

# KIC 004390625

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004390625-01	OBS	No	2.552800	131.778368	45.1	8.820	7.3	6.4	1.40	6995	1.09	2938.38
004390625-02	OBS	No	1.276435	132.389024	60.3	7.984	9.2	9.3	1.40	6995	1.29	7403.98
004390625-03	OBS	No	75.223800	166.434374	900.8	5.821	8.6	9.9	1.40	6995	5.09	32.28
004390625-04	OBS	No	15.287801	143.491037	275.4	2.651	8.6	6.5	1.40	6995	2.56	270.19
004390625-05	OBS	No	212.739706	191.761958	712.0	4.822	9.5	9.0	1.40	6995	4.65	8.07
004390625-06	OBS	No	30.256104	159.489605	471.5	1.835	8.5	8.0	1.40	6995	3.48	108.74
004390625-07	OBS	No	31.528847	132.957413	702.9	5.557	7.7	9.2	1.40	6995	5.85	102.92
004390625-08	OBS	No	40.289721	146.290226	580.3	5.414	8.1	8.1	1.40	6995	3.58	74.22
004390625-09	OBS	No	638.187757	153.507721	339.7	5.000	7.2	-1.0	1.40	6995	2.61	1.87

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004390625-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004390625-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—SAME_NTL_PERIOD
004390625-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-05	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST
004390625-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004390625-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
004390625-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_NOFITS

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

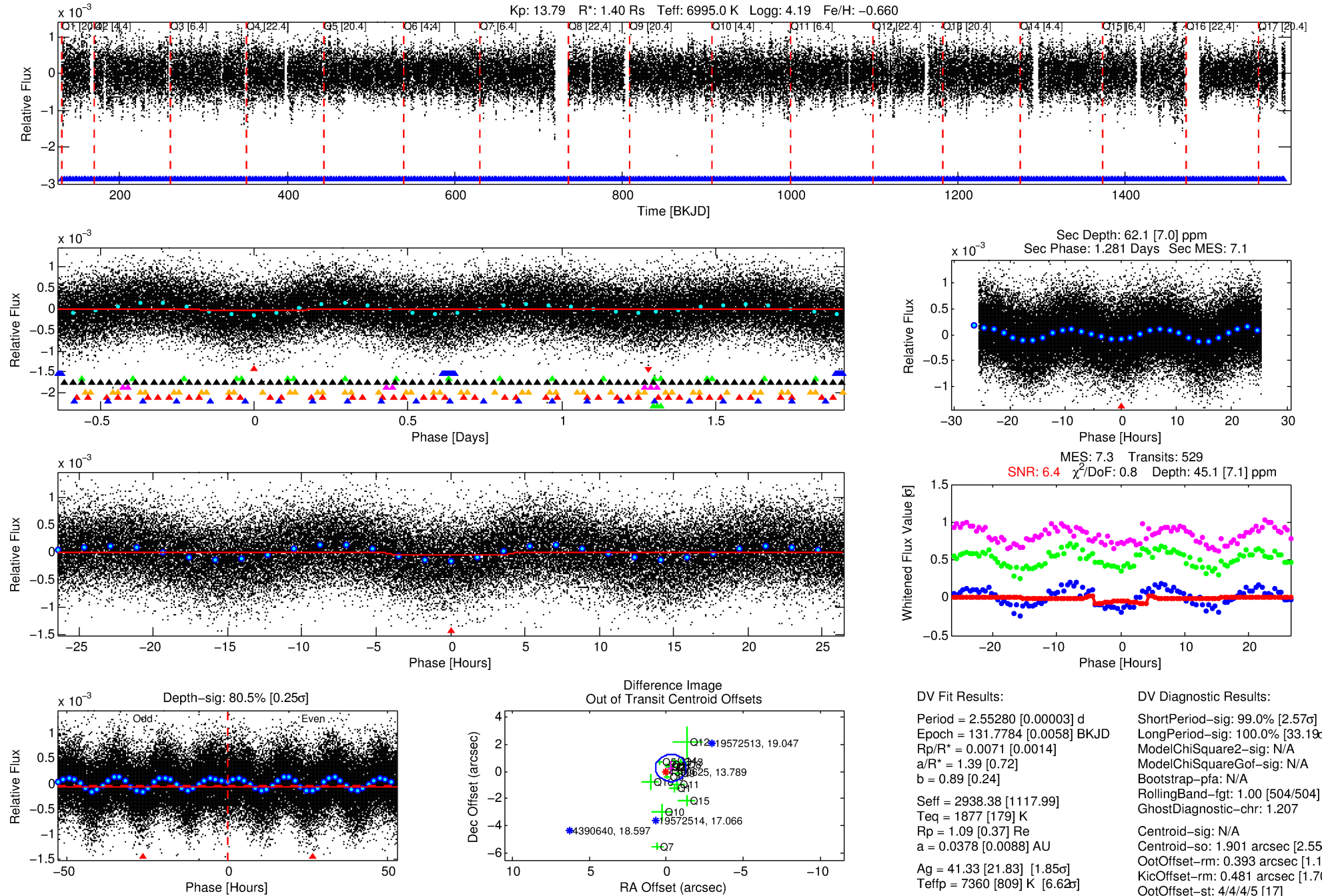
Ephemeris Match Information For 004390625-01

No Significant Match Found



# DV One-Page Summary

KIC: 4390625 Candidate: 1 of 9 Period: 2.553 d



## DV Fit Results:

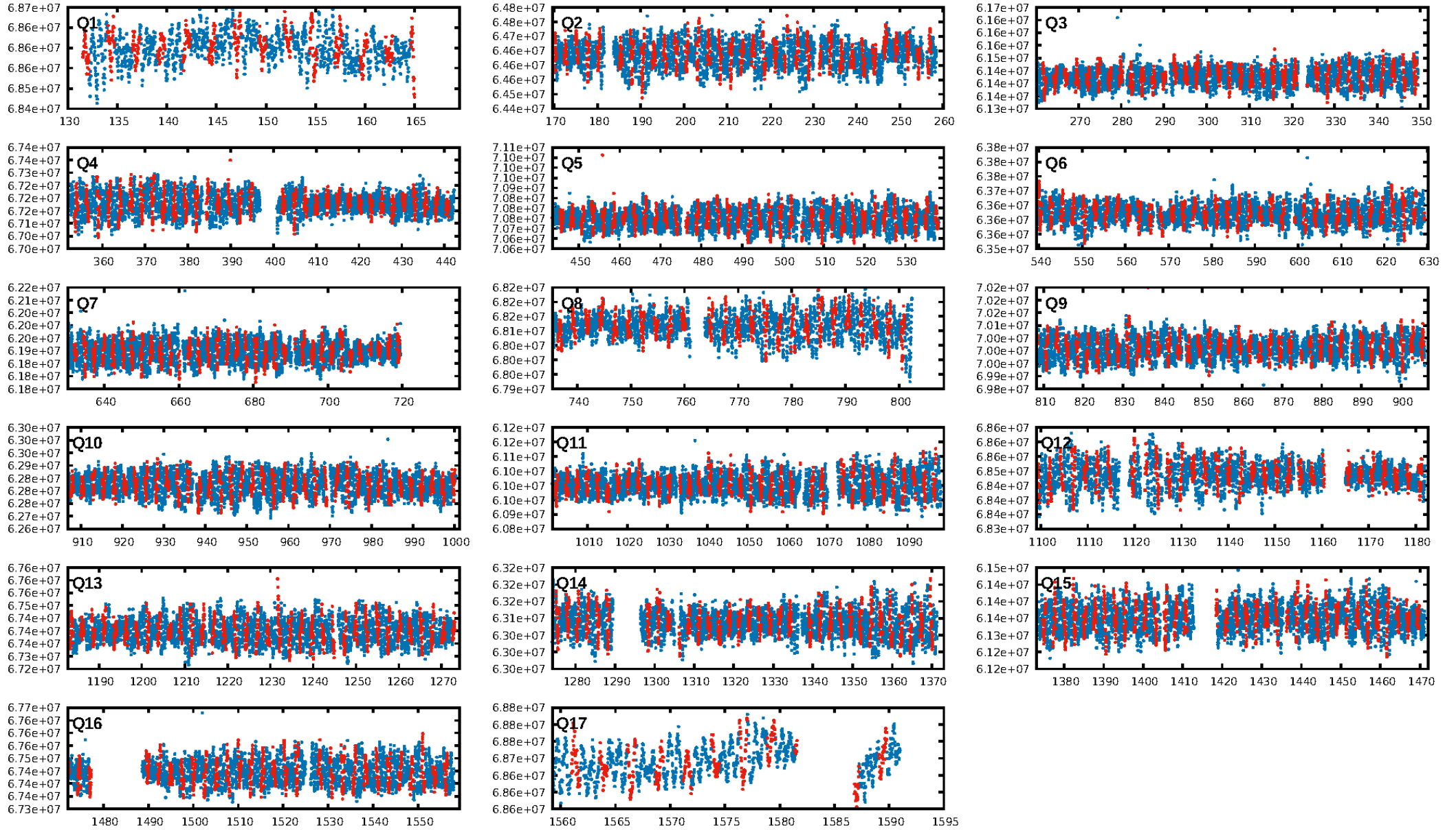
Period = 2.55280 [0.00003] d  
Epoch = 131.7784 [0.0058] BKJD  
Rp/R\* = 0.0071 [0.0014]  
a/R\* = 1.39 [0.72]  
b = 0.89 [0.24]  
Seff = 2938.38 [1117.99]  
Teq = 1877 [179] K  
Rp = 1.09 [0.37] Re  
a = 0.0378 [0.0088] AU  
Ag = 41.33 [21.83] [1.85 $\sigma$ ]  
Teffp = 7360 [809] K [6.62 $\sigma$ ]

## DV Diagnostic Results:

ShortPeriod-sig: 99.0% [2.57 $\sigma$ ]  
LongPeriod-sig: 100.0% [33.19 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [504/504]  
GhostDiagnostic-chr: 1.207  
Centroid-sig: N/A  
Centroid-so: 1.901 arcsec [2.55 $\sigma$ ]  
OotOffset-rm: 0.393 arcsec [1.19 $\sigma$ ]  
KicOffset-rm: 0.481 arcsec [1.70 $\sigma$ ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.82 [14/17]  
DiffImageOverlap-fno: 0.00 [0/17]

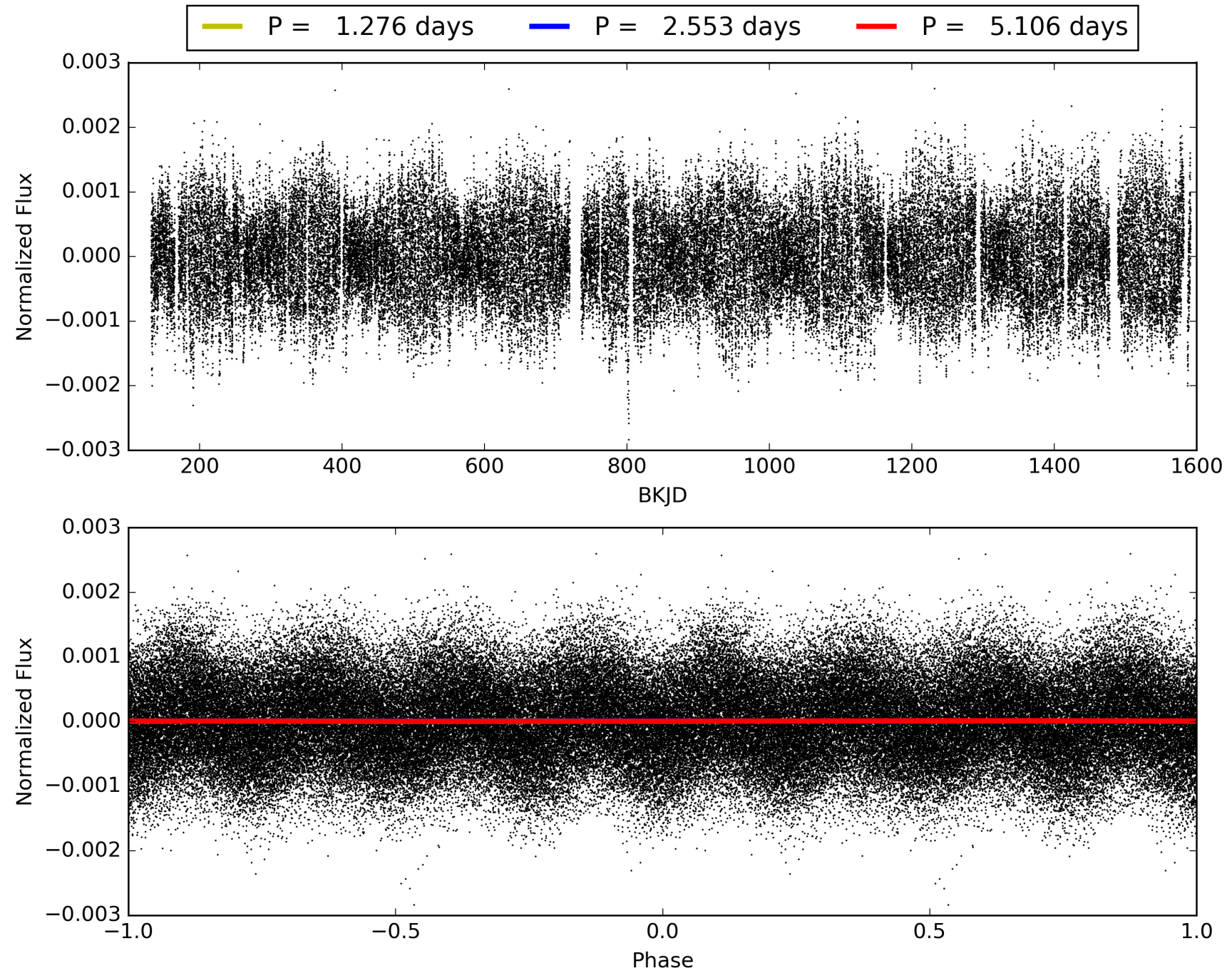


# TCE 004390625-01, PDC Light Curves





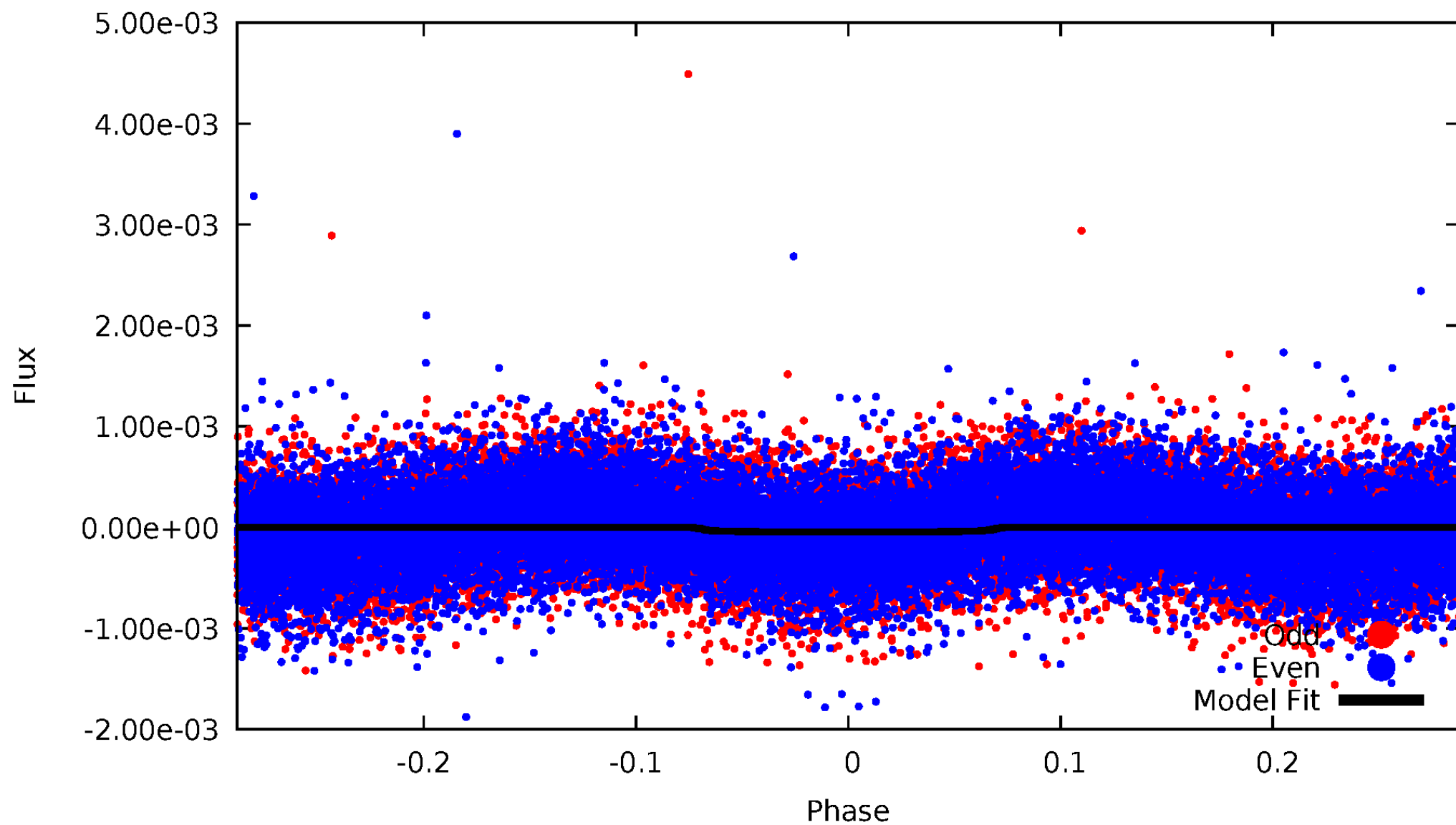
TCE 004390625-01





# DV Odd/Even

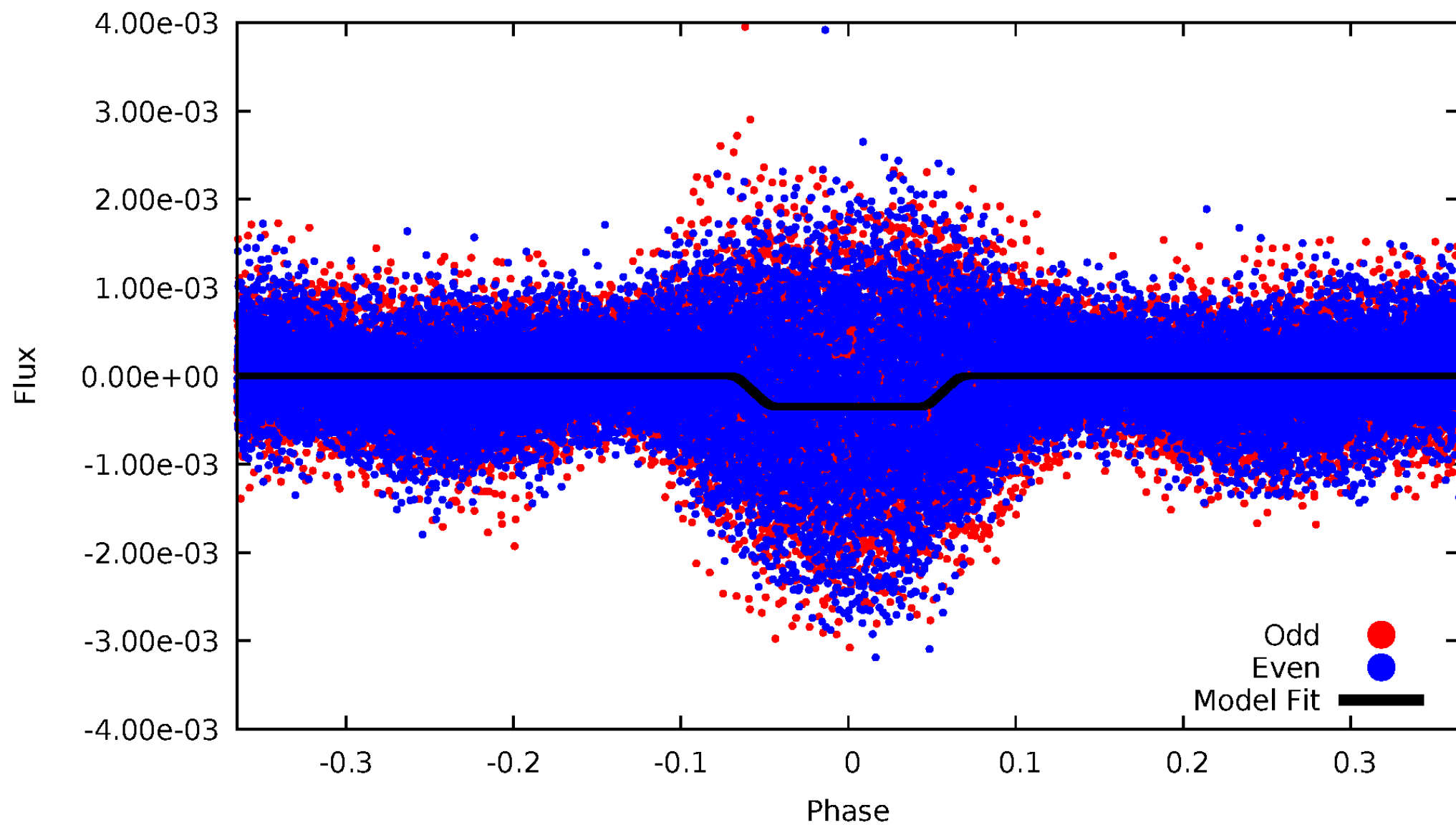
TCE 004390625-01





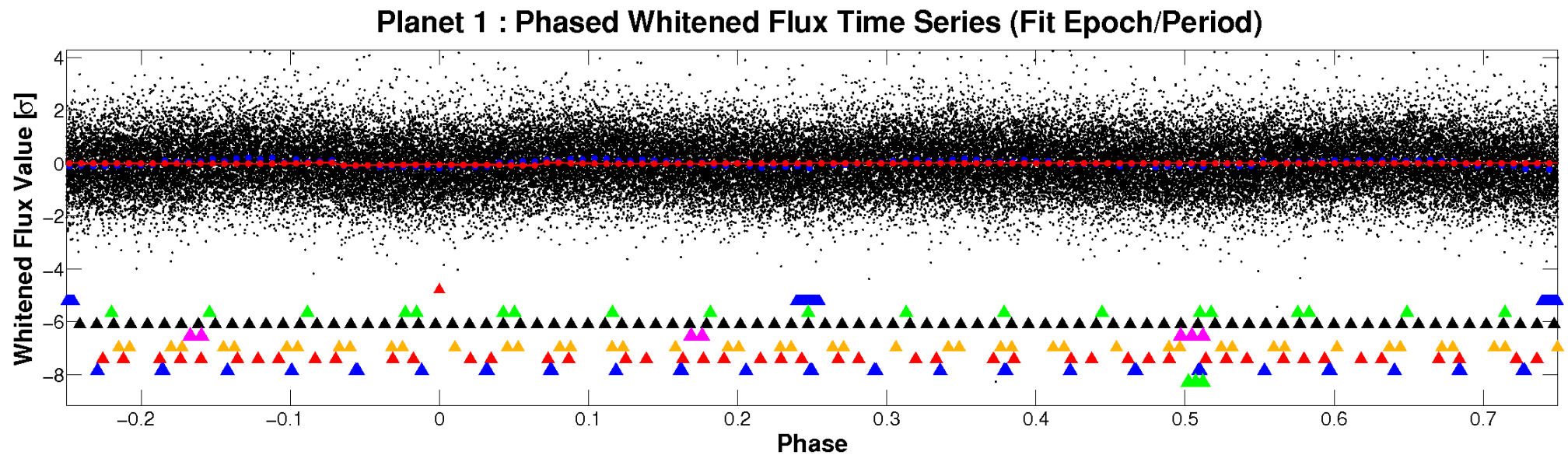
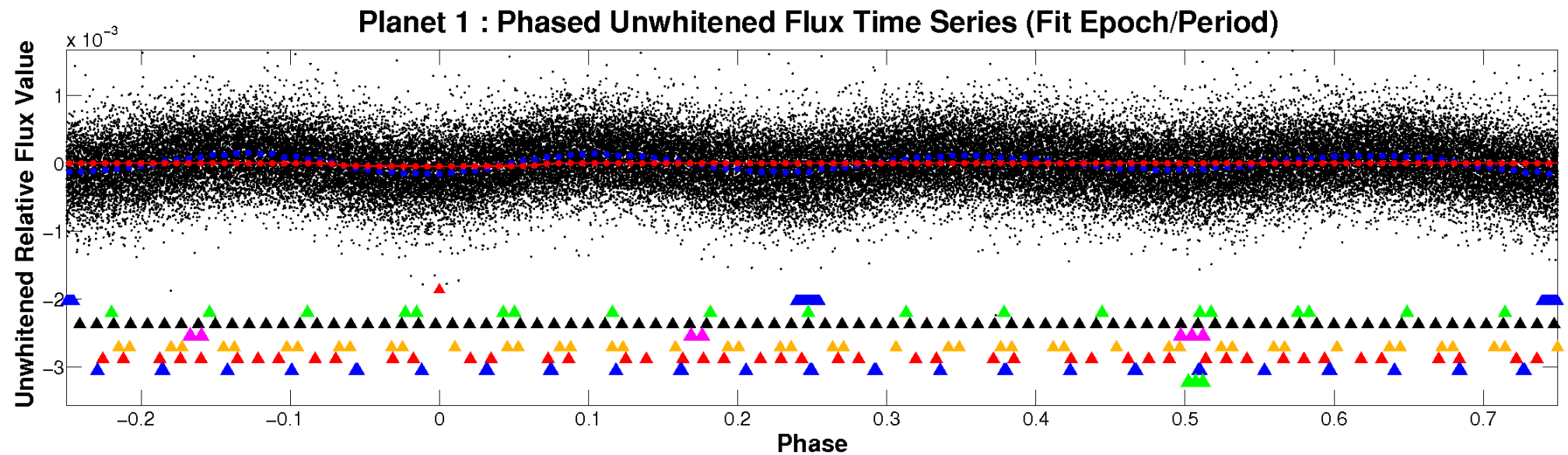
# ALT Odd/Even

TCE 004390625-01





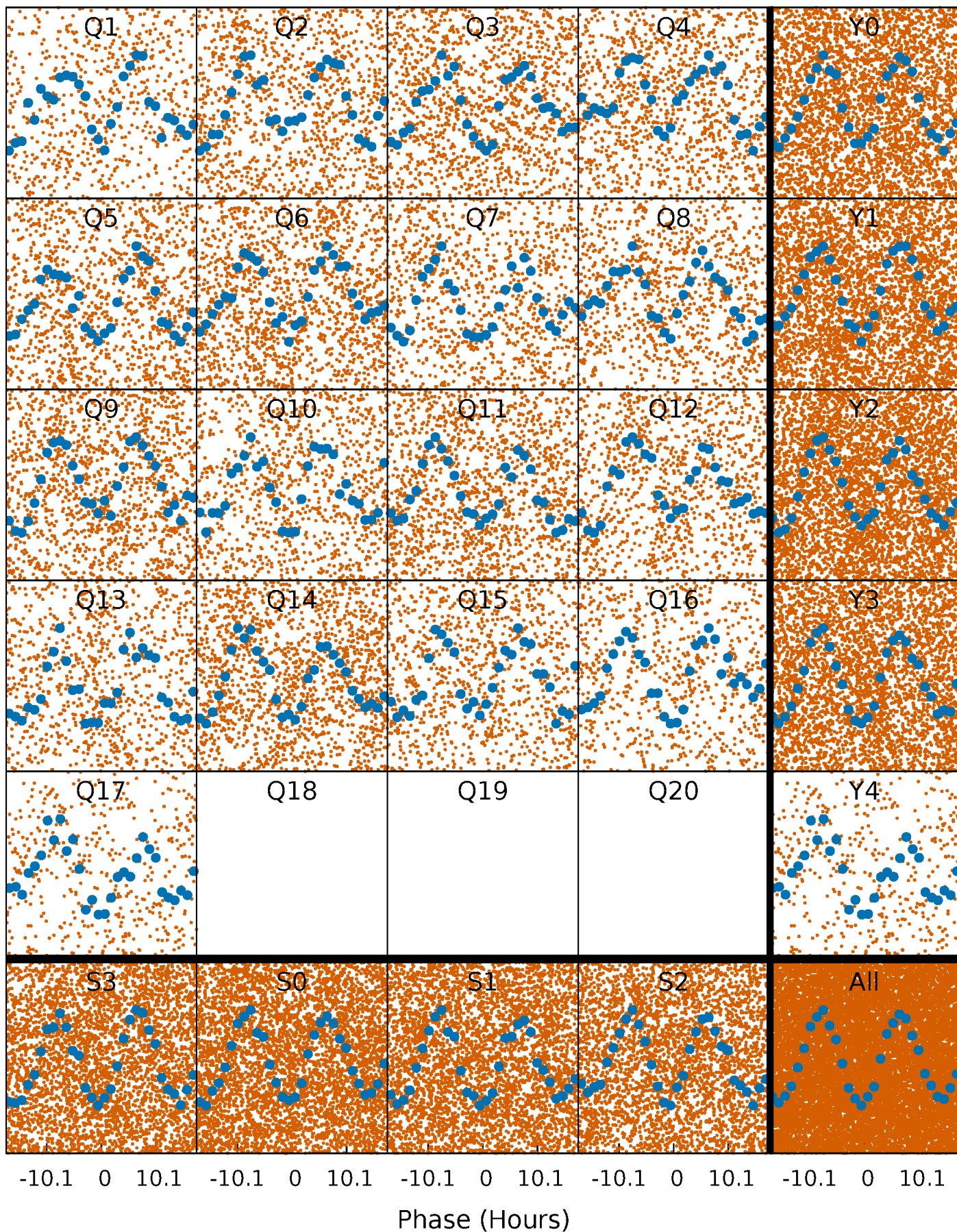
# Non-Whitened Vs. Whitened Light Curve





# PDC Quarter-Phased Transit Curves

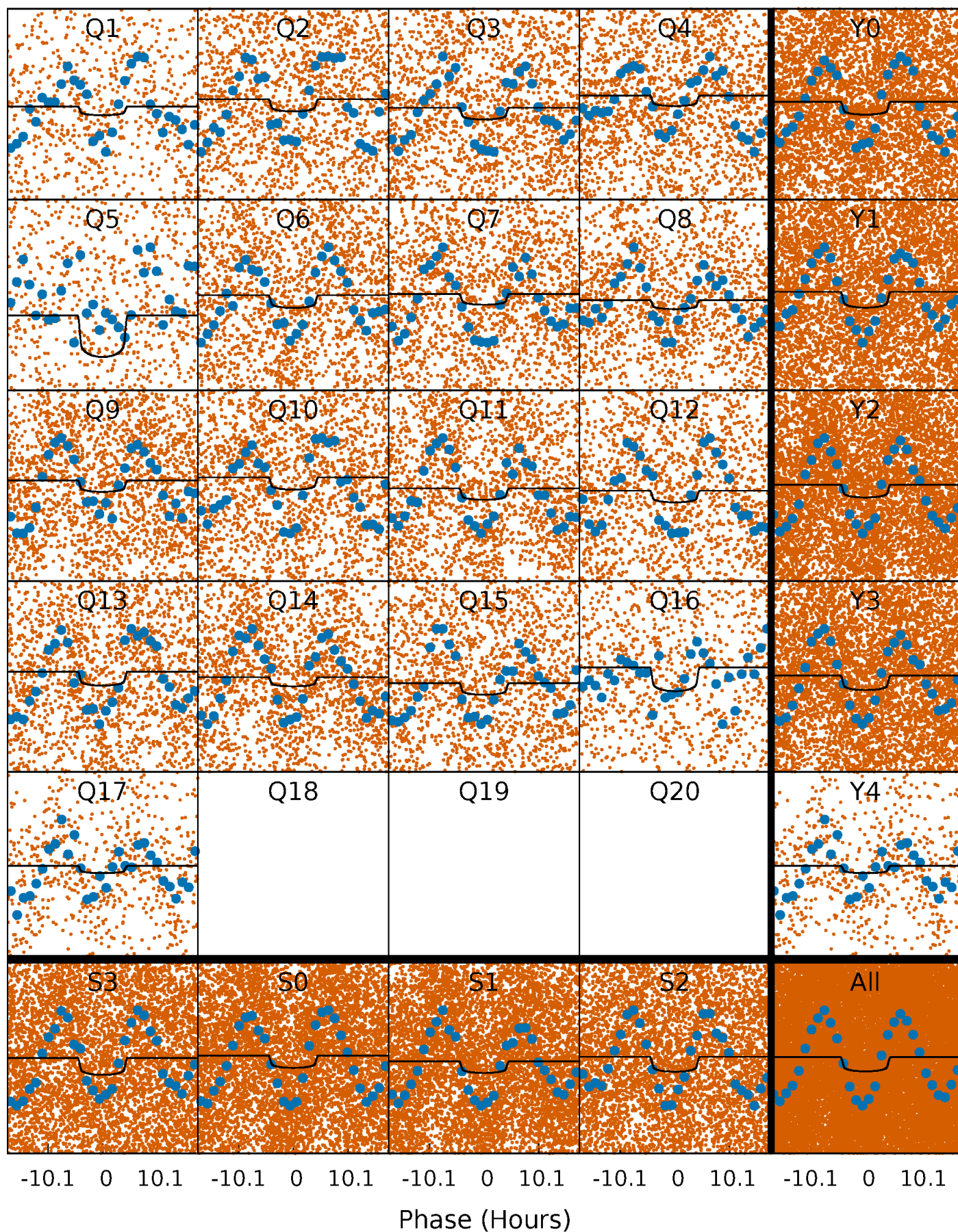
TCE 004390625-01 P= 2.552800 Days  $T_0=131.778368$  (BKJD)





# DV Quarter-Phased Transit Curves

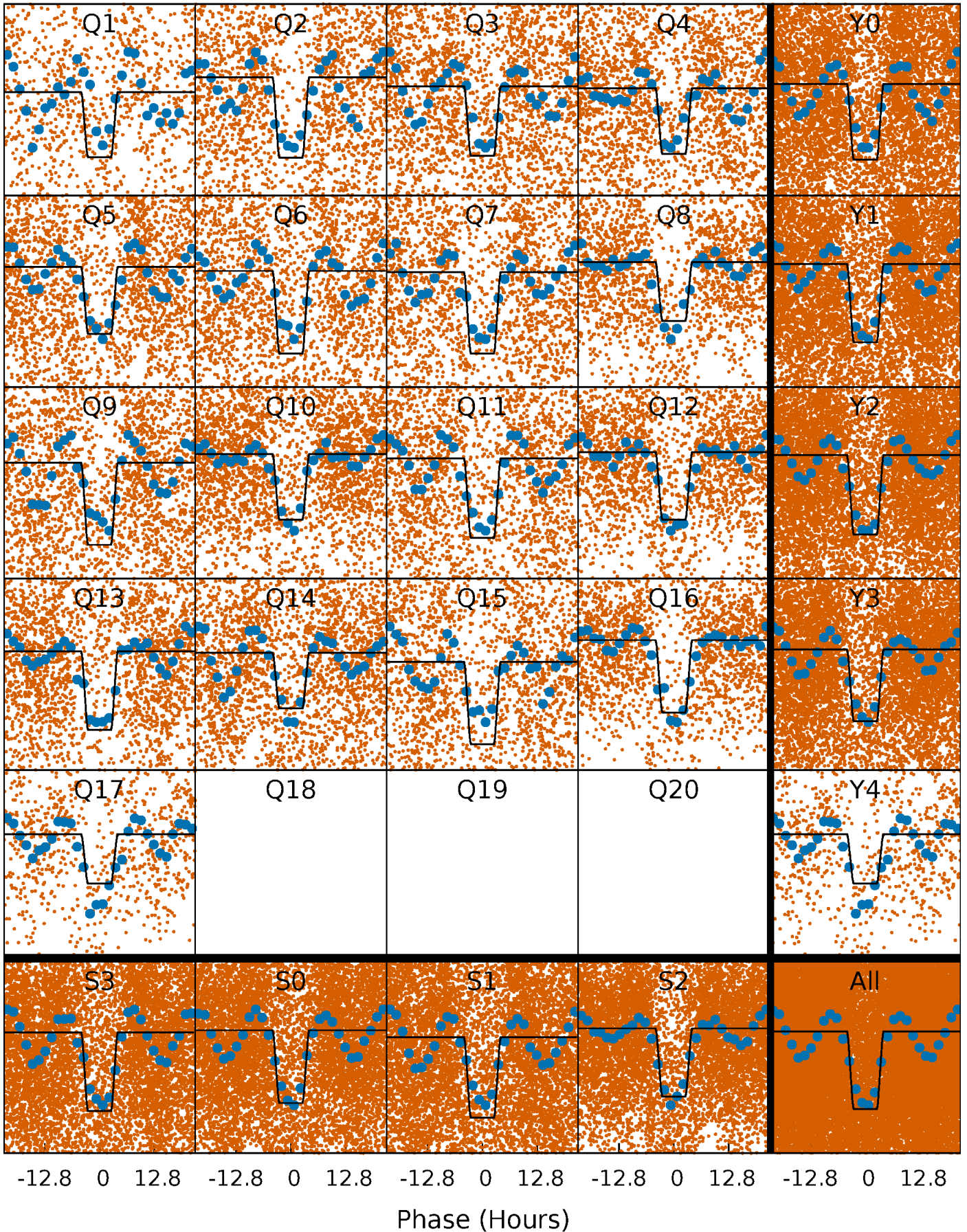
TCE 004390625-01 P= 2.552800 Days  $T_0=131.778368$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 004390625-01 P= 2.552833 Days  $T_0=131.738906$  (BKJD)

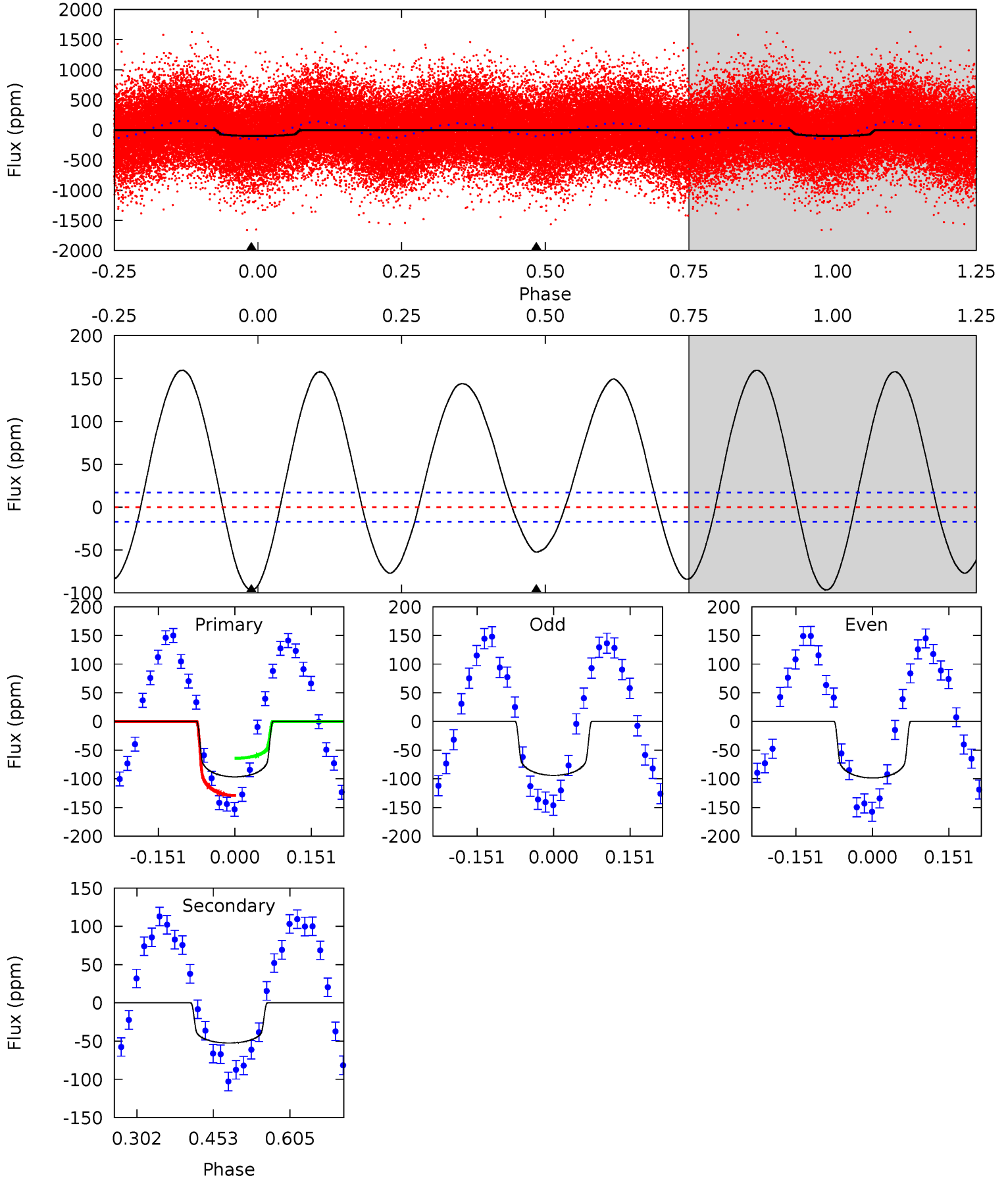




# DV Model-Shift Uniqueness Test

004390625-01, P = 2.552800 Days, E = 129.225568 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
25.3	13.8	0	0	4.48	1.44	18.0	25.3	25.3	13.8	13.8	0.59	0.93	0.62	8.73

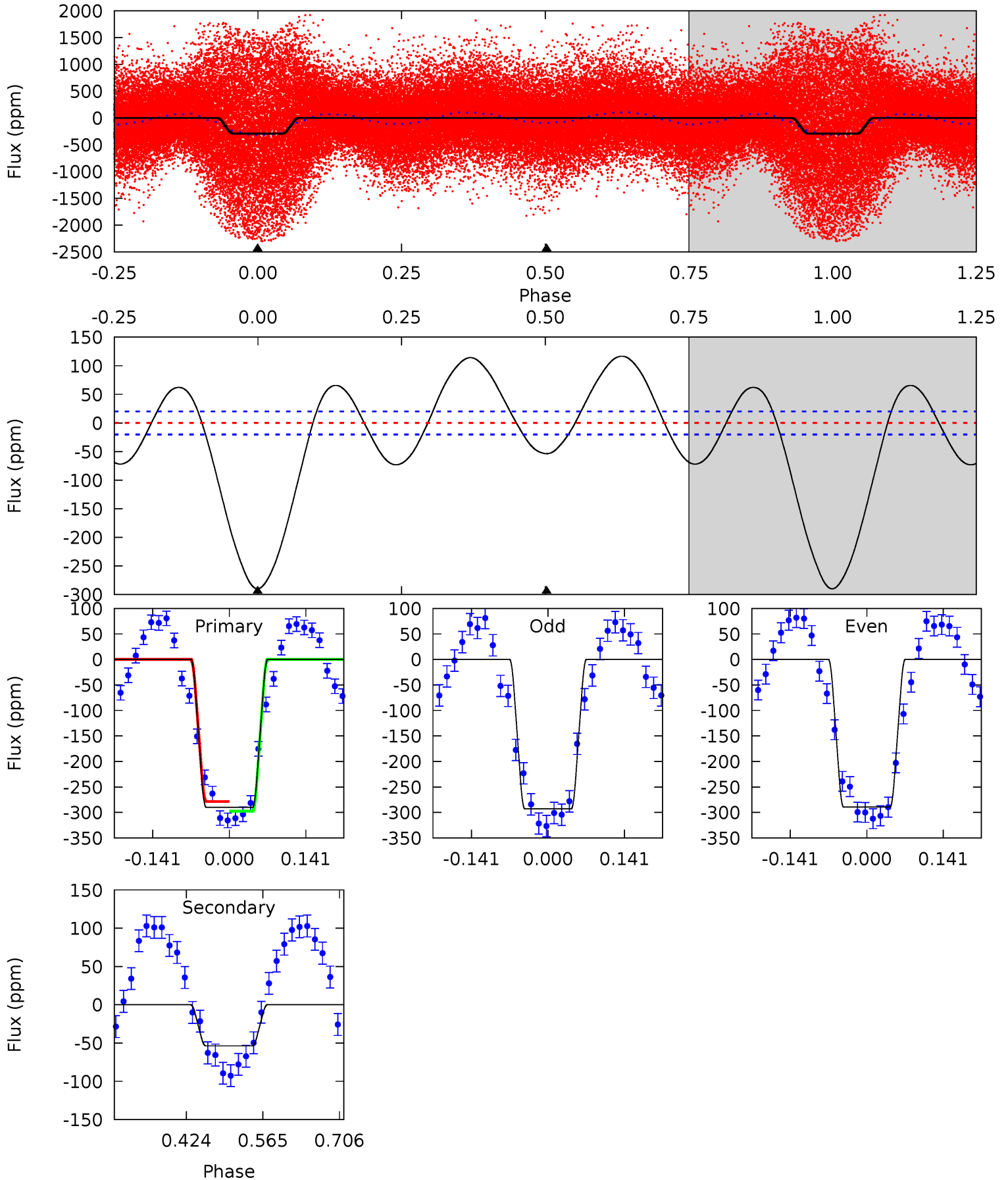




# Alt Model-Shift Uniqueness Test

004390625-01, P = 2.552833 Days, E = 129.186073 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
64.3	11.9	0	0	4.49	1.47	12.8	64.3	64.3	11.9	11.9	0.38	0.96	0.29	2.11





### Stellar Parameters For KIC 004390625

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6995^{+219}_{-301}$	$4.190^{+0.185}_{-0.167}$	$-0.660^{+0.250}_{-0.300}$	$1.400^{+0.390}_{-0.319}$	$1.106^{+0.160}_{-0.131}$	$0.568^{+0.534}_{-0.277}$
	+3%/-4%	+4%/-4%	+38%/-45%	+28%/-23%	+14%/-12%	+94%/-49%
Source	PHO1	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 004390625-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-52 \pm 4$	$1.09^{+0.26}_{-0.23}$	$2627^{+184}_{-188}$	$7024^{+955}_{-695}$	$35^{+21}_{-12}$
Alt.	$-54 \pm 5$	$2.83^{+0.43}_{-0.38}$	$2610^{+192}_{-194}$	$4481^{+197}_{-196}$	$5.358^{+1.819}_{-1.330}$

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature

$T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$



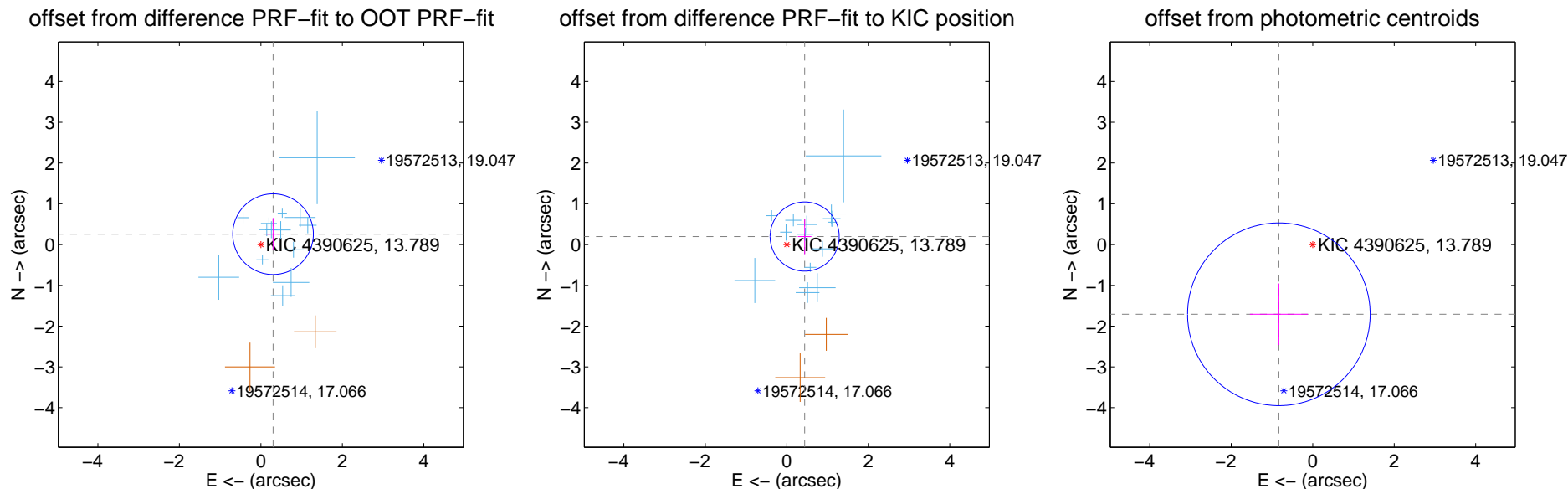
## DV Centroid Data

Supplemental centroid analysis for 004390625-01. Kepler magnitude: 13.79. Transit SNR 6.43

There are 14 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

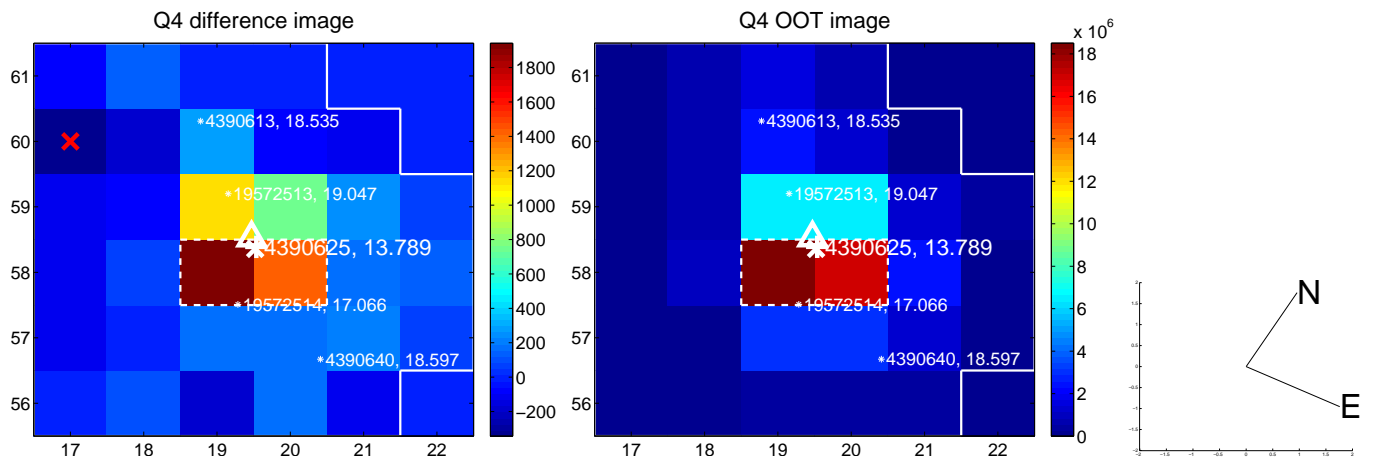
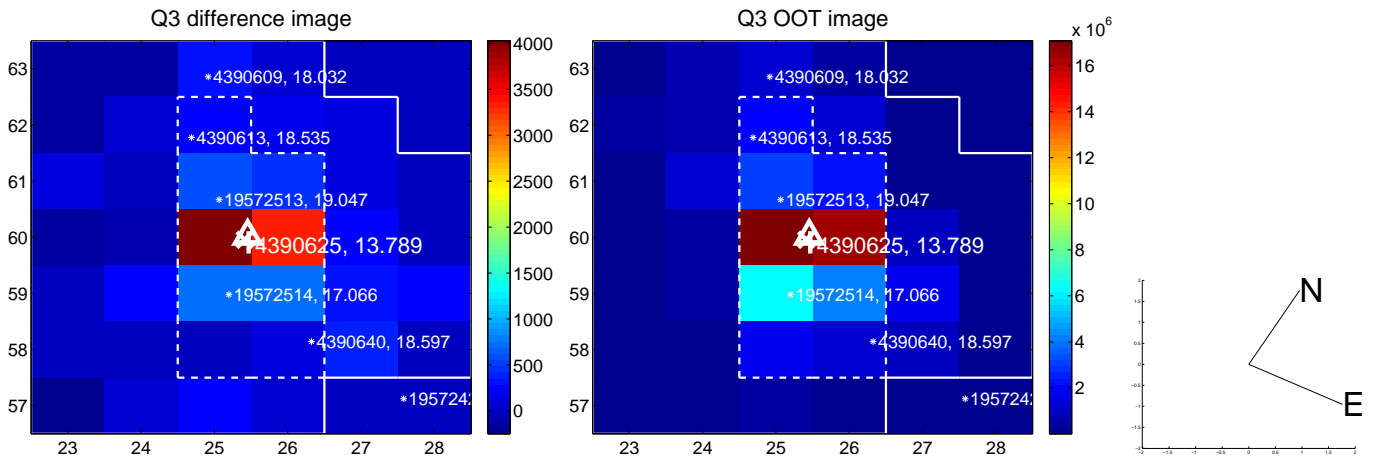
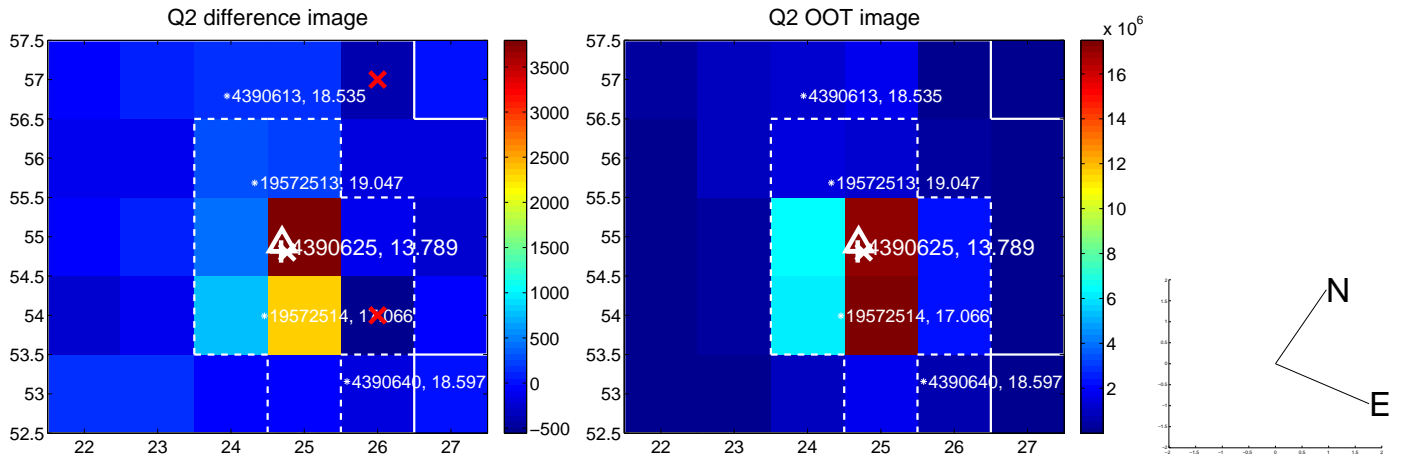
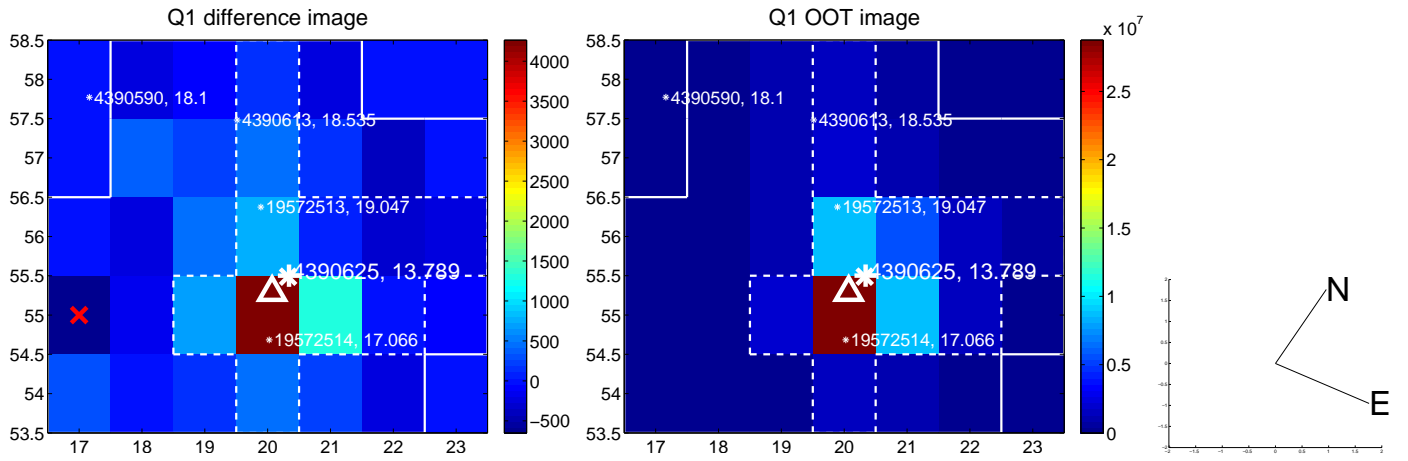
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.393 \pm 0.330$	1.19	$-0.299 \pm 0.171$	$0.255 \pm 0.398$
PRF-fit source offset from KIC position	$0.481 \pm 0.283$	1.70	$-0.438 \pm 0.166$	$0.197 \pm 0.434$
photometric centroid source offset	$1.90 \pm 0.75$	2.55	$0.83 \pm 0.71$	$-1.71 \pm 0.75$



Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

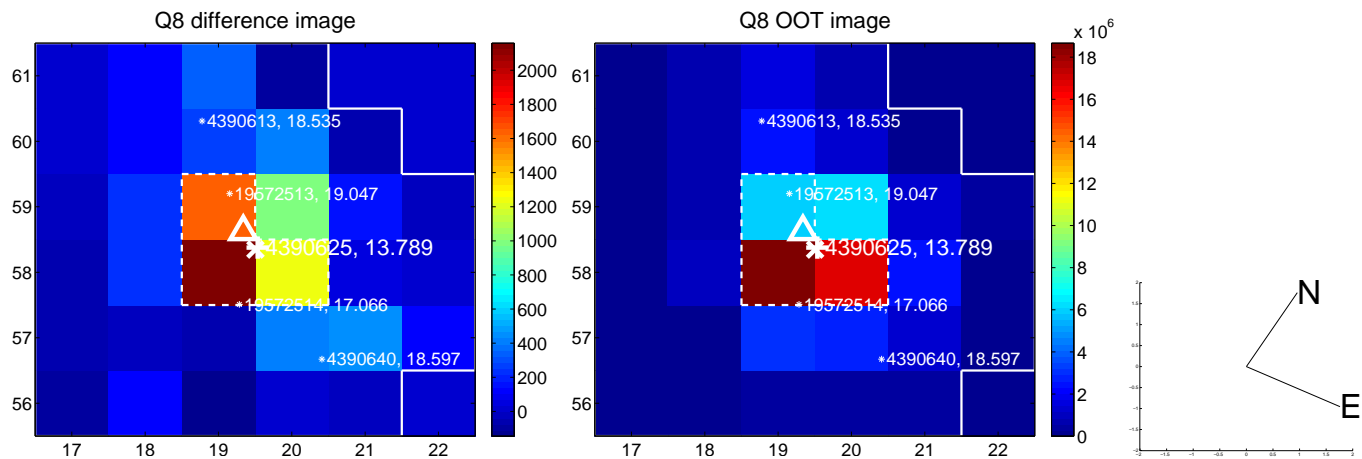
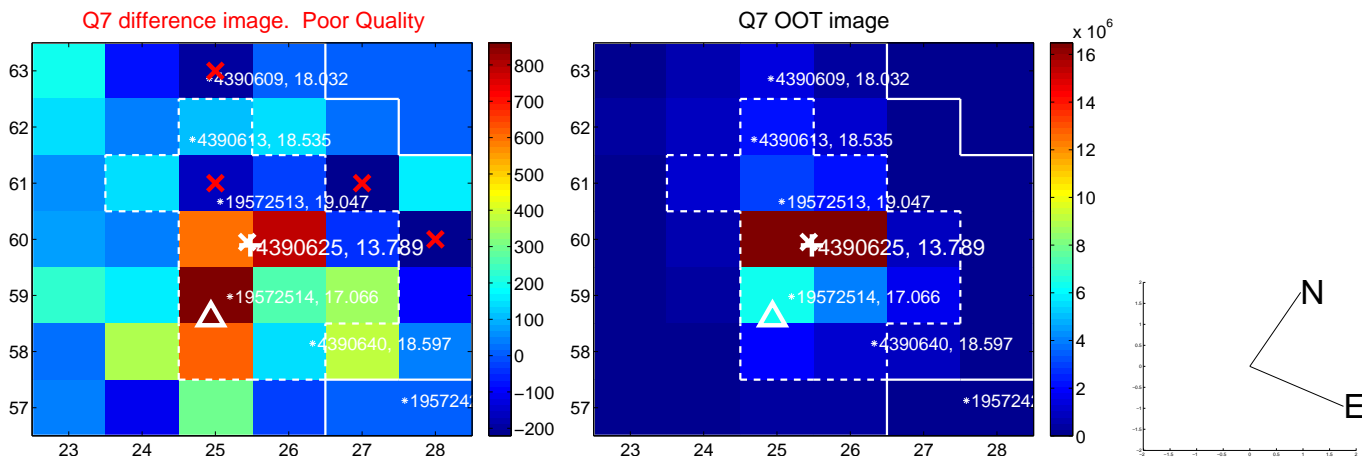
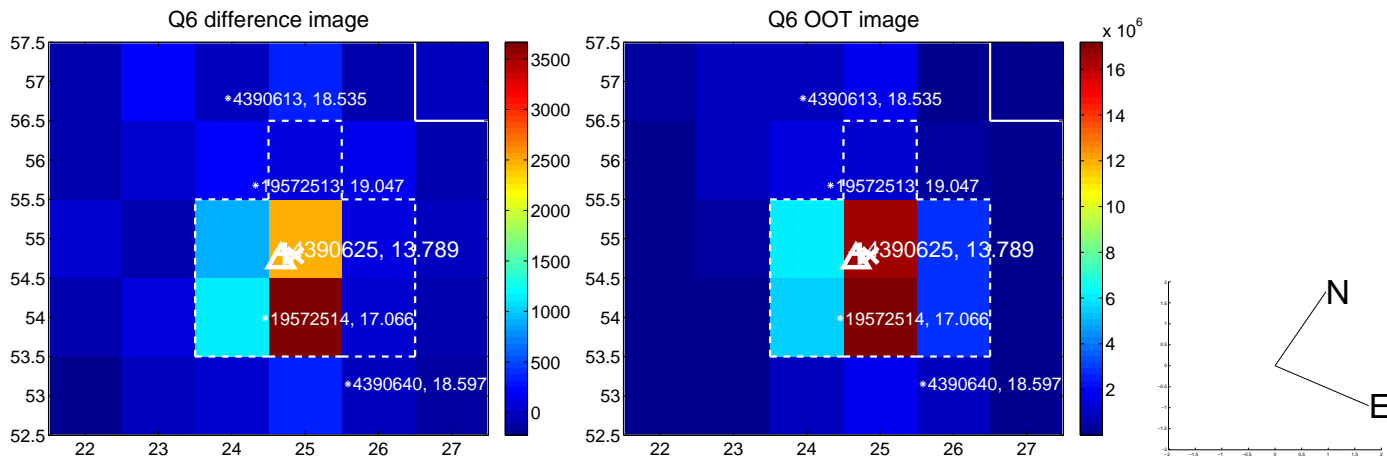
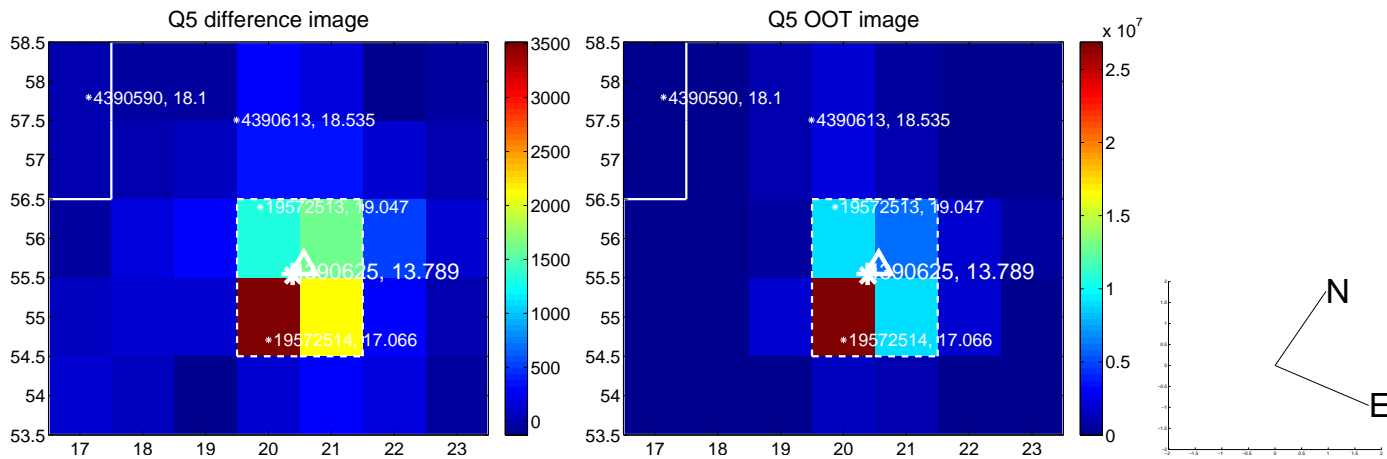


