

JET PROPULSION LABORATORY

SIRTF IPF REPORT

JPL ID101095

October 17, 2003

**SIRTF INSTRUMENT POINTING FRAME
KALMAN FILTER EXECUTION SUMMARY**

IPF RUN NUMBER: 101095
REPORT TYPE: IOC EXECUTION (COARSE)

PRIME FRAME: MIPS_24um_center (95)
INFERRED FRAMES: (96) (99) (100) (103) (104)

IPF TEAM

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1 IPF EXECUTION SUMMARY

This report summarizes the SIRTf Instrument Pointing Frame (IPF) Kalman Filter execution associated with run file: RN101095. In particular, this Focal Point Survey calibrates the instrument: MIPS_24um_center (95), as part of the IOC Coarse Survey. The main calibration results from the IPF filter execution have been documented in IF101095 typically stored in the mission archive DOM collection IPF_IF. This report only summarizes the main aspects of the run, and does not substitute for the full information contained in the IF file.

Section 1 summarizes the filter execution results. The filter configurations are tabulated in Table 1.2 and the mask vector assignments are tabulated in Table 1.3. A total of 27 state parameters are estimated in this run. The overall End-to-End pointing performances are tabulated in Table 1.4. The prediction residuals throughout the estimation processes are tabulated in Table 1.5. Section 3 summarizes resulting plots, a mini summary of the IF IPF output file, and the execution log. Section 4 captures the user comments that are specific to this particular run.

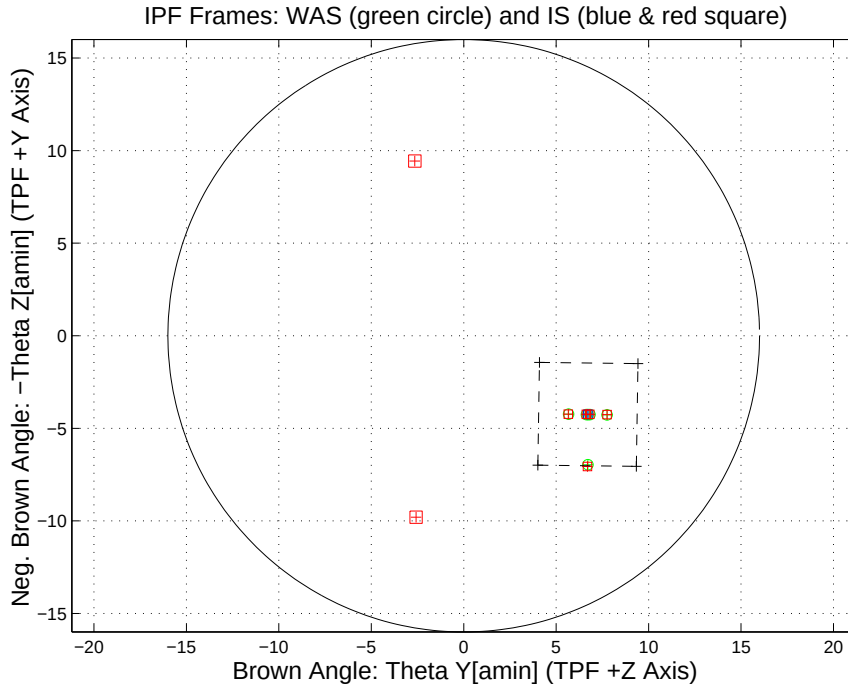


Figure 1.1: A-priori and a-posteriori IPF frames

RAW	FINAL (After Editing)
AA101095	AA101095
AS101095	AS101095
CA105095	CA105095
CB101095	CB101095
CS105095	CS105095

Table 1.1: IPF filter input files

EXECUTION CONFIGURATION ITEM	CURRENT STATUS
IPF Filter Version Used	IPF.V2.0.0D
Frame Table Version Used	BodyFrames_SPC_08a
Scan-Mirror Employed?	YES
IPF Filter Mode	NORMAL-MODE(0)
SLIT-MODE Operation	DISABLED
Kalman Filter Operation	ENABLED
Least-Squares Data Analysis	ENABLED
IBAD Screening	ENABLED
User-Specified Data Editing	DISABLED
Total Number of Iterations	30
LS Residual Sigma Scale	9.05312579E-001
Total Number of Maneuvers	7

Table 1.2: IPF filter execution configuration

Con. Plate Scale			Γ Dependent				Γ^2 Dependent				Linear Plate Scale						Mirror	
a_{00}	b_{00}	c_{00}	a_{10}	b_{10}	c_{10}	d_{10}	a_{20}	b_{20}	c_{20}	d_{20}	a_{01}	b_{01}	c_{01}	d_{01}	e_{01}	f_{01}	α	β
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1
IPF (T)			Alignment R									Gyro Drift Bias						
θ_1	θ_2	θ_3	a_{rx}	a_{ry}	a_{rz}	b_{rx}	b_{ry}	b_{rz}	c_{rx}	c_{ry}	c_{rz}	b_{gx}	b_{gy}	b_{gz}	c_{gx}	c_{gy}	c_{gz}	
20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	
1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1	

Table 1.3: IPF filter execution mask vector assignment

FOCAL PLANE SURVEY ANALYSIS: IOC Coarse Survey.

INSTRUMENT NAME: MIPS_24um_center NF: 95

PIX2RADW: 1.20874169E-005[rad/pixel] = 2.4932E+000[arcsec/pixel]

PIX2RADV: 1.20874169E-005[rad/pixel] = 2.4932E+000[arcsec/pixel]

FRAME	DESCRIPTION	IPF ¹	SF ²	TOTAL	REQ
095(P)	MIPS_24um_center	0.0771	0.0855	0.1151	1.00
096(I)	MIPS_24um_plusY_edge	0.0993	0.0855	0.1311	N/A
099(I)	MIPS_24um_small_FOV1	0.0771	0.0855	0.1151	N/A
100(I)	MIPS_24um_small_FOV2	0.0781	0.0855	0.1158	N/A
103(I)	MIPS_24um_large_FOV1	0.0770	0.0855	0.1151	N/A
104(I)	MIPS_24um_large_FOV2	0.0772	0.0855	0.1152	N/A

Table 1.4: IPF calibration error summary ([arcsec], 1-sigma, radial)

RMS METRIC	A PRIORI ³	A POSTERIORI ³	ATT. CORRECTED ⁴	UNITS
Radial	2.3723	0.3233	0.1655	arcsec
W-Axis	1.0587	0.2188	0.1033	arcsec
V-Axis	2.1230	0.2380	0.1292	arcsec
Radial	0.9515	0.1297	0.0664	pixels
W-Axis	0.4246	0.0877	0.0414	pixels
V-Axis	0.8515	0.0955	0.0518	pixels

Table 1.5: Measurement prediction error summary (1-sigma)

¹IPF filter removes systematic pointing errors due to: thermomechanical alignment drift (Body to TPF), gyro bias and bias drift, centroiding error, attitude error, and optical distortion. IPF SIGMA presented here is “Scaled” by the Least Squares Scale factor. The Least Squares Scale Factor was: 0.905313. It is assumed that the gyro Angle Random Walk contribution is captured with the Least Squares scaling. The gyro ARW contribution can be approximately calculated as 0.0753 arcseconds, given that $ARW = 100 \mu deg/\sqrt{hr}$, with 5.518000e+002 second Maneuver time (max), and 7 independent Maneuvers.

²Gyro Scale Factor(GSF) assumes 95 ppm error over 0.250 degree maneuver.

³This can be interpreted as estimate of ”pixel to sky” pointing reconstruction error if no science data is used.

⁴This can be interpreted as estimate of achieved S/I centroiding error

IPF BROWN ANGLE SUMMARY					
FRAME TABLE USED: BodyFrames_SPC_08a					
NF	NAME	WAS	IS	CHANGE	UNIT
095	theta_Y	+6.724001	+6.714552	-0.009449	arcmin
095	theta_Z	+4.258239	+4.245573	-0.012666	arcmin
095	angle	+0.577299	+0.643100	+0.065800	deg
096	theta_Y	+6.721218	+6.694786	-0.026433	arcmin
096	theta_Z	+6.970374	+7.059681	+0.089307	arcmin
096	angle	+0.577299	+0.643100	+0.065800	deg
099	theta_Y	+7.758095	+7.755240	-0.002855	arcmin
099	theta_Z	+4.277861	+4.258819	-0.019042	arcmin
099	angle	+0.577299	+0.643100	+0.065800	deg
100	theta_Y	+5.669225	+5.658183	-0.011043	arcmin
100	theta_Z	+4.238226	+4.233701	-0.004525	arcmin
100	angle	+0.577299	+0.643100	+0.065800	deg
103	theta_Y	+6.827410	+6.818397	-0.009014	arcmin
103	theta_Z	+4.260201	+4.246826	-0.013375	arcmin
103	angle	+0.577299	+0.643100	+0.065800	deg
104	theta_Y	+6.641274	+6.631513	-0.009761	arcmin
104	theta_Z	+4.256670	+4.244582	-0.012088	arcmin
104	angle	+0.577299	+0.643100	+0.065800	deg

Table 1.6: IPF Brown angle summary

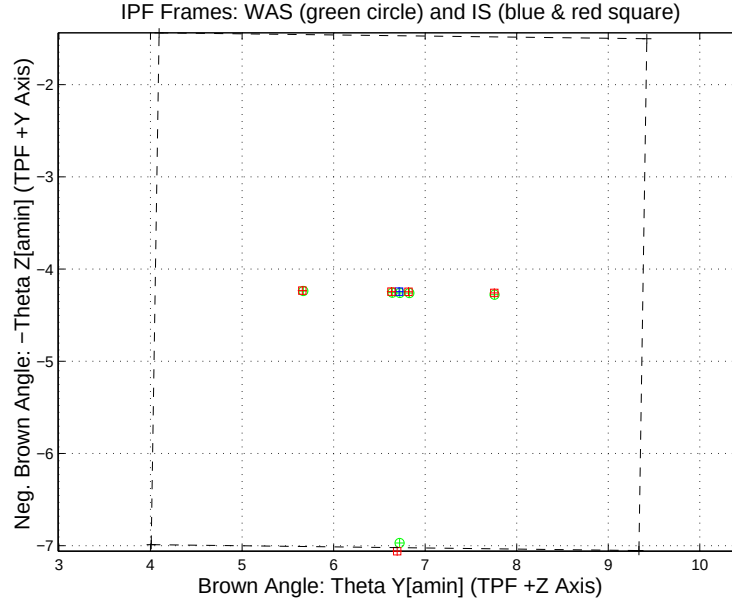


Figure 1.2: A-priori and a-posteriori IPF frames (ZOOMED)

2 IPF INPUT FILE HISTORY

WAS	SIZE	IS	SIZE	REMOVED	PATCHED
AA101095	UNCHANGED	AA101095	UNCHANGED	0	0
CA105095	UNCHANGED	CA105095	UNCHANGED	0	N/A
CB101095	UNCHANGED	CB101095	UNCHANGED	0	N/A

Table 2.1: IPF input file editing status

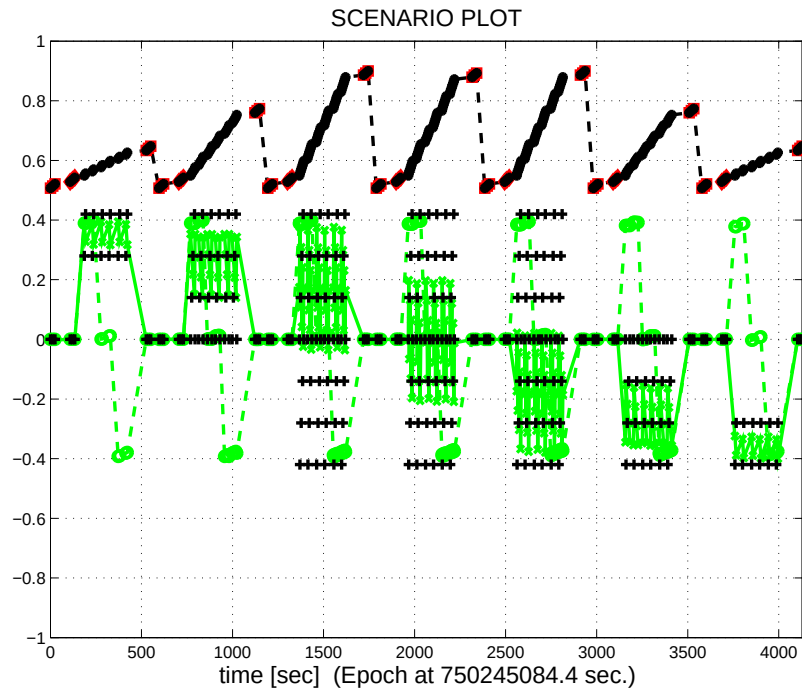


Figure 2.1: Scenario Plot

3 IPF EXECUTION RESULTS

3.1 IPF EXECUTION OUTPUT PLOTS

This subsection summarizes the IPF filter results. As shown in Table 3.1, the output plots are segmented to three groups: predicted performance, post-run results and IPF trending plots.

FIGURE NO.	DESCRIPTION
Predicted performance prior to IPF run	
Figure 3.1	Meas. and a-priori predicts in TPF coords
Figure 3.2	Meas. and a-priori predicts in Oriented Pixel Coords including rectangular array boundary approximation
Figure 3.3	A-Priori Prediction Error Quiver Plot in Oriented Pixel Coords including rectangular array boundary approximation
Figure 3.4	A-priori prediction error
Figure 3.5	Oriented Pixel Coords of measurements and a-priori predicts (PCRS only)
Figure 3.6	Oriented Pixel Coords of measurements and a-priori predicts (Zoomed, PCRS only)
Figure 3.7	Oriented (W,V) Pixel Coords of A-Priori PCRS Prediction Error Quiver Plot
Figure 3.8	A-priori PCRS prediction error
IPF filter performance (post run results)	
Figure 3.9	IPF execution convergence, chart 1: (top) normalized residual error vs. iteration number and (bottom) norm of effective parameter corrections
Figure 3.10	IPF execution convergence, chart 2: parameter correction size vs. iteration number
Figure 3.11	Parameter uncertainty convergence: square-root of diagonal elements of covariance matrix vs. maneuver number
Figure 3.12	IPF parameter symbol table
Figure 3.13	KF parameter error sigma plot (a-priori-dashed, a-posteriori-solid). Includes true parameter errors (FLUTE runs only)
Figure 3.14	LS parameter error sigma plot. Includes true parameter errors (FLUTE runs only)
Figure 3.15	KF and LS parameter errors sigma plot (Figure 3.13 & Figure 3.14 combined)
Figure 3.16	Measurements and a-posteriori predicts in Oriented Pixel Coords including rectangular array boundaries (a-priori-dashed, a-posteriori-solid)
Figure 3.17	Attitude corrected meas. and a-posteriori predicts in Oriented Pixel Coords including rectangular array boundaries (a-priori-dashed, a-posteriori-solid)

Table 3.1: Table of figures I (IPF run)

FIGURE NO.	DESCRIPTION
IPF filter performance (post run results) - CONTINUE	
Figure 3.18	KF innovations with (o) and w/o (+) attitude corrections
Figure 3.19	Histograms of science a-posteriori residuals (or innovations)
Figure 3.20	KF innovations with (o) and w/o (+) attitude corrections (PCRS)
Figure 3.21	Histograms of PCRS a-posteriori residuals (or innovations)
Figure 3.22	A-Posteriori Science Centroid Prediction Error Quiver (Att. Cor.)
Figure 3.23	Normalized A-Posteriori Science Centroid Prediction Errors
Figure 3.24	A-Posteriori PCRS Prediction Errors Quiver (Att. Cor.)
Figure 3.25	Normalized A-Posteriori PCRS Prediction Errors
Figure 3.26	W-axis KF innovations and 1-sigma bound
Figure 3.27	V-axis KF innovations and 1-sigma bound
Figure 3.28	Array plot with (solid) and w/o (dashed) optical distortion corrections
Figure 3.29	Optical Distortion Plot: total (x5 magnification)
Figure 3.30	Optical Distortion Plot: constant plate scales (x5 magnification)
Figure 3.31	Optical Distortion Plot: linear plate scale (x5 magnification)
Figure 3.32	Optical Distortion Plot: gamma terms (x5 magnification)
IPF parameter trending plots	
Figure 3.33	Estimated attitude corrections (Body frame)
Figure 3.34	Estimated attitude error sigma plot (Body frame)
Figure 3.35	Systematic error attributed to thermo-mechanical boresight drift (equiv. angle in (W,V) coords)
Figure 3.36	Systematic error attributed to thermo-mechanical boresight drift (equiv. angle in Body frame)
Figure 3.37	Systematic error attributed to gyro drift bias (equiv. rate in (W,V) coords)
Figure 3.38	Systematic error attributed to gyro drift bias (equiv. angle in (W,V) coords)
Figure 3.39	Systematic error attributed to gyro drift bias (equiv. angle in Body frame)

