY\XDATA.DAT

7	23	16	20	40016.181	8.703	85.20	10	25	307
7	24	16	20	40017.181	8.505	84.99	10	25	331
7	25	16	16	40018.178	8.317	84.78	10	25	315
7	26	16	14	40019.177	8.125	84.57	10	25	259
7	27	16	14	40020.176	7.931	84.34	10	23	262
7	28	14	59	40021.125	9.114	85.62	10	22	249
7	28	15	15	40021.135	8.622	85.11	10	23	249
7	28	15	25	40021.142	8.368	84.84	10	22	249
7	28	16	21	40021.181	7.721	84.09	10	22	250
7	28	17	25	40021.226	8.418	84.89	10	22	244
7	29	15	0	40022.125	8.847	85.35	10	23	217
7	29	15	16	40022.136	8.376	84.85	10	23	218
7	29	15	44	40022.156	7.803	84.19	10	23	220
7	29	16	19	40022.180	7.534	83.86	10	23	221
7	29	17	0	40022.208	7.757	84.13	10	23	217
7	29	17	30	40022.229	8.328	84.79	10	23	215
7	30	15	0	40023.125	8.634	85.13	10	25	247
7	30	17	59	40023.250	9.066	85.57	10	25	261
7	31	15	0	40024.125	8.405	84.88	10	25	261
7	31	18	0	40024.250	8.848	85.35	10	25	263
8	1	15	1	40025.126	8.147	84.59	10	25	260
8	1	17	59	40025.250	8.594	85.08	10	25	255
8	2	15	0	40026.125	7.941	84.35	10	24	245
8	2	17	59	40026.250	8.362	84.83	10	24	252
8	3	14	59	40027.124	7.767	84.15	10	23	264
8	3	18	0	40027.250	8.152	84.60	10	23	255
8	4	15	0	40028.125	7.509	83.83	10	24	280
8	4	17	59	40028.250	7.911	84.32	10	24	272
8	5	15	0	40029.125	7.314	83.57	10	25	291
8	5	18	0	40029.250	7.709	84.08	10	25	279
8	6	15	0	40030.125	7.110	83.30	10	23	276
8	6	17	59	40030.250	7.480	83.79	10	25	270
8	7	15	1	40031.126	6.887	82.98	10	23	269
8	7	17	59	40031.249	7.257	83.50	10	23	250
8	8	15	0	40032.125	6.719	82.73	10	23	254
8	8	18	0	40032.250	7.086	83.26	10	24	262
8	9	14	59	40033.124	6.554	82.48	10	25	250
8	9	18	0	40033.250	6.890	82.98	10	25	255
8	10	15	0	40034.125	6.350	82.15	6	25	223
8	10	18	0	40034.250	6.700	82.70	10	24	233


Vernadsky 2009 November
Prelim
450
400
350
300
250
200
150
100
Y Data
40110
40120
40130
40140
40150
Modified Julian date

C:\ozone\FARADAY\ADD.DAT

162	190	2.58	0.727	0.063	95
206	226	2.55	0.936	0.142	93
205	225	2.43	0.866	0.099	93
191	202	2.47	0.855	0.127	94
191	202	2.65	0.931	0.165	94
147	169	2.69	0.708	0.081	95
168	155	2.12	0.646	0.069	95
149	155	2.30	0.629	0.074	95
203	214	2.14	0.792	0.110	93
352	359	1.91	1.222	0.197	93
347	360	2.06	1.288	0.214	93
360	373	2.47	1.583	0.299	95
359	369	2.04	1.319	0.213	94
359	366	1.89	1.232	0.187	92
356	371	2.03	1.321	0.231	95
254	252	1.81	0.811	0.094	94
259	252	1.95	0.945	0.177	94
322	313	1.79	1.041	0.156	92
326	315	1.75	1.006	0.123	93
322	315	1.94	1.109	0.164	92
323	319	2.14	1.213	0.186	92
334	324	2.43	1.403	0.224	92
369	376	2.33	1.533	0.267	93
364	378	2.08	1.359	0.214	92
362	378	1.88	1.237	0.186	92
363	375	1.76	1.172	0.170	92
363	376	1.72	1.150	0.166	92
370	378	1.90	1.283	0.196	92
362	381	2.10	1.368	0.223	92
357	382	2.39	1.511	0.267	92
370	382	2.43	1.579	0.267	92
365	382	2.39	1.542	0.267	92
368	376	2.68	1.707	0.302	92
355	361	1.86	1.199	0.181	94
357	361	1.75	1.147	0.171	94
351	356	1.87	1.190	0.181	92
355	358	2.09	1.326	0.212	92
350	362	2.56	1.578	0.298	94
363	366	1.73	1.158	0.170	94
365	374	1.69	1.146	0.166	94
351	373	1.86	1.181	0.176	93
360	376	2.06	1.336	0.218	93
350	372	2.32	1.438	0.251	93
333	367	2.61	1.534	0.298	93