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



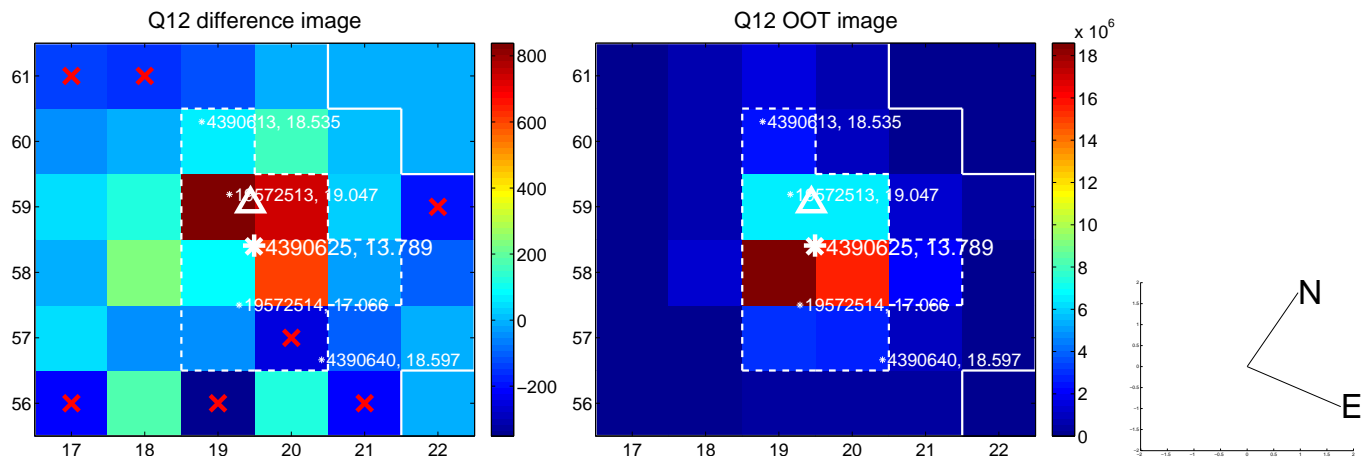
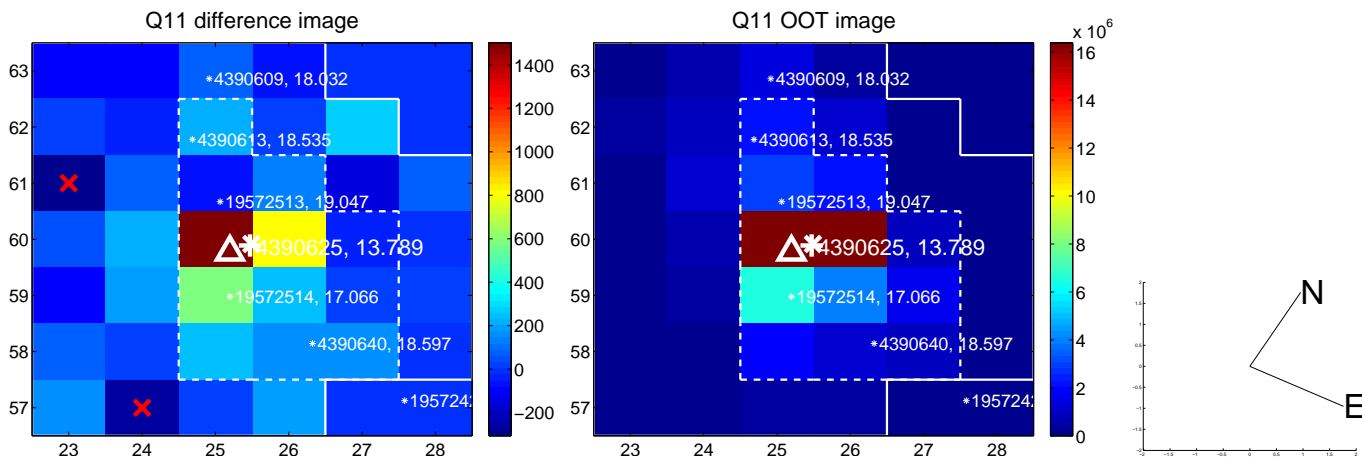
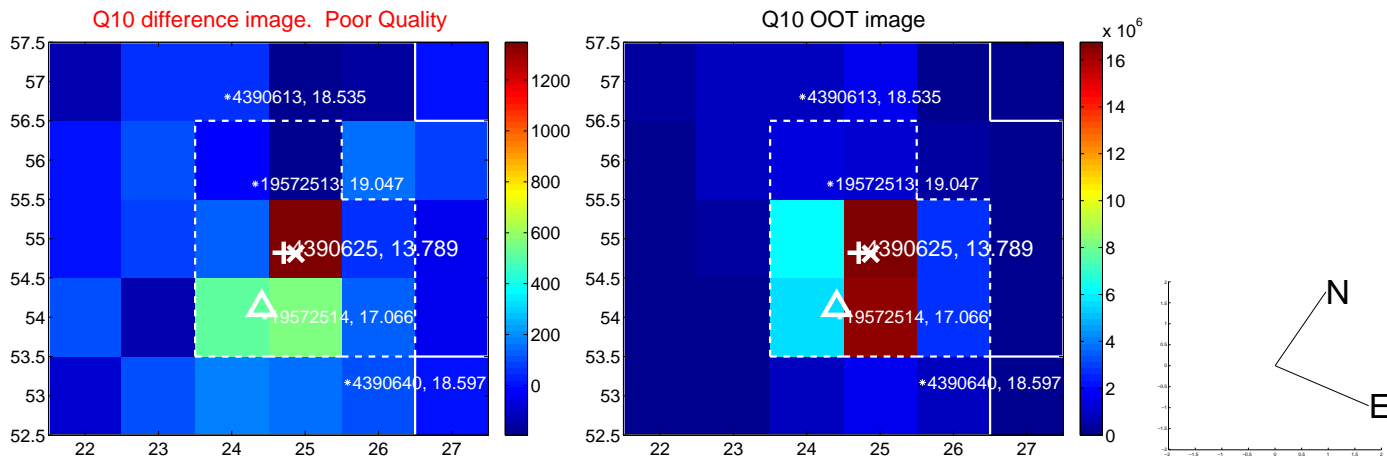
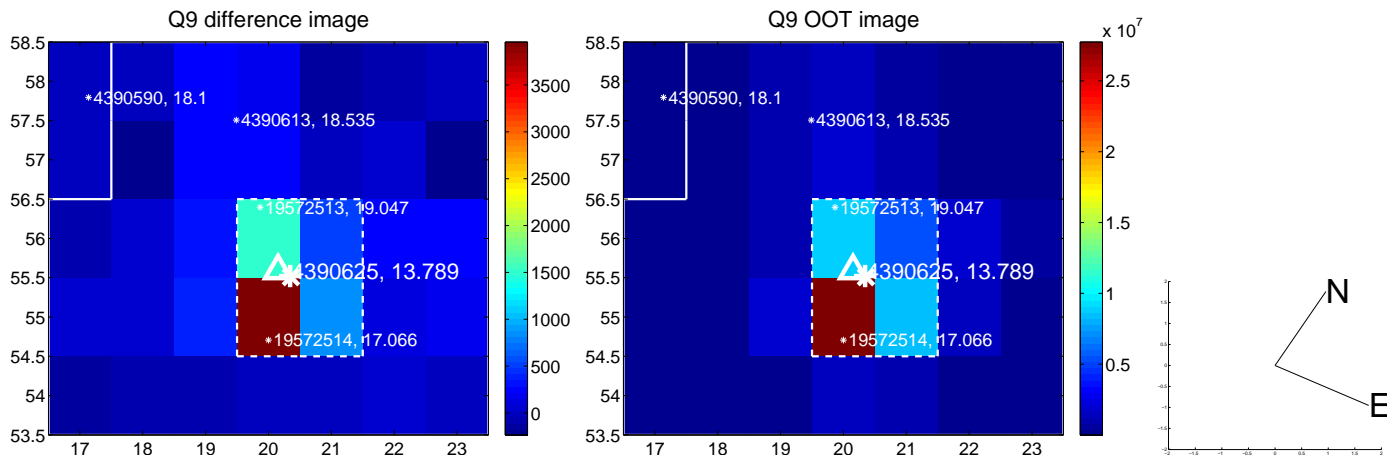


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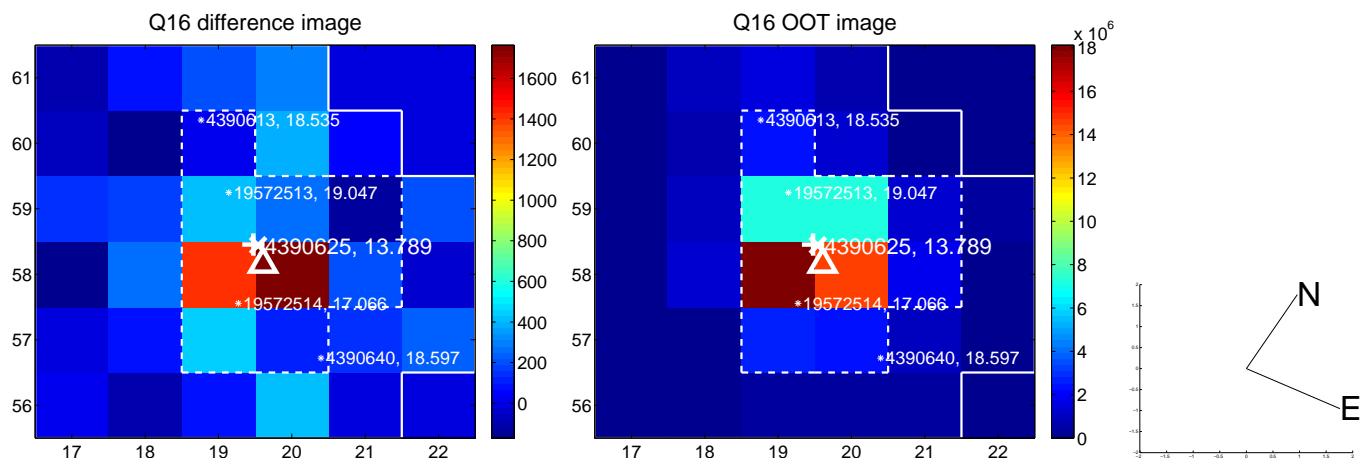
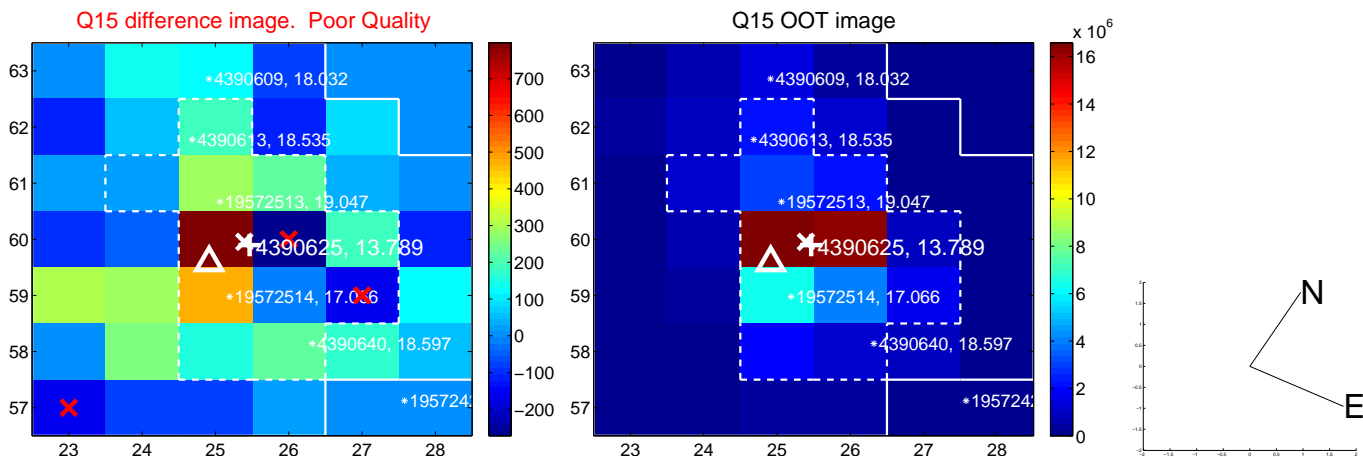
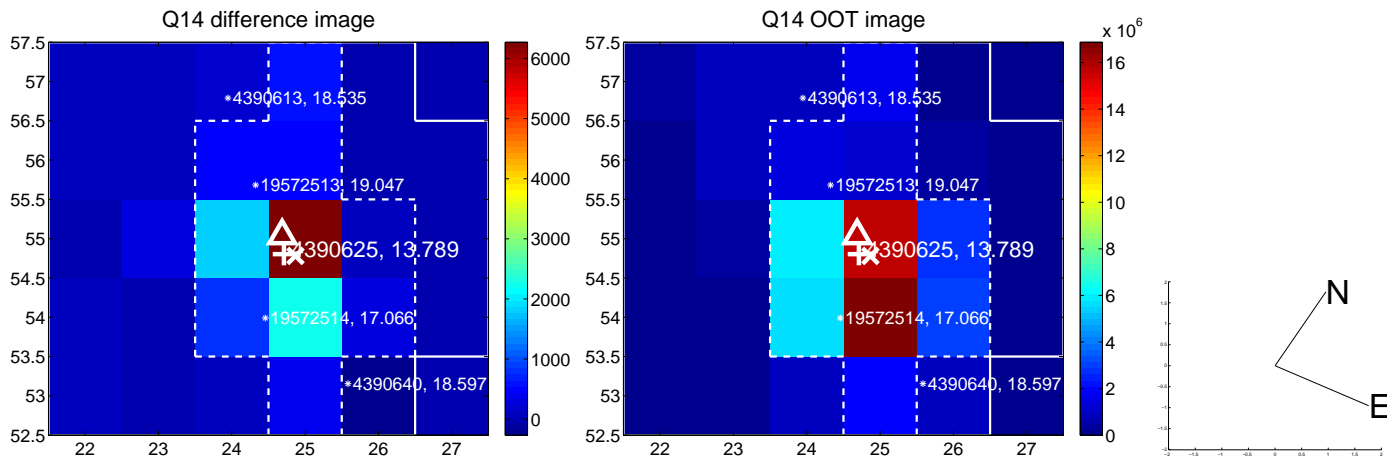
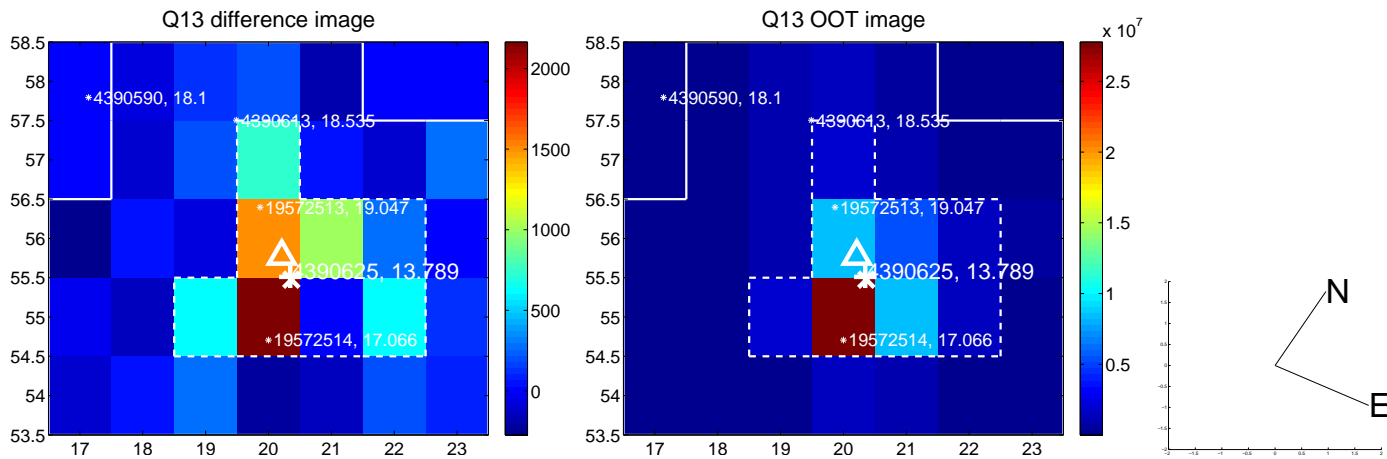


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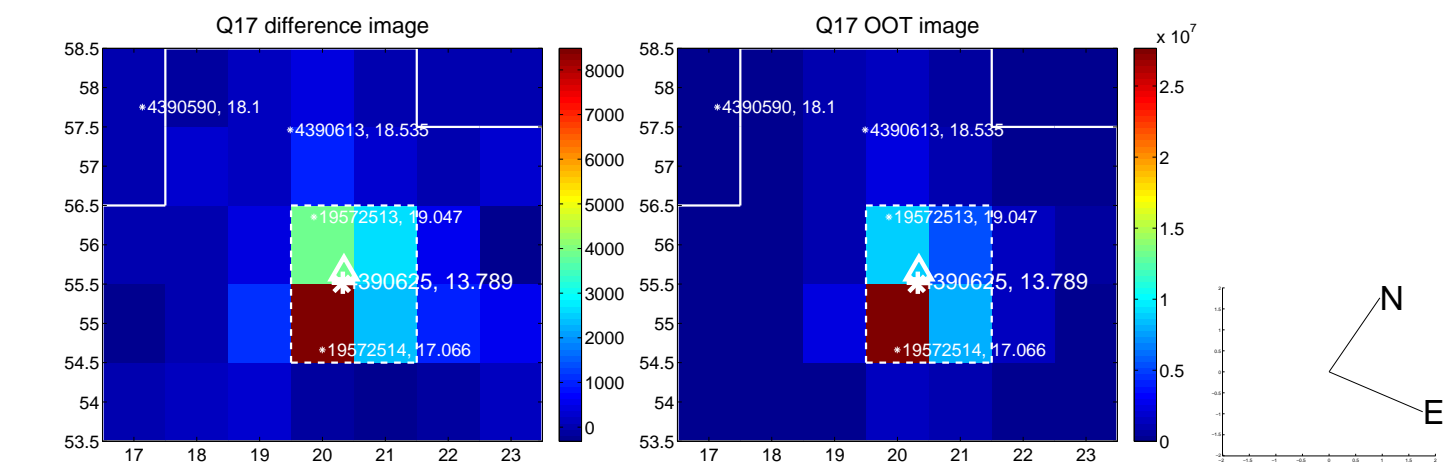


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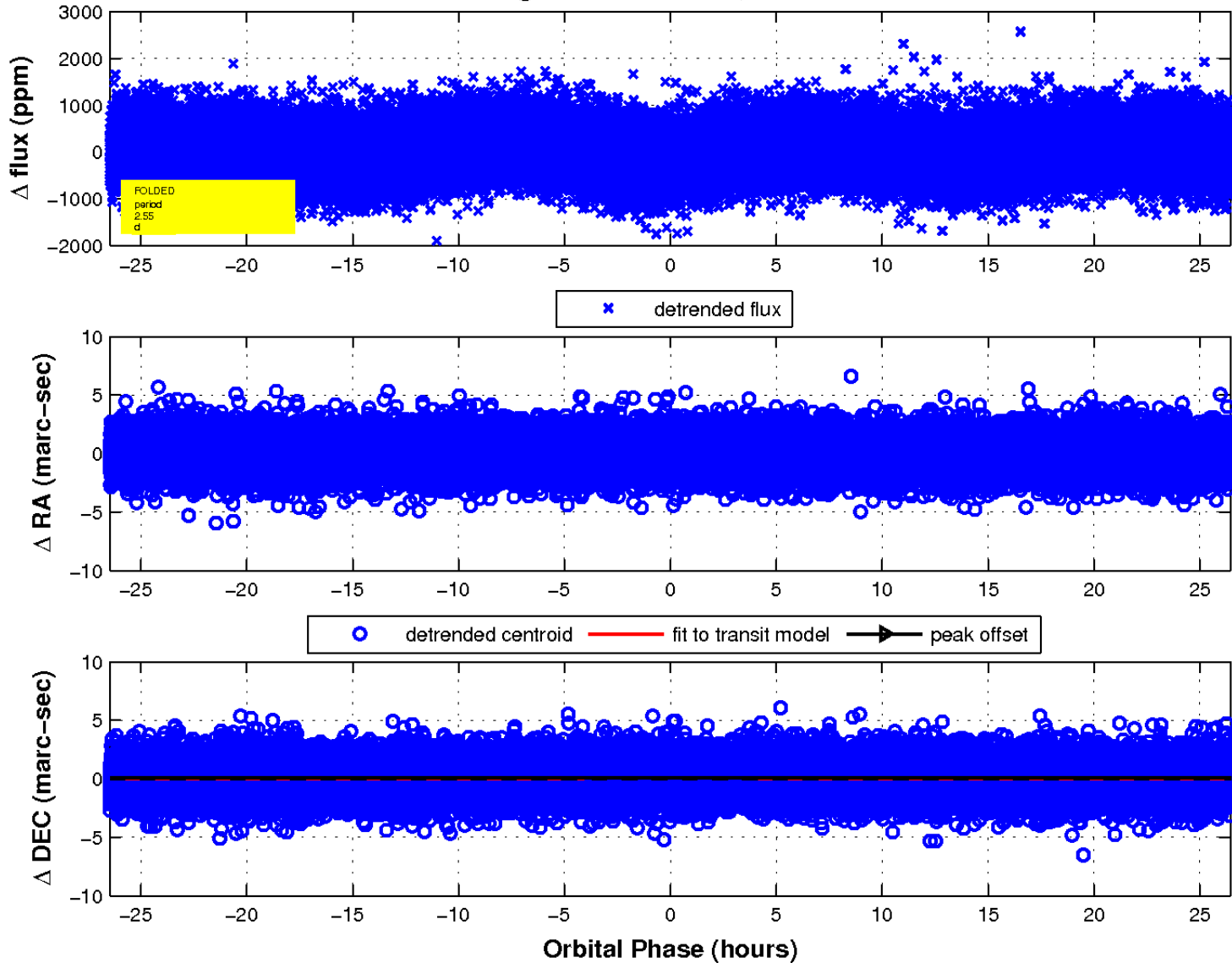




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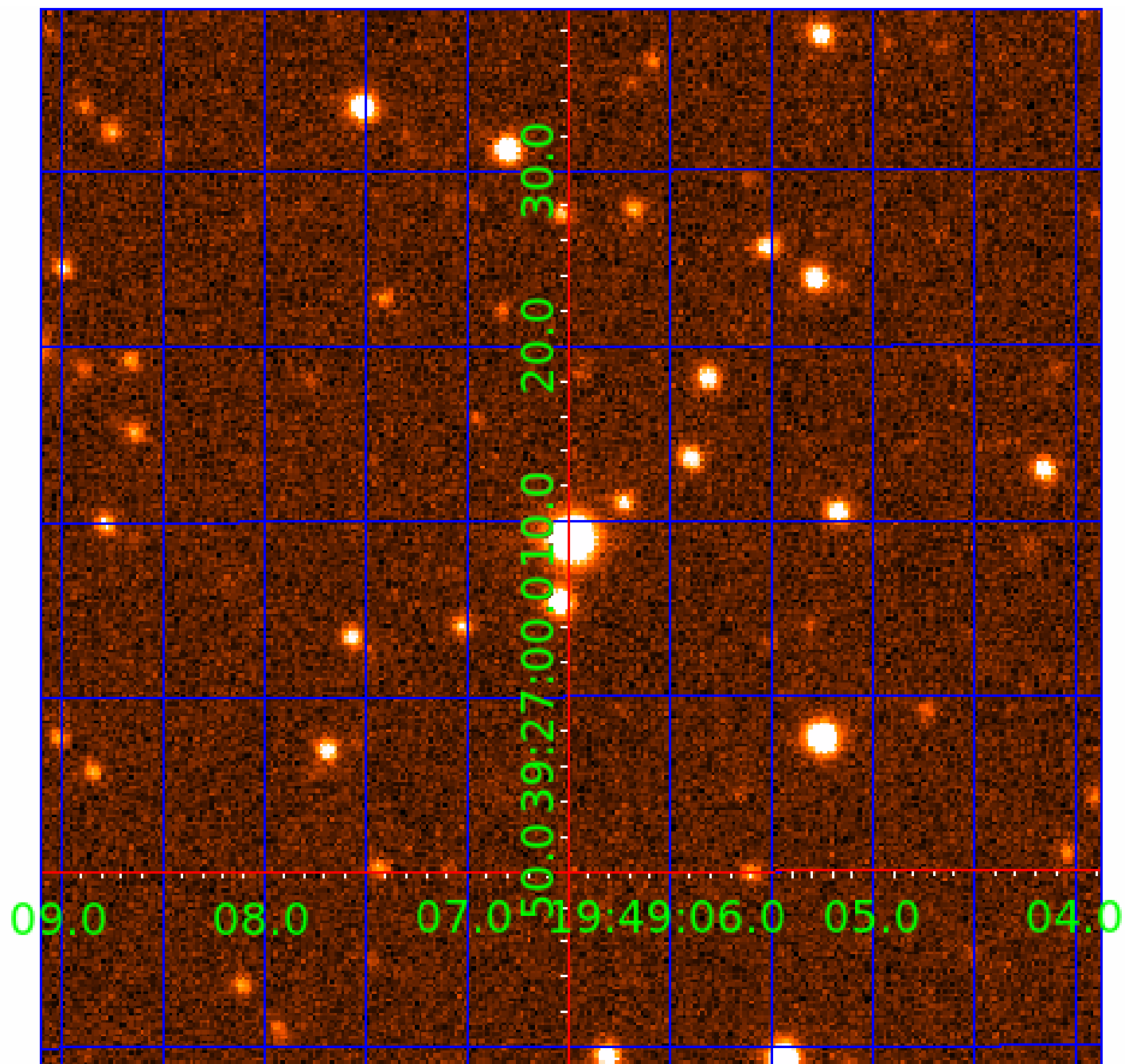
fluxWeightedCentroids, Planet 1 of 9





UKIRT Image

Declination





# KIC 004390625

## Q1-17 DR25 TCE Parameters

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004390625-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-05	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST
004390625-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004390625-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
004390625-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_NOFITS

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

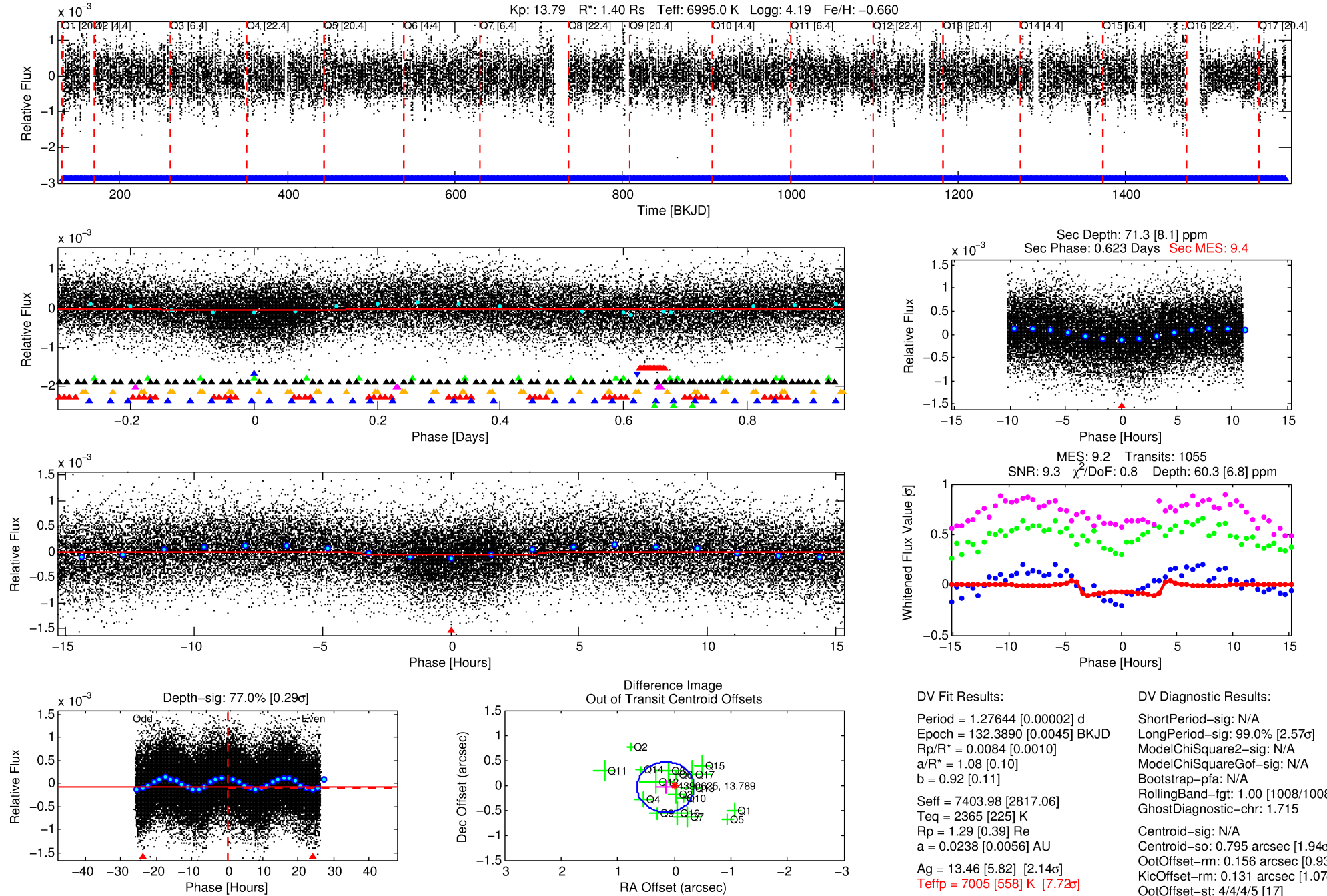
Ephemeris Match Information For 004390625-02

No Significant Match Found



# DV One-Page Summary

KIC: 4390625 Candidate: 2 of 9 Period: 1.276 d



## DV Fit Results:

Period = 1.27644 [0.00002] d  
Epoch = 132.3890 [0.0045] BKJD  
Rp/R\* = 0.0084 [0.0010]  
a/R\* = 1.08 [0.10]  
b = 0.92 [0.11]  
Seff = 7403.98 [2817.06]  
Teq = 2365 [225] K  
Rp = 1.29 [0.39] Re  
a = 0.0238 [0.0056] AU  
Ag = 13.46 [5.82] [2.14σ]  
**Teffp = 7005 [558] K [7.72σ]**

## DV Diagnostic Results:

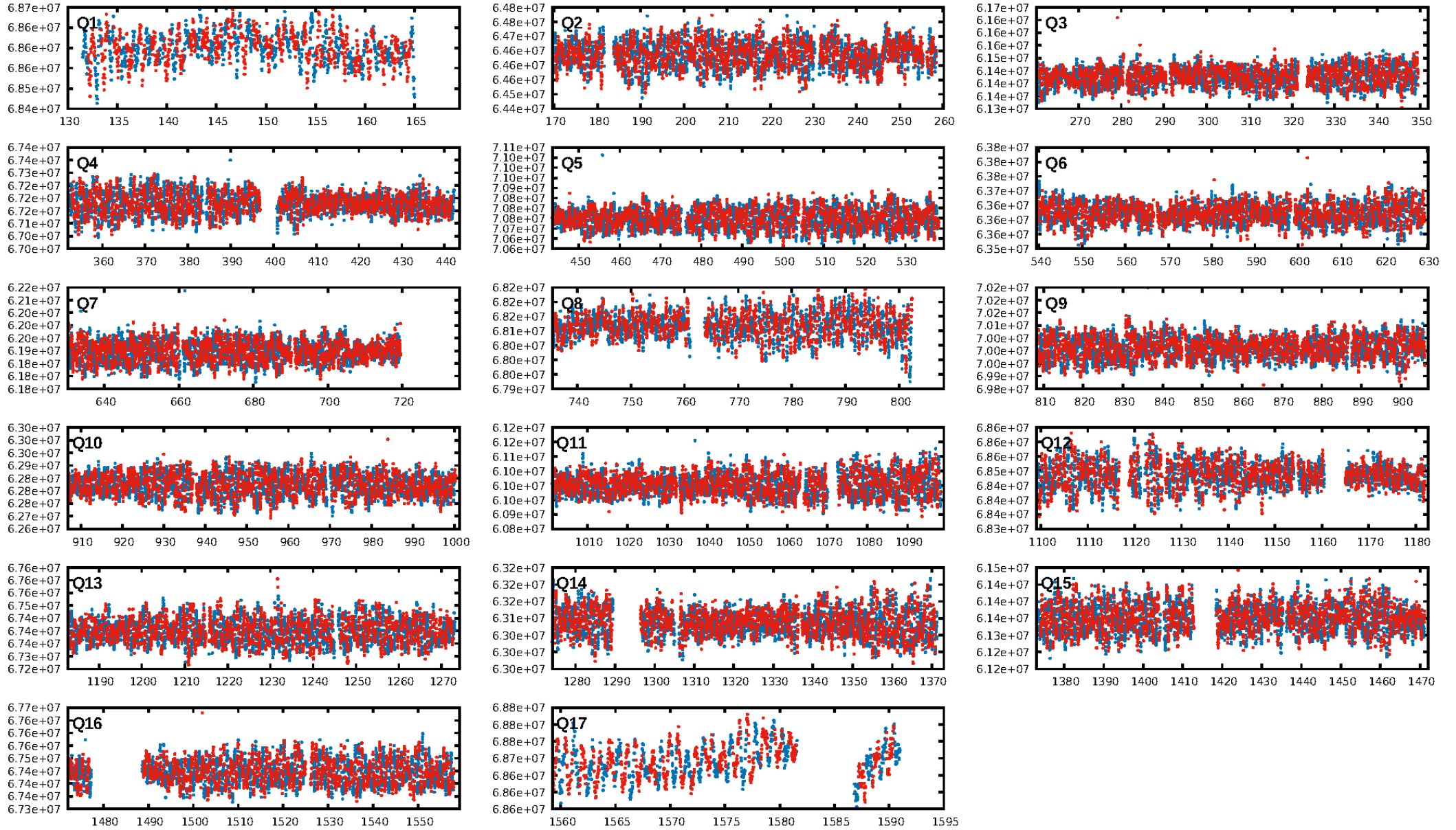
ShortPeriod-sig: N/A  
LongPeriod-sig: 99.0% [2.57σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [1008/1008]  
GhostDiagnostic-chr: 1.715  
Centroid-sig: N/A  
Centroid-so: 0.795 arcsec [1.94σ]  
OotOffset-rm: 0.156 arcsec [0.93σ]  
KicOffset-rm: 0.131 arcsec [1.07σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 16:27:06 Z

This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

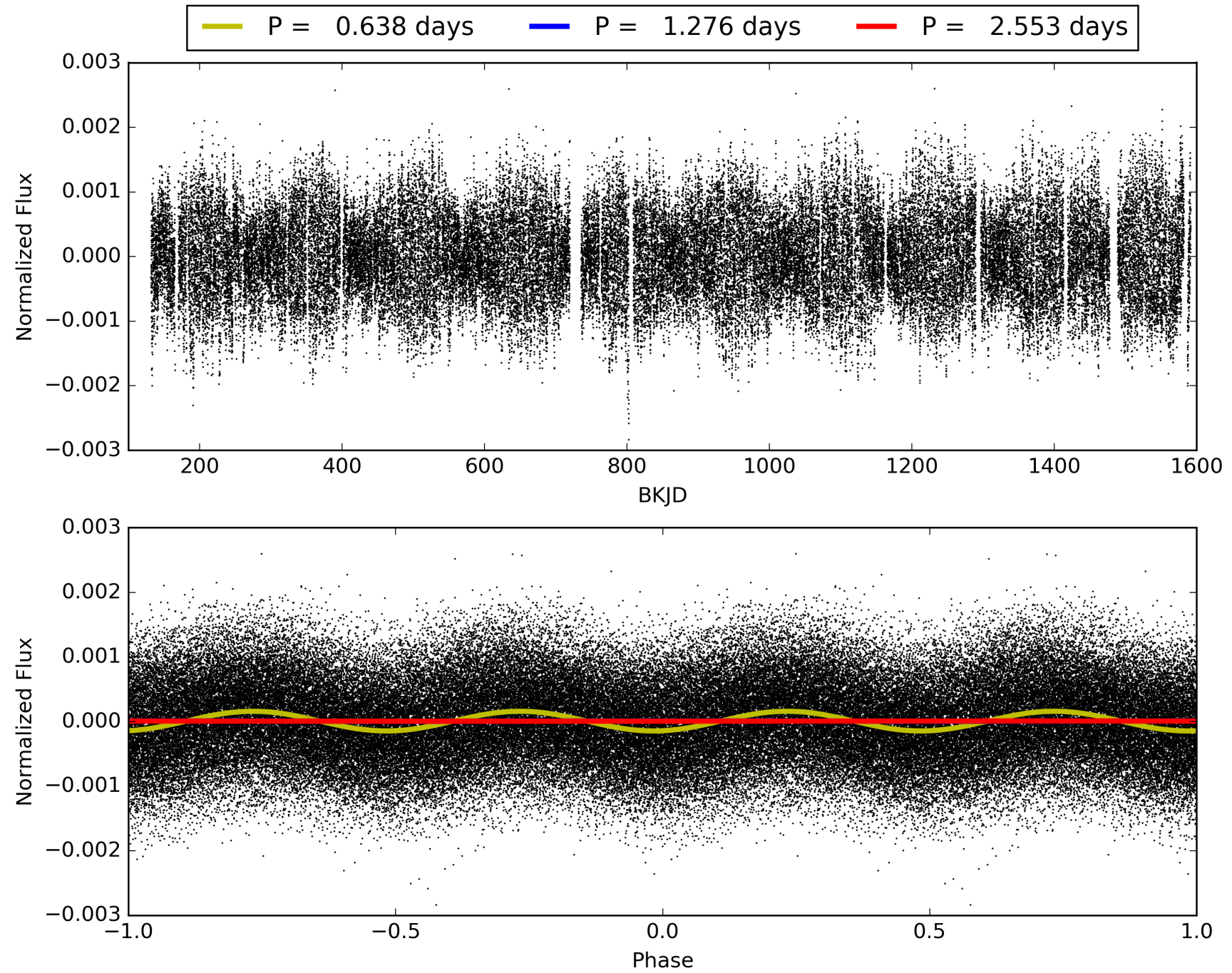


# TCE 004390625-02, PDC Light Curves





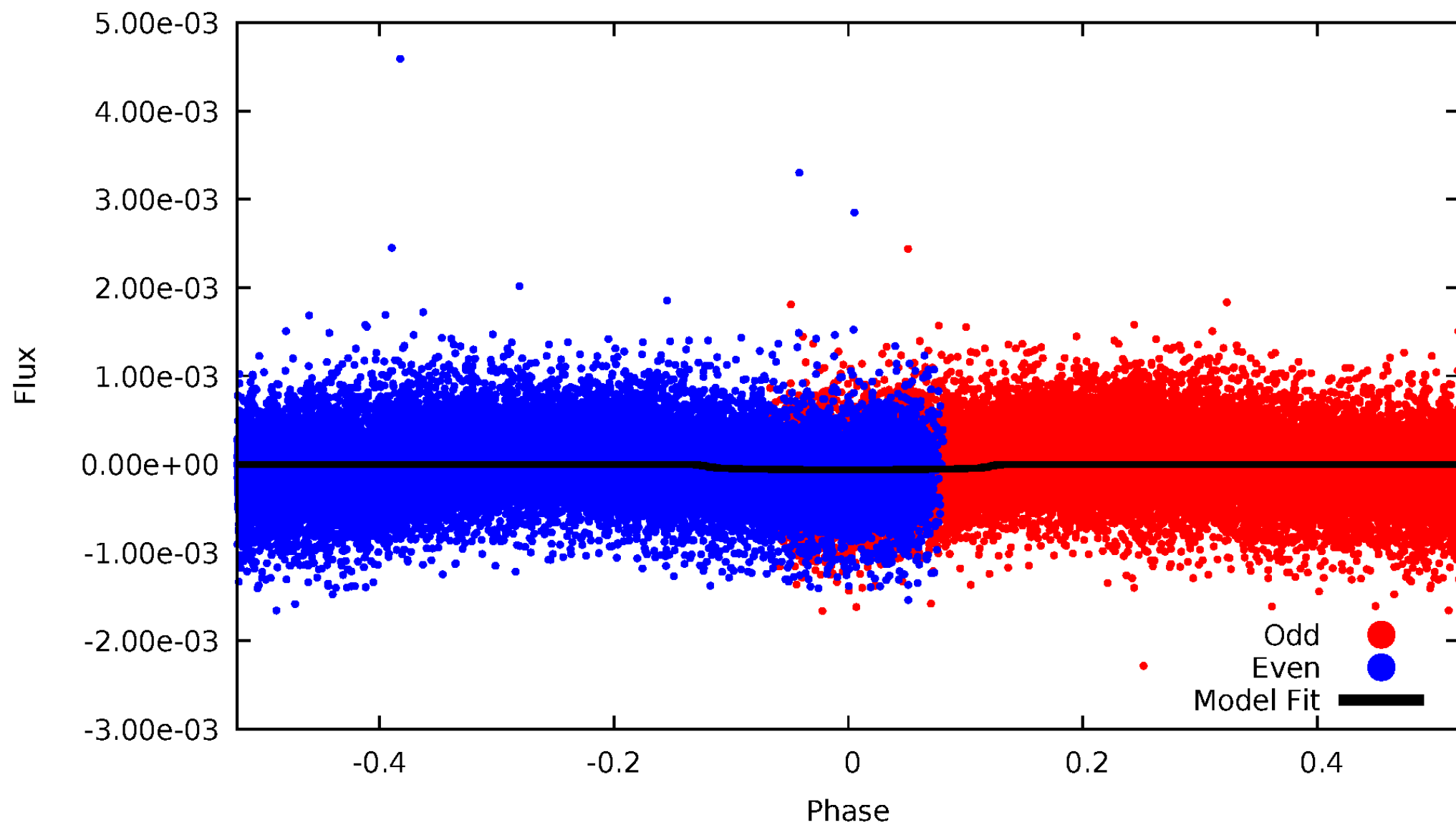
TCE 004390625-02





# DV Odd/Even

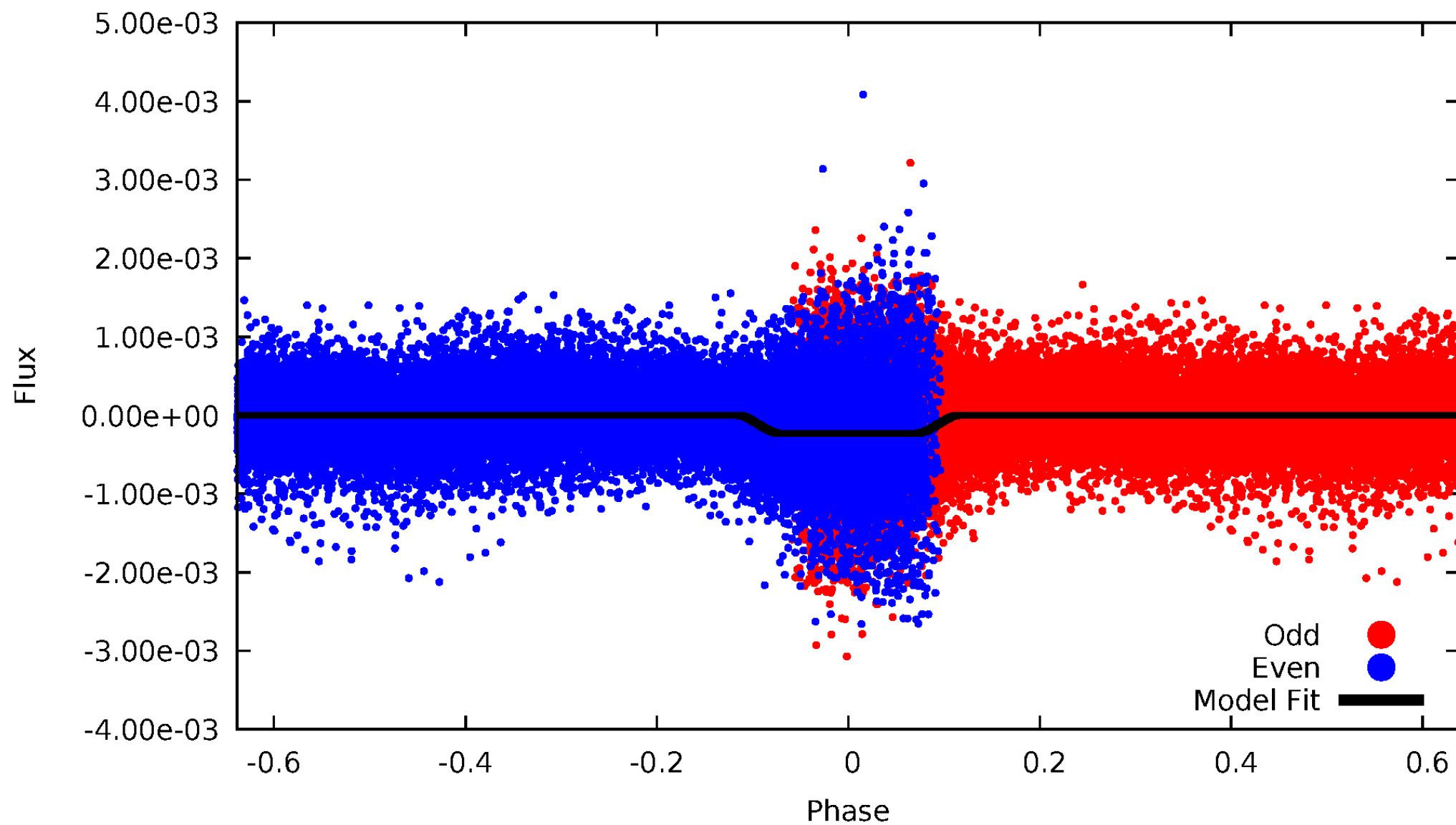
TCE 004390625-02





# ALT Odd/Even

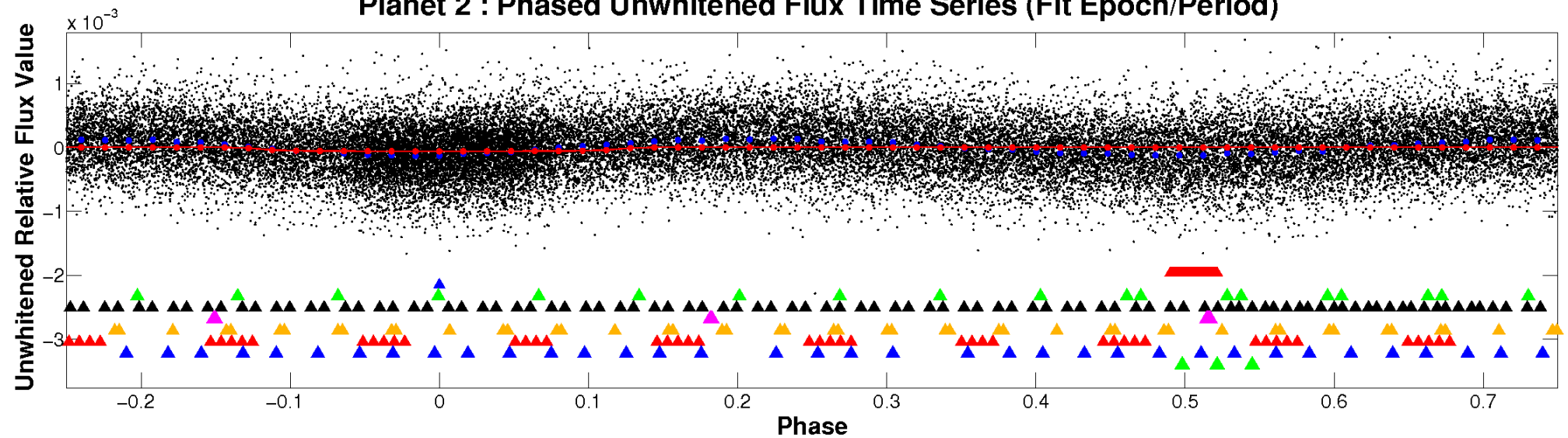
TCE 004390625-02



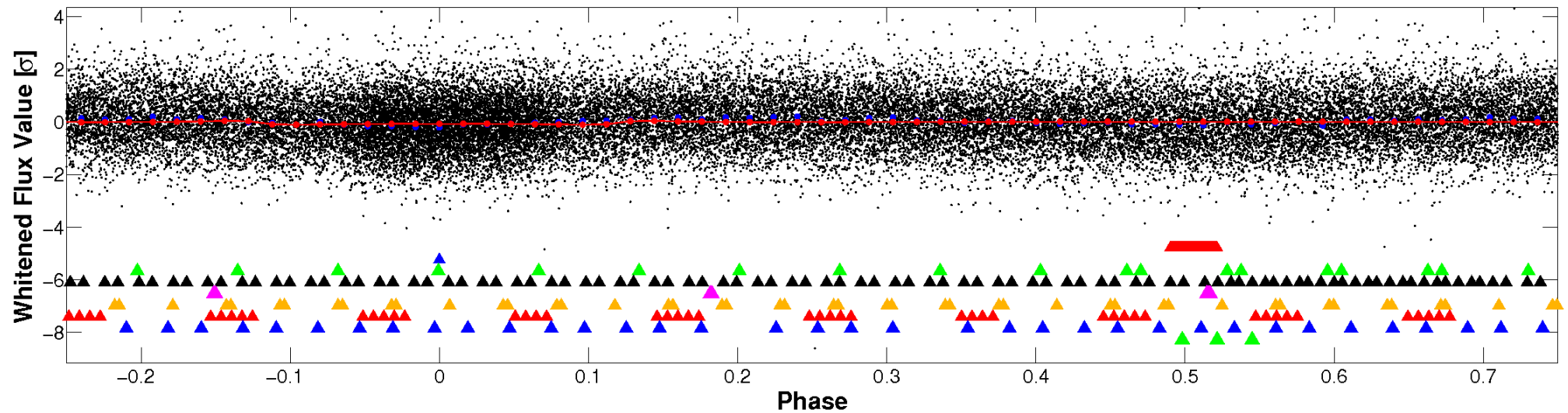


# Non-Whitened Vs. Whitened Light Curve

## Planet 2 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



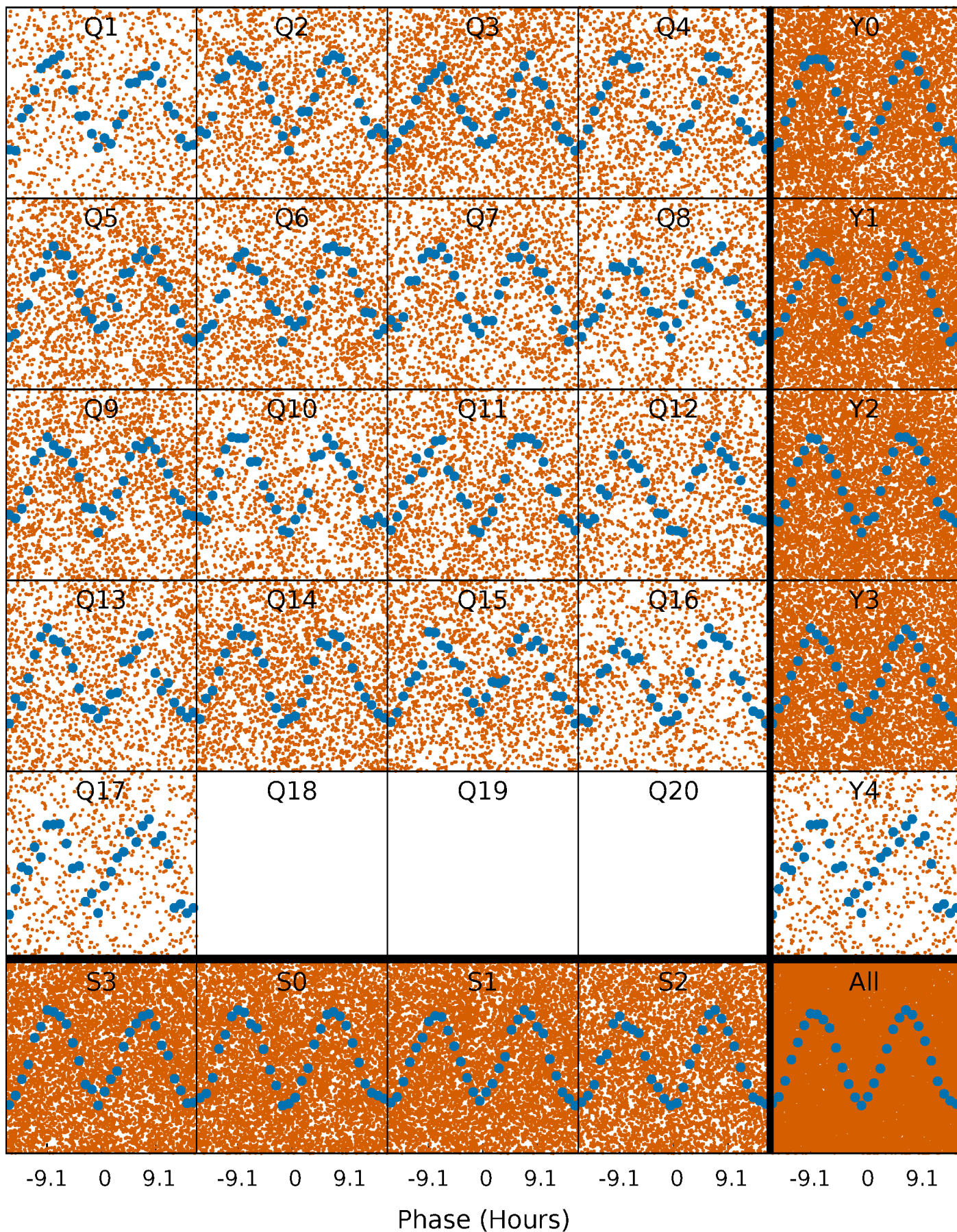
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

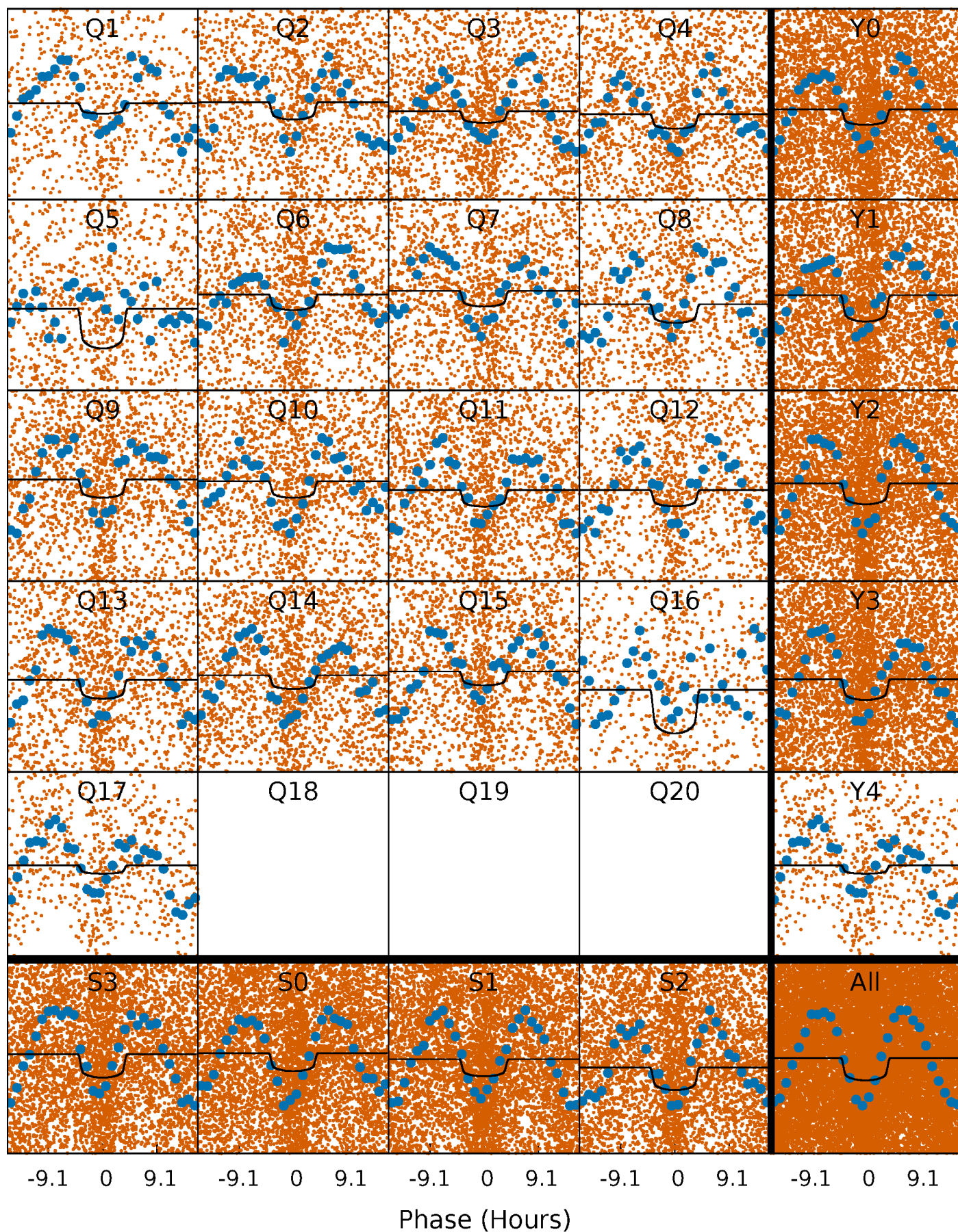
TCE 004390625-02   P= 1.276435 Days    $T_0=132.389025$  (BKJD)





