

CMB DIPOLE, COMPTON EFFECT, LORENTZ GROUP EXTENSIONS, ESRF DATA ANALYSIS

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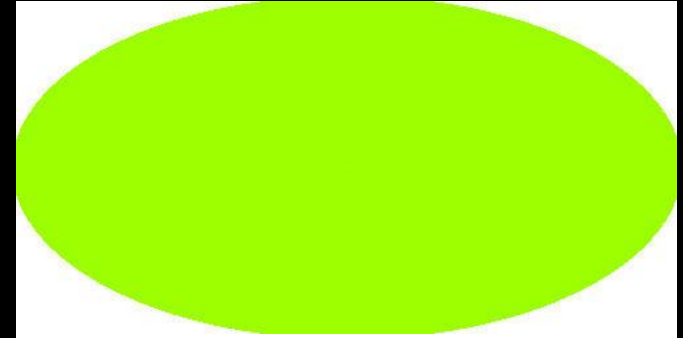
CMB sky

a. Monopole

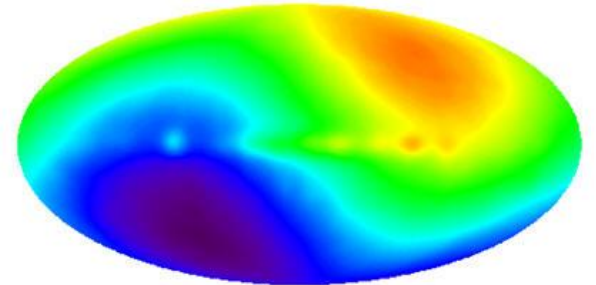
b. Dipole

c.d. Quadrupole

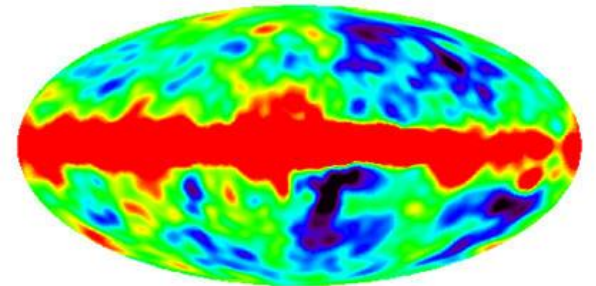
1965



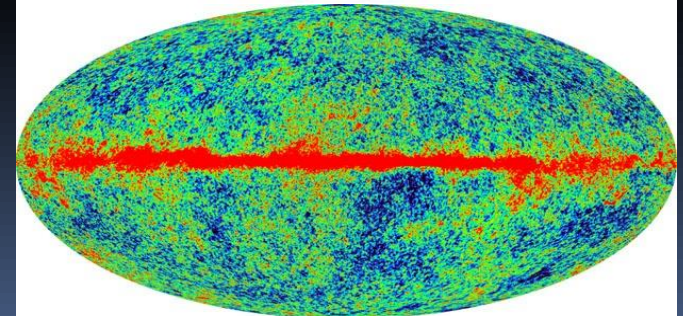
1977



1992



2003



CMB frame of rest

$$T(\theta) = T_0 (1 - \beta^2)^{1/2} / (1 - \beta \cos\theta)$$

$$T = \beta \cos\theta + (\beta^2 / 2) \cos 2\theta + O(\beta^3), \beta \ll 1.$$

$$T_0 = 2.725 \text{ (0.020) K}$$

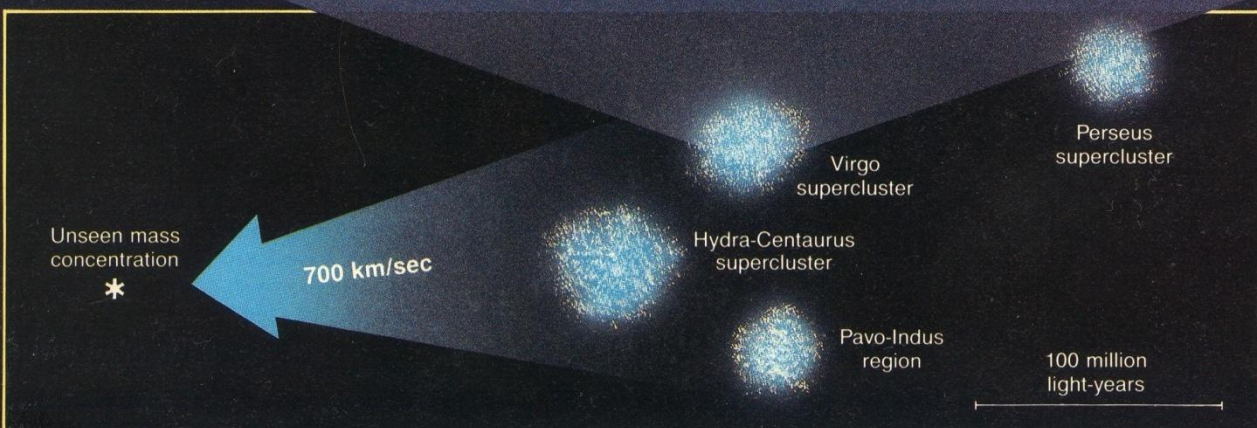
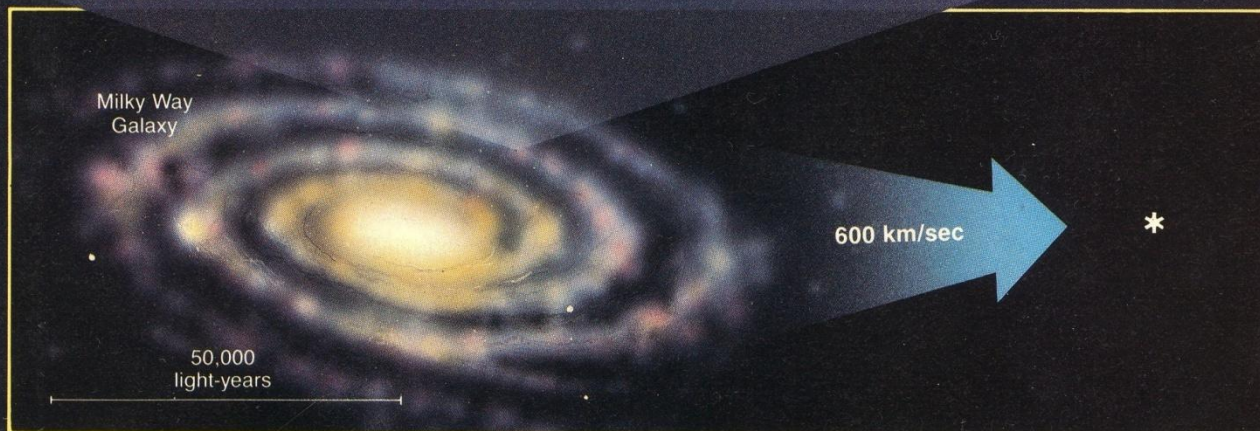
$$T_d = 3.35 \text{ (0.024) mK}$$

$$DT/T = 1.23 \text{ (0.01) } 10^{-3}$$

$$v/c = 0.000122 \pm 0.000006; v = 365 \pm 18 \text{ km s}^{-1},$$

$$l = 263.85^\circ \pm 0.1^\circ, b = 48.25^\circ \pm 0.04^\circ.$$

Wilkinson Microwave Anisotropy Probe's data



A. Einstein, Forsch. und Fortschritte, 1927, 3, 36,
Neue Experimente über ...

New experiments on the influence of the motion of the Earth on
the speed of light relative to the Earth

Available limits for $\Delta c/c$

- $< 10^{-6}$ GP-A, uplink-downlink signals (1980)
- $< (2-3.5) 10^{-7}$ Deep Space network (1990)
- $< 9 10^{-8}$ Mössbauer-rotor (one way) (1989)
- S. Herrmann et al., Test of the Isotropy of the Speed of Light Using a Continuously Rotating Optical Resonator
Phys. Rev. Lett. 95, 150401 (2005)
 $< (2.1 \pm 1.9) \times 10^{-10}$
- P. Antonini et al., Phys. Rev. Lett. 95, 040404 (2005)
 $< 0.9 \times 10^{-10}$

Frequency dependence limit

B. Schaefer PRL 1999

GRB 930229, 30-200 keV

$< 6.3 \cdot 10^{-23}$

$< 3 \cdot 10^{-12}$ ESRF GRAAL, 2005

Einstein 1905

$$t_2 = t_1 + 0,5(t_3 - t_1)$$

Reichenbach 1928

$$t_2 = t_1 + \epsilon(t_3 - t_1)$$

Light travel from A (at t_1) to B (t_2) and return to A (t_3)

Tangherlini (1958) transformations: extensions of Lorentz

$$x' = \gamma(x - vt), \quad x = \gamma^{-1}x' + \gamma vt',$$

$$y' = y, \quad y = y',$$

$$z' = z, \quad z = z',$$

$$t' = \gamma^{-1}t, \quad t = \gamma t',$$

$$V' = \frac{v + V}{(1 + v^2/c^2)}$$

if $v=c$

SR

$$V' = \frac{v + V}{(1 + vV/c^2)}$$

$$c' = \frac{c}{1 + (v/c) \cos \theta'}$$

Explaining Michelson-Morley (two-way) type experiment, Sagnac effect

Sjodin 1979

$$x' = \gamma(x - vt), \quad y' = y, \quad z' = z,$$
$$t' = \gamma - \xi \frac{v}{c^2} x + \left[1 - (1 - \xi) \frac{v^2}{c^2} \right] t$$

$$1 - c/v < \xi < 1 + c/v$$

Relation with Reichenbach's parameter

$$\varepsilon = 0,5 \left[1 + \frac{v}{c} (1 - \xi) \right]$$

$\xi = 1$ Lorentz transformations

Other extensions: Mansouri, Sexl (1977); Kostelecky (1998), etc.

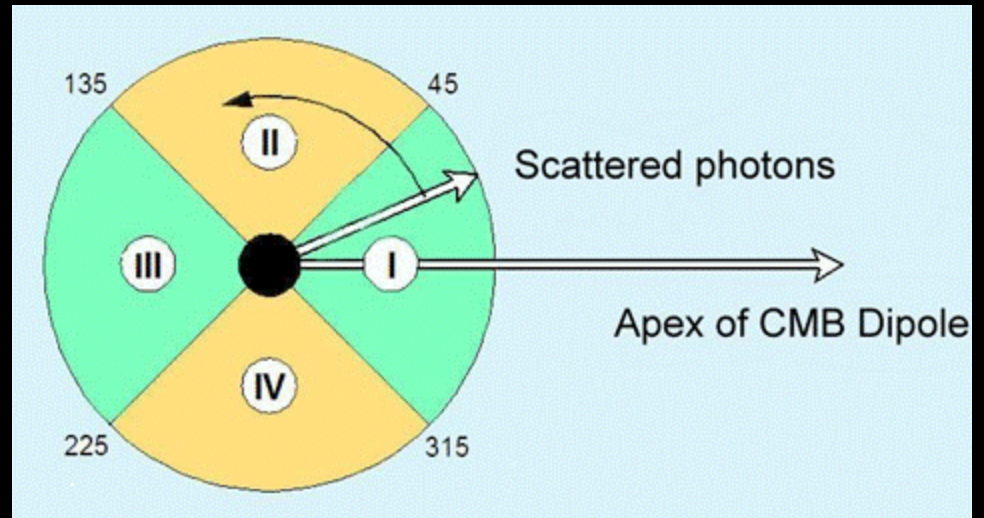
Inverse Compton

Gurzadyan, Margarian 1996

Facility: $v = \beta c$

Compton: $E = m(1 - \beta^2)^{-1/2}$

Variations of $E \rightarrow$
variations of c



$$E_{\gamma} = \frac{4\gamma^2 E_{\ell}}{1 + \frac{4\gamma E_{\ell}}{m_e} + \theta^2 \gamma^2}$$

$$\sigma_E / E \approx 10^{-4}$$

$$d\beta \leq 10^{-12}.$$

Maximum energy of the scattered electrons: Compton edge (CE)

$$E_{\text{CE}} = \frac{4\gamma^2 E_1}{1 + 4\gamma m_e E_1} = \frac{\gamma m_e X_{\text{CE}}}{A + X_{\text{CE}}}$$

X_{CE} distance to beam

A: dipole dispersion = 159.28 +/- 0.2 mm

6.04 GeV

$$\delta\beta/\beta = (1 / \gamma^2) \delta\gamma/\gamma$$

$$\gamma^2 = (11820)^2$$

$$\Delta c/c = 0.7 \cdot 10^{-8} \delta X_{\text{CE}} / X_{\text{CE}}$$



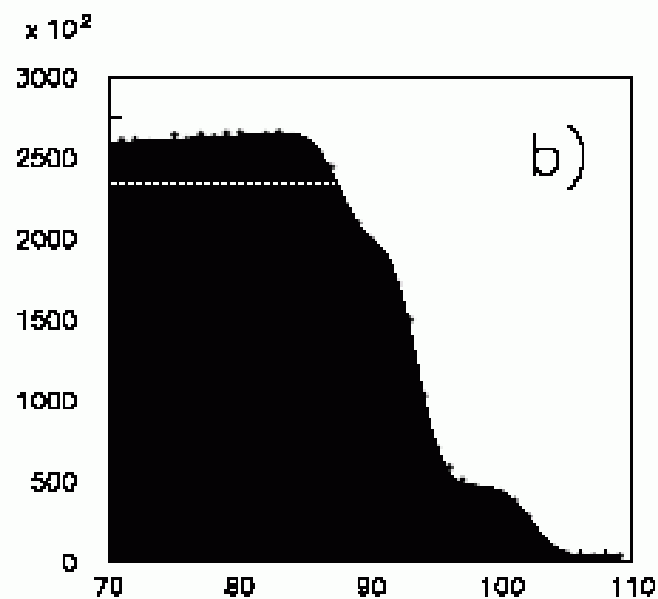
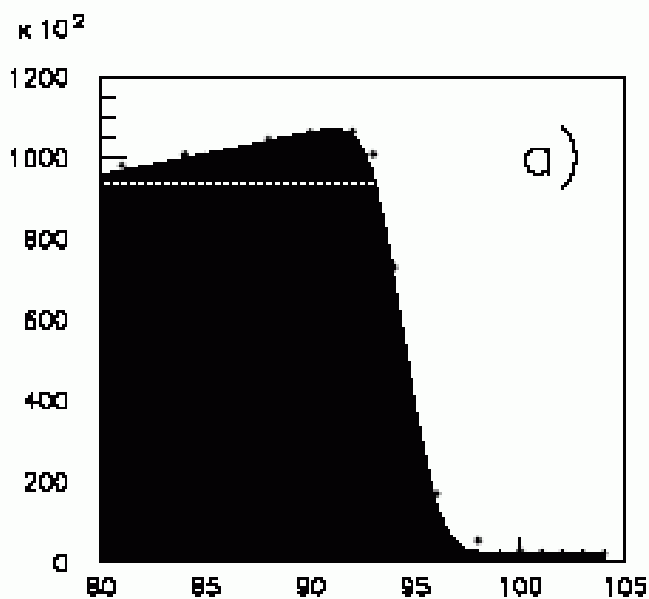
The block of data	Time of supervision	Duration, day	Quantity of data
Data I	10.04.1998 - 11.05.2002	1493	2075 Position
Data II	10.04.1998 - 26.11.2002	1692	2436 Correction2
Data III	05.06.1999 - 19.04.2001	685	294 New Data
Data IV	20.06.2005 - 14.07.2005	25	26821 Frequency
Data V	01.07.2005 - 11.07.2005	11	153 nStrip
Data VI	23.07.2008 - 29.07.2008	7	14765
Data VII	15.11.2008 - 24.11.2008	12	18621

GRAAL data;
48 periods
1998-2002

	position	run	error	energy	run	error	
833	98.51310	94.46374	94.42140	0.02030	1482.11108	1481.83887	0.13054
834	98.62690	94.46374	94.41090	0.01950	1482.11108	1481.77136	0.12539
835	98.73090	94.46374	94.38430	0.04690	1482.11108	1481.60022	0.30158
837	98.85660	94.46374	94.53100	0.01950	1482.11108	1482.54358	0.12539
838	98.96990	94.46374	94.48070	0.02040	1482.11108	1482.22021	0.13118
839	99.08680	94.46374	94.53380	0.02070	1482.11108	1482.56165	0.13311
840	99.22040	94.46374	94.49470	0.02070	1482.11108	1482.31018	0.13311
841	99.33530	94.46374	94.33430	0.01970	1482.11108	1481.27856	0.12668
842	99.44890	94.46374	94.43740	0.01980	1482.11108	1481.94177	0.12732
843	99.56440	94.46374	94.38250	0.02010	1482.11108	1481.58862	0.12925
844	99.65820	94.46374	94.44440	0.02600	1482.11108	1481.98669	0.16719
845	99.77040	94.46374	94.54580	0.01420	1482.11108	1482.63879	0.09131
846	99.88550	94.46374	94.57000	0.02090	1482.11108	1482.79431	0.13439
847	100.00100	94.46374	94.53870	0.01980	1482.11108	1482.59314	0.12732
848	100.11600	94.46374	94.50470	0.02160	1482.11108	1482.37451	0.13889
849	100.19900	94.46374	94.48580	0.03590	1482.11108	1482.25305	0.23085
850	100.30200	94.46374	94.46510	0.01460	1482.11108	1482.11987	0.09388
852	100.42700	94.46374	94.44640	0.02000	1482.11108	1481.99963	0.12861
853	100.54000	94.46374	94.47420	0.02040	1482.11108	1482.17834	0.13118
855	100.64900	94.46374	94.45200	0.02410	1482.11108	1482.06726	0.15107
856	100.77300	94.46374	94.46374				
857	100.88700	94.46374	94.46374				
858	100.97300	94.46374	94.46374				