Table 3.2: Table of figures II (IPF run)

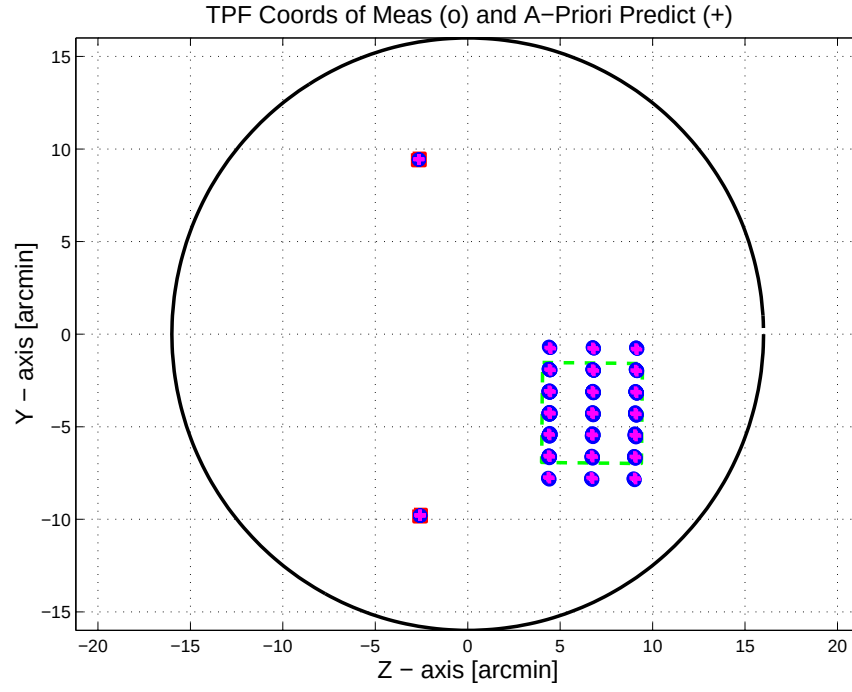


Figure 3.1: TPF coords of measurements and a-priori predicts

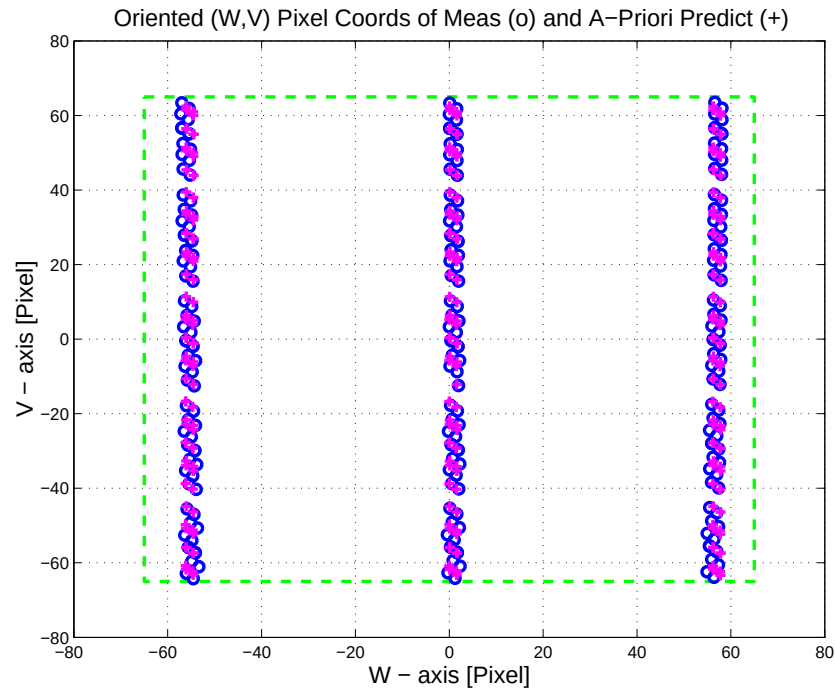


Figure 3.2: Oriented Pixel Coords of measurements and a-priori predicts

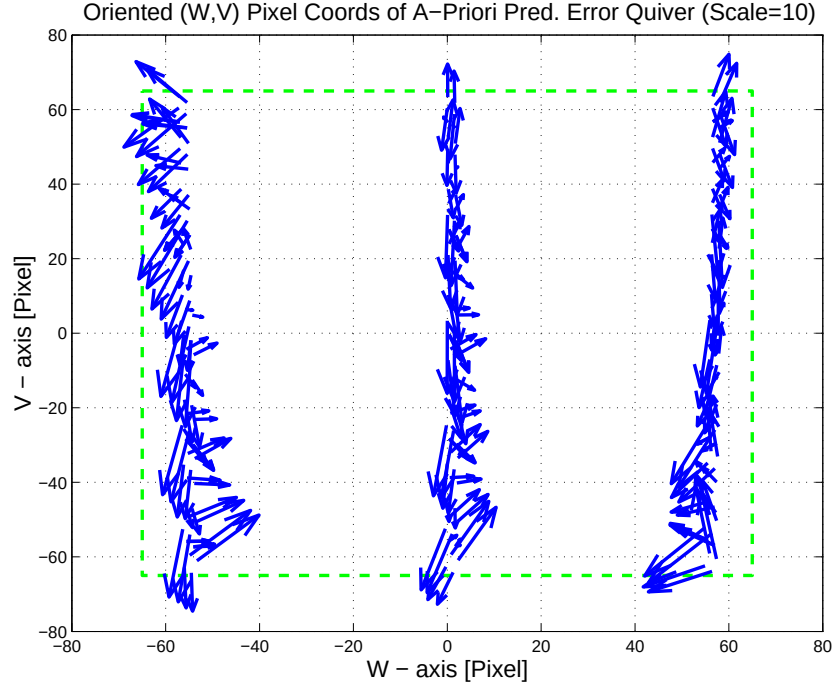


Figure 3.3: Oriented (W,V) Pixel Coords of A-Priori Prediction Error Quiver Plot

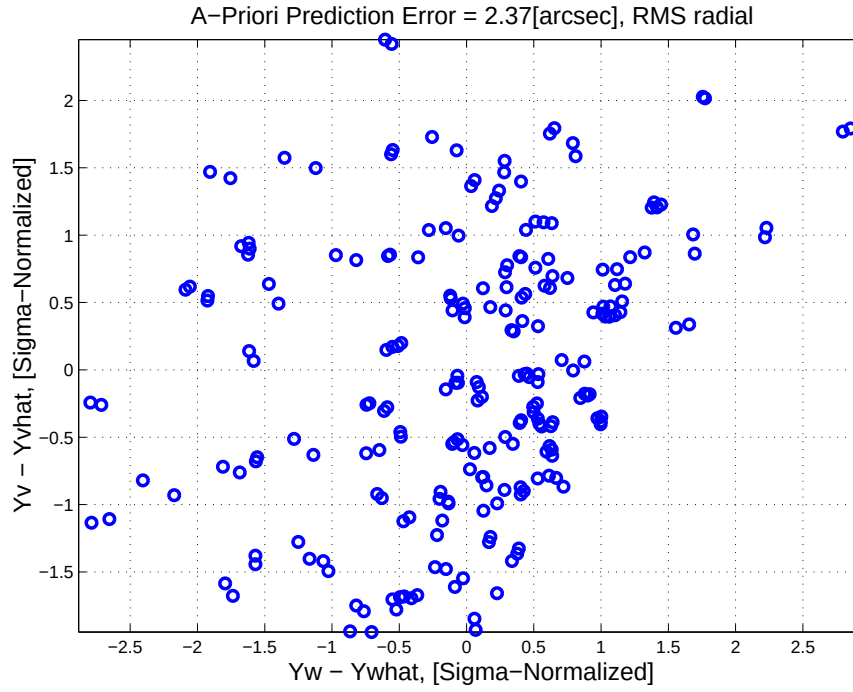


Figure 3.4: A-priori prediction error (Science Centroids)

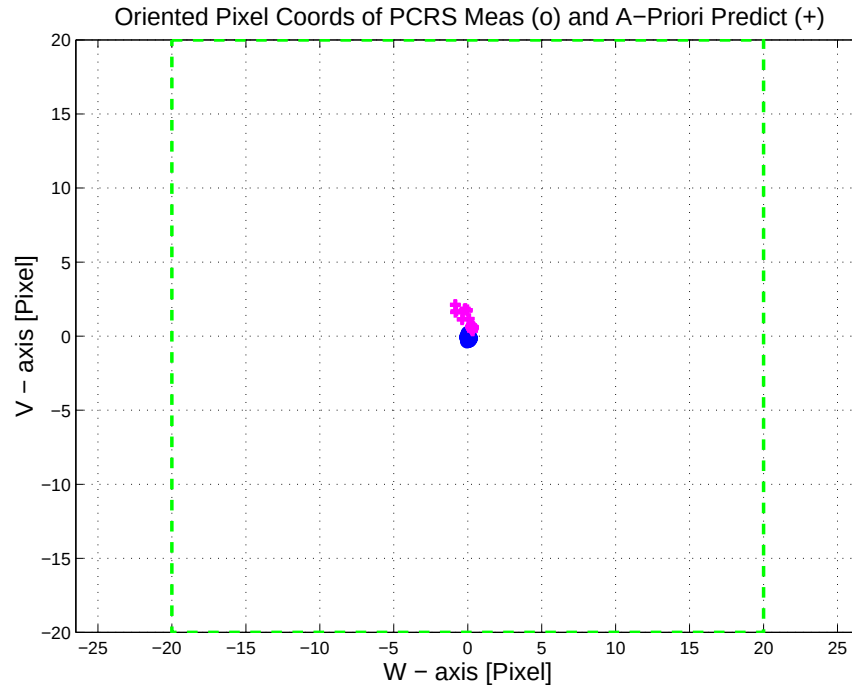


Figure 3.5: Oriented Pixel Coords of measurements and a-priori predicts (PCRS only)

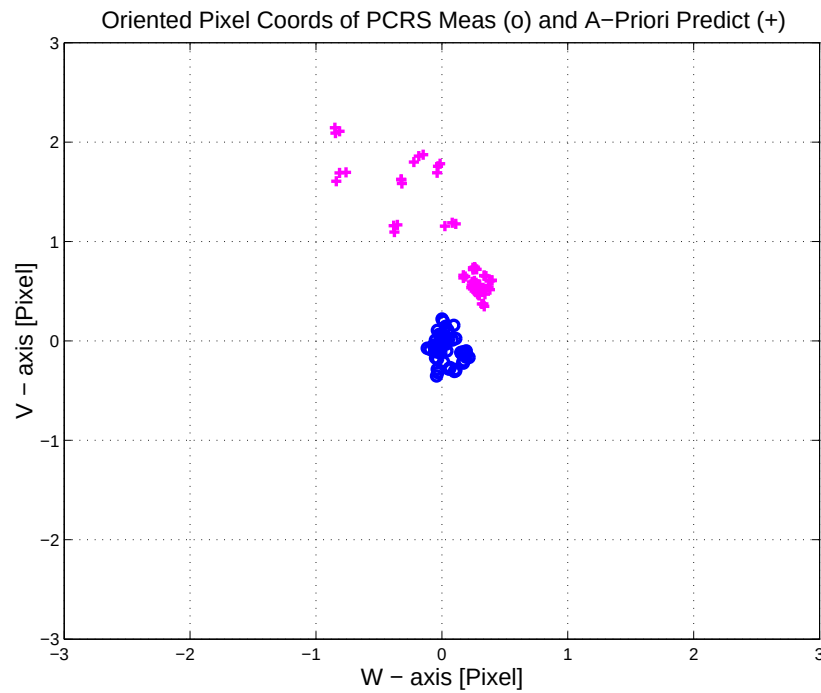


Figure 3.6: Oriented Pixel Coords of measurements and a-priori predicts (Zoomed, PCRS only)

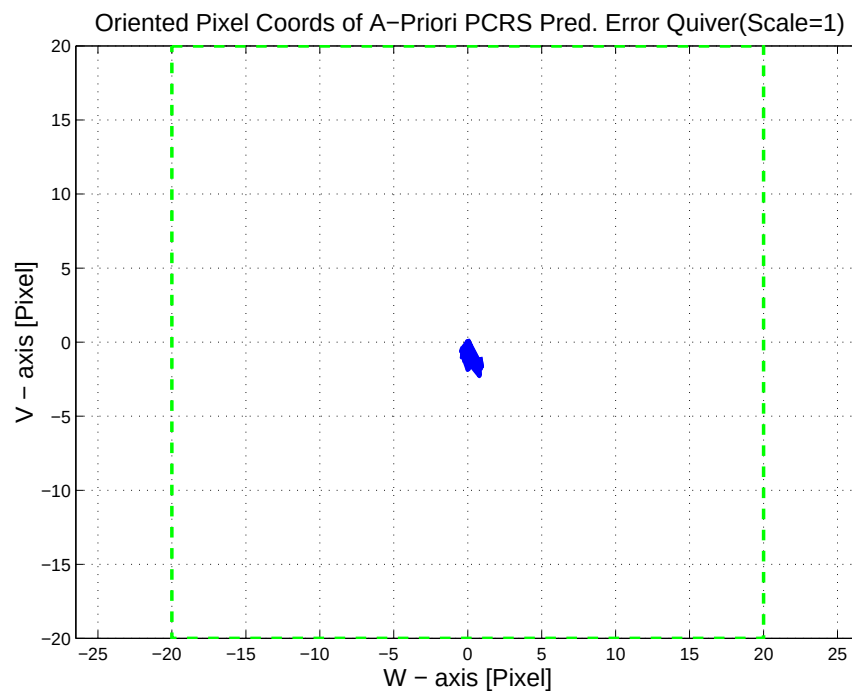


Figure 3.7: Oriented (W,V) Pixel Coords of A-Priori PCRS Prediction Error Quiver Plot