# DV Quarter-Phased Transit Curves

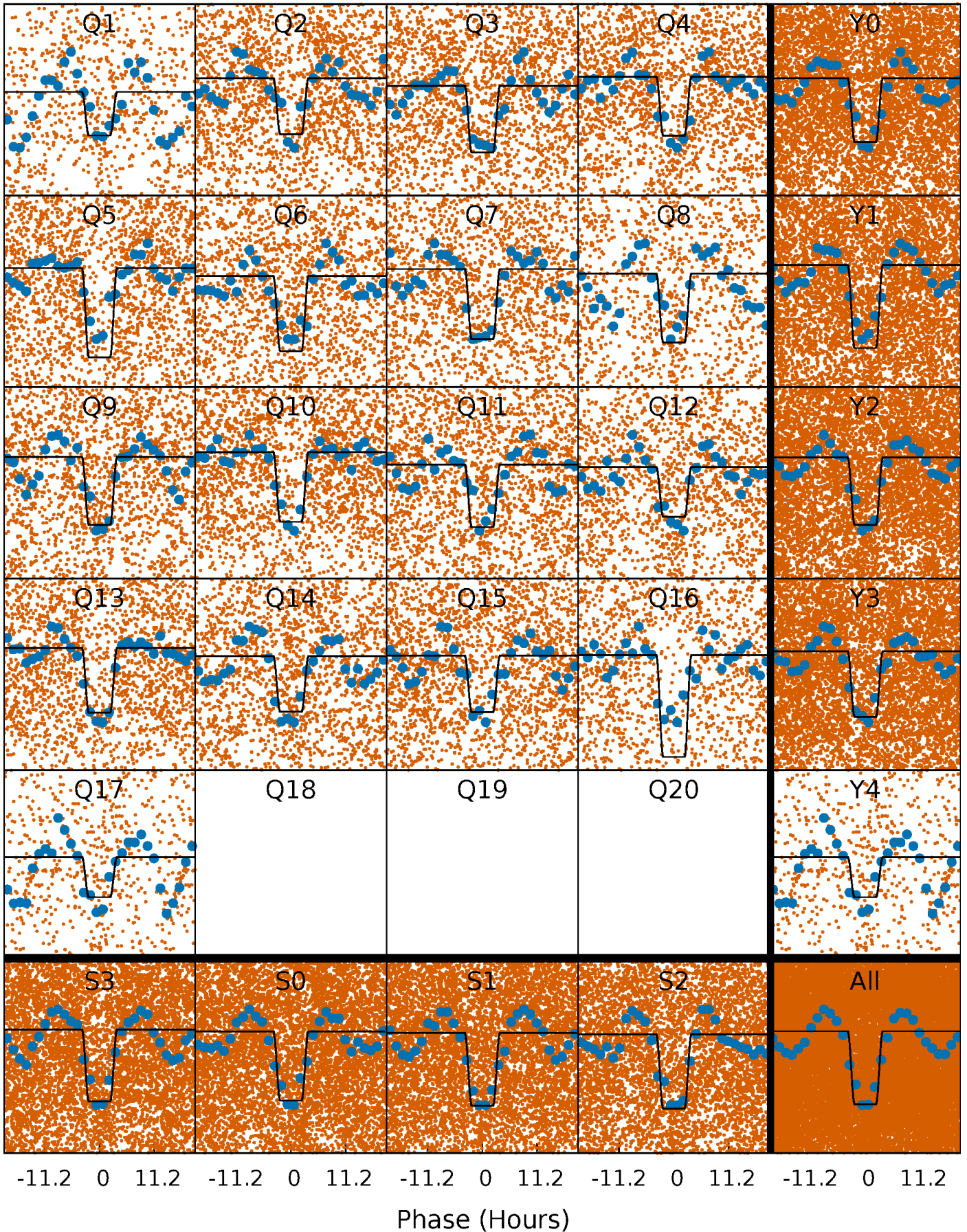
TCE 004390625-02 P= 1.276435 Days  $T_0=132.389025$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 004390625-02 P= 1.276442 Days  $T_0=132.368967$  (BKJD)

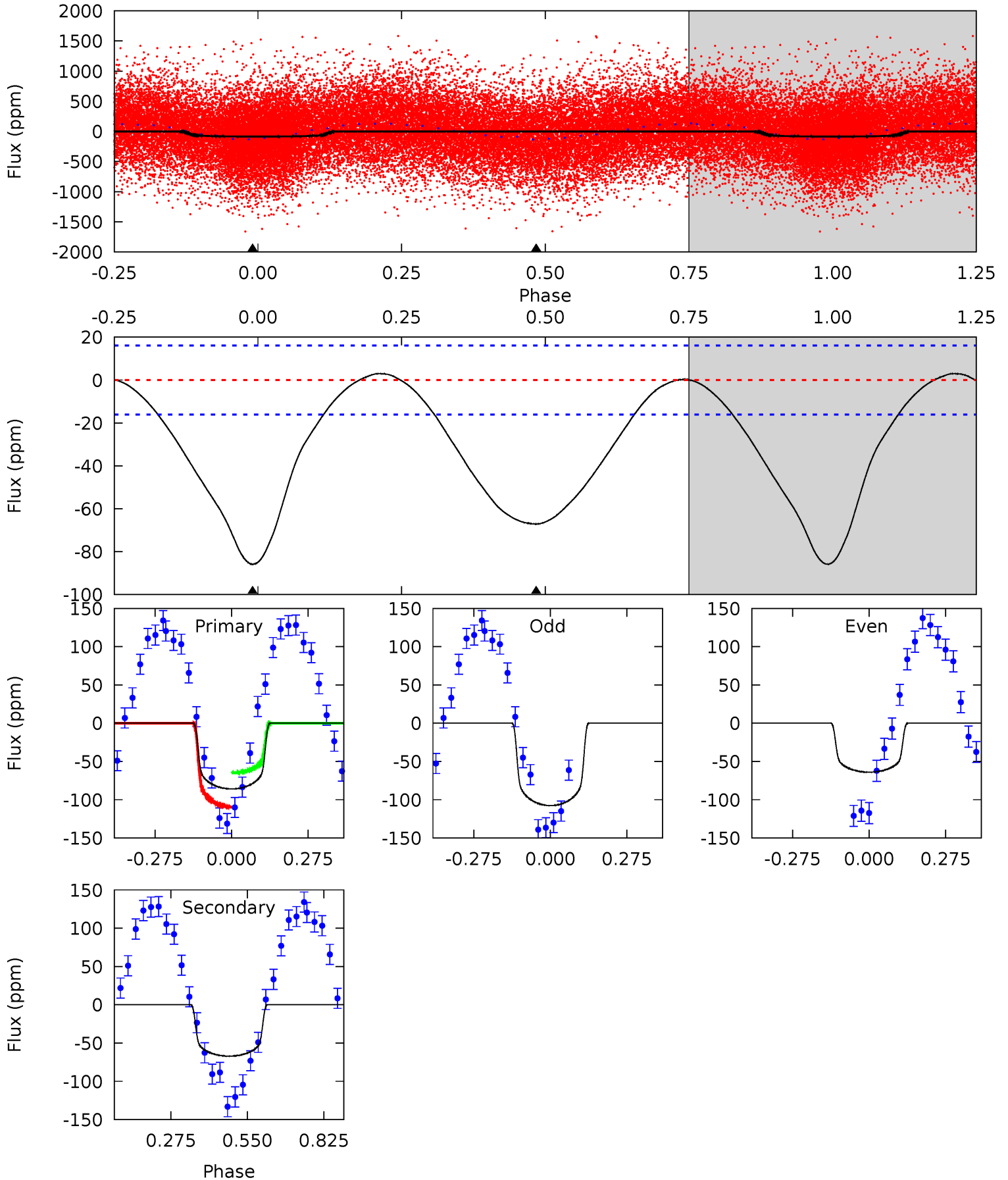




# DV Model-Shift Uniqueness Test

004390625-02, P = 1.276435 Days, E = 131.112590 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
23.2	18.2	0	0	4.35	1.09	0.41	23.2	23.2	18.2	18.2	6.16	1.20	0.03	6.34

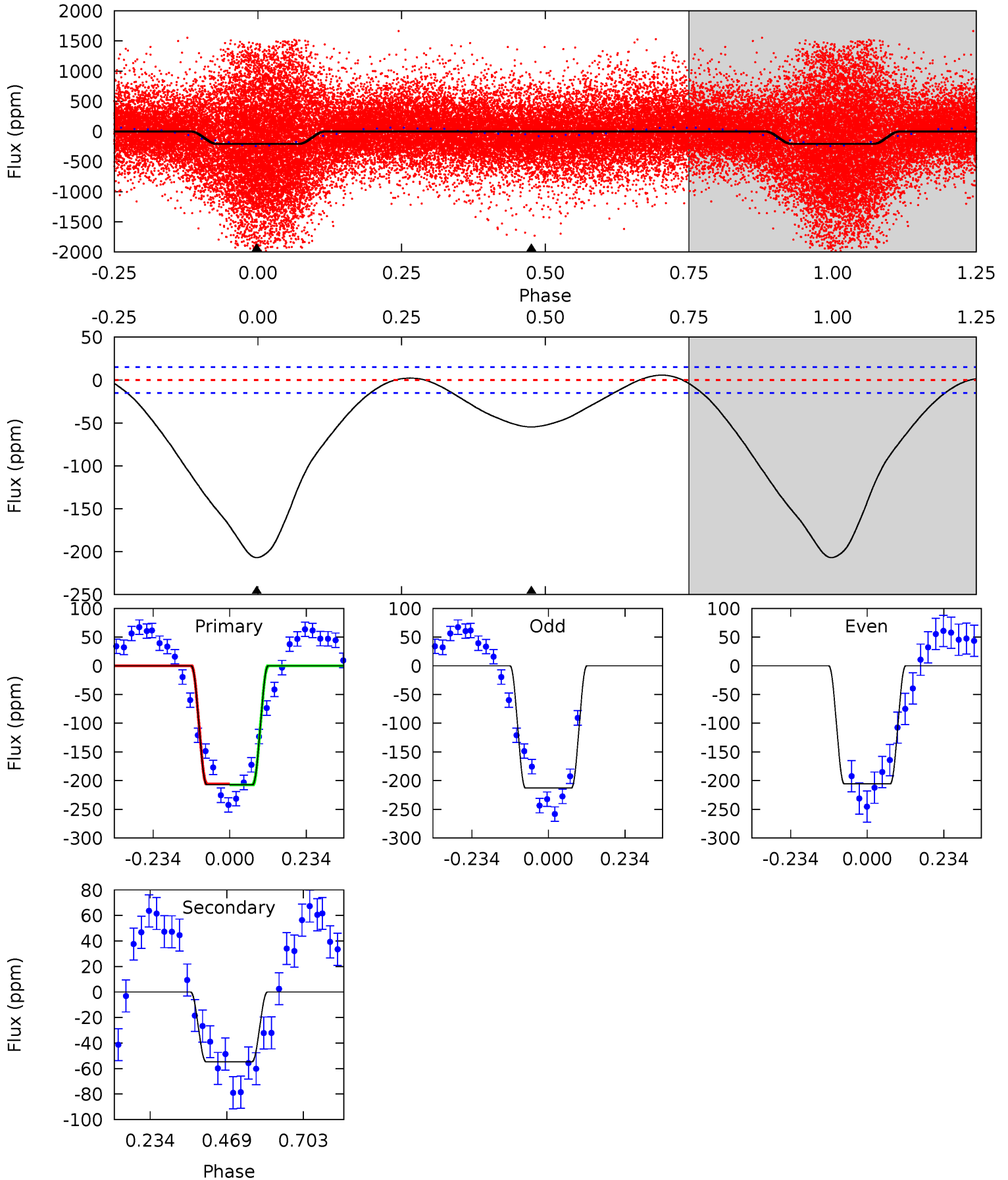




# Alt Model-Shift Uniqueness Test

004390625-02, P = 1.276442 Days, E = 131.092525 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
60.0	15.9	0	0	4.38	1.19	1.72	60.0	60.0	15.9	15.9	1.05	1.00	0.03	0.23





### Stellar Parameters For KIC 004390625

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6995^{+219}_{-301}$	$4.190^{+0.185}_{-0.167}$	$-0.660^{+0.250}_{-0.300}$	$1.400^{+0.390}_{-0.319}$	$1.106^{+0.160}_{-0.131}$	$0.568^{+0.534}_{-0.277}$
	+3%/-4%	+4%/-4%	+38%/-45%	+28%/-23%	+14%/-12%	+94%/-49%
Source	PHO1	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 004390625-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-67 \pm 4$	$1.28^{+0.26}_{-0.20}$	$3300^{+233}_{-241}$	$6824^{+591}_{-513}$	$13^{+5}_{-4}$
Alt.	$-55 \pm 3$	$2.33^{+0.41}_{-0.31}$	$3300^{+250}_{-224}$	$4823^{+225}_{-209}$	$3.137^{+1.085}_{-0.800}$

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature

$T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$



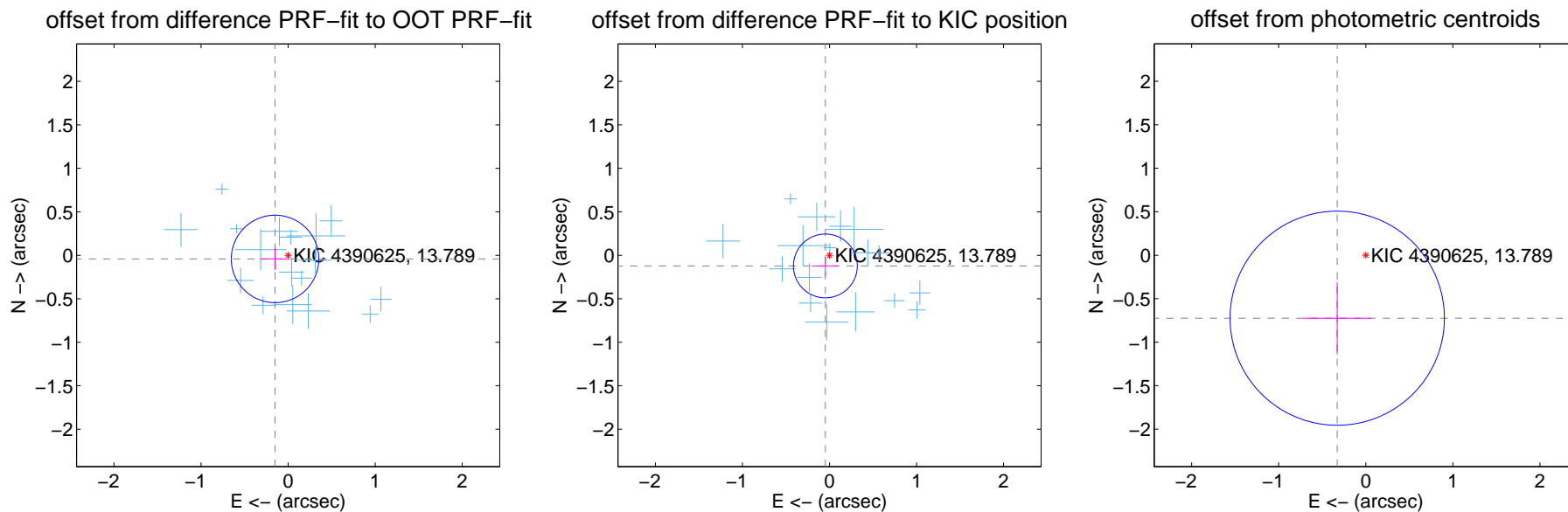
## DV Centroid Data

Supplemental centroid analysis for 004390625-02. Kepler magnitude: 13.79. Transit SNR 9.29

There are 17 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.156 \pm 0.168$	0.93	$0.150 \pm 0.171$	$-0.042 \pm 0.125$
PRF-fit source offset from KIC position	$0.131 \pm 0.122$	1.07	$0.047 \pm 0.153$	$-0.123 \pm 0.117$
photometric centroid source offset	$0.80 \pm 0.41$	1.94	$0.33 \pm 0.39$	$-0.72 \pm 0.41$



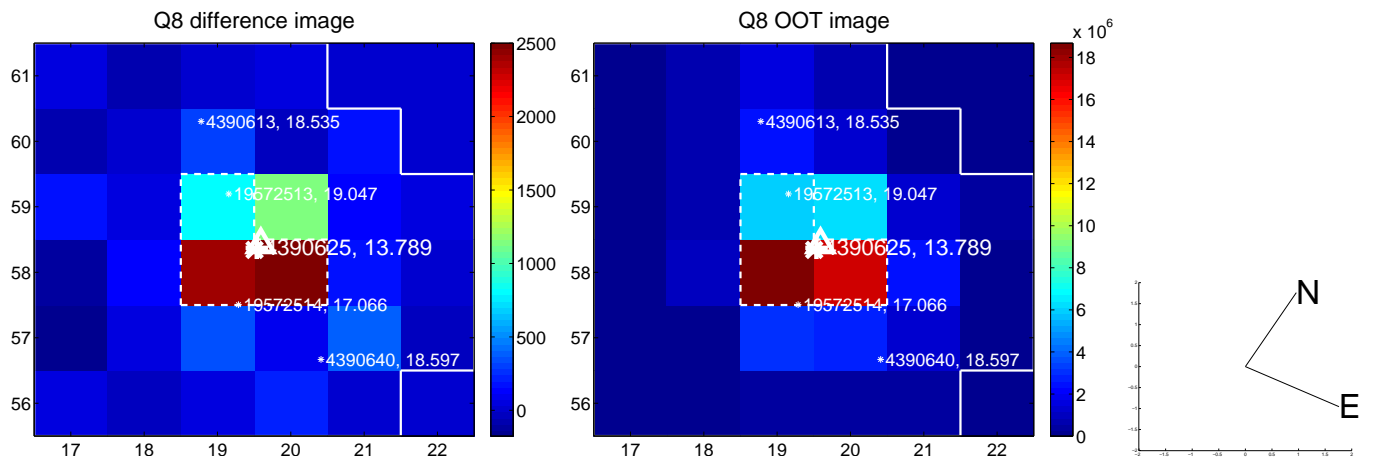
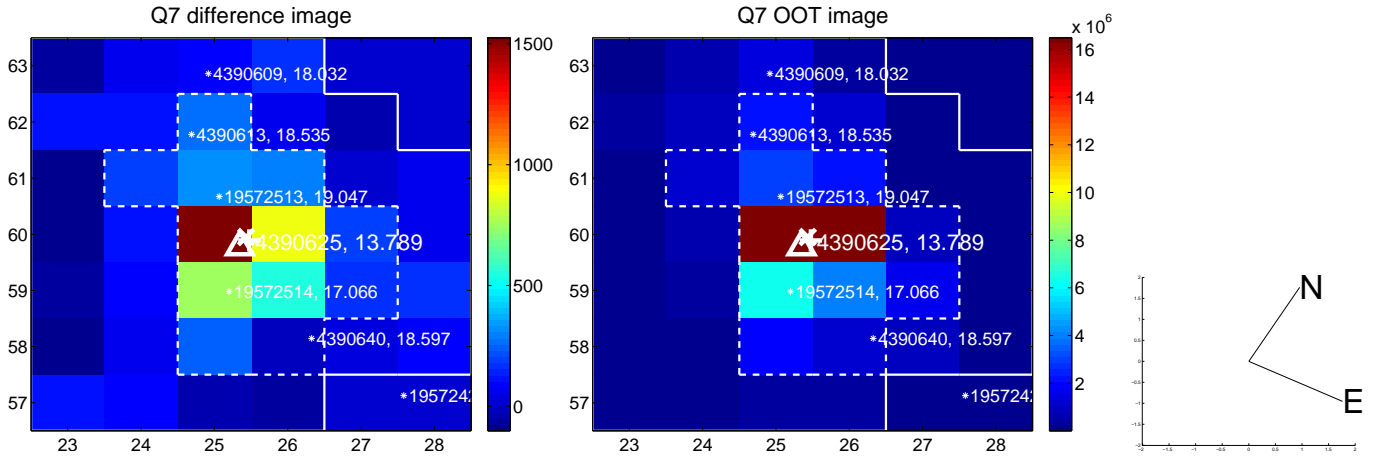
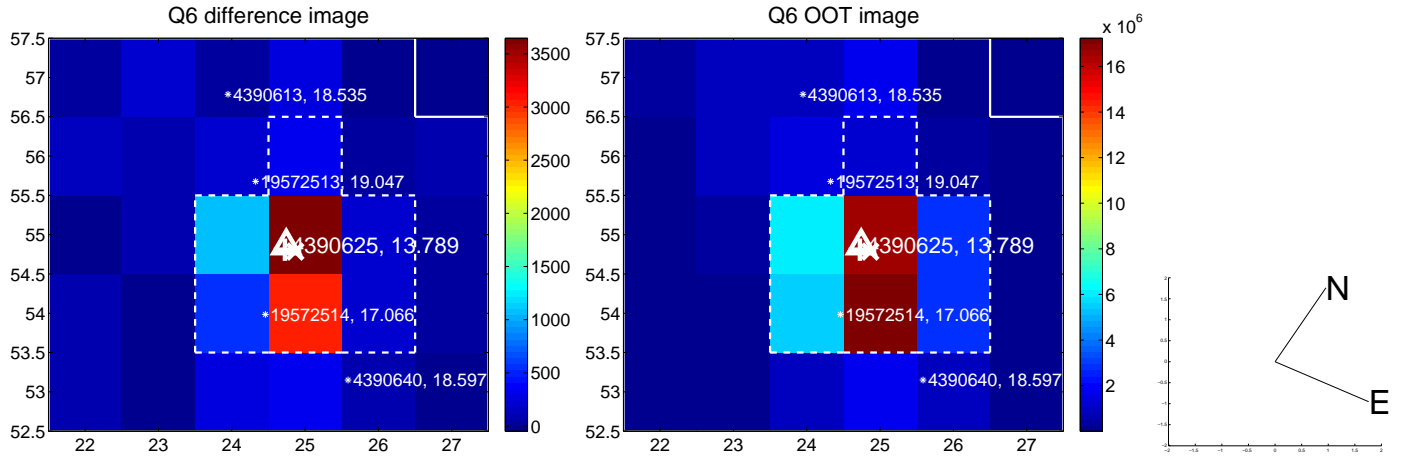
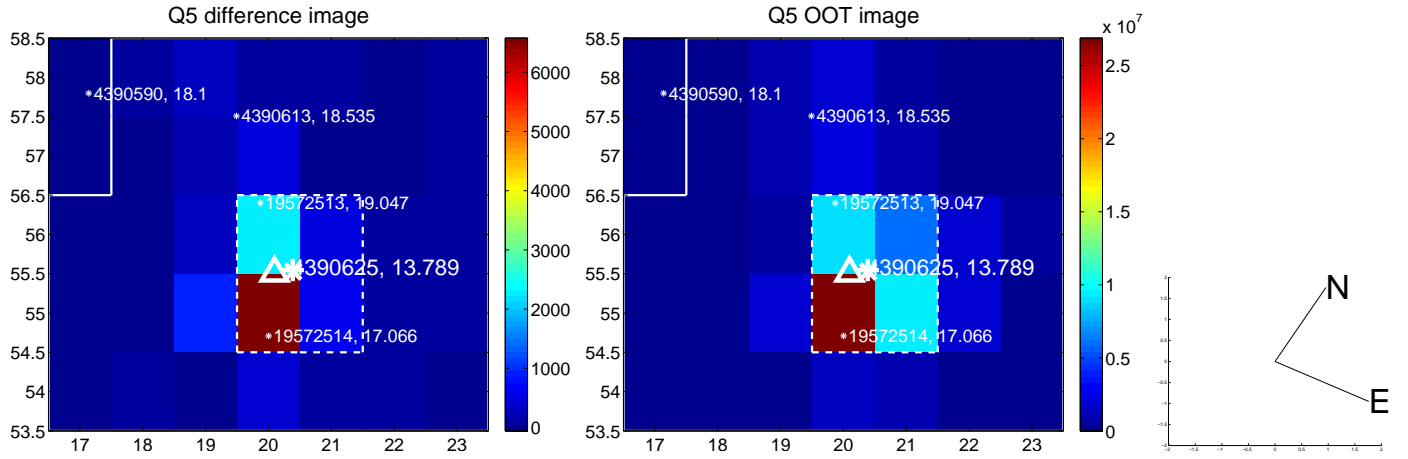
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.





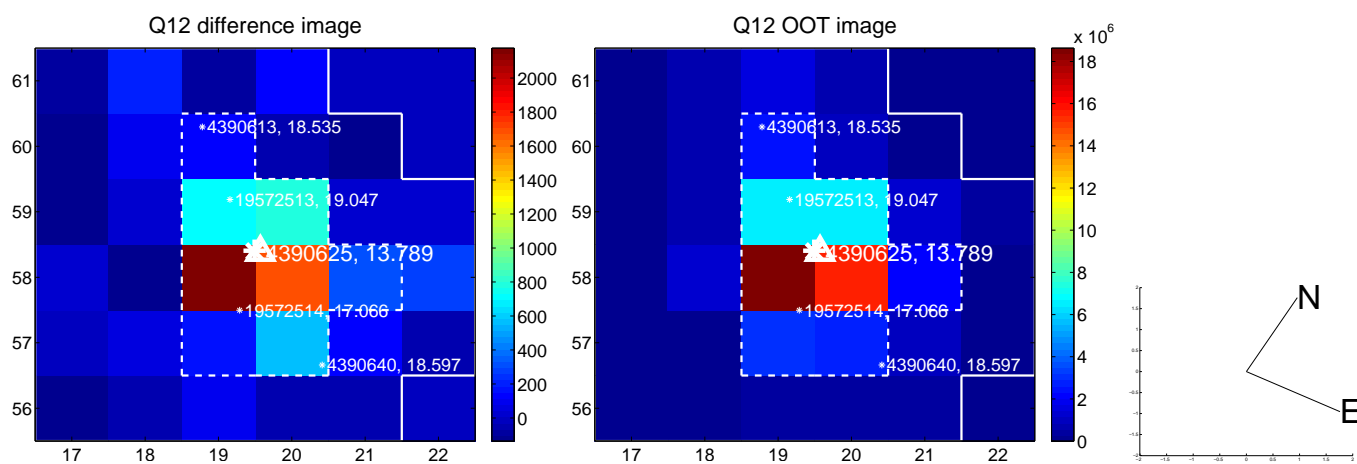
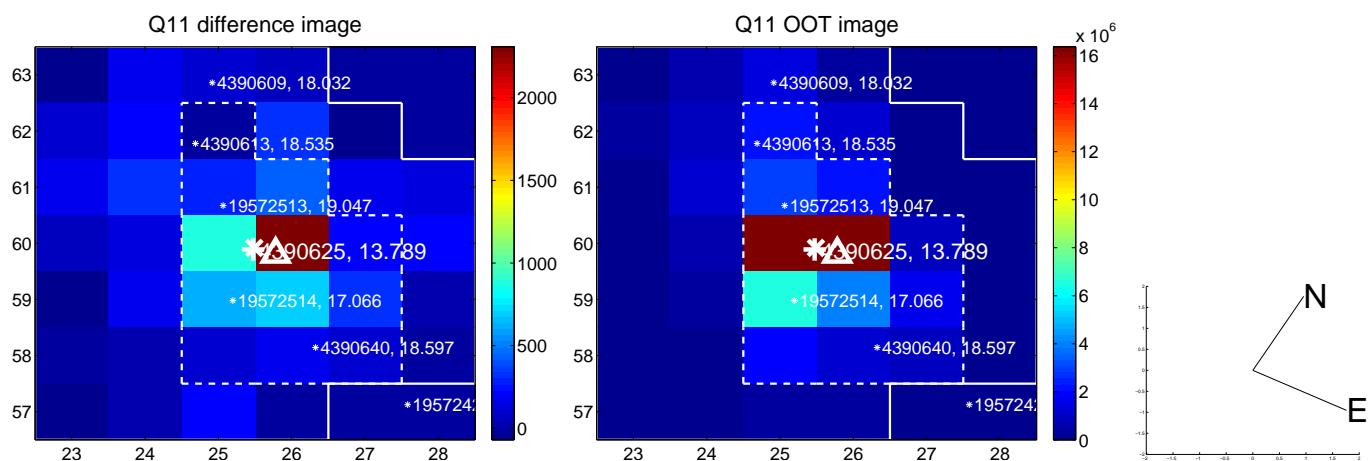
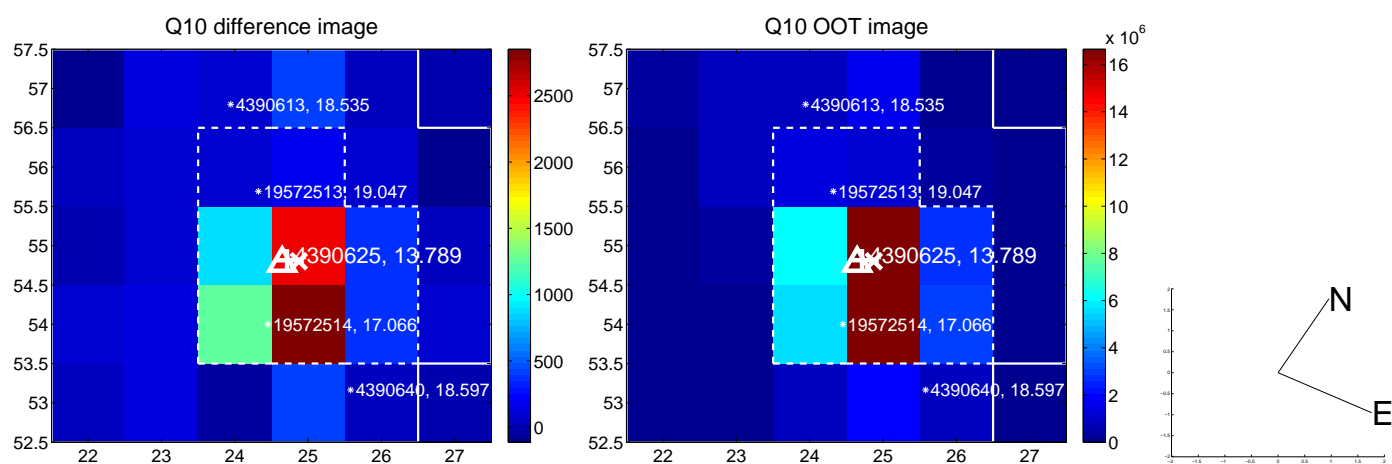
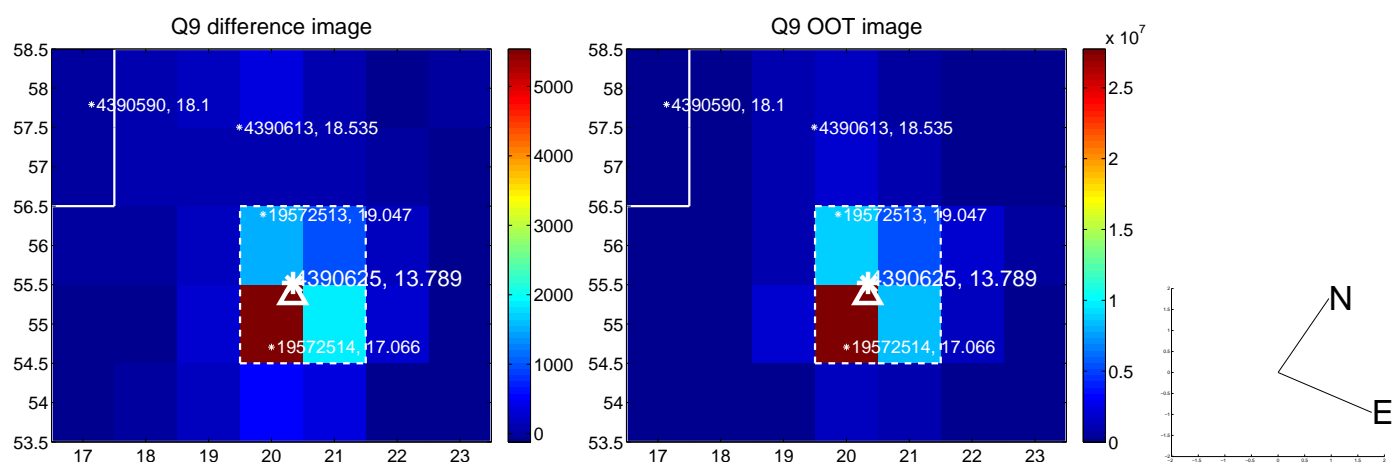


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



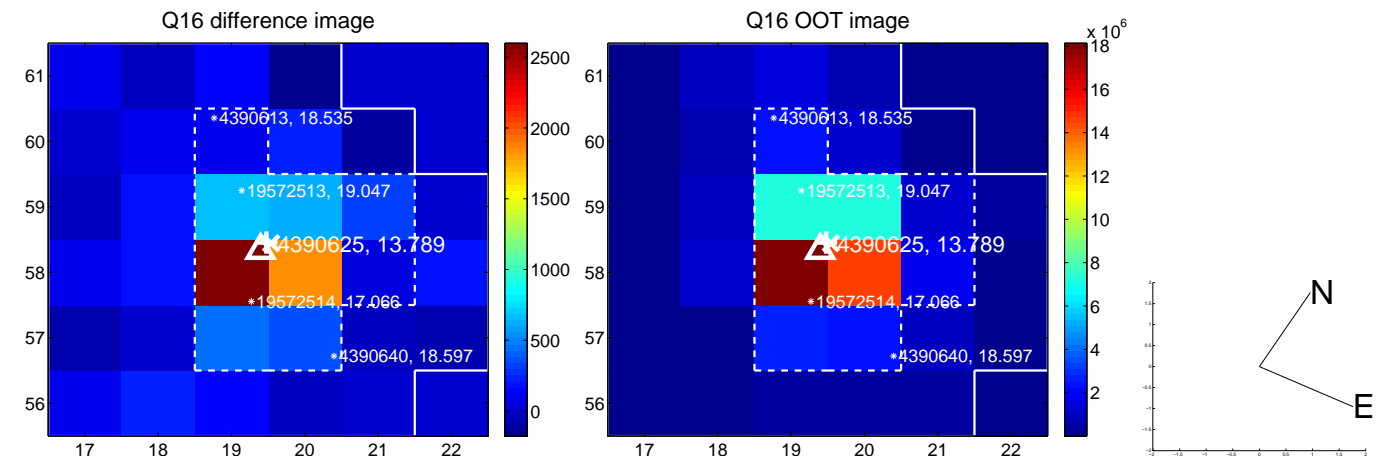
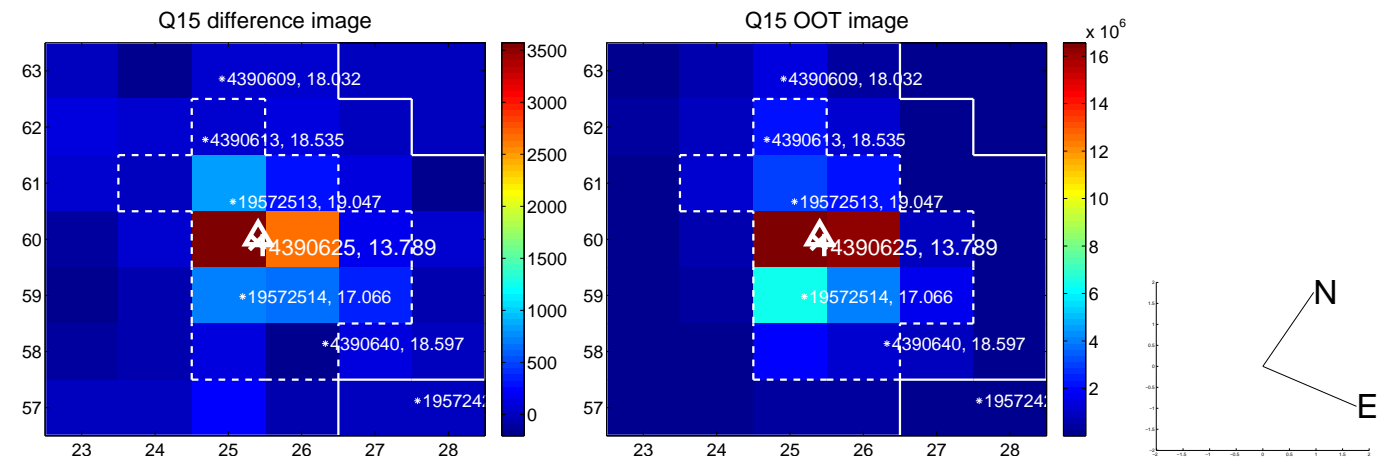
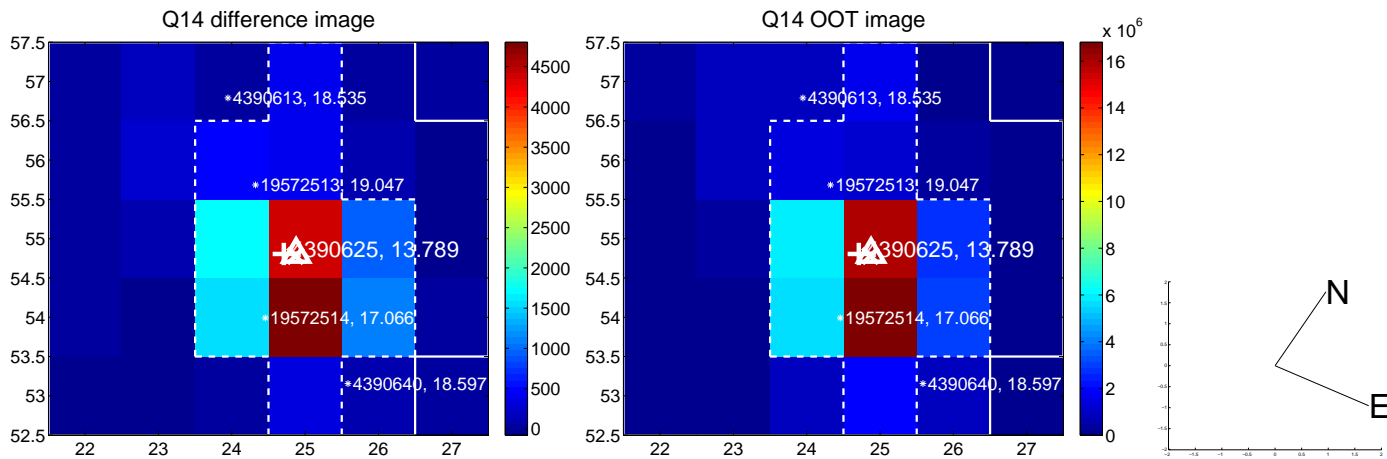
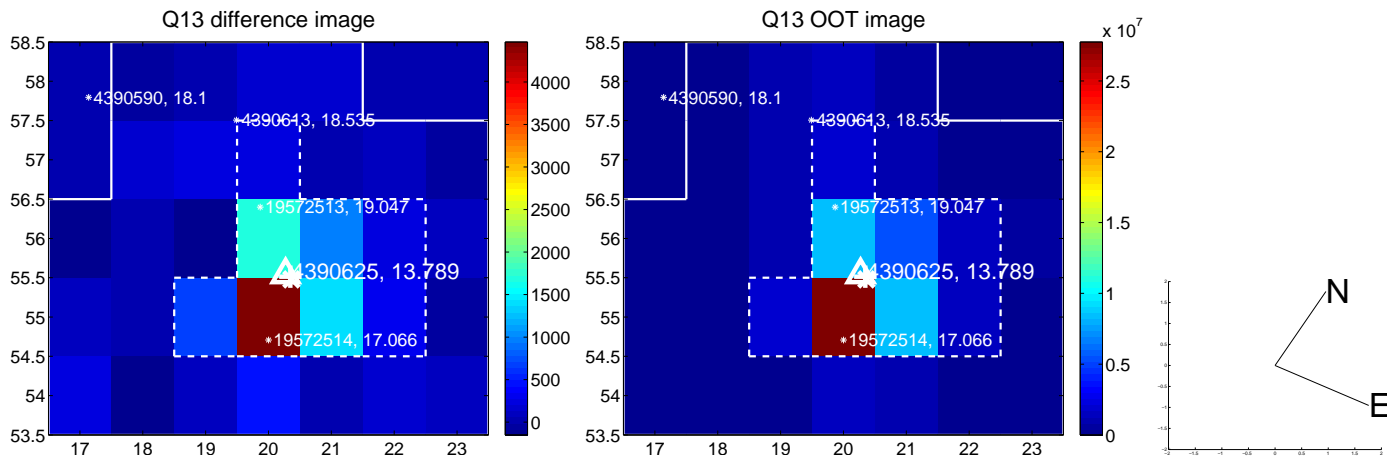


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



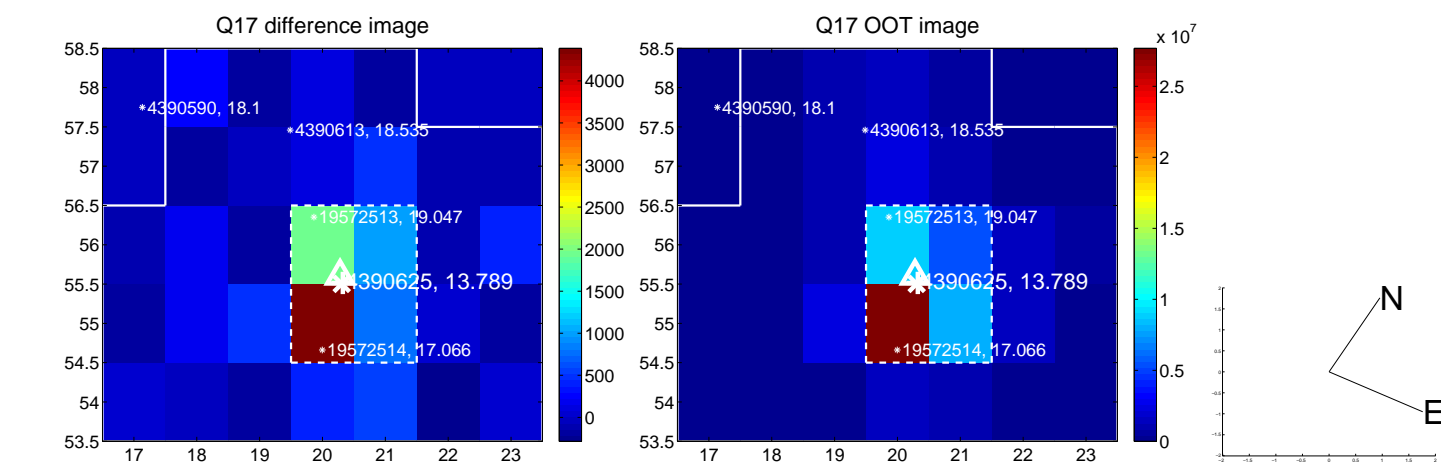


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

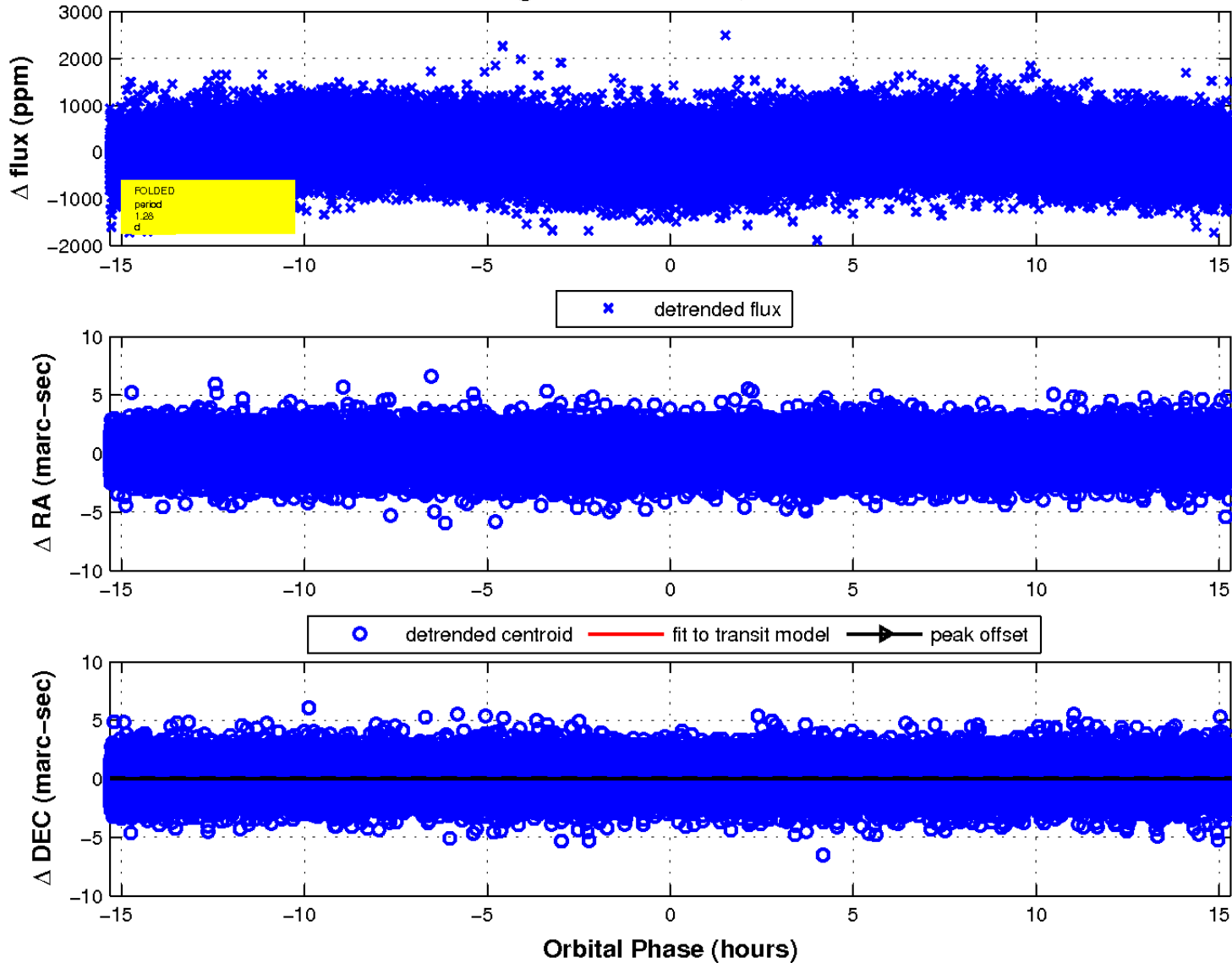




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



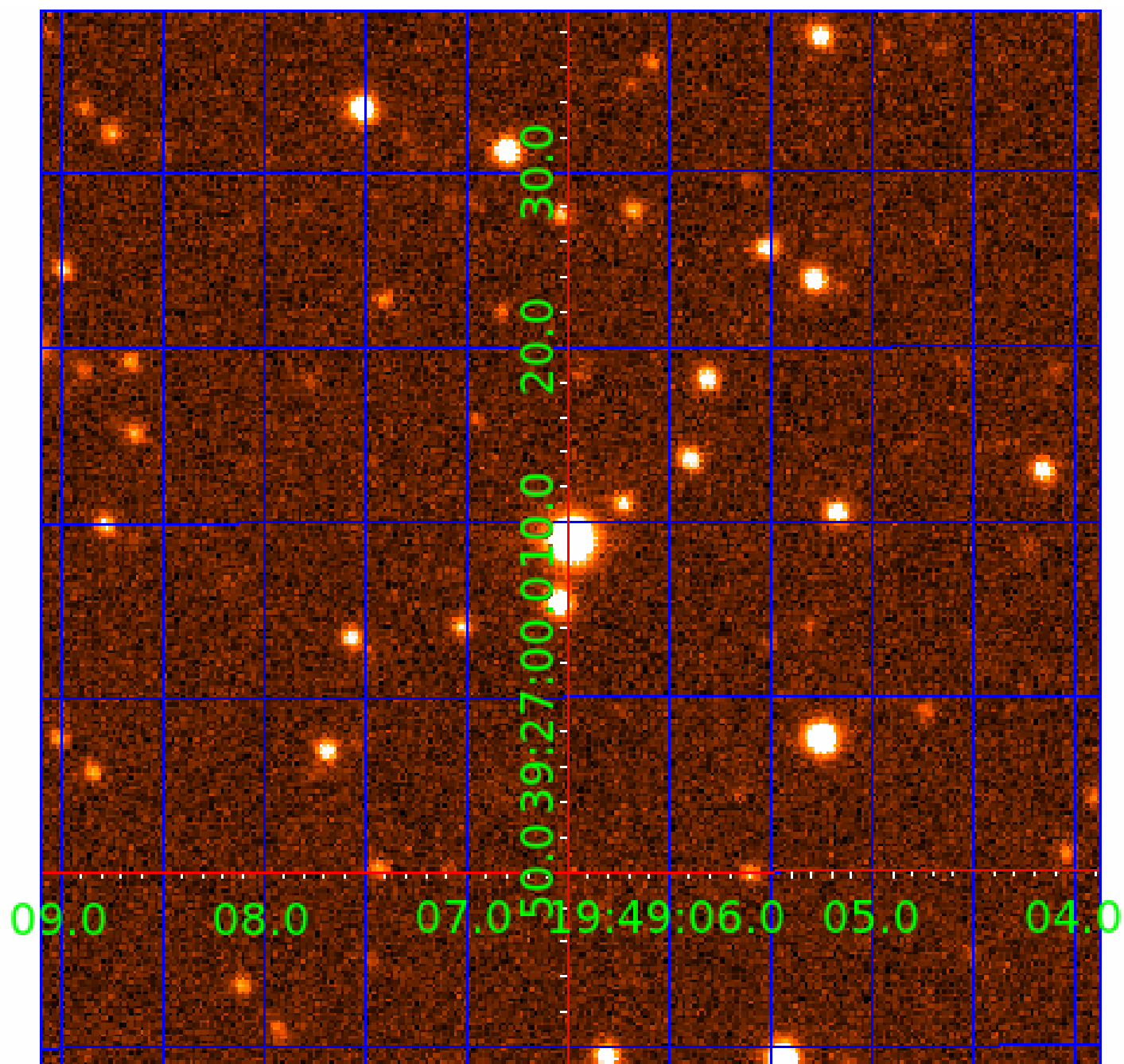
fluxWeightedCentroids, Planet 2 of 9





UKIRT Image

Declination





# KIC 004390625

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004390625-01	OBS	No	2.552800	131.778368	45.1	8.820	7.3	6.4	1.40	6995	1.09	2938.38
004390625-02	OBS	No	1.276435	132.389024	60.3	7.984	9.2	9.3	1.40	6995	1.29	7403.98
004390625-03	OBS	No	75.223800	166.434374	900.8	5.821	8.6	9.9	1.40	6995	5.09	32.28
004390625-04	OBS	No	15.287801	143.491037	275.4	2.651	8.6	6.5	1.40	6995	2.56	270.19
004390625-05	OBS	No	212.739706	191.761958	712.0	4.822	9.5	9.0	1.40	6995	4.65	8.07
004390625-06	OBS	No	30.256104	159.489605	471.5	1.835	8.5	8.0	1.40	6995	3.48	108.74
004390625-07	OBS	No	31.528847	132.957413	702.9	5.557	7.7	9.2	1.40	6995	5.85	102.92
004390625-08	OBS	No	40.289721	146.290226	580.3	5.414	8.1	8.1	1.40	6995	3.58	74.22
004390625-09	OBS	No	638.187757	153.507721	339.7	5.000	7.2	-1.0	1.40	6995	2.61	1.87

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004390625-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004390625-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—SAME_NTL_PERIOD
004390625-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-05	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST
004390625-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004390625-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
004390625-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_NOFITS

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

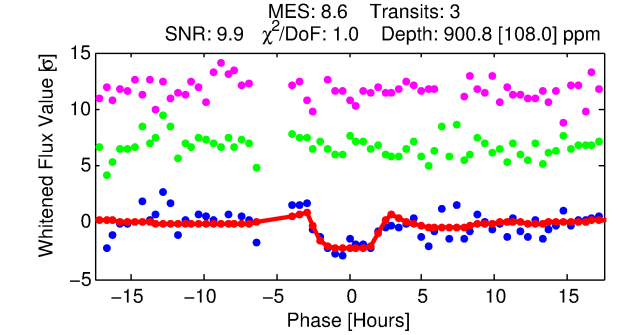
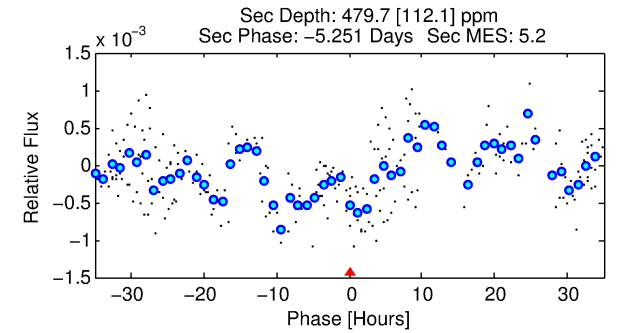
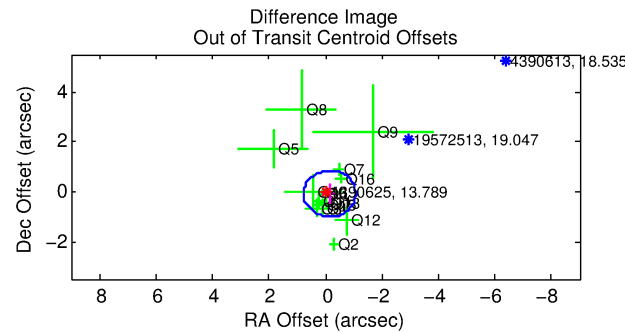
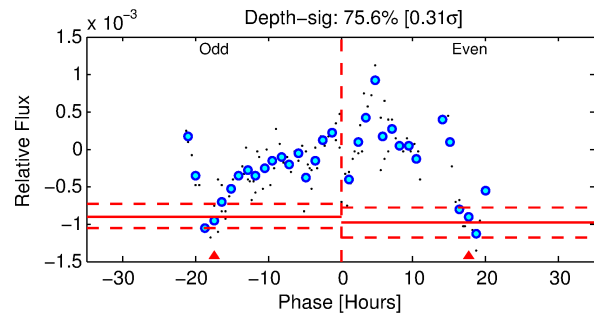
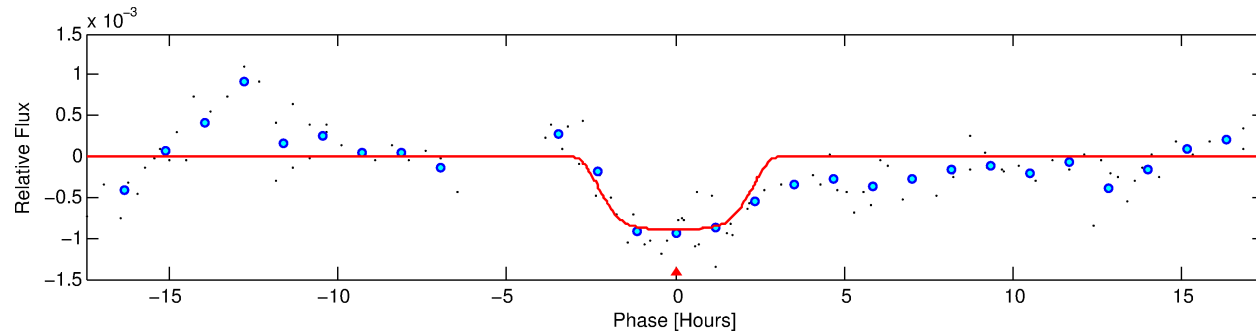
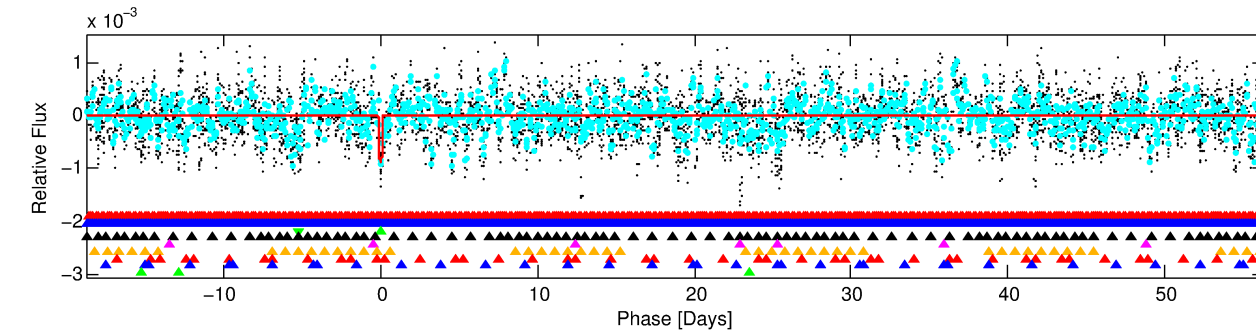
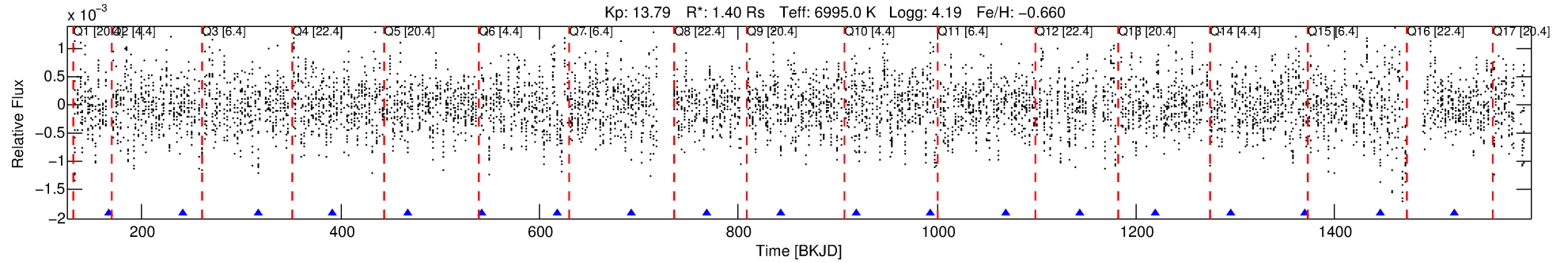
Ephemeris Match Information For 004390625-03

No Significant Match Found



# DV One-Page Summary

KIC: 4390625 Candidate: 3 of 9 Period: 75.224 d



## DV Fit Results:

Period = 75.22380 [0.00090] d  
Epoch = 166.4344 [0.0096] BKJD  
Rp/R\* = 0.0333 [0.0027]  
a/R\* = 42.12 [10.19]  
b = 0.94 [0.03]  
Seff = 32.28 [12.28]  
Teq = 608 [58] K  
Rp = 5.09 [1.48] Re  
a = 0.3609 [0.0844] AU  
Ag = 1326.02 [586.25] [2.26 $\sigma$ ]  
Teffp = 5671 [470] K [10.69 $\sigma$ ]

## DV Diagnostic Results:

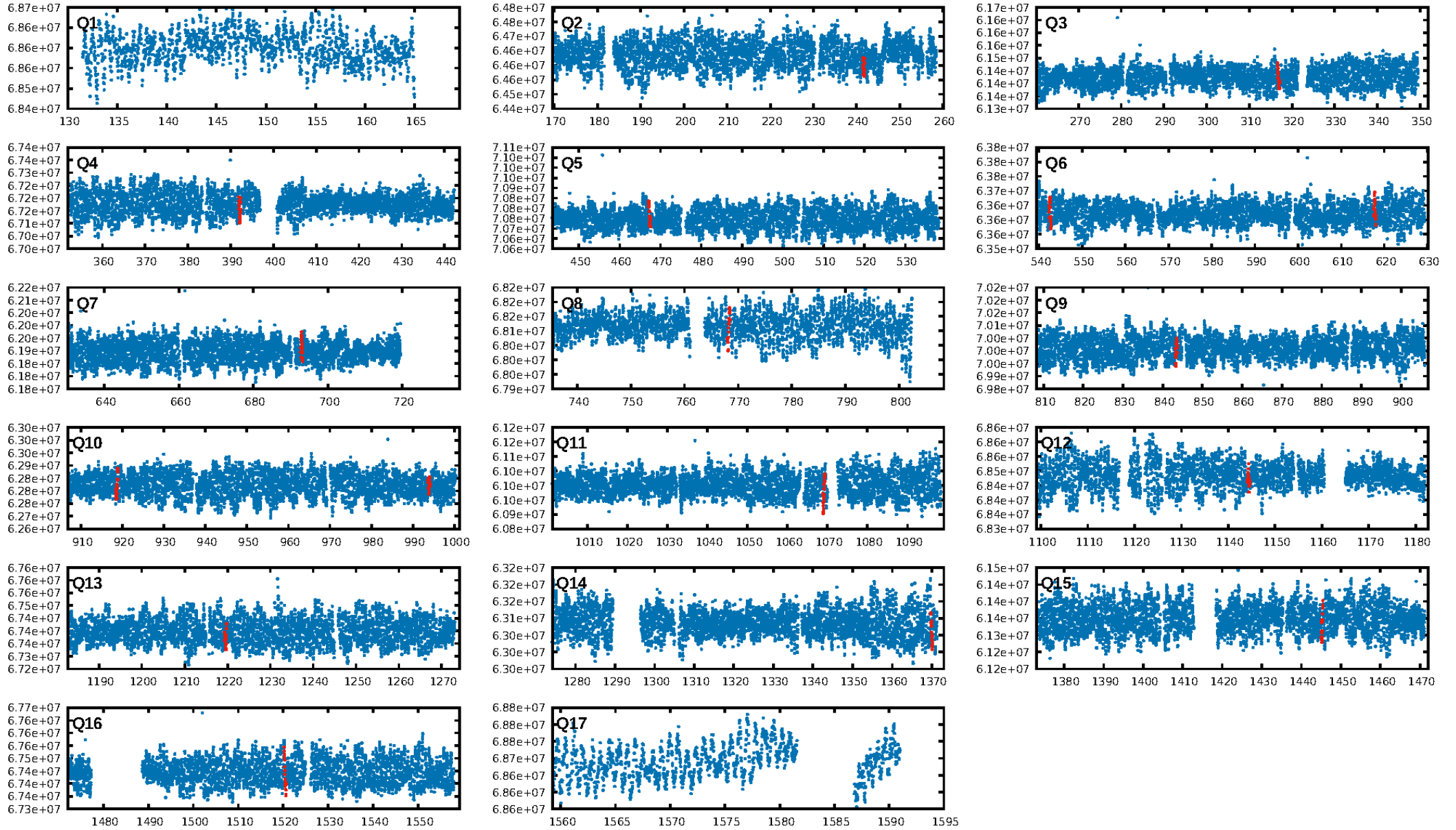
ShortPeriod-sig: 100.0% [105.46 $\sigma$ ]  
LongPeriod-sig: 100.0% [436.61 $\sigma$ ]  
ModelChiSquare2-sig: 56.5%  
ModelChiSquareGof-sig: 99.8%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 0.5945  
Centroid-sig: N/A  
Centroid-so: 0.226 arcsec [0.79 $\sigma$ ]  
OotOffset-rm: 0.165 arcsec [0.54 $\sigma$ ]  
KicOffset-rm: 0.321 arcsec [1.08 $\sigma$ ]  
OotOffset-st: 3/4/4/3 [14]  
KicOffset-st: 3/4/4/3 [14]  
DiffImageQuality-fgm: 0.57 [8/14]  
DiffImageOverlap-fno: 0.00 [0/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 16:27:14 Z