Block	CE position	Laser nm	Date of measurements	Total points	Months (1998 - 2002) / Quantity of points of measurements											
					I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	54.7-56.5	514.5	05.06.1999-05.02.2002	389	26	39	-	-	-	151	-	-	94	79	-	-
2	94.2-94.8	351.1	10.04.1998-21.09.1998	443	-	-	-	87	62	64	32	60	138	-	-	-
3	101.3-101.9	351.1	16.04.1999-16.05.1999	316	-	-	-	192	124	-	-	-	-	-	-	-
4	104.4-104.9	351.1	30.01.2000-06.03.2000	209	6	145	58	-	-	-	-	-	-	-	-	-
5	108.0-110.7	334.4 351.1	15.04.2000-12.03.2002	329	-	39	69	97	8	-	-	-	-	-	116	-
Total	53.1-110.7		10.04.1998-11.05.2002	2075	32	261	180	546	256	215	32	60	298	79	116	-

Compton edge



27.05.09
20:30:31
No selection
Hr
Mn
An

SELECTION
Jul Nov 2008
 Absolute **H**
 Relative

FRAGMENT
Error
 Mean **H**
 Sqrt
 Sigma
 Weight
 Variance
7.5 sec
START

Use Summer T

Screen
 Data
 24h Day
 Period
 Sidereal Day
 Solar Day
 Months
 Asimuth
 Declination
 Gr-Dipole
 All Data
 Graph 3D

Eliminate
List Gauss
Save Harmonik
Setup Abs
EXIT

Date 29.05.09
Local Time 18:14:32
Sidereal T 10:06:44
Solar Time 17:40:02

Horizontal system:
Azimuth South 339.9
Azimuth GRAAL 287.0
Declination 35.9
Gr-Dipole 76.3

Equatorial system: Hour Angle, h 22.9 Alpha, d 168.0 Delta, d -6.9

- Light ON
- Earth on
- Axis
- Degree
- Dipole Cn
- Dipole Gr

RGB

Ambient

Diffuse

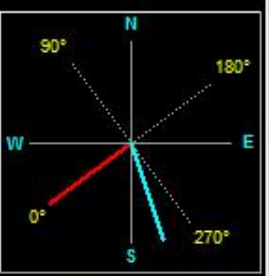
Specular

Reset
1 turn, sec
15

- St + St

AutoRot
Data source
10.04.1998
Time source
00:18:51
Set DTime
dAngle
45
- A + A
X /

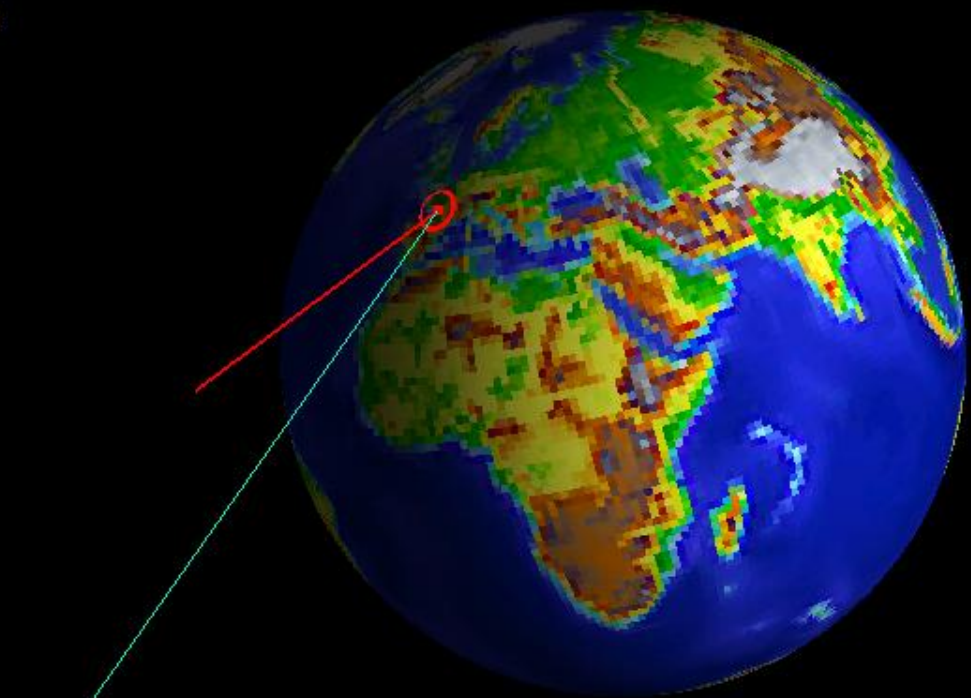
Azimuth relative GRAAL



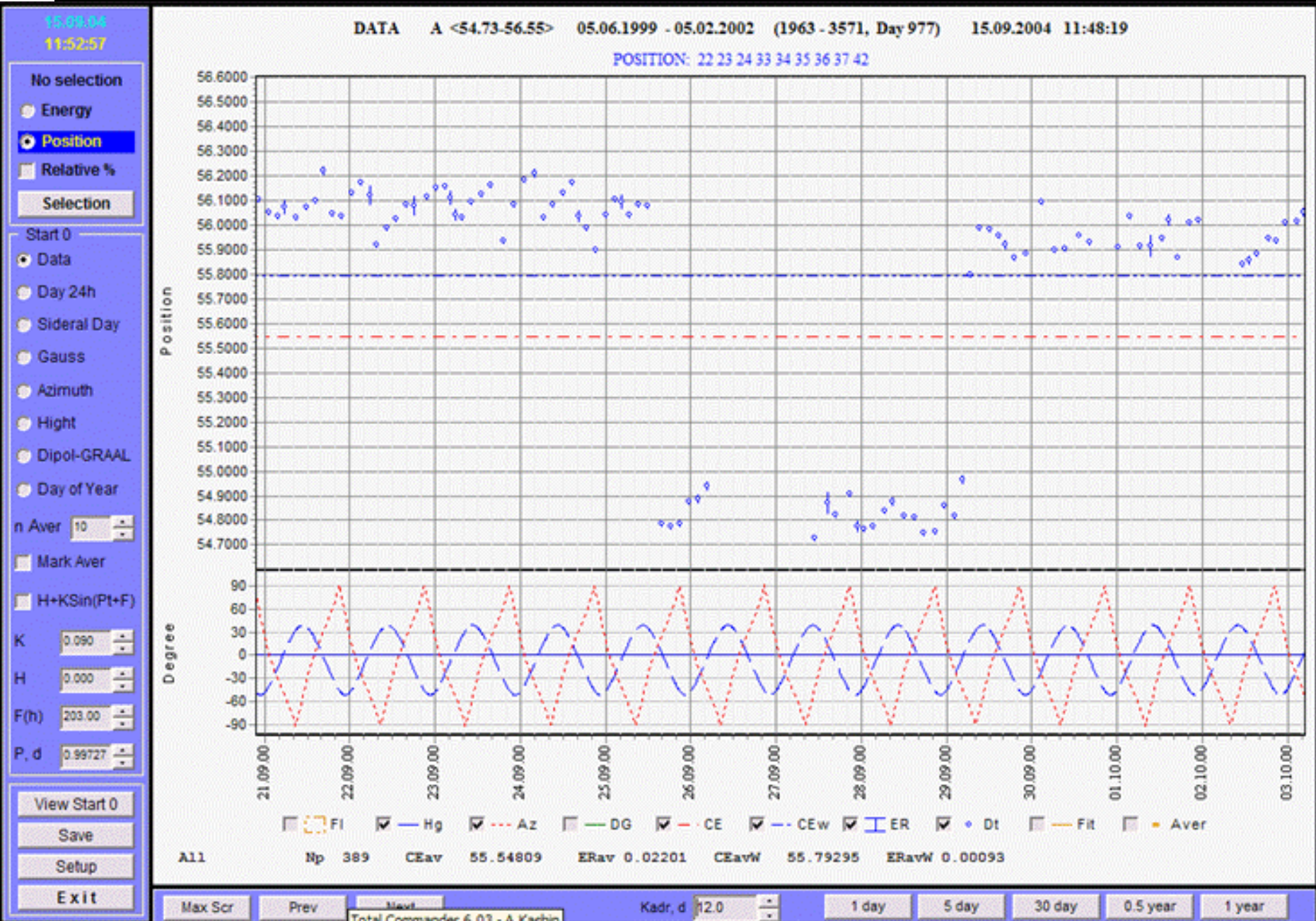
Declination



GRAAL-Dipole



Sample periods



CMB dipole

I
263.85

b
48.25

Geodetic coordinates

Entry

Latitude
45.20753

Longitude
5.69097

Exit

Latitude
45.20751

Longitude
5.69093

Azimuth

232.95611

IZone

1

Standart

Save Block
 Dp - Gr
 Normaliz
 Directory
 c:\000new

Quit

FR	Np	Run1	Run2	Date1	Date2	POSITav	ENERGYav	FR	Np	Run1	Run2	Date1	Date2	POSITav	ENERGYav
01	23	833	858	10.04.98	12.04.98	94.46374	1482.11108	25	21	2388	2410	30.01.00	01.02.00	104.73995	1482.11108
02	9	869	879	15.04.98	16.04.98	94.39833	1482.11108	26	55	2413	2477	02.02.00	06.02.00	104.70674	1482.11108
03	28	886	918	17.04.98	20.04.98	94.41512	1482.11108	27	75	2479	2564	23.02.00	29.02.00	104.61627	1482.11108

Selection Position

01p All Position

02p **54.7 - 56.3**

03p 94.4 - 94.7

04p 101.5 - 101.8

05p 104.5 - 104.8

06p 108.1 - 110.6

07p 92.0 - 110.7

Energy

08e All Energy

09e 1097.08

10e 1482.11

11e 1537.25

12r All Relative

Off Fragment

Start 0

Plot

Data

Day 24h

Day SD

Gauss

Azimuth q5

High q6

Dp-Gr q7

Month q8

Start 0

Start 1, 2

No selection

Begin End

Hours 0..24

Azimuth 0..360

Hight -50..35

Gr-Dp 19..148

Month 1..12

Start 1 Start 2 Sun (Month)

Start 3, 4

No selection Begin 5 h

Begin 23 h

Hr 1/2 1 3 6 12

Az 10 20 45 90 180

Hg 1/2F Az, Hg, DG, Dy

DG Shift 1/2 Hr, Az, Mn

Mn 1/4 1/2 1 2 3 6

Start 3 Start 4 Sun for Month only

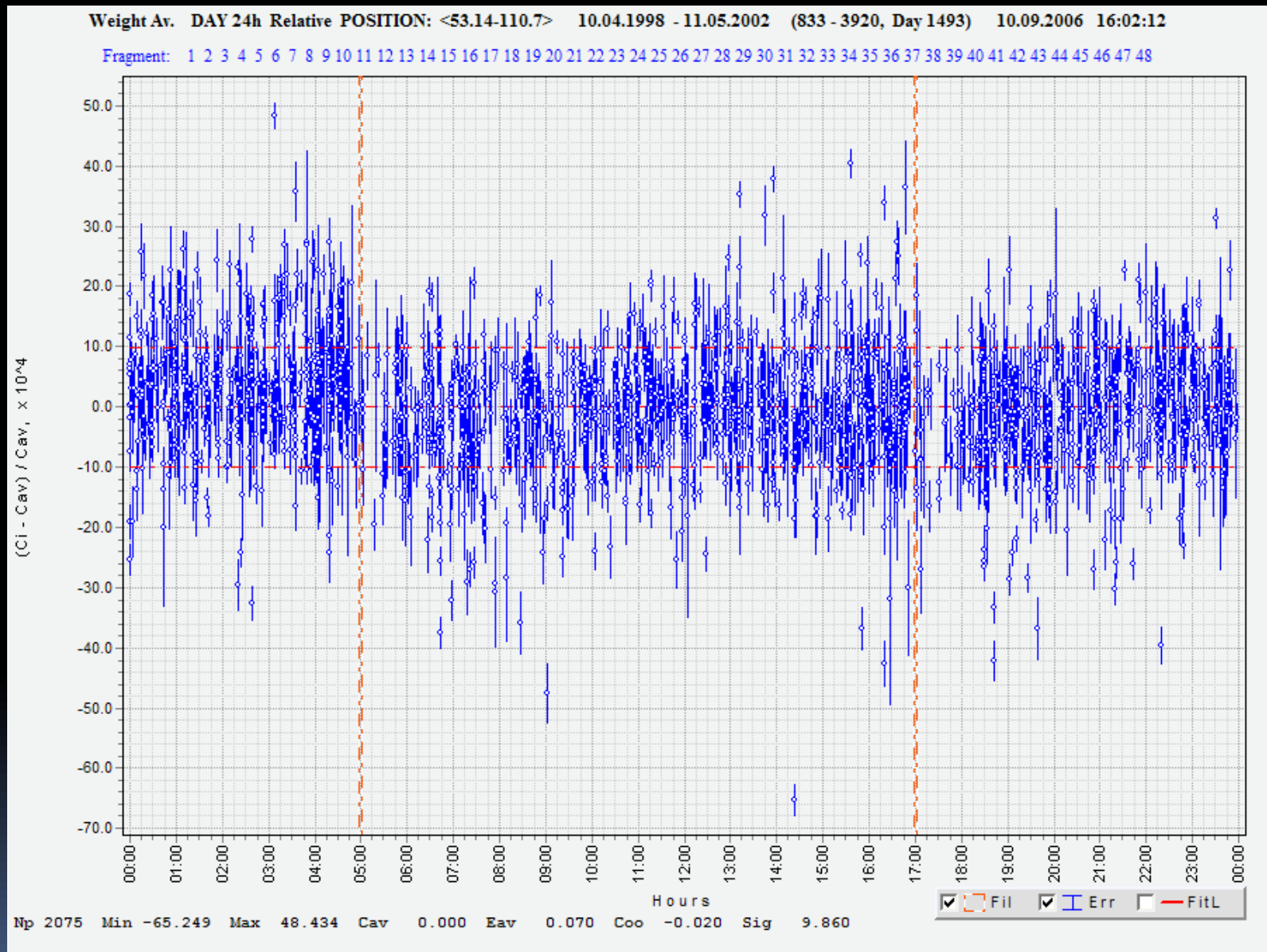
OK All data > CEw < CEw

Auto save Table Auto save Plot

19	71	1709	1799	28.04.99	03.05.99	101.68488	1482.11108	43	38	3572	3618	06.02.02	12.02.02	53.26230	1097.08008	
20	45	1801	1856	05.05.99	08.05.99	101.63240	1482.11108	44	42	3635	3694	20.02.02	02.03.02	108.39078	1482.11108	
21	52	1862	1932	12.05.99	16.05.99	101.61553	1482.11108	45	6	3695	3701	02.03.02	03.03.02	109.52827	1482.11108	
<input checked="" type="checkbox"/>	22	33	1963	1998	05.06.99	08.06.99	54.97754	1097.08008	46	60	3702	3775	03.03.02	12.03.02	108.18991	1482.11108
<input checked="" type="checkbox"/>	23	72	1999	2077	09.06.99	15.06.99	54.99217	1097.08008	47	41	3778	3819	19.04.02	26.04.02	99.02583	1482.11108
<input checked="" type="checkbox"/>	24	46	2080	2130	16.06.99	19.06.99	54.97136	1097.08008	48	92	3820	3920	26.04.02	11.05.02	106.93372	1482.11108

OK All 1482.11108 1537.25110 1097.08008 54.7 <- frag -> 56.3 None Update 2

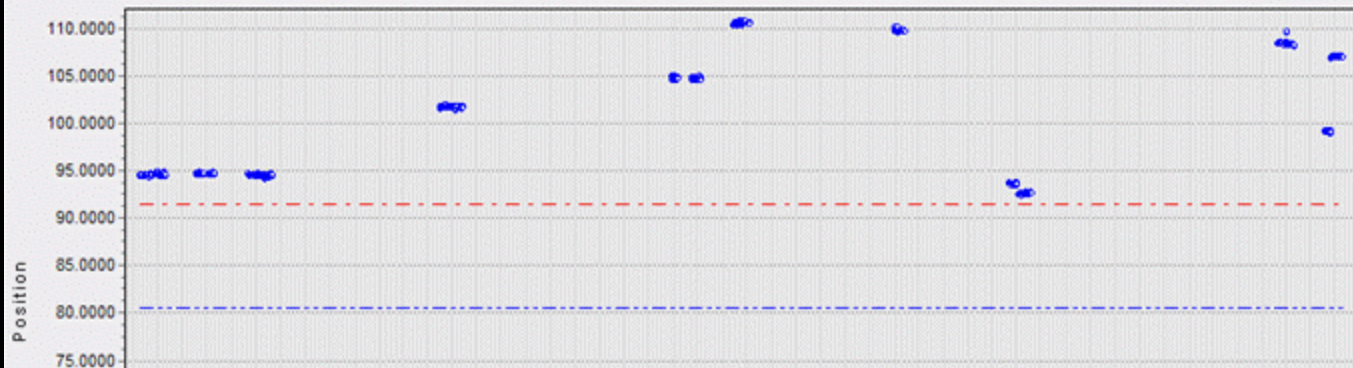
Distribution of energy during 24-hour day