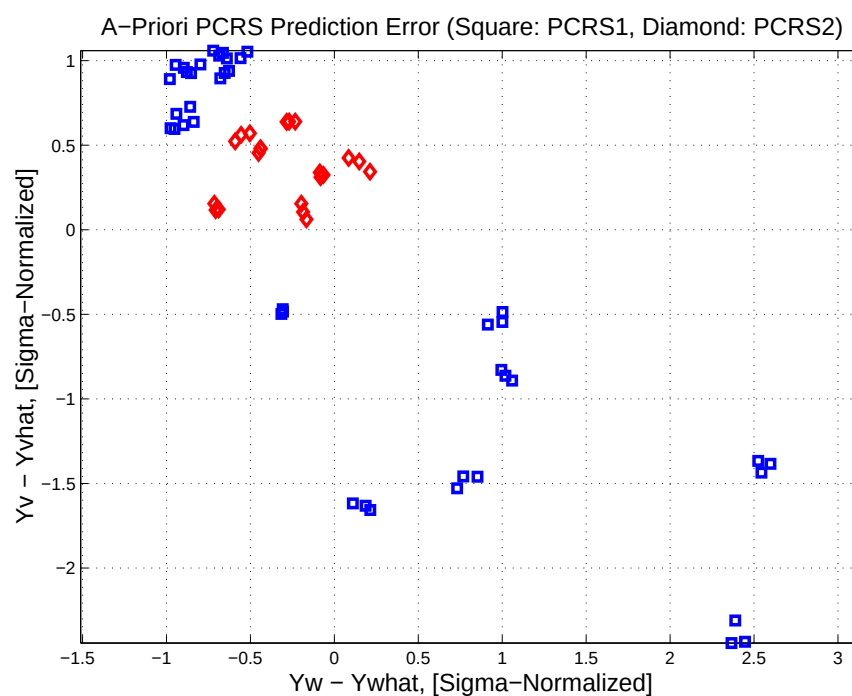


Figure 3.8: A-priori PCRS prediction error

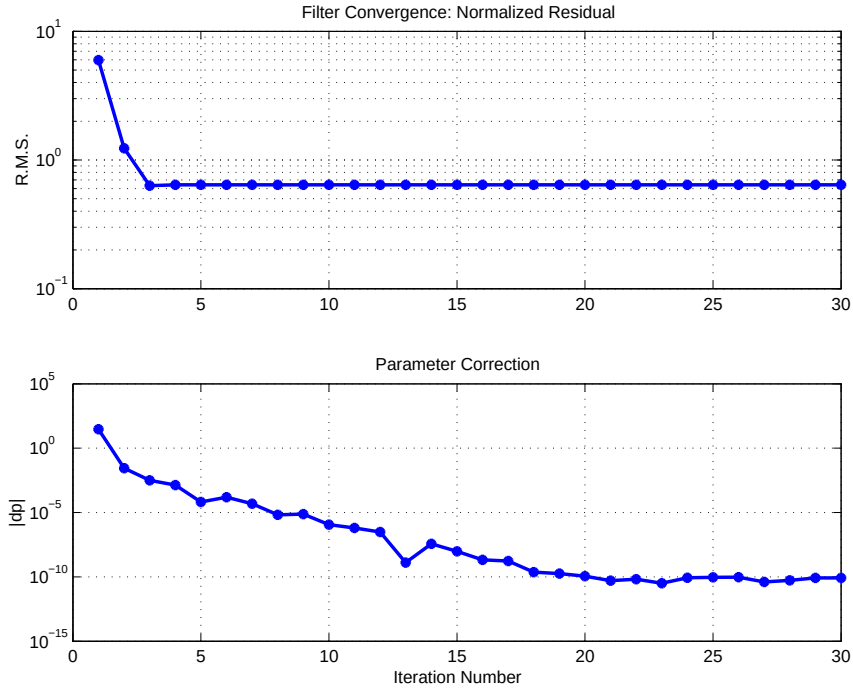


Figure 3.9: IPF execution convergence, chart 1

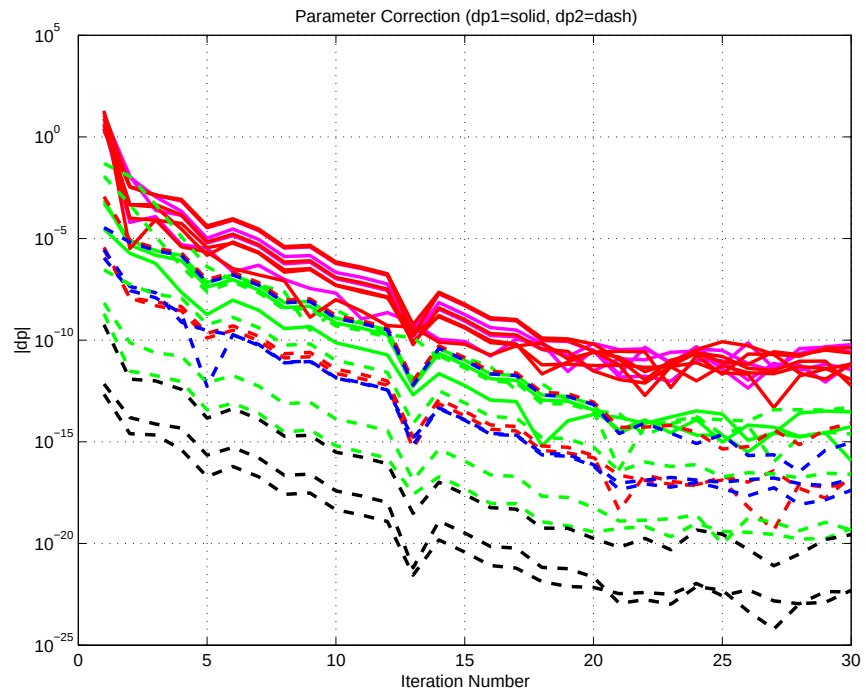


Figure 3.10: IPF execution convergence, chart 2

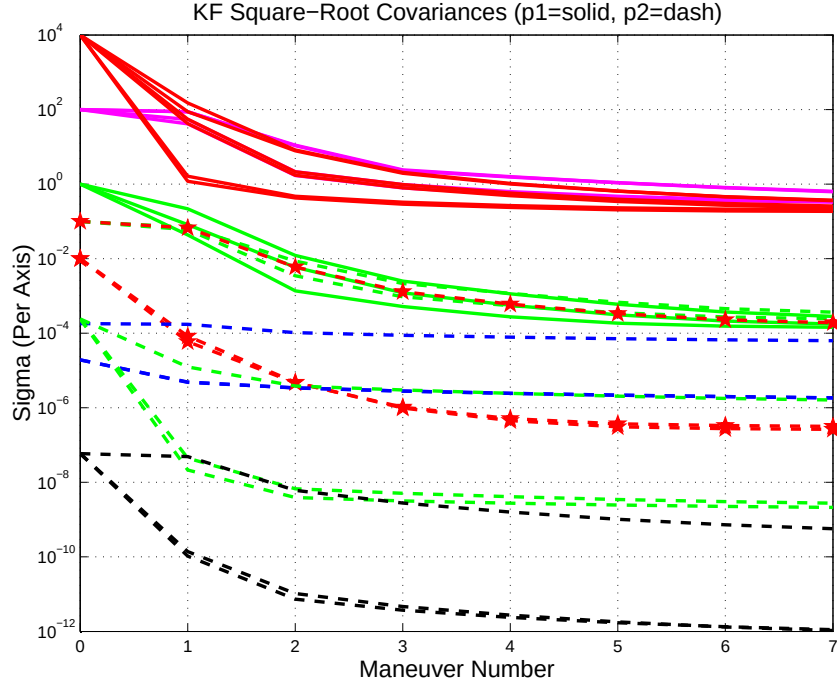


Figure 3.11: Parameter uncertainty convergence

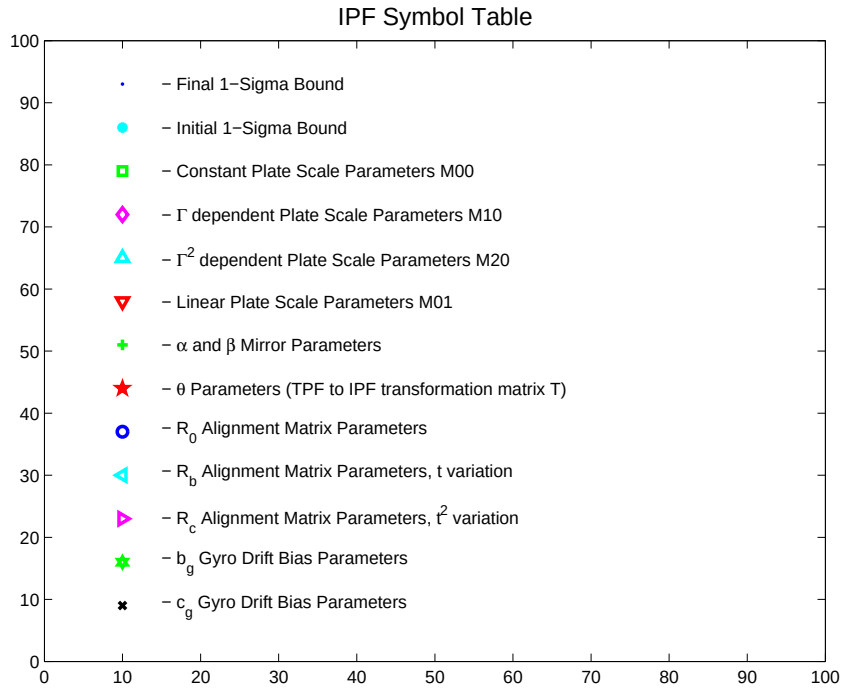


Figure 3.12: IPF parameter symbol table

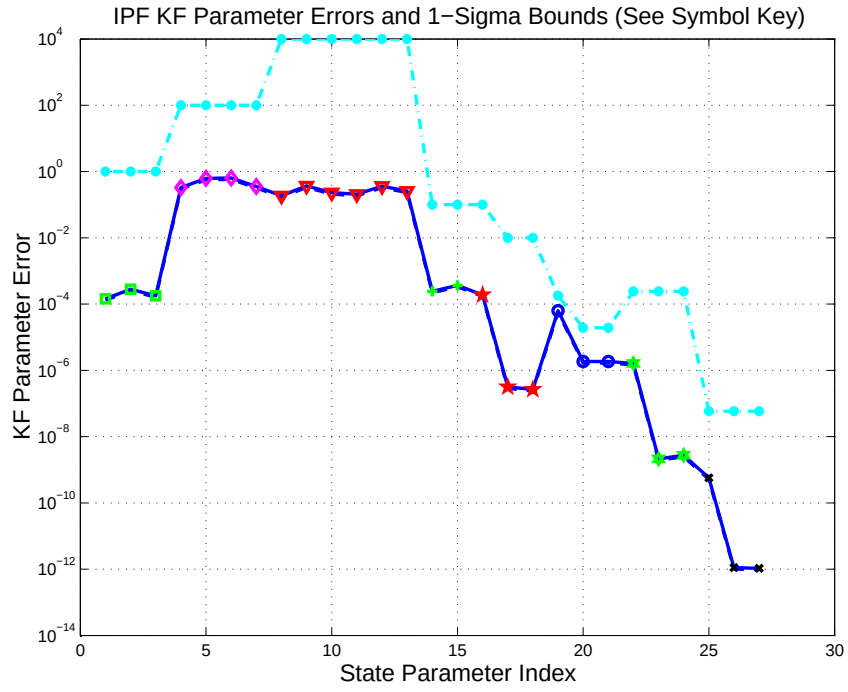


Figure 3.13: KF parameter error sigma plots

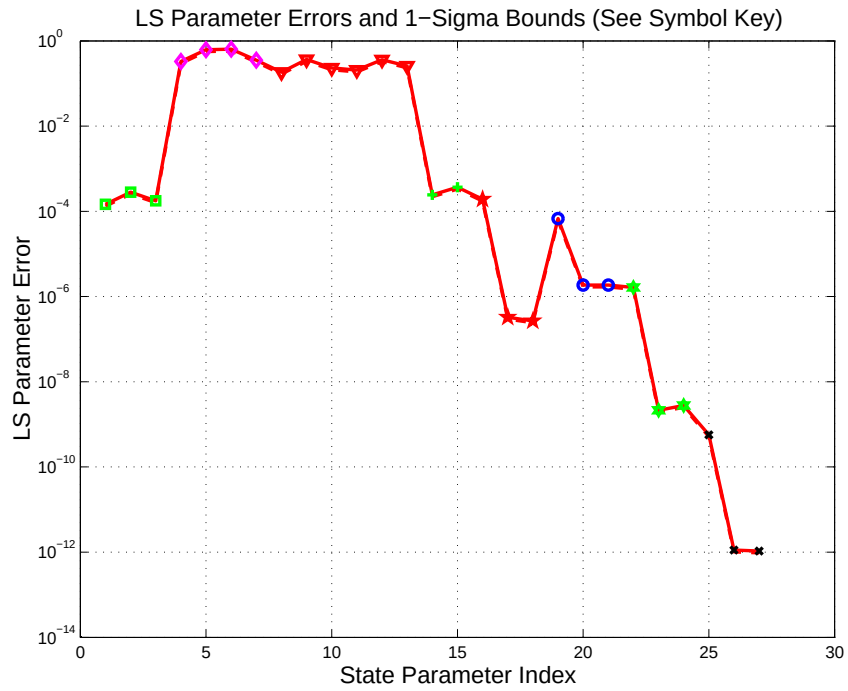


Figure 3.14: LS parameter error sigma plot

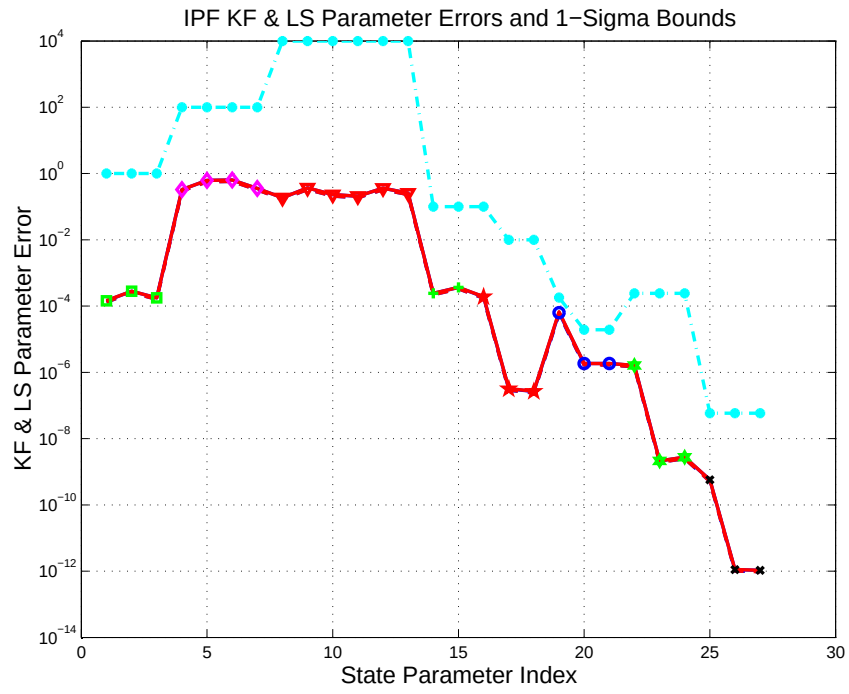


Figure 3.15: KF and LS parameter error sigma plot

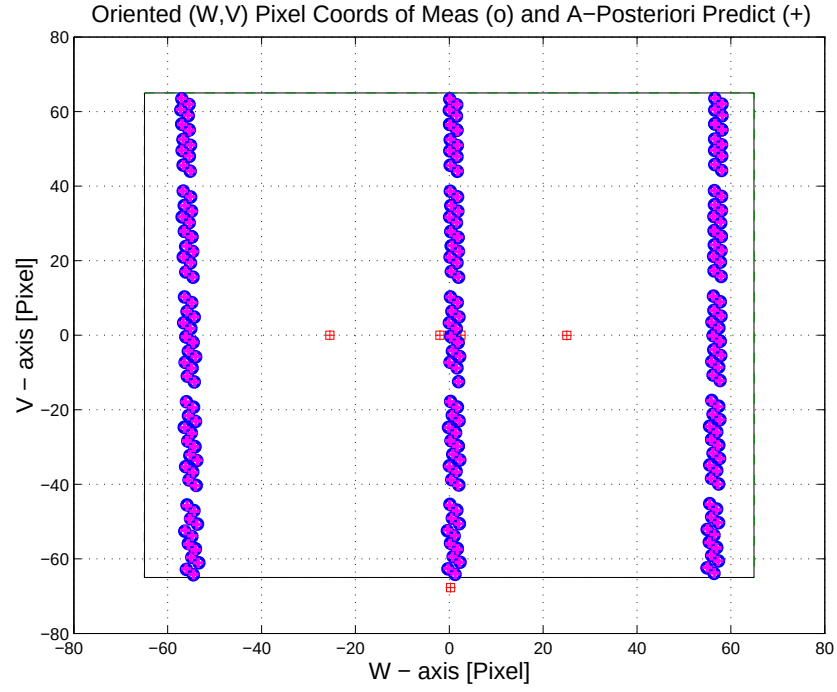


Figure 3.16: Oriented Pixel Coords of meas. and a-posteriori predicts

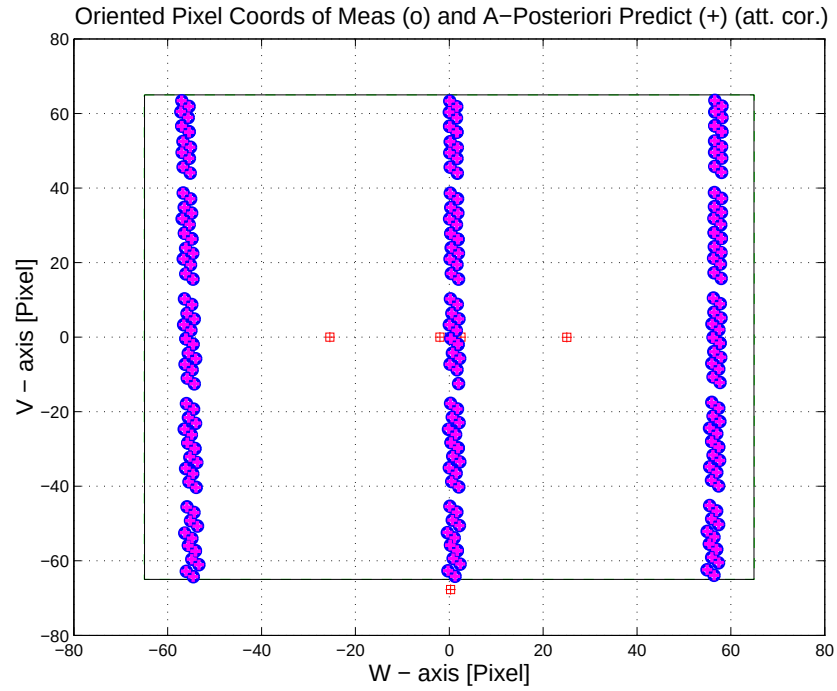


Figure 3.17: Oriented Pixel Coords of meas. and a-posteriori predicts (attitude corrected)