This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

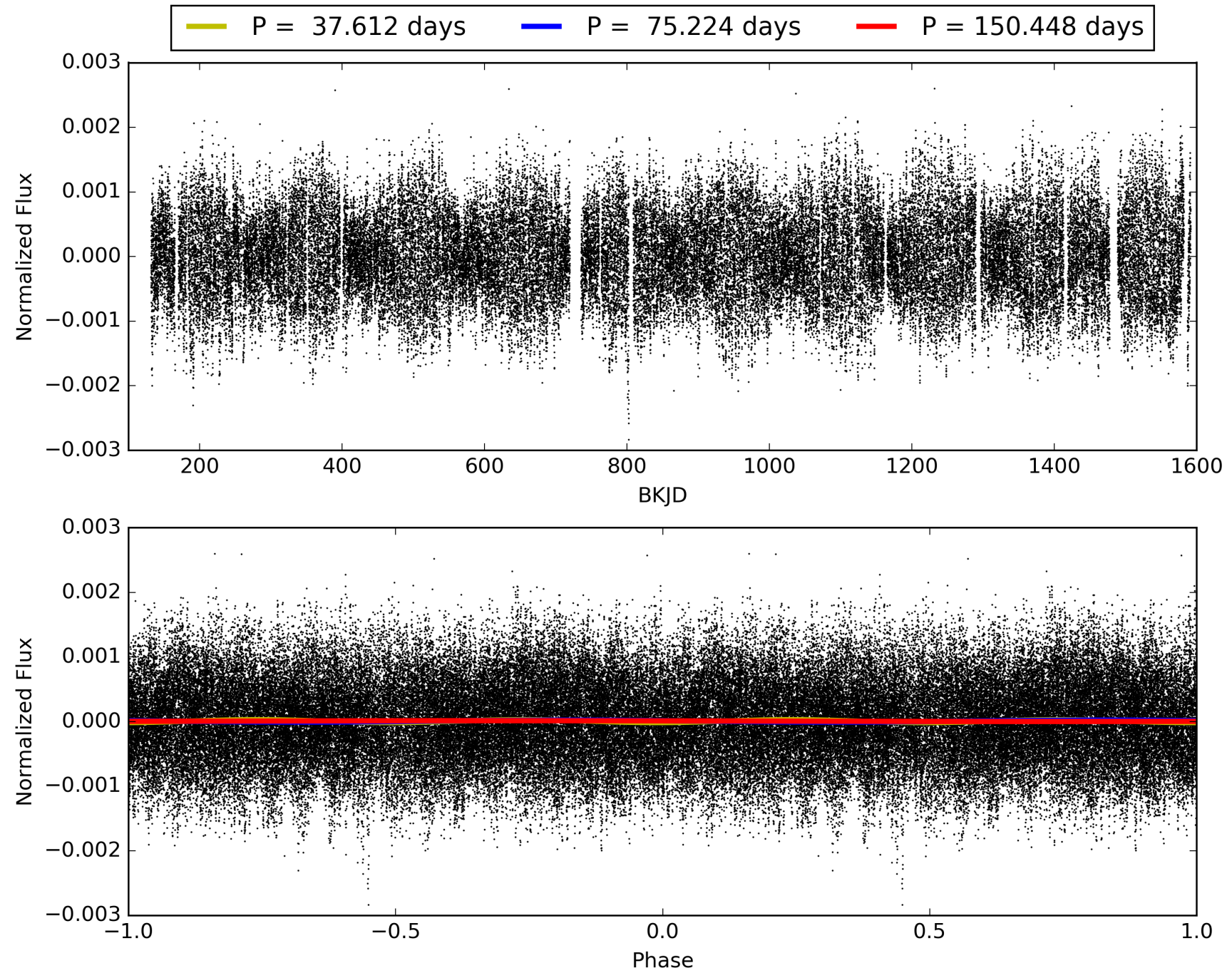


# TCE 004390625-03, PDC Light Curves





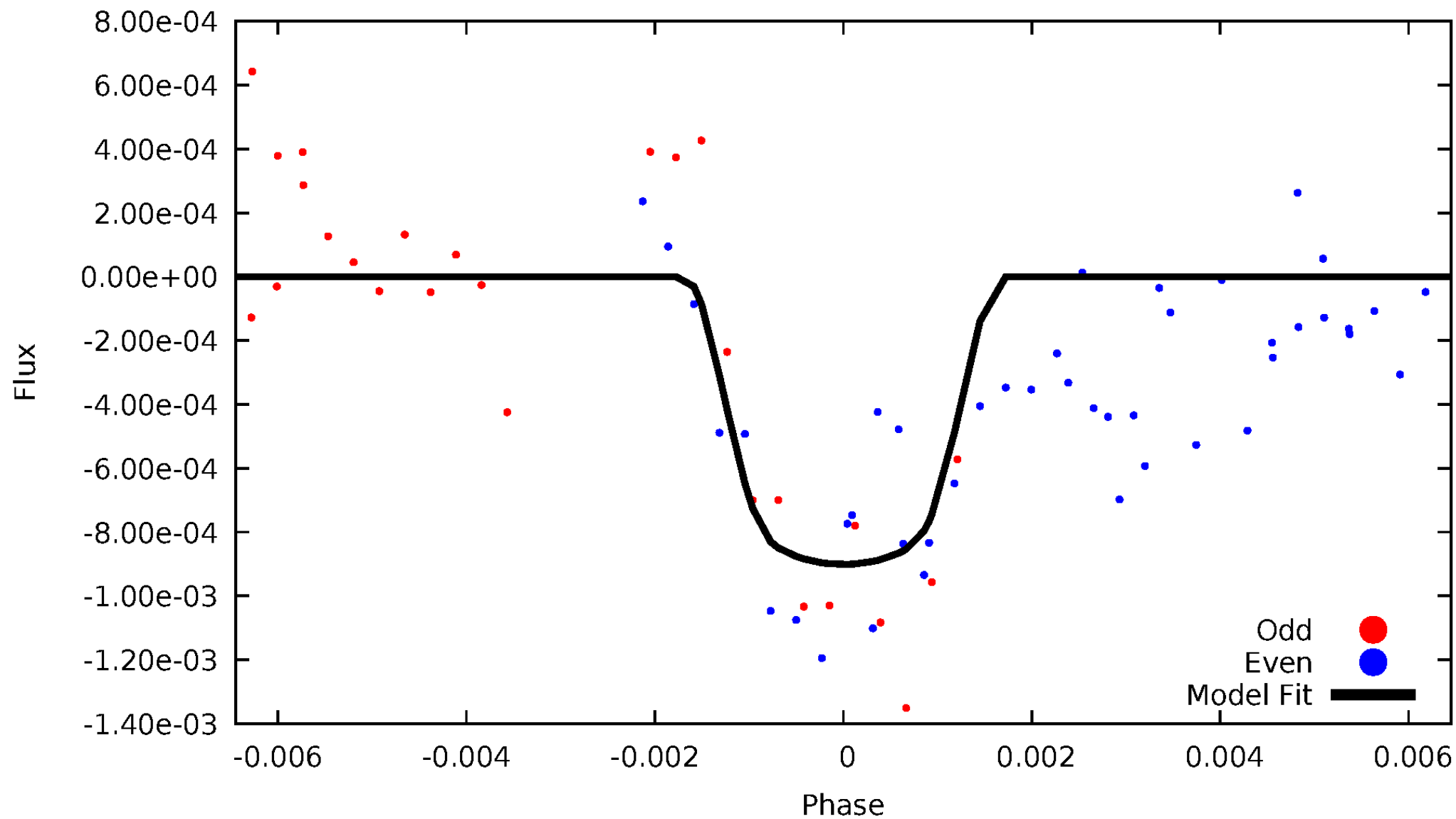
TCE 004390625-03





# DV Odd/Even

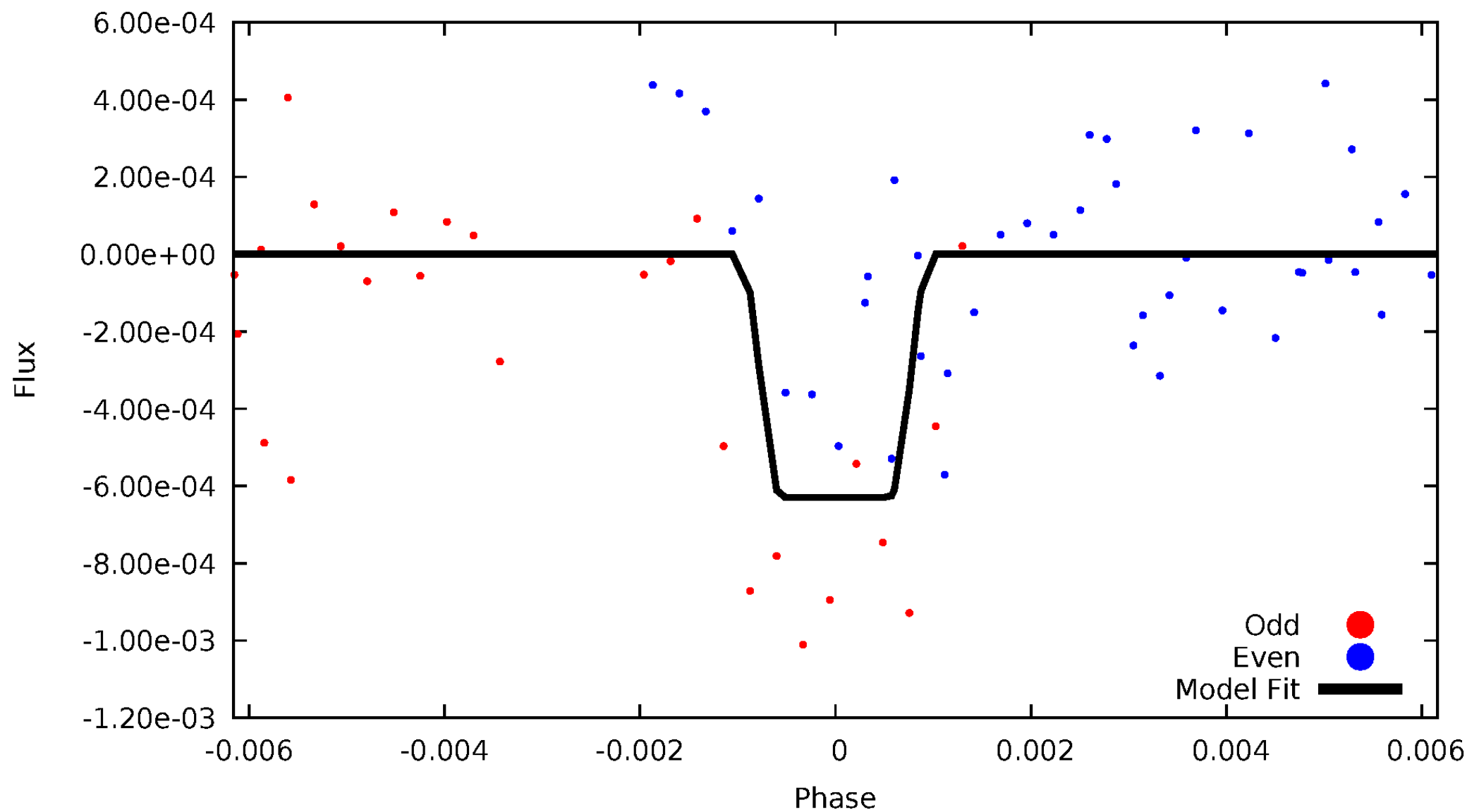
TCE 004390625-03





# ALT Odd/Even

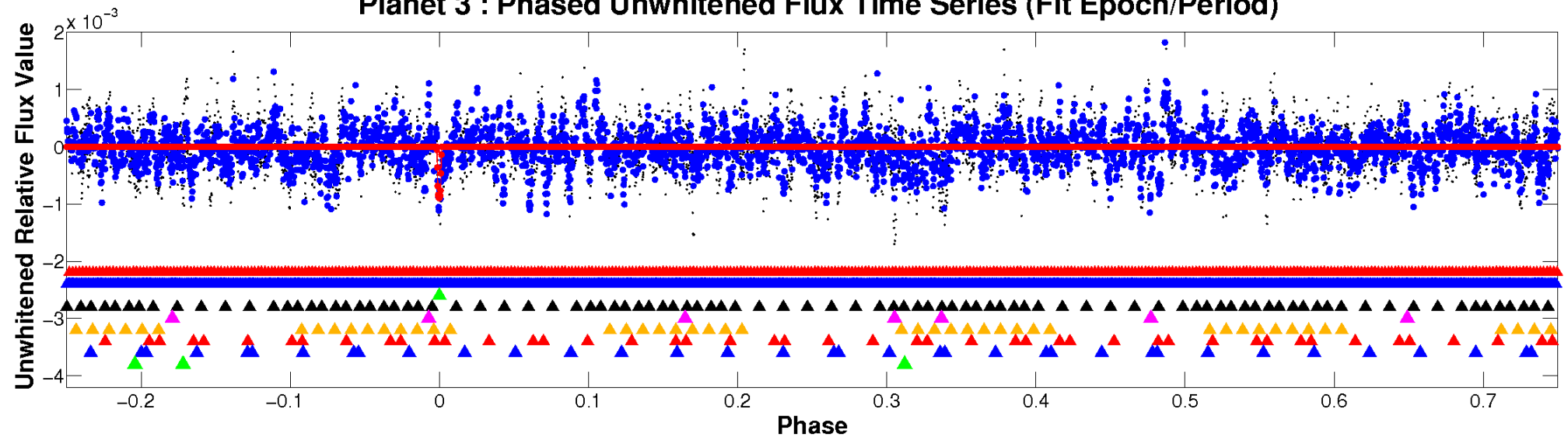
TCE 004390625-03



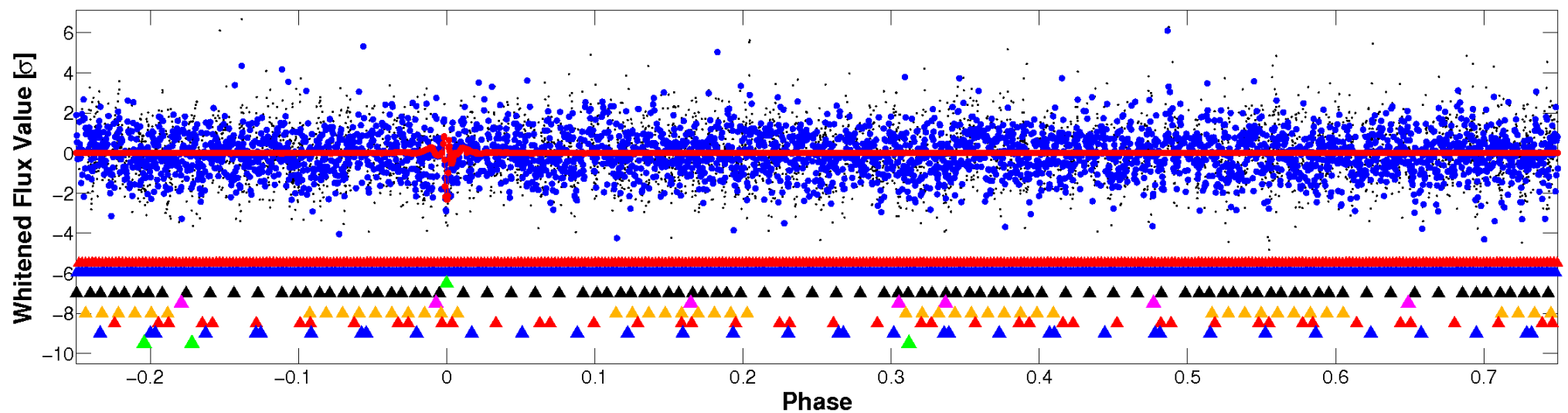


# Non-Whitened Vs. Whitened Light Curve

Planet 3 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



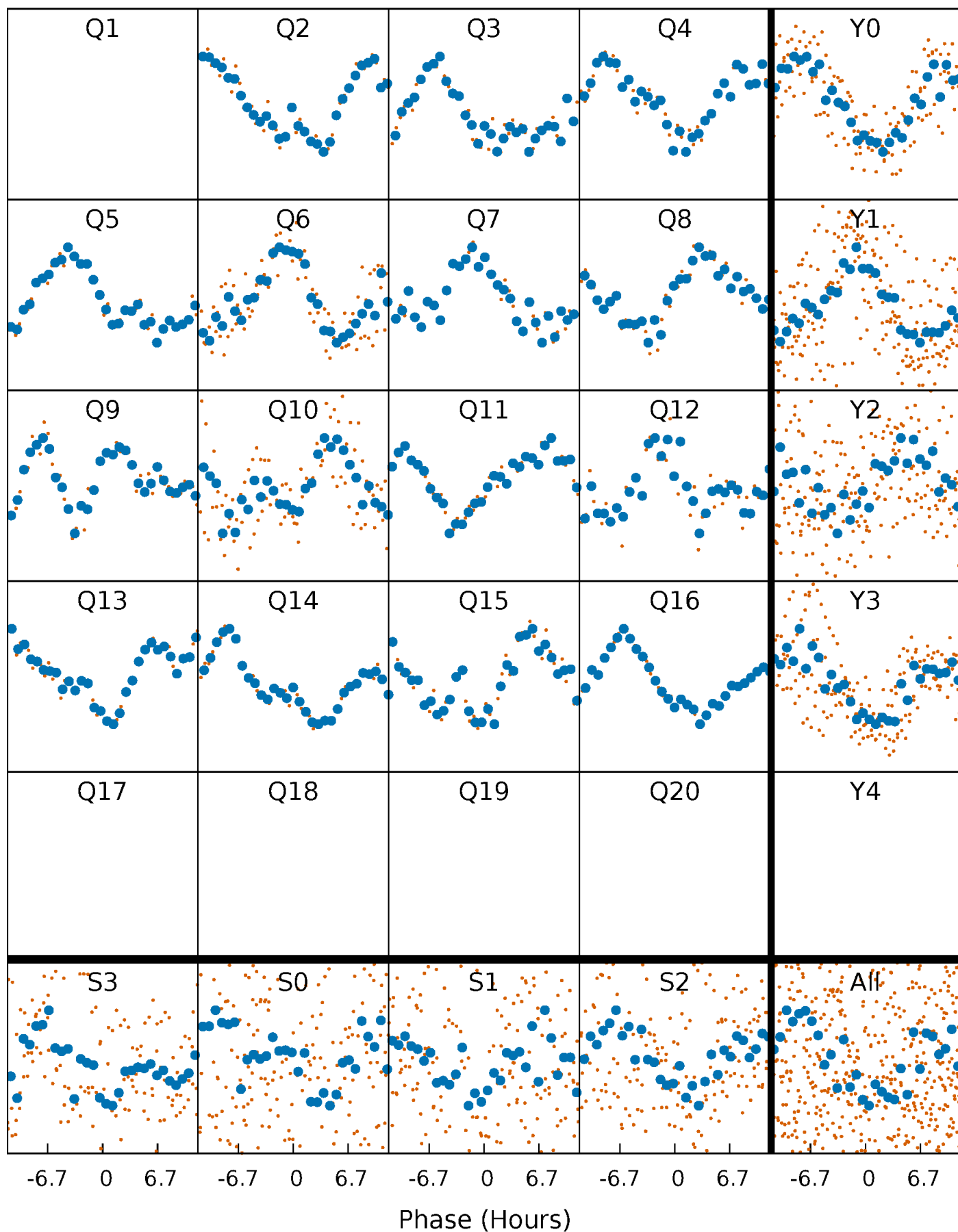
Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

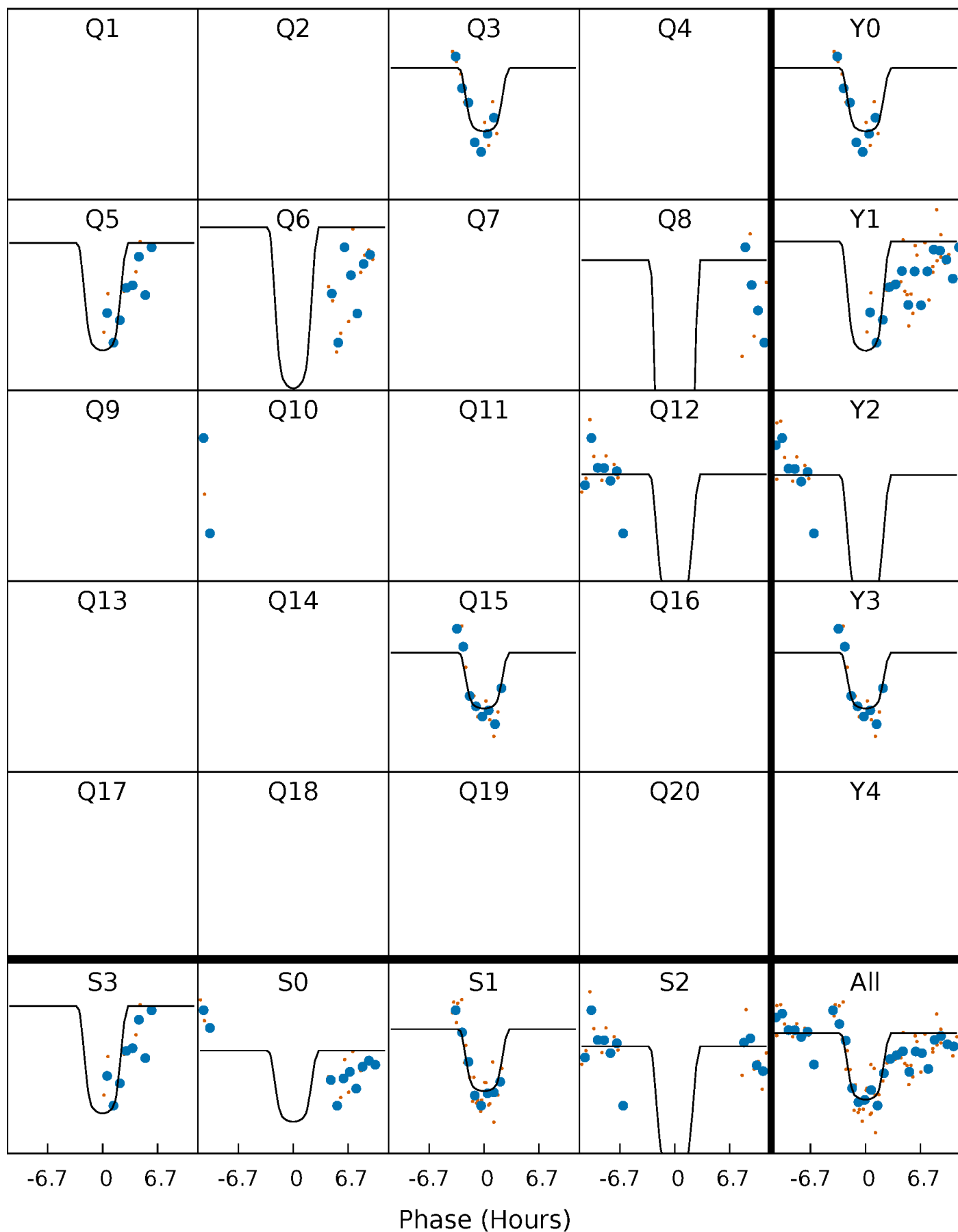
TCE 004390625-03   P= 75.223800 Days    $T_0=166.434374$  (BKJD)





# DV Quarter-Phased Transit Curves

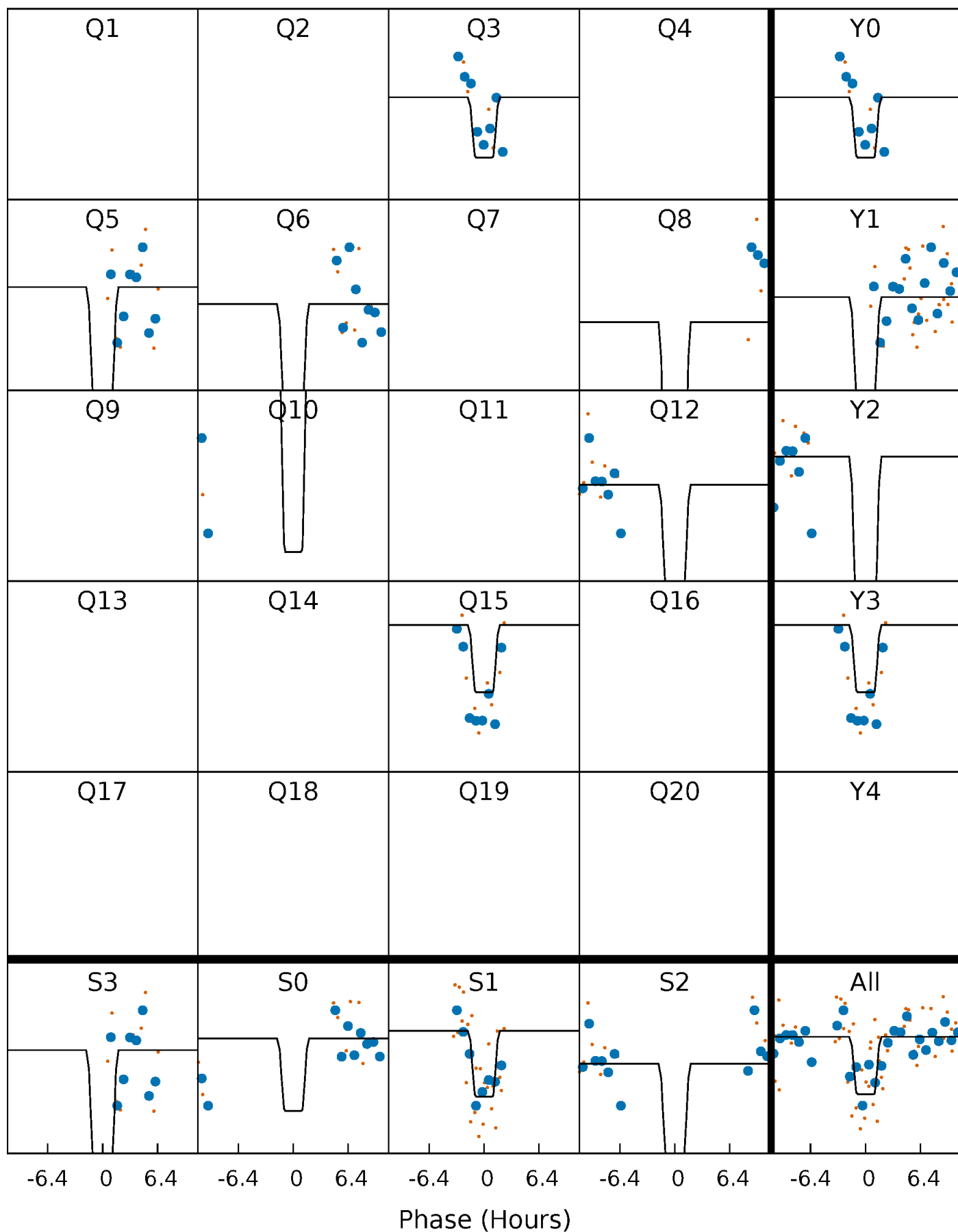
TCE 004390625-03     $P = 75.223800$  Days     $T_0 = 166.434374$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 004390625-03 P= 75.224658 Days  $T_0=166.413012$  (BKJD)

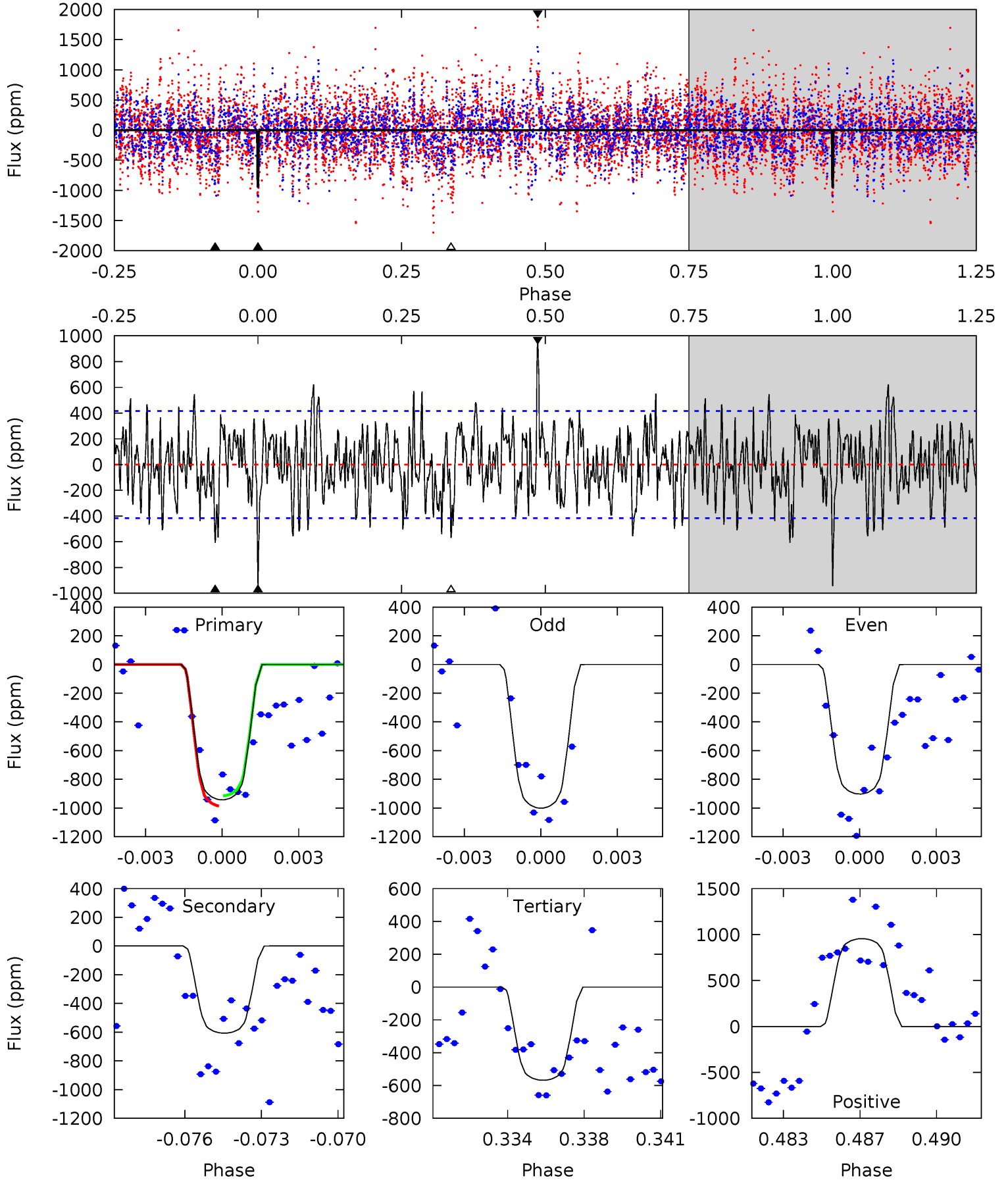




# DV Model-Shift Uniqueness Test

004390625-03, P = 75.223800 Days, E = 91.210574 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.9	7.63	7.15	12.0	5.23	2.94	2.69	4.72	-0.15	0.48	-4.38	0.62	0.95	0.50	0.44

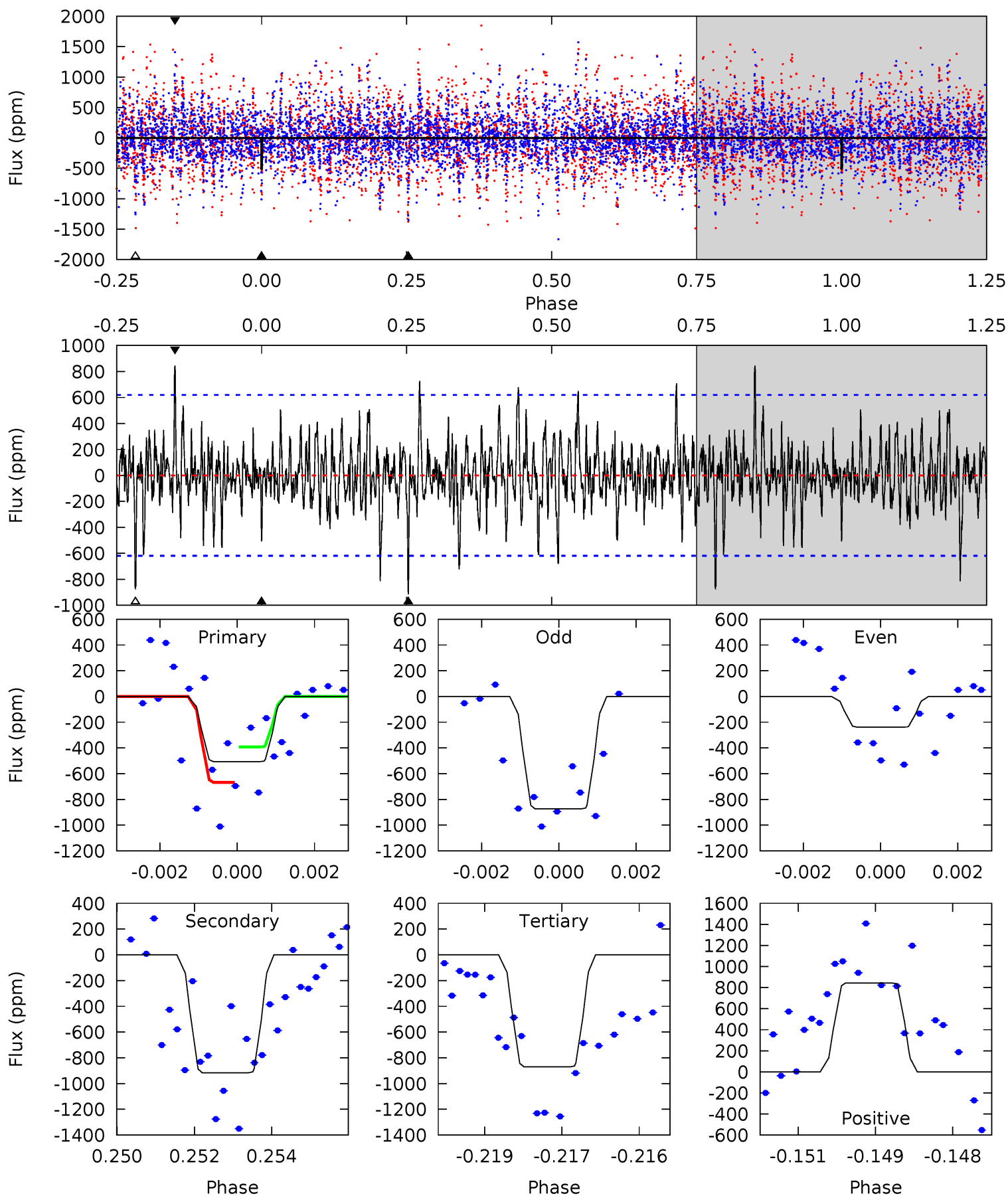




# Alt Model-Shift Uniqueness Test

004390625-03, P = 75.224658 Days, E = 91.188354 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.39	7.94	7.53	7.31	5.36	3.15	1.79	-3.15	-2.92	0.40	0.63	2.70	1.14	0.48	1.15





### Stellar Parameters For KIC 004390625

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6995^{+219}_{-301}$	$4.190^{+0.185}_{-0.167}$	$-0.660^{+0.250}_{-0.300}$	$1.400^{+0.390}_{-0.319}$	$1.106^{+0.160}_{-0.131}$	$0.568^{+0.534}_{-0.277}$
	+3%/-4%	+4%/-4%	+38%/-45%	+28%/-23%	+14%/-12%	+94%/-49%
Source	PHO1	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 004390625-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-607 \pm 80$	$5.09^{+0.92}_{-0.75}$	$848^{+71}_{-60}$	$5974^{+363}_{-366}$	$1652^{+647}_{-467}$
Alt.	$-916 \pm 115$	$3.88^{+0.73}_{-0.63}$	$851^{+62}_{-61}$	$7743^{+735}_{-609}$	$4346^{+1995}_{-1277}$

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature

$T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$



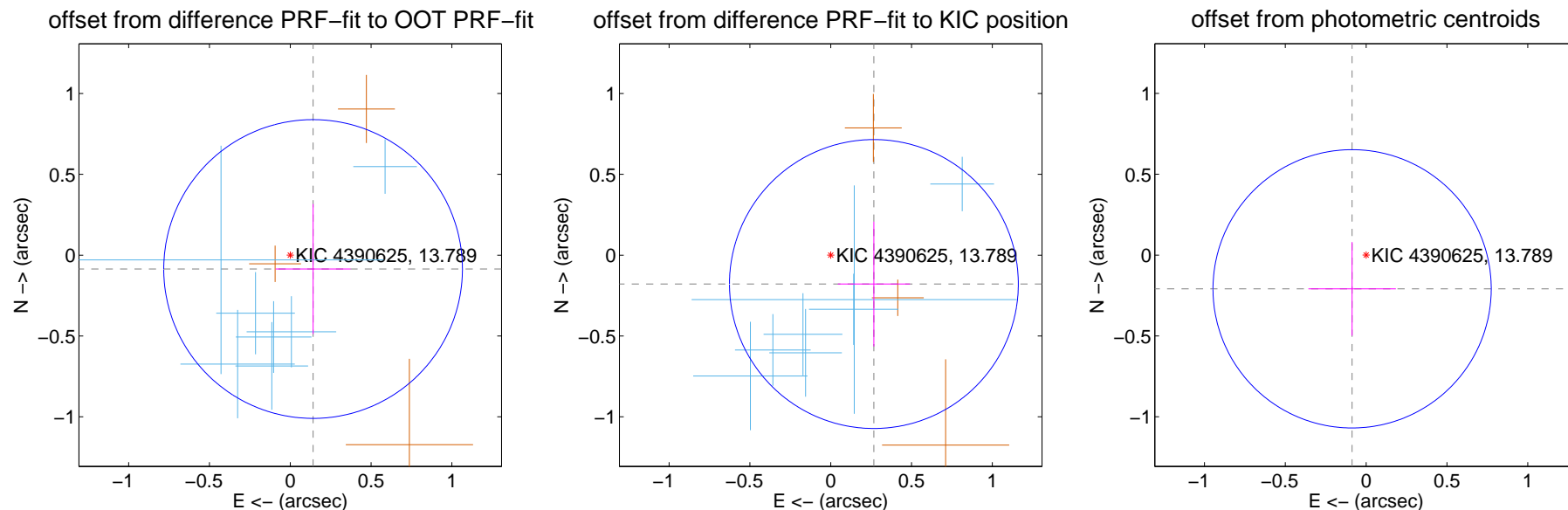
## DV Centroid Data

Supplemental centroid analysis for 004390625-03. Kepler magnitude: 13.79. Transit SNR 9.85

There are 8 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.25 arcsec

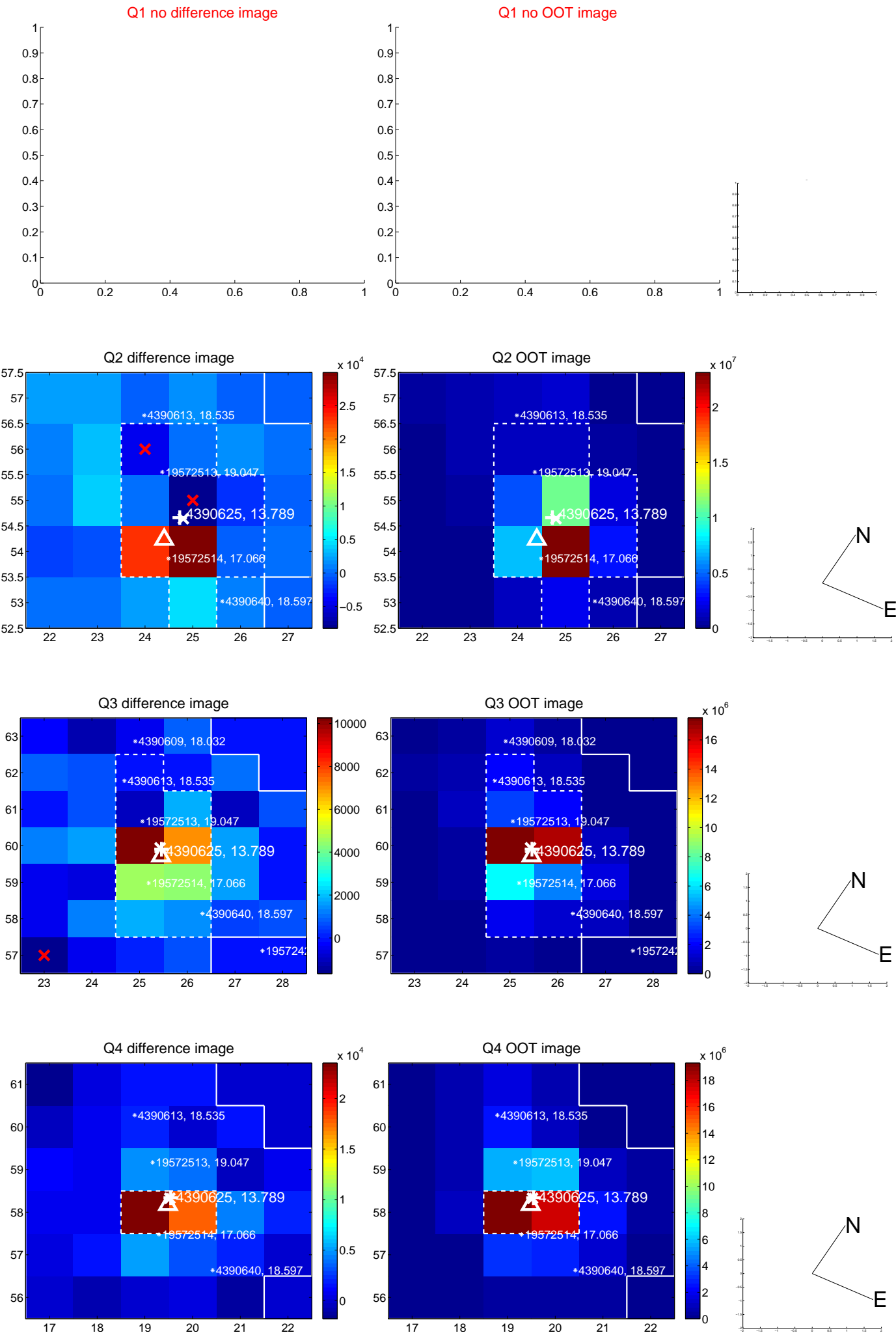
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.165 \pm 0.308$	0.54	$-0.141 \pm 0.232$	$-0.086 \pm 0.402$
PRF-fit source offset from KIC position	$0.321 \pm 0.298$	1.08	$-0.267 \pm 0.223$	$-0.179 \pm 0.386$
photometric centroid source offset	$0.23 \pm 0.29$	0.79	$0.09 \pm 0.27$	$-0.21 \pm 0.29$



Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

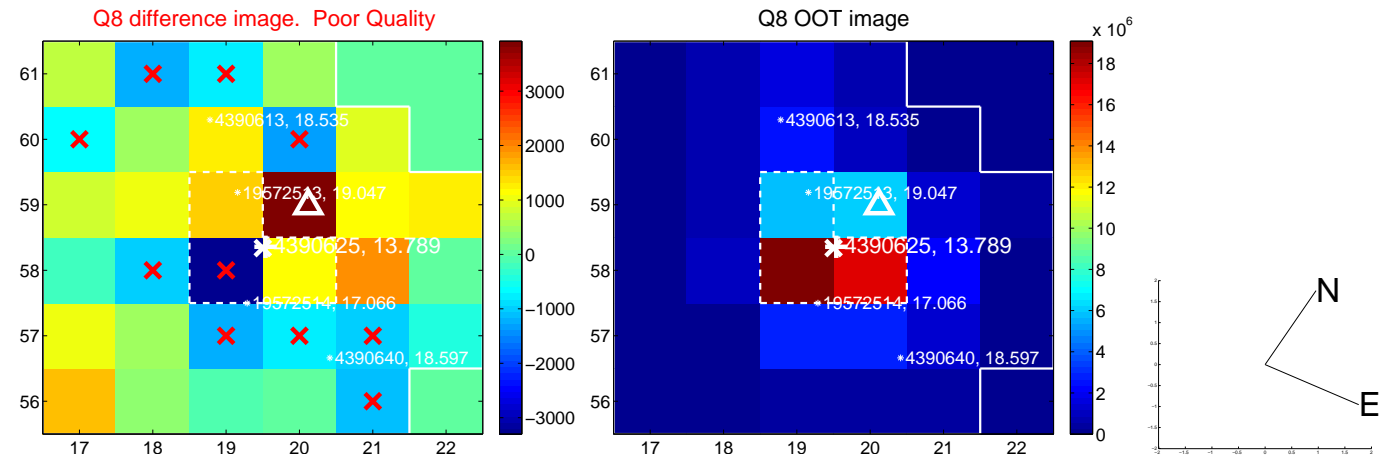
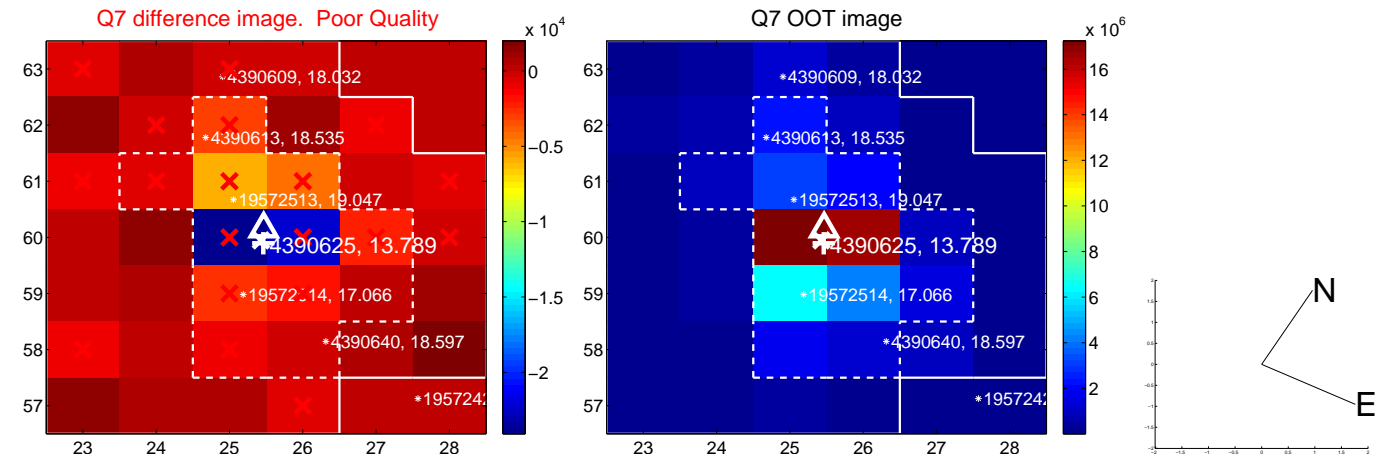
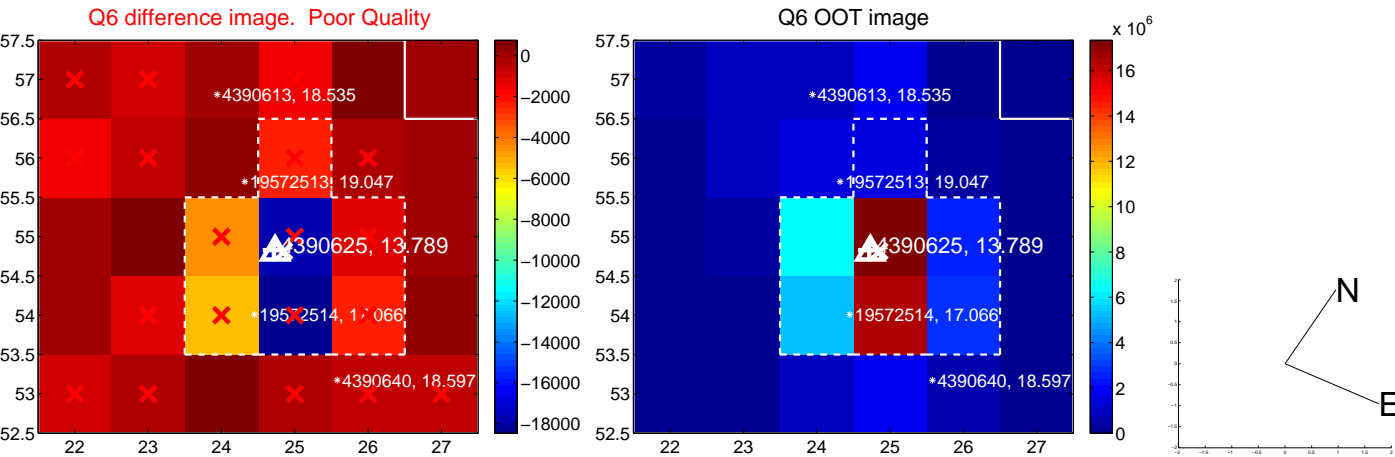
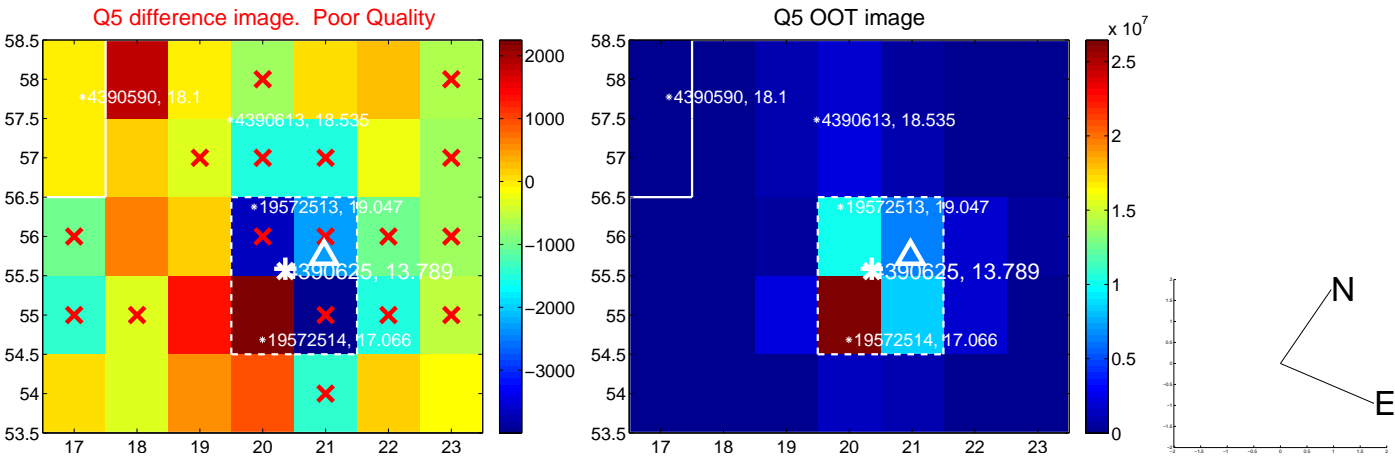


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



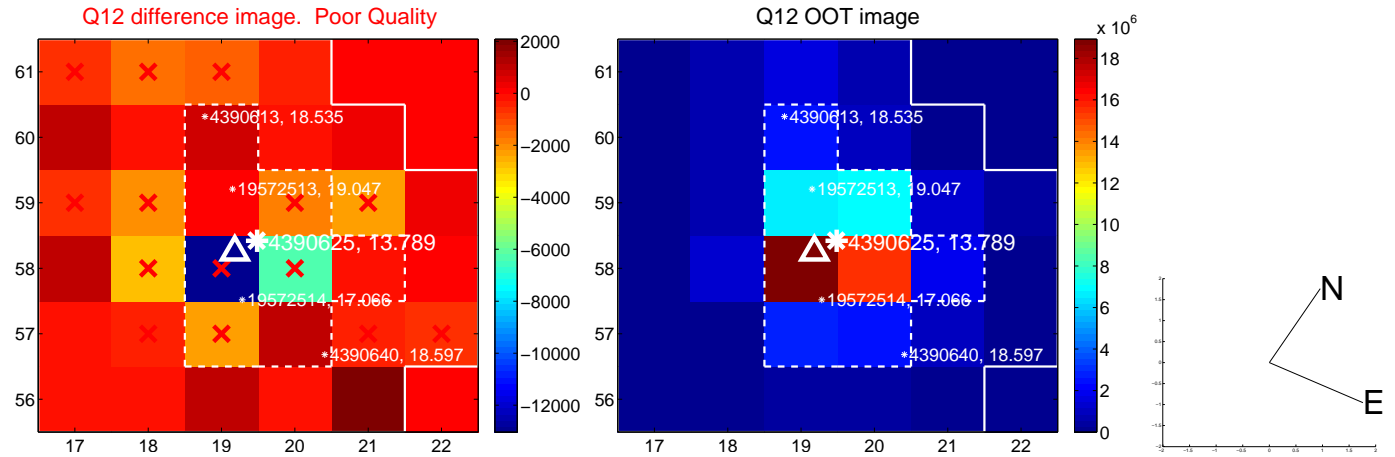
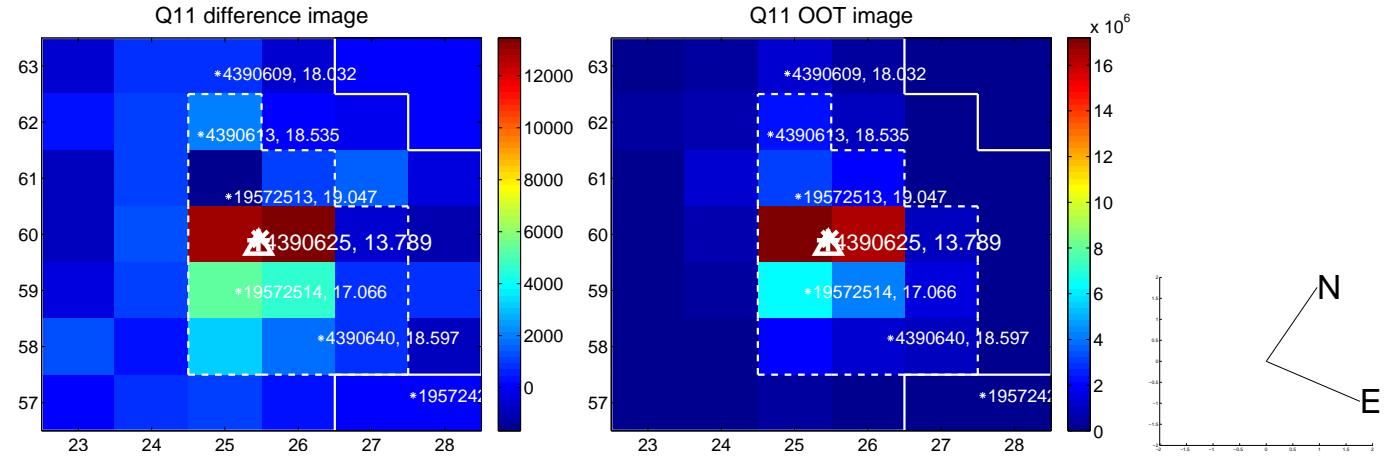
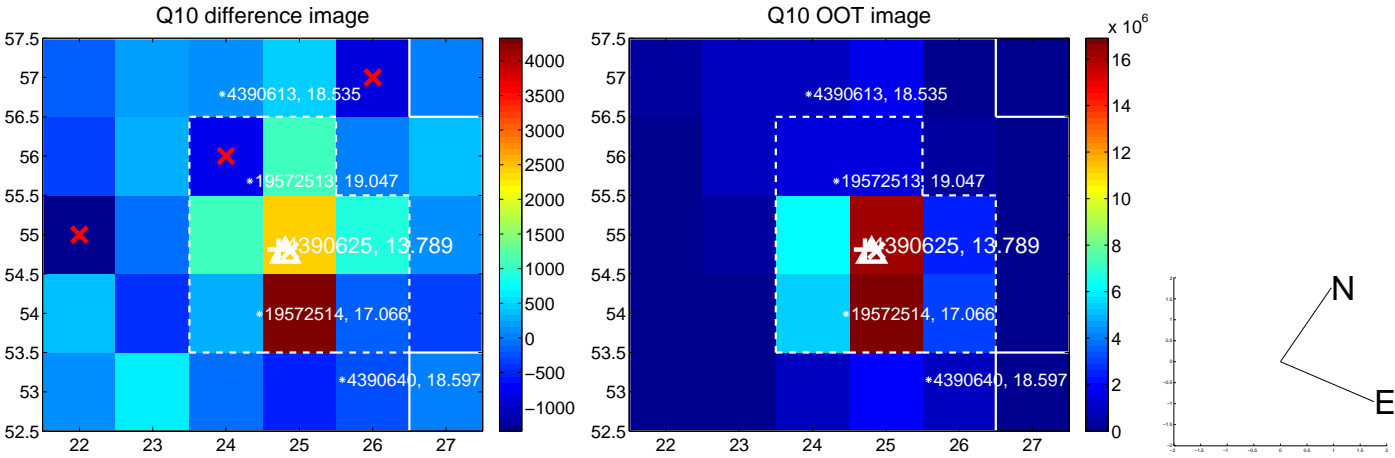
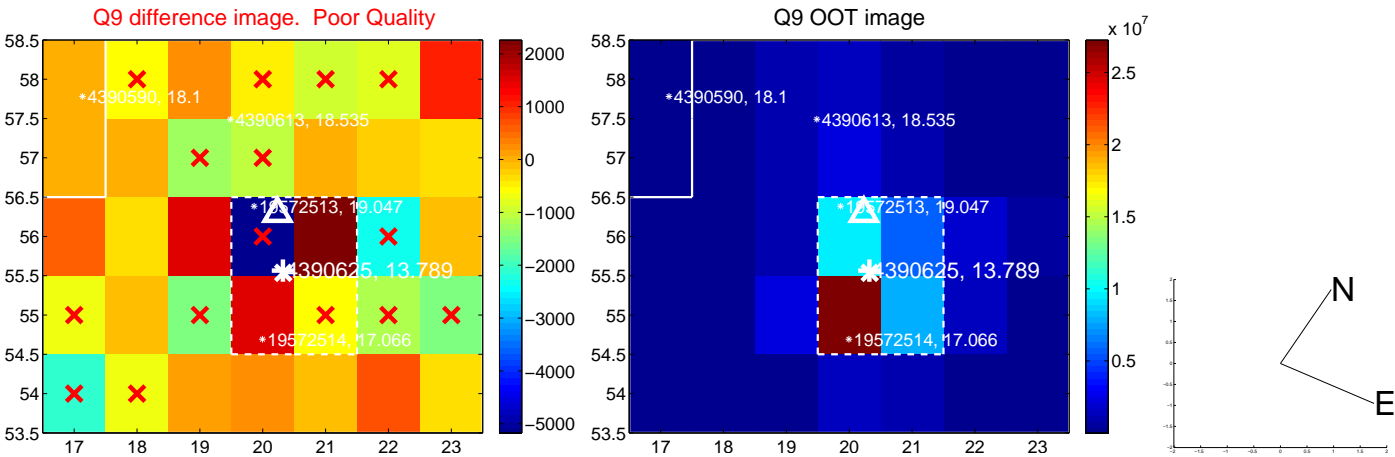