Data I - Position

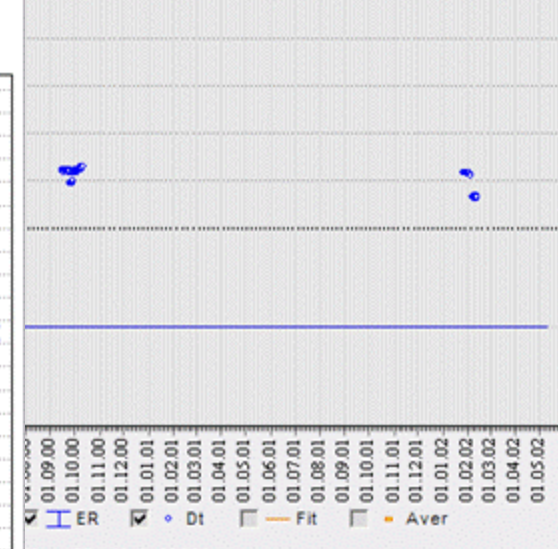
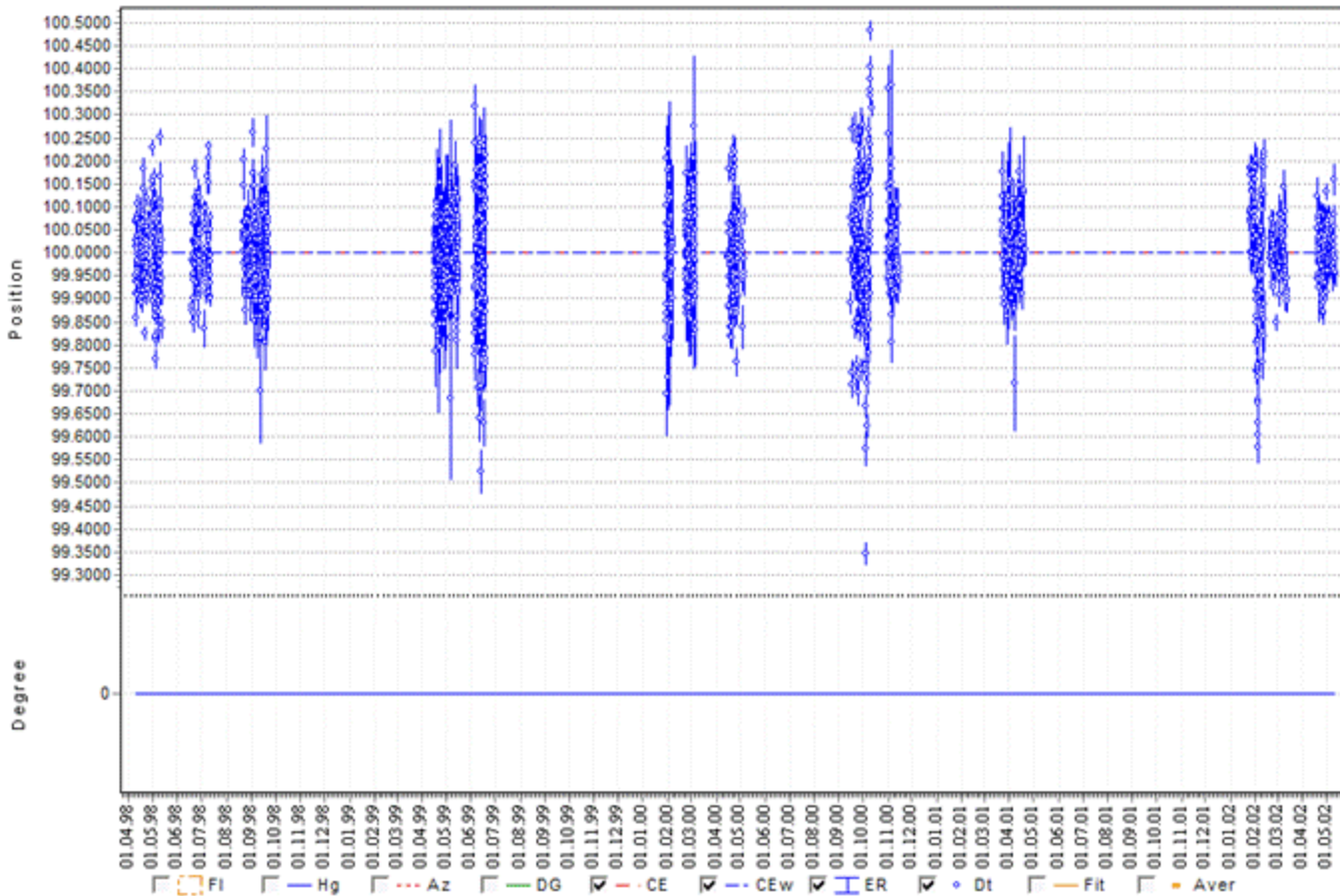
10.04.1998 - 11.05.2002, 1692 day, 2075 points

POSITION: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48



DATA R 01p <99.35-100.48> 10.04.1998 - 11.05.2002 (833 - 3920, Day 1493) 09.09.2004 15:50:41

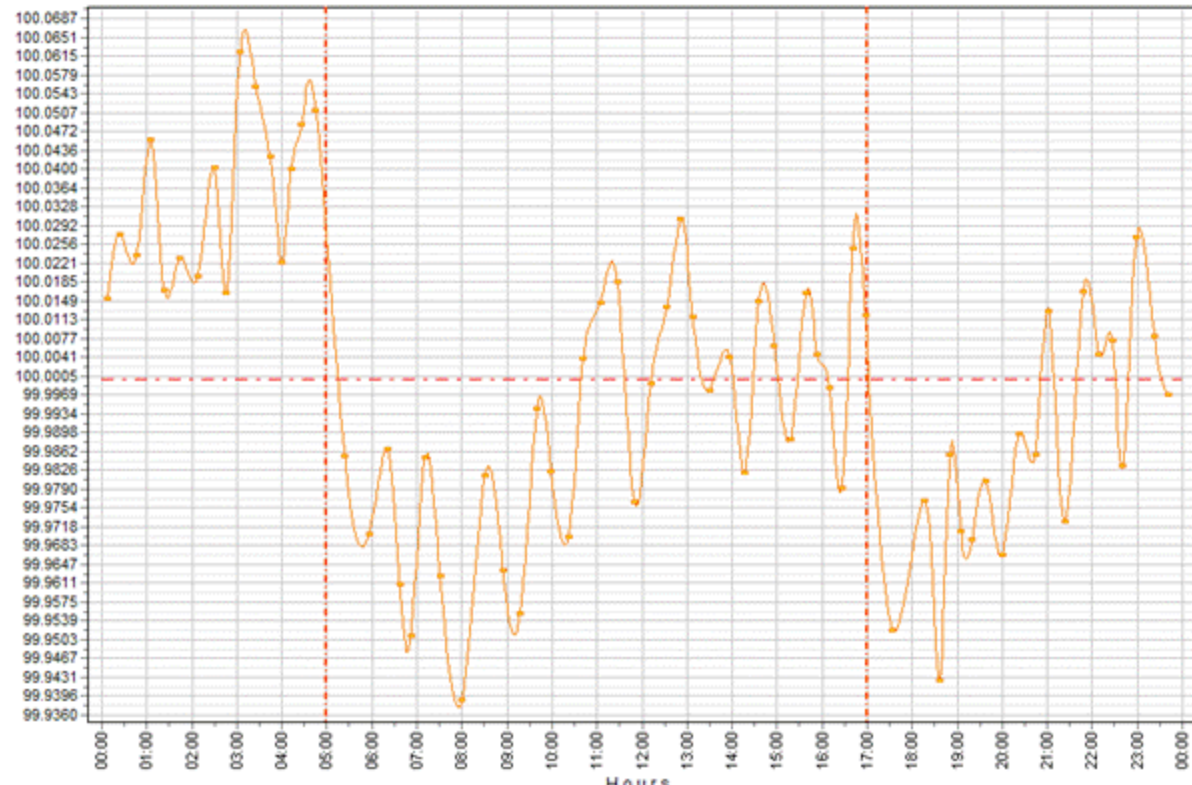
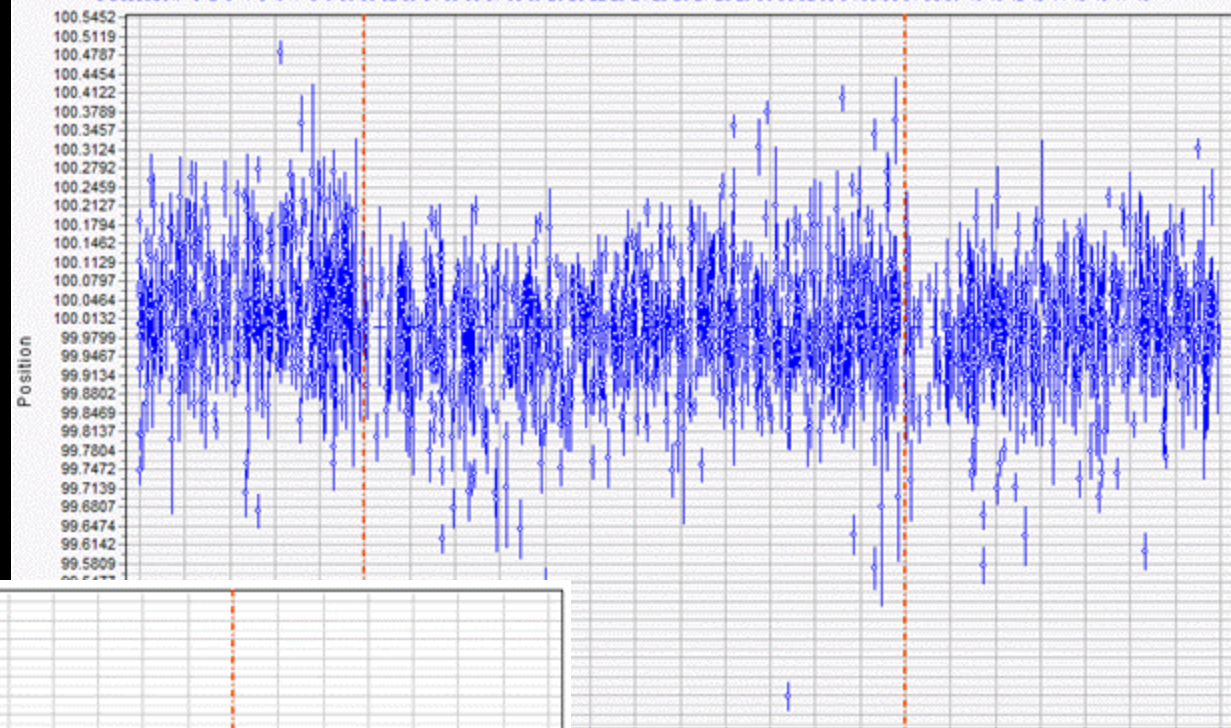
POSITION: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48



ERavW 0.00058

Daily variations

DAY 24h R 12r <99.35-100.48> 10.04.1998 - 11.05.2002 (833 - 3920, Day 1493) 02.09.2004 12:15:36

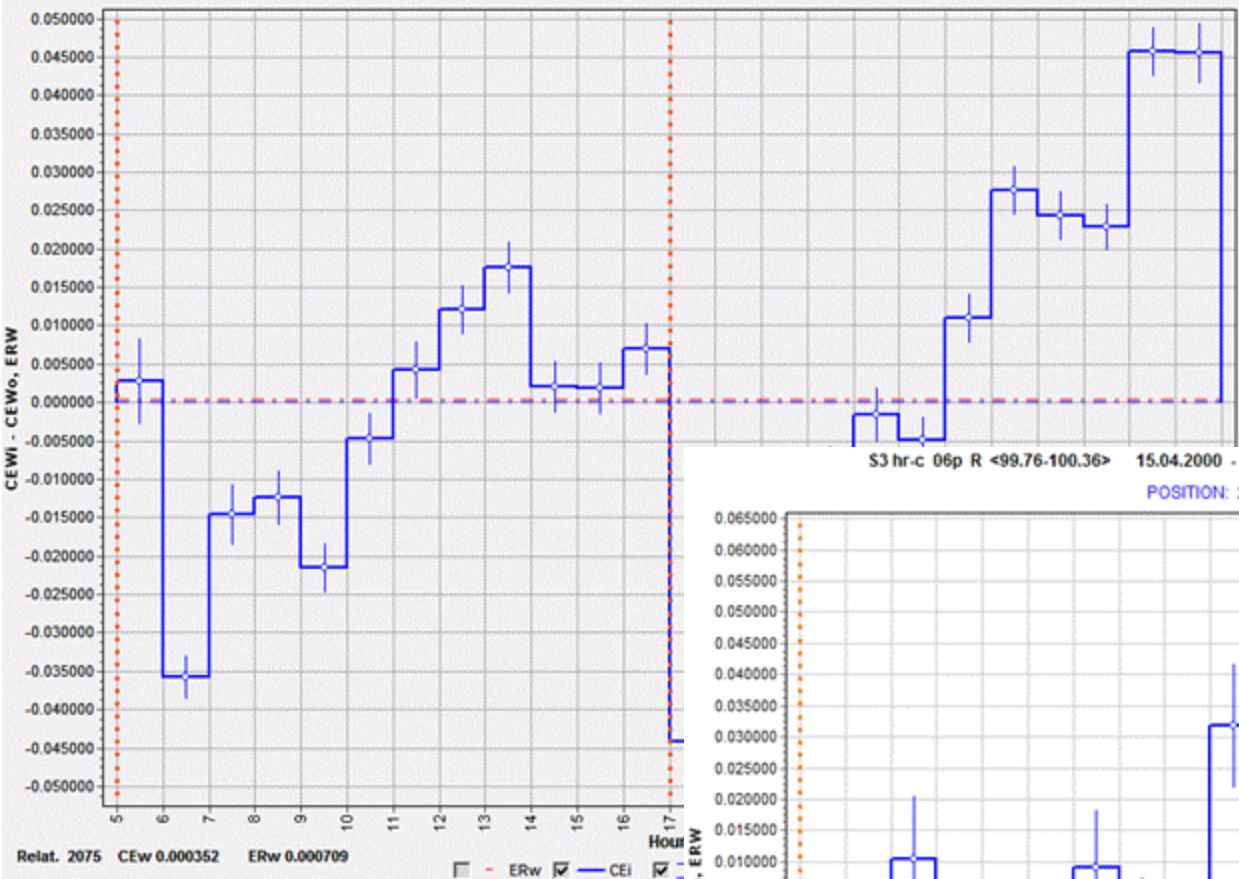


Hours
 Error dT Fit Aver
 CEavW 100.00000 ERavW 0.00070

S3 hr-c 12r R <99.35-100.48> 10.04.1998 - 11.05.2002 (833 - 3920, Day 1493) 02.09.2004 13:09:49

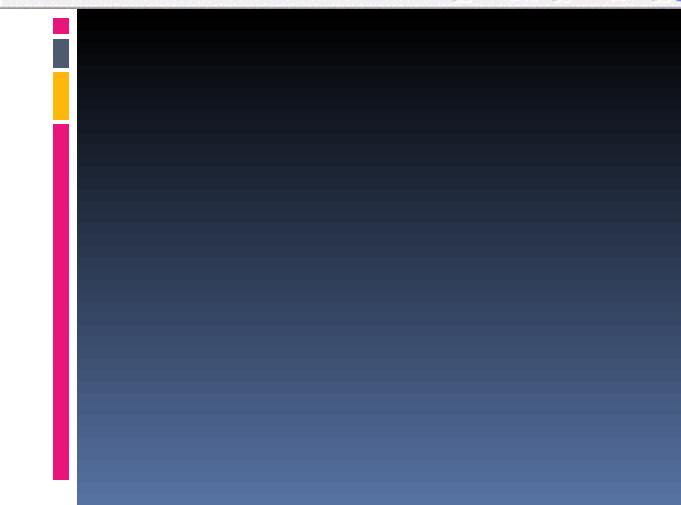
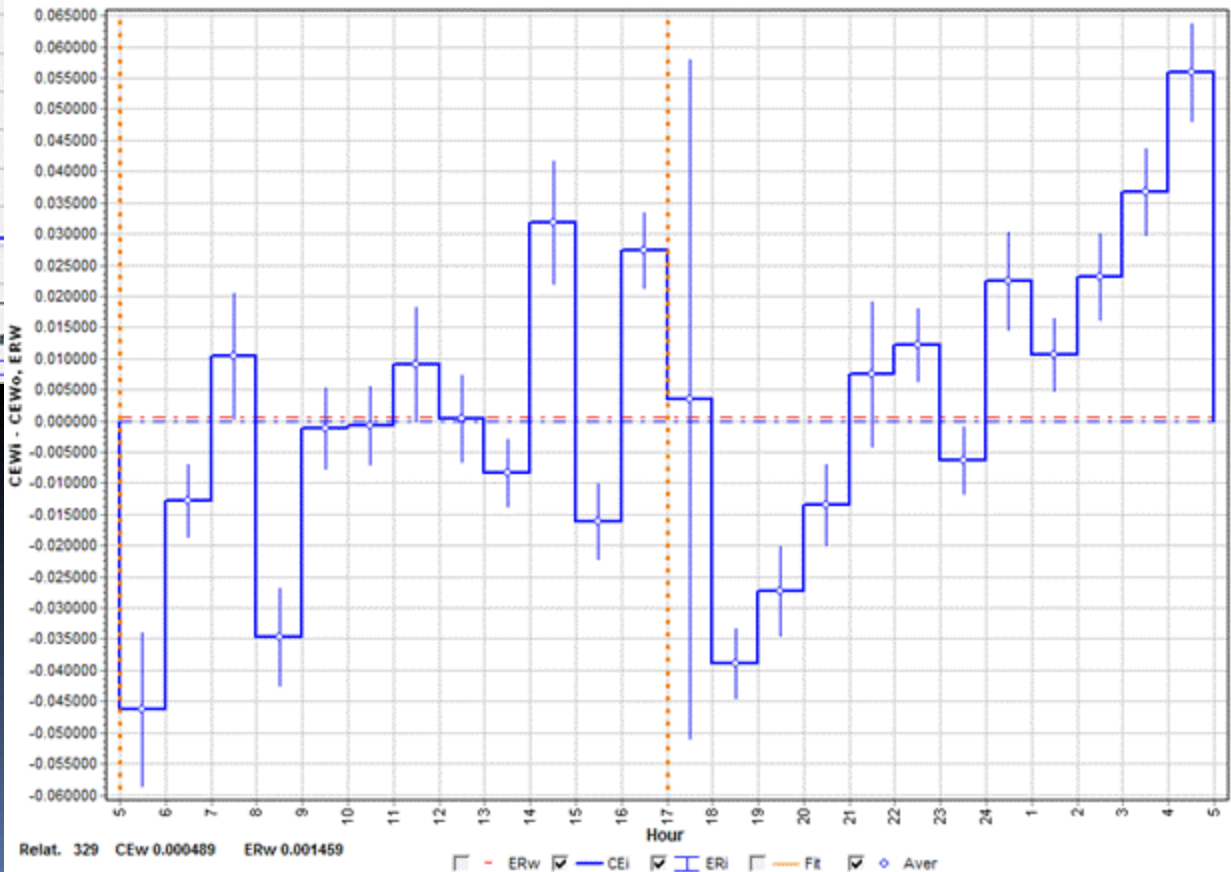
Daily variations; 2-hour averaged

