

With Compliments

AT.39.2/017.

Pat,

Here is another technical notes document  
to be distributed.

RDS  
JGB  
MWS  
GM  
B.P.  
BMT  
DNC.

Regards

Ky Lee



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<b>TO:</b>	Australia Telescope	<b>FROM:</b>	Jeff Schafer
<b>ATTENTION:</b>	Dr Graham Nelson	<b>DATE:</b>	20 April 1993
<b>FAX NO:</b>	067 904090	<b>JOB NO:</b>	5455/01
<b>SUBJECT:</b>	Wind Torques on Antennas	<b>PAGES:</b>	6 (including this page)

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**RE: WIND TORQUES ON ANTENNAS**

Attached is detailed information on predicted wind torques about the elevation axis. The graph is from an analysis of wind tunnel data and was used for design of the telescope. The tables have been prepared on a spreadsheet by fitting curves to the original hand-drawn data points and interpolating between the curves for EL = 8,22.5,45,67.5 and 90° to give data for elevation angles of 10, 20, ... 90°. As such, the tabulated values imply unrealistic precision especially as the computer drawn curves are not identical to the hand-drawn originals.

Tables have been prepared for wind speeds of 25 to 150km/hr. All figures are estimated to be +/- 5% to 10% from the original graph data.

Attached:

- Original hand-drawn graph showing nomenclature.
- Graph from spread sheet.
- Tables of Wind Torques for 150, 125, 100, 75, 50, 25km/hr.

We trust that this is in line with your requirements. If you have any practical results from site of wind torque for wind speed and direction we would be interested to compare them with the predictions and other published graphs.

*Rogers*  
*Jeff Schafer*  
 JEFF SCHAFER

*Graham - if you need to discuss this,  
 I will be on leave for 5 weeks from  
 24/4/93  
 Rogers Jeff.*