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



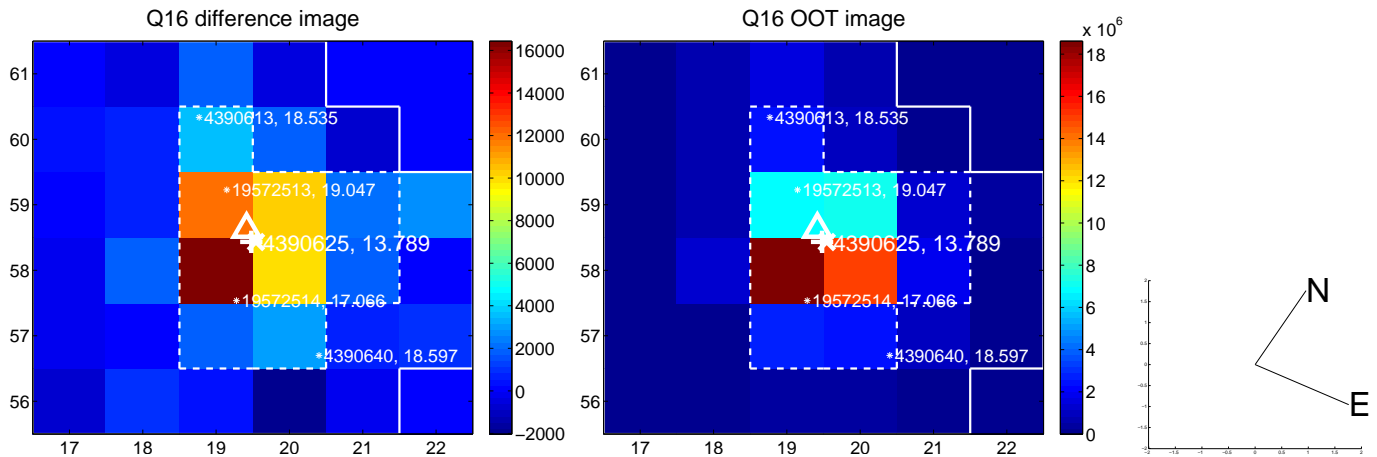
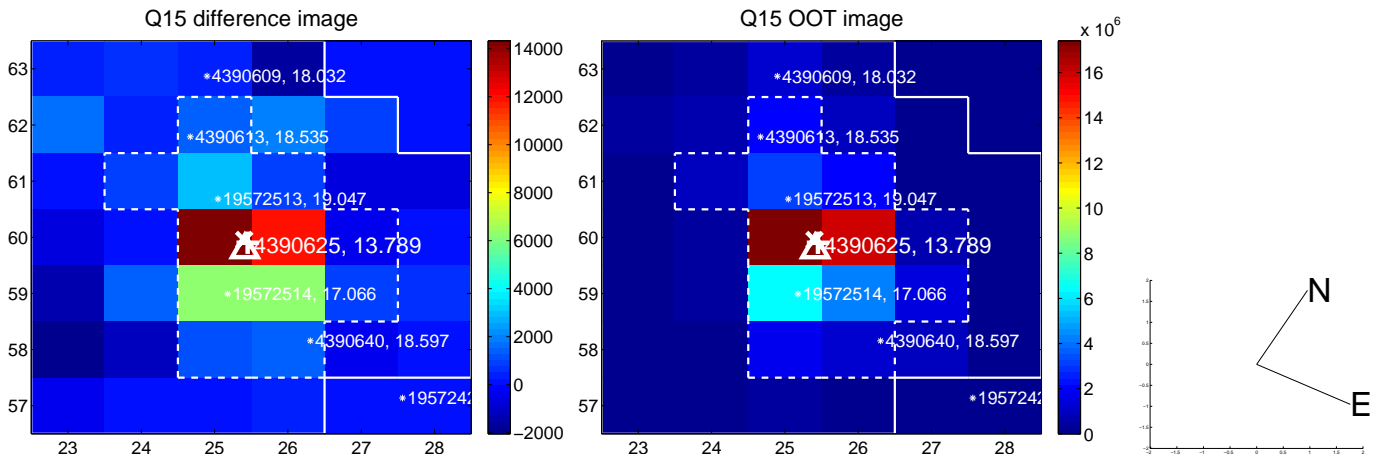
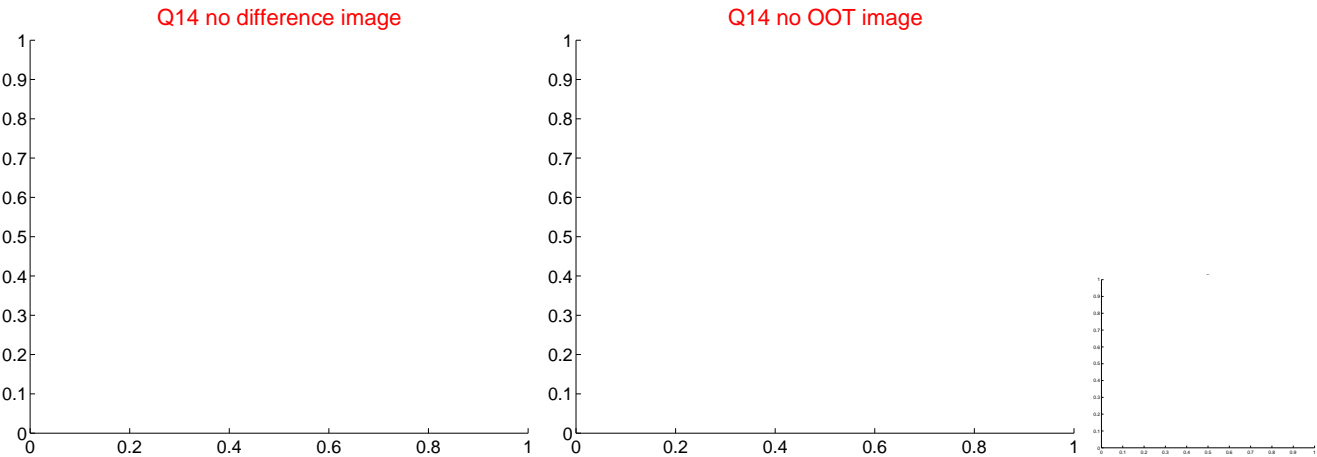
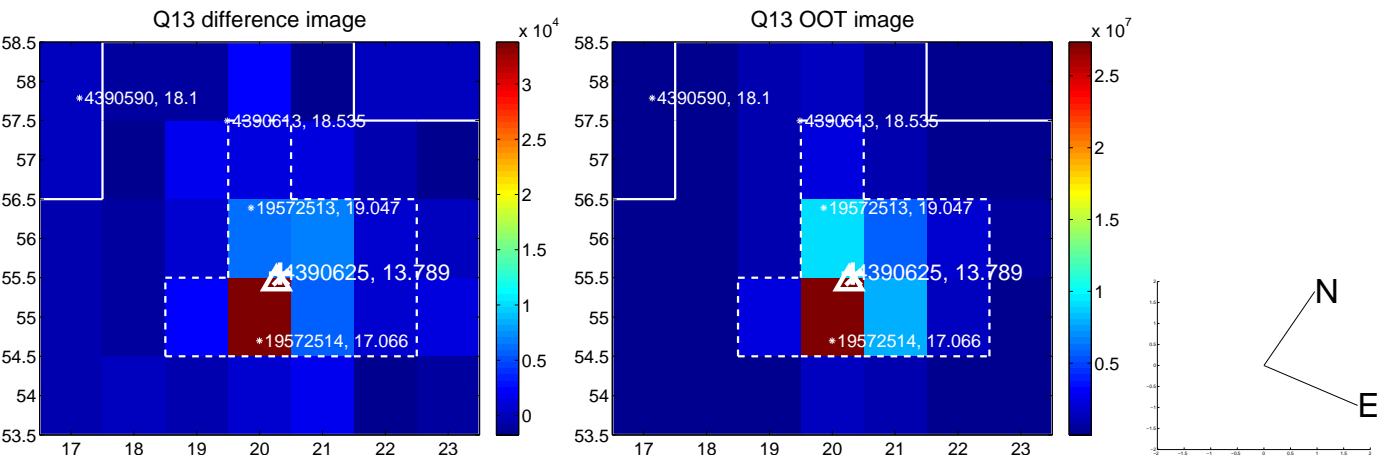


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



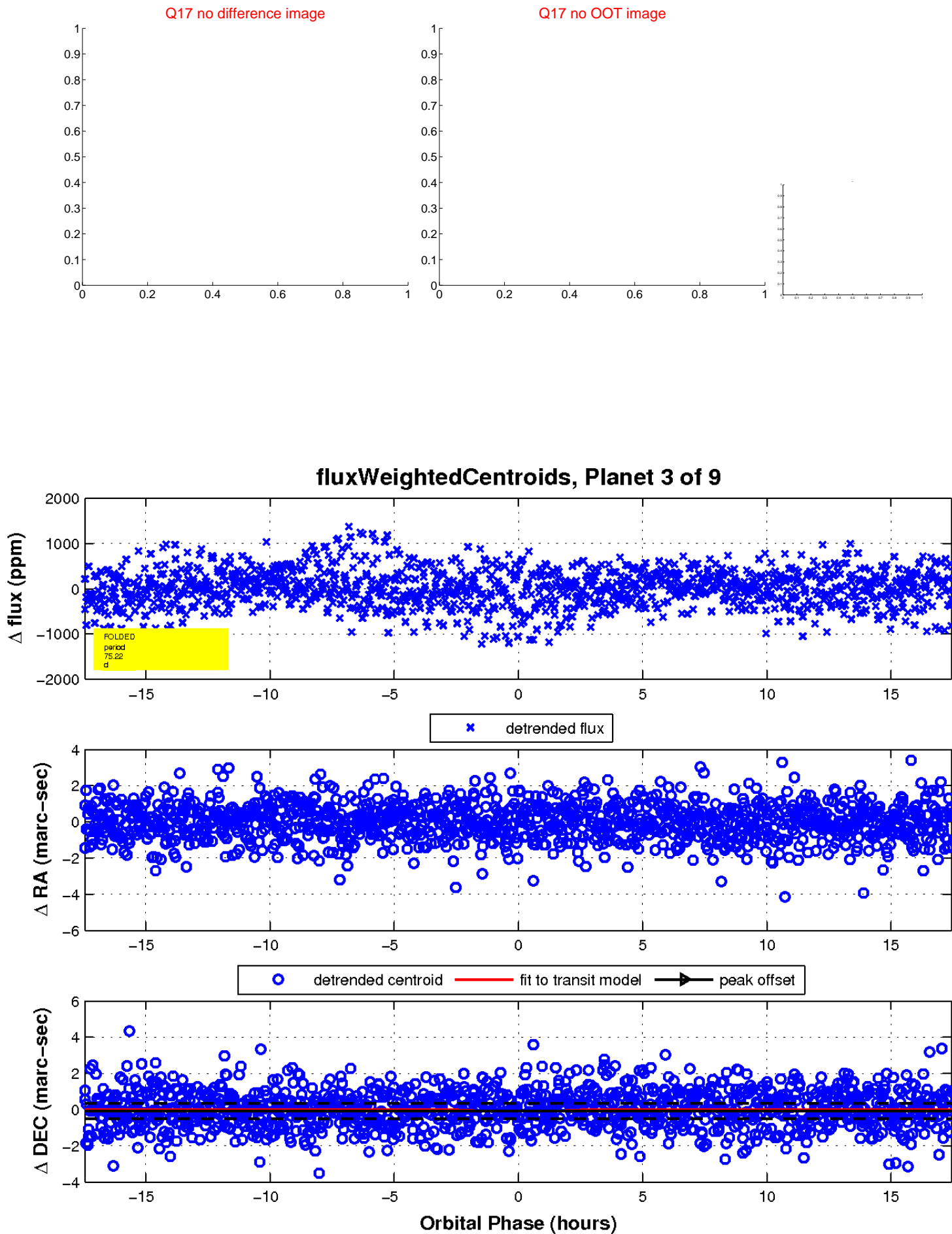


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





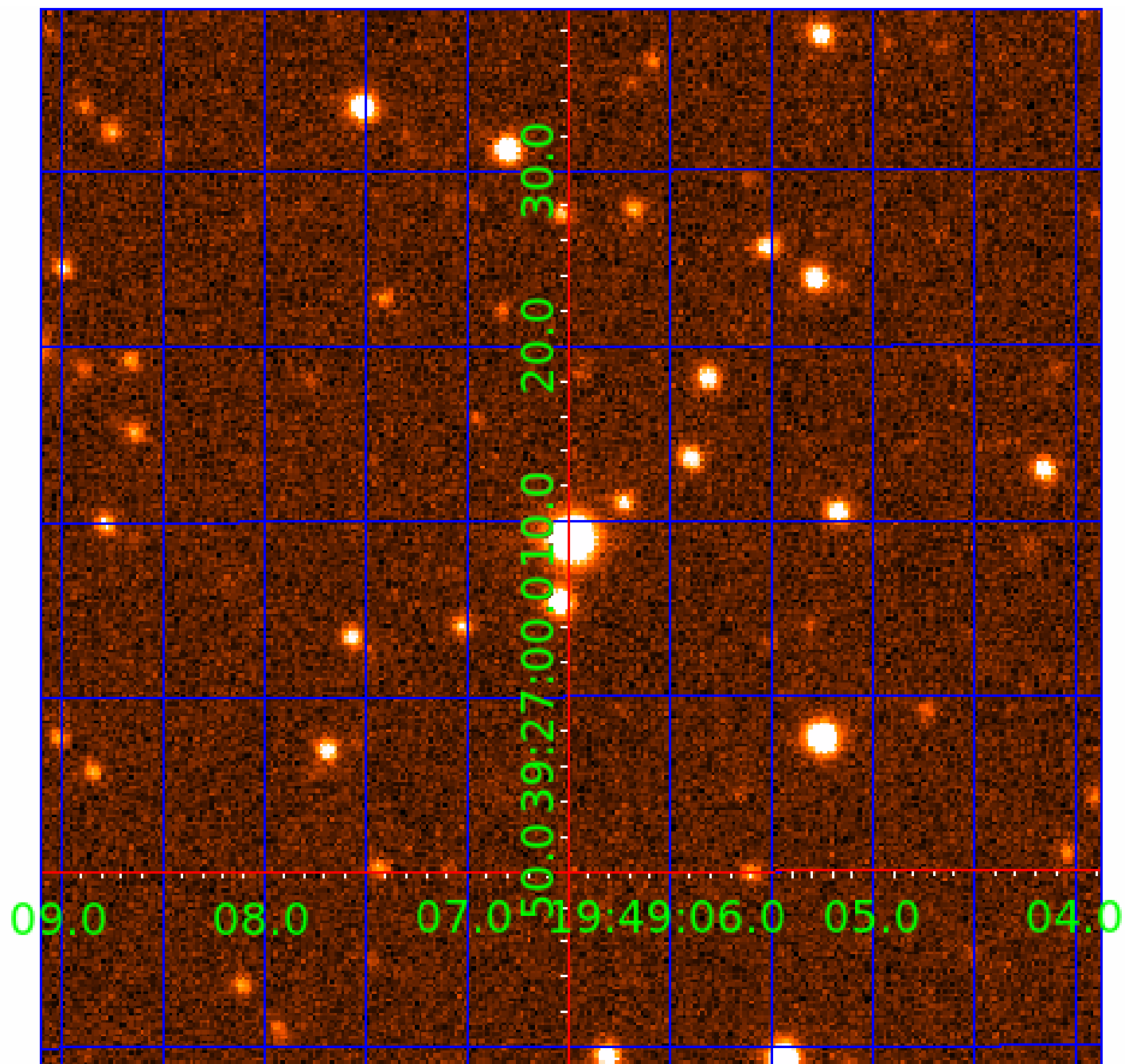
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination





# KIC 004390625

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004390625-01	OBS	No	2.552800	131.778368	45.1	8.820	7.3	6.4	1.40	6995	1.09	2938.38
004390625-02	OBS	No	1.276435	132.389024	60.3	7.984	9.2	9.3	1.40	6995	1.29	7403.98
004390625-03	OBS	No	75.223800	166.434374	900.8	5.821	8.6	9.9	1.40	6995	5.09	32.28
004390625-04	OBS	No	15.287801	143.491037	275.4	2.651	8.6	6.5	1.40	6995	2.56	270.19
004390625-05	OBS	No	212.739706	191.761958	712.0	4.822	9.5	9.0	1.40	6995	4.65	8.07
004390625-06	OBS	No	30.256104	159.489605	471.5	1.835	8.5	8.0	1.40	6995	3.48	108.74
004390625-07	OBS	No	31.528847	132.957413	702.9	5.557	7.7	9.2	1.40	6995	5.85	102.92
004390625-08	OBS	No	40.289721	146.290226	580.3	5.414	8.1	8.1	1.40	6995	3.58	74.22
004390625-09	OBS	No	638.187757	153.507721	339.7	5.000	7.2	-1.0	1.40	6995	2.61	1.87

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004390625-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004390625-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—SAME_NTL_PERIOD
004390625-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-05	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST
004390625-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004390625-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
004390625-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_NOFITS

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

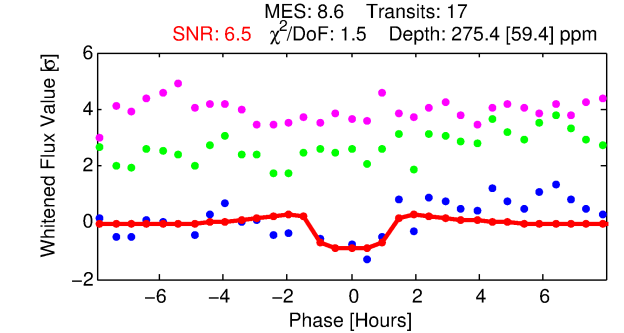
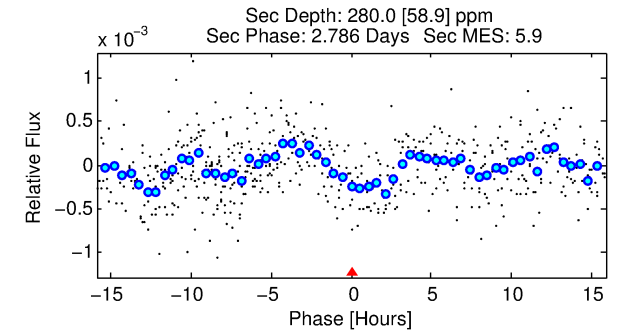
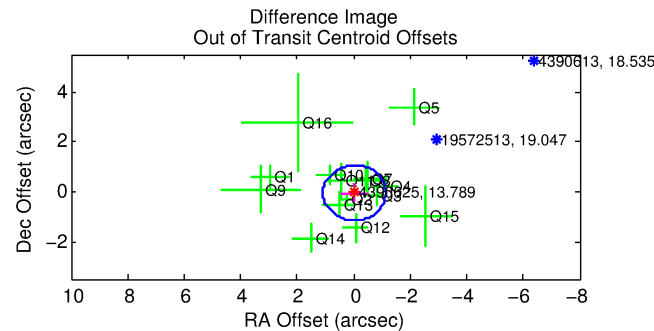
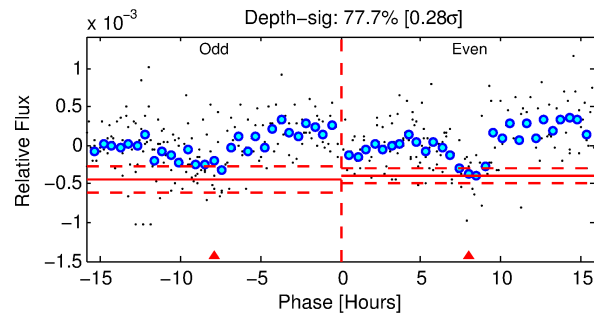
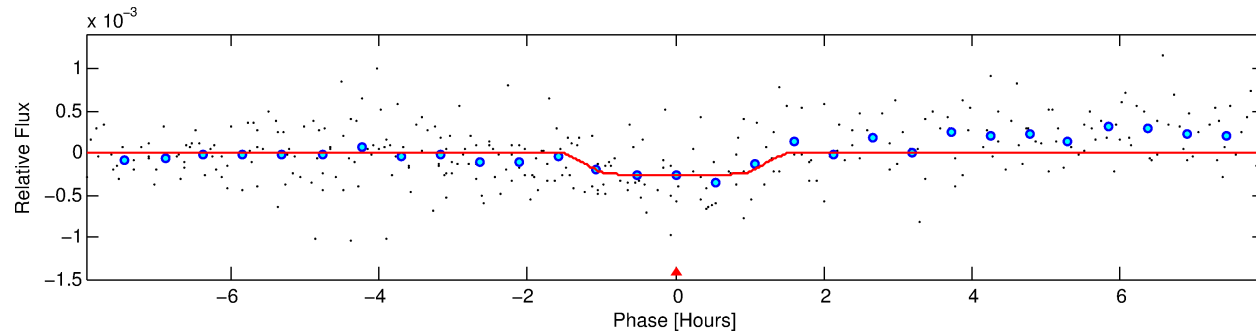
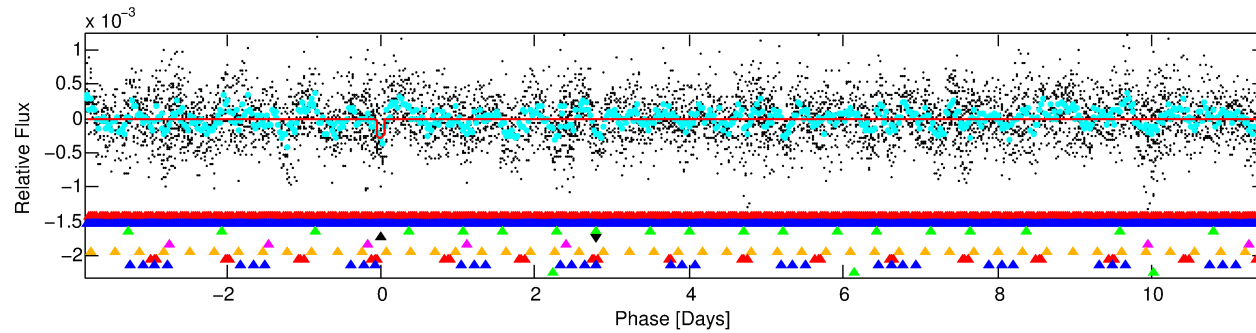
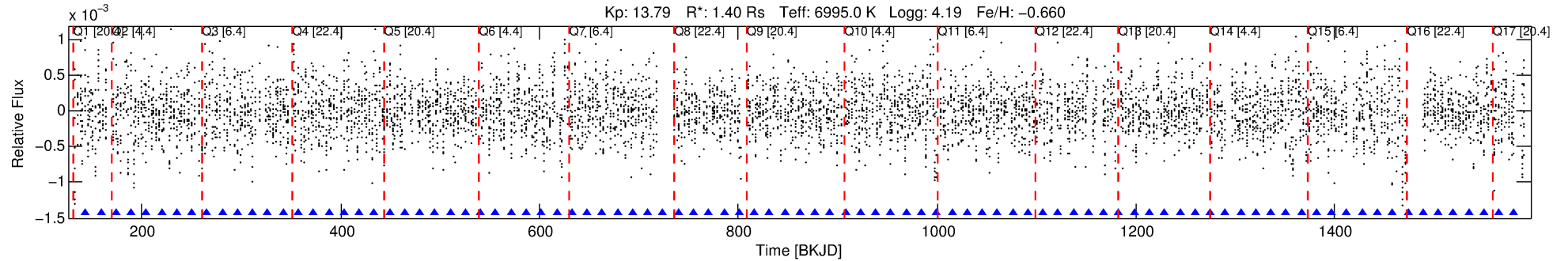
Ephemeris Match Information For 004390625-04

No Significant Match Found



# DV One-Page Summary

KIC: 4390625 Candidate: 4 of 9 Period: 15.288 d



## DV Fit Results:

Period = 15.28780 [0.00014] d  
Epoch = 143.4910 [0.0073] BKJD  
Rp/R\* = 0.0168 [0.0236]  
a/R\* = 27.93 [234.68]  
b = 0.80 [3.92]  
Seff = 270.19 [102.80]  
Teff = 1034 [98] K  
Rp = 2.56 [3.68] Re  
a = 0.1247 [0.0292] AU  
Ag = 365.78 [1042.24] [0.35 $\sigma$ ]  
Teffp = 6990 [4953] K [1.20 $\sigma$ ]

## DV Diagnostic Results:

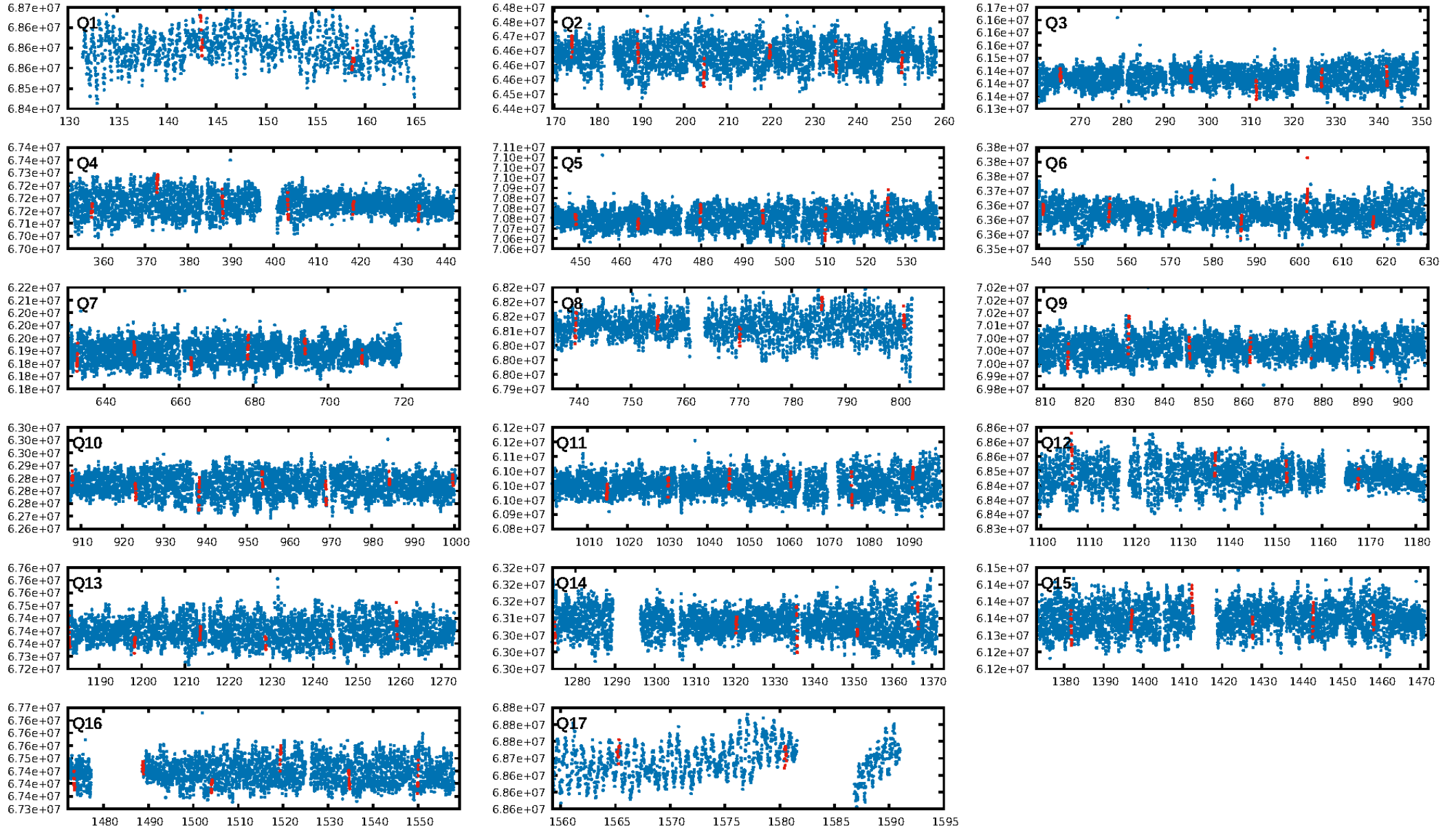
ShortPeriod-sig: 100.0% [33.19 $\sigma$ ]  
LongPeriod-sig: 100.0% [111.42 $\sigma$ ]  
ModelChiSquare2-sig: 10.9%  
ModelChiSquareGof-sig: 99.8%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [15/15]  
GhostDiagnostic-chr: 2.149  
Centroid-sig: N/A  
Centroid-so: 0.566 arcsec [1.09 $\sigma$ ]  
OotOffset-rm: 0.055 arcsec [0.15 $\sigma$ ]  
KicOffset-rm: 0.180 arcsec [0.47 $\sigma$ ]  
OotOffset-st: 3/4/4/4 [15]  
KicOffset-st: 3/4/4/4 [15]  
DiffImageQuality-fgm: 0.40 [6/15]  
DiffImageOverlap-fno: 0.29 [5/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 16:27:17 Z

This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

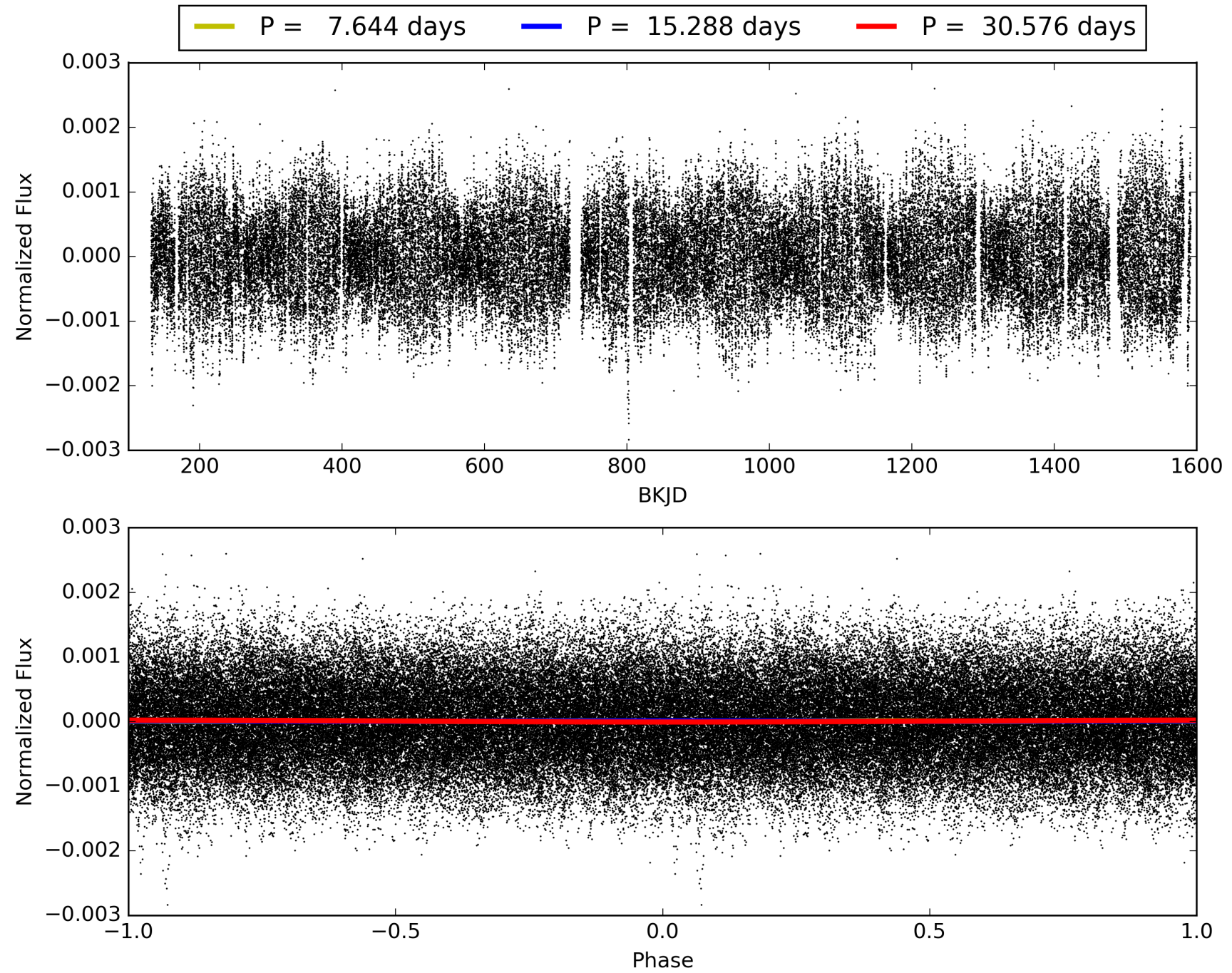


# TCE 004390625-04, PDC Light Curves





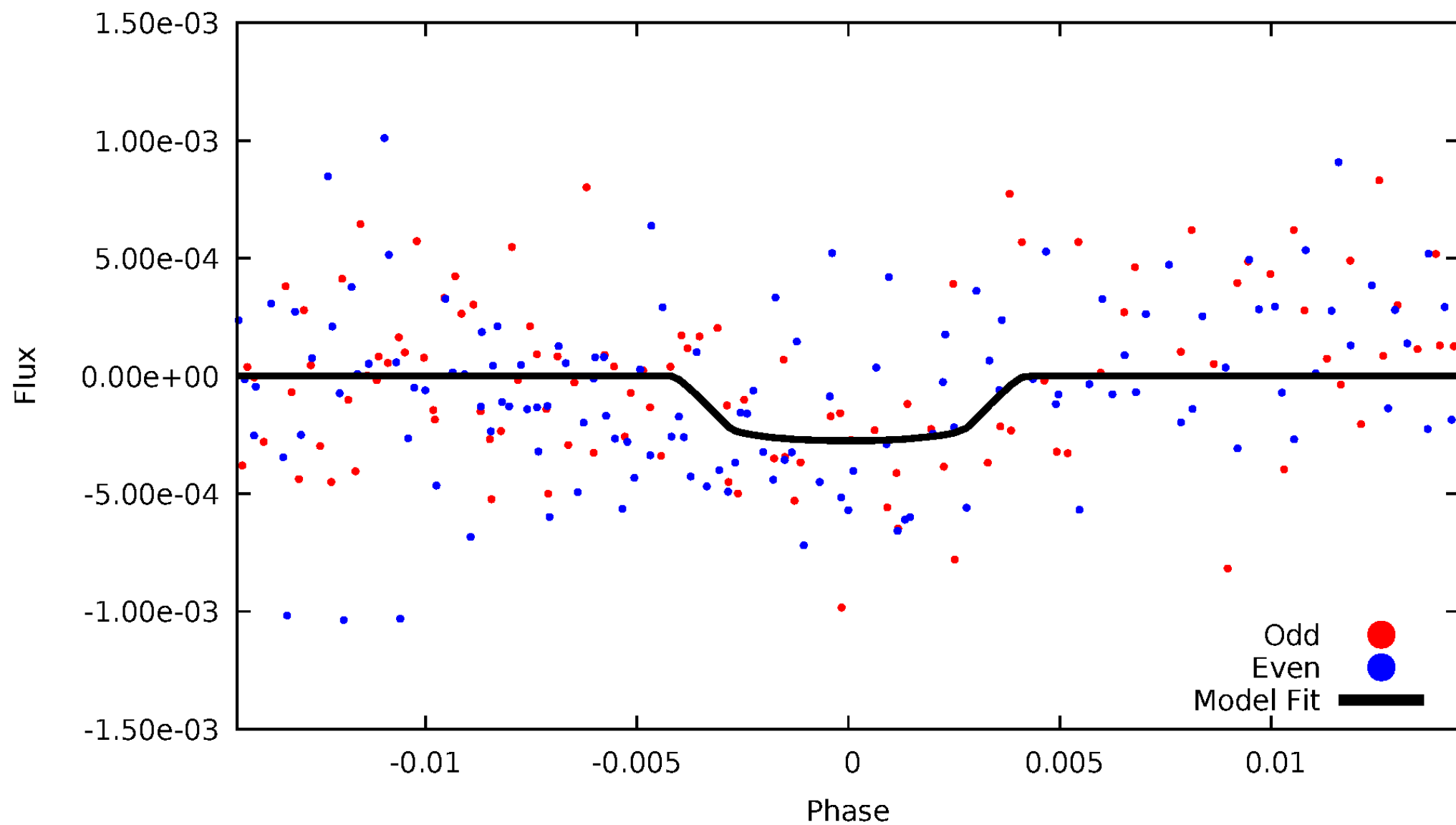
TCE 004390625-04





# DV Odd/Even

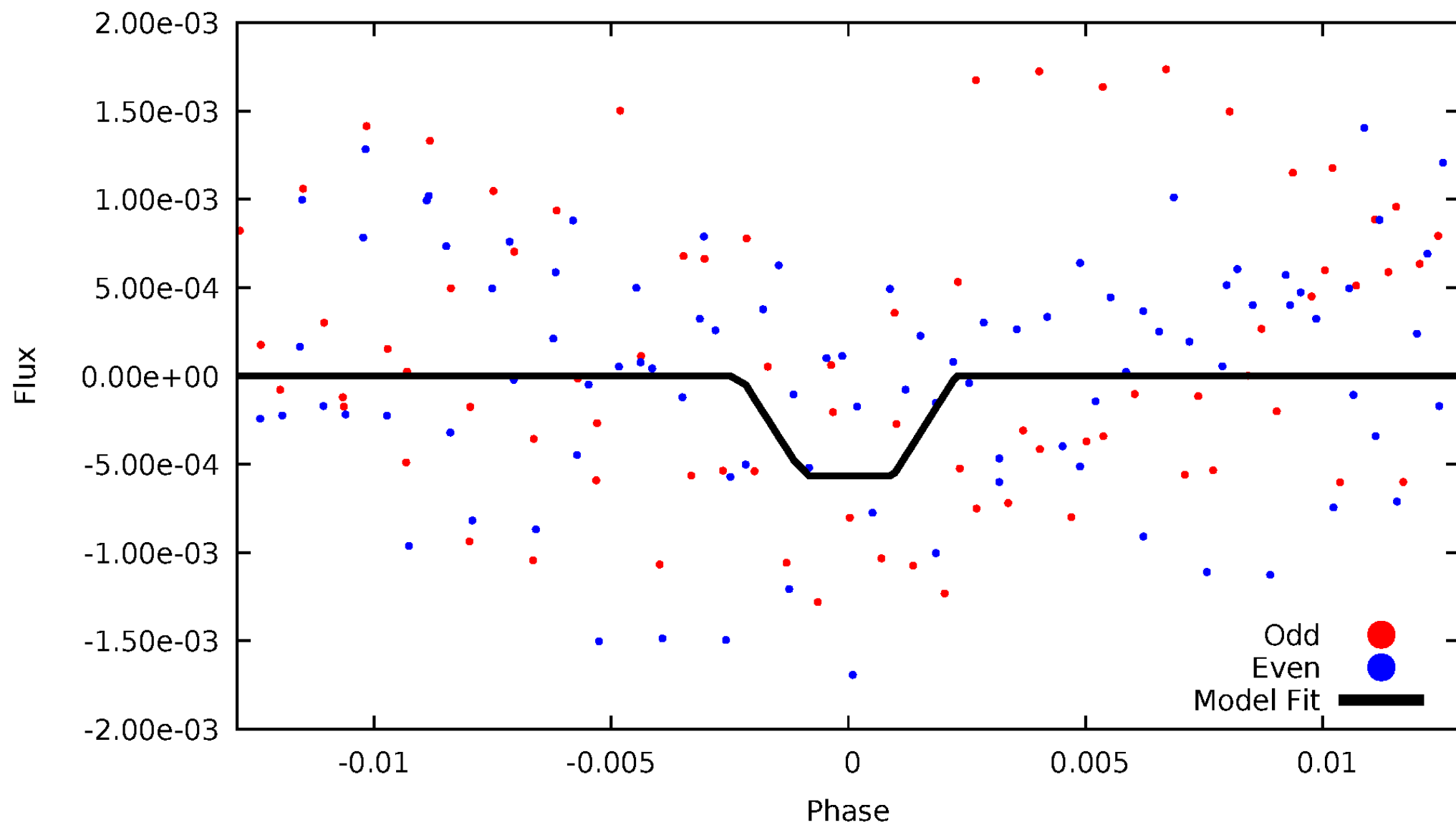
TCE 004390625-04





# ALT Odd/Even

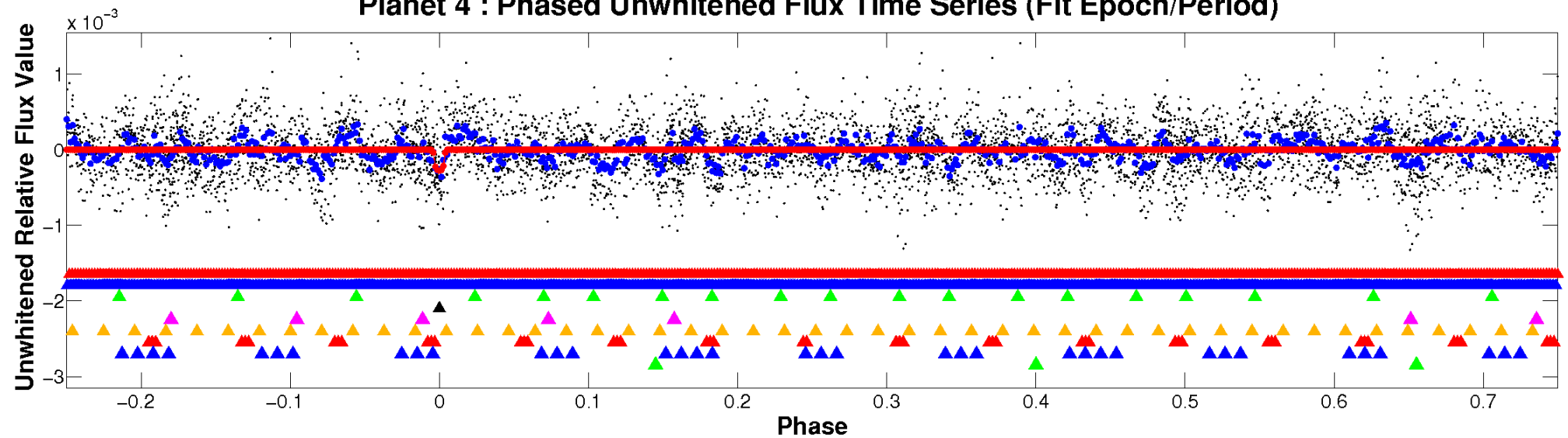
TCE 004390625-04



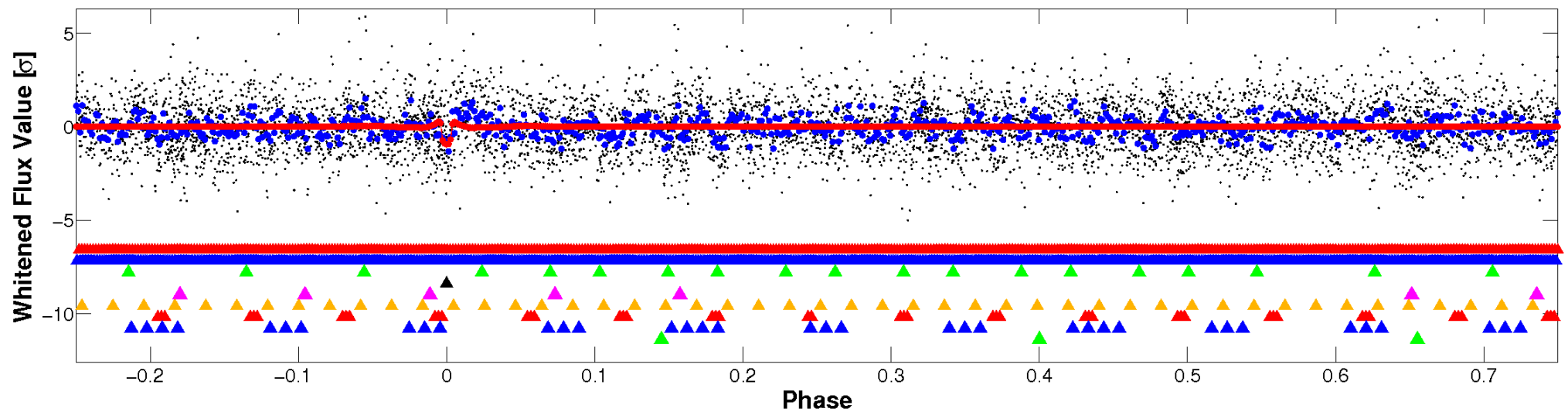


# Non-Whitened Vs. Whitened Light Curve

## Planet 4 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



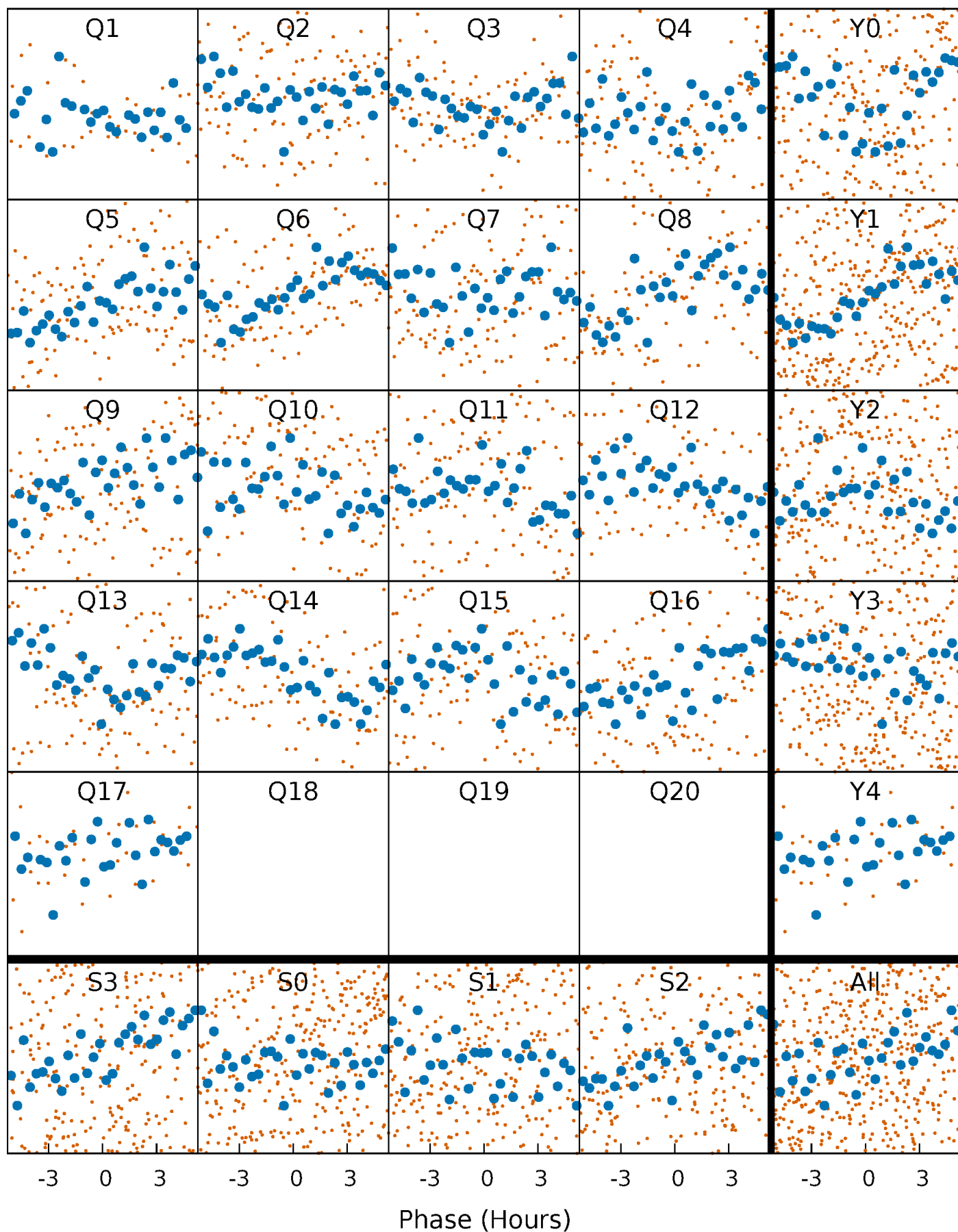
## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

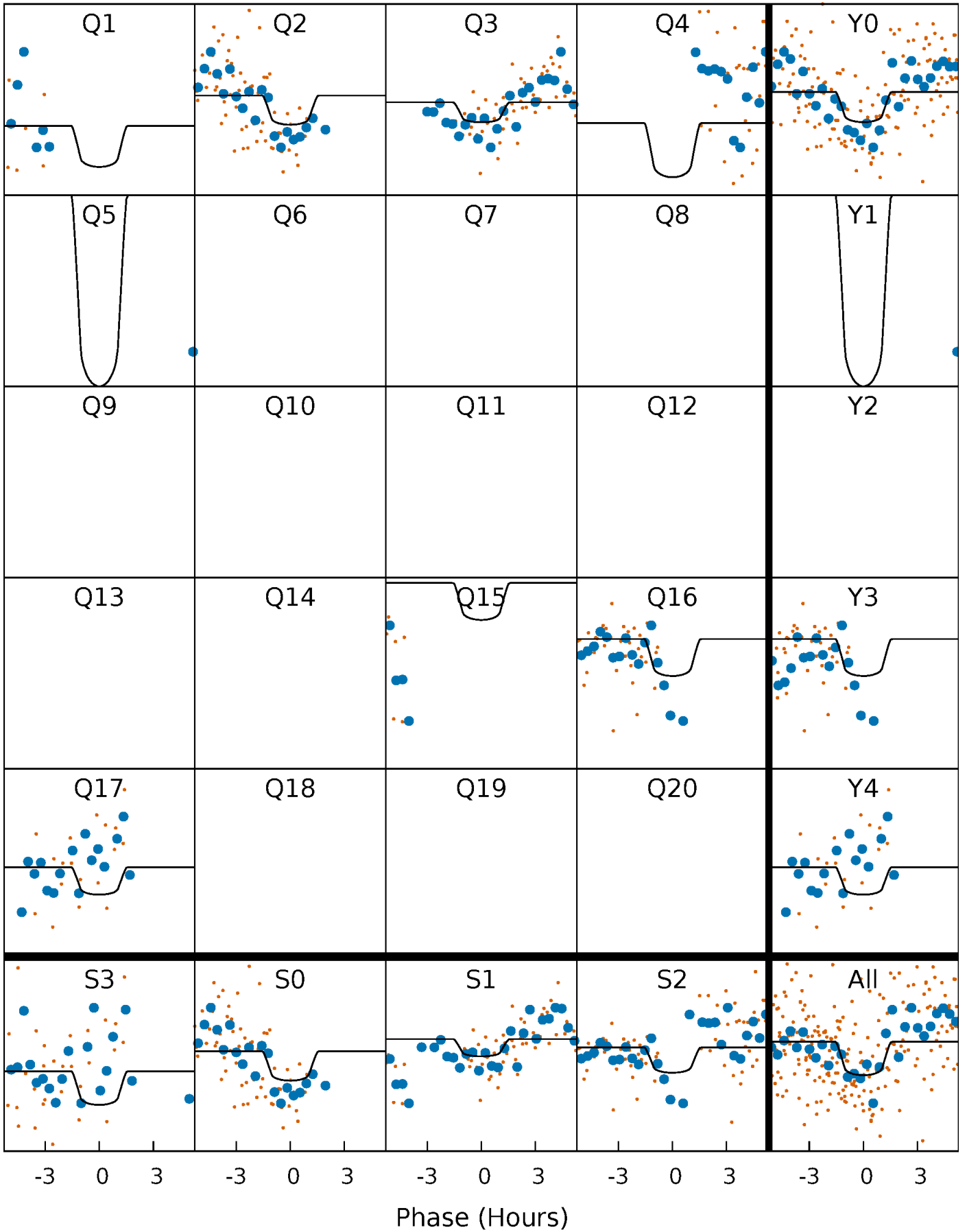
TCE 004390625-04 P= 15.287801 Days  $T_0=143.491037$  (BKJD)





# DV Quarter-Phased Transit Curves

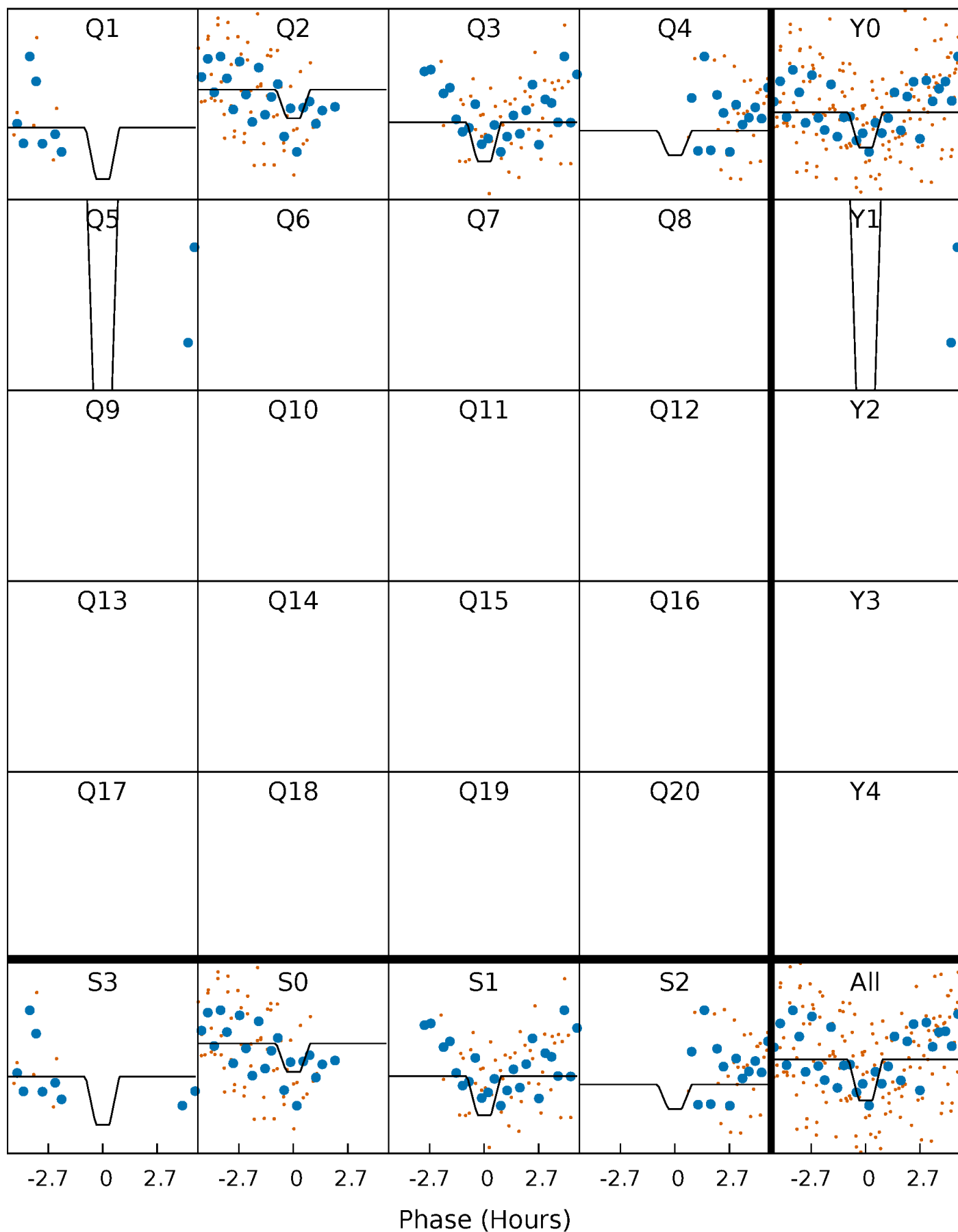
TCE 004390625-04 P= 15.287801 Days  $T_0=143.491037$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 004390625-04 P= 15.291357 Days  $T_0=143.459299$  (BKJD)

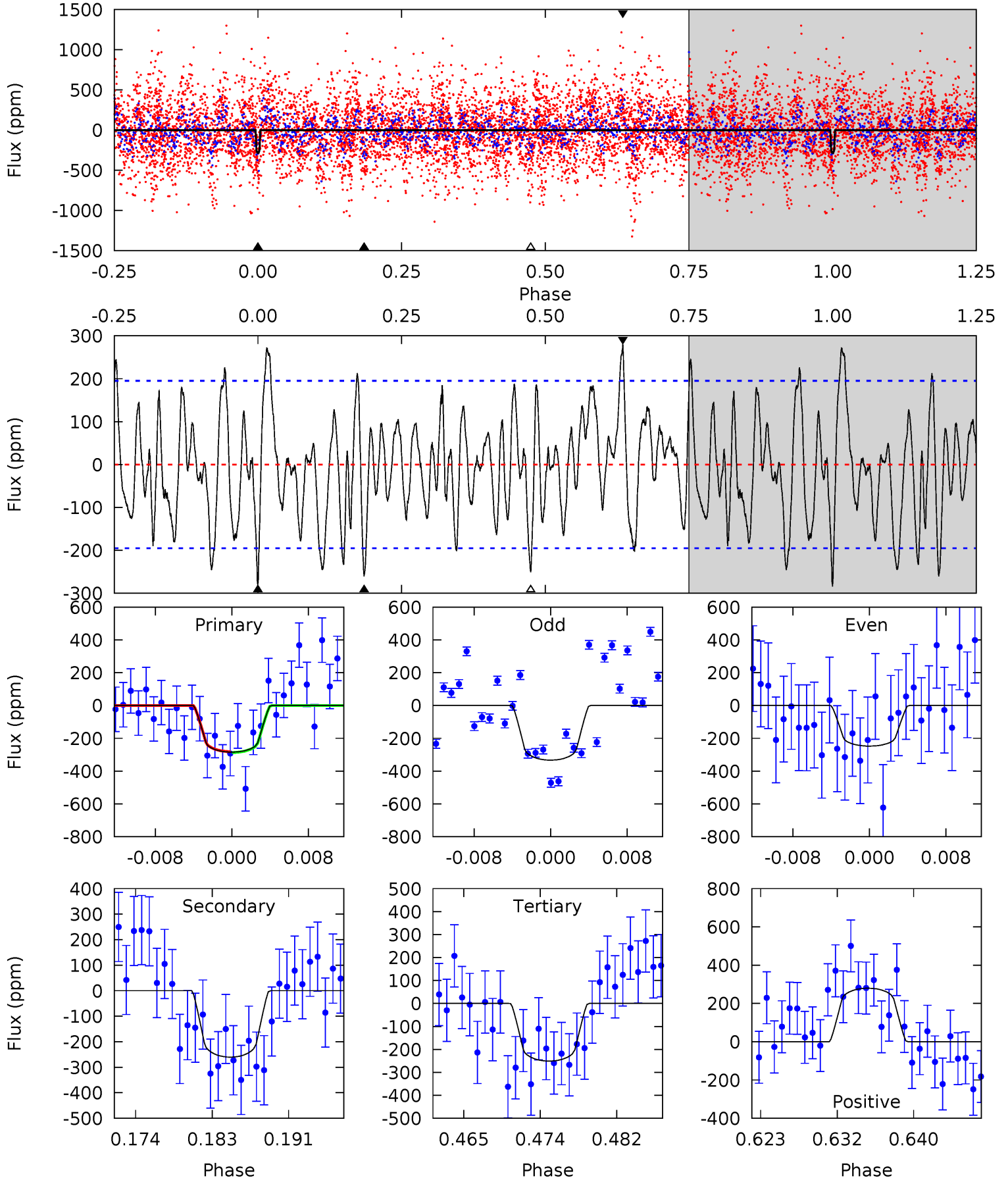




# DV Model-Shift Uniqueness Test

004390625-04, P = 15.287801 Days, E = 128.203236 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.37	6.75	6.50	7.25	5.06	2.64	2.73	0.86	0.12	0.25	-0.50	1.11	0.93	0.50	0.06

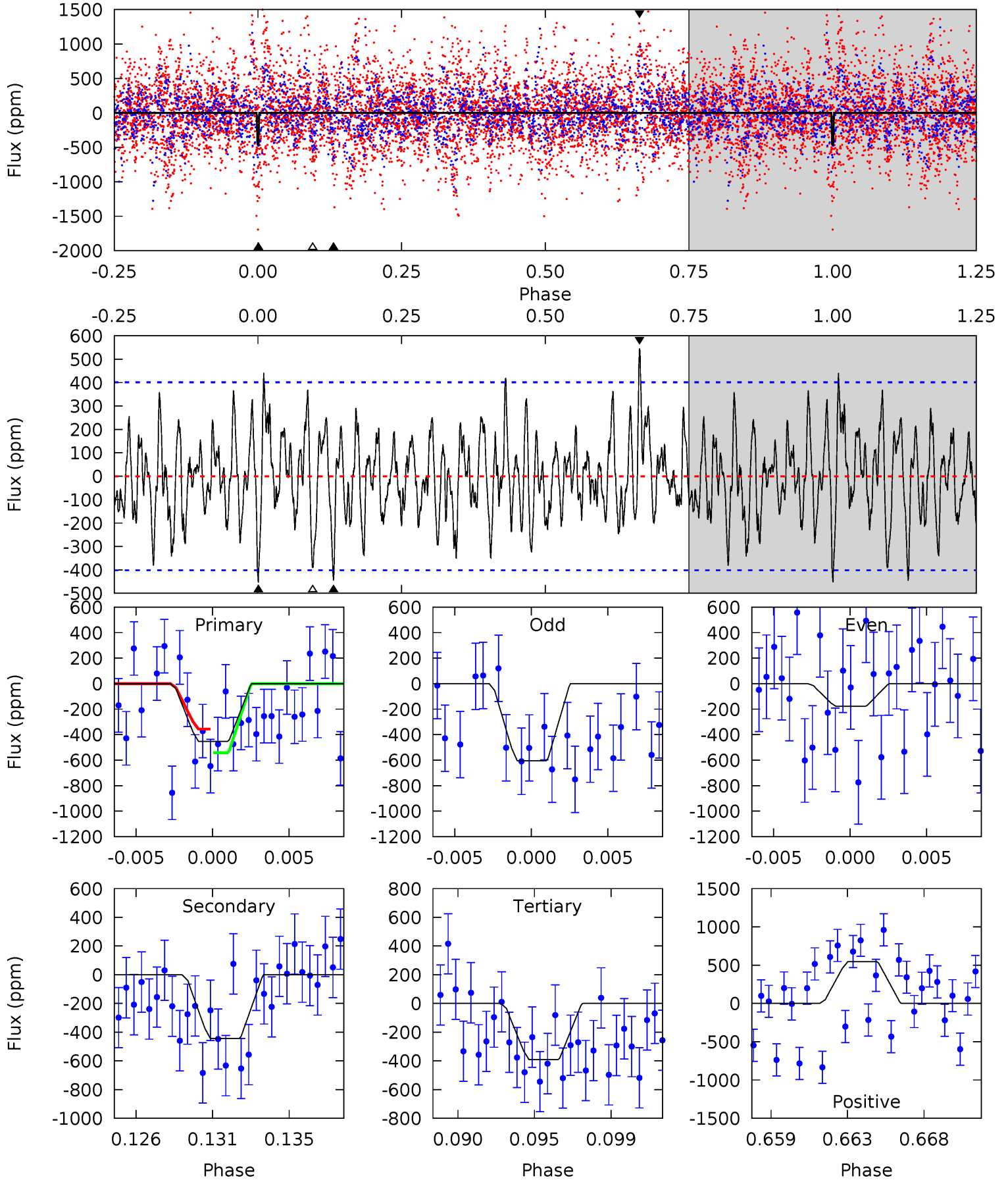




# Alt Model-Shift Uniqueness Test

004390625-04, P = 15.291357 Days, E = 128.167942 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.85	5.72	5.05	7.04	5.18	2.84	1.95	0.80	-1.19	0.67	-1.32	2.75	2.01	0.55	1.20





### Stellar Parameters For KIC 004390625

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6995^{+219}_{-301}$	$4.190^{+0.185}_{-0.167}$	$-0.660^{+0.250}_{-0.300}$	$1.400^{+0.390}_{-0.319}$	$1.106^{+0.160}_{-0.131}$	$0.568^{+0.534}_{-0.277}$
	+3%/-4%	+4%/-4%	+38%/-45%	+28%/-23%	+14%/-12%	+94%/-49%
Source	PHO1	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 004390625-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-260 \pm 39$	$3.71^{+3.28}_{-2.47}$	$1431^{+121}_{-102}$	$5691^{+4886}_{-1361}$	$163^{+1193}_{-116}$
Alt.	$-444 \pm 78$	$4.33^{+2.91}_{-2.75}$	$1442^{+103}_{-109}$	$5950^{+5178}_{-1215}$	$205^{+1387}_{-134}$