Standard DS equation

$$\text{Ozone} = a + by/m$$

$$m = mu$$

$$y = N_w - N_d$$

Zenith Equations

BAS

$AD = a + bN_a + c(y/m)^2 + d(y/m)^3$

or

$AD = a + by/m + c(y/m)^2 + d(y/m)^3$

[Standard ozone equation + terms]

$CD = a + bN_a + cy/m + d/m$ [to m = 6.5]

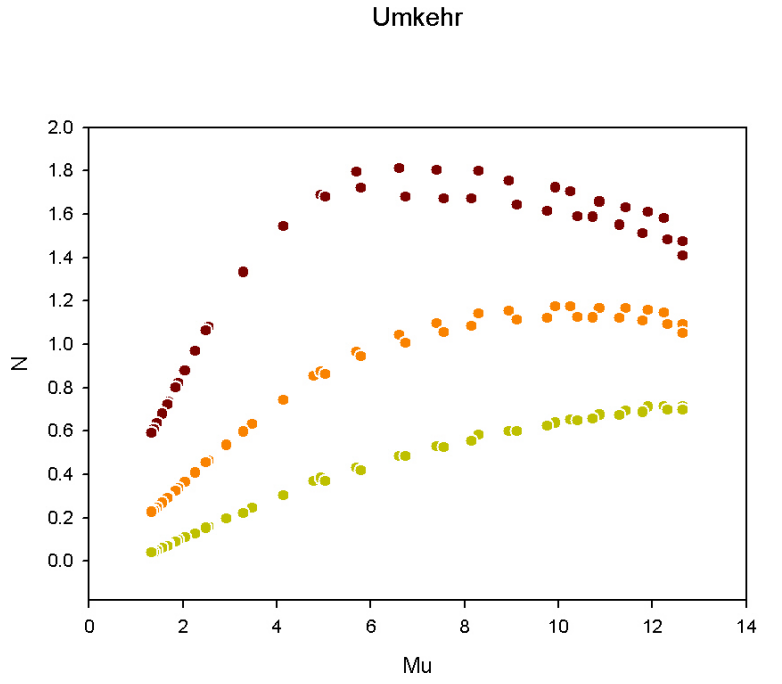
$CD_h = a + bN_d + cy/m + dm$ [m = 6.5 to 9]