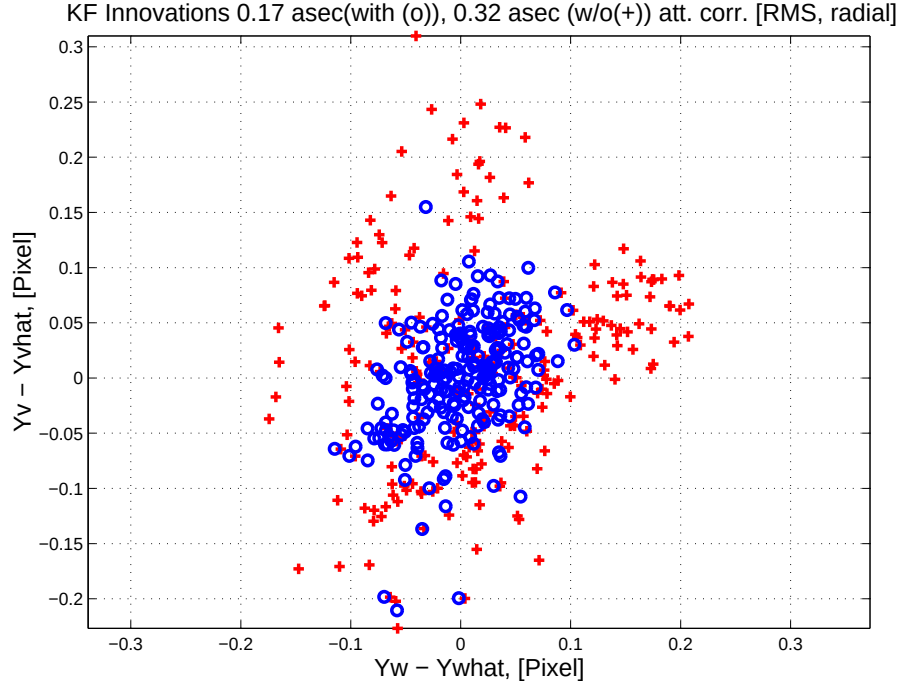


Figure 3.18: KF innovations with (o) and w/o (+) attitude corrections

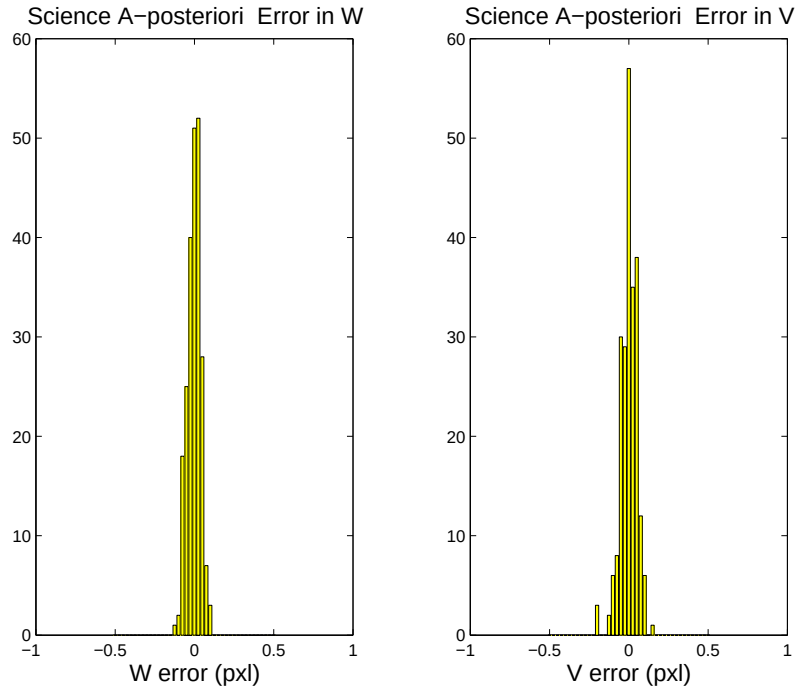


Figure 3.19: Histograms of science a-posteriori residuals (or innovations)

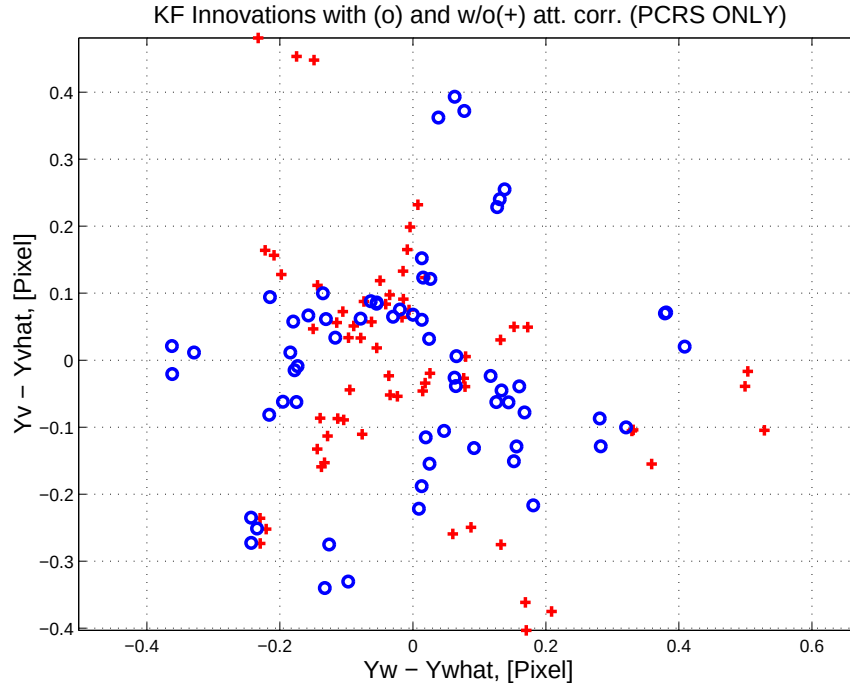


Figure 3.20: KF innovations with (o) and w/o (+) attitude corrections (PCRS)

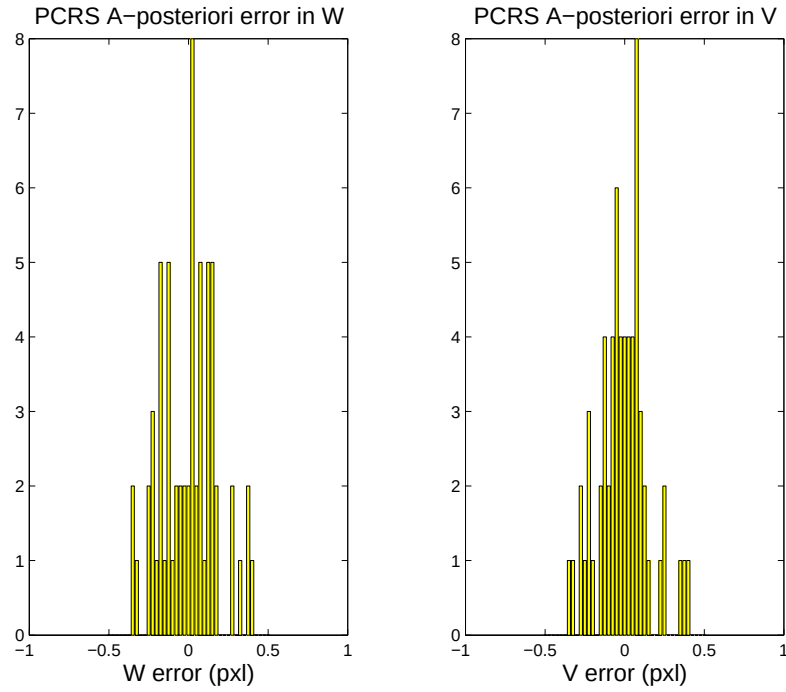


Figure 3.21: Histograms of PCRS a-posteriori residuals (or innovations)

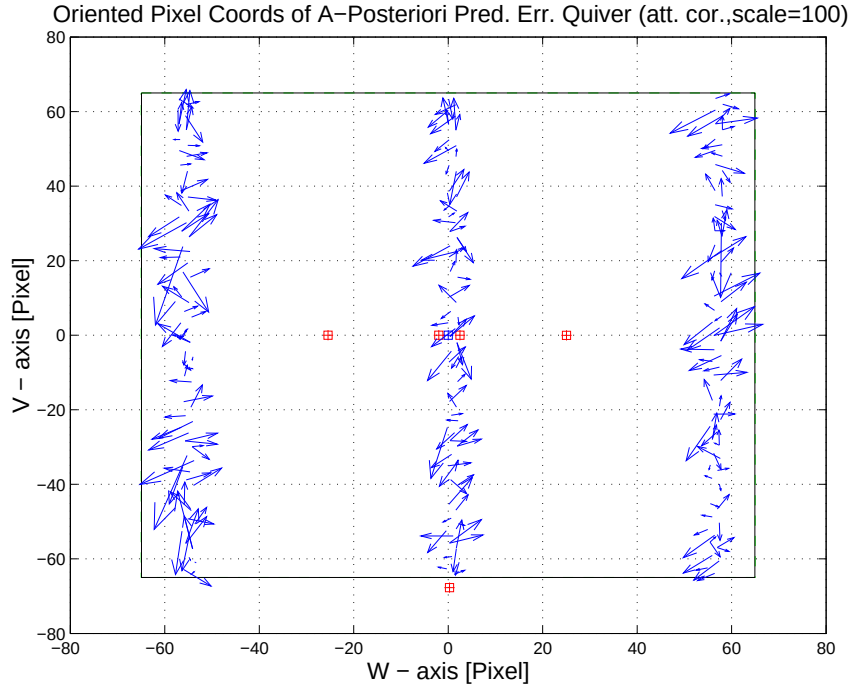


Figure 3.22: A-Posteriori Science Centroid Prediction Error Quiver (Att. Cor.)

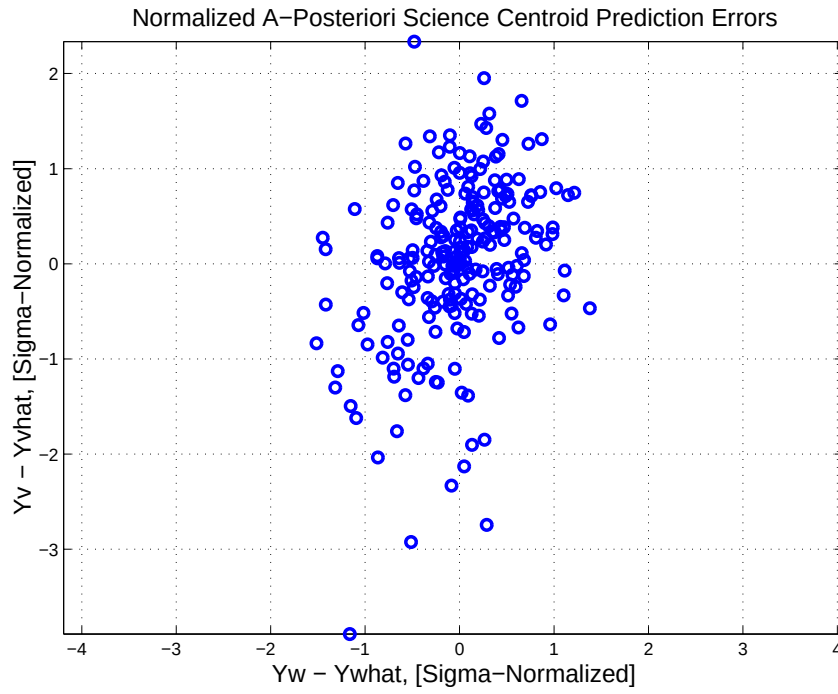


Figure 3.23: Normalized A-Posteriori Science Centroid Prediction Errors

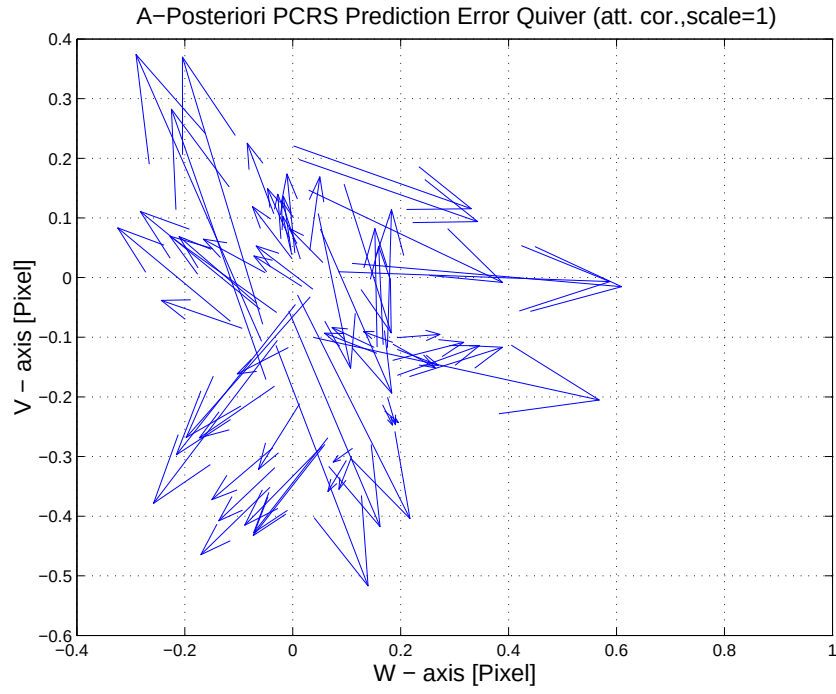


Figure 3.24: A-Posteriori PCRS Prediction Errors Quiver (Att. Cor.)