POSITION: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48

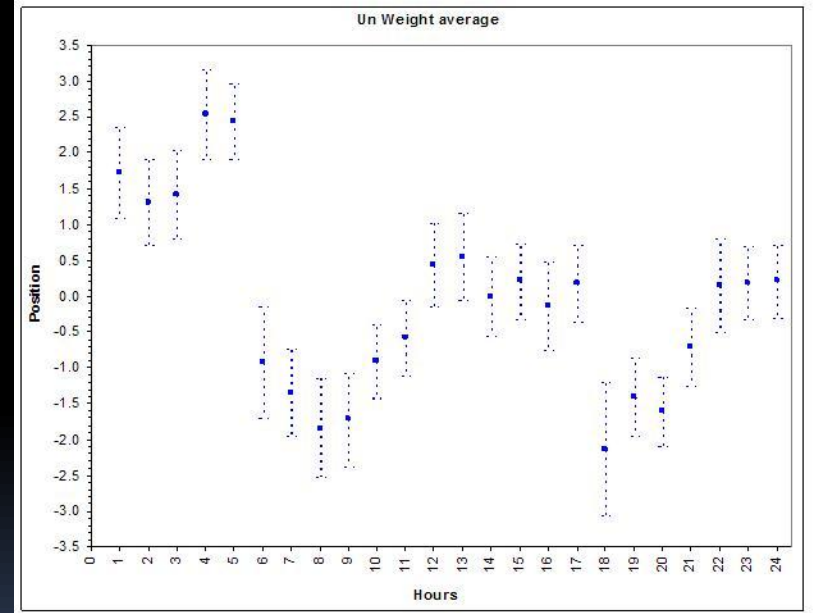
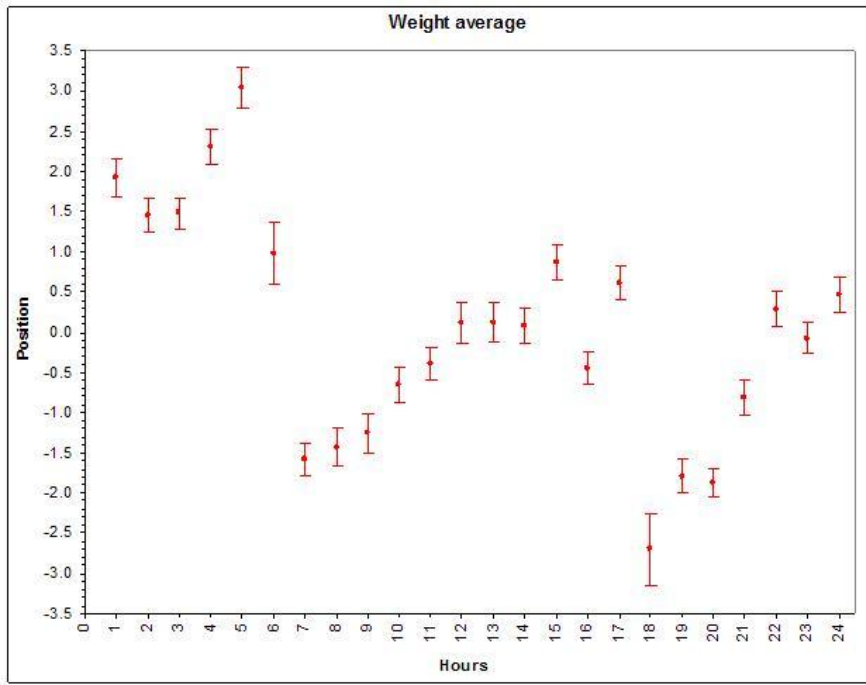


S3 hr-c 06p R <99.76-100.36> 15.04.2000 - 12.03.2002 (2655 - 3775, Day 697) 02.09.2004 13:10:23

POSITION: 29 30 31 32 38 39 44 45 46



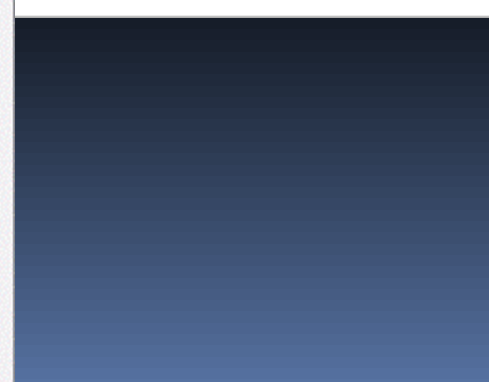
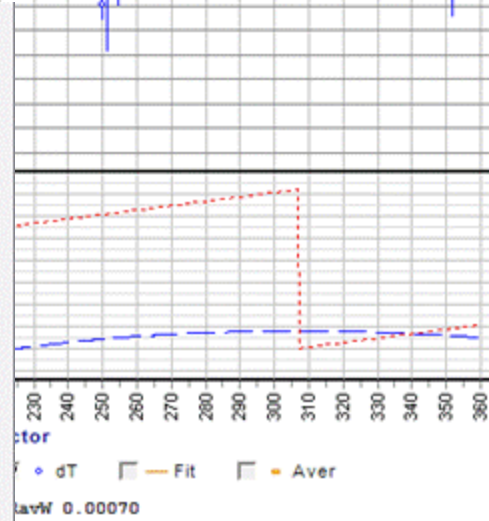
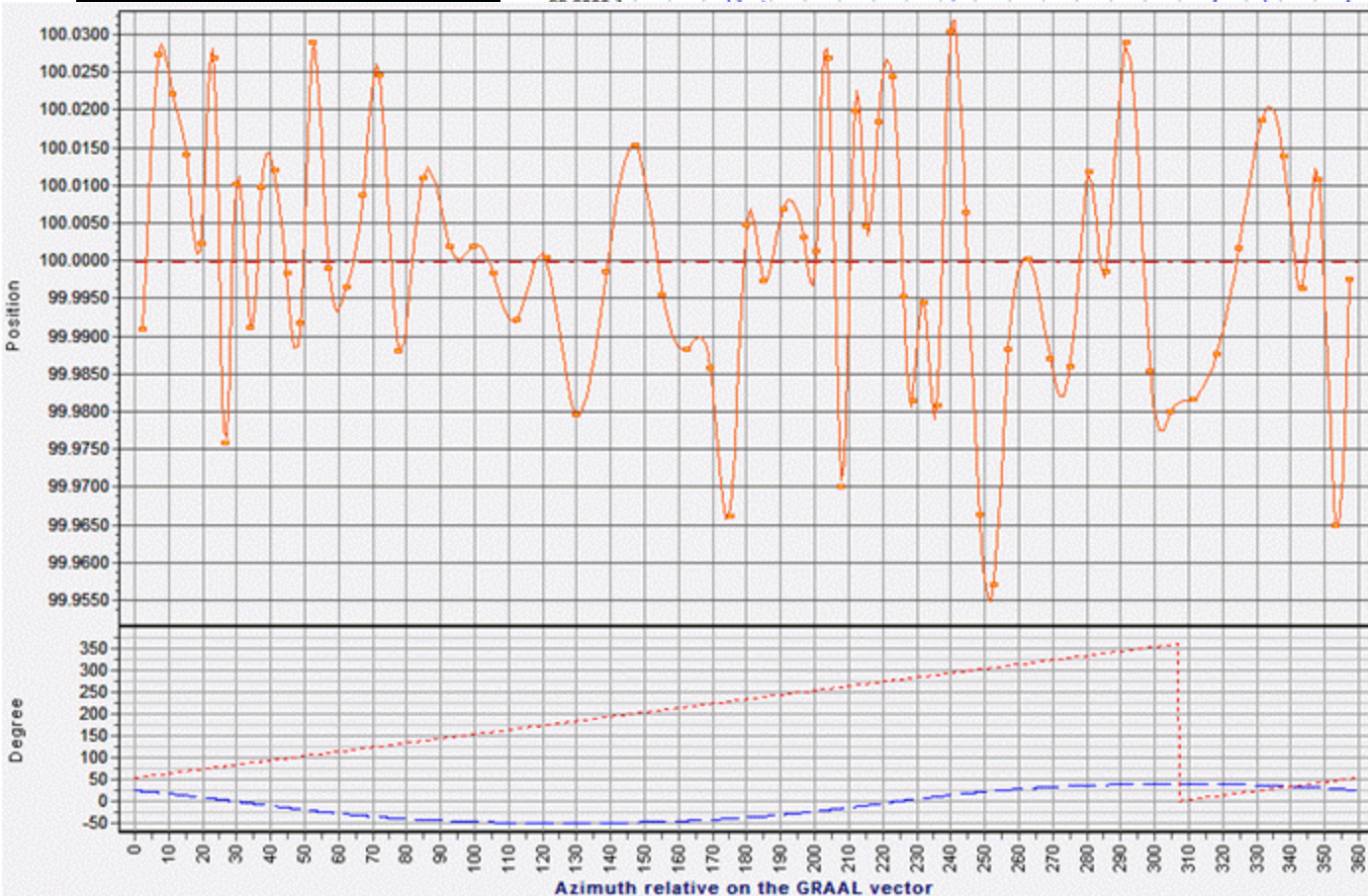
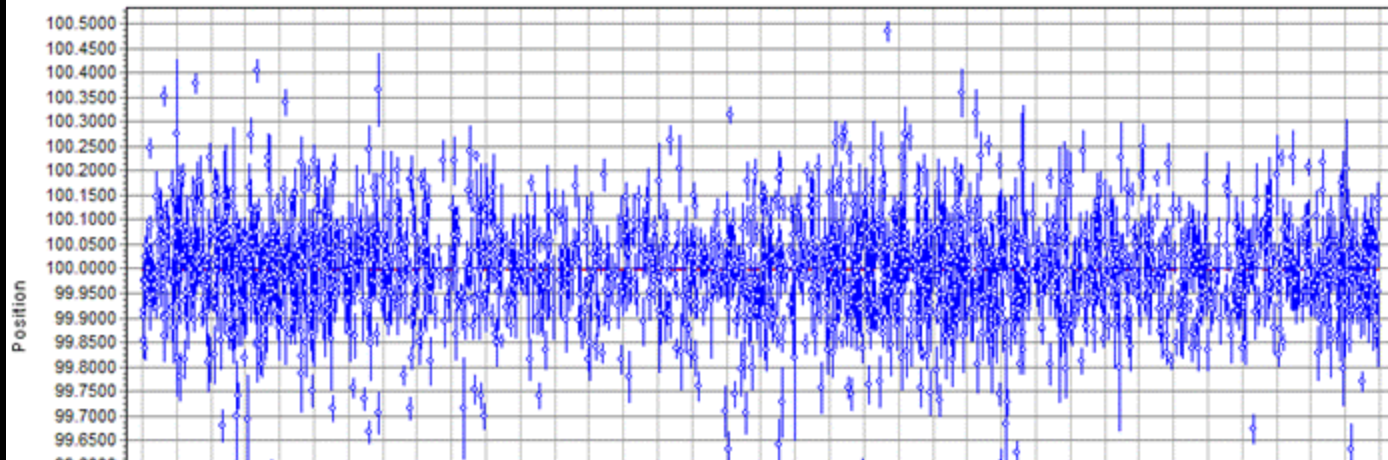
Daily variations; the role of weighting



Angular dependence

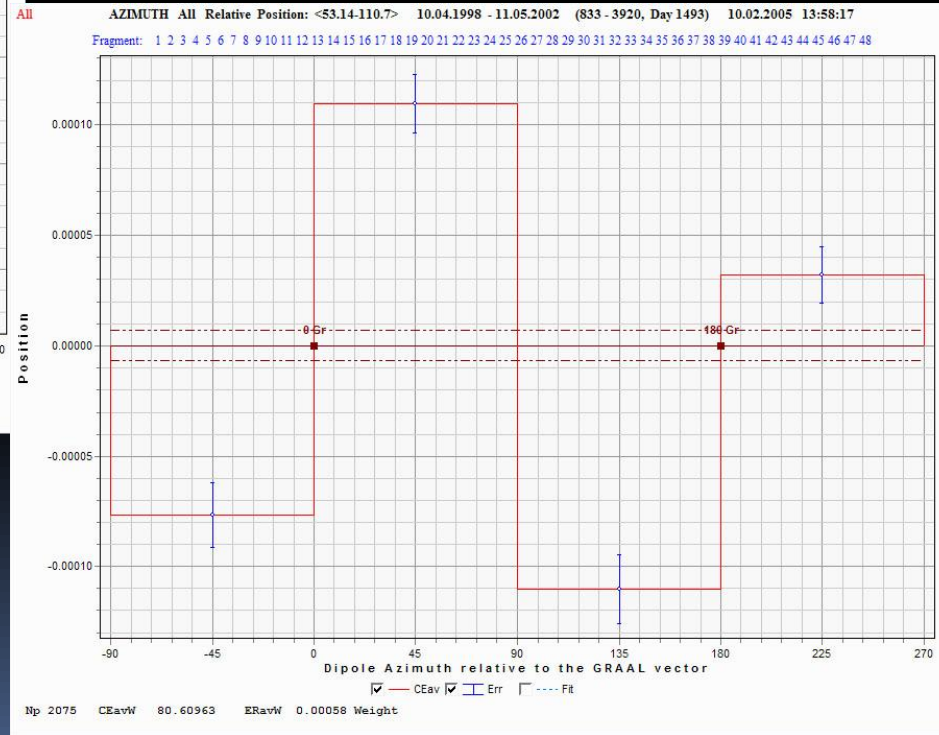
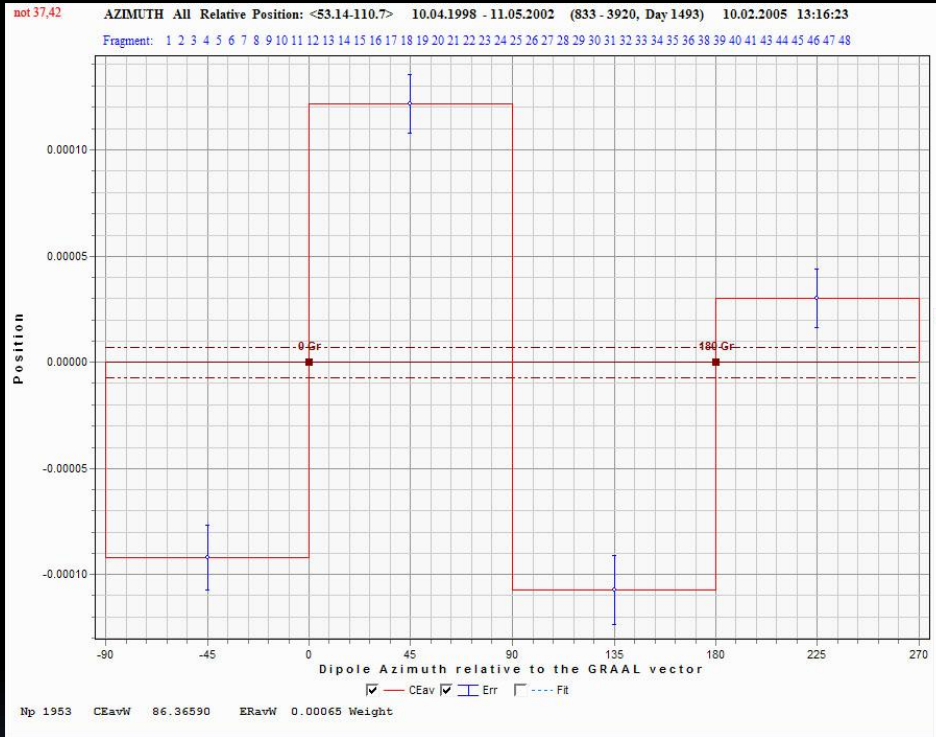
SIDERAL DAY R 12r <99.35-100.48> 10.04.1998 - 11.05.2002 (833 - 392, Day 1493) 02.09.2004 12:52:19

