Blind Pointing Model Development - Results of DSS-13 Measurements on DOY 347, 2001

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X-band Open-loop Conscan Measurements, DOY-01347

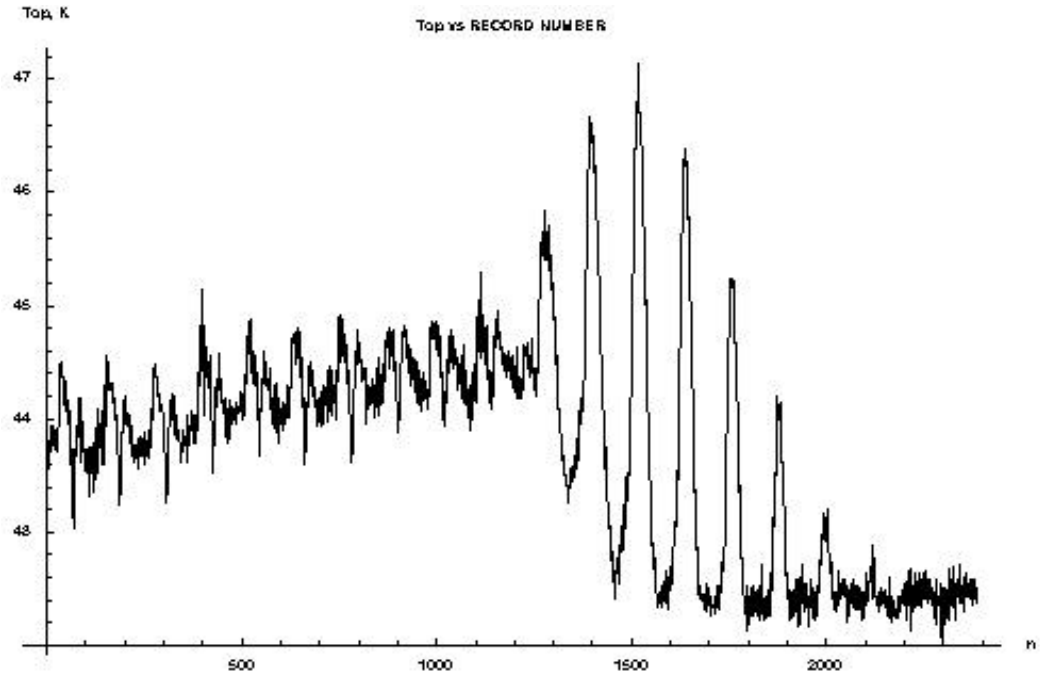
- Measurementsmade with X-band radiometer of S-X system
- Output fed to Ku-band JMOC receiver for control and data acquisition

General Observations

- Problem with dropouts of encoder data previously observed with Ku-band measurements has been solved - cause was apparently a faulty connector
- Problem with dropouts of power meter data persists
  - Possible cause is lack of synchronism between computer commands and HP437B power meter operation
- The DSS-13 antenna structure is more flexible than that of the operational BWG antennas, resulting in eccentric scans and considerable distortion of the Top signal with a CONSCAN period of 30 seconds, as has been successfully used at DSS-26, for example
  - A 60 second CONSCAN period eliminates this problem
- The X-band HPBW determined from analysis of the CONSCAN data is 66.6 mdeg, compared with a value of 64.0 mdeg obtained at DSS-26
- The computed pointing errors are considerably smaller than those previously obtained with the (misaligned) Ku-band system