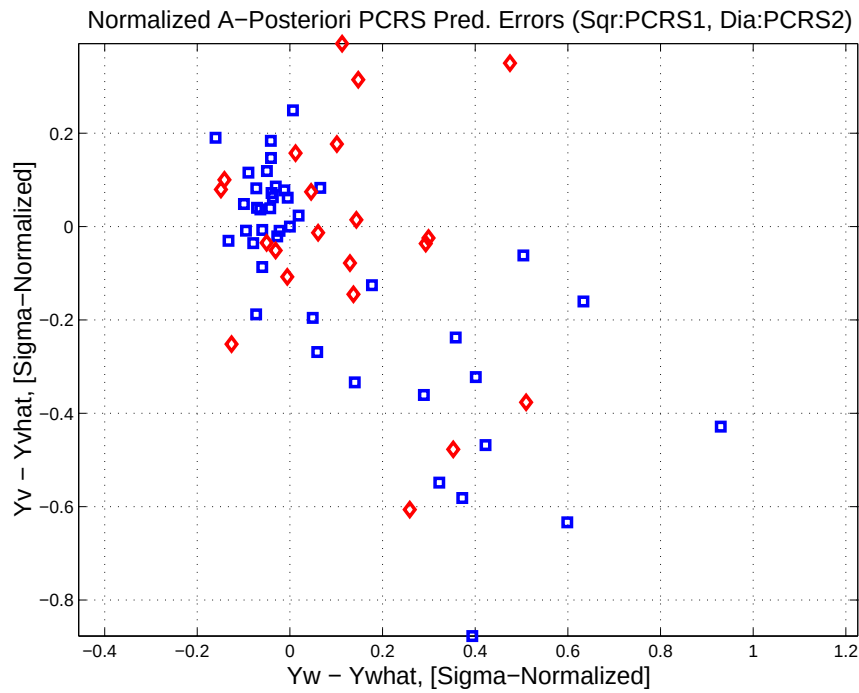


Figure 3.25: Normalized A-Posteriori PCRS Prediction Errors

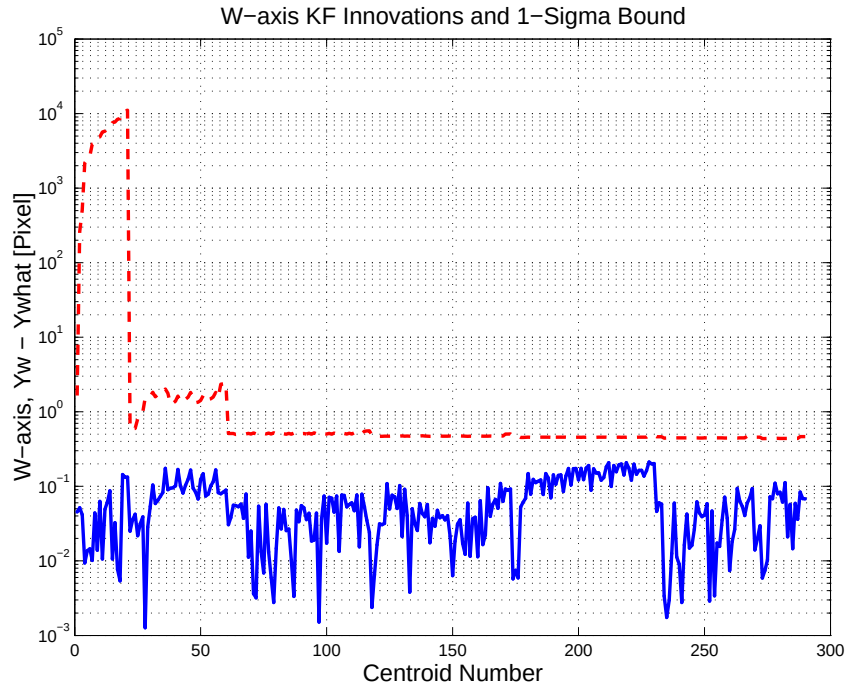


Figure 3.26: W-axis KF innovations and 1-sigma bound

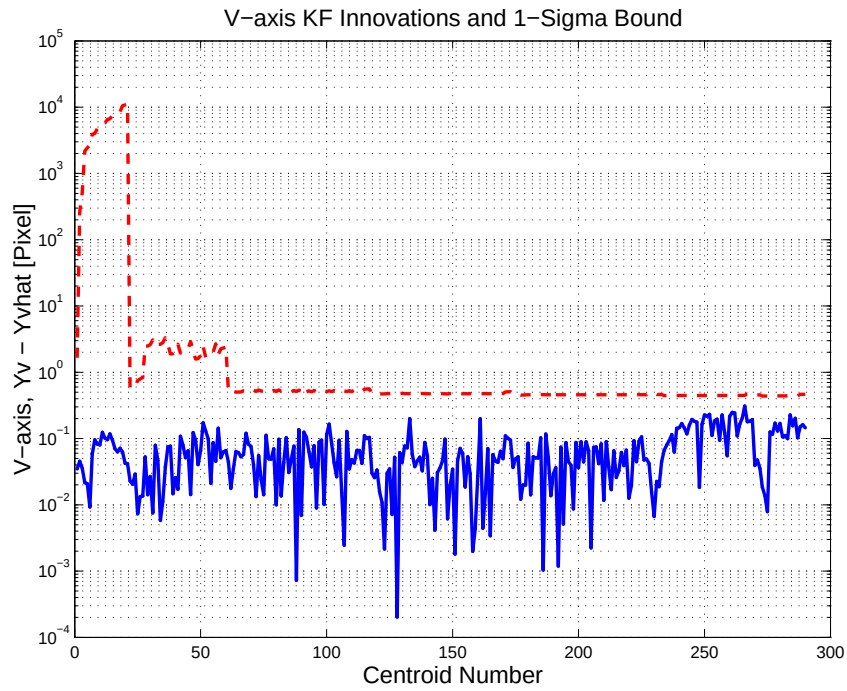


Figure 3.27: V-axis KF innovations and 1-sigma bound

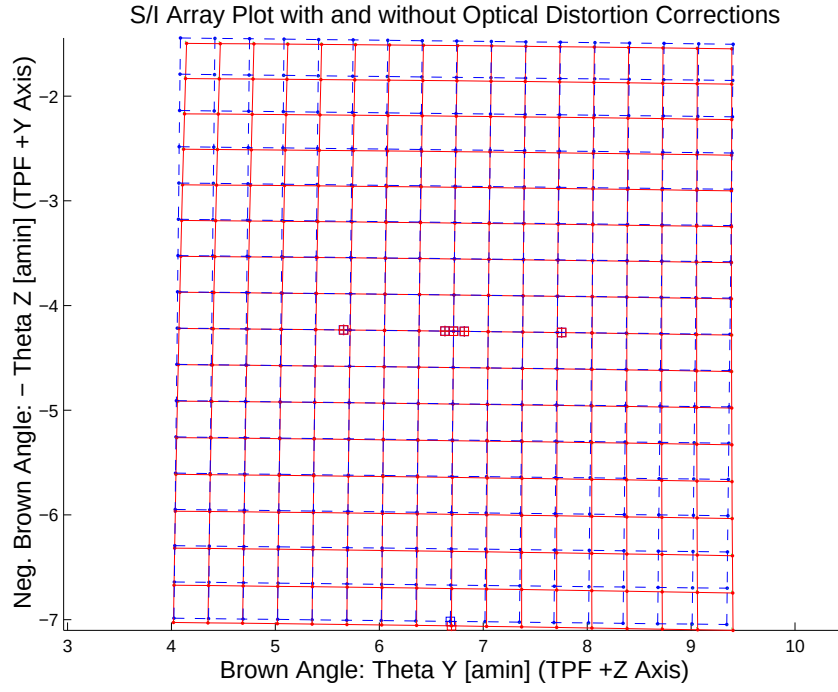


Figure 3.28: Array plot with (solid) and w/o (dashed) optical distortion corrections

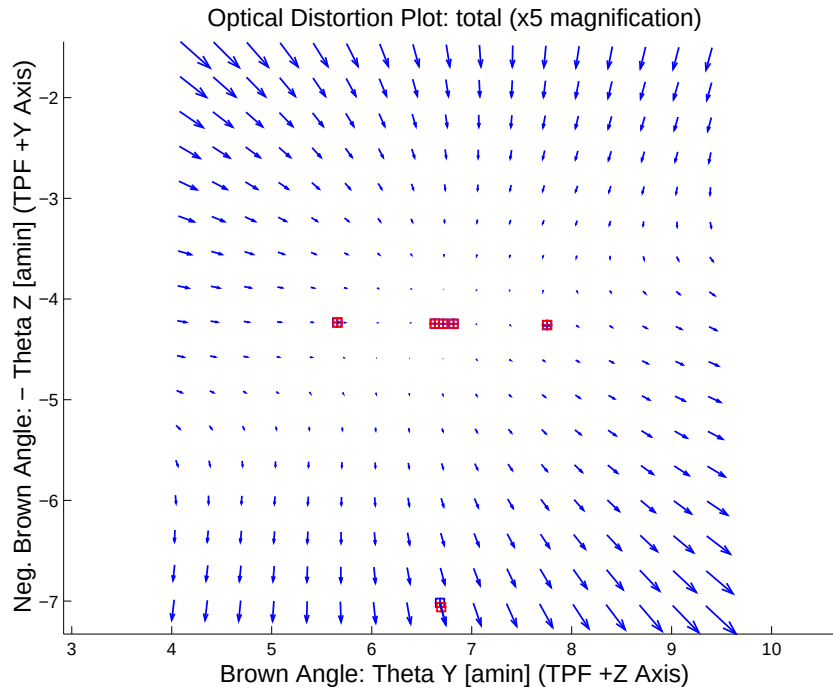


Figure 3.29: Optical Distortion Plot: total (x5 magnification)

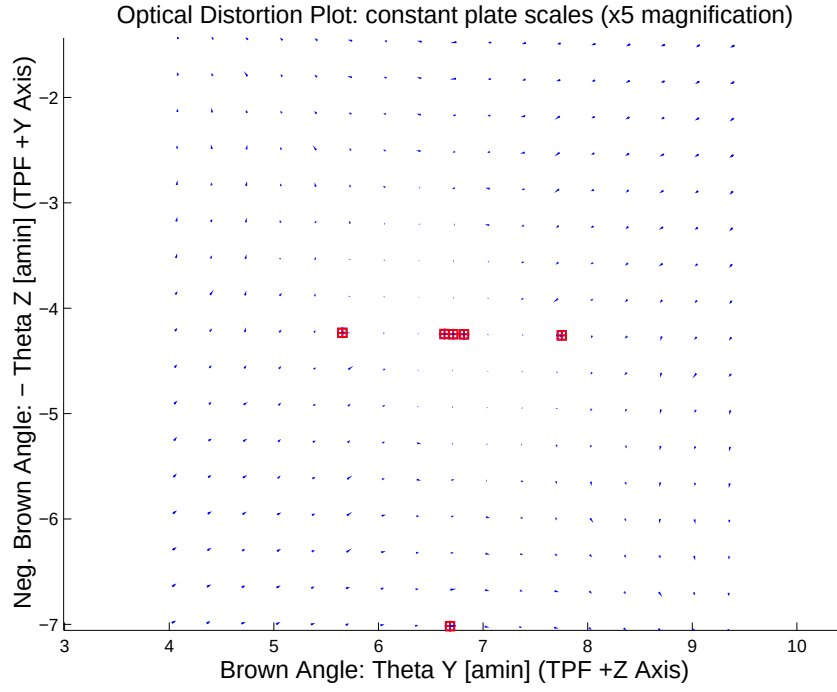


Figure 3.30: Optical Distortion Plot: constant plate scales (x5 magnification)

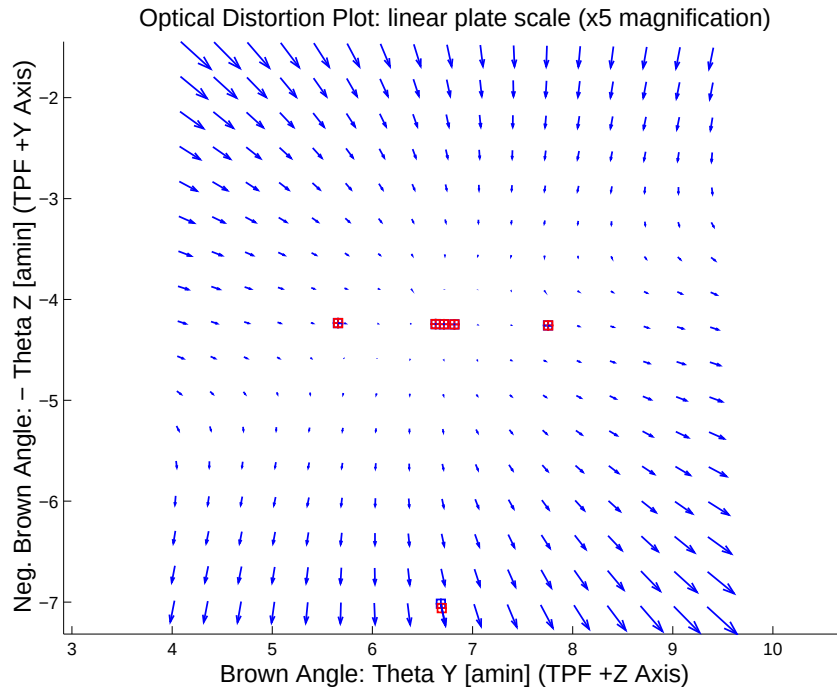


Figure 3.31: Optical Distortion Plot: linear plate scale (x5 magnification)

Opt. Dist. Plot: Γ depdt; $\Gamma = -3.99676e-004$ in blue and $\Gamma = 3.99676e-004$ in red (x5 magn)

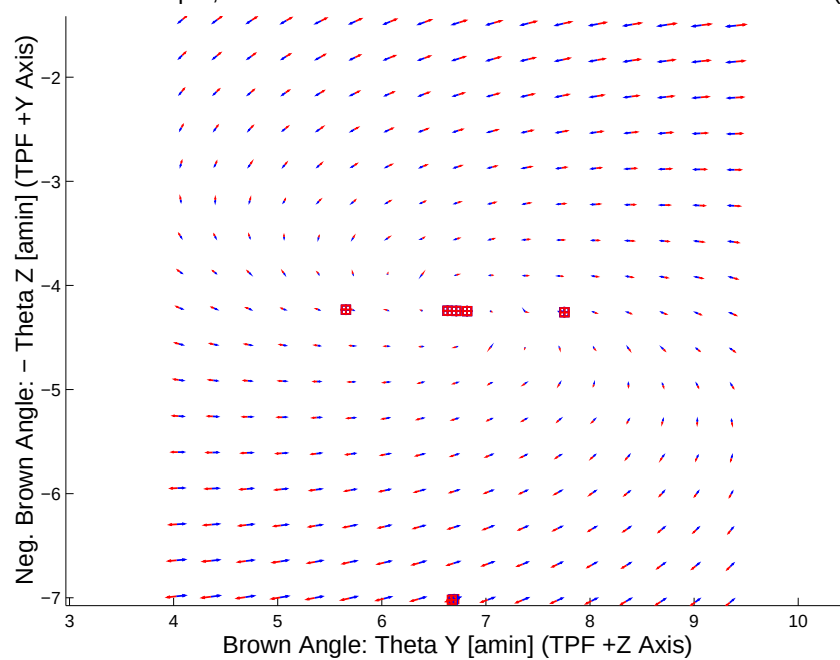


Figure 3.32: Optical Distortion Plot: gamma terms (x5 magnification)