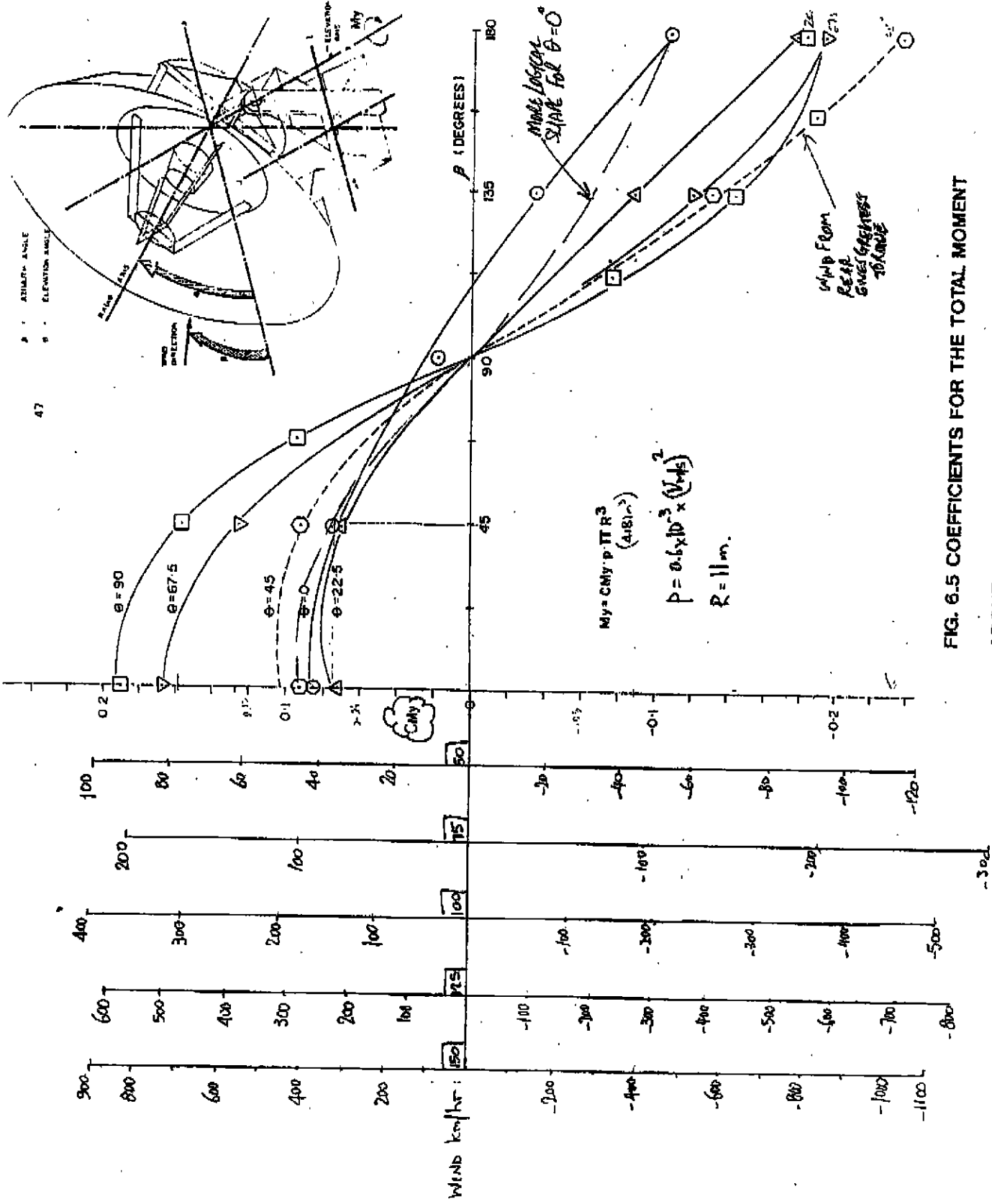
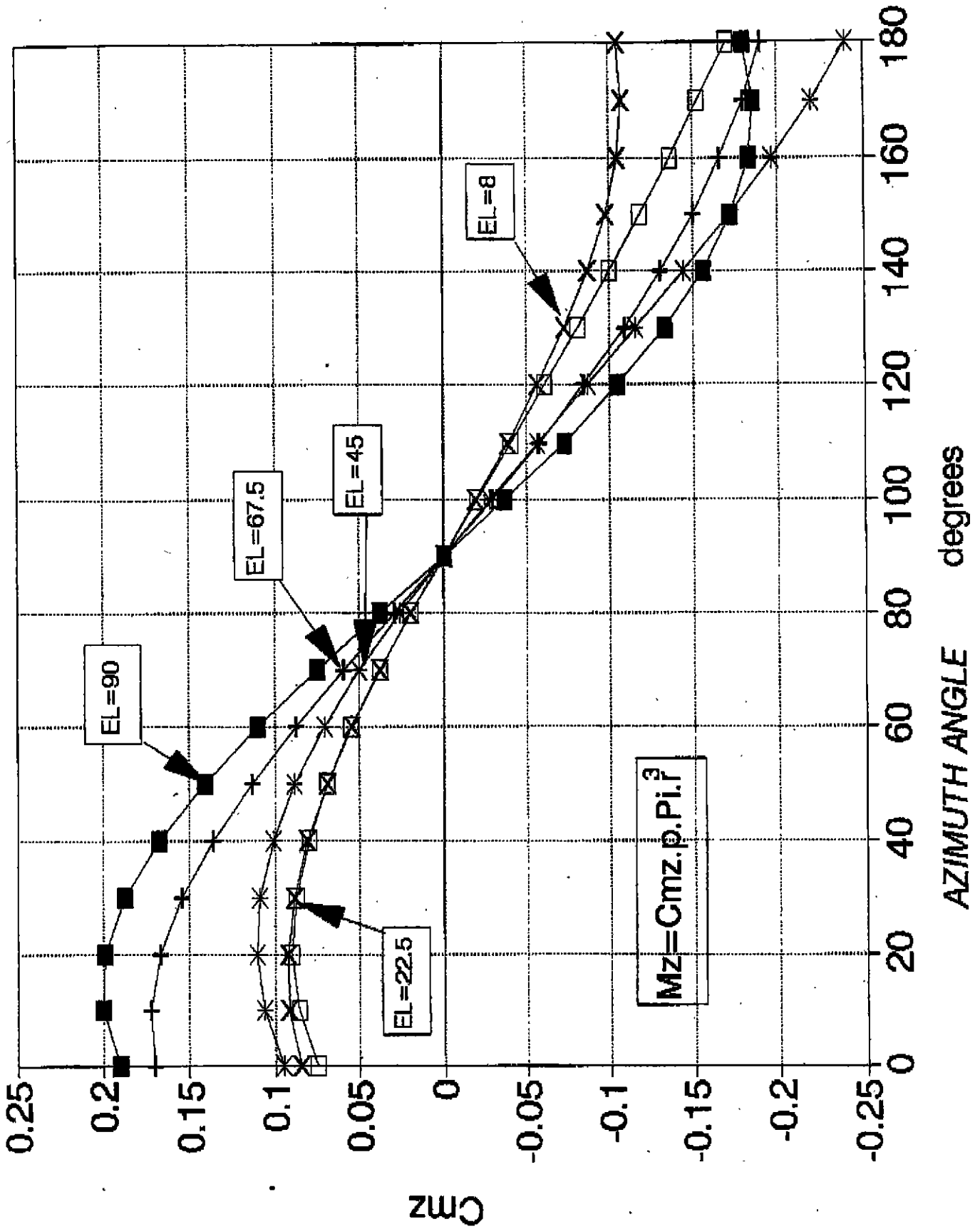