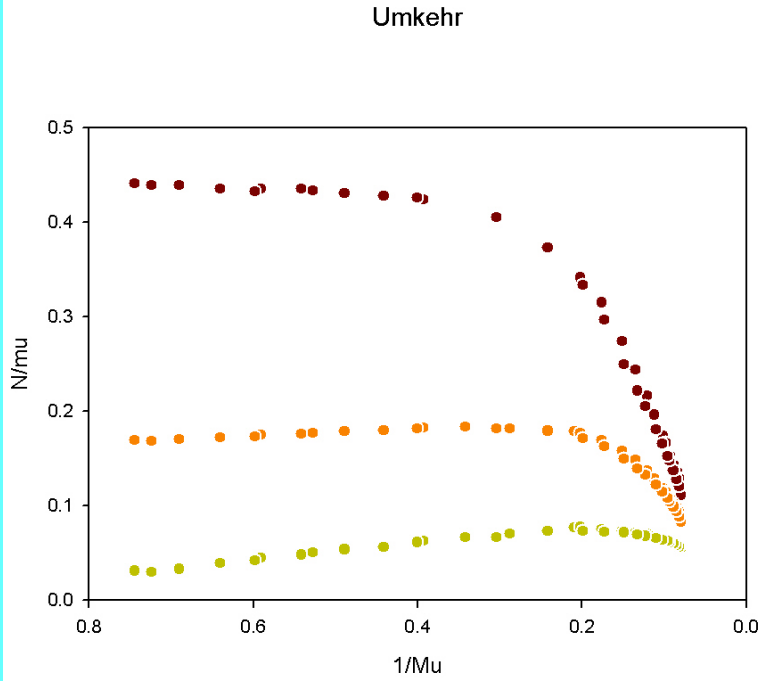
Based on multiple regression and rejecting coefficients that are not significant.

Zenith Equations

or for AD and CD

$$Z = a + bm + cy + dm^2 + ey^2 + fmy + gm^2y + hmy^2 + jm^3 + ky^3$$





SigmaPlot - Notebook1*

File Edit Insert View Format Tools Graph Statistics Transforms Toolbox Window Help

All Open Notebooks
Notebook1*
Section 1
Data 1*

Show summary information

Data 1*

	1	2	3	4	5	6	7	8	9
1	127.0000	134.0000	2.4800						
2	137.0000	145.0000	2.5500						
3	145.0000	150.0000	2.5100						
19	284.0000	303.0000	2.0700						
20	289.0000	303.0000	2.3000						
21	291.0000	303.0000	2.4900	1.2730	0.1910	92.0000			

Regression Wizard - Equation

Select the equation to fit your data

Preview not available.

Equation Category: Section 1

Equation Name: Equation1

Help Cancel Back Next

Function - Equation1

Equation

```
nmu = (na-nd)/mu;
nmu2 = nmu * nmu;
nmu3 = nmu2 * nmu;
f = x + a*na+b*nmu2+c*nmu3;
fit f to ozone;
```

Variables

```
ozone = col(2);
mu = col(3);
nd = col(5);
na = col(4);
```

Initial parameters

```
x = 55;
a = 45;
b = 1500;
c = -1230;
```

Constraints

Options
Iterations: 100
Step size: 100
Tolerance: 0.000100

Trigonometric units: Degrees Radians Grads

Help Add As... Run OK Cancel

For Help, press F1 OVR NUM

start 4 W... ZTree... 2 Fi... wmo ... 2 Mi... Wind... bsuce... Mast... Jasc ... Turbo... Sigma... 20:49

SigmaPlot - Notebook1*

File Edit Insert View Format Tools Graph Statistics Transforms Toolbox Window Help

All Open Notebooks
Notebook1*
Section 1
Data 1*

Show summary information

Data 1*

	1	2	3	4	5	6	7	8	9
1	127.0000	134.0000	2.4800	0.5920	0.0440	92.0000			
2	137.0000	145.0000	2.5500	0.6540	0.0570	94.0000			
3	145.0000	150.0000	2.5100	0.7050	0.0970	94.0000			
					0.0580	92.0000			
					0.0470	92.0000			
					0.0430	92.0000			
					0.0620	92.0000			
					0.0440	93.0000			
					0.0770	94.0000			
					0.0360	94.0000			
					0.0680	94.0000			
					0.0370	94.0000			
					0.1090	95.0000			
					0.0980	94.0000			
					0.1350	92.0000			
					0.1150	92.0000			
					0.1000	92.0000			
					0.0970	92.0000			
19	284.0000	303.0000	2.0700	1.0480	0.1360	92.0000			
20	289.0000	303.0000	2.3000	1.1780	0.1660	92.0000			
21	291.0000	303.0000	2.4900	1.2730	0.1910	92.0000			

Regression Wizard - Fit Results

Converged in 6 iterations, tolerance satisfied.