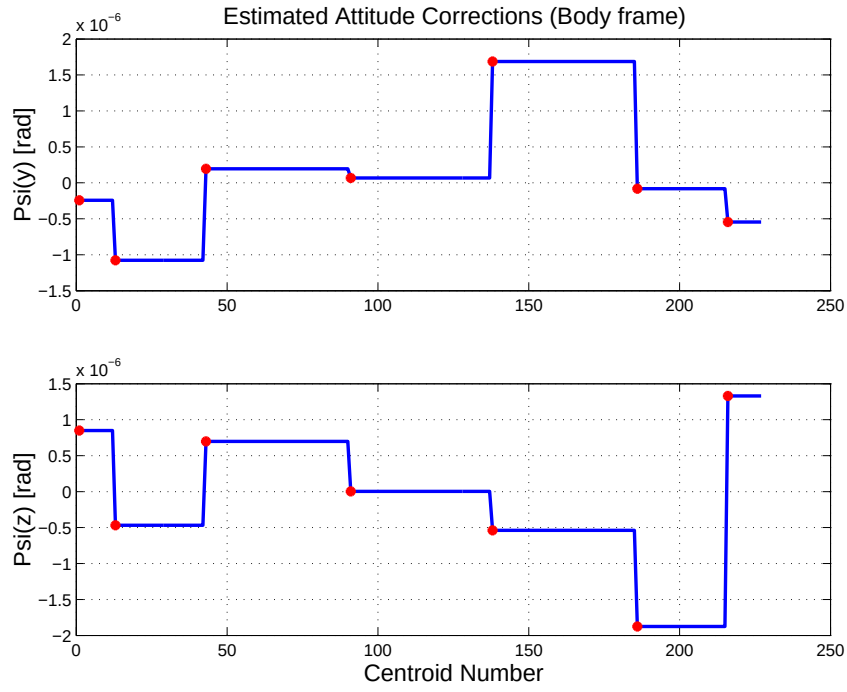


Figure 3.33: Estimated attitude corrections (Body frame)

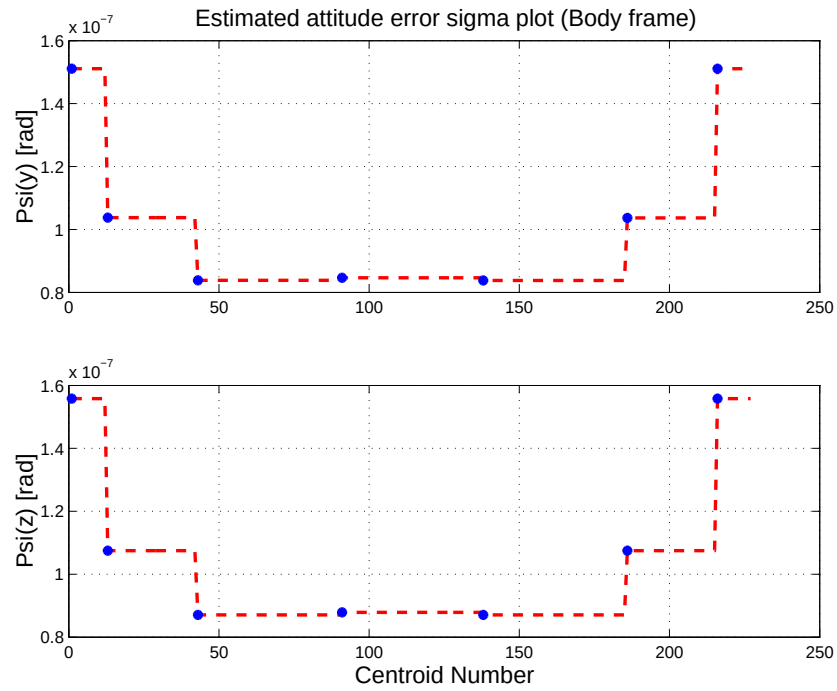


Figure 3.34: Estimated attitude error sigma plot (Body frame)

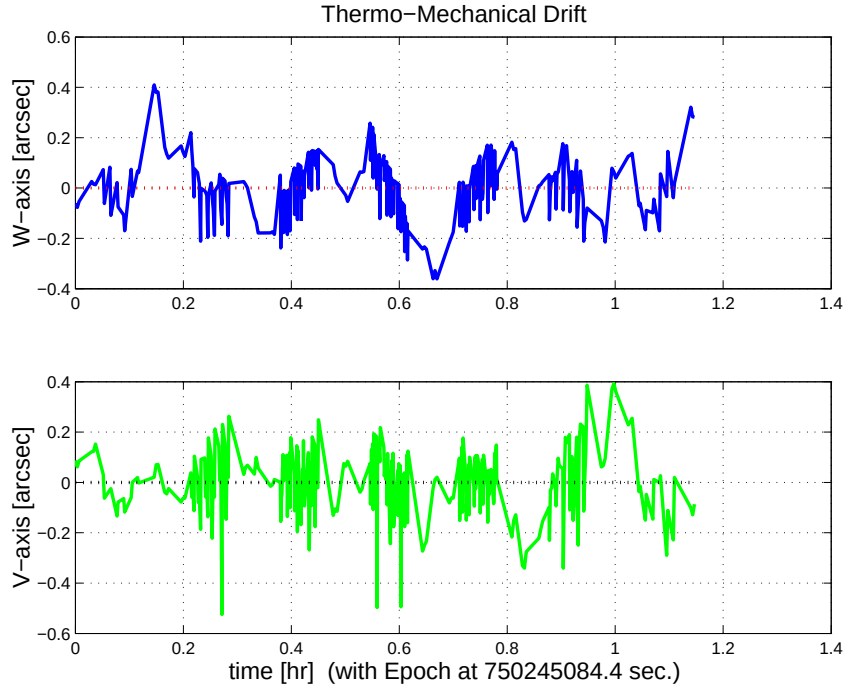


Figure 3.35: Thermo-mechanical boresight drift (equiv. angle in (W,V) coords)

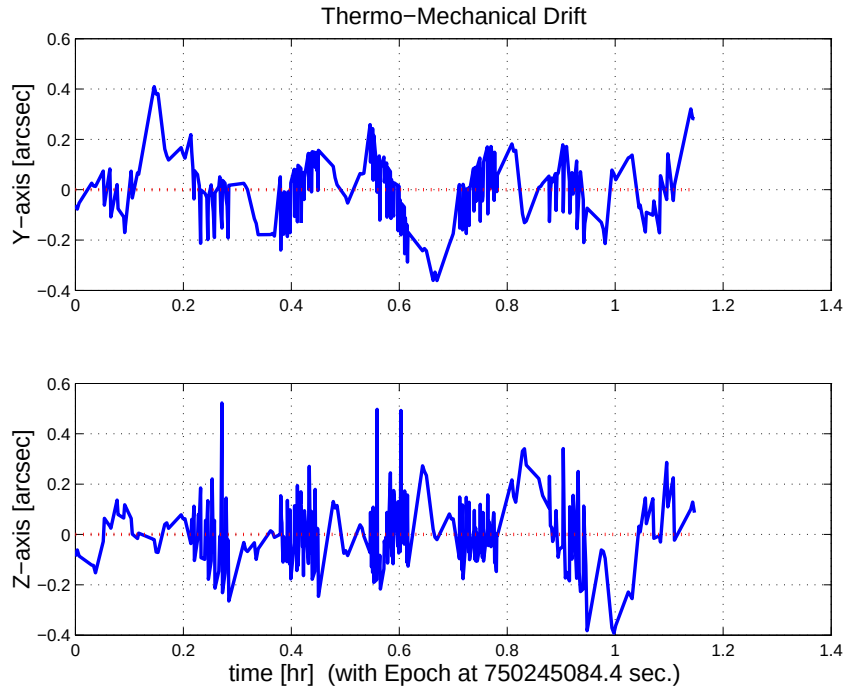


Figure 3.36: Thermo-mechanical boresight drift (equiv. angle in Body frame)

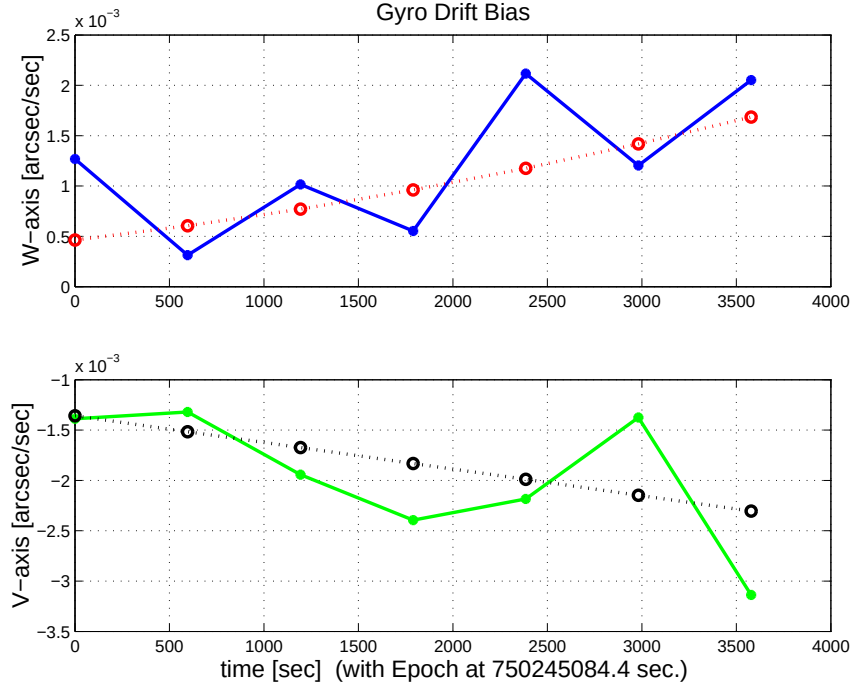


Figure 3.37: Gyro drift bias contribution (equiv. rate in (W,V) coords)

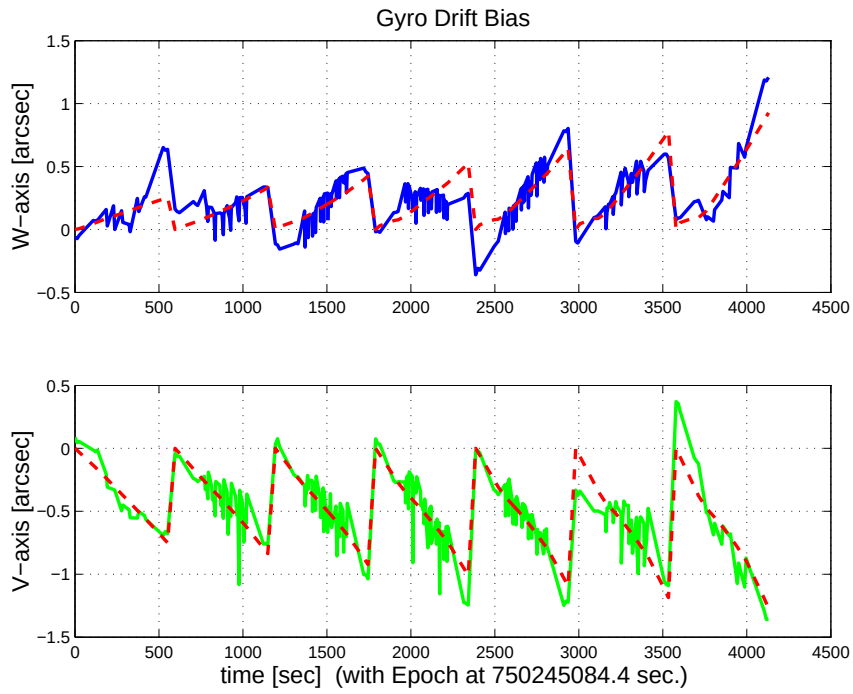


Figure 3.38: Gyro drift bias contribution (equiv. angle in (W,V) coords)

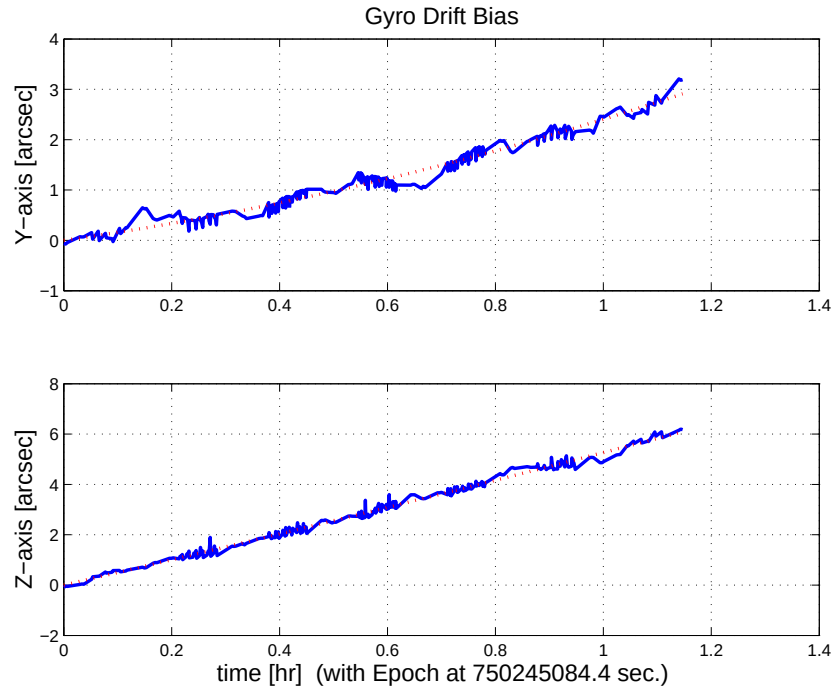


Figure 3.39: Gyro drift bias contribution (equiv. angle in Body frame)

3.2 IPF OUTPUT DATA (IF MINI FILE)

OUTPUT FILE NAME: IFmini101095.dat DATE: 17-Oct-2003 TIME: 17:25
 INSTRUMENT NAME: MIPS_24um_center NF: 95
 IPF FILTER VERSION: IPF.V2.0.0D SW RELEASE DATE: August 1, 2003
 FRAME TABLE USED: BodyFrames_SPC_08a

----- IPF BROWN ANGLE SUMMARY -----						
Frame Number	----- WAS -----			----- IS -----		
	theta_Y (arcmin)	theta_Z (arcmin)	angle (deg)	theta_Y (arcmin)	theta_Z (arcmin)	angle (deg)
095	+6.724001	+4.258239	+0.577299	+6.714552	+4.245573	+0.643100
096	+6.721218	+6.970374	+0.577299	+6.694786	+7.059681	+0.643100
099	+7.758095	+4.277861	+0.577299	+7.755240	+4.258819	+0.643100
100	+5.669225	+4.238226	+0.577299	+5.658183	+4.233701	+0.643100
103	+6.827410	+4.260201	+0.577299	+6.818397	+4.246826	+0.643100
104	+6.641274	+4.256670	+0.577299	+6.631513	+4.244582	+0.643100

OFFSET 0	NF 95	Delta_CW +0.000	Delta_CV +0.000	pixels		
OFFSET FRAME NAME: MIPS_24um_center						
Brown Angle	theta_Y(arcmin)	theta_Z(arcmin)	angle(deg)			
WAS(FTB)	+6.724001	+4.258239	+0.577299			
IS (EST)	+6.714552	+4.245573	+0.643100			
dT_EST	-0.009449	-0.012666	+0.065800			
T_sSIGMA	+0.000987	+0.000823	+0.009863			
dT_EST/T_sSIGMA	-9.570721	-15.399694	+6.671430			

OFFSET 1	NF 96	Delta_CW +0.000	Delta_CV -64.000	pixels		
OFFSET FRAME NAME: MIPS_24um_plusY_edge						
Brown Angle	theta_Y(arcmin)	theta_Z(arcmin)	angle(deg)			
WAS(FTB)	+6.721218	+6.970374	+0.577299			
IS (EST)	+6.694786	+7.059681	+0.643100			
dT_EST	-0.026433	+0.089307	+0.065800			
T_sSIGMA	+0.001257	+0.001078	+0.009863			
dT_EST/T_sSIGMA	-21.034111	+82.870495	+6.671435			

OFFSET 2	NF 99	Delta_CW +25.000	Delta_CV +0.000	pixels		
OFFSET FRAME NAME: MIPS_24um_small_FOV1						
Brown Angle	theta_Y(arcmin)	theta_Z(arcmin)	angle(deg)			
WAS(FTB)	+7.758095	+4.277861	+0.577299			
IS (EST)	+7.755240	+4.258819	+0.643100			
dT_EST	-0.002855	-0.019042	+0.065800			
T_sSIGMA	+0.000995	+0.000812	+0.009863			
dT_EST/T_sSIGMA	-2.868915	-23.444067	+6.671430			