POSITION: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48



Factor
 dT Fit Aver
 lavW 0.00070

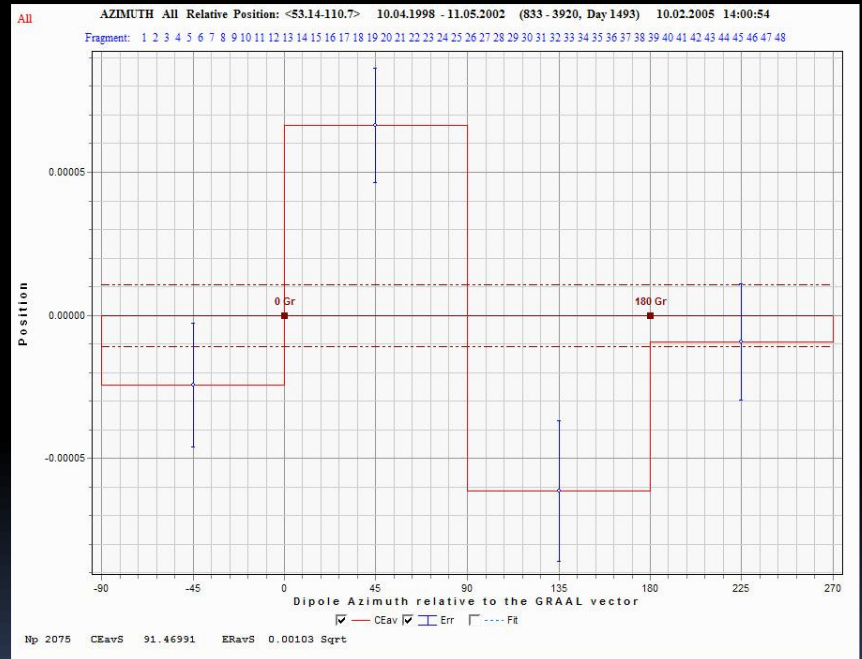
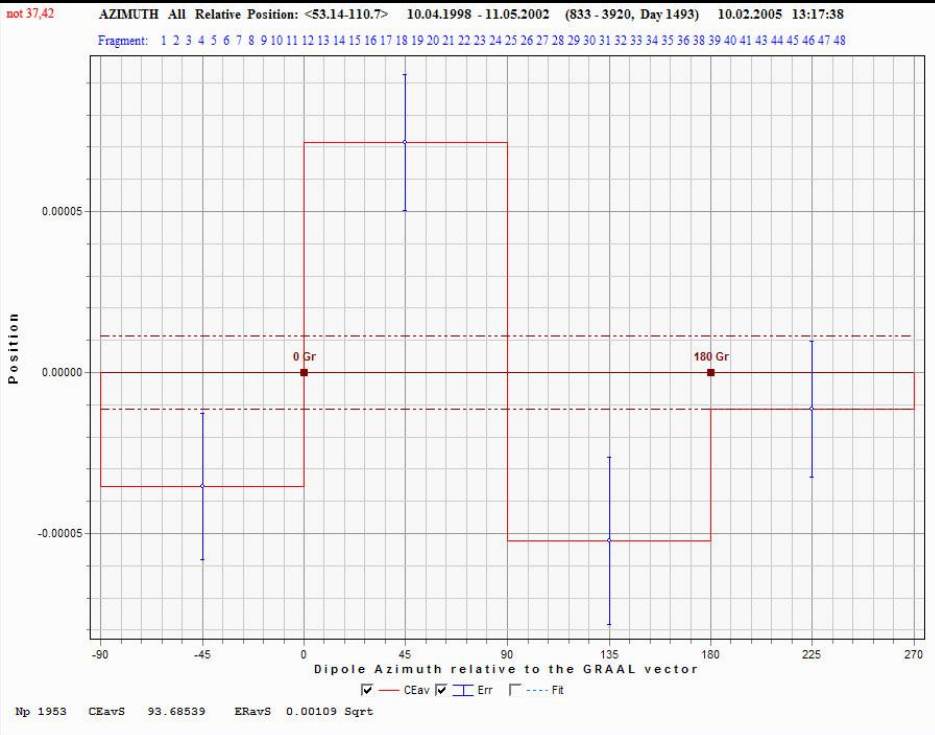
Weighted



$$\bar{C} = \frac{\sum \left[\left(\frac{1}{E_i} \right)^2 \times C_i \right]}{\sum \left(\frac{1}{E_i} \right)^2}$$

$$\bar{E} = \frac{1}{\sqrt{\sum \left(\frac{1}{E_i} \right)^2}}$$

Unweighted



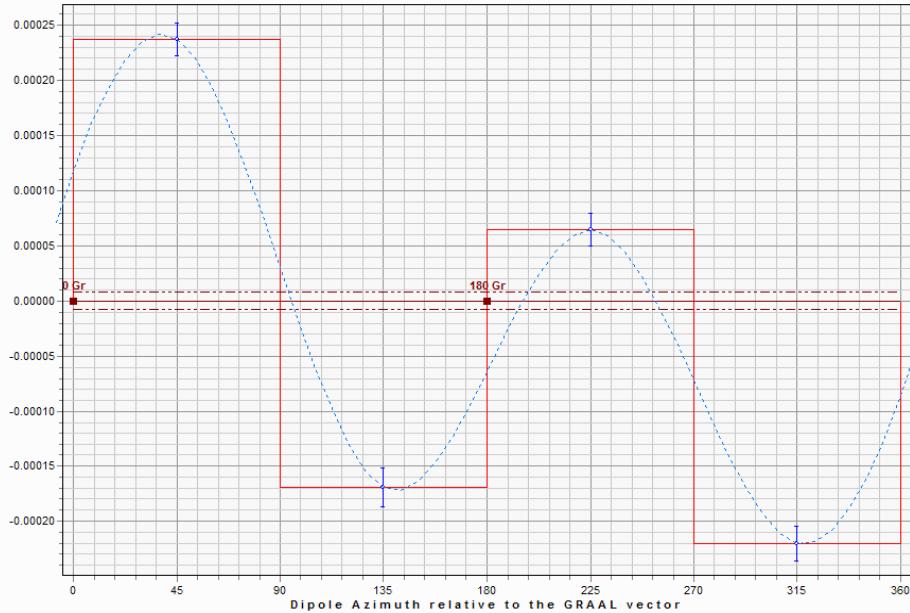
$$\bar{C} = \frac{\sum C_i}{N}$$

$$\bar{E} = \frac{\sigma_{all}}{\sqrt{N}}$$

UV

AZIMUTH uv Relative Correction: <92.06-110.88> 10/04/1998 - 11/05/2002 (833 - 3920, Day 1493) 17.01.2005 11:34:08

Fragment: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 25 26 27 28 29 30 31 32 38 39 40 41 44 45 46 47 48

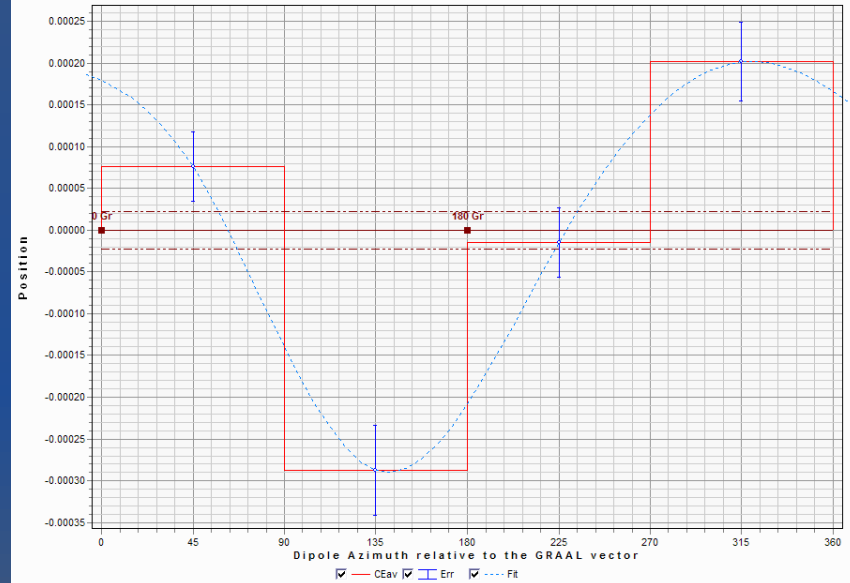


Np 1648 CEavW 100.02294 ERavW 0.00078 Weight

Optical

AZIMUTH vis Relative Correction: <53.04-56.37> 05.06.1999 - 12.02.2002 (1963 - 3618, Day 984) 17.01.2005 20:53:56

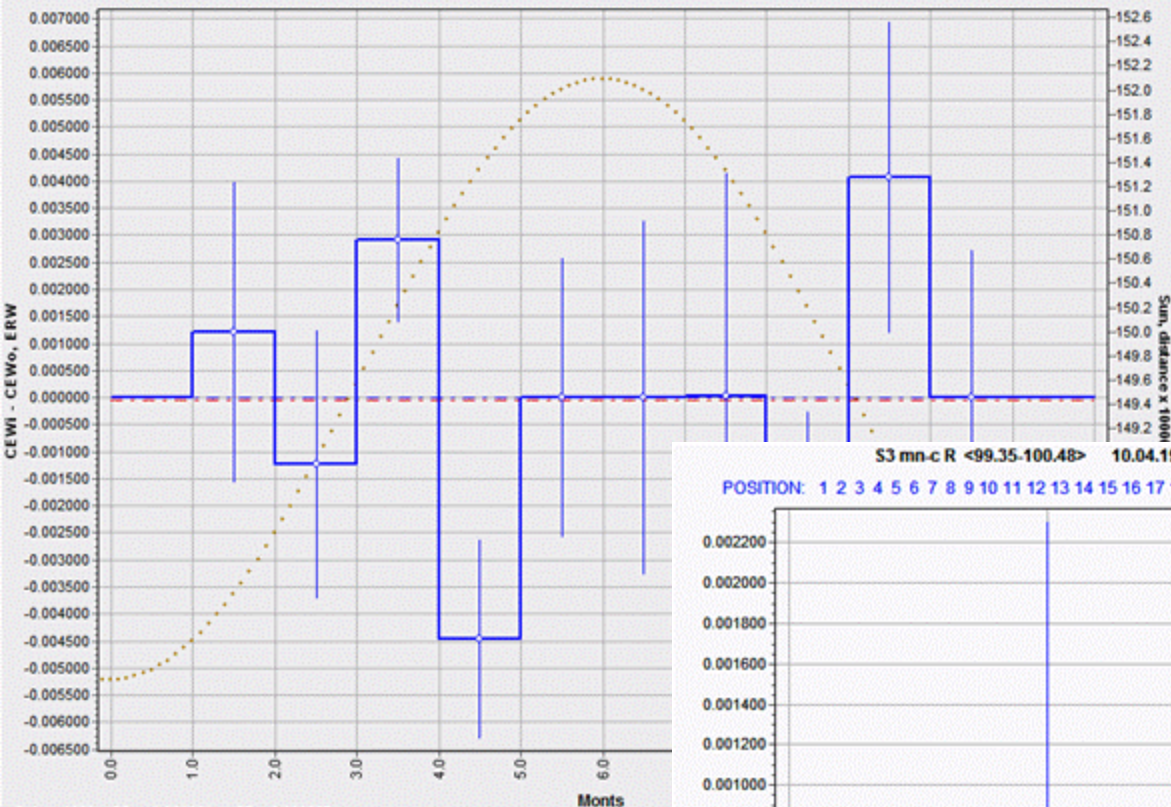
Fragment: 22 23 24 33 34 35 36 42 43



Np 370 CEavS 55.20276 ERavS 0.00126 Sqrt

S3 mn-c R <99.35-100.48> 10.04.1998 - 11.05.2002 (833 - 3920, Day 1493) 02.09.2004 13:32:18

POSITION: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 43 44 45 46 47 48

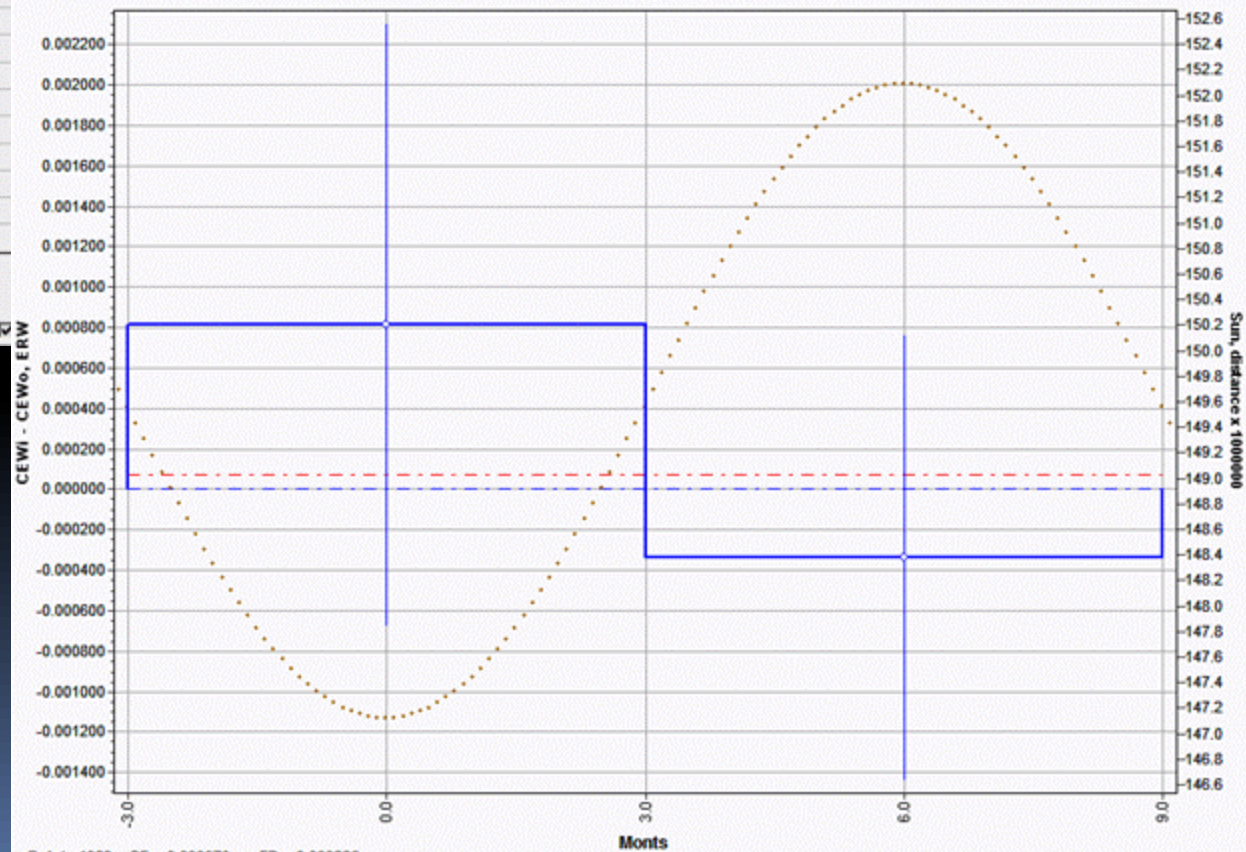


Relat. 1989 CEw -0.000051 ERw 0.000757

Sun ERw CEI

S3 mn-c R <99.35-100.48> 10.04.1998 - 11.05.2002 (833 - 3920, Day 1493) 02.09.2004 13:32:07

POSITION: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 43 44 45 46 47 48

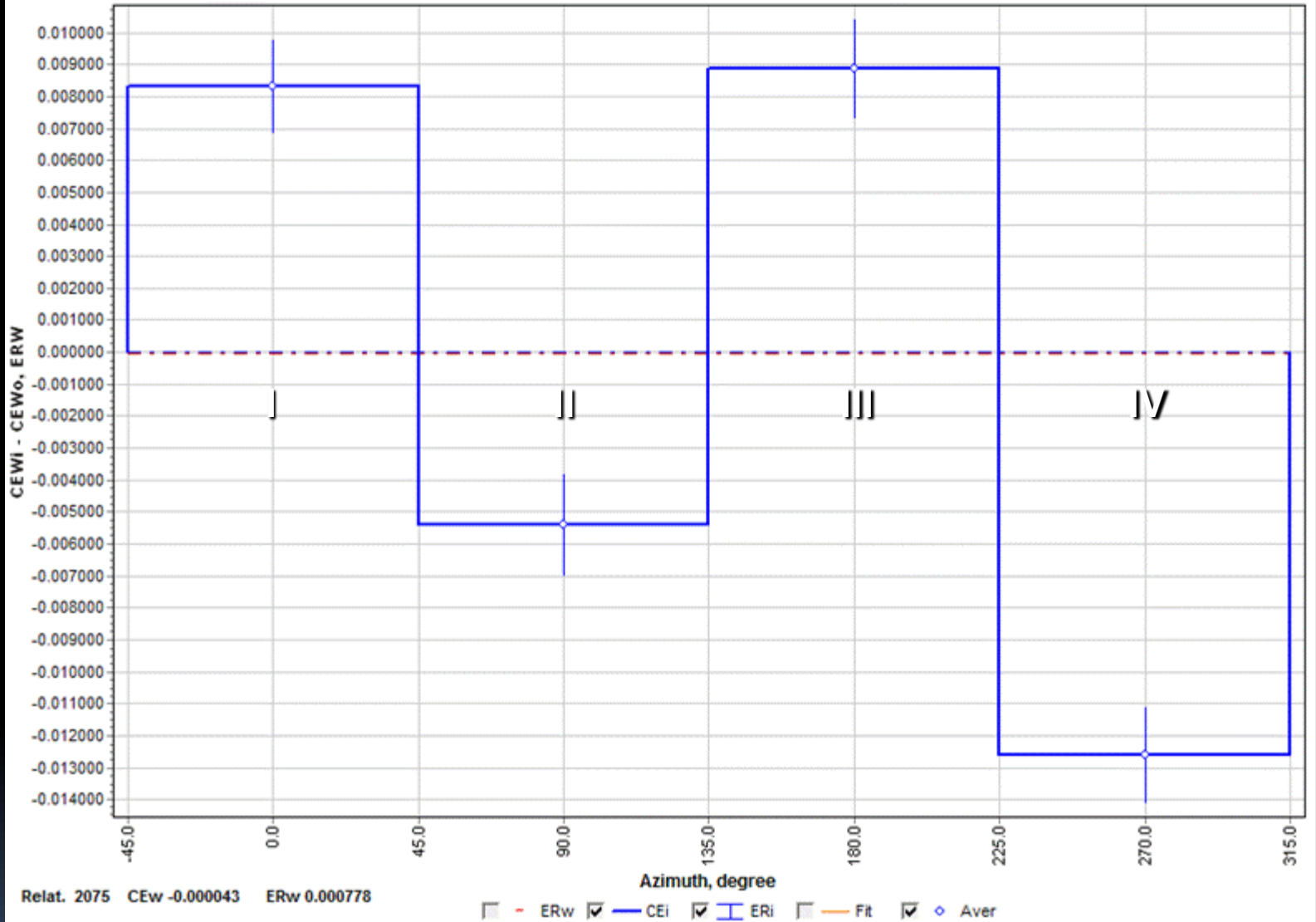


Relat. 1989 CEw 0.000070 ERw 0.000886

Sun ERw CEI ERI Fit Aver



POSITION: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48



Relat. 2075 CEw -0.000043 ERw 0.000778

- ERw CEI ERI Fit Aver

All	2075	100.000000	0.000696		
Az -45..45	592	100.008327	0.001317	0.008327	0.001489
Az 45..135	437	99.994599	0.001466	-0.005401	0.001623
Az 135..225	508	100.008862	0.001422	0.008862	0.001583
Az 225..315	538	99.987409	0.001374	-0.012591	0.001540

-0.000043 0.000778

:18:05
20 21
44 45

dER

2008 measurements

Fragment	Points	Sigma	Chi ²
21-37 (15)	14765	0.00006570	0.97
21-30 (10)	10083	0.00006526	1.24
21,22 (2)	2411	0.00006525	0.86
21 (1)	1008	0.00006299	1.38
22 (1)	1403	0.00006191	0.89
25 (1)	1415	0.00006257	1.71
30 (1)	1629	0.00006828	1.91