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature

$T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$



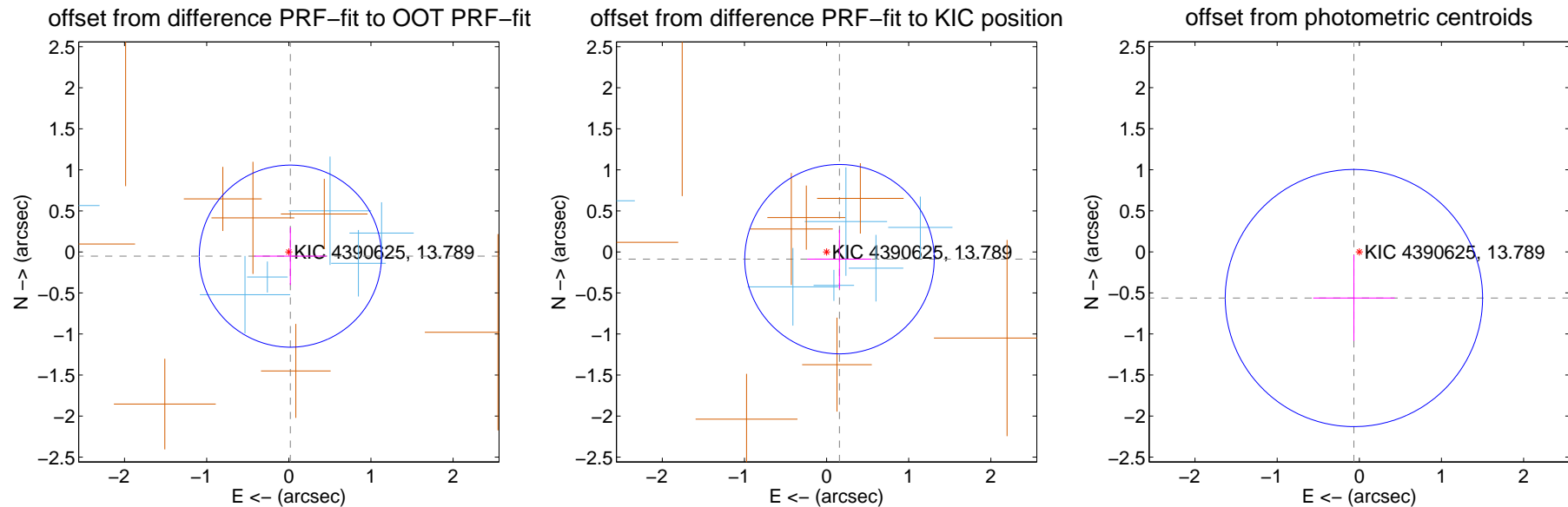
## DV Centroid Data

Supplemental centroid analysis for 004390625-04. Kepler magnitude: 13.79. Transit SNR 6.49

There are 6 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.26 arcsec

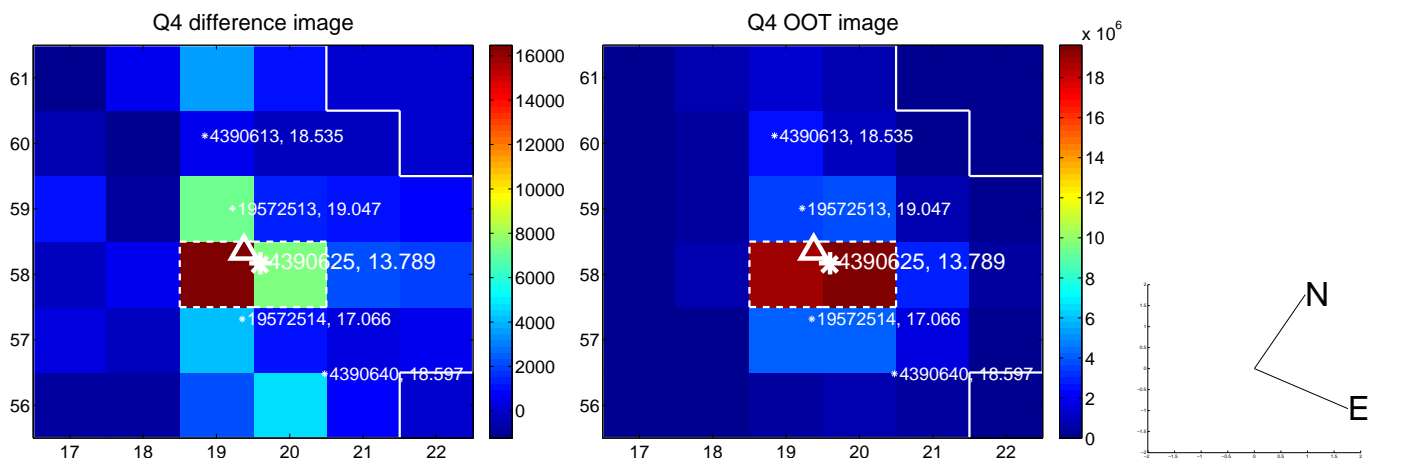
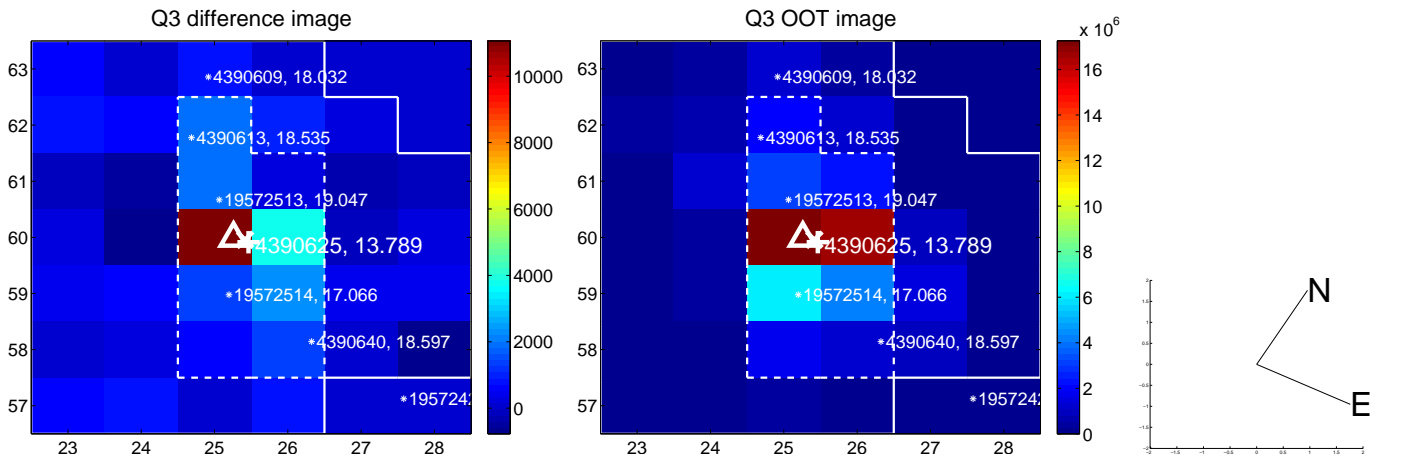
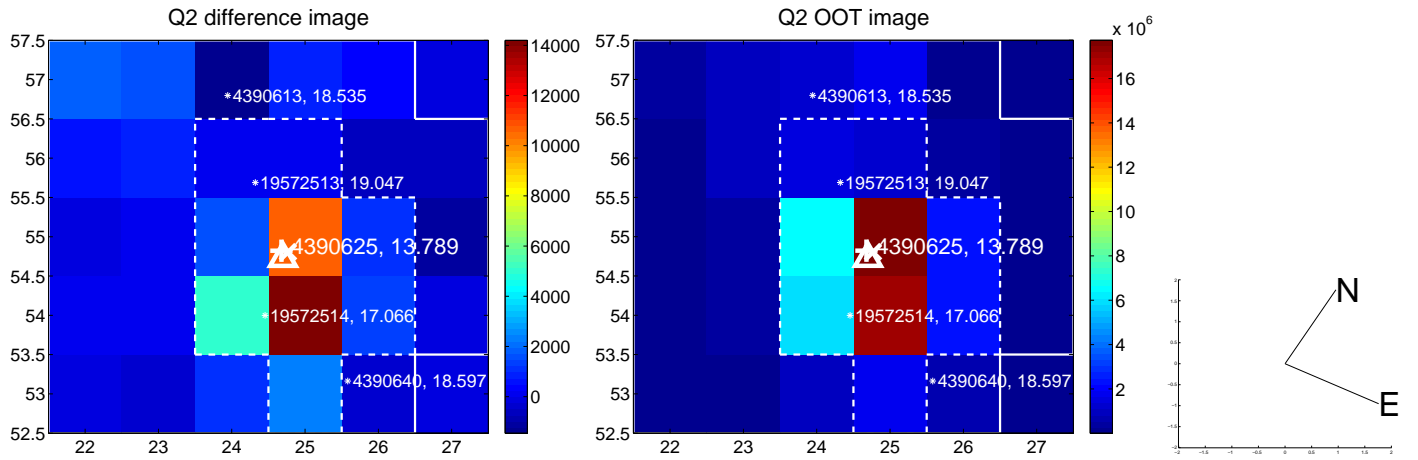
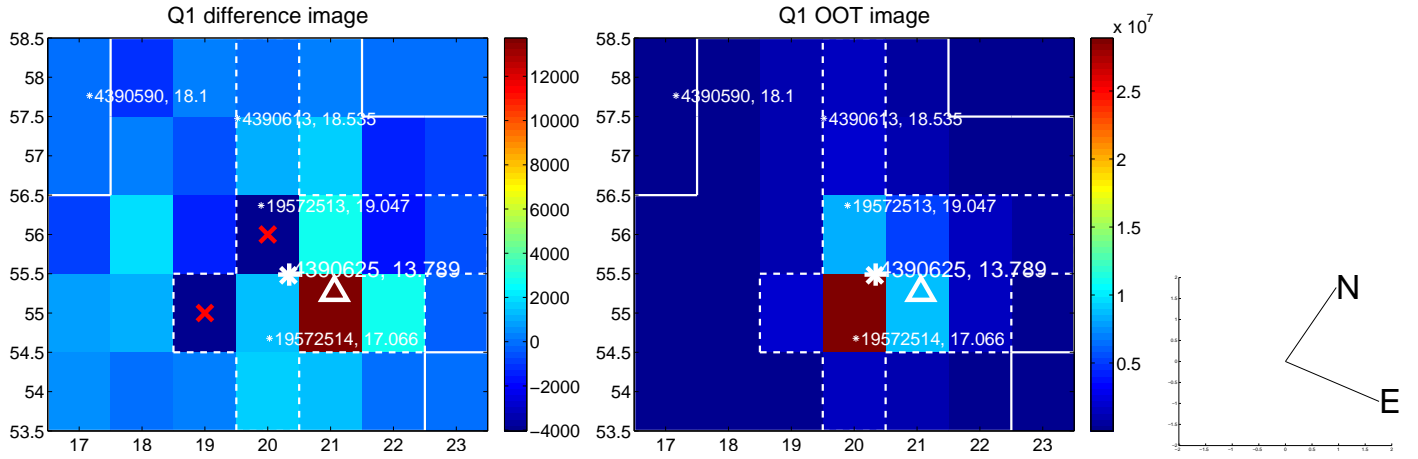
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.055 \pm 0.370$	0.15	$-0.019 \pm 0.440$	$-0.052 \pm 0.351$
PRF-fit source offset from KIC position	$0.180 \pm 0.384$	0.47	$-0.157 \pm 0.392$	$-0.088 \pm 0.358$
photometric centroid source offset	$0.57 \pm 0.52$	1.09	$0.07 \pm 0.50$	$-0.56 \pm 0.52$



Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

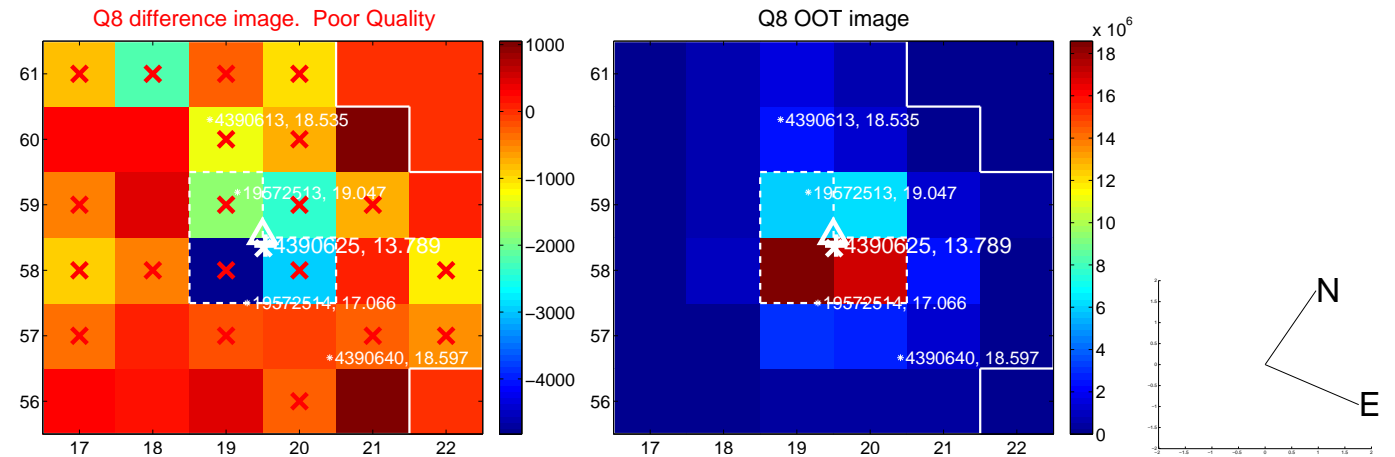
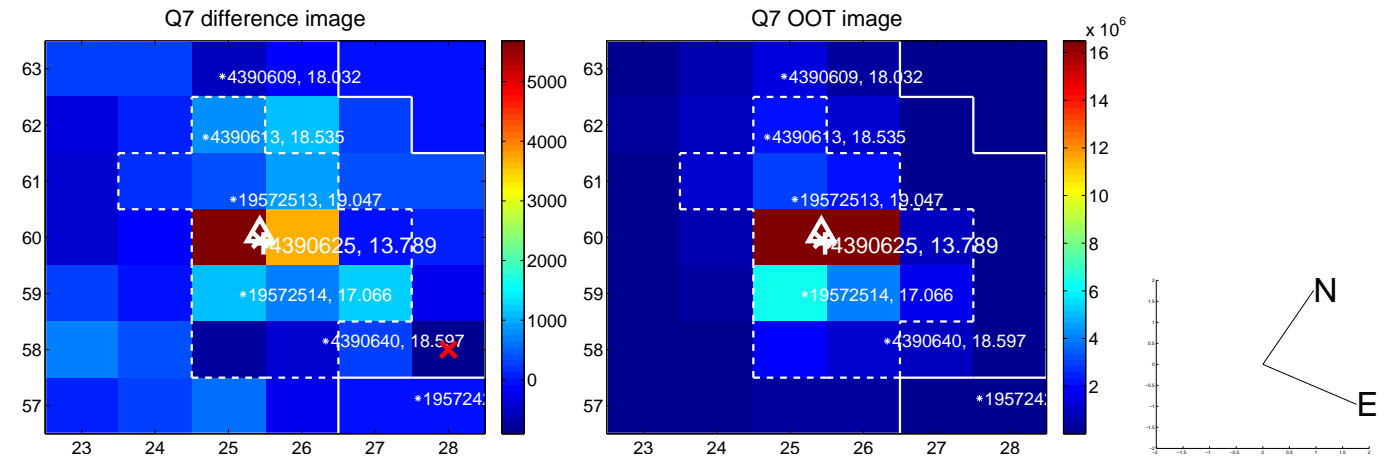
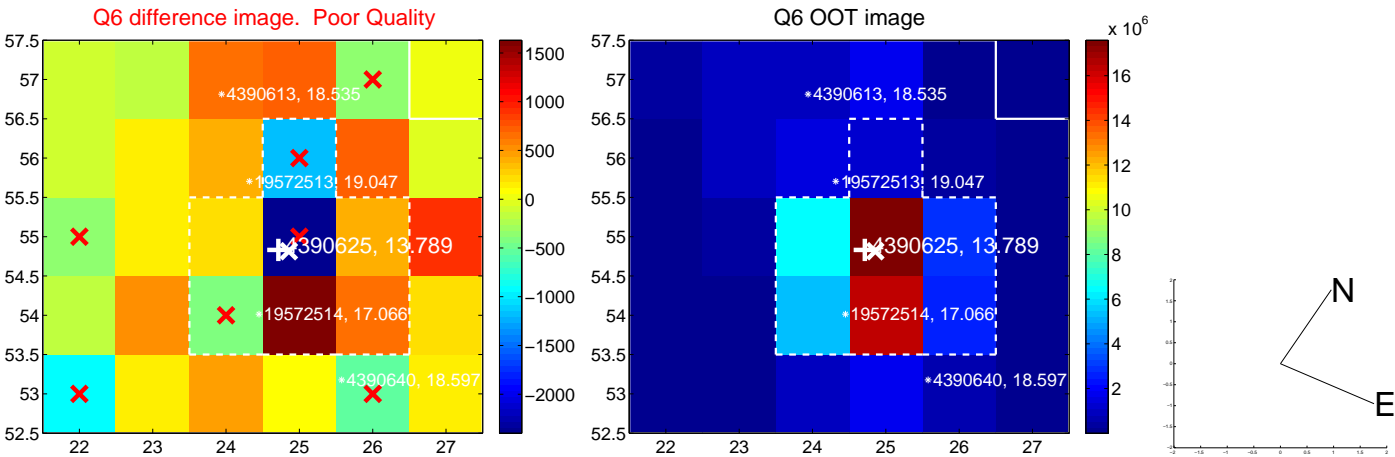
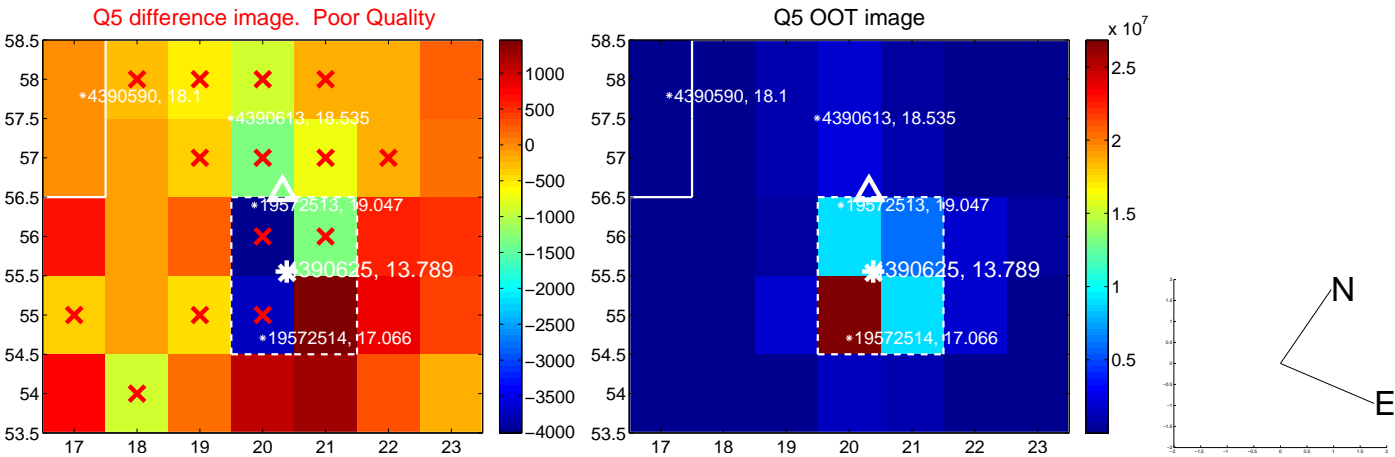


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



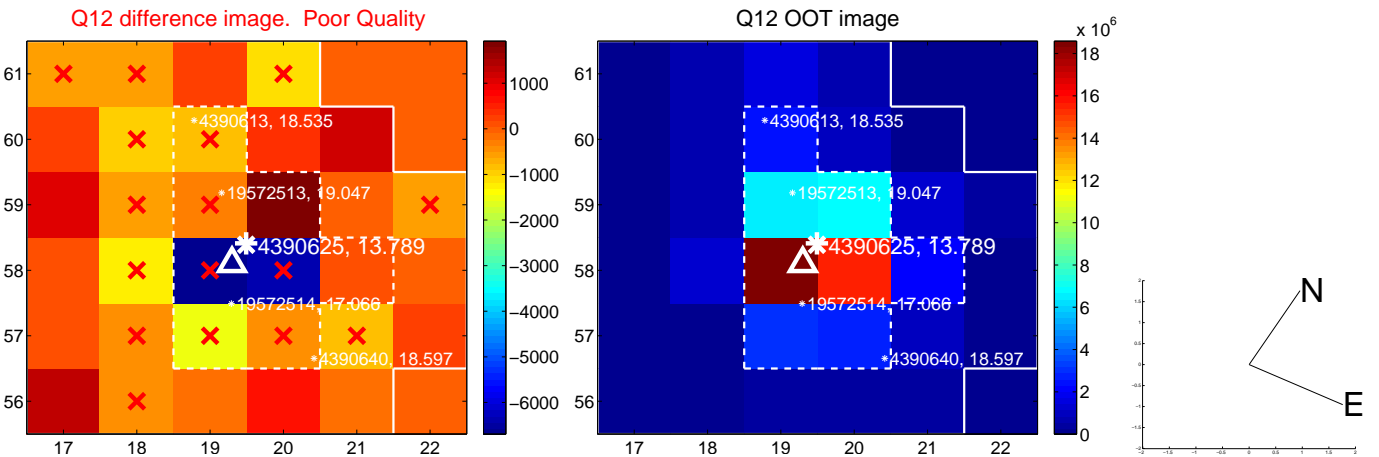
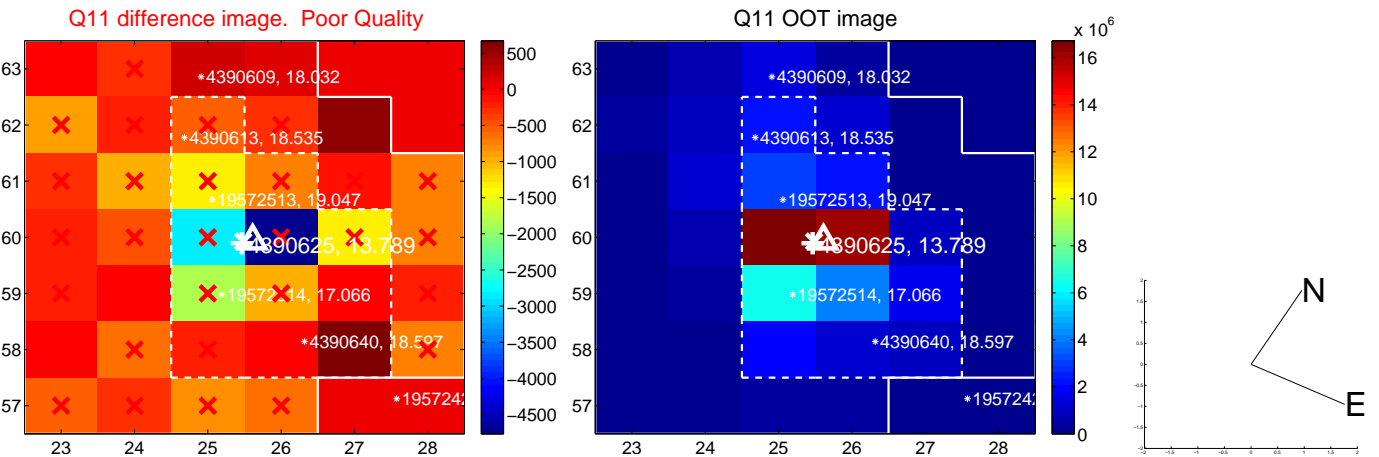
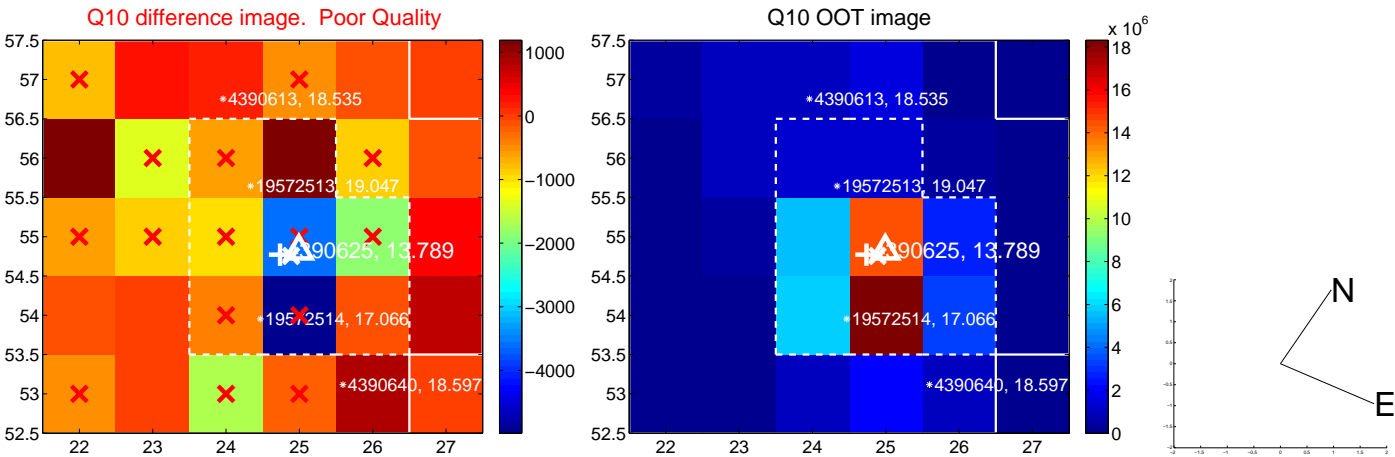
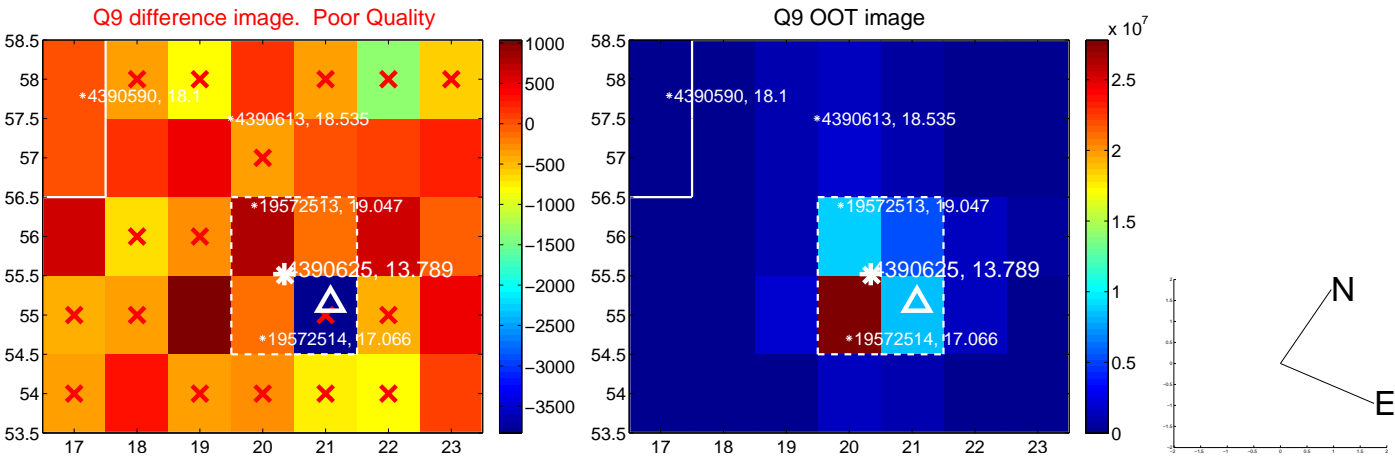


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



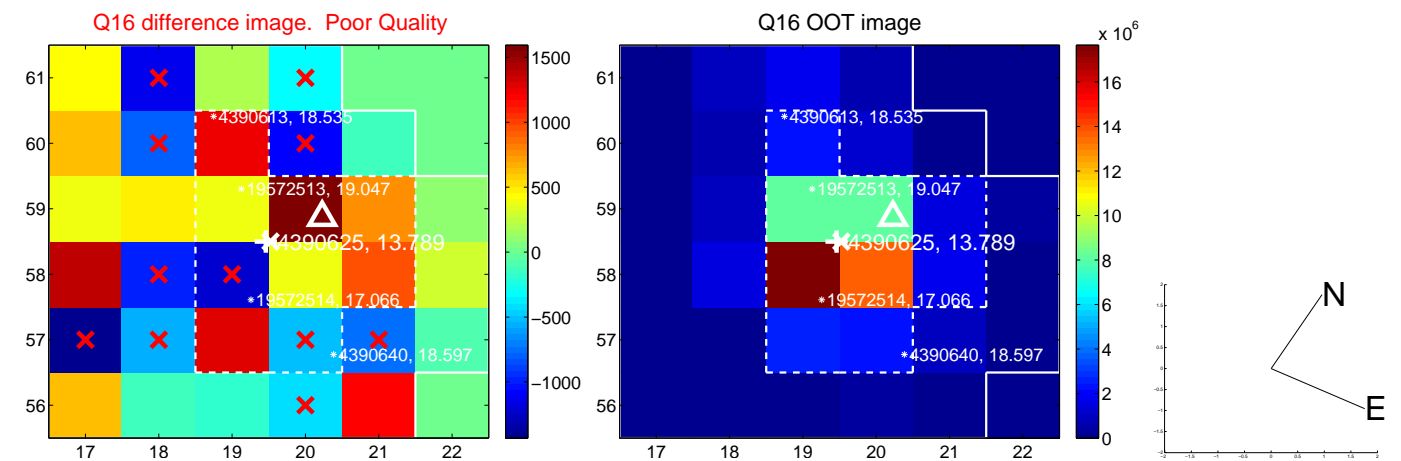
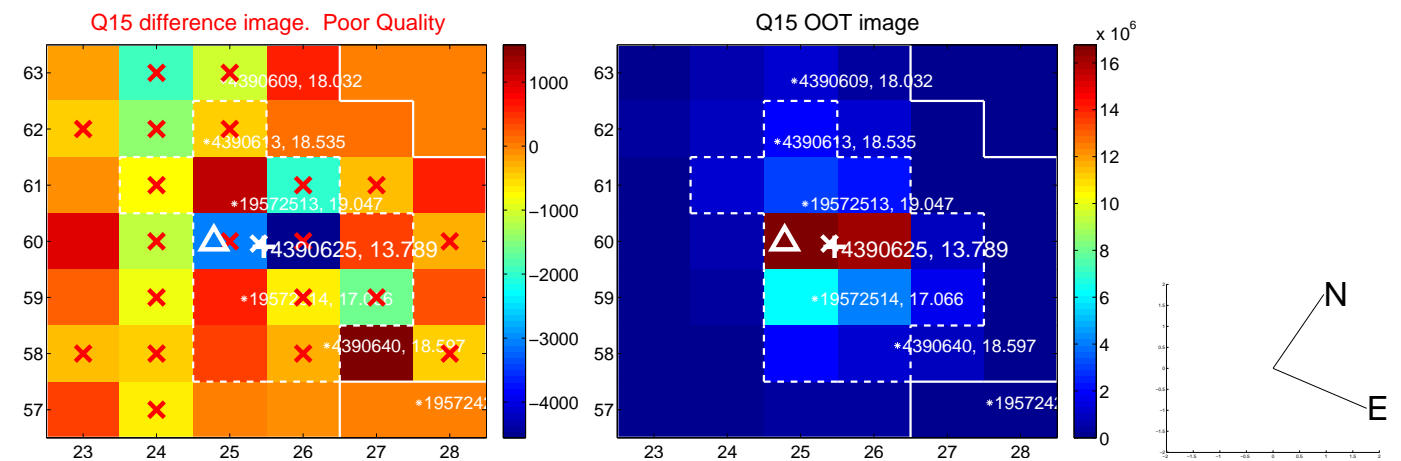
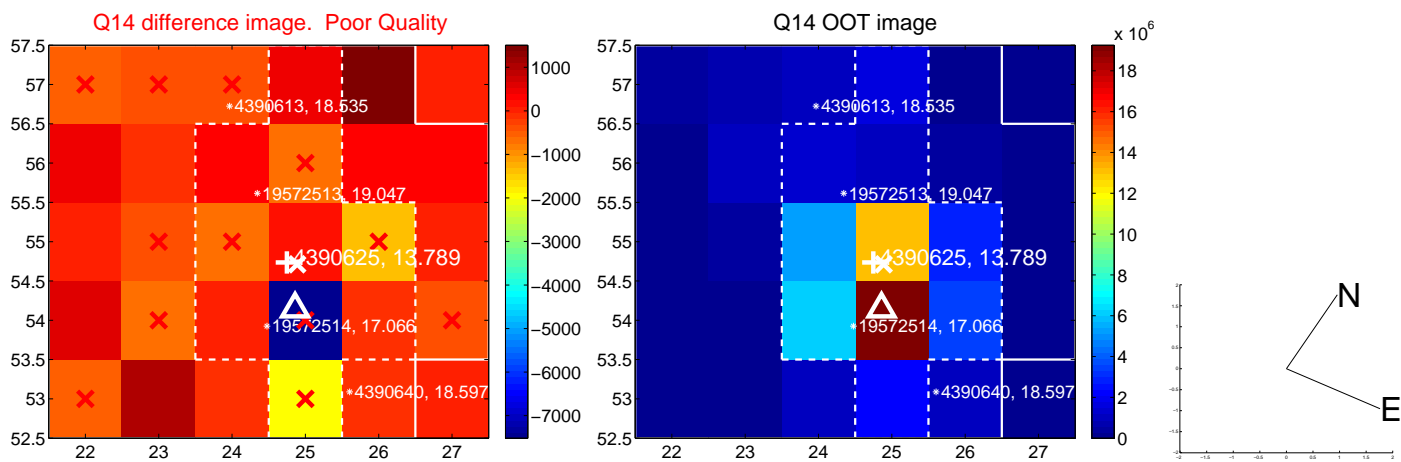
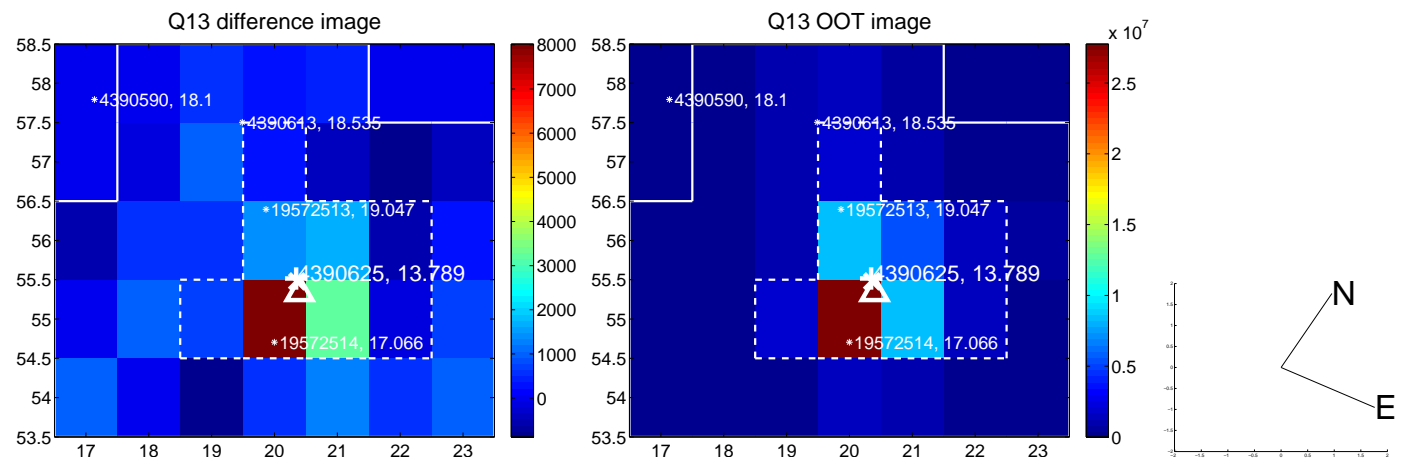


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



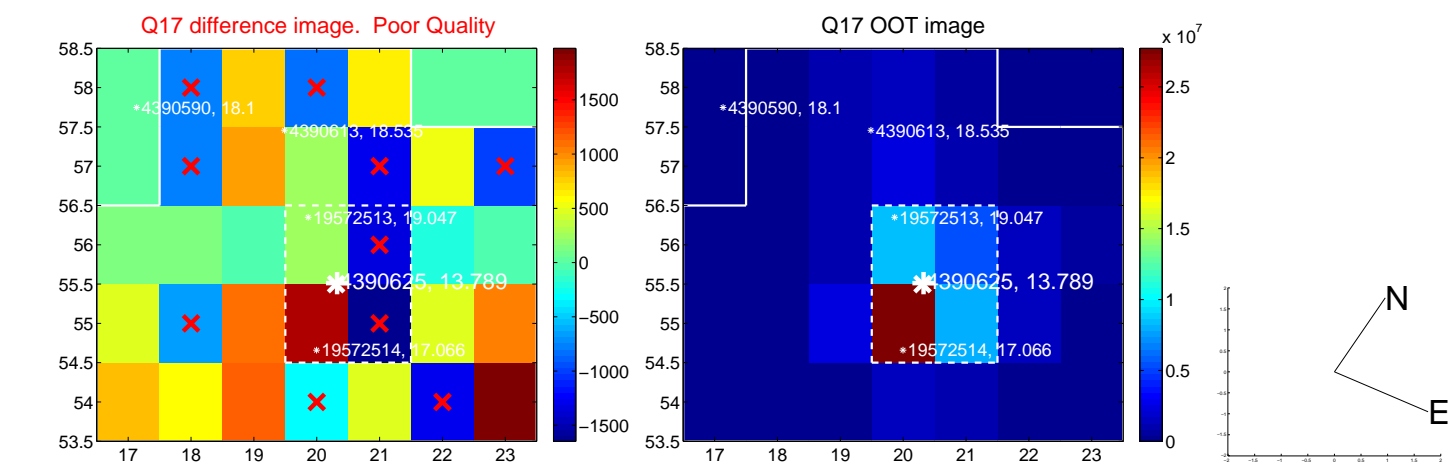


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

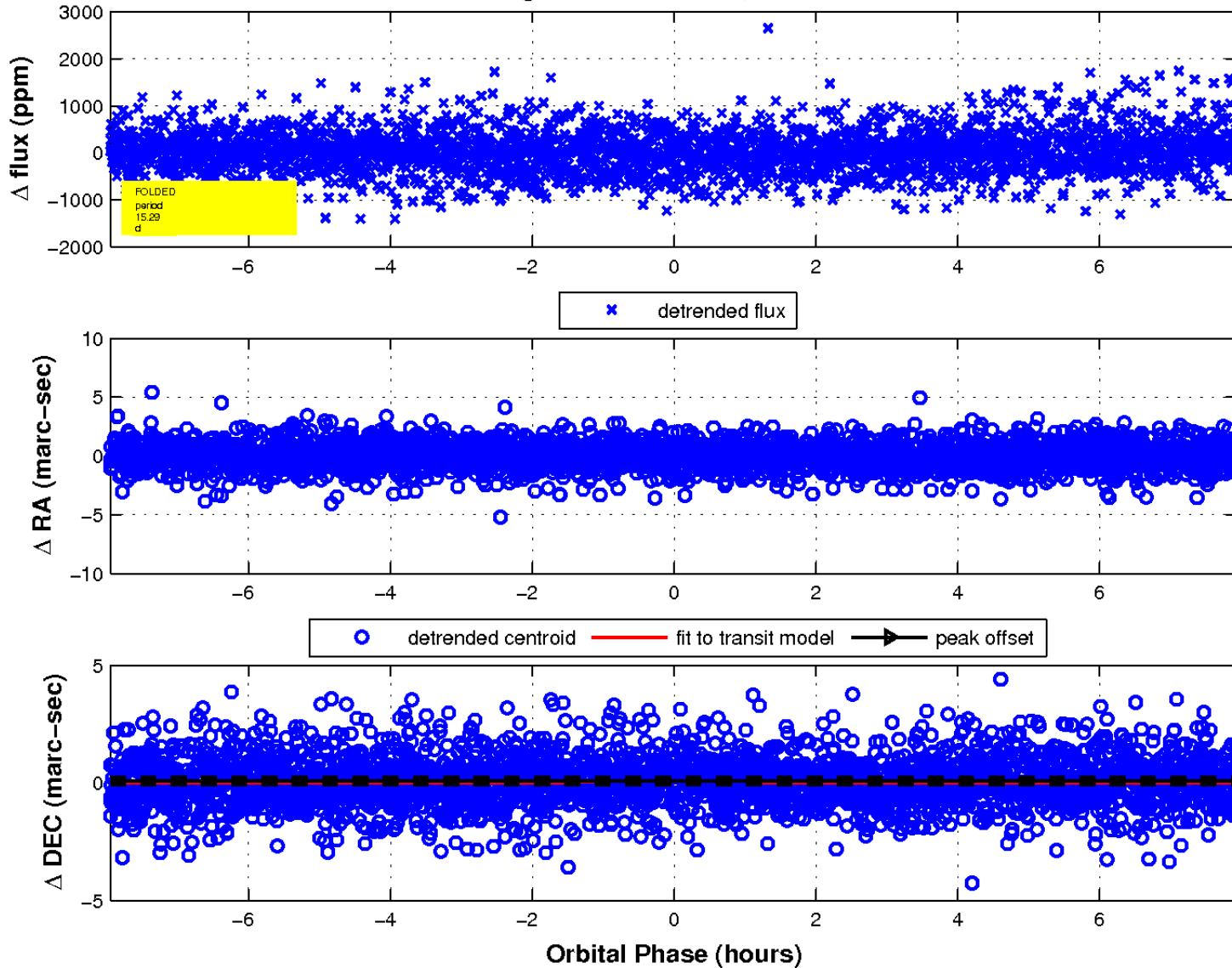




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



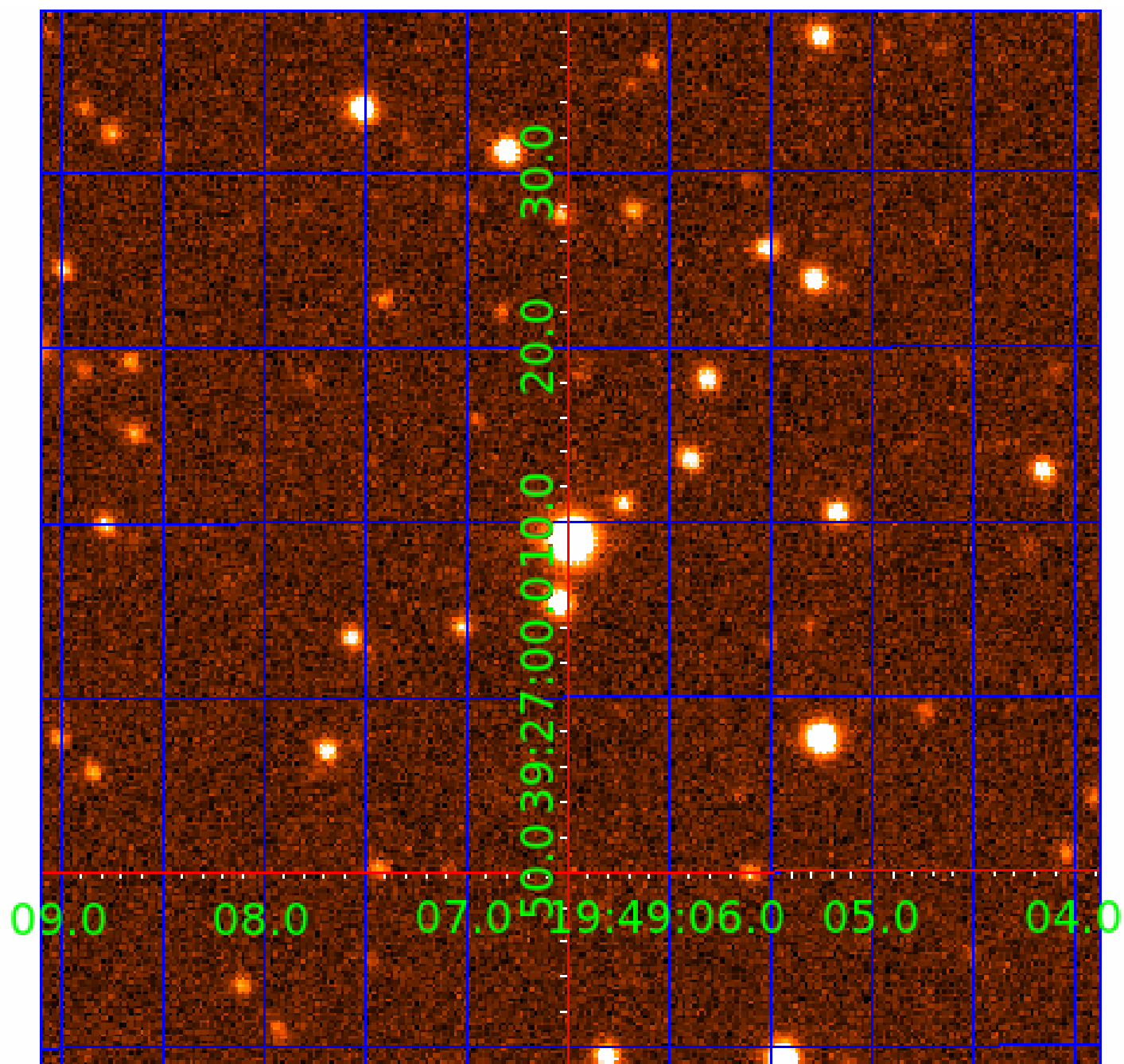
fluxWeightedCentroids, Planet 4 of 9





UKIRT Image

Declination





# KIC 004390625

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004390625-01	OBS	No	2.552800	131.778368	45.1	8.820	7.3	6.4	1.40	6995	1.09	2938.38
004390625-02	OBS	No	1.276435	132.389024	60.3	7.984	9.2	9.3	1.40	6995	1.29	7403.98
004390625-03	OBS	No	75.223800	166.434374	900.8	5.821	8.6	9.9	1.40	6995	5.09	32.28
004390625-04	OBS	No	15.287801	143.491037	275.4	2.651	8.6	6.5	1.40	6995	2.56	270.19
004390625-05	OBS	No	212.739706	191.761958	712.0	4.822	9.5	9.0	1.40	6995	4.65	8.07
004390625-06	OBS	No	30.256104	159.489605	471.5	1.835	8.5	8.0	1.40	6995	3.48	108.74
004390625-07	OBS	No	31.528847	132.957413	702.9	5.557	7.7	9.2	1.40	6995	5.85	102.92
004390625-08	OBS	No	40.289721	146.290226	580.3	5.414	8.1	8.1	1.40	6995	3.58	74.22
004390625-09	OBS	No	638.187757	153.507721	339.7	5.000	7.2	-1.0	1.40	6995	2.61	1.87

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004390625-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004390625-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—SAME_NTL_PERIOD
004390625-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-05	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST
004390625-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004390625-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
004390625-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_NOFITS

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

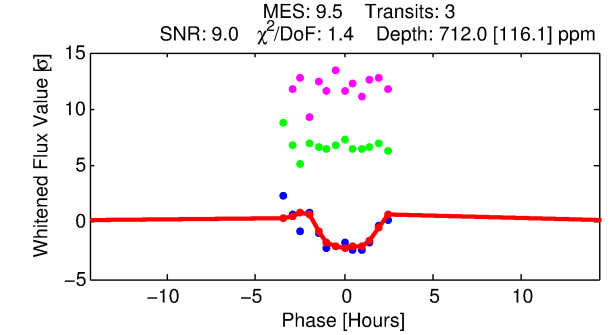
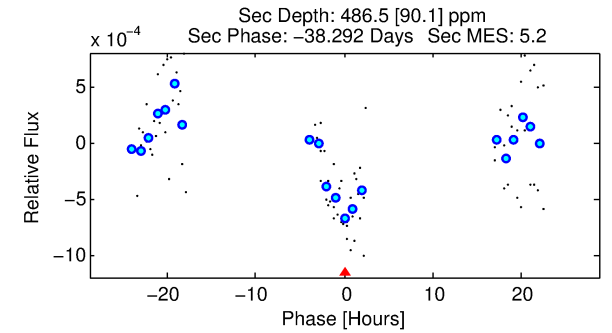
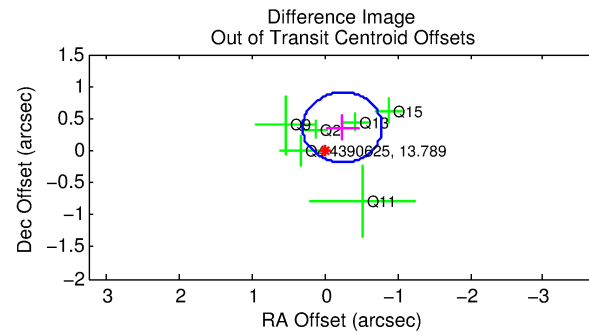
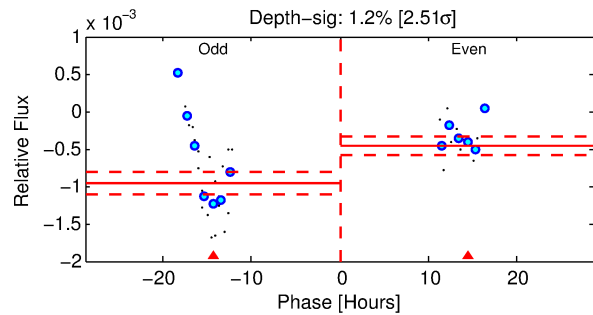
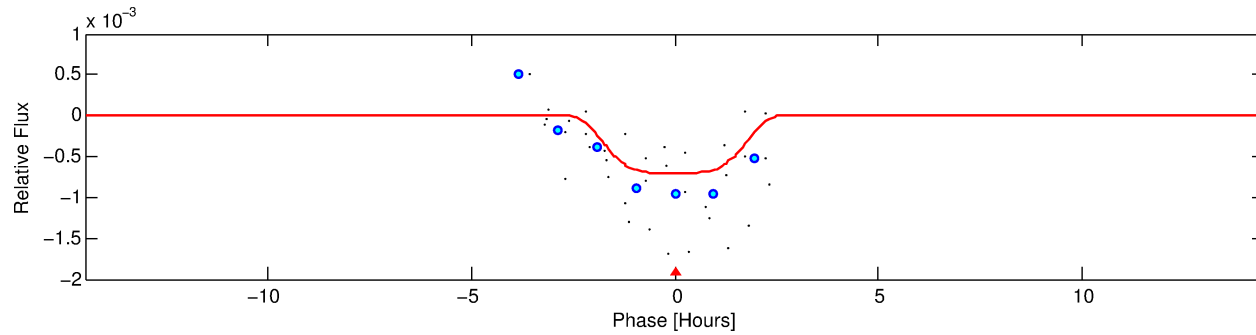
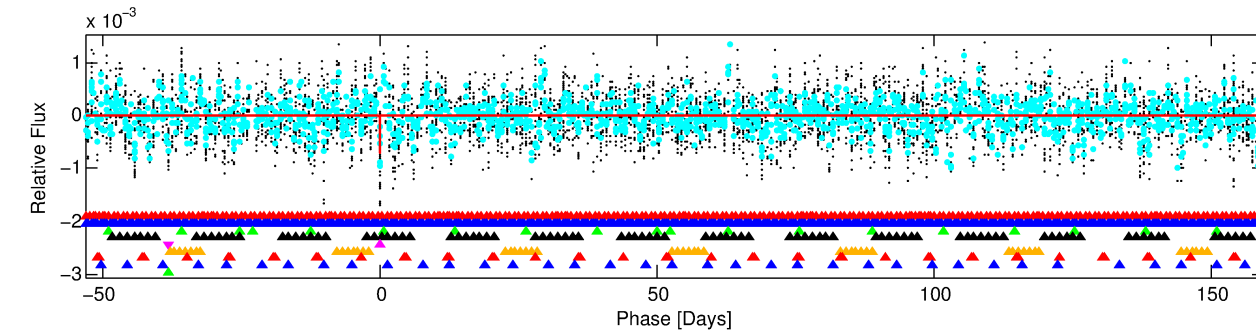
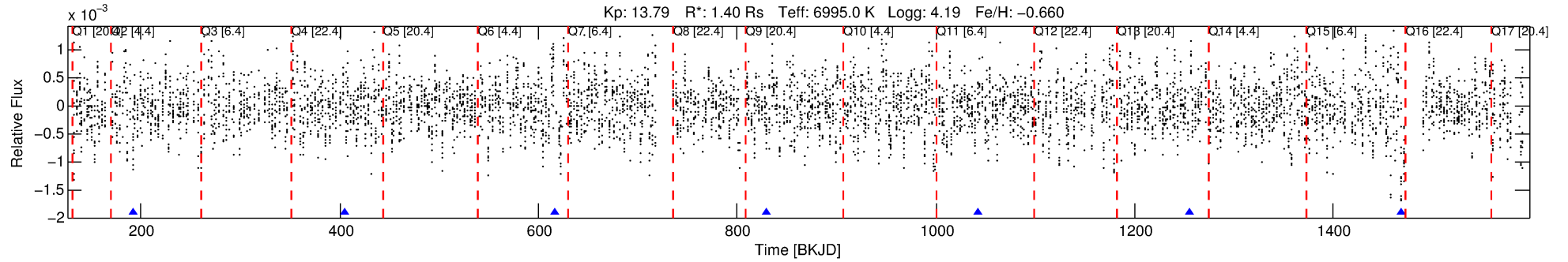
Ephemeris Match Information For 004390625-05

No Significant Match Found



# DV One-Page Summary

KIC: 4390625 Candidate: 5 of 9 Period: 212.740 d



## DV Fit Results:

Period = 212.73971 [0.00260] d  
Epoch = 191.7620 [0.0098] BKJD  
Rp/R\* = 0.0304 [0.0031]  
a/R\* = 127.62 [28.21]  
b = 0.96 [0.02]  
Seff = 8.07 [3.07]  
Teq = 430 [41] K  
Rp = 4.65 [1.38] Re  
a = 0.7217 [0.1687] AU  
Ag = 6445.25 [2809.45] [2.29 $\sigma$ ]  
Teffp = 5954 [481] K [11.44 $\sigma$ ]

## DV Diagnostic Results:

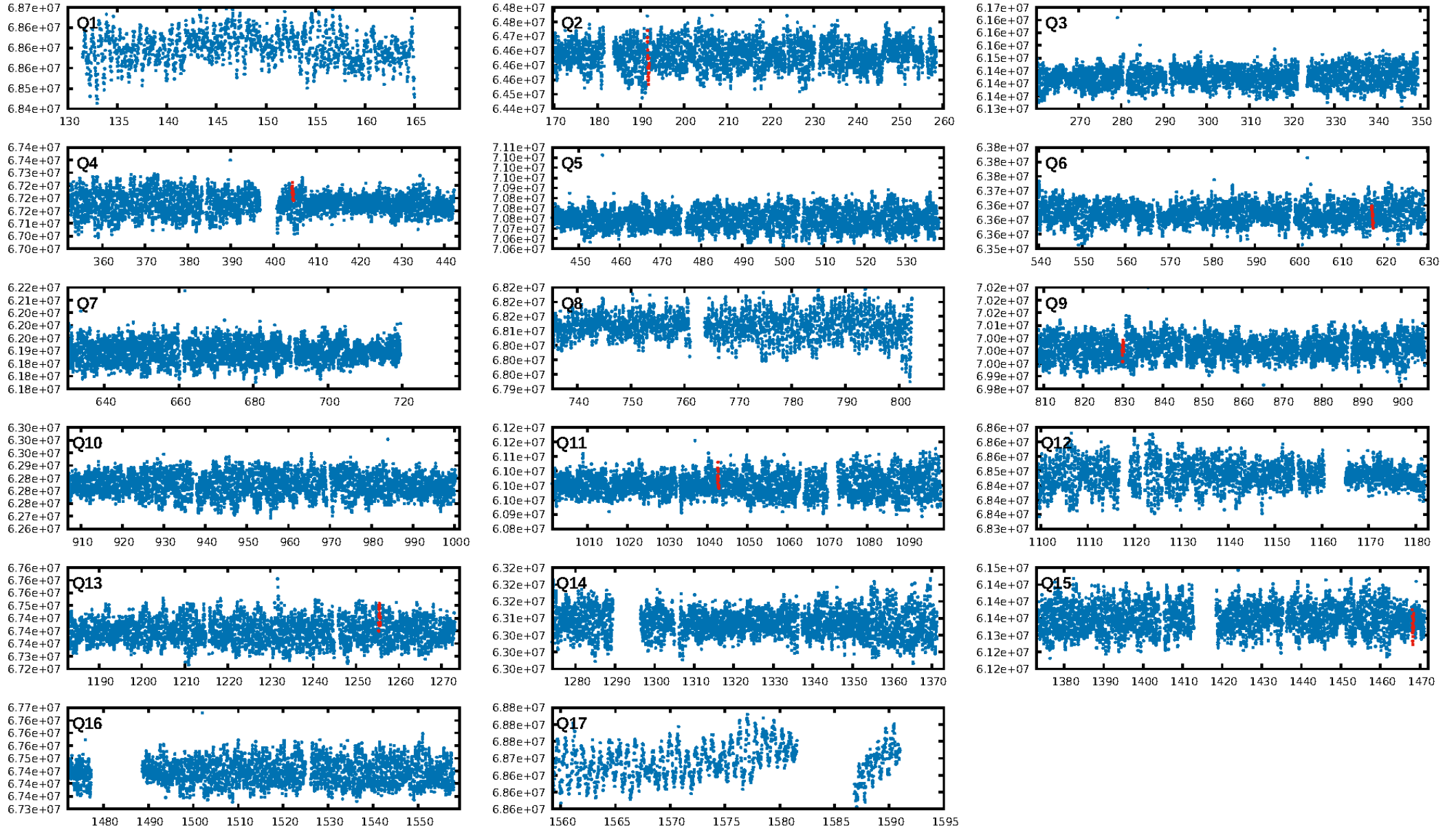
ShortPeriod-sig: 100.0% [436.61 $\sigma$ ]  
LongPeriod-sig: 100.0% [1469.93 $\sigma$ ]  
ModelChiSquare2-sig: 7.5%  
ModelChiSquareGof-sig: 64.3%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 0.2464  
Centroid-sig: N/A  
Centroid-so: 0.825 arcsec [1.32 $\sigma$ ]  
OotOffset-rm: 0.434 arcsec [2.38 $\sigma$ ]  
KicOffset-rm: 0.431 arcsec [2.25 $\sigma$ ]  
OotOffset-st: 1/2/1/2 [6]  
KicOffset-st: 1/2/1/2 [6]  
DiffImageQuality-fgm: 0.33 [2/6]  
DiffImageOverlap-fno: 0.43 [3/7]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 16:27:21 Z