OFFSET 3	NF 100	Delta_CW -25.500	Delta_CV +0.000	pixels		
OFFSET FRAME NAME: MIPS_24um_small_FOV2						
Brown Angle	theta_Y(arcmin)	theta_Z(arcmin)	angle(deg)			
WAS(FTB)	+5.669225	+4.238226	+0.577299			
IS (EST)	+5.658183	+4.233701	+0.643100			
dT_EST	-0.011043	-0.004525	+0.065800			
T_sSIGMA	+0.000983	+0.000854	+0.009863			
dT_EST/T_sSIGMA	-11.231472	-5.297471	+6.671430			

OFFSET 4	NF 103	Delta_CW +2.500	Delta_CV +0.000	pixels		
OFFSET FRAME NAME: MIPS_24um_large_FOV1						
Brown Angle	theta_Y(arcmin)	theta_Z(arcmin)	angle(deg)			
WAS(FTB)	+6.827410	+4.260201	+0.577299			
IS (EST)	+6.818397	+4.246826	+0.643100			

dT_EST	-0.009014	-0.013375	+0.065800
T_sSIGMA	+0.000988	+0.000820	+0.009863
dT_EST/T_sSIGMA	-9.124287	-16.308075	+6.671430

OFFSET	NF	Delta_CW	Delta_CV	
5	104	-2.000	+0.000	pixels

OFFSET FRAME NAME: MIPS_24um_large_FOV2

Brown Angle	theta_Y(arcmin)	theta_Z(arcmin)	angle(deg)
WAS(FTB)	+6.641274	+4.256670	+0.577299
IS (EST)	+6.631513	+4.244582	+0.643100
dT_EST	-0.009761	-0.012088	+0.065800
T_sSIGMA	+0.000987	+0.000824	+0.009863
dT_EST/T_sSIGMA	-9.891847	-14.660680	+6.671430

VARNAME	MEAN	SIGMA	SCALED_SIGMA
---------	------	-------	--------------

a00	-5.4433328019016060E-004	+1.4459706107582517E-004	+1.3090553832166034E-004
b00	-3.0566059208434913E-005	+2.8117477574708200E-004	+2.5455106146550597E-004
c00	-7.6727422408259262E-004	+1.7651031722114549E-004	+1.5979701055642099E-004
a10	+4.7376180678530950E+000	+3.2807556557693301E-001	+2.9701093647754495E-001
b10	+3.6244501628414909E+000	+6.2054191077897347E-001	+5.6178439781065703E-001
c10	+1.0892885404261666E+001	+6.3869797911775827E-001	+5.7822131486837758E-001
d10	-1.8761137900579590E+000	+3.5364483032381189E-001	+3.2015911349632969E-001
a01	+7.9625495358678471E+000	+1.8516186921576855E-001	+1.6762936940761558E-001
b01	+4.3400903879524861E+000	+3.6770850399729876E-001	+3.3289113418409838E-001
c01	-1.5969963804450648E+001	+2.3144987469830677E-001	+2.0953448304163452E-001
d01	-2.4439342669844213E+000	+2.0604520291702691E-001	+1.8653531410507074E-001
e01	-1.9218015591263068E+001	+3.6023677186958336E-001	+3.2612688109972260E-001
f01	+2.5841438499580631E+000	+2.5764453850566582E-001	+2.3324884169695398E-001
del_alpha	+2.4177708446426749E-015	+2.4294203970779221E-004	+2.1993848458810549E-004
beta	+9.6246352423999870E-001	+3.6724233070692565E-004	+3.3246910164019025E-004
del_theta1	-8.2641142193362604E-015	+1.9014622197686758E-004	+1.7214176666190397E-004
del_theta2	-9.5915628666912818E-018	+3.1721724760892415E-007	+2.8718076463107441E-007
del_theta3	+1.8834148159113792E-017	+2.6428140677021008E-007	+2.3925728202399853E-007
del_arx	+9.1174287629273987E-016	+6.3261866006767128E-005	+5.7271763085875963E-005
del_ary	-4.1019688053157630E-018	+1.8436315185217361E-006	+1.6690628053104828E-006
del_arz	-1.4510445318797064E-017	+1.8481905988692224E-006	+1.6731901980990986E-006
bgx	-2.5872088761762044E-007	+1.6160243703948147E-006	+1.4630071909727312E-006
bgx	+2.0155971189499628E-009	+2.1307445387140791E-009	+1.9289898341712380E-009
bgz	+6.7120277627108987E-009	+2.7494669676610459E-009	+2.4891270321915727E-009
cgx	+5.7580352677504936E-010	+5.6830597150303785E-010	+5.1449454489263581E-010
cgy	+6.8525878136945980E-013	+1.1187799879684995E-012	+1.0128455965762536E-012
cgz	+2.2281740025494148E-013	+1.0585819061201940E-012	+9.5834751582929092E-013

LSQF RESIDUAL SIGMA SCALE = +9.0531257929934594E-001

	a_mirror(1)	a_mirror(2)	a_mirror(3)
--	-------------	-------------	-------------

a_mirror_ipf	+0.0000000000000000E+000	+1.2192040482879366E-002	+9.9992567431227808E-001
a_mirror_tpf	-1.9519848179798934E-003	+9.7054978047684398E-004	+9.9999762389137414E-001
beta	beta_0	beta	beta_total
	+2.8047410000000001E-006	+9.6246352423999870E-001	+2.6994609074404181E-006

	qT(1)	qT(2)	qT(3)	qT(4)
--	-------	-------	-------	-------

FrmTbl:	+5.0372558129468097E-003	-9.8107368935810191E-004	-6.1440075534372396E-004	+9.9998664294079498E-001
Estim:	+5.6114657829231702E-003	-9.8004174764065909E-004	-6.1200280515191882E-004	+9.9998358807657761E-001
DelTheta	deltheta(1)	deltheta(2)	deltheta(3)	
	+1.1484388819926596E-003	+2.7855107968653725E-006	+3.6566017036804425E-006	[rad]
EulAngT	theta(1)	theta(2)	theta(3)	[rad]
Mean	+1.1224204036402235E-002	-1.9531841028166954E-003	-1.2349871331074811E-003	
SigmaT	+1.9014622197686758E-004	+3.1721724760892415E-007	+2.6428140677021008E-007	

	qR(1)	qR(2)	qR(3)	qR(4)
--	-------	-------	-------	-------

ASFILE:	+7.0861761923879385E-004	+1.2695450568571687E-003	-1.6060027701314539E-004	+9.9999892711639404E-001
Estim:	+6.8991226272108609E-004	+1.2689870660293101E-003	-1.5917969253863672E-004	+9.9999894417680346E-001
DelThetaR	delthetaR(1)	delthetaR(2)	delthetaR(3)	

EulAngR	-3.7414126522737658E-005	-1.1199663717489069E-006	+2.7944885593243469E-006	[rad]
Mean	angR(1)	angR(2)	angR(3)	[rad]
SigmaR	+1.3794239555289603E-003	+2.5381938178045921E-003	-3.1660909462448672E-004	
	+6.3261866006767128E-005	+1.8436315185217361E-006	+1.8481905988692224E-006	

Initial Gyro Bias	Bg0(1)	Bg0(2)	Bg0(3)	
	+3.7006947195550310E-007	+1.7281990949413739E-007	-3.4789076153174392E-007	
Gyro Bias Correction	Bg(1)	Bg(2)	Bg(3)	
	-2.5872088761762044E-007	+2.0155971189499628E-009	+6.7120277627108987E-009	
Total Gyro Bias	BgT(1)	BgT(2)	BgT(3)	
	+1.1134858433788266E-007	+1.7483550661308734E-007	-3.4117873376903302E-007	

Initial Gyro Bias Rate	Cg0(1)	Cg0(2)	Cg0(3)	
	+0.0000000000000000E+000	+0.0000000000000000E+000	+0.0000000000000000E+000	
Gyro Bias Rate Correction	Cg(1)	Cg(2)	Cg(3)	
	+5.7580352677504936E-010	+6.8525878136945980E-013	+2.2281740025494148E-013	
Total Gyro Bias Rate	CgT(1)	CgT(2)	CgT(3)	
	+5.7580352677504936E-010	+6.8525878136945980E-013	+2.2281740025494148E-013	

OFFSET	NF	Delta_CW	Delta_CV	
1	96	+0.000	-64.000	pixels
OFFSET FRAME NAME: MIPS_24um_plusY_edge				
qT	qT(1)	qT(2)	qT(3)	qT(4)
WAS (FTB)	+5.0368688350518696E-003	-9.8265590121642096E-004	-1.0088615259627000E-003	+9.9998632317554204E-001
IS (EST)	+5.6110671539182852E-003	-9.7946352952275341E-004	-1.0213076092609732E-003	+9.9998325661350740E-001

DelTheta	deltheta(1)	deltheta(2)	deltheta(3)	
Units	rad	rad	rad	
	+1.1483808877564383E-003	+7.4267853266082426E-006	-2.6054391378638152E-005	
EulAngT	theta(1)	theta(2)	theta(3)	[rad]
Mean	+1.1224204036402235E-002	-1.9474342397524350E-003	-2.0535780269826279E-003	
sSigmaT	+1.7214162023354029E-004	+3.6554541566495038E-007	+3.1348055652098924E-007	
SigmaT	+1.9014606023343551E-004	+4.0377812484154275E-007	+3.4626775733482366E-007	

OFFSET	NF	Delta_CW	Delta_CV	
2	99	+25.000	+0.000	pixels
OFFSET FRAME NAME: MIPS_24um_small_FOV1				
qT	qT(1)	qT(2)	qT(3)	qT(4)
WAS (FTB)	+5.0371586372862228E-003	-1.1314889056829706E-003	-6.1649671362086034E-004	+9.9998648325740958E-001
IS (EST)	+5.6113692458992339E-003	-1.1314119880571087E-003	-6.1307974382115234E-004	+9.9998342815035057E-001

DelTheta	deltheta(1)	deltheta(2)	deltheta(3)	
Units	rad	rad	rad	
	+1.1484441756856388E-003	+8.8616555161973839E-007	+5.5303893085642961E-006	
EulAngT	theta(1)	theta(2)	theta(3)	[rad]
Mean	+1.1224204036402235E-002	-2.2559079567268077E-003	-1.2388401779613440E-003	
sSigmaT	+1.7214175864120590E-004	+2.8944695313479735E-007	+2.3626665952840333E-007	
SigmaT	+1.9014621311727782E-004	+3.1972045871582916E-007	+2.6097799249763945E-007	

OFFSET	NF	Delta_CW	Delta_CV	
3	100	-25.500	+0.000	pixels
OFFSET FRAME NAME: MIPS_24um_small_FOV2				
qT	qT(1)	qT(2)	qT(3)	qT(4)
WAS (FTB)	+5.0373539303327245E-003	-8.2765014547835373E-004	-6.1226286617559059E-004	+9.9998678251004891E-001
IS (EST)	+5.6115628575882535E-003	-8.2639184354550807E-004	-6.1113842514605725E-004	+9.9998372684191295E-001

DelTheta	deltheta(1)	deltheta(2)	deltheta(3)	
Units	rad	rad	rad	
	+1.1484338459211063E-003	+3.2252379296789112E-006	+1.2837975592485087E-006	
EulAngT	theta(1)	theta(2)	theta(3)	[rad]
Mean	+1.1224204036402237E-002	-1.6458986508243068E-003	-1.2315336389445149E-003	
sSigmaT	+1.7214175861783213E-004	+2.8599450302392234E-007	+2.4846389972227150E-007	
SigmaT	+1.9014621309145936E-004	+3.1590691388079886E-007	+2.7445095252577478E-007	

```

OFFSET      NF      Delta_CW      Delta_CV
  4         103         +2.500         +0.000      pixels
OFFSET FRAME NAME: MIPS_24um_large_FOV1
qT          qT(1)          qT(2)          qT(3)          qT(4)
WAS(FTB)   +5.0372461391393897E-003 -9.9611521251996506E-004 -6.1461035168427895E-004 +9.9998662799056104E-001
IS (EST)    +5.6114561919301392E-003 -9.9514611025026804E-004 -6.1210027344367219E-004 +9.9998357315351960E-001

```

```

DelTheta    deltheta(1)      deltheta(2)      deltheta(3)
Units        rad              rad              rad
              +1.1484394024993995E-003 +2.6609929041932651E-006 +3.8641409633610703E-006
EulAngT      theta(1)        theta(2)        theta(3)          [rad]
Mean         +1.1224204036402237E-002 -1.9833912789275049E-003 -1.2353516187847125E-003
sSigmaT      +1.7214176657237559E-004 +2.8735661772425966E-007 +2.3857896225658666E-007
SigmaT       +1.9014622187797536E-004 +3.1741149332825502E-007 +2.6353214095537202E-007

```

```

OFFSET      NF      Delta_CW      Delta_CV
  5         104         -2.000         +0.000      pixels
OFFSET FRAME NAME: MIPS_24um_large_FOV2
qT          qT(1)          qT(2)          qT(3)          qT(4)
WAS(FTB)   +5.0372635449913205E-003 -9.6904047066332906E-004 -6.1423307818932811E-004 +9.9998665473808712E-001
IS (EST)    +5.6114734459713194E-003 -9.6796348346404935E-004 -6.1192646661012776E-004 +9.9998359984474705E-001

```

```

DelTheta    deltheta(1)      deltheta(2)      deltheta(3)
Units        rad              rad              rad
              +1.1484384680876772E-003 +2.8746584471863345E-006 +3.4873446175482230E-006
EulAngT      theta(1)        theta(2)        theta(3)          [rad]
Mean         +1.1224204036402235E-002 -1.9290287955567775E-003 -1.2346988755727946E-003
sSigmaT      +1.7214176662010884E-004 +2.8704199725561739E-007 +2.3983457392590105E-007
SigmaT       +1.9014622193070106E-004 +3.1706396643441048E-007 +2.6491907812826113E-007

```

```

              q(1)          q(2)          q(3)          q(4)
PCRS1A: +5.3377191730804340E-007 +3.7444181445836429E-004 -1.4255121007937610E-003 +9.9999891385355677E-001
PCRS2A: -5.2784857378083422E-007 +3.8463011681657313E-004 +1.3723523317471205E-003 +9.9999898435372037E-001

```

```

***** CS-FILE PARAMETERS: ***** ***** AS-FILE PARAMETERS: *****
Row (01) PIX2RADX: +1.2087416876100000E-005 Row (1) TASTART: +7.5024450039074707E+008
Row (02) PIX2RADY: +1.2595908372599999E-005 Row (2) TASTOP: +7.5025000029077756E+008
Row (03) CX0: +6.4500000000000000E+001 Row (3) S/C TIME: +7.5023110219073486E+008
Row (04) CY0: +6.4500000000000000E+001 Row (4) QR1: +7.0861761923879385E-004
Row (05) BETA0: +2.8047410000000001E-006 Row (5) QR2: +1.2695450568571687E-003
Row (06) GAMMA_E0: +2.0070000000000000E+003 Row (6) QR3: -1.6060027701314539E-004
Row (07) D11: -1.0000000000000000E+000 Row (7) QR4: +9.9999892711639404E-001
Row (08) D12: +0.0000000000000000E+000
Row (09) D21: +0.0000000000000000E+000
Row (10) D22: -1.0000000000000000E+000
Row (11) DG: -1.0000000000000000E+000

```

```

INITIAL STA-TO-PCRS ALIGNMENT (R) KNOWLEDGE (1-SIGMA)
      SIGMA(X)      SIGMA(Y)      SIGMA(Z)
3.72482062E+000 3.96855444E-001 3.97055348E-001 [arcsec]

```

```

PIX2RADX = 1.208741687610E-005[rad/pixel]
XPIXSIZE = 2.4932[arcsec]
PIX2RADY = 1.259590837260E-005[rad/pixel]
YPIXSIZE = 2.5981[arcsec]
CX0 = 64.5[pixel] = 160.81[arcsec]
CY0 = 64.5[pixel] = 167.58[arcsec]