Weight Aver. Jul, Nov 2008-DF Absolute 27.05.2009 20:33:20

FR	Np	Run1	Run2	Date1	Date2	CEaver	FR	Np	Run1	Run2	Date1	Date2	CEaver		
<input checked="" type="checkbox"/>	21	1008	0	1007	23.07.08	23.07.08	-0.00010	<input type="checkbox"/>	51	1140	0	1139	29.07.08	16.11.08	-0.00001
<input checked="" type="checkbox"/>	22	1403	0	1402	23.07.08	24.07.08	-0.00005	<input type="checkbox"/>	52	1400	0	1400	16.11.08	16.11.08	-0.00002
<input checked="" type="checkbox"/>	23	530	0	529	24.07.08	24.07.08	-0.00007	<input type="checkbox"/>	53	774	0	773	16.11.08	17.11.08	-0.00002
<input checked="" type="checkbox"/>	24	818	0	817	24.07.08	24.07.08	-0.00011	<input type="checkbox"/>	54	430	0	429	17.11.08	17.11.08	-0.00003
<input checked="" type="checkbox"/>	25	1415	0	1429	24.07.08	25.07.08	-0.00013	<input type="checkbox"/>	55	1314	72	1393	17.11.08	17.11.08	0.00001
<input checked="" type="checkbox"/>	26	1369	0	1391	25.07.08	25.07.08	-0.00011	<input type="checkbox"/>	56	1277	1423	2704	17.11.08	18.11.08	0.00000
<input checked="" type="checkbox"/>	27	1287	0	1286	25.07.08	26.07.08	-0.00007	<input type="checkbox"/>	57	1367	1459	2825	19.11.08	20.11.08	-0.00011
<input checked="" type="checkbox"/>	28	486	0	489	26.07.08	26.07.08	-0.00015	<input type="checkbox"/>	58	1077	0	1121	20.11.08	20.11.08	-0.00011
<input checked="" type="checkbox"/>	29	138	0	137	26.07.08	26.07.08	-0.00011	<input type="checkbox"/>	59	1045	1722	2766	21.11.08	21.11.08	-0.00008
<input checked="" type="checkbox"/>	30	1629	0	1628	26.07.08	27.07.08	-0.00012	<input type="checkbox"/>	60	1213	2816	4090	21.11.08	21.11.08	-0.00008
<input checked="" type="checkbox"/>	31	1359	0	1358	27.07.08	27.07.08	-0.00010	<input type="checkbox"/>	61	1381	4223	5603	21.11.08	22.11.08	-0.00012
<input checked="" type="checkbox"/>	33	1726	0	1747	28.07.08	28.07.08	-0.00008	<input type="checkbox"/>	62	1263	5660	6922	22.11.08	22.11.08	-0.00017
<input checked="" type="checkbox"/>	35	827	0	826	29.07.08	29.07.08	-0.00009	<input type="checkbox"/>	63	1388	0	1387	22.11.08	23.11.08	-0.00011
<input checked="" type="checkbox"/>	36	319	0	318	29.07.08	29.07.08	-0.00006	<input type="checkbox"/>	64	465	0	479	23.11.08	23.11.08	-0.00017
<input checked="" type="checkbox"/>	37	451	0	450	29.07.08	29.07.08	-0.00014	<input type="checkbox"/>	65	585	528	1173	23.11.08	23.11.08	-0.00051
								<input type="checkbox"/>	66	1244	0	1245	23.11.08	24.11.08	-0.00005
								<input type="checkbox"/>	67	1258	0	1311	24.11.08	24.11.08	-0.00015

Position CE

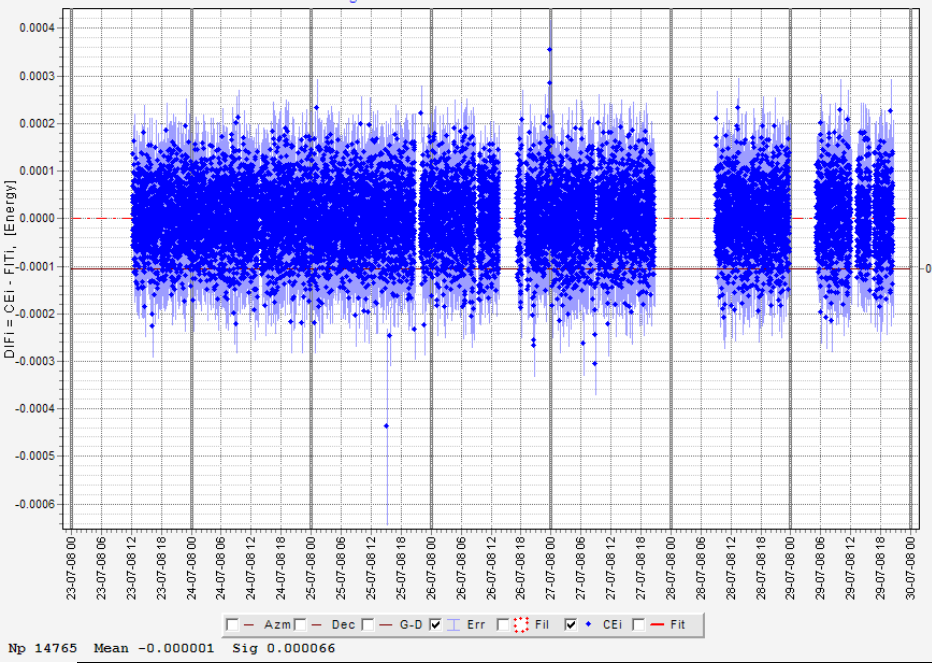
 Fitted

 Difference

UV 0,0057581
 VISIBLE 0,0079965

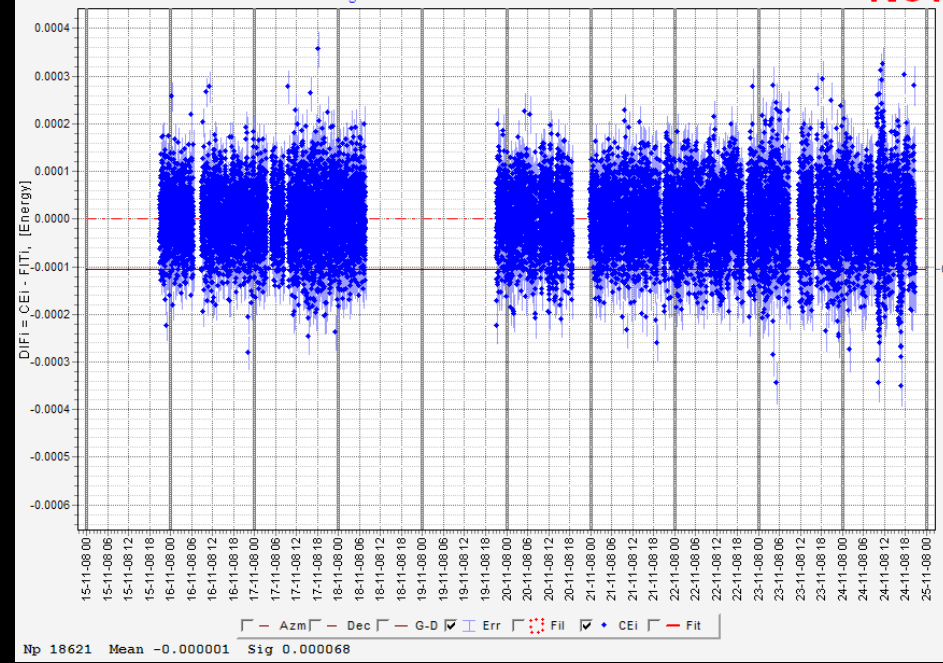
Jul, Nov 2008-DF Absolute DATA [23.07.2008 ... 29.07.2008]

Jul



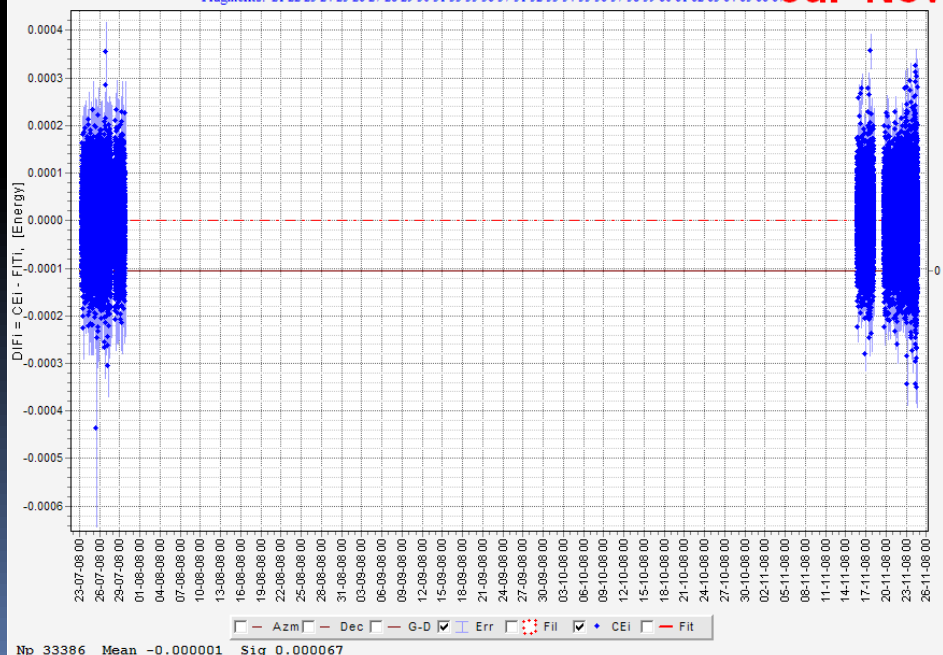
Jul, Nov 2008-DF Absolute DATA [15.11.2008 ... 24.11.2008]

Nov



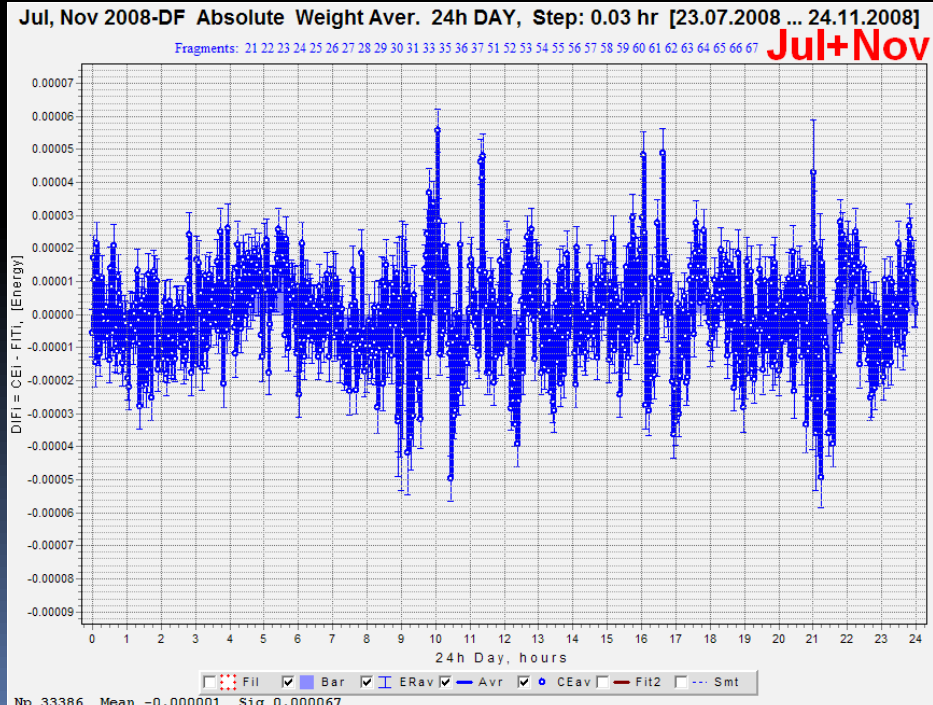
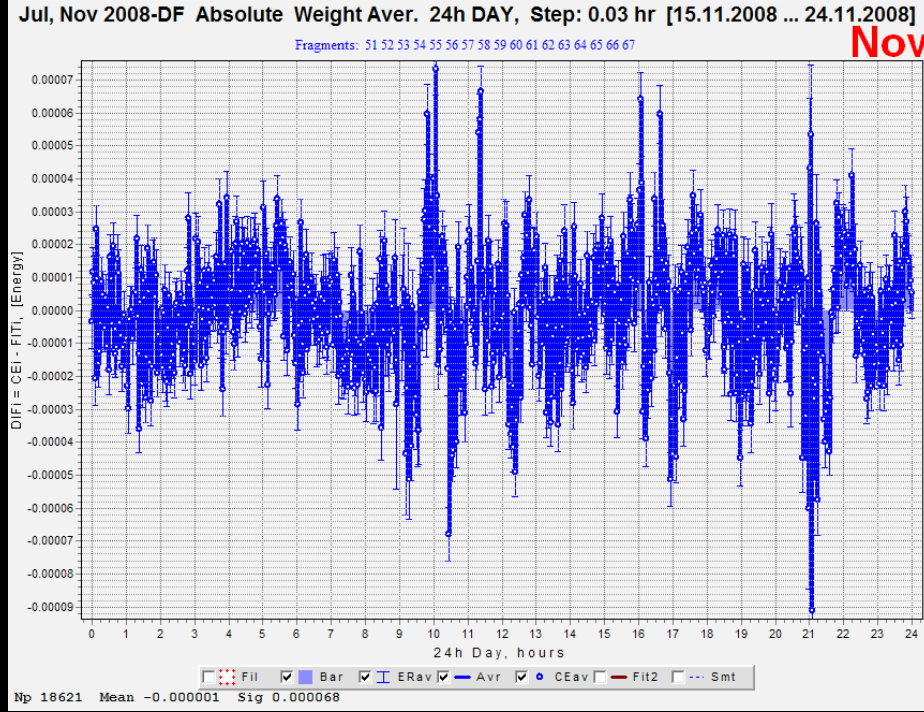
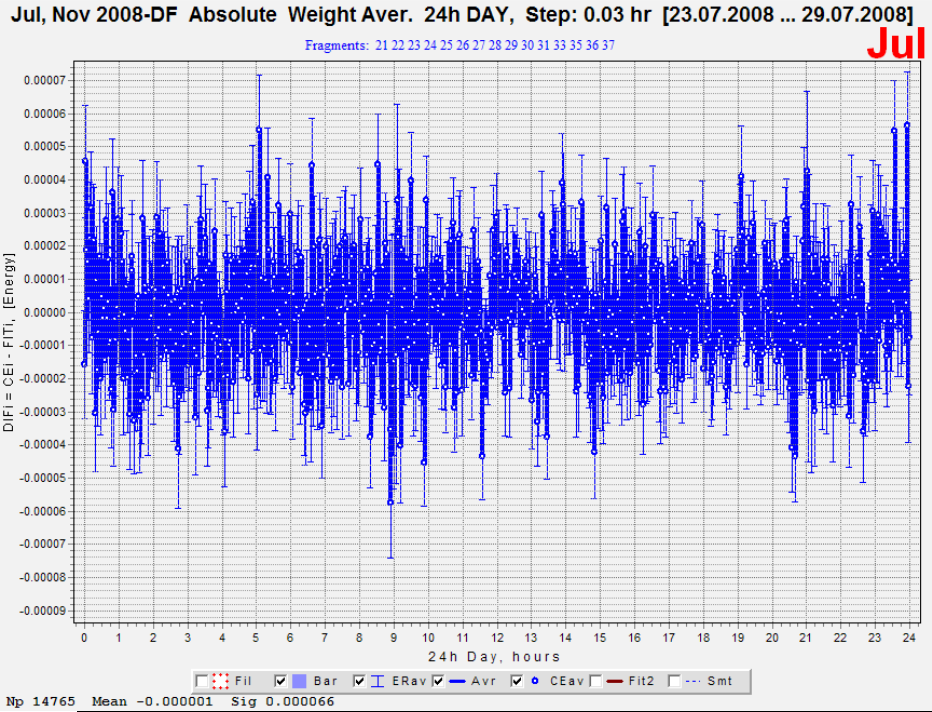
Jul, Nov 2008-DF Absolute DATA [23.07.2008 ... 24.11.2008]

Jul+Nov



Data



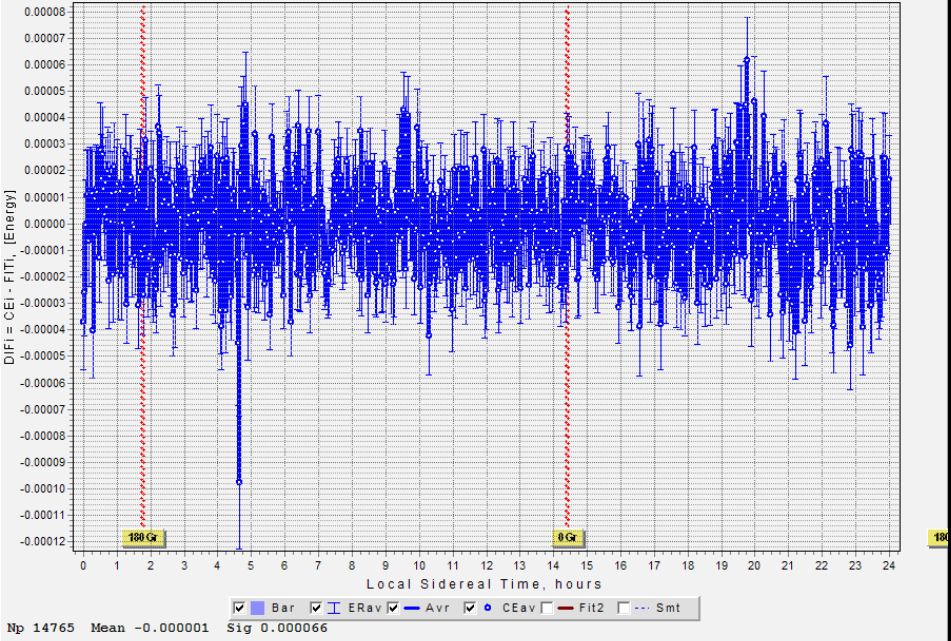


24h
Step 0.03h



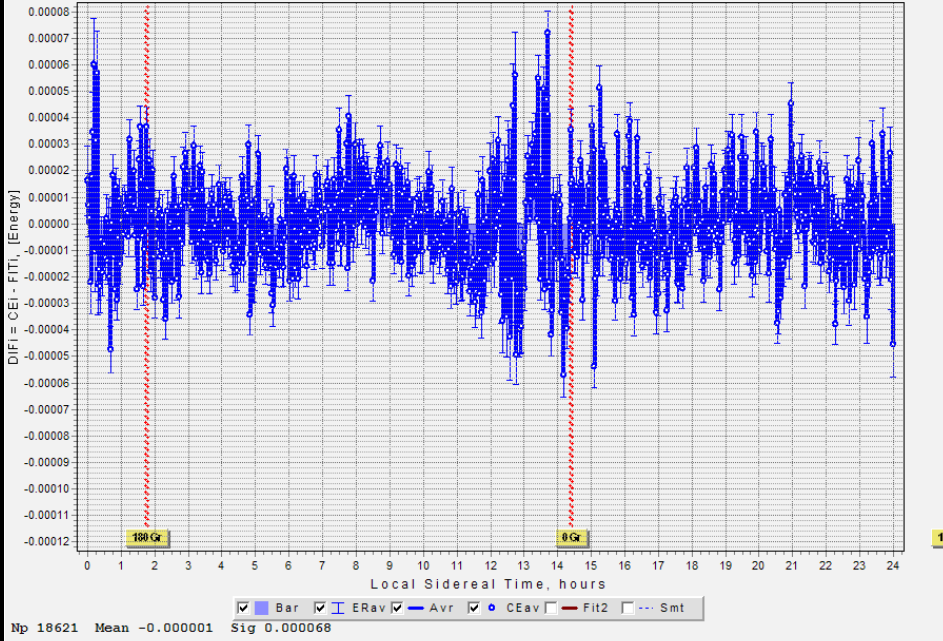
Jul, Nov 2008-DF Absolute Weight Aver. SIDEREAL DAY, Step: 0.03 hr [23.07.2008 ... 29.07.2008]