This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

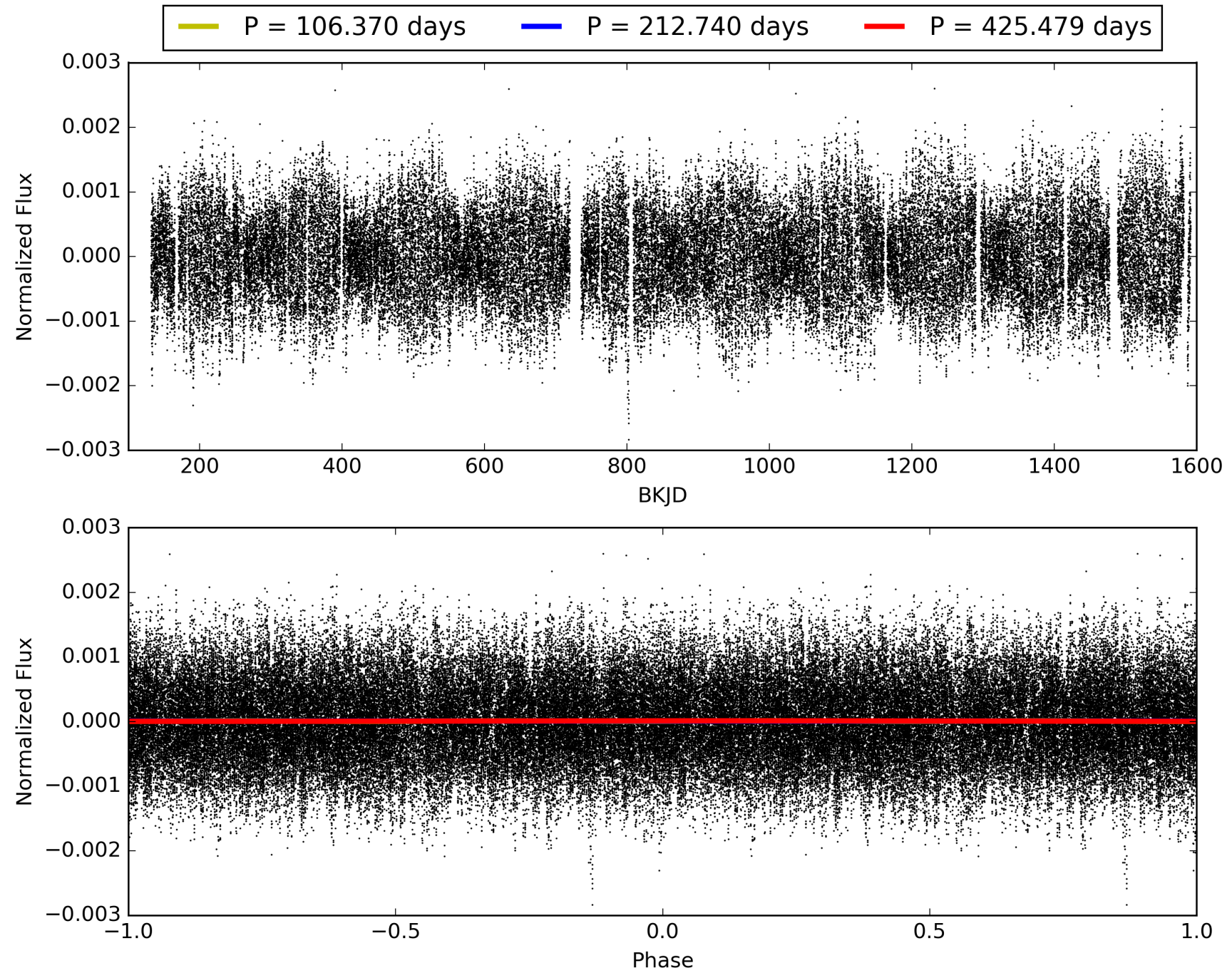


# TCE 004390625-05, PDC Light Curves





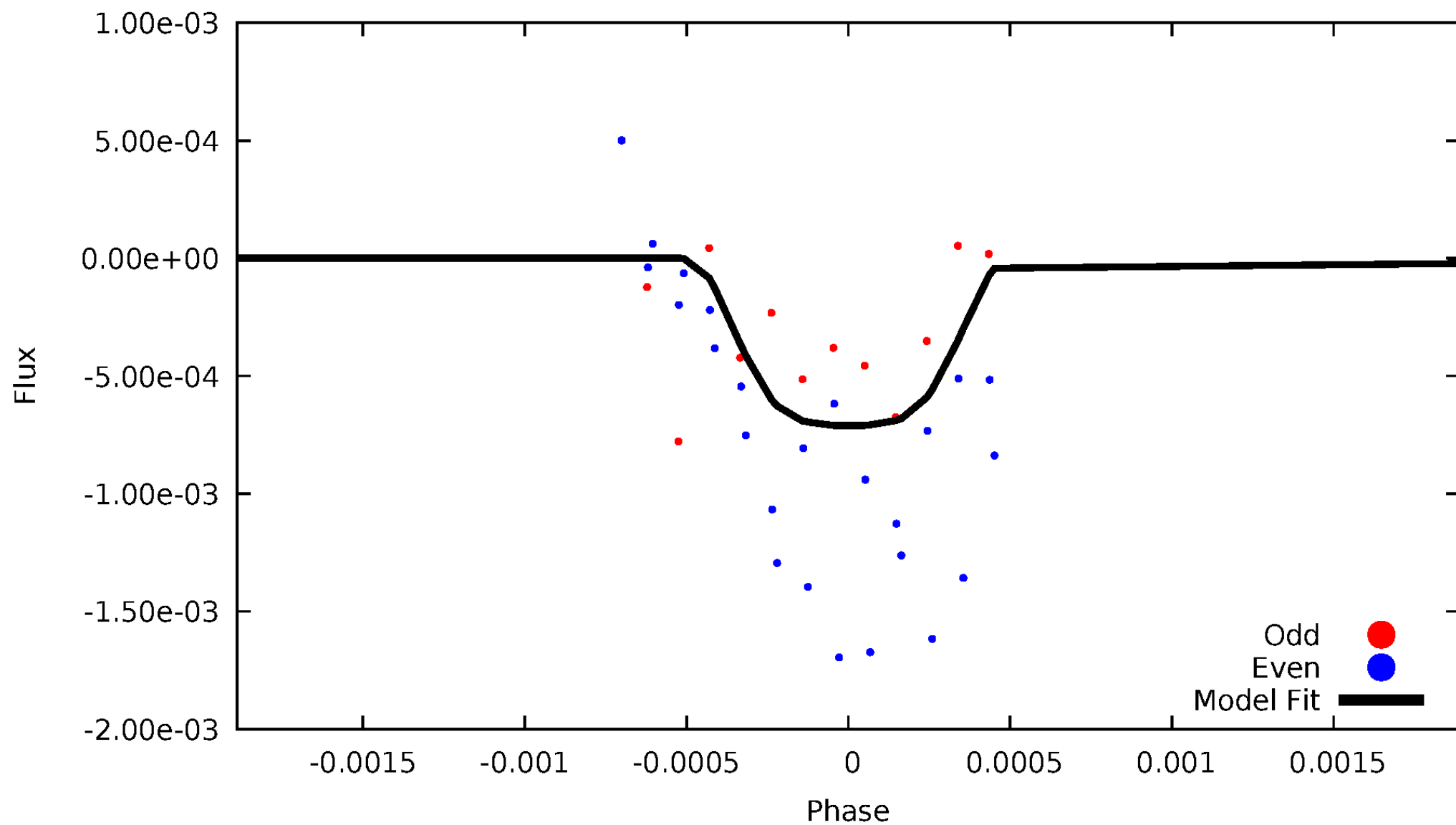
TCE 004390625-05





# DV Odd/Even

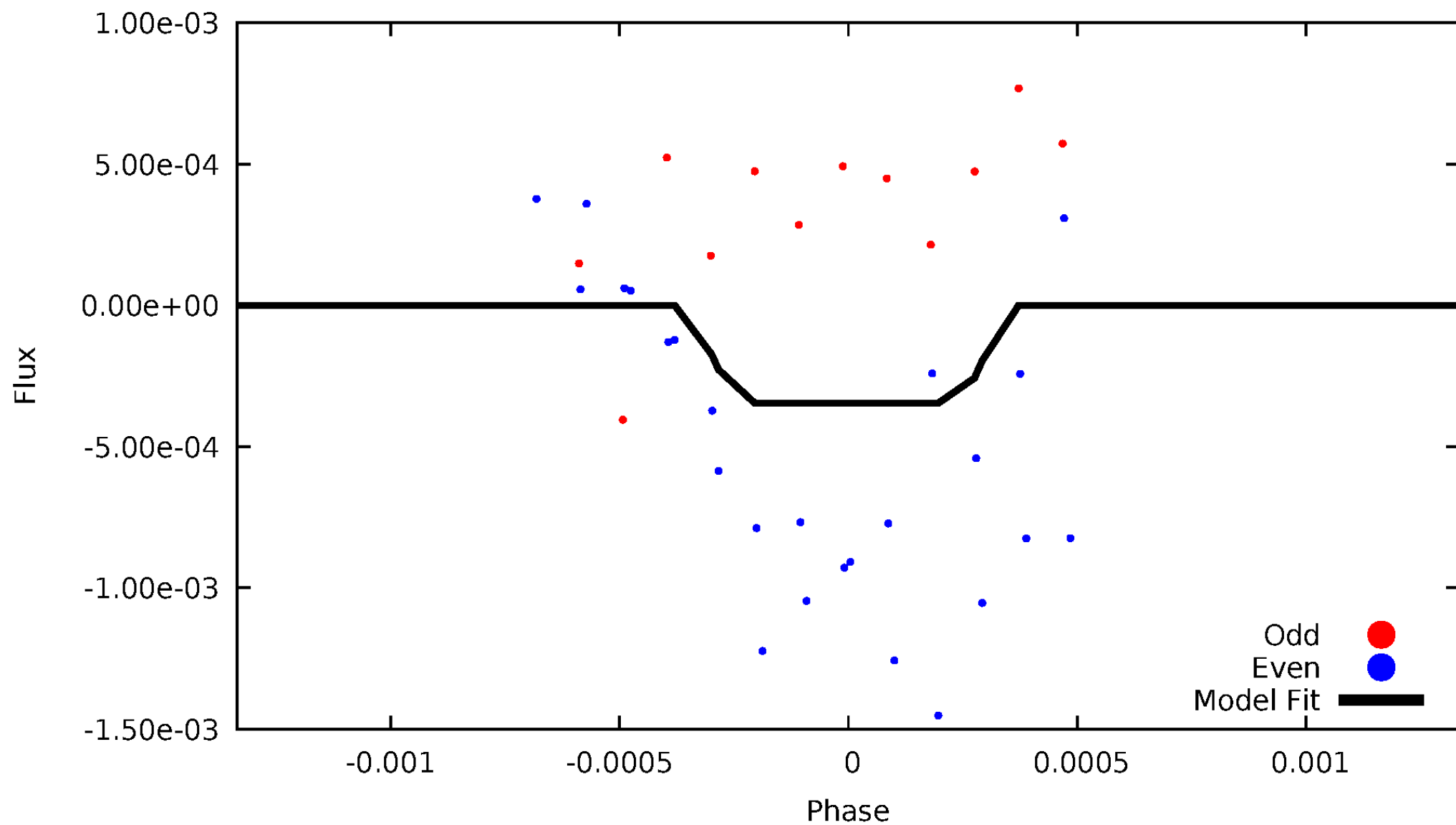
TCE 004390625-05





# ALT Odd/Even

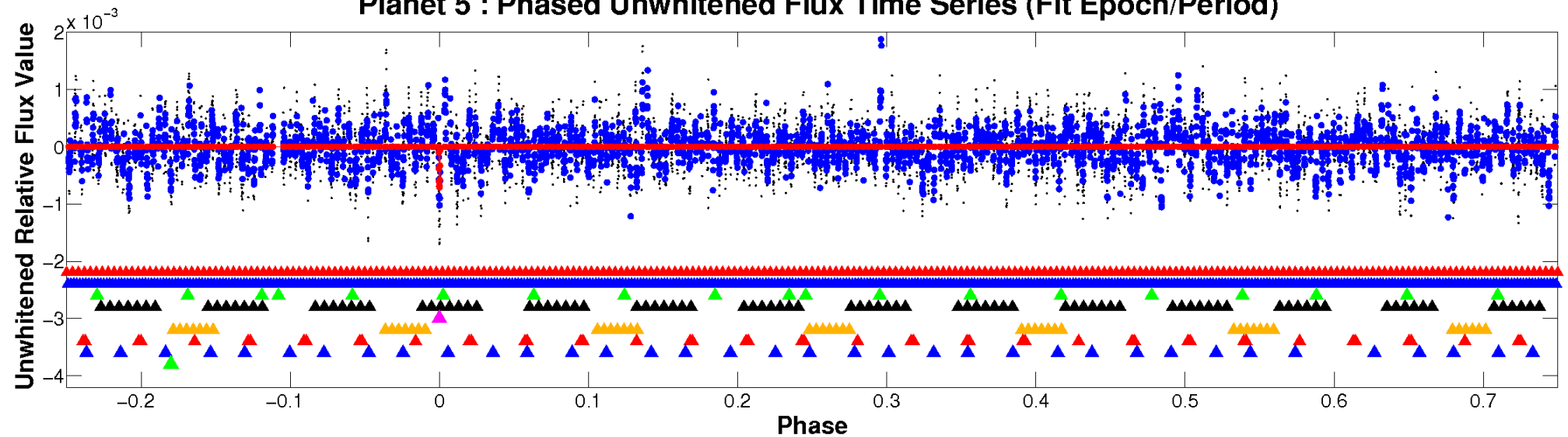
TCE 004390625-05



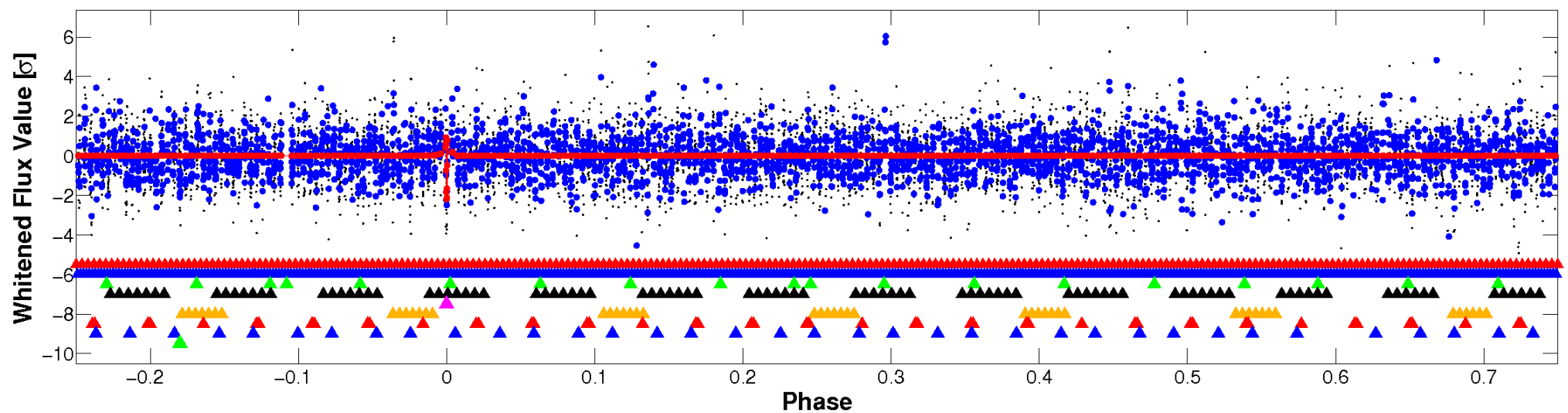


# Non-Whitened Vs. Whitened Light Curve

Planet 5 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



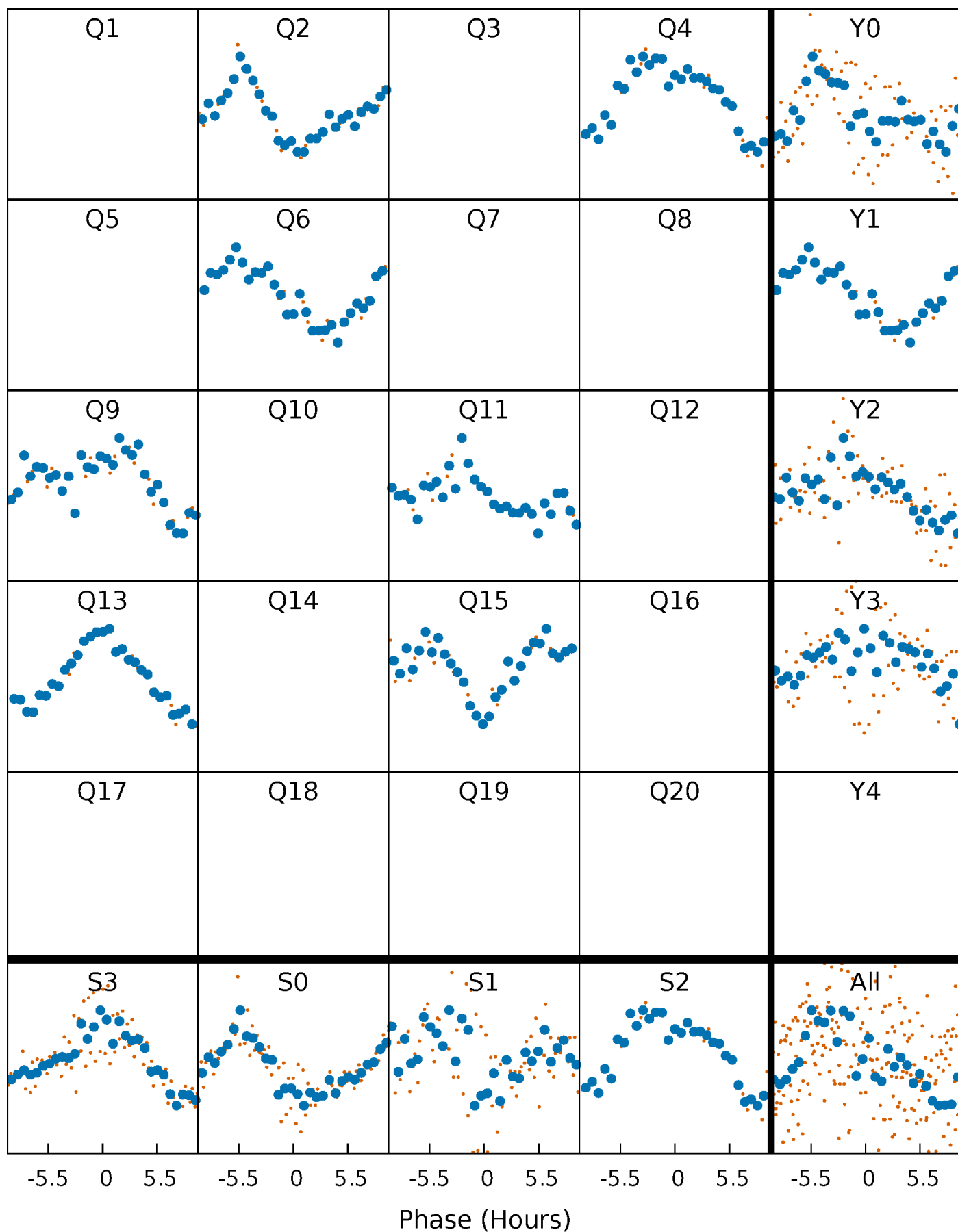
Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

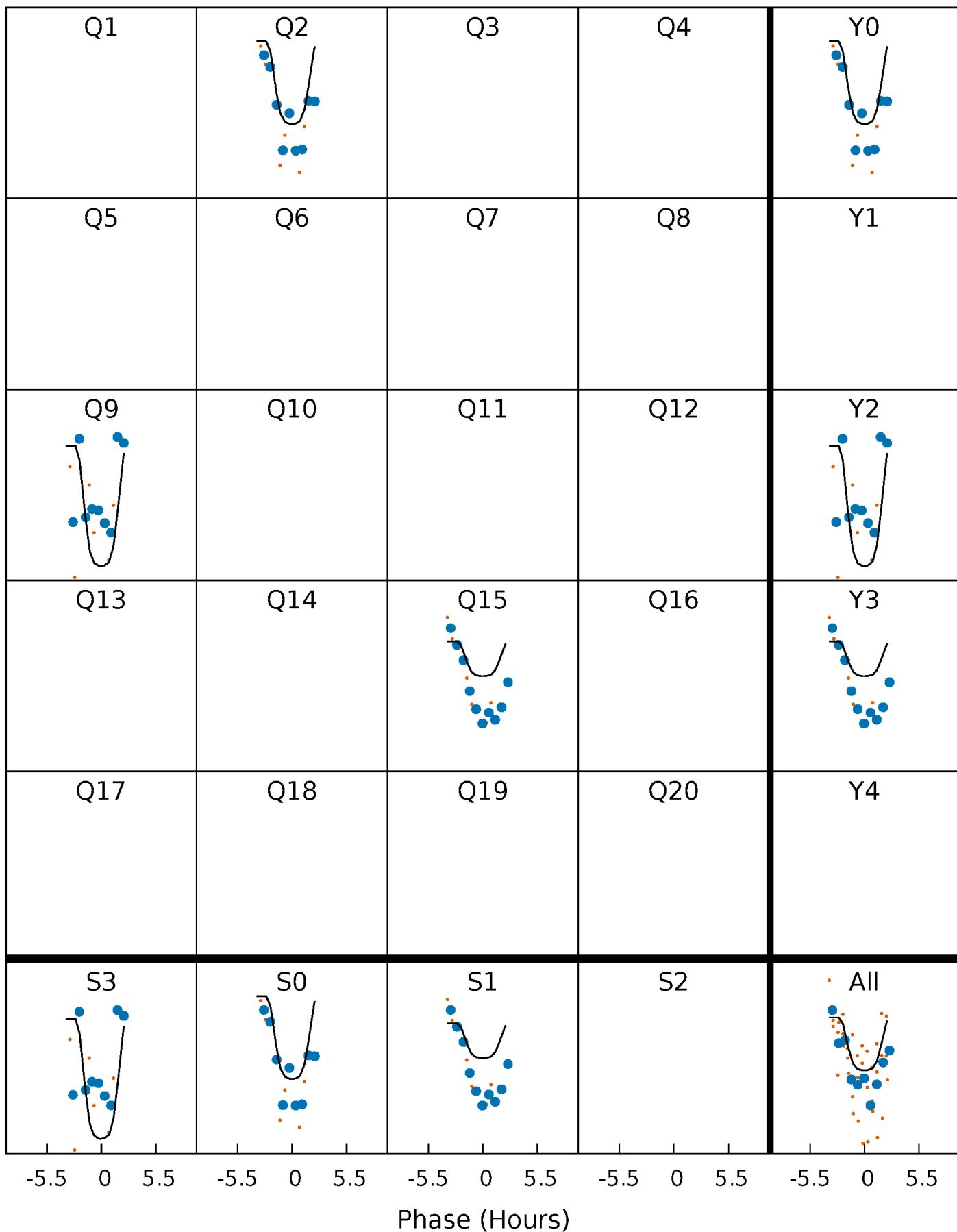
TCE 004390625-05     $P=212.739706$  Days     $T_0=191.761958$  (BKJD)





# DV Quarter-Phased Transit Curves

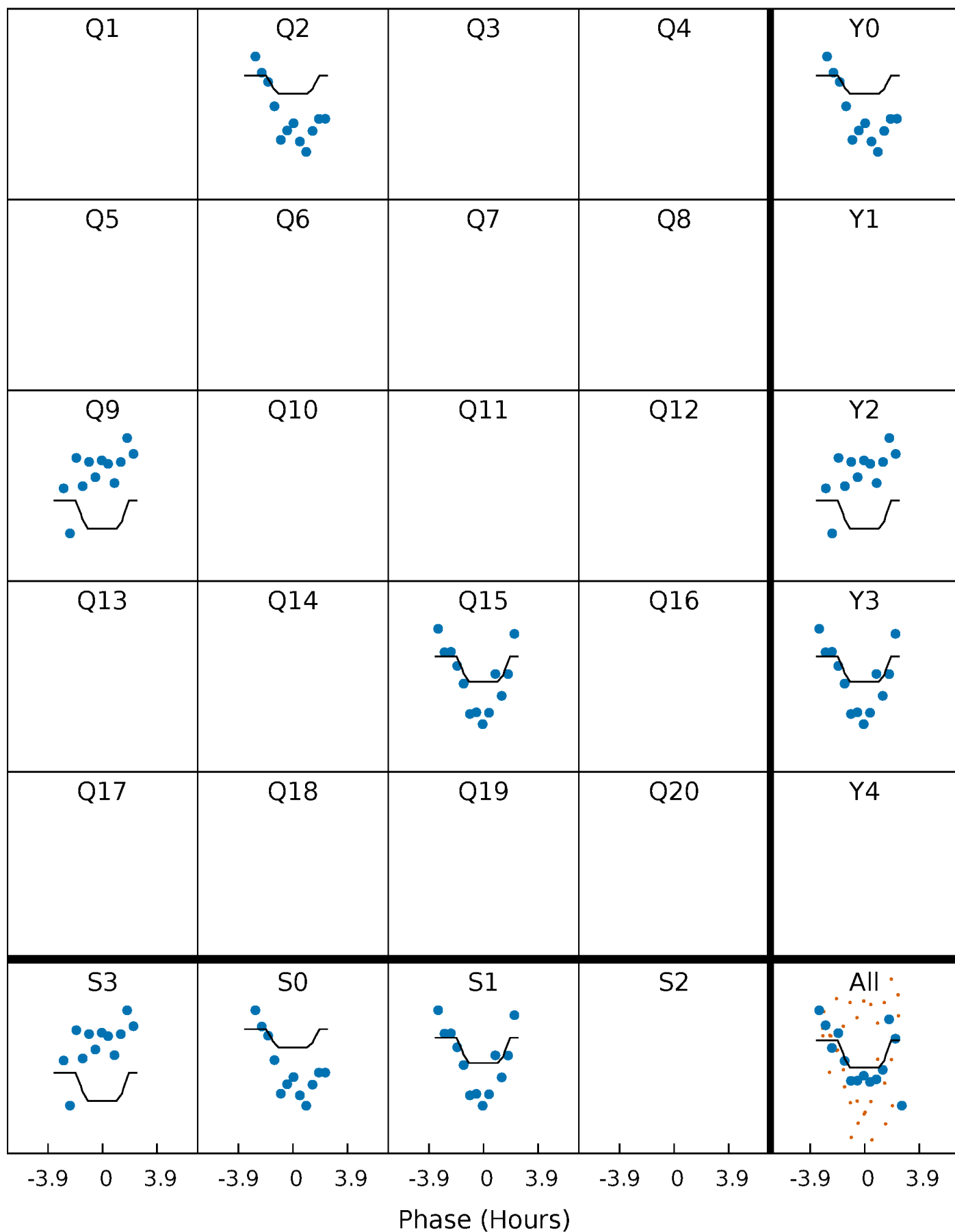
TCE 004390625-05     $P=212.739706$  Days     $T_0=191.761958$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 004390625-05 P=212.740711 Days  $T_0=191.751758$  (BKJD)

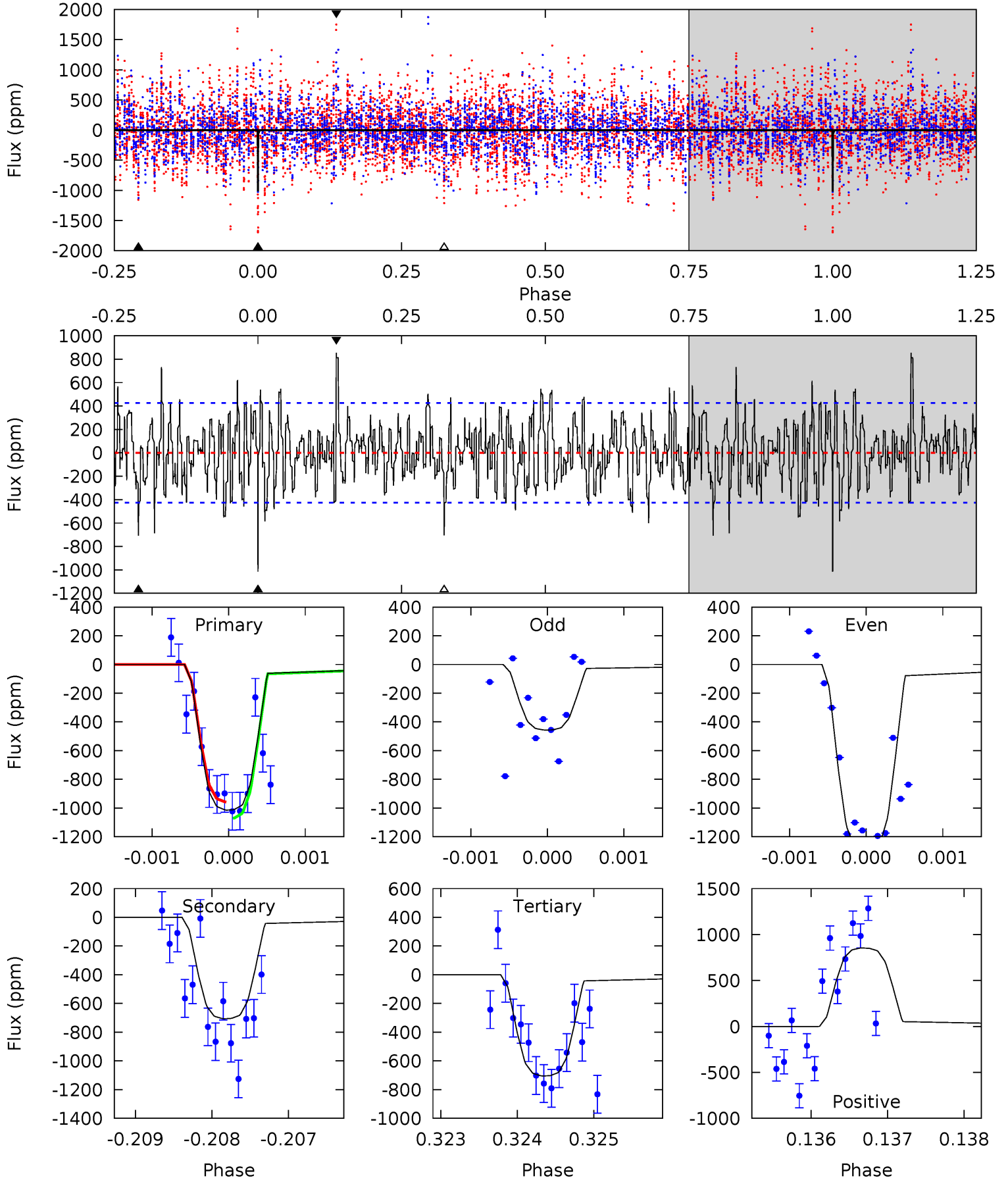




# DV Model-Shift Uniqueness Test

004390625-05, P = 212.739706 Days, E = 191.761958 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.0	9.08	9.06	11.0	5.47	3.33	2.93	3.98	2.07	0.02	-1.89	5.13	1.06	0.46	0.73

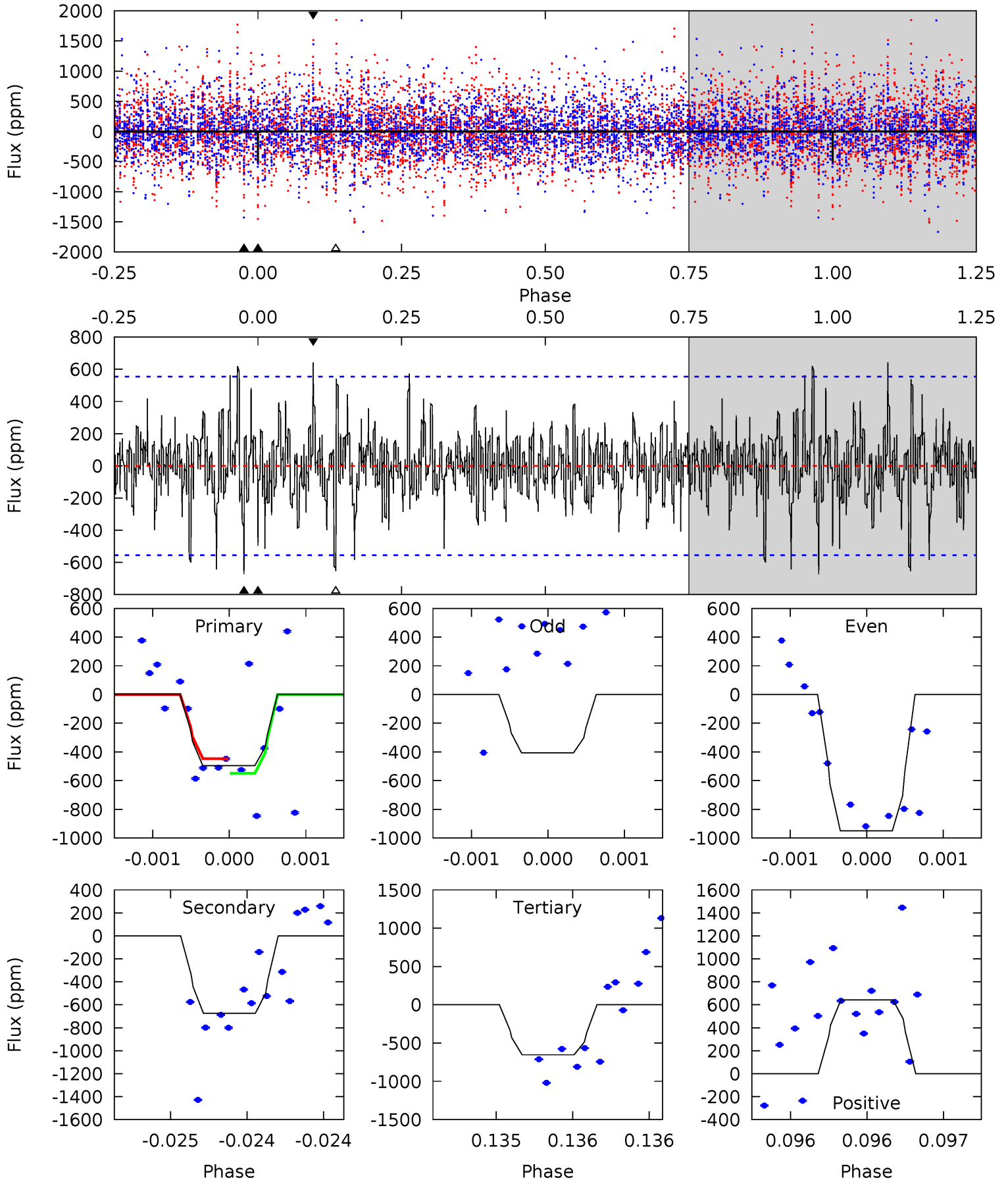




# Alt Model-Shift Uniqueness Test

004390625-05, P = 212.740711 Days, E = 191.751758 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.96	6.73	6.53	6.42	5.54	3.44	1.69	-1.58	-1.46	0.19	0.31	2.64	0.70	0.49	0.51





### Stellar Parameters For KIC 004390625

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6995^{+219}_{-301}$	$4.190^{+0.185}_{-0.167}$	$-0.660^{+0.250}_{-0.300}$	$1.400^{+0.390}_{-0.319}$	$1.106^{+0.160}_{-0.131}$	$0.568^{+0.534}_{-0.277}$
	+3%/-4%	+4%/-4%	+38%/-45%	+28%/-23%	+14%/-12%	+94%/-49%
Source	PHO1	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 004390625-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-706 \pm 78$	$4.58^{+0.83}_{-0.73}$	$596^{+45}_{-42}$	$6509^{+506}_{-451}$	$9685^{+4212}_{-2855}$
Alt.	$-673 \pm 100$	$2.82^{+0.71}_{-0.58}$	$598^{+47}_{-44}$	$8520^{+1315}_{-1045}$	$24024^{+13887}_{-8822}$

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature

$T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$



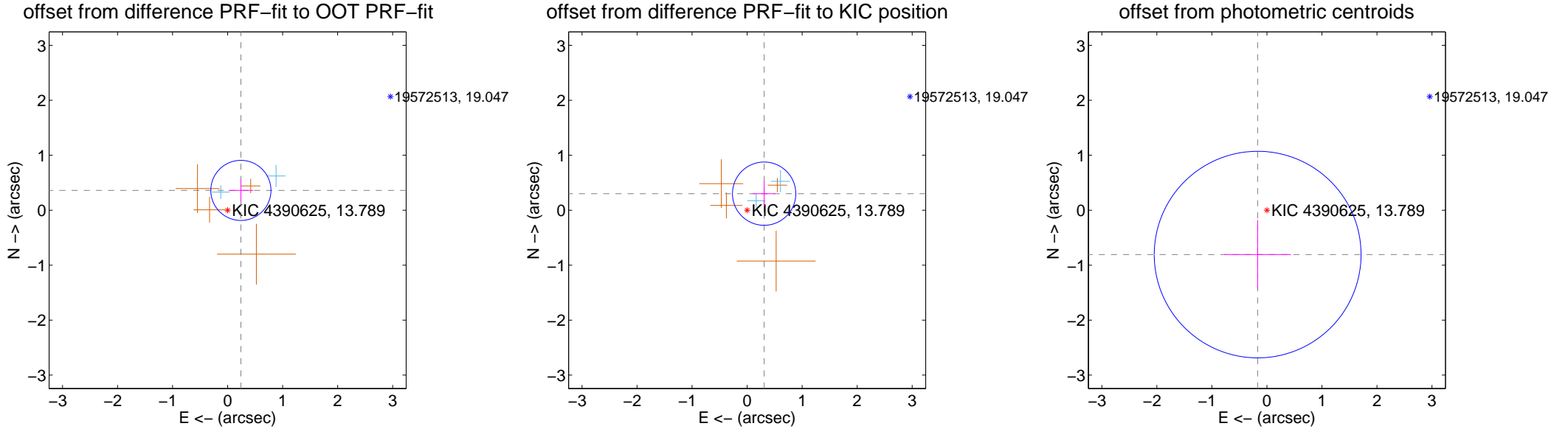
## DV Centroid Data

Supplemental centroid analysis for 004390625-05. Kepler magnitude: 13.79. Transit SNR 8.95

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.29 arcsec

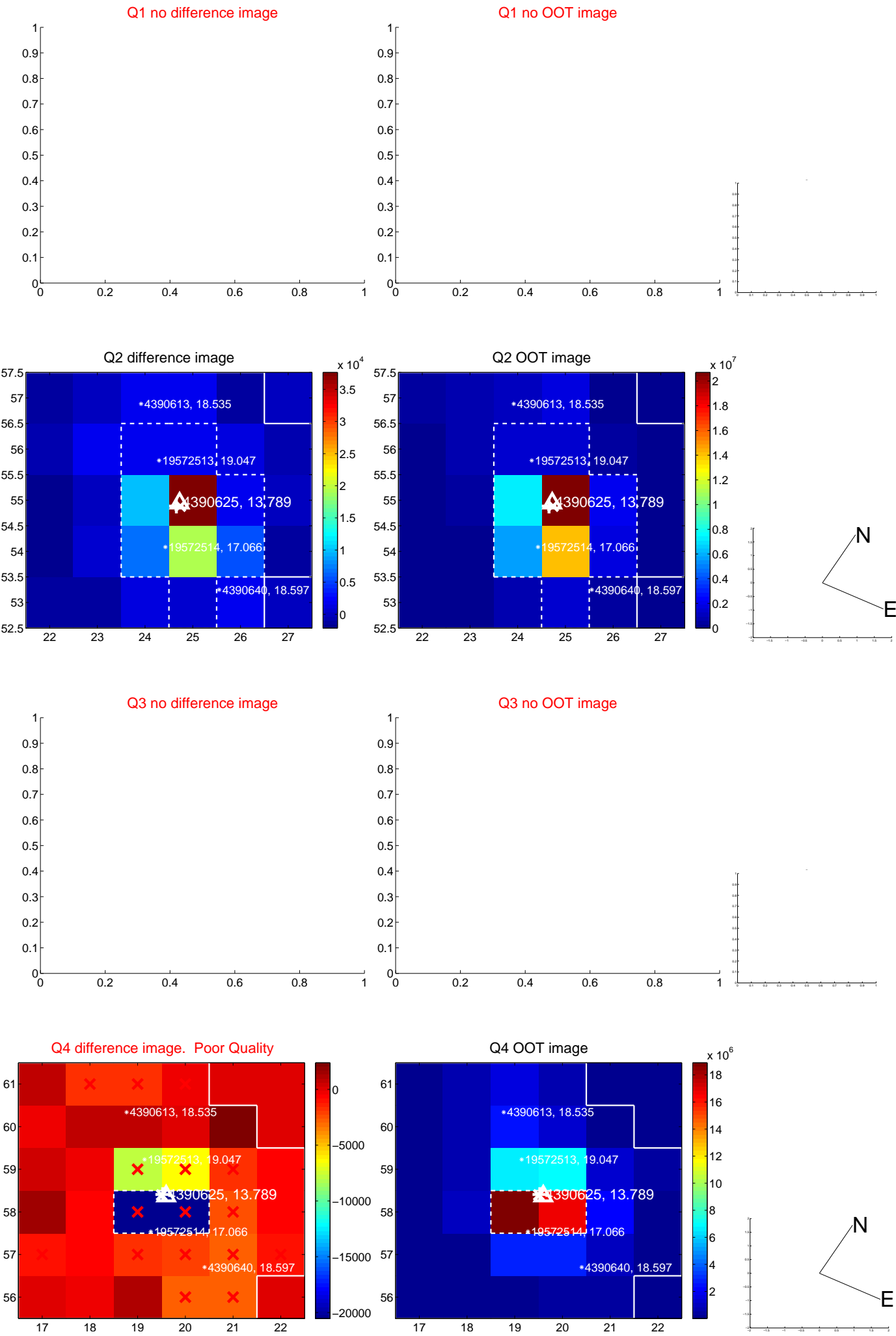
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.434 \pm 0.182$	2.38	$-0.241 \pm 0.221$	$0.360 \pm 0.199$
PRF-fit source offset from KIC position	$0.431 \pm 0.192$	2.25	$-0.309 \pm 0.202$	$0.301 \pm 0.226$
photometric centroid source offset	$0.82 \pm 0.63$	1.32	$0.17 \pm 0.61$	$-0.81 \pm 0.63$



Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

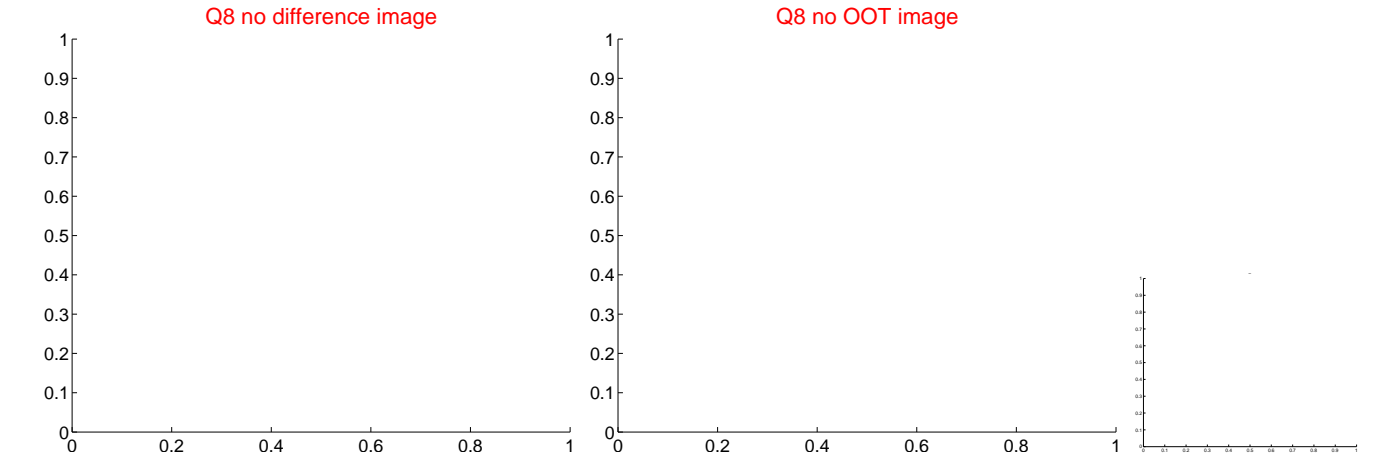
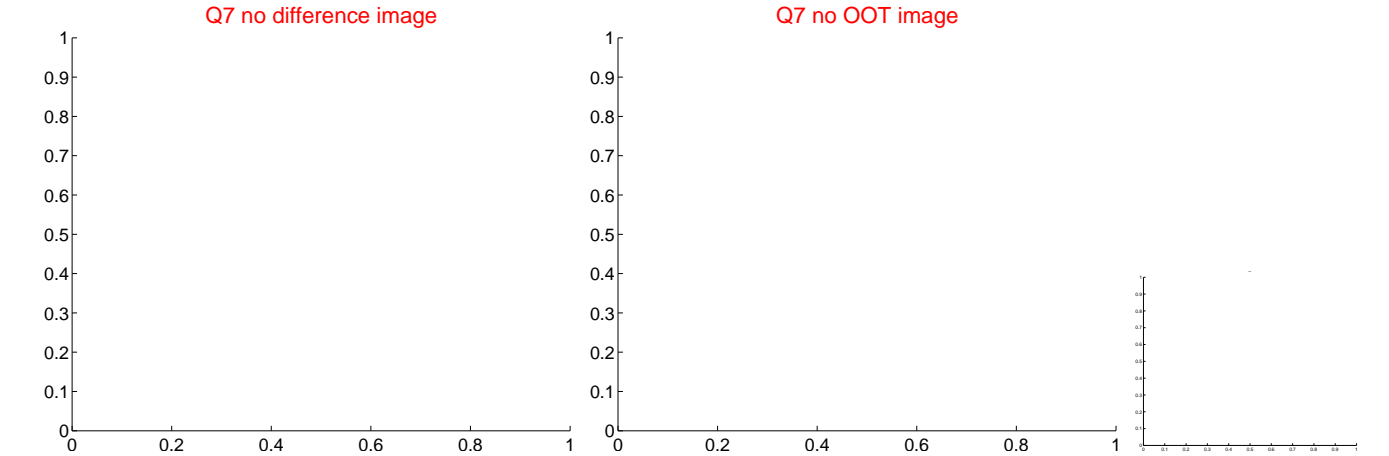
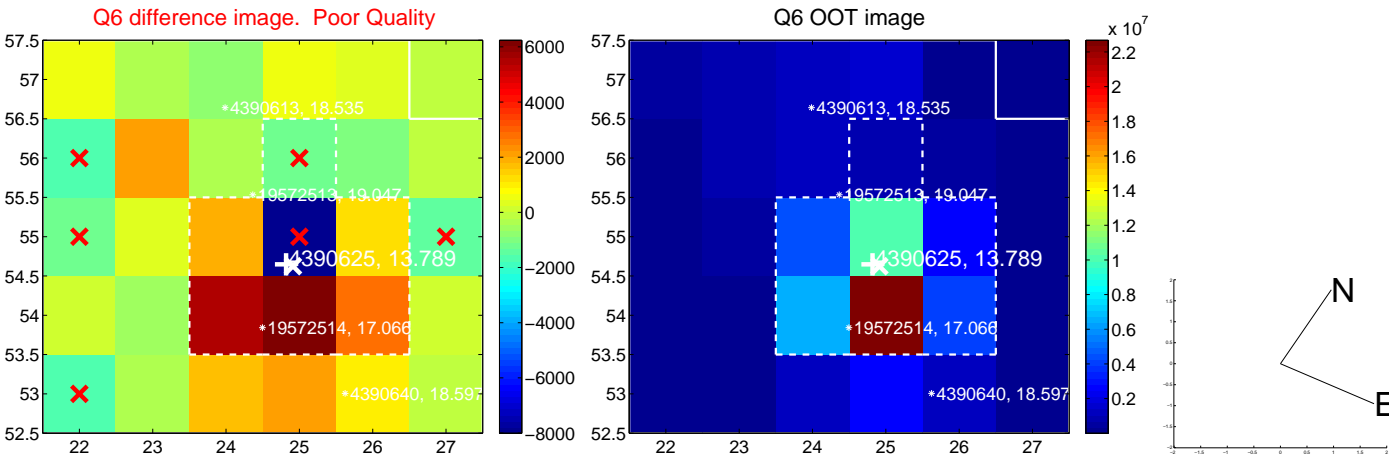
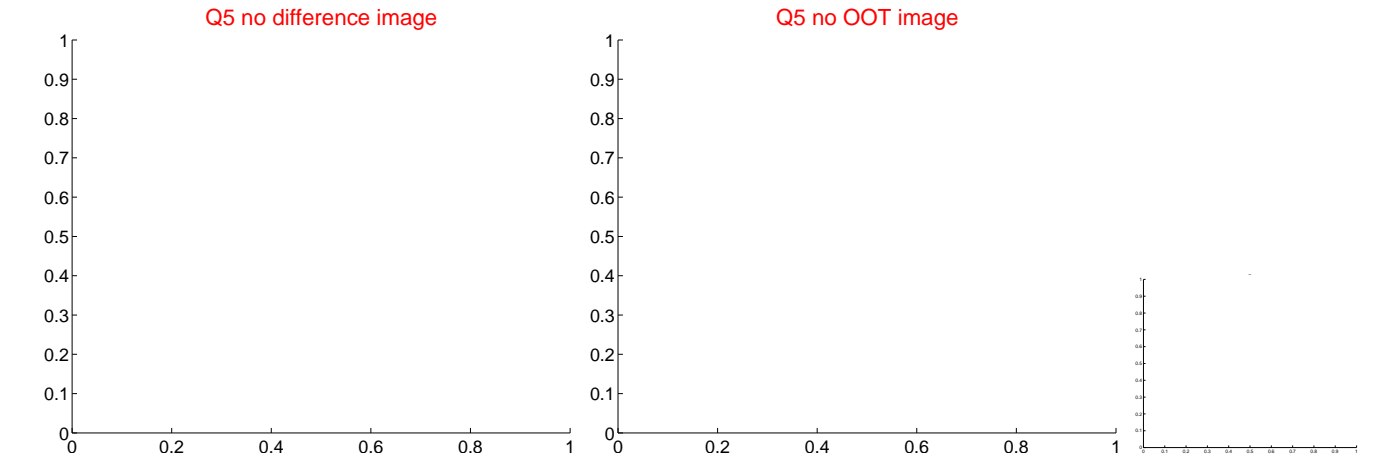


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



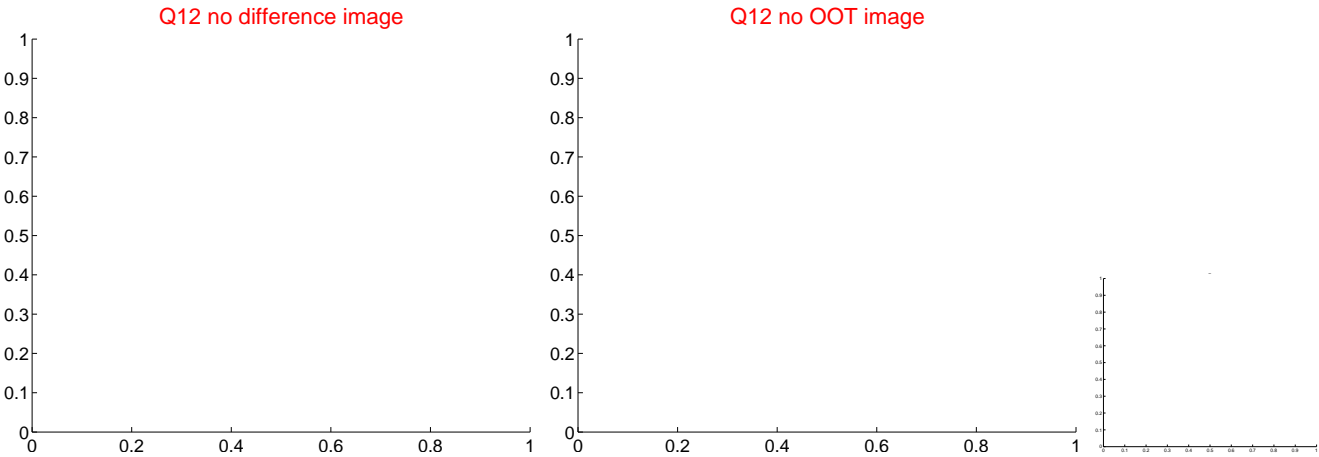
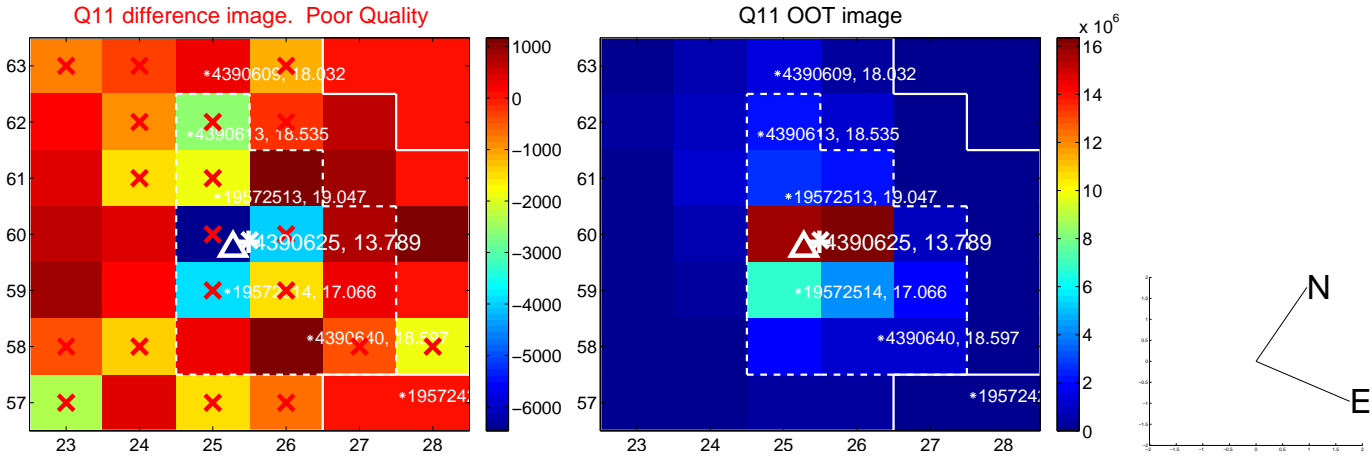
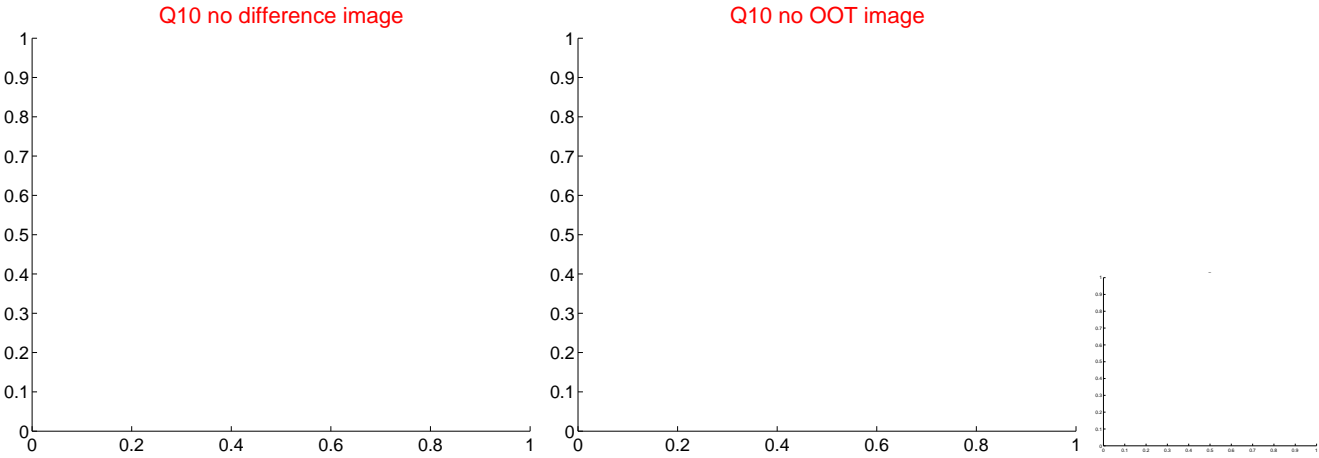
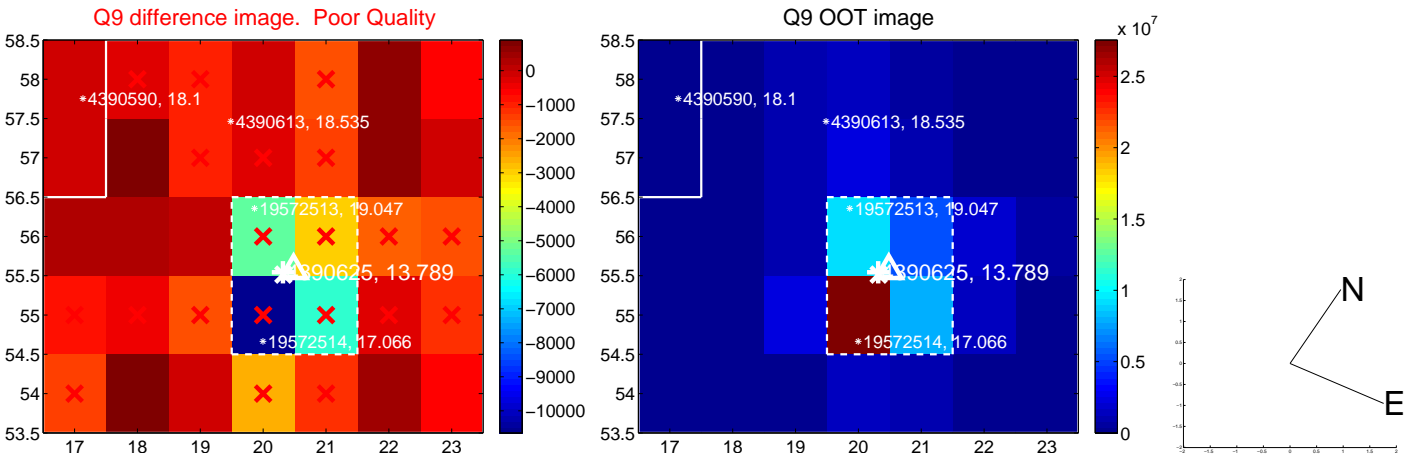


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



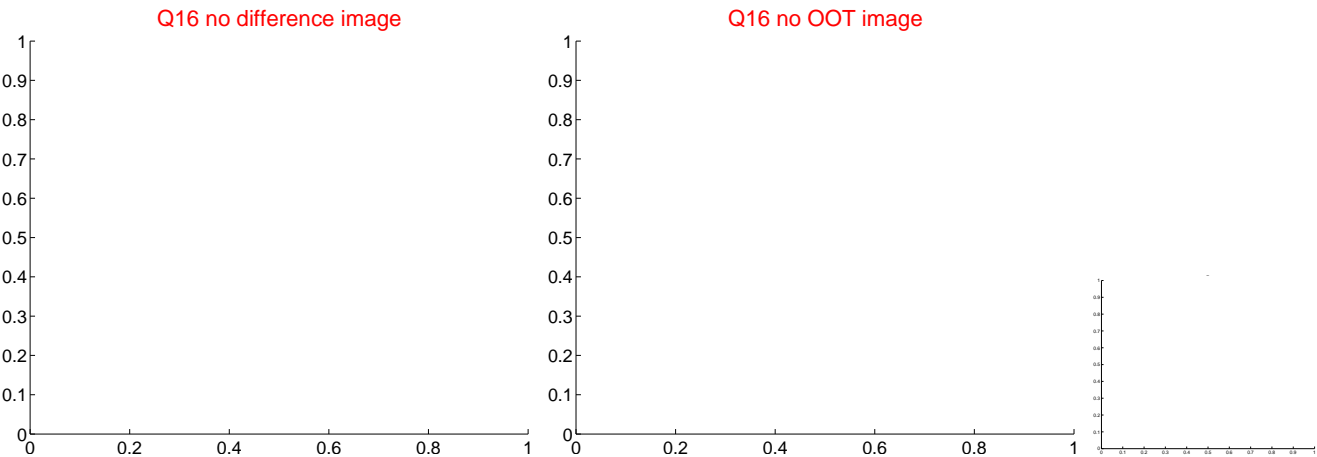
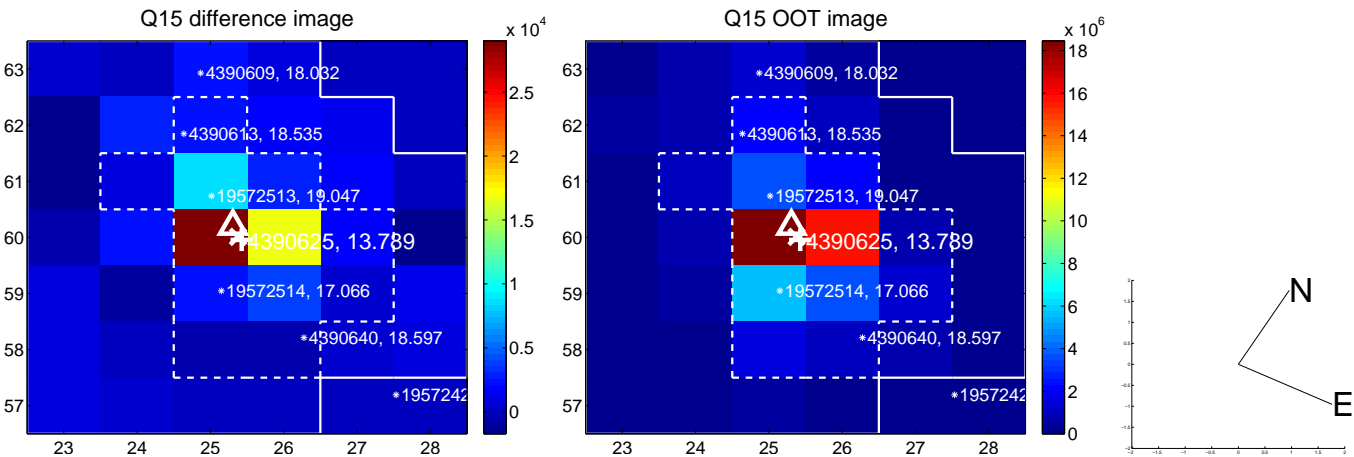
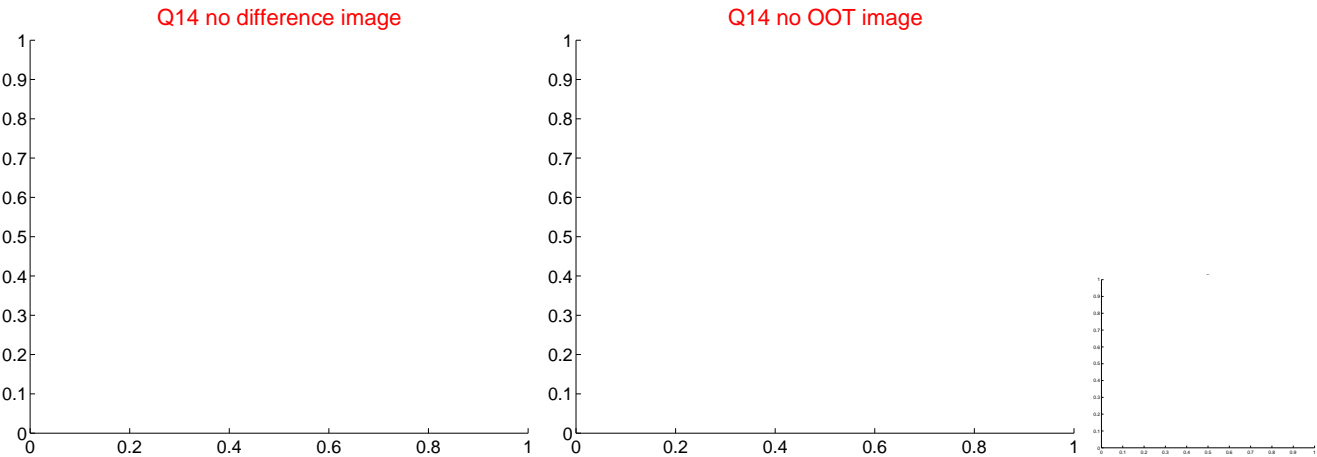
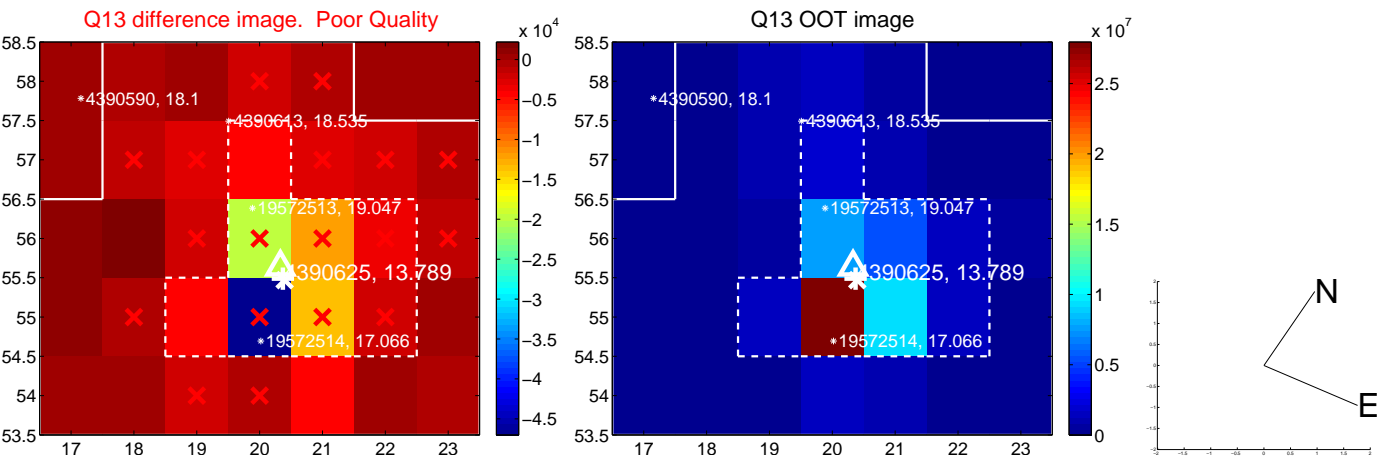