FIG. 6.5 COEFFICIENTS FOR THE TOTAL MOMENT ABOUT Y AXIS (C MY) AT THE ELEVATION AXIS



wind (km/hr):	150	41.7 (m/s)	pressure:	1.04 (kPa)
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TORQUE ABOUT ELEVATION AXIS :kilonewton-metres (kNm)

		elevation angle								
		90	80	70	60	50	40	30	20	10
azim angle	0	828	789	750	632	486	394	356	334	364
	10	873	819	766	656	528	444	404	378	395
	20	866	804	743	646	537	462	421	392	401
	30	816	752	688	606	517	453	411	381	385
	40	729	668	607	541	473	419	379	349	350
	50	614	560	506	456	408	365	328	300	300
	60	478	434	391	356	324	293	262	238	237
	70	325	295	265	244	227	206	183	165	164
	80	164	149	133	124	117	108	95	85	84
	90	-0	-0	-0	-0	-0	-0	-0	-0	-0
	100	-161	-146	-131	-126	-123	-114	-99	-87	-85
	110	-318	-286	-258	-250	-248	-232	-200	-175	-169
	120	-455	-416	-376	-370	-374	-351	-301	-261	-248
	130	-578	-532	-485	-483	-497	-469	-401	-344	-321
	140	-679	-630	-581	-589	-615	-585	-498	-424	-385
	150	-753	-709	-664	-684	-726	-695	-592	-499	-437
	160	-798	-765	-733	-769	-828	-799	-680	-568	-474
	170	-809	-797	-785	-841	-919	-893	-764	-633	-495
180	-784	-803	-823	-900	-997	-978	-842	-692	-496	

wind (km/hr):	125	34.7 (m/s)	pressure:	0.72 (kPa)
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TORQUE ABOUT ELEVATION AXIS :kilonewton-metres (kNm)

		elevation angle								
		90	80	70	60	50	40	30	20	10
azim angle	0	575	548	521	439	338	274	247	232	253
	10	606	569	532	456	367	308	280	262	274
	20	601	559	516	448	373	321	292	272	278
	30	566	522	478	421	359	314	286	265	267
	40	507	464	422	376	329	291	263	243	243
	50	427	389	352	317	283	253	228	209	208
	60	332	301	271	247	225	203	182	165	164
	70	226	205	184	170	157	143	127	115	114
	80	114	103	93	86	82	75	66	59	58
	90	-0	-0	-0	-0	-0	-0	-0	-0	-0
	100	-112	-102	-91	-87	-85	-79	-69	-61	-59
	110	-219	-199	-179	-173	-172	-161	-139	-121	-117
	120	-316	-289	-261	-257	-260	-244	-209	-181	-173
	130	-402	-369	-337	-336	-345	-326	-279	-239	-223
	140	-471	-438	-404	-409	-427	-406	-346	-294	-267
	150	-523	-492	-461	-475	-504	-483	-411	-346	-303
	160	-554	-531	-509	-534	-575	-555	-472	-395	-329
	170	-562	-554	-545	-584	-638	-620	-531	-439	-344
180	-544	-558	-571	-625	-692	-679	-585	-480	-345	

wind (km/hr):	100	27.8 (m/s)	pressure:	0.46 (kPa)
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TORQUE ABOUT ELEVATION AXIS :kilonewton-metres (kNm)

		elevation angle								
		90	80	70	60	50	40	30	20	10
azim angle	0	368	351	333	281	216	175	158	149	162
	10	388	364	340	292	235	197	179	168	176
	20	385	357	330	287	239	205	187	174	178
	30	363	334	306	269	230	201	183	169	171
	40	324	297	270	240	210	186	168	155	156
	50	273	249	225	203	181	162	146	133	133
	60	212	193	174	158	144	130	116	106	105
	70	145	131	118	108	101	92	81	73	73
	80	73	66	59	55	52	48	42	38	37
	90	-0	-0	-0	-0	-0	-0	-0	-0	-0
	100	-72	-65	-58	-56	-55	-51	-44	-39	-38
	110	-140	-127	-115	-111	-110	-103	-89	-78	-75
	120	-202	-185	-167	-164	-166	-156	-134	-116	-110
	130	-257	-236	-216	-215	-221	-209	-178	-153	-143
	140	-302	-280	-258	-262	-273	-260	-221	-188	-171
	150	-335	-315	-295	-304	-323	-309	-263	-222	-194
	160	-355	-340	-326	-342	-368	-355	-302	-253	-211
	170	-360	-354	-349	-374	-408	-397	-340	-281	-220
180	-348	-357	-366	-400	-443	-434	-374	-307	-221	