W-band Study - Pointing Issues

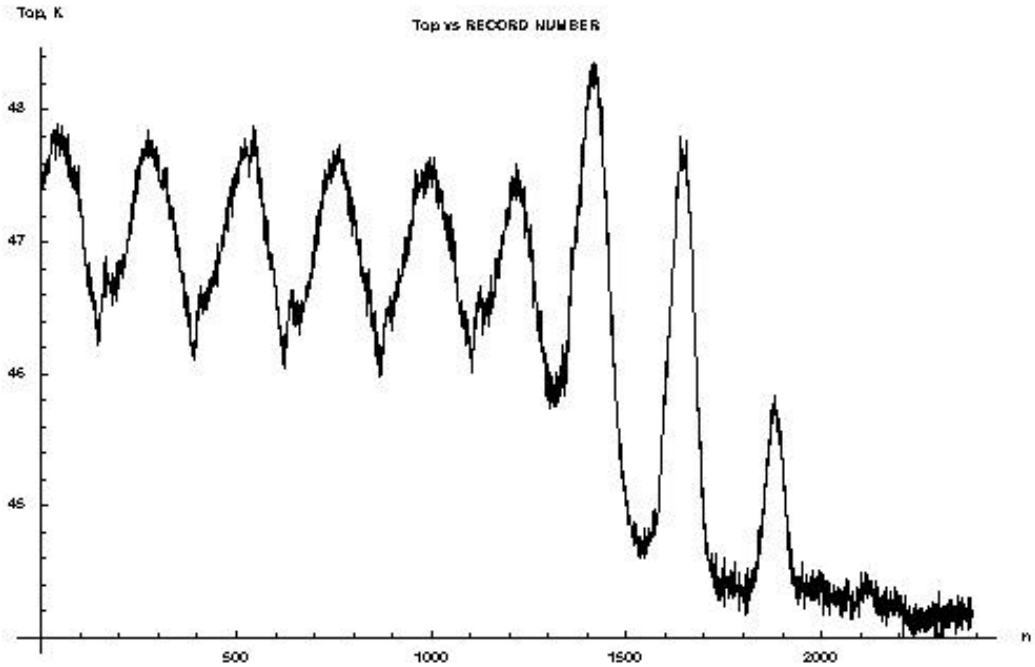
Typical Top data with 30 second period CONSCAN



The total number of CSC cycles is 20, 10 on source and 10 during the 0.4 mdeg/sec drift in elevation. The signal is distorted due to accelerations of the structure, especially the SR, during the scans. Note: The dropouts have been removed from the data

W-band Study - Pointing Issues

Typical Top data with 60 second period CONSCAN



The total number of CSC cycles is 10, 5 on source and 5 during the 0.4 mdeg/sec drift in elevation. The signal is relatively undistorted. Note: The dropouts have been removed from the data.

W-band Study - Pointing Issues

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Results of Analysis of CSC Data

"SOURCE"	"UTC-hrs"	"AZ-deg"	"EL-deg"	"Top-K"	"XELAMPL-mdeg"	"ELAMPL-mdeg"	"XEL/EL"	"ELLIPTICITY"
"1230+123"	17.483	247.934	47.140	38.779	33.208	30.017	1.106	1.138
"0927+390"	17.683	303.173	21.931	42.067	33.220	30.005	1.107	1.101
"1058+015"	17.883	259.010	17.758	43.654	34.242	30.037	1.140	1.187
"1331+305"	18.083	270.323	61.057	38.526	33.011	29.946	1.102	1.104
"1411+522"	18.283	319.754	64.342	38.377	32.781	29.942	1.095	1.053
"0927+390"	18.483	308.278	13.969	45.964	34.012	29.991	1.134	1.154
"1256-057"	18.683	240.856	26.317	42.285	33.657	29.962	1.123	1.133
"1833-210"	18.884	148.964	27.158	41.763	33.693	29.960	1.125	1.173
"2136+006"	19.083	99.918	14.918	44.932	33.149	29.963	1.106	1.115
"2202+422"	19.283	58.225	32.525	40.391	33.894	29.960	1.131	1.127
"1411+522"	19.683	311.856	52.165	39.752	33.427	29.900	1.118	1.171
"1642+398"	19.883	297.276	78.501	38.992	30.867	29.916	1.032	0.971
"1829+487"	20.084	26.248	74.447	38.934	30.318	29.914	1.014	0.917
"DR21"	20.283	64.818	58.508	39.394	32.778	29.900	1.096	1.094
"2253+161"	20.483	87.349	25.032	41.438	33.990	29.944	1.135	1.197
"2206-185"	20.683	126.120	14.770	45.104	34.219	30.008	1.140	1.164
"2253+161"	20.883	90.781	29.938	40.806	34.096	29.989	1.137	1.216
"1927+739"	21.483	1.689	51.217	39.369	33.166	29.972	1.107	1.097
"1411+522"	21.283	312.630	37.509	40.345	33.591	29.986	1.120	1.131
"1927+739"	21.483	1.689	51.217	39.369	33.166	29.972	1.107	1.097
"2253+161"	20.883	90.781	29.938	40.806	34.096	29.989	1.137	1.216
"DR21"	22.083	50.336	77.820	38.588	28.455	27.776	1.024	0.997
"2131-121"	22.483	154.756	39.066	39.421	28.356	27.800	1.020	0.999
"0319+415"	22.883	49.751	15.556	44.570	28.652	27.814	1.030	1.001