```

```

NOMINAL BETA0 = 2.804741000000E-006[rad/encoder unit]
ENCODER UNIT SIZE = 0.58[arcsec]
GAMMA_E0 = 2007.00[encoder unit] = 1161.09[arcsec]

```

```

      | -1 | +0 |
FLIP MATRIX D = |----|----| and DG = -1
      | +0 | -1 |

```

3.3 IPF EXECUTION LOG

```
*****
IPF EXECUTION-LOG FILE NAME:  LG101095.dat
INSTRUMENT TYPE:              MIPS_24um_center
IPF FILTER EXECUTION DATE:    17-Oct-2003    TIME: 17:22
IPF FILTER VERSION USED:      IPF.V2.0.0D
*****

----- Loading & Preparing Input Files -----
AAFILE:  AA101095 Loaded!      AAFILE dimension = 55000 X 21
ASFILE:  AS101095 Loaded!
CAFILE:  CA105095 Loaded!      CAFILE dimension = 227 X 15
CBFILE:  CB101095 Loaded!      CBFILE dimension = 63 X 15
CCFILE:  CC101095 Created!     CCFILE dimension = 290 X 19
CSFILE:  CS105095 Loaded!
Loading Input Files Completed!
-----

----- Selected Mask Vectors -----
index =   1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20
-----
mask1 = [ 1  1  1  1  1  1  1  0  0  0  0  1  1  1  1  1  1  1 ]
mask2 = [ 1  1  1  1  1  1  1  1  0  0  0  0  0  0  1  1  1  1  1  1 ]
-----

----- Selected Initial Gyro Bias Parameters -----
User Entered 1 : Use AFILE database - from S/C filter
IPF Linearized Using Following Nominal Gyro Bias Estimates
bg0 = [+3.7006947195550310E-007 +1.7281990949413739E-007 -3.4789076153174392E-007 ]
cg0 = [+0.0000000000000000E+000 +0.0000000000000000E+000 +0.0000000000000000E+000 ]
-----

----- Gyro Pre-Processor Run Completed -----
AGFILE CREATED:  AG101095.m    ACFILE CREATED:  AC101095.m
-----

Total Gyro Preprocessor Execution Time: 29 seconds

FRAME TABLE ENTRIES FOR PCRS LOADED TO TPCRS
q_PCRS4 = [ +5.3377191730804340E-007      q_PCRS5 = [ +7.3379987833742897E-007
+3.7444181445836429E-004                  +5.2236196154513707E-004
-1.4255121007937610E-003                  -1.4047712280184723E-003
+9.9999891385355677E-001 ];               +9.9999887687698918E-001 ];
q_PCRS8 = [ -5.2784857378083422E-007      q_PCRS9 = [ -7.1963421681856818E-007
+3.8463011681657313E-004                  +5.3239763239987400E-004
+1.3723523317471205E-003                  +1.3516841804518383E-003
+9.9999898435372037E-001 ];               +9.9999894475050310E-001 ];
-----

----- Initial Conditions for State -----   ----- Initial Square-Root Cov (diag) -----
p1(01) = a00 = +0.0000000000000000E+000   Sigma_initial(01,01) = 1.0000000000000000E+000
p1(02) = b00 = +0.0000000000000000E+000   Sigma_initial(02,02) = 1.0000000000000000E+000
p1(03) = c00 = +0.0000000000000000E+000   Sigma_initial(03,03) = 1.0000000000000000E+000
p1(04) = a10 = +0.0000000000000000E+000   Sigma_initial(04,04) = 1.0000000000000000E+002
p1(05) = b10 = +0.0000000000000000E+000   Sigma_initial(05,05) = 1.0000000000000000E+002
p1(06) = c10 = +0.0000000000000000E+000   Sigma_initial(06,06) = 1.0000000000000000E+002
p1(07) = d10 = +0.0000000000000000E+000   Sigma_initial(07,07) = 1.0000000000000000E+002
p1(08) = a20 = +0.0000000000000000E+000   Sigma_initial(08,08) = 9.9999000000000000E+004
p1(09) = b20 = +0.0000000000000000E+000   Sigma_initial(09,09) = 9.9999000000000000E+004
```

```

p1(10) = c20 = +0.000000000000000E+000 Sigma_initial(10,10) = 9.999900000000000E+004
p1(11) = d20 = +0.000000000000000E+000 Sigma_initial(11,11) = 9.999900000000000E+004
p1(12) = a01 = +0.000000000000000E+000 Sigma_initial(12,12) = 1.000000000000000E+004
p1(13) = b01 = +0.000000000000000E+000 Sigma_initial(13,13) = 1.000000000000000E+004
p1(14) = c01 = +0.000000000000000E+000 Sigma_initial(14,14) = 1.000000000000000E+004
p1(15) = d01 = +0.000000000000000E+000 Sigma_initial(15,15) = 1.000000000000000E+004
p1(16) = e01 = +0.000000000000000E+000 Sigma_initial(16,16) = 1.000000000000000E+004
p1(17) = f01 = +0.000000000000000E+000 Sigma_initial(17,17) = 1.000000000000000E+004
-----
p2f(01) = am1 = +0.000000000000000E+000
p2f(02) = am2 = +0.000000000000000E+000 Sigma_initial(18,18) = 1.000000000000000E-001
p2f(03) = am3 = +1.000000000000000E+000
p2f(04) = beta = +1.000000000000000E+000 Sigma_initial(19,19) = 1.000000000000000E-001
p2f(05) = qT1 = +5.0372558129468141E-003 Sigma_initial(20,20) = 1.000000000000000E-001
p2f(06) = qT2 = -9.8107368935810278E-004 Sigma_initial(21,21) = 1.000000000000000E-002
p2f(07) = aT3 = -6.1440075534372450E-004 Sigma_initial(22,22) = 1.000000000000000E-002
p2f(08) = qT4 = +9.9998664294079587E-001
p2f(09) = qR1 = +7.0861761923879385E-004 Sigma_initial(23,23) = 1.8058439939781077E-004
p2f(10) = qR2 = +1.2695450568571687E-003 Sigma_initial(24,24) = 1.9240094872549512E-005
p2f(11) = qR3 = -1.6060027701314539E-004 Sigma_initial(25,25) = 1.9249786506380275E-005
p2f(12) = qR4 = +9.9999892711639404E-001
p2f(13) = brx = +0.000000000000000E+000 Sigma_initial(26,26) = 9.999900000000000E+004
p2f(14) = bry = +0.000000000000000E+000 Sigma_initial(27,27) = 9.999900000000000E+004
p2f(15) = brz = +0.000000000000000E+000 Sigma_initial(28,28) = 9.999900000000000E+004
p2f(16) = crx = +0.000000000000000E+000 Sigma_initial(29,29) = 9.999900000000000E+004
p2f(17) = cry = +0.000000000000000E+000 Sigma_initial(30,30) = 9.999900000000000E+004
p2f(18) = crz = +0.000000000000000E+000 Sigma_initial(31,31) = 9.999900000000000E+004
p2f(19) = bgx = +0.000000000000000E+000 Sigma_initial(32,32) = 2.4218939210462581E-004
p2f(20) = bgy = +0.000000000000000E+000 Sigma_initial(33,33) = 2.4218939210462581E-004
p2f(21) = bgz = +0.000000000000000E+000 Sigma_initial(34,34) = 2.4218939210462581E-004
p2f(22) = cgx = +0.000000000000000E+000 Sigma_initial(35,35) = 5.8655701648008190E-008
p2f(23) = cgy = +0.000000000000000E+000 Sigma_initial(36,36) = 5.8655701648008190E-008
p2f(24) = cgz = +0.000000000000000E+000 Sigma_initial(37,37) = 5.8655701648008190E-008
-----

```

```

----- IPF KALMAN FILTER STARTED -----
Iteration#001: |dp|= +2.966076716407E+001 RMS(|Res|)=+1.265415087509E-005
Iteration#002: |dp|= +2.796316773419E-002 RMS(|Res|)=+3.456606243431E-006
Iteration#003: |dp|= +3.162494779683E-003 RMS(|Res|)=+1.582280095041E-006
Iteration#004: |dp|= +1.369966761393E-003 RMS(|Res|)=+1.567360842468E-006
Iteration#005: |dp|= +6.627798211342E-005 RMS(|Res|)=+1.567240479830E-006
Iteration#006: |dp|= +1.537032687073E-004 RMS(|Res|)=+1.567272218916E-006
Iteration#007: |dp|= +4.777985097174E-005 RMS(|Res|)=+1.567290980766E-006
Iteration#008: |dp|= +6.576388142151E-006 RMS(|Res|)=+1.567294687786E-006
Iteration#009: |dp|= +7.554685116238E-006 RMS(|Res|)=+1.567293628780E-006
Iteration#010: |dp|= +1.145412072387E-006 RMS(|Res|)=+1.567292877854E-006
Iteration#011: |dp|= +6.326034598486E-007 RMS(|Res|)=+1.567292810999E-006
Iteration#012: |dp|= +3.03562216614E-007 RMS(|Res|)=+1.567292886075E-006
Iteration#013: |dp|= +1.277894960067E-009 RMS(|Res|)=+1.567292913687E-006
Iteration#014: |dp|= +3.707625674750E-008 RMS(|Res|)=+1.567292911591E-006
Iteration#015: |dp|= +9.649273167272E-009 RMS(|Res|)=+1.567292907658E-006
Iteration#016: |dp|= +2.079610934170E-009 RMS(|Res|)=+1.567292906906E-006
Iteration#017: |dp|= +1.711158844394E-009 RMS(|Res|)=+1.567292907189E-006
Iteration#018: |dp|= +2.308692282719E-010 RMS(|Res|)=+1.567292907360E-006
Iteration#019: |dp|= +1.787751877971E-010 RMS(|Res|)=+1.567292907364E-006
Iteration#020: |dp|= +1.141975856712E-010 RMS(|Res|)=+1.567292907348E-006
Iteration#021: |dp|= +5.025423438211E-011 RMS(|Res|)=+1.567292907340E-006
Iteration#022: |dp|= +6.521105205547E-011 RMS(|Res|)=+1.567292907344E-006
Iteration#023: |dp|= +3.154156733742E-011 RMS(|Res|)=+1.567292907343E-006
Iteration#024: |dp|= +8.533968770825E-011 RMS(|Res|)=+1.567292907345E-006
Iteration#025: |dp|= +9.116059066458E-011 RMS(|Res|)=+1.567292907349E-006
Iteration#026: |dp|= +9.396738991827E-011 RMS(|Res|)=+1.567292907339E-006
Iteration#027: |dp|= +4.053576142808E-011 RMS(|Res|)=+1.567292907345E-006
Iteration#028: |dp|= +5.294394587945E-011 RMS(|Res|)=+1.567292907343E-006
Iteration#029: |dp|= +8.397180313523E-011 RMS(|Res|)=+1.567292907344E-006
Iteration#030: |dp|= +8.304556513363E-011 RMS(|Res|)=+1.567292907340E-006
IPF Kalman Filter Completed with Error |dp1| + |dp2| = +8.3045565133631253E-011
-----

```

```

----- IPF LEAST SQUARES FILTER STARTED -----
Iteration#001  COND#==+1.865228128523E+009,  |dp|==+2.966033505013E+001
Iteration#002  COND#==+1.865165862804E+009,  |dp|==+2.690530470968E-002
Iteration#003  COND#==+1.865166358625E+009,  |dp|==+1.111978573917E-003
Iteration#004  COND#==+1.865166384568E+009,  |dp|==+2.693657217791E-005
Iteration#005  COND#==+1.865166375430E+009,  |dp|==+3.462578791608E-007
Iteration#006  COND#==+1.865166386861E+009,  |dp|==+4.274701315624E-009
Iteration#007  COND#==+1.865166367133E+009,  |dp|==+1.418976248770E-010
Iteration#008  COND#==+1.865166372979E+009,  |dp|==+5.169610212889E-011
Iteration#009  COND#==+1.865166370063E+009,  |dp|==+9.816561791207E-011
Iteration#010  COND#==+1.865166366390E+009,  |dp|==+4.058561471610E-011
Iteration#011  COND#==+1.865166396021E+009,  |dp|==+4.914871502319E-011
Iteration#012  COND#==+1.865166374323E+009,  |dp|==+7.040235036163E-011
Iteration#013  COND#==+1.865166362226E+009,  |dp|==+8.545258521372E-011
Iteration#014  COND#==+1.865166374577E+009,  |dp|==+3.068233640598E-011
Iteration#015  COND#==+1.865166374874E+009,  |dp|==+3.475220853001E-011
Iteration#016  COND#==+1.865166366324E+009,  |dp|==+8.128910703838E-011
Iteration#017  COND#==+1.865166383814E+009,  |dp|==+1.207103142958E-010
Iteration#018  COND#==+1.865166370287E+009,  |dp|==+6.143941684038E-011
Iteration#019  COND#==+1.865166375572E+009,  |dp|==+4.785183190720E-011
Iteration#020  COND#==+1.865166376234E+009,  |dp|==+5.303033253302E-011
Iteration#021  COND#==+1.865166375698E+009,  |dp|==+1.089775880866E-010
Iteration#022  COND#==+1.865166380422E+009,  |dp|==+6.170340316229E-011
Iteration#023  COND#==+1.865166386334E+009,  |dp|==+6.145685075551E-011
Iteration#024  COND#==+1.865166384013E+009,  |dp|==+4.239936615428E-011
Iteration#025  COND#==+1.865166386009E+009,  |dp|==+6.740113503972E-011
Iteration#026  COND#==+1.865166379487E+009,  |dp|==+6.213971945248E-011
Iteration#027  COND#==+1.865166363695E+009,  |dp|==+5.369696219896E-011
Iteration#028  COND#==+1.865166376929E+009,  |dp|==+6.078358195406E-011
Iteration#029  COND#==+1.865166386700E+009,  |dp|==+1.134911670933E-010
Iteration#030  COND#==+1.865166378579E+009,  |dp|==+1.229907787848E-010
IPF Least Squares Filter Completed with Error |dp1| + |dp2| = +1.2299077878484463E-010
-----
Total Execution Time: 184 seconds

```

4 COMMENTS

The data set looked clean and filter converged nicely. Comments:

1. The run was performed in normal IPF operating mode. This decision was made based on seeing systematic errors at about 0.4 arcseconds in the observer at centroid times, implying that Lite Mode 3 (observer-based) would not be adequate.
2. This run estimated 27 total parameters consisting of: 3 constant and 6 linear plate scales, 4 Gamma Dependent parameters, 2 mirror parameters, 3 IPF alignment angles, 3 STA-to-PCRS alignment angles, and 3 gyro bias and 3 gyro bias-drift parameters.
3. Amy Mainzer has indicated that the PCRS measurements for this run were based on a simple center-of-mass algorithm which was accurate to about 0.5 arcseconds (looked like .4" average), which will limit the accuracy of this IPF run. The errors on the PCRS appeared mostly systematic and field dependent, being repeatable and larger the further they were located from the center. This will further limit the accuracy of the IPF run.
4. The linear plate scales were helpful in this run to estimate centroids accurately (see quiver plots in Figures 3-28 through 3-32). The constant plate scales were much smaller than the linear terms.
5. The scan mirror parameter estimates indicate that the mirror spin axis is tilted by 0.7 deg and the scan mirror scale factors are off by 4 percent.
6. There were 227 science centroids in the science data set, and 63 PCRS measurements. The data set was coordinated as 7 sandwich maneuvers. The number of science and PCRS centroids was sufficient to identify all 27 parameters.
7. This run was made using BodyFrames_SPC_08a which was a special frame table incorporating the 40 star Stage 2 PAC filter run results.

We recommend updating frames 95, 96, 99, 100, 103 and 104 with the new quaternions listed in the IF file IF101095.dat. This contains adjustments of 0.6 and 0.8 arcseconds in Y and Z, and .07 deg in twist (for the prime frame). In our best judgment, these frames will be accurate to better than 0.3 arcsecond (disregard the accuracies quoted in the the tables).

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