wind (km/hr):	75	20.8 (m/s)	pressure:	0.26 (kPa)
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TORQUE ABOUT ELEVATION AXIS :kilonewton-metres (kNm)

		elevation angle								
		90	80	70	60	50	40	30	20	10
azim angle	0	207	197	188	158	122	99	89	84	91
	10	218	205	191	164	132	111	101	94	99
	20	216	201	186	161	134	115	105	98	100
	30	204	188	172	151	129	113	103	95	96
	40	182	167	152	135	118	105	95	87	88
	50	154	140	127	114	102	91	82	75	75
	60	119	109	98	89	81	73	65	59	59
	70	81	74	66	61	57	52	46	41	41
	80	41	37	33	31	29	27	24	21	21
	90	-0	-0	-0	-0	-0	-0	-0	-0	-0
	100	-40	-37	-33	-31	-31	-28	-25	-22	-21
	110	-79	-72	-64	-62	-62	-58	-50	-44	-42
	120	-114	-104	-94	-92	-93	-88	-75	-65	-62
	130	-145	-133	-121	-121	-124	-117	-100	-86	-80
	140	-170	-158	-145	-147	-154	-146	-125	-106	-96
	150	-188	-177	-166	-171	-182	-174	-148	-125	-109
	160	-199	-191	-183	-192	-207	-200	-170	-142	-119
	170	-202	-199	-196	-210	-230	-223	-191	-158	-124
180	-196	-201	-206	-225	-249	-244	-211	-173	-124	

wind (km/hr):	50	13.9 (m/s)	pressure:	0.12 (kPa)
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TORQUE ABOUT ELEVATION AXIS :kilonewton-metres (kNm)

		elevation angle								
		90	80	70	60	50	40	30	20	10
azim angle	0	92	88	83	70	54	44	40	37	40
	10	97	91	85	73	59	49	45	42	44
	20	96	89	83	72	60	51	47	44	45
	30	91	84	76	67	57	50	46	42	43
	40	81	74	67	60	53	47	42	39	39
	50	68	62	56	51	45	41	36	33	33
	60	53	48	43	40	36	33	29	26	26
	70	36	33	29	27	25	23	20	18	18
	80	18	17	15	14	13	12	11	9	9
	90	-0	-0	-0	-0	-0	-0	-0	-0	-0
	100	-18	-16	-15	-14	-14	-13	-11	-10	-9
	110	-35	-32	-29	-28	-28	-26	-22	-19	-19
	120	-51	-46	-42	-41	-42	-39	-33	-29	-28
	130	-64	-59	-54	-54	-55	-52	-45	-39	-36
	140	-75	-70	-65	-65	-68	-65	-55	-47	-43
	150	-84	-79	-74	-76	-81	-77	-66	-55	-49
	160	-89	-85	-81	-85	-92	-89	-76	-63	-53
	170	-90	-89	-87	-93	-102	-99	-85	-70	-55
180	-87	-89	-91	-100	-111	-109	-94	-77	-55	

wind (km/hr):	25	6.9 (m/s)	pressure:	0.03 (kPa)
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TORQUE ABOUT ELEVATION AXIS :kilonewton-metres (kNm)

		elevation angle								
		90	80	70	60	50	40	30	20	10
azim angle	0	23	22	21	18	14	11	10	9	10
	10	24	23	21	18	15	12	11	10	11
	20	24	22	21	18	15	13	12	11	11
	30	23	21	19	17	14	13	11	11	11
	40	20	19	17	15	13	12	11	10	10
	50	17	16	14	13	11	10	9	8	8
	60	13	12	11	10	9	8	7	7	7
	70	9	8	7	7	6	6	5	5	5
	80	5	4	4	3	3	3	3	2	2
	90	-0	-0	-0	-0	-0	-0	-0	-0	-0
	100	-4	-4	-4	-3	-3	-3	-3	-2	-2
	110	-9	-8	-7	-7	-7	-6	-6	-5	-5
	120	-13	-12	-10	-10	-10	-10	-8	-7	-7
	130	-16	-15	-13	-13	-14	-13	-11	-10	-9
	140	-19	-18	-16	-16	-17	-16	-14	-12	-11
	150	-21	-20	-18	-19	-20	-19	-16	-14	-12
	160	-22	-21	-20	-21	-23	-22	-19	-16	-13
	170	-22	-22	-22	-23	-26	-25	-21	-18	-14
180	-22	-22	-23	-25	-28	-27	-23	-19	-14	