The last three entries are for 60 sec scan data, and these scans are almost perfectly circular, as indicated by the XEL/EL ratio (from linear LS fitting) and the Ellipticity (from nonlinear LS fitting).

W-band Study - Pointing Issues

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Results of Analysis of CSC Data - cont.

"XELERR-mdeg"	"ELERR-mdeg"	"STDERR-mdeg"	"STDERR-mdeg"	"TPK-K"	"STDERR-K"	"HPBW-mdeg"	"STDERR-mdeg"	"STDDEV-K"
4.639	7.234	0.099	0.233	9.321	0.036	67.867	0.446	0.116
4.178	3.066	0.121	0.244	2.385	0.012	66.391	0.513	0.040
7.587	0.157	0.272	0.486	1.076	0.012	67.244	1.077	0.040
5.813	1.970	0.200	0.374	1.184	0.010	65.327	0.805	0.033
5.551	-3.838	0.276	0.421	0.760	0.009	66.248	1.011	0.031
-0.218	-3.639	0.249	0.426	2.332	0.028	66.907	1.012	0.091
2.787	-1.193	0.154	0.273	4.484	0.032	65.221	0.629	0.105
1.704	1.258	0.257	0.499	2.334	0.025	67.793	1.085	0.085
6.024	-0.164	0.269	0.477	1.833	0.021	67.795	1.060	0.069
-3.477	0.645	0.610	1.115	0.597	0.016	65.656	2.448	0.051
3.077	-2.260	0.750	1.382	0.798	0.028	70.642	3.184	0.090
7.685	-0.548	0.203	0.305	2.300	0.018	66.711	0.689	0.060
5.385	-8.938	0.481	0.598	0.804	0.018	66.447	1.536	0.058
-1.479	-8.839	0.092	0.136	4.528	0.021	65.982	0.349	0.070
1.184	-2.744	0.195	0.348	2.374	0.022	66.494	0.819	0.073
5.537	-9.117	0.558	0.763	0.734	0.021	59.769	2.011	0.070
3.048	-1.846	0.205	0.377	2.352	0.023	66.923	0.874	0.074
5.203	-7.499	0.506	0.736	0.705	0.017	68.996	1.840	0.055
1.884	-5.183	0.579	0.966	0.796	0.024	67.043	2.362	0.075
5.203	-7.499	0.506	0.736	0.705	0.017	68.996	1.840	0.055
3.048	-1.846	0.205	0.377	2.352	0.023	66.923	0.874	0.074
-0.037	-9.102	0.109	0.171	4.269	0.023	66.717	0.429	0.075
1.642	-2.919	0.555	1.096	0.971	0.025	66.250	2.406	0.079
-6.186	-1.592	0.163	0.303	3.860	0.026	66.015	0.650	0.084

The pointing errors are considerable smaller than was seen with the (misaligned) Ku-band feed. Also, the computed HPBWs tend to be a few mdeg larger than those determined by identical means at DSS-26

Results of Analysis of CSC Data - cont.

- The weighted mean value for the HPBW determined from the X-band results shown above is 66.55 ±0.16 mdeg
  - The X-band values obtained from measurements at DSS-26 are 64.03 ±0.16 mdeg (DOY97329) and 63.30 ±0.18 mdeg (DOY97330)
- The weighted mean value for the HPBW determined from the previous Ku-band results (DOY01199) is 41.09 ±0.17 mdeg