Fragments: 21 22 23 24 25 26 27 28 29 30 31 33 35 36 37



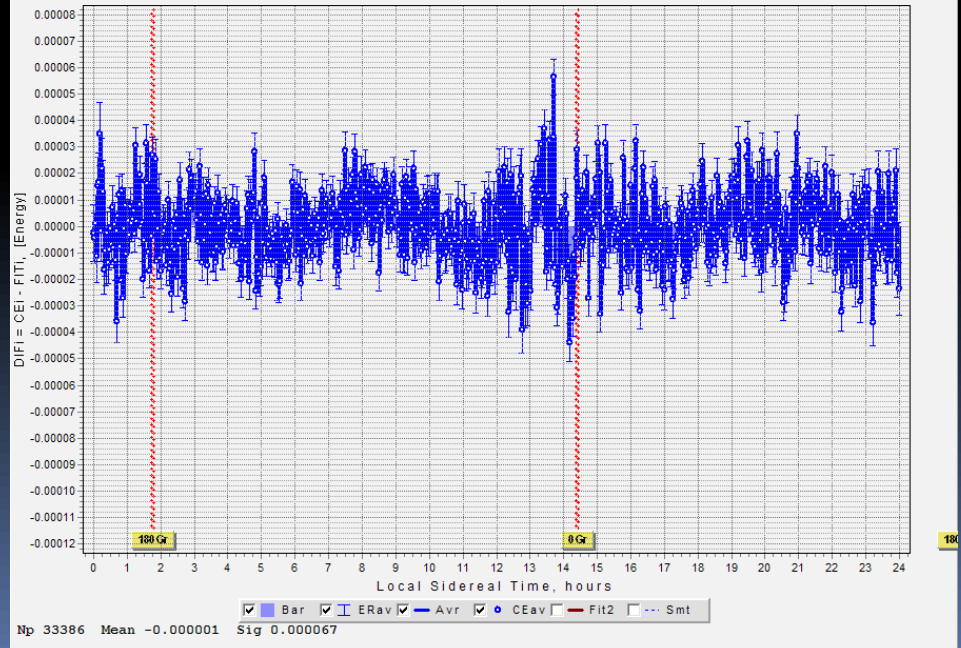
Nov, Nov 2008-DF Absolute Weight Aver. SIDEREAL DAY, Step: 0.03 hr [15.11.2008 ... 24.11.2008]

Fragments: 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67



Jul+Nov 2008-DF Absolute Weight Aver. SIDEREAL DAY, Step: 0.03 hr [23.07.2008 ... 24.11.2008]

Fragments: 21 22 23 24 25 26 27 28 29 30 31 33 35 36 37 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67



Sidereal Day
Step 0.03h



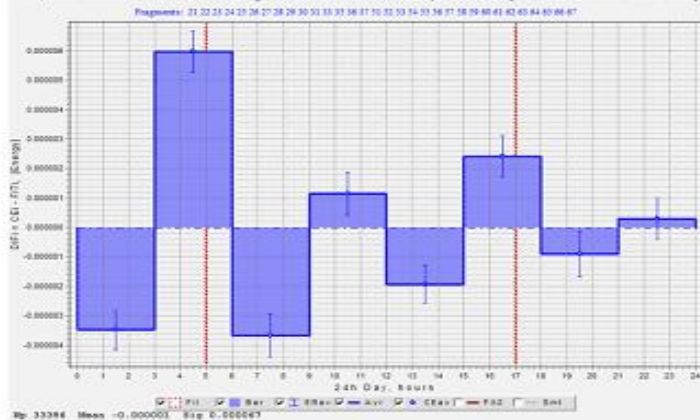
Jul, Nov 2008-DF Absolute Weight Aver. 24h DAY, Step: 3.00 hr [23.07.2008 ... 29.07.2008]



Jul, Nov 2008-DF Absolute Weight Aver. 24h DAY, Step: 3.00 hr [15.11.2008 ... 24.11.2008]



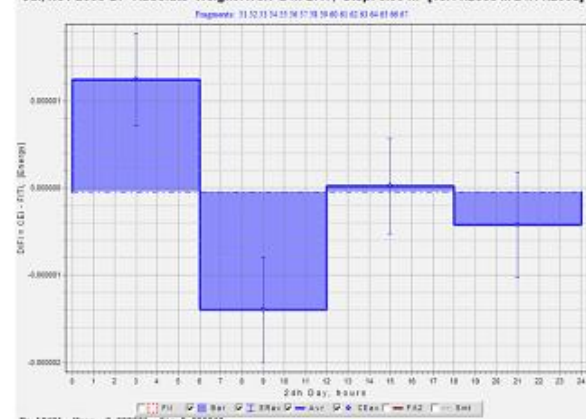
Jul, Nov 2008-DF Absolute Weight Aver. 24h DAY, Step: 3.00 hr [23.07.2008 ... 24.11.2008]



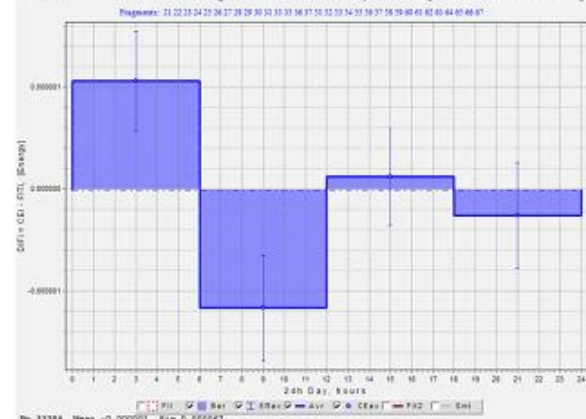
Jul, Nov 2008-DF Absolute Weight Aver. 24h DAY, Step: 6.00 hr [23.07.2008 ... 29.07.2008]



Jul, Nov 2008-DF Absolute Weight Aver. 24h DAY, Step: 6.00 hr [15.11.2008 ... 24.11.2008]



Jul, Nov 2008-DF Absolute Weight Aver. 24h DAY, Step: 6.00 hr [23.07.2008 ... 24.11.2008]



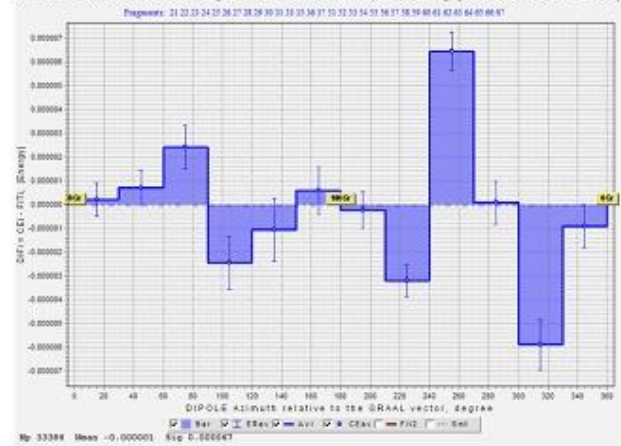
Jul, Nov 2008-DF Absolute Weight Aver. AZIMUTH, Step: 30.00 deg [23.07.2008 ... 29.07.2008]



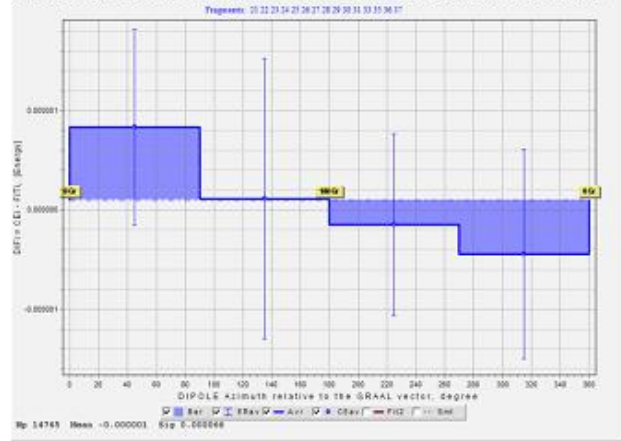
Jul, Nov 2008-DF Absolute Weight Aver. AZIMUTH, Step: 30.00 deg [15.11.2008 ... 24.11.2008]



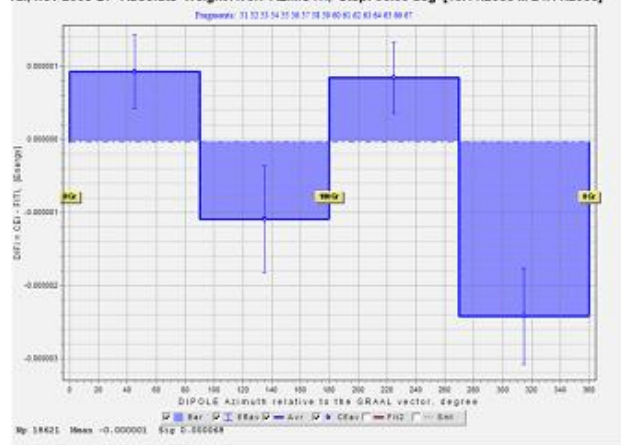
Jul, Nov 2008-DF Absolute Weight Aver. AZIMUTH, Step: 30.00 deg [23.07.2008 ... 24.11.2008]



Jul, Nov 2008-DF Absolute Weight Aver. AZIMUTH, Step: 90.00 deg [23.07.2008 ... 29.07.2008]

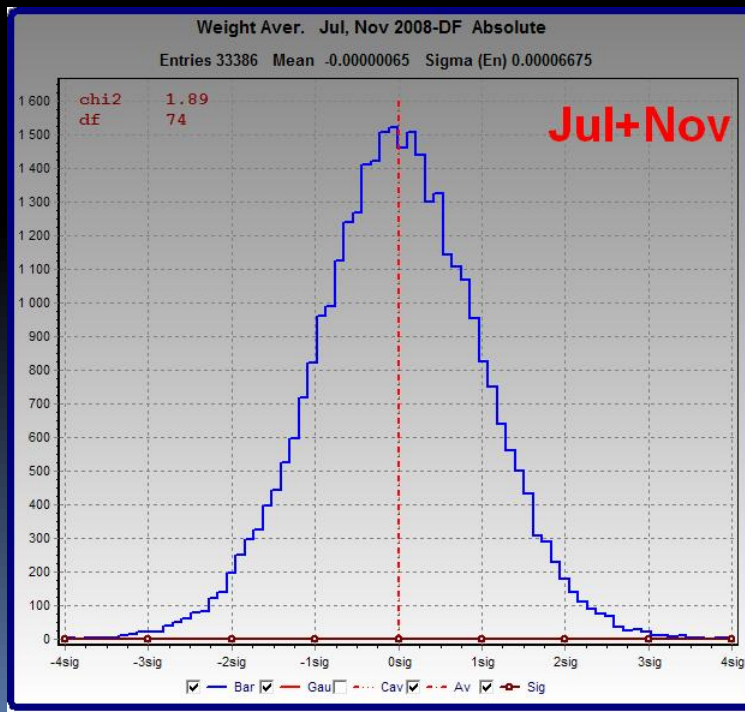
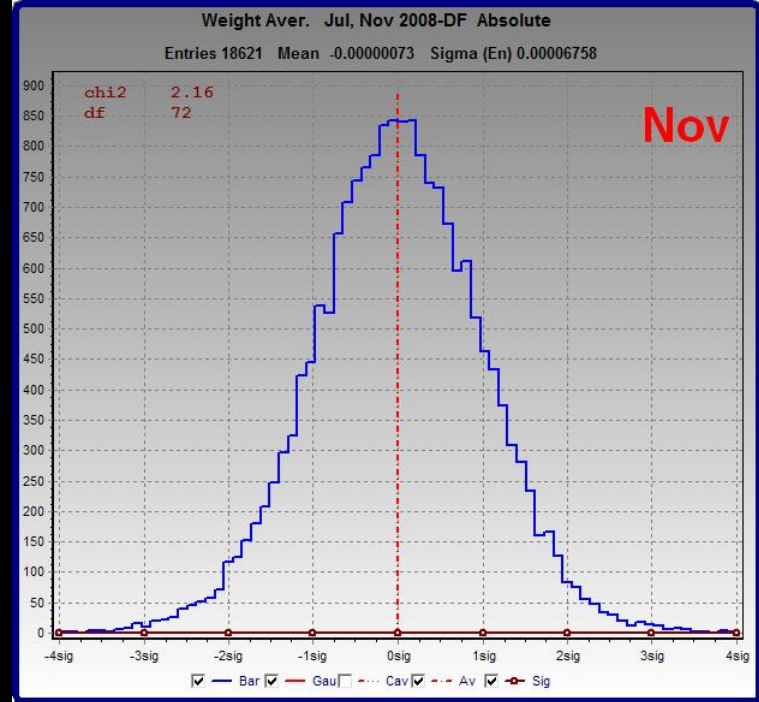
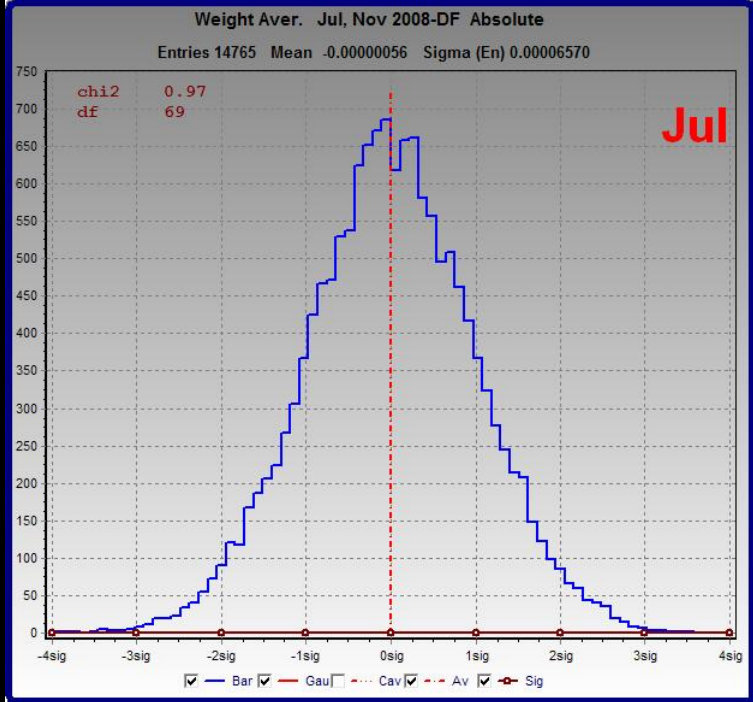


Jul, Nov 2008-DF Absolute Weight Aver. AZIMUTH, Step: 90.00 deg [15.11.2008 ... 24.11.2008]



Jul, Nov 2008-DF Absolute Weight Aver. AZIMUTH, Step: 90.00 deg [23.07.2008 ... 24.11.2008]