More Iterations

View Constraints...

Rsqr = 0.965441 Sum of squares = 42757.642759

Parameter	Value	StdErr	CV(%)	Dependencies
x	3.713e+1	4.129e+0	1.112e+1	0.9859816
a	4.633e+1	2.423e+0	5.229e+0	0.9561542
b	1.836e+3	7.249e+1	3.949e+0	0.9989095
c	-1.752e+3	1.132e+2	6.459e+0	0.9980432

Help Cancel Back Next Finish

For Help, press F1

OVR NUM

start 4 W... ZTree... 2 Fi... wmo ... 2 Mi... Wind... bsuce... Mast... Jasc ... Turbo... Sigma... 20:50

SigmaPlot - Notebook1*

File Edit Insert View Format Tools Graph Statistics Transforms Toolbox Window Help

All Open Notebooks
Notebook1*
Section 1
Data 1*

Show summary information

Data 1*

1	2	3	4	5	6	7	8	9
				0.0440	92.0000			
				0.0570	94.0000			
				0.0970	94.0000			
				0.0580	92.0000			
				0.0470	92.0000			
				0.0430	92.0000			
				0.0620	92.0000			
				0.0440	93.0000			
				0.0770	94.0000			
				0.0360	94.0000			
				0.0680	94.0000			
				0.0370	94.0000			
				0.1090	95.0000			
				0.0980	94.0000			
				0.1350	92.0000			
				0.1150	92.0000			
				0.1000	92.0000			
				0.0970	92.0000			
				0.1360	92.0000			
				0.1660	92.0000			
21	291.0000	303.0000	2.4900	1.2730	0.1910	92.0000		

Function - Equation1

Equation

```
y = na - nd;
y2 = y*y;
mu2 = mu*mu;
f = a0 + a1*mu + a2*y + a3*mu2 + a4*y2 + a!
fi; f to ozone;
```

Variables

```
ozone = col(2);
mu = col(3);
nd = col(5);
na = col(4);
```

Initial parameters

```
a0 = 55;
a1 = 45;
a2 = 1500;
a3 = -1230;
a4 = 0;
a5 = 0;
a6 = 0;
```

Constraints

Options

Iterations: 100

Step size: 100

Tolerance: 0.000100

Trigonometric units: Degrees / Radians / Grads

Help | Add As... | Run | OK | Cancel

For Help, press F1

OVR NUM

start | 4 W... | ZTree... | 2 Fi... | wmo ... | 2 Mi... | Wind... | bsuce... | Mast... | Jasc ... | Turbo... | Sigma... | 20:52

SigmaPlot - [Report 1*]

File Edit Insert View Format Tools Graph Statistics Transforms Toolbox Window Help

All Open Notebooks
Notebook1*
Section 1
Data 1*
Report 1*

Singular Solutions 0.5%

Results for the Overall Best-Fit Solution:

R	Rsqr	Adj Rsqr	Standard Error of Estimate
0.9846	0.9694	0.9687	9.5580

	Coefficient	Std. Error	t	P	VIF
a0	587.6147	87.2087	6.7380	<0.0001	35381.2652<
a1	-949.8842	122.5112	-7.7534	<0.0001	260803.4130<
a2	1036.5348	153.4958	6.7529	<0.0001	75333.2541<
a3	401.7395	68.9133	5.8296	<0.0001	358555.1907<
a4	-418.5029	178.8825	-2.3395	0.0198	84414.5805<
a5	-160.6195	132.6455	-1.2109	0.2266	231841.5041<
a6	-47.8326	38.7998	-1.2328	0.2183	93195.8284<
a7	172.0171	87.8850	1.9573	0.0510	92941.2621<
a8	-49.5055	13.3150	-3.7180	0.0002	65784.3232<
a9	-19.8339	101.7576	-0.1949	0.8456	26376.0157<

Analysis of Variance:

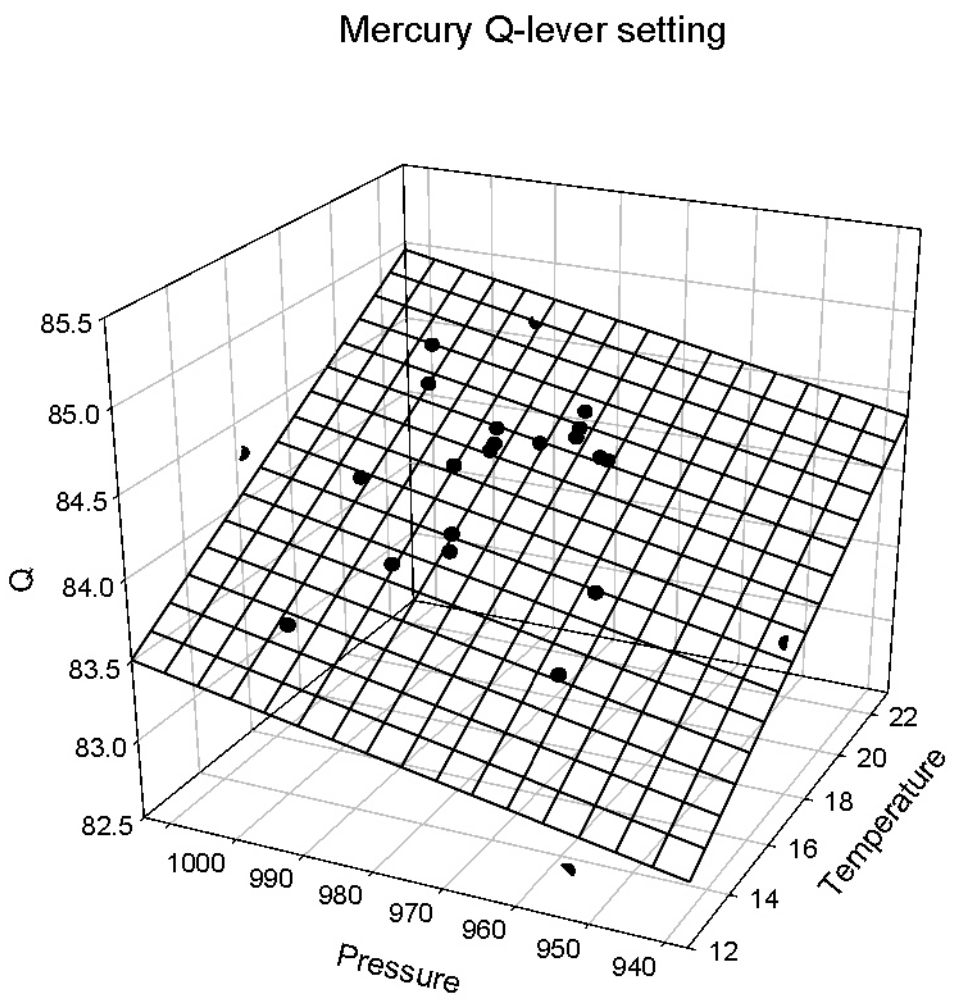
Uncorrected for the mean of the observations:

Show summary information

For Help, press F1

NUM

start 4 W... ZTree... 2 Fi... wmo ... 2 Mi... Wind... PuTT... Mast... Jasc ... Turbo... Sigma... 21:03



Nonlinear Regression

Data Source: Data 1 in Notebook1
Equation: Section 1, qfit in DOBFIT.JNB
f = q0 + a*(t-15) + b*(p-1000);

R	**Rsqr**	**Adj Rsqr**	**Standard Error of Estimate**
0.9446	0.8923	0.8815	0.1422

Coefficient		**Std. Error**	**t**	**P**	**VIF**
q0	83.7894	0.0642	1305.3269	<0.0001	4.6869<
a	0.1301	0.0124	10.5085	<0.0001	2.8088
b	0.0078	0.0018	4.2910	0.0004	2.2603

See http://www.antarctica.ac.uk/met/jds/ozone/ for more Antarctic ozone information

QUESTIONS ?