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



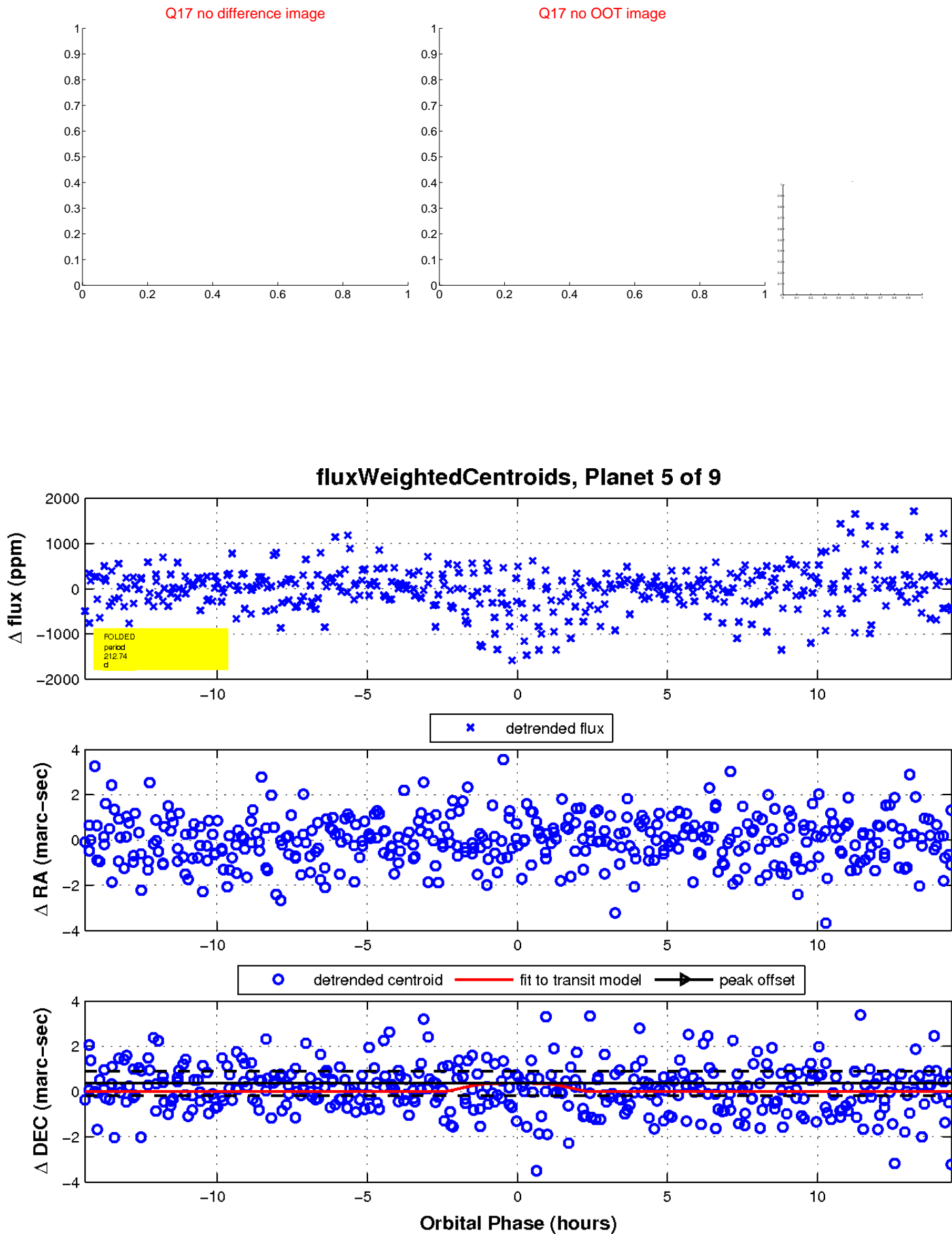


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





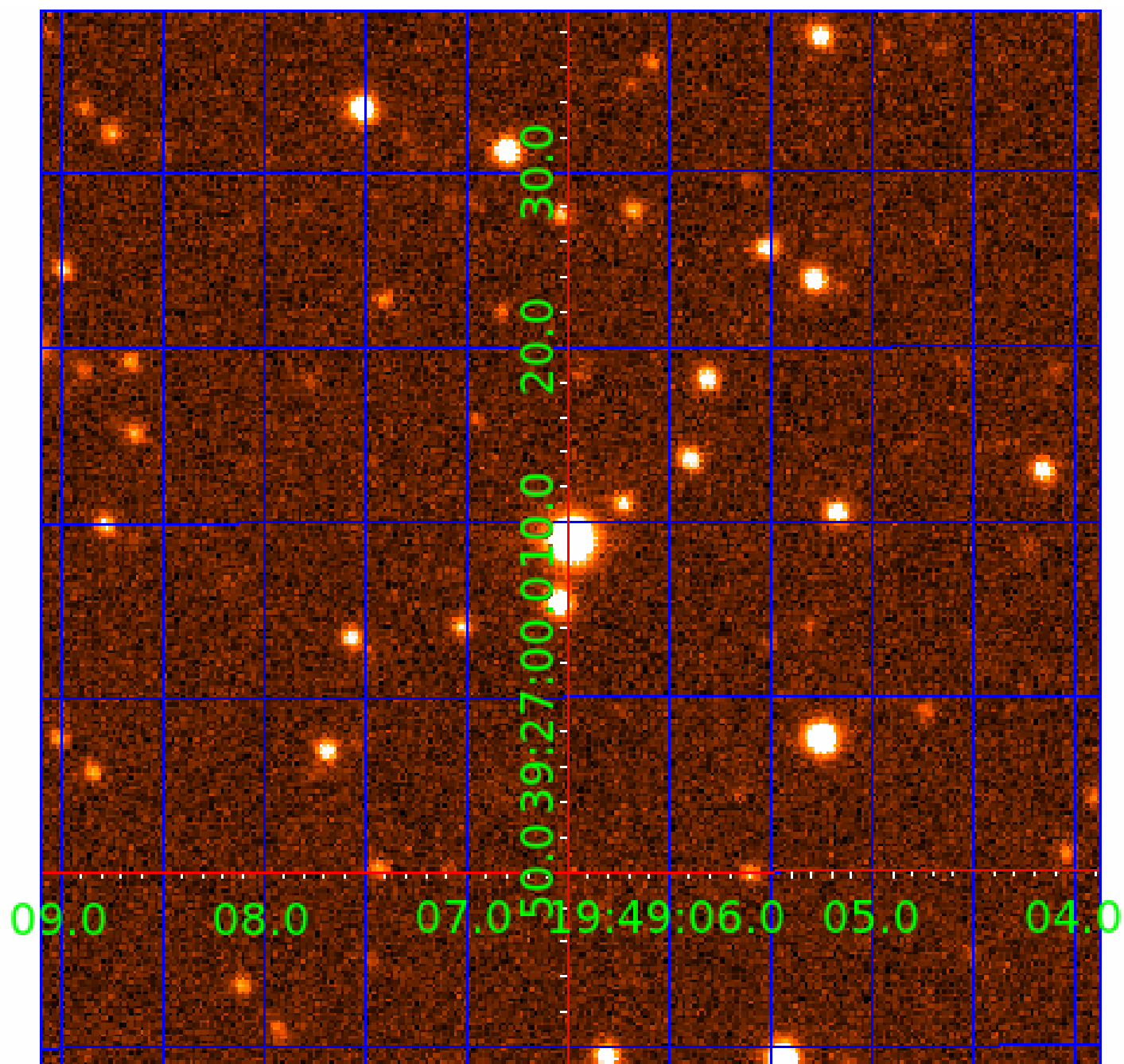
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination





## KIC 004390625

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004390625-01	OBS	No	2.552800	131.778368	45.1	8.820	7.3	6.4	1.40	6995	1.09	2938.38
004390625-02	OBS	No	1.276435	132.389024	60.3	7.984	9.2	9.3	1.40	6995	1.29	7403.98
004390625-03	OBS	No	75.223800	166.434374	900.8	5.821	8.6	9.9	1.40	6995	5.09	32.28
004390625-04	OBS	No	15.287801	143.491037	275.4	2.651	8.6	6.5	1.40	6995	2.56	270.19
004390625-05	OBS	No	212.739706	191.761958	712.0	4.822	9.5	9.0	1.40	6995	4.65	8.07
004390625-06	OBS	No	30.256104	159.489605	471.5	1.835	8.5	8.0	1.40	6995	3.48	108.74
004390625-07	OBS	No	31.528847	132.957413	702.9	5.557	7.7	9.2	1.40	6995	5.85	102.92
004390625-08	OBS	No	40.289721	146.290226	580.3	5.414	8.1	8.1	1.40	6995	3.58	74.22
004390625-09	OBS	No	638.187757	153.507721	339.7	5.000	7.2	-1.0	1.40	6995	2.61	1.87

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004390625-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004390625-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—SAME_NTL_PERIOD
004390625-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-05	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST
004390625-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004390625-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
004390625-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_NOFITS

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

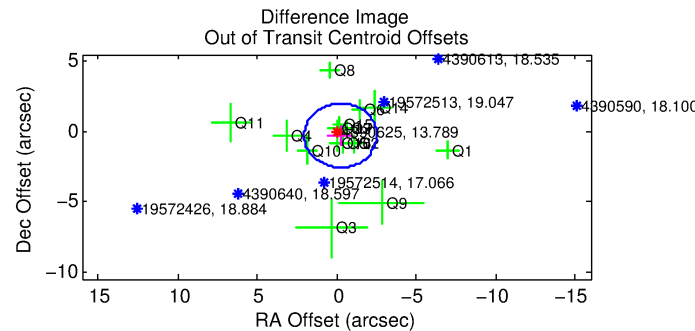
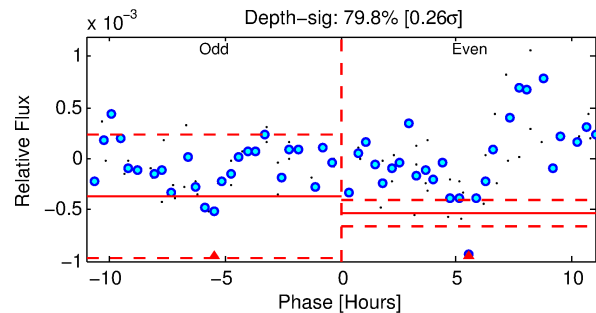
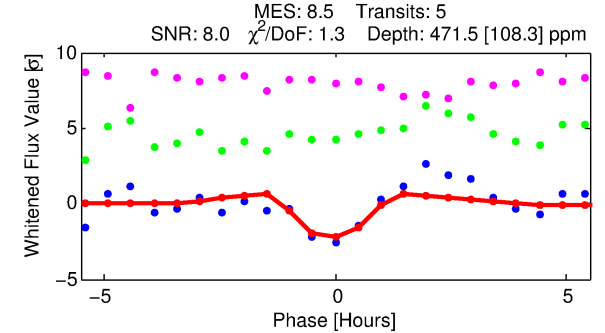
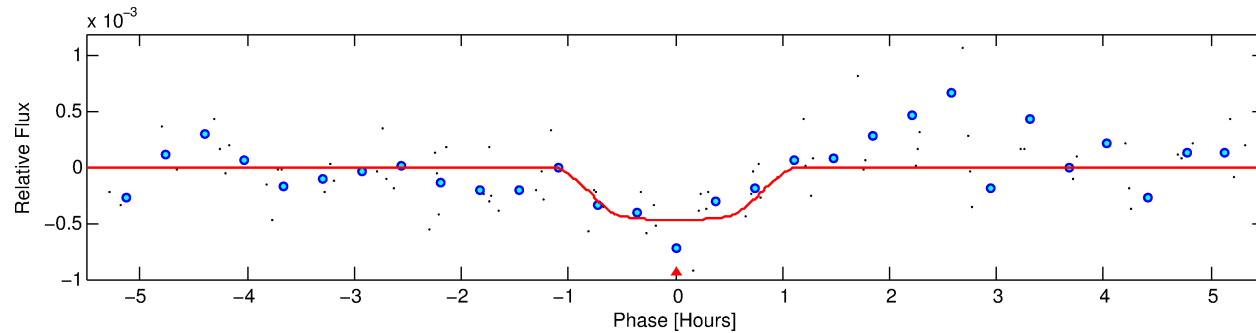
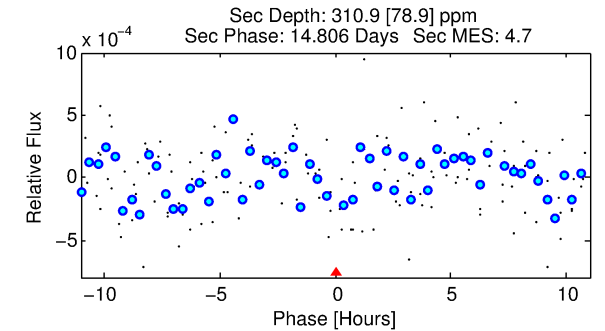
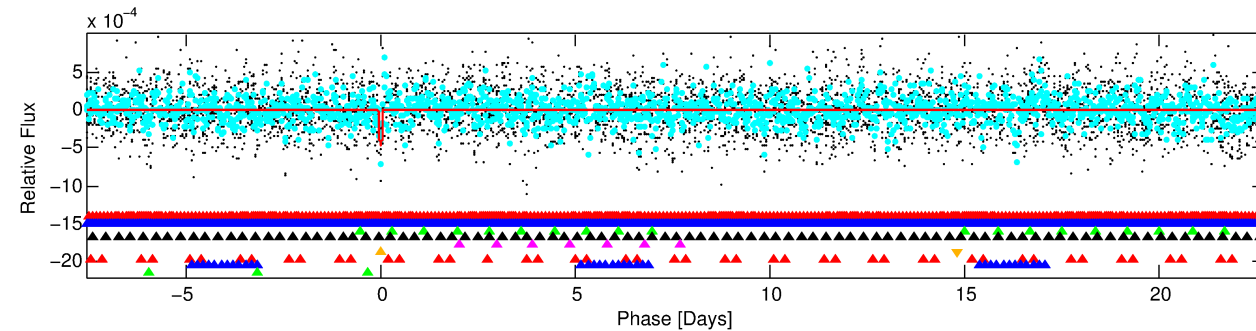
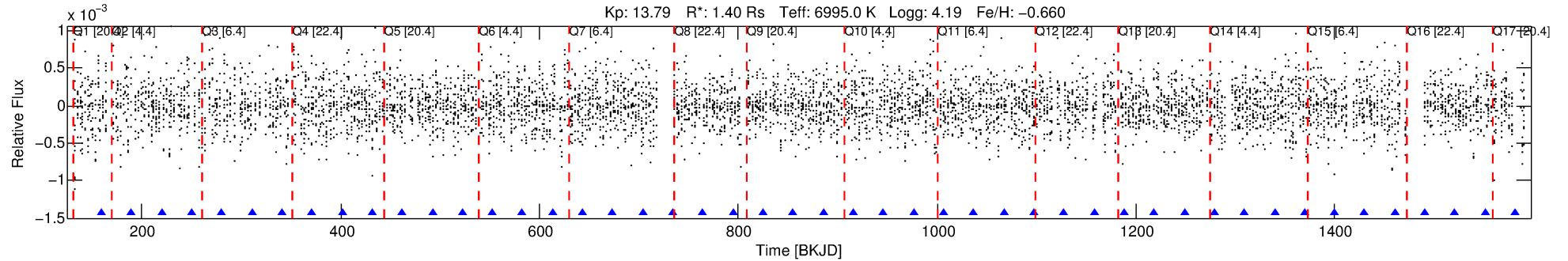
Ephemeris Match Information For 004390625-06

No Significant Match Found



# DV One-Page Summary

KIC: 4390625 Candidate: 6 of 9 Period: 30.256 d



## DV Fit Results:

Period = 30.25610 [0.00029] d  
Epoch = 159.4896 [0.0081] BKJD  
Rp/R\* = 0.0228 [0.0749]  
a/R\* = 67.13 [1354.36]  
b = 0.87 [5.55]  
Seff = 108.74 [41.37]  
Teff = 823 [78] K  
Rp = 3.48 [11.48] Re  
a = 0.1966 [0.0460] AU  
Ag = 547.35 [3609.08] [0.15 $\sigma$ ]  
Teffp = 6158 [10141] K [0.53 $\sigma$ ]

## DV Diagnostic Results:

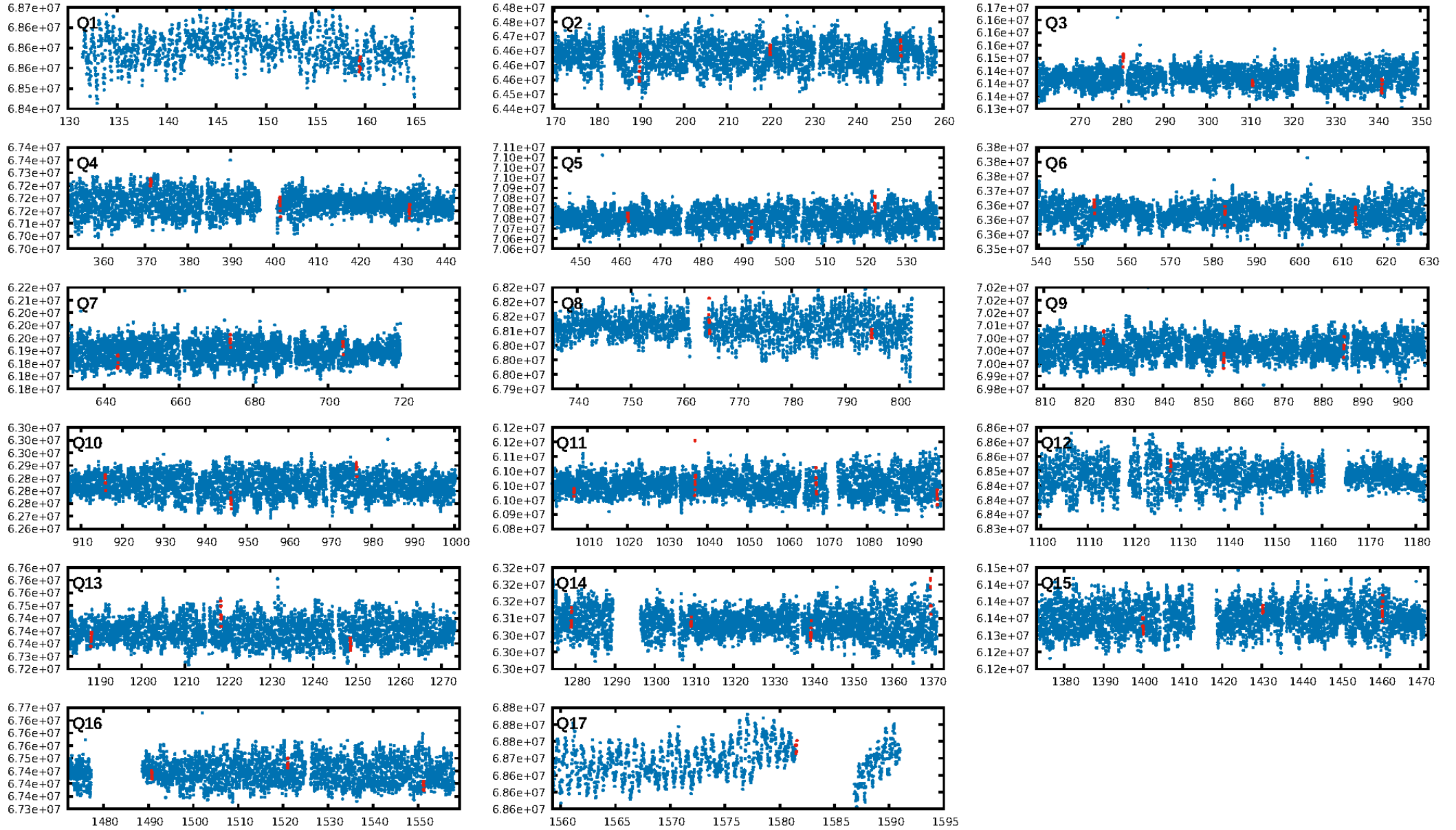
ShortPeriod-sig: 100.0% [111.42 $\sigma$ ]  
LongPeriod-sig: 100.0% [5.22 $\sigma$ ]  
ModelChiSquare2-sig: 15.2%  
ModelChiSquareGof-sig: 71.5%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 1.263  
Centroid-sig: N/A  
Centroid-so: 0.849 arcsec [1.61 $\sigma$ ]  
OotOffset-rm: 0.372 arcsec [0.49 $\sigma$ ]  
KicOffset-rm: 0.416 arcsec [0.55 $\sigma$ ]  
OotOffset-st: 4/4/3/4 [15]  
KicOffset-st: 4/4/3/4 [15]  
DiffImageQuality-fgm: 0.40 [6/15]  
DiffImageOverlap-fno: 0.38 [6/16]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 16:27:24 Z

This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

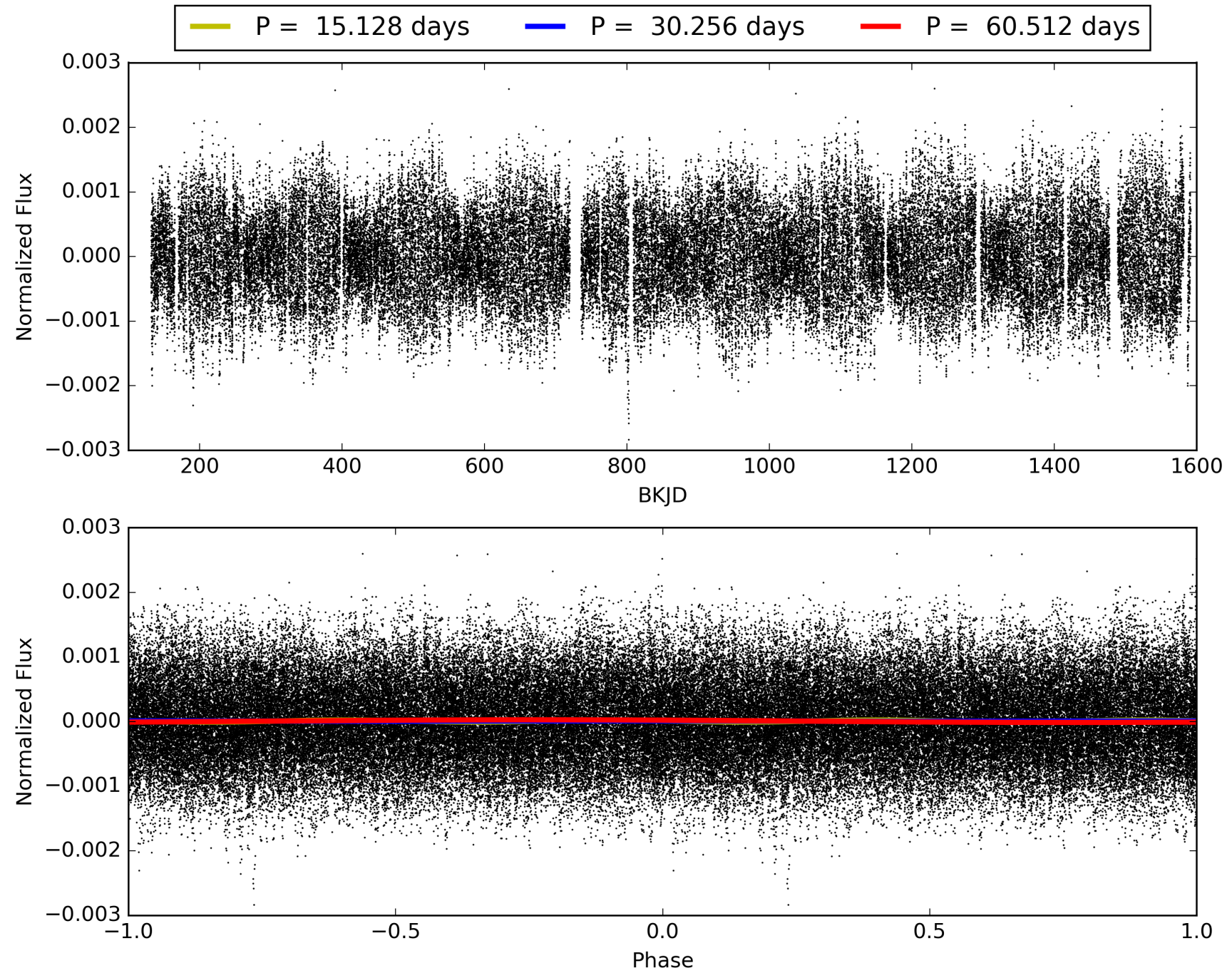


# TCE 004390625-06, PDC Light Curves





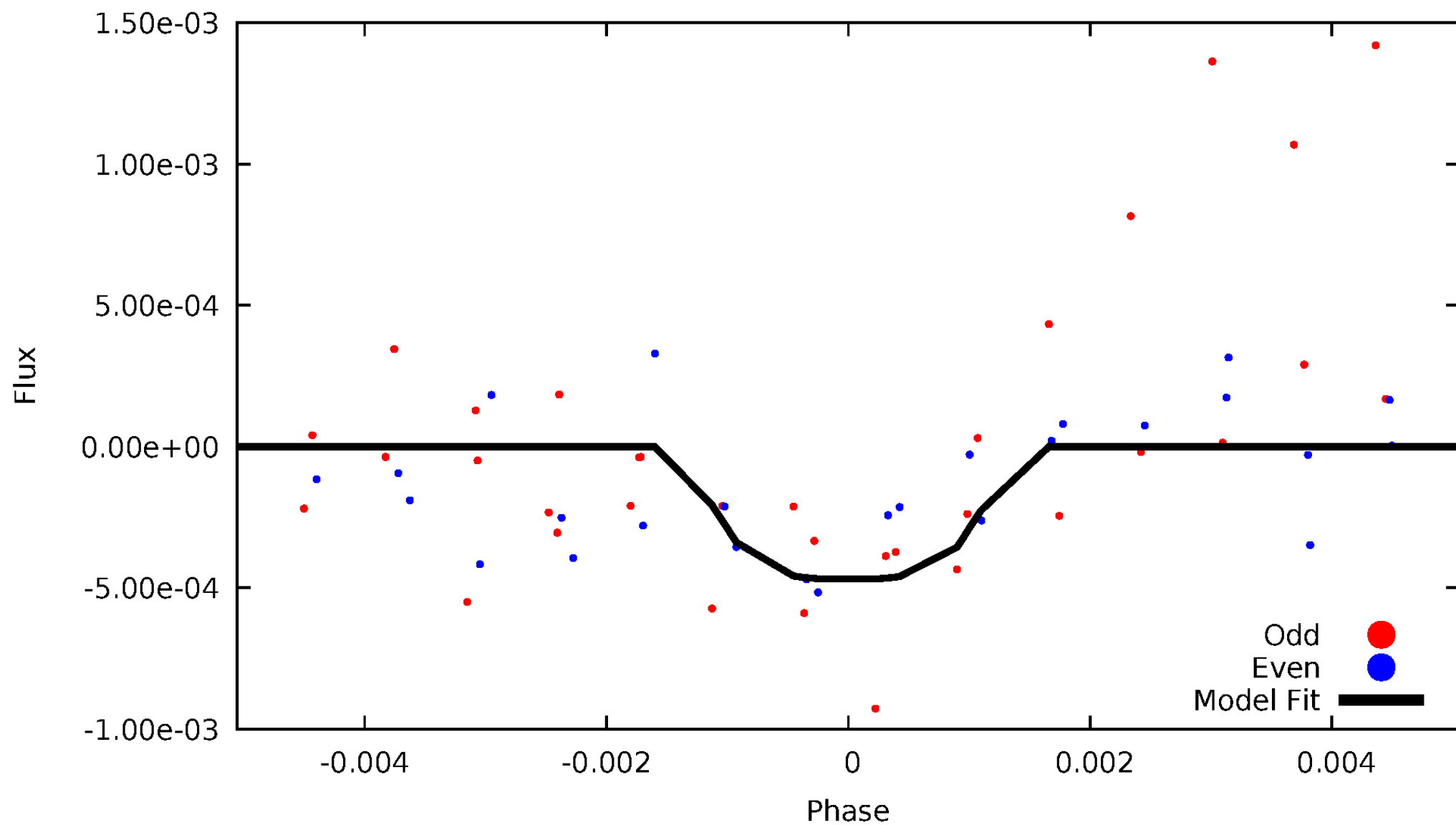
TCE 004390625-06





# DV Odd/Even

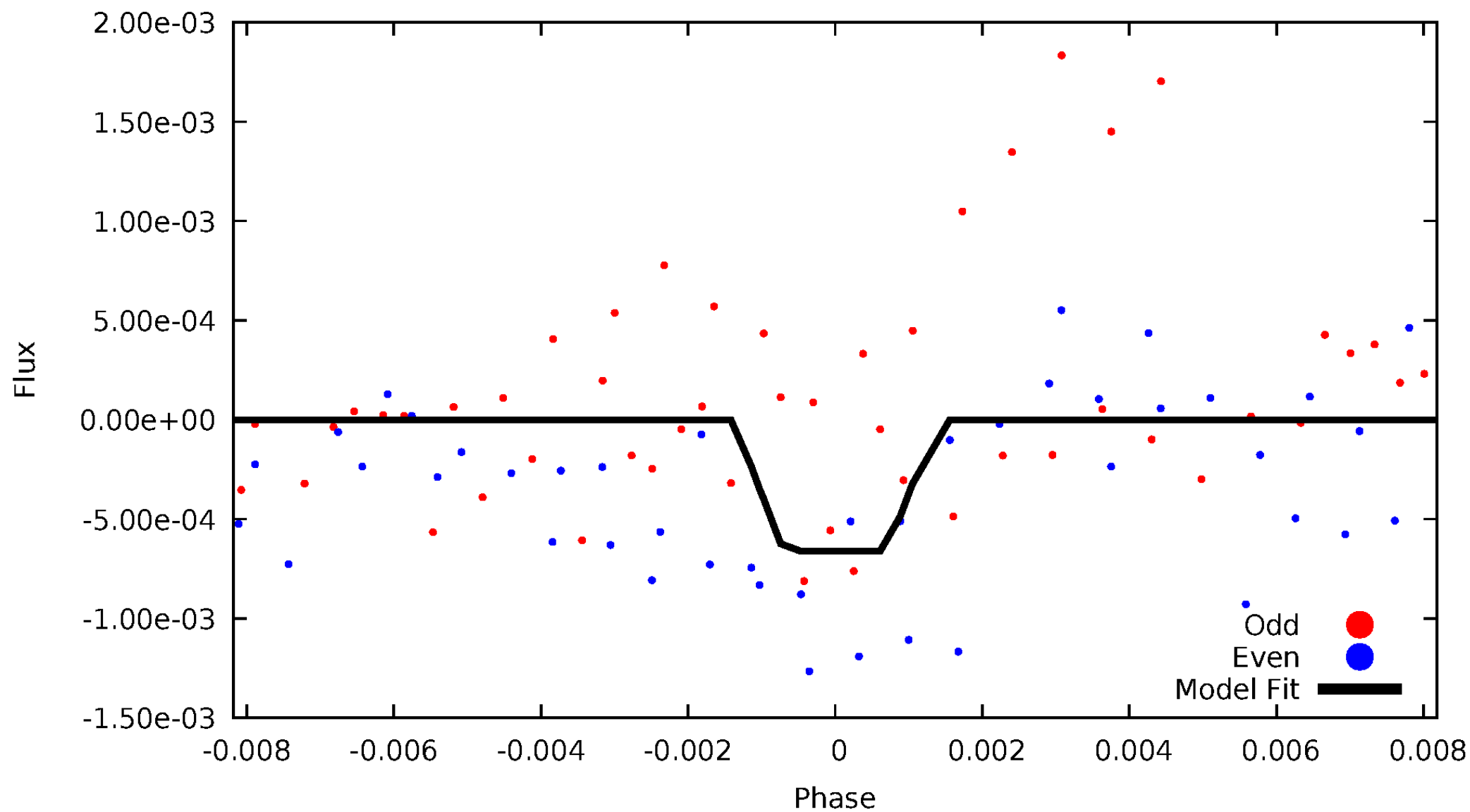
TCE 004390625-06





# ALT Odd/Even

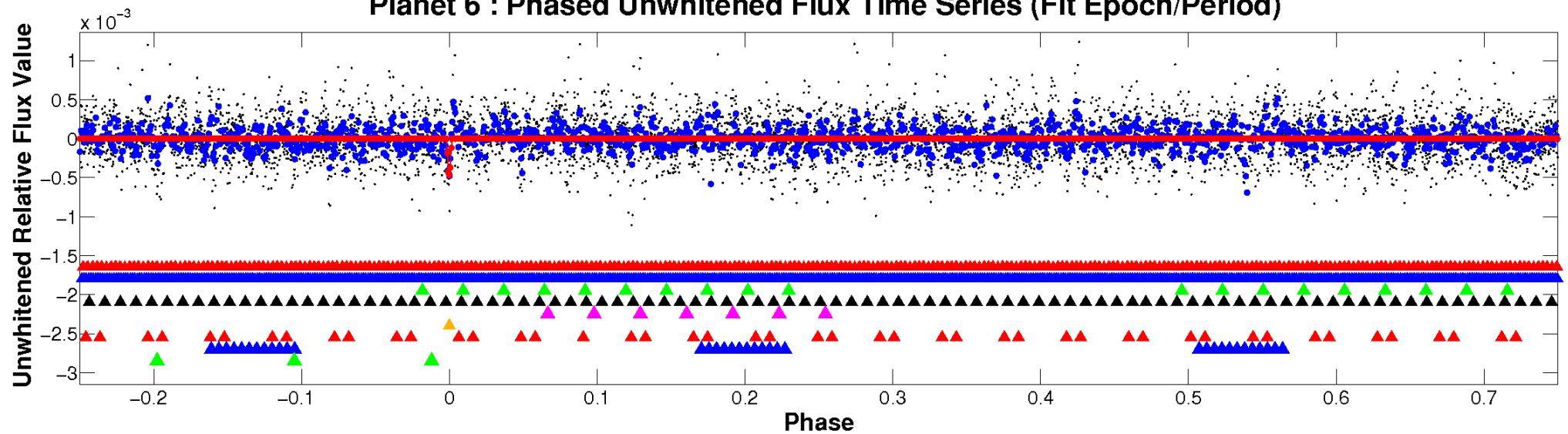
TCE 004390625-06



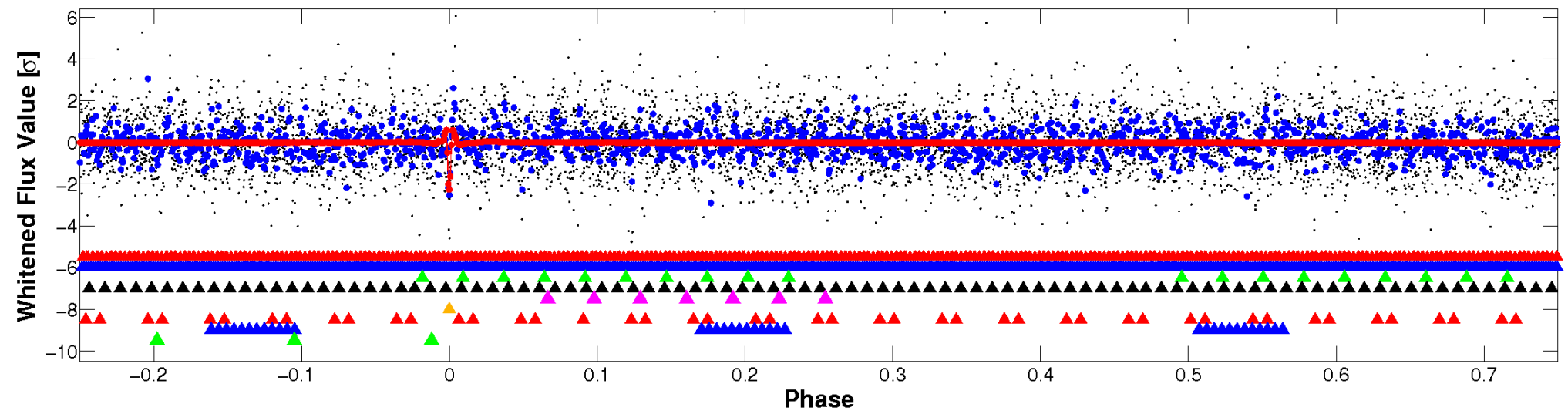


# Non-Whitened Vs. Whitened Light Curve

## Planet 6 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



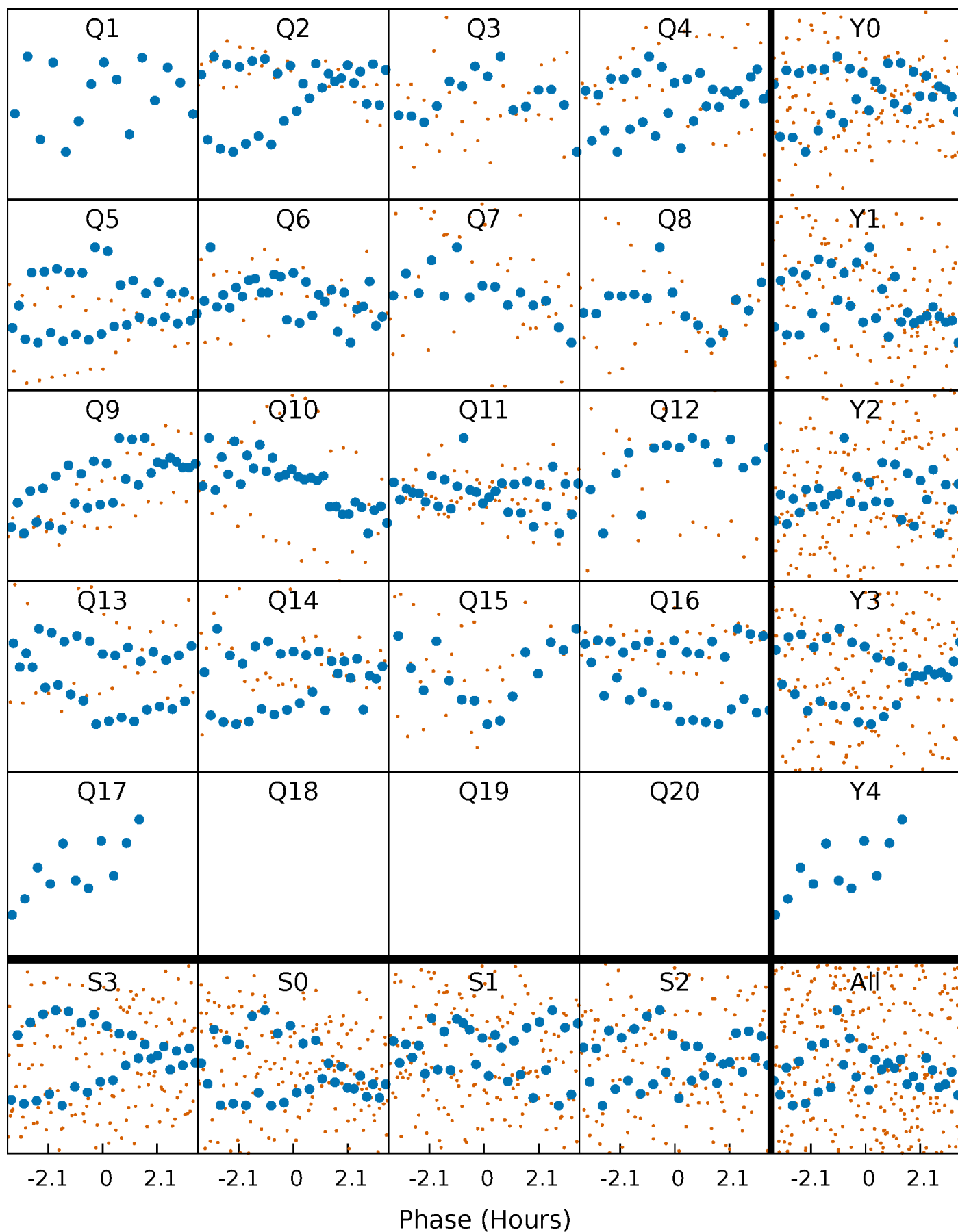
## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

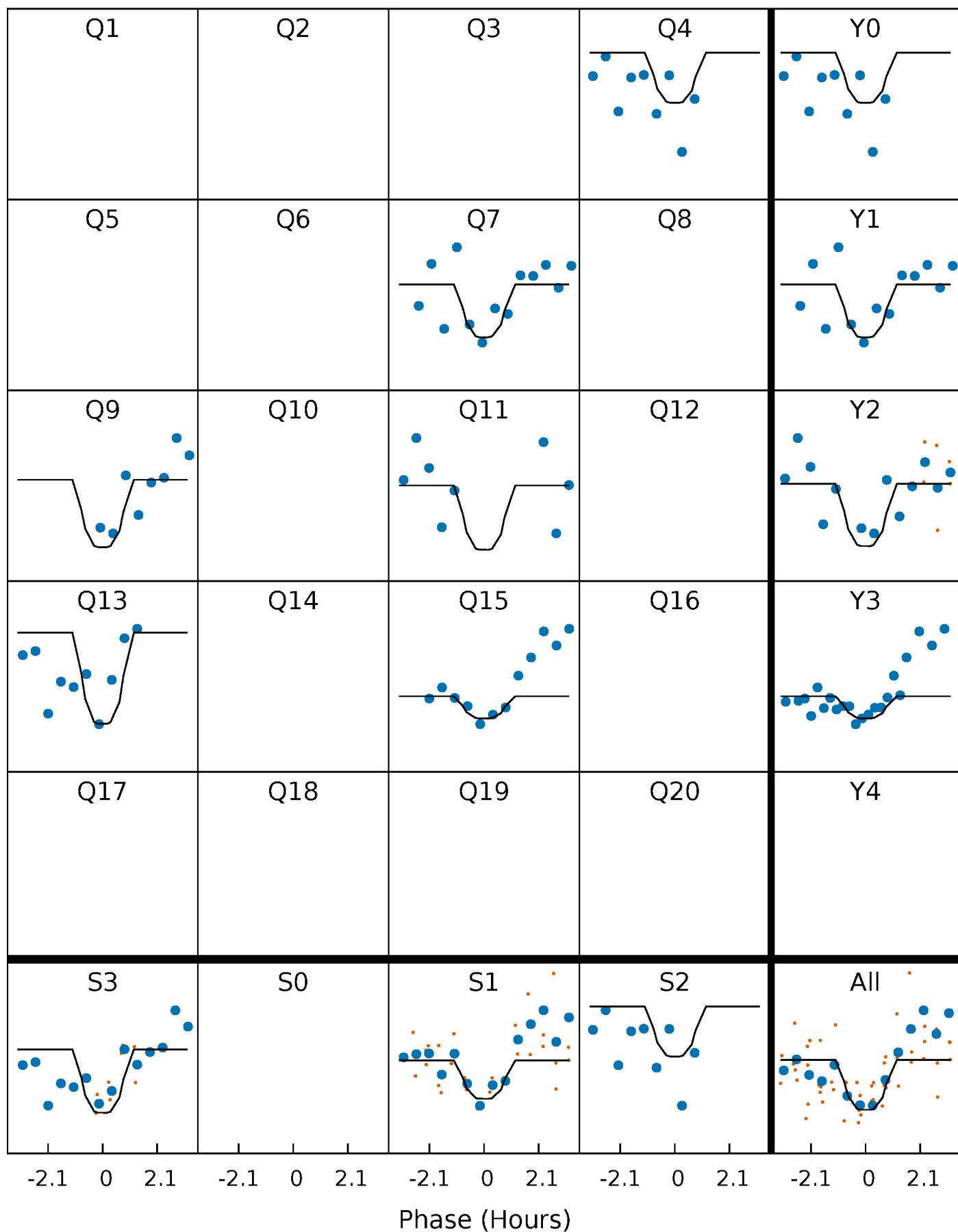
TCE 004390625-06 P= 30.256104 Days  $T_0=159.489605$  (BKJD)





# DV Quarter-Phased Transit Curves

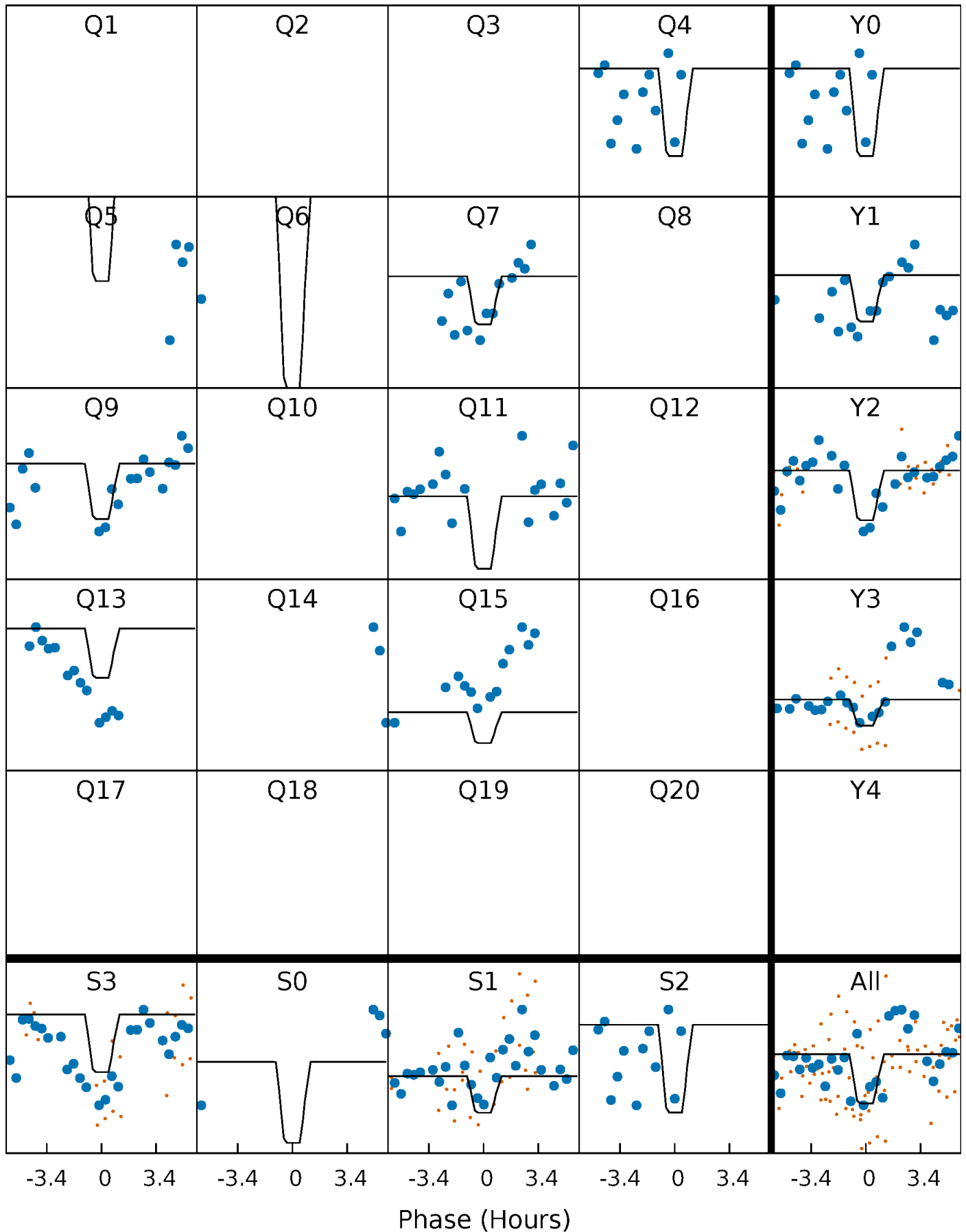
TCE 004390625-06 P= 30.256104 Days  $T_0=159.489605$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 004390625-06 P= 30.255785 Days  $T_0=159.501223$  (BKJD)

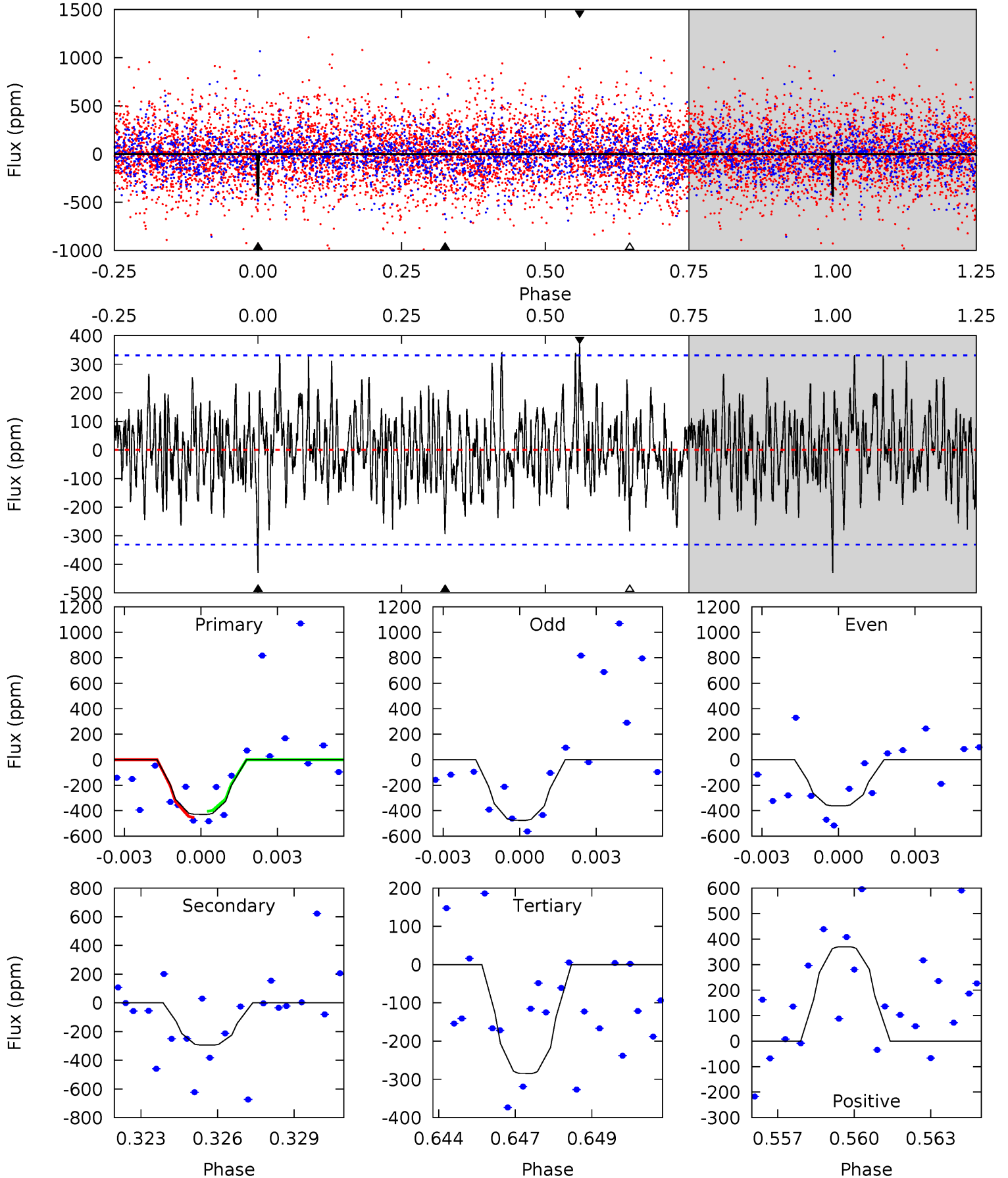




# DV Model-Shift Uniqueness Test

004390625-06, P = 30.256104 Days, E = 129.233501 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.82	4.68	4.53	5.88	5.27	2.99	1.69	2.29	0.93	0.15	-1.20	0.90	1.04	0.46	0.39

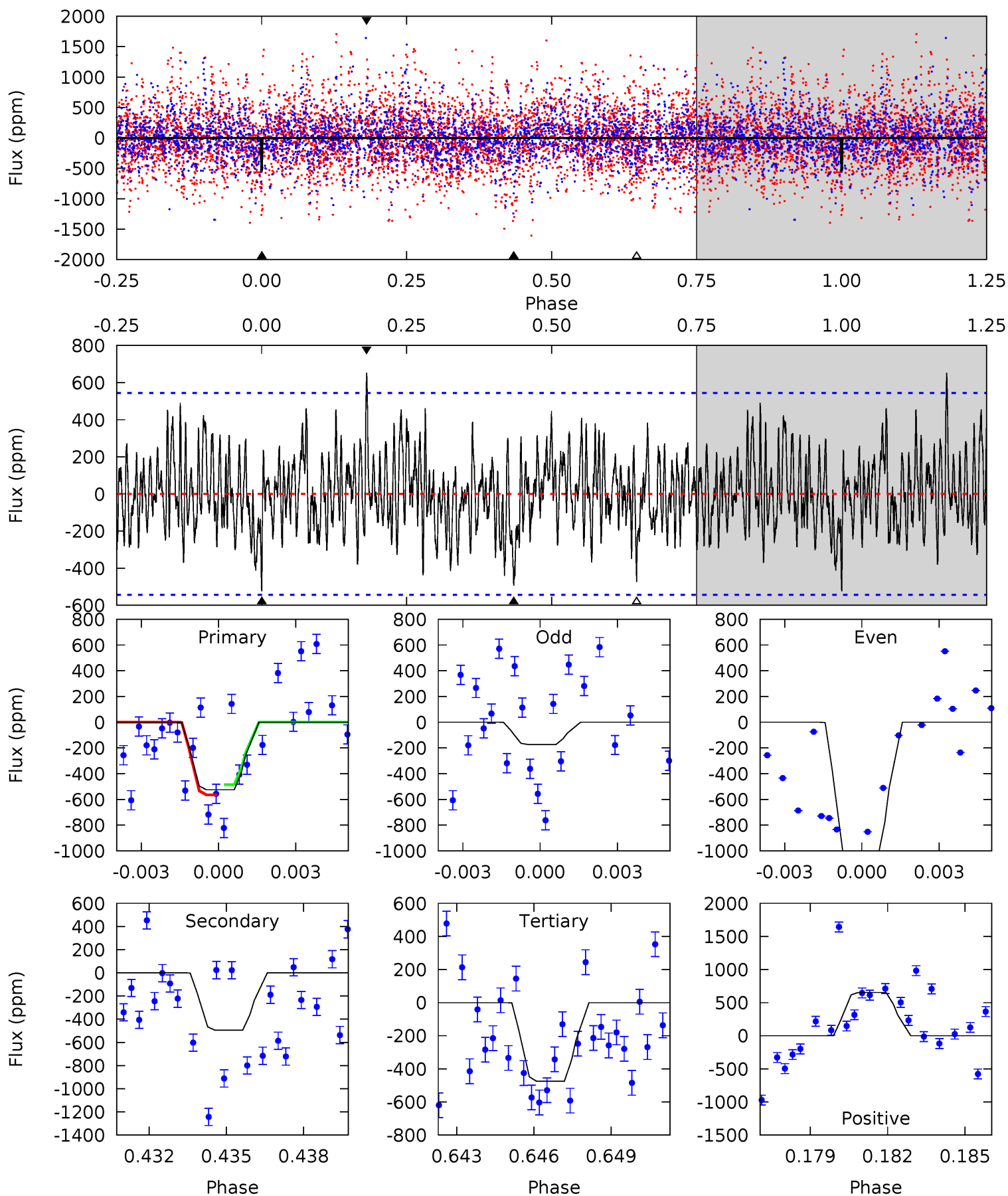




# Alt Model-Shift Uniqueness Test

004390625-06,  $P = 30.255785$  Days,  $E = 129.245438$  Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.07	4.77	4.59	6.31	5.25	2.97	1.66	0.49	-1.23	0.19	-1.53	4.21	0.74	0.55	0.39





### Stellar Parameters For KIC 004390625

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6995^{+219}_{-301}$	$4.190^{+0.185}_{-0.167}$	$-0.660^{+0.250}_{-0.300}$	$1.400^{+0.390}_{-0.319}$	$1.106^{+0.160}_{-0.131}$	$0.568^{+0.534}_{-0.277}$
	+3%/-4%	+4%/-4%	+38%/-45%	+28%/-23%	+14%/-12%	+94%/-49%
Source	PHO1	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 004390625-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-294 \pm 63$	$9.34^{+9.73}_{-6.34}$	$1141^{+84}_{-82}$	$3981^{+2457}_{-807}$	$73^{+608}_{-56}$
Alt.	$-494 \pm 103$	$8.74^{+9.19}_{-6.10}$	$1145^{+87}_{-89}$	$4469^{+3445}_{-989}$	$137^{+1388}_{-105}$

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature

$T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$



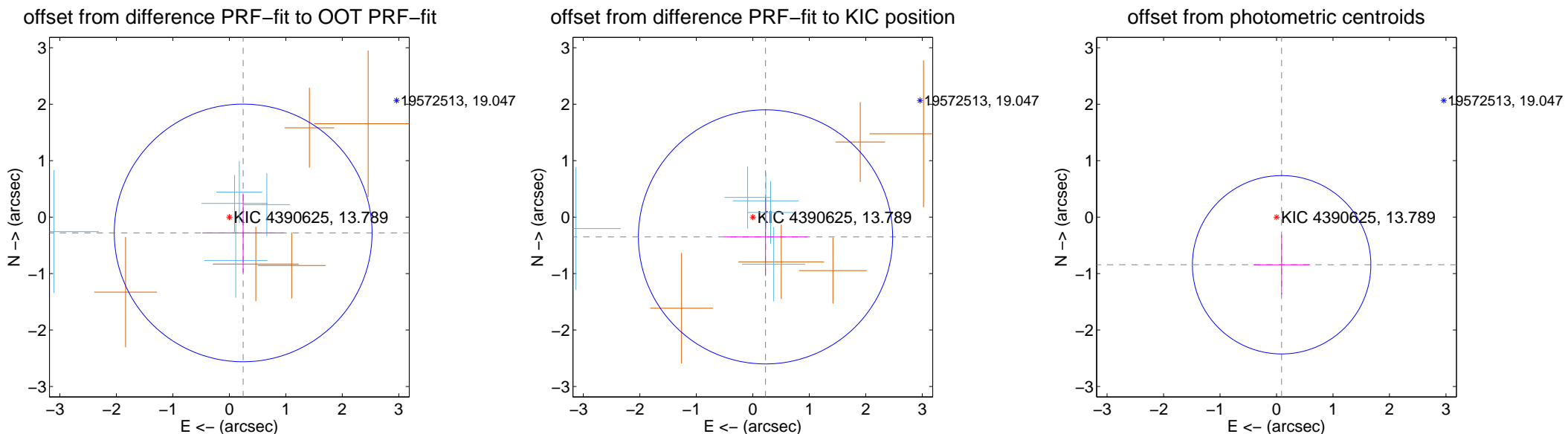
## DV Centroid Data

Supplemental centroid analysis for 004390625-06. Kepler magnitude: 13.79. Transit SNR 8.01

There are 6 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.26 arcsec

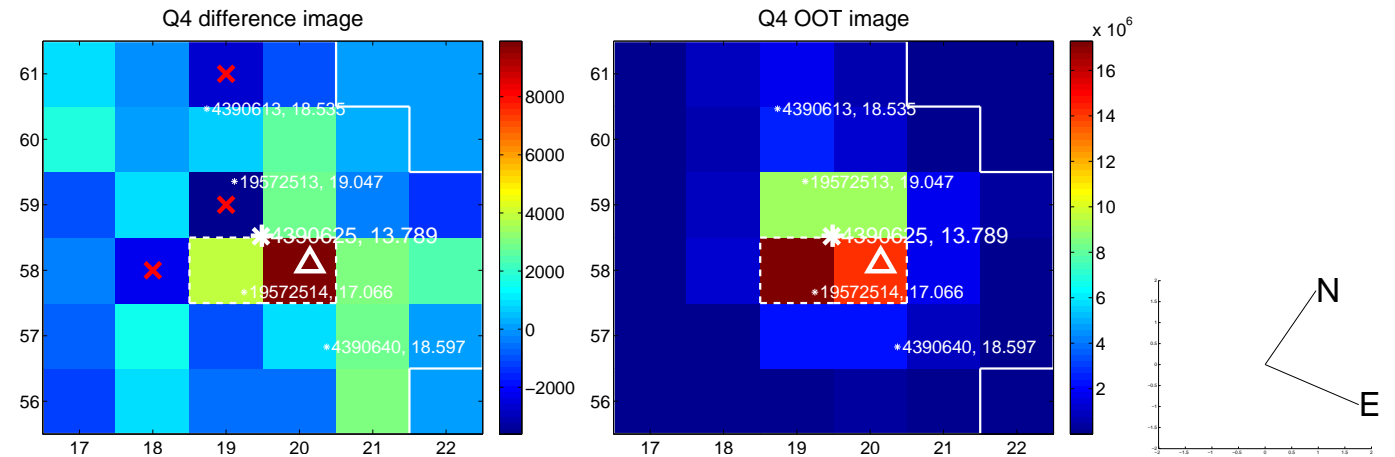
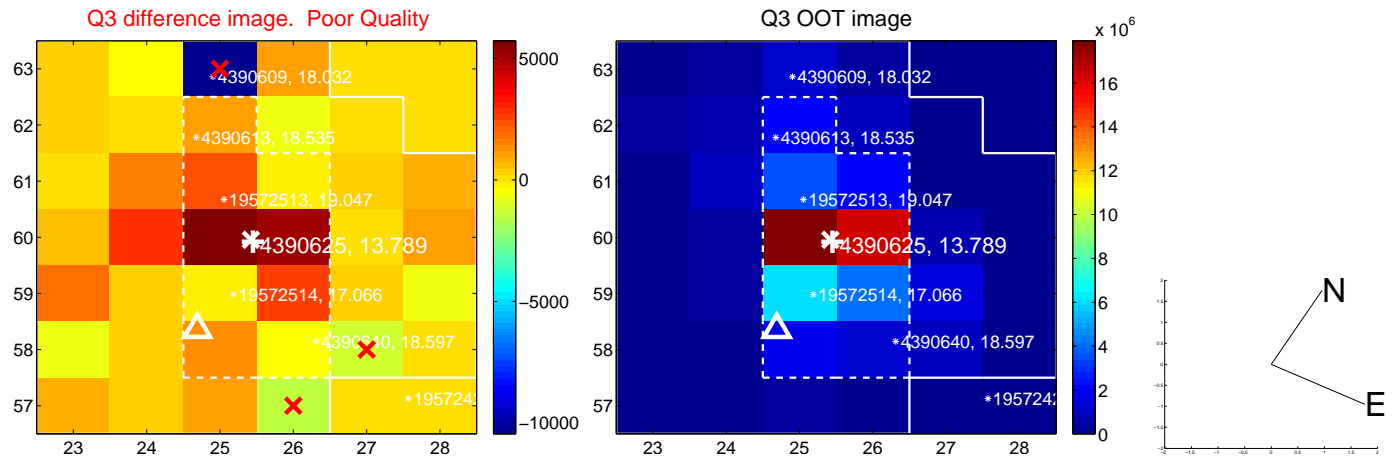