Sigma

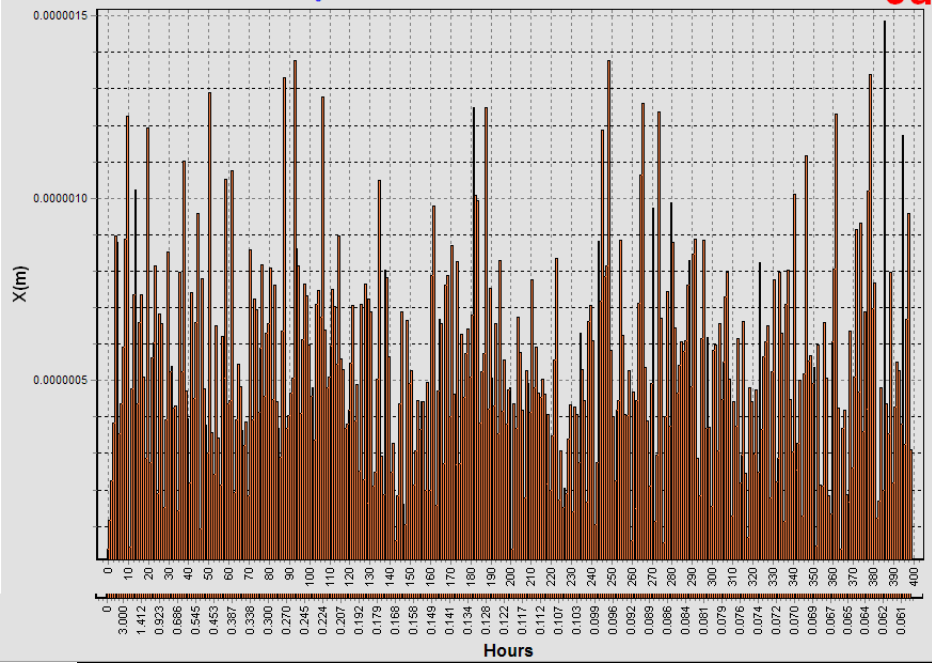
Jul+Nov

0.00006675

Jul_Nov_2008-DF Fourier spectrum, SIDEREAL DAY, Step 0.03 hour

Fragments: 21 22 23 24 25 26 27 28 29 30 31 33 35 36 37

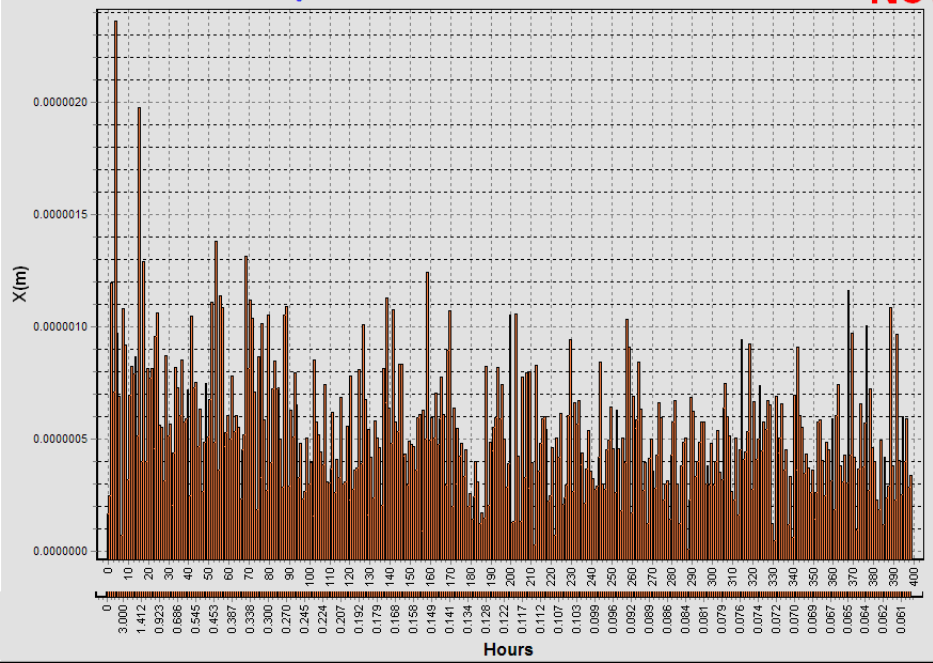
Jul



Jul_Nov_2008-DF Fourier spectrum, SIDEREAL DAY, Step 0.03 hour

Fragments: 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67

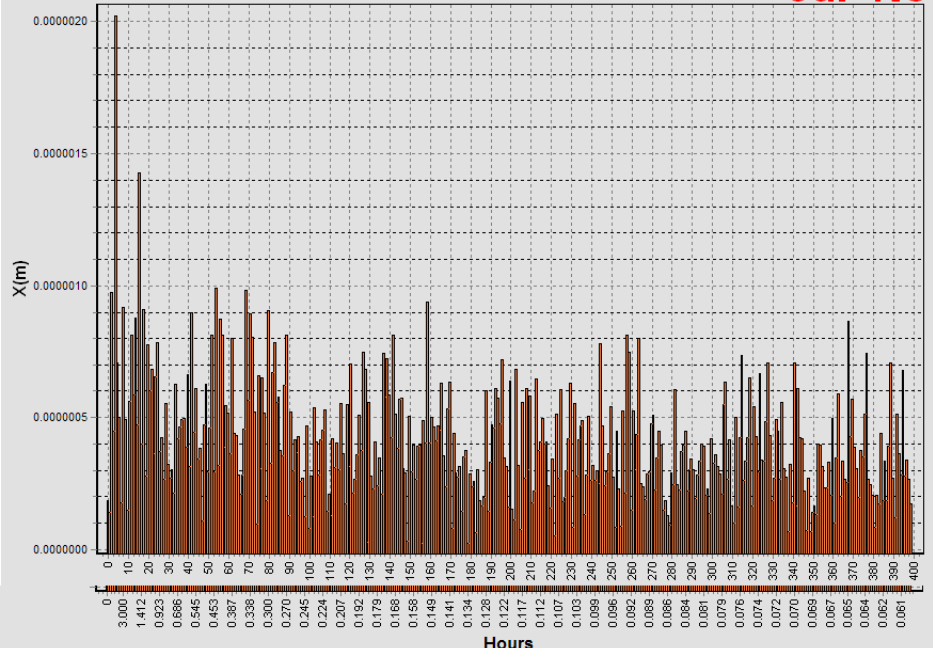
Nov



Jul_Nov_2008-DF Fourier spectrum, SIDEREAL DAY, Step 0.03 hour

Fragments: 21 22 23 24 25 26 27 28 29 30 31 33 35 36 37 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67

Jul+Nov



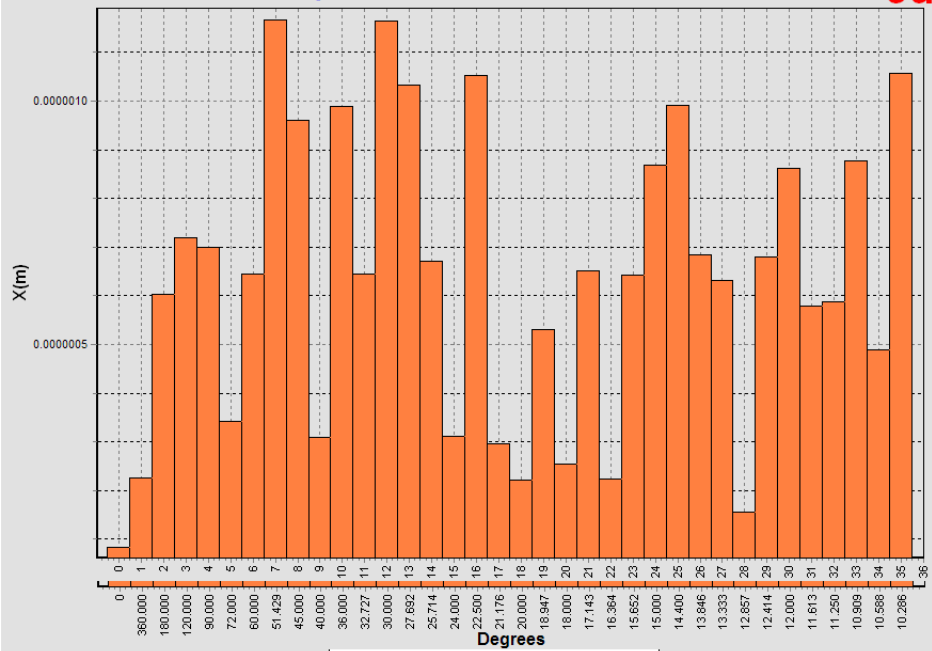
Sidereal Day Step 0.03h



Jul_Nov_2008-DF Fourier spectrum, AZIMUTH, Step 5.00 degree

Fragments: 21 22 23 24 25 26 27 28 29 30 31 33 35 36 37

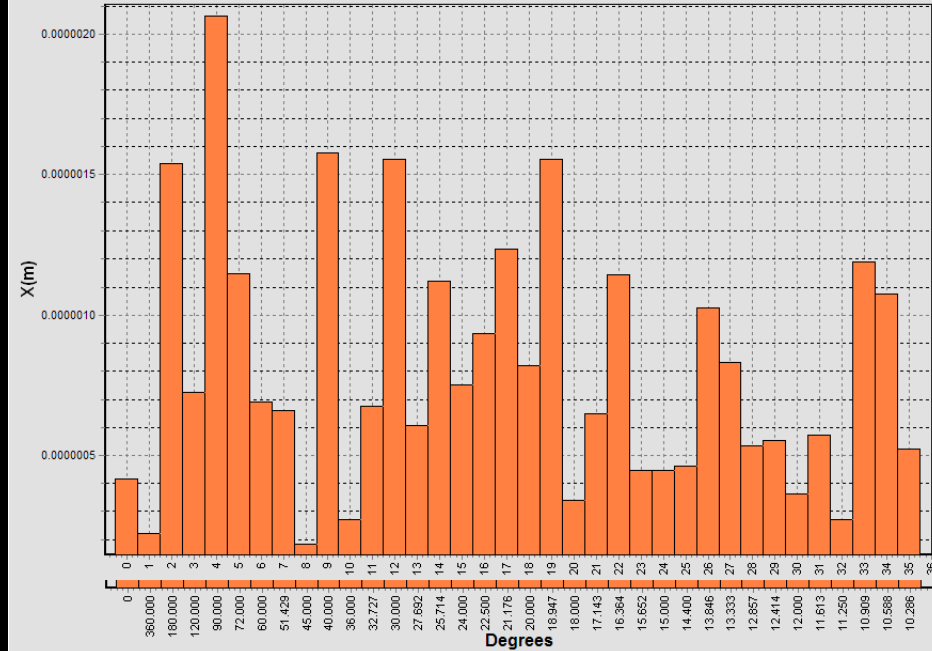
Jul



Jul_Nov_2008-DF Fourier spectrum, AZIMUTH, Step 5.00 degree

Fragments: 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67

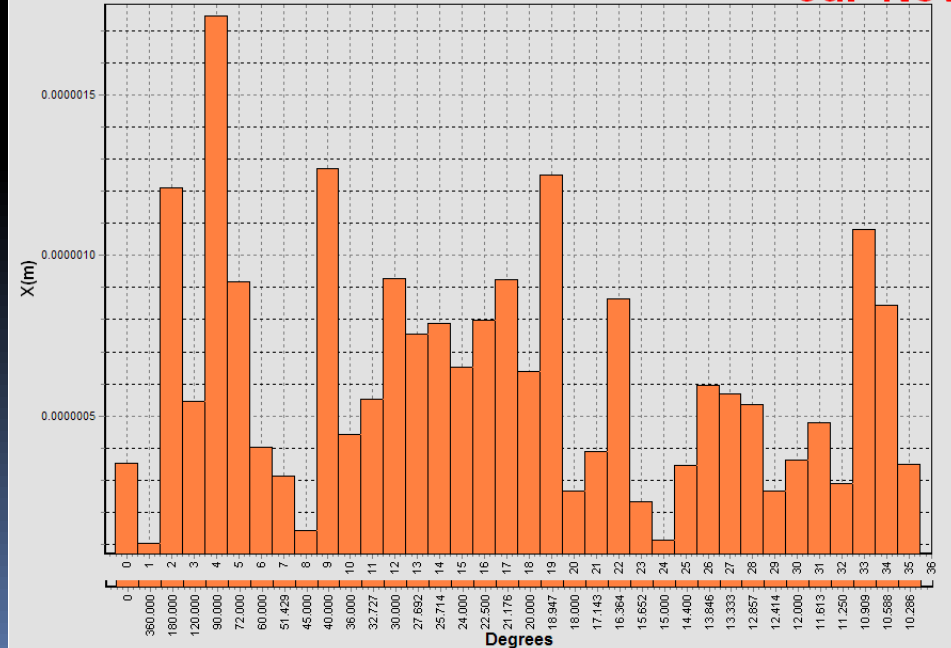
Nov



Jul_Nov_2008-DF Fourier spectrum, AZIMUTH, Step 5.00 degree

Fragments: 21 22 23 24 25 26 27 28 29 30 31 33 35 36 37 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67

Jul+Nov

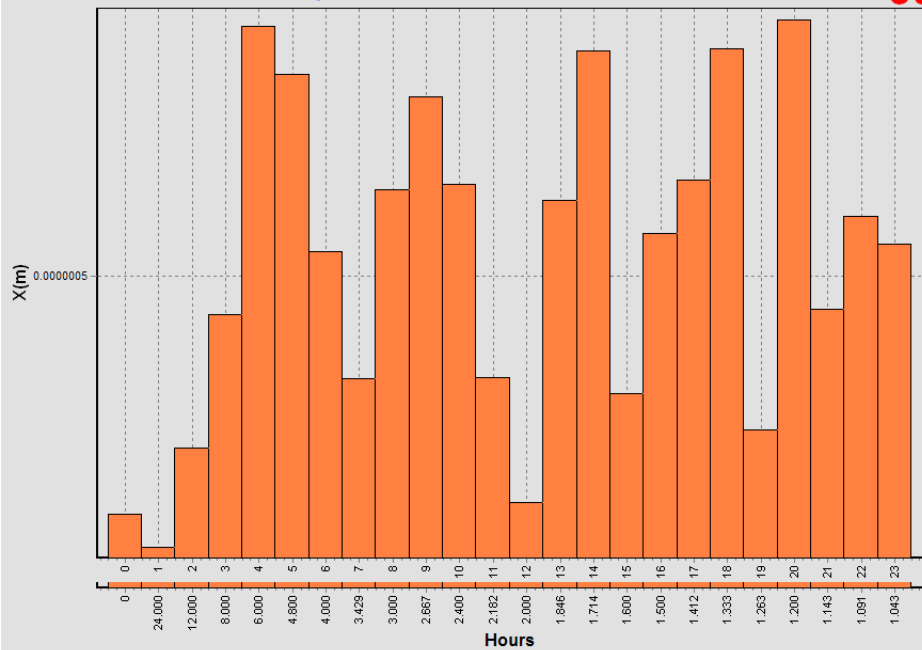


Azimuth Step 5deg

Jul_Nov_2008-DF Fourier spectrum, SIDEREAL DAY, Step 0.50 hour

Fragments: 21 22 23 24 25 26 27 28 29 30 31 33 35 36 37

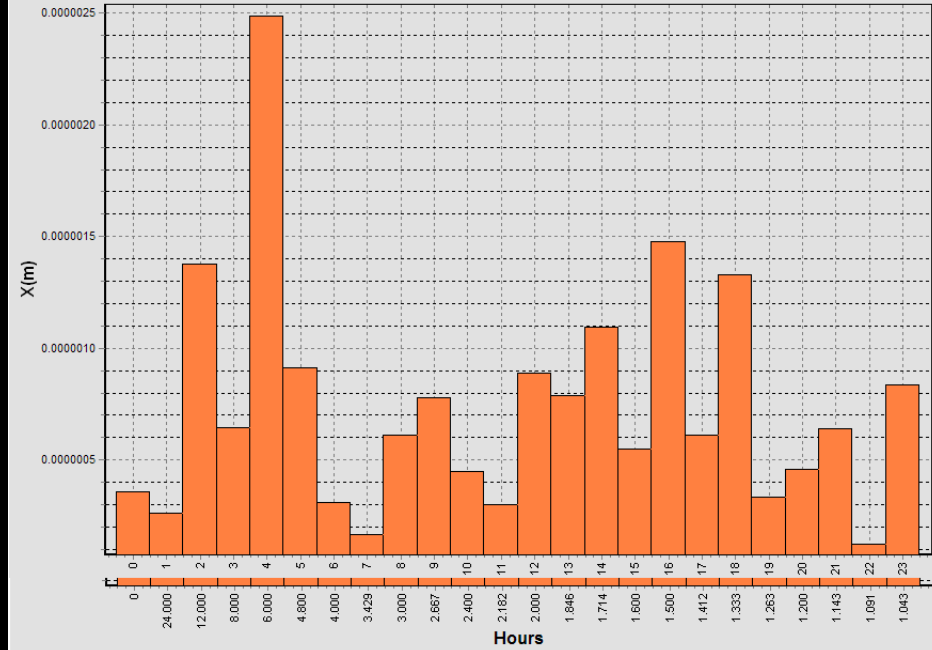
Jul



Jul_Nov_2008-DF Fourier spectrum, SIDEREAL DAY, Step 0.50 hour

Fragments: 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67

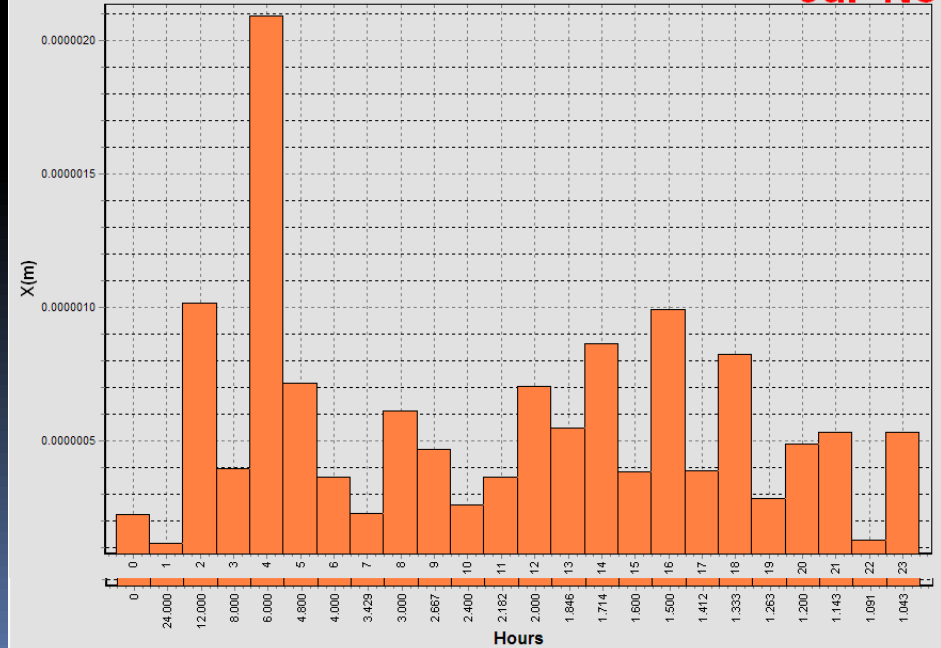
Nov



Jul_Nov_2008-DF Fourier spectrum, SIDEREAL DAY, Step 0.50 hour

Fragments: 21 22 23 24 25 26 27 28 29 30 31 33 35 36 37 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67

Jul+Nov



Sidereal Day
Step 0.5h



CONCLUSIONS

Conservative limit

$$\Delta c/c < 1.0 \cdot 10^{-14}$$

i.e. independent on systematics, while purely statistically the limit can be even lowered for given confidence level.

Need for further dedicated measurements to reveal the nature of the $2-4\sigma$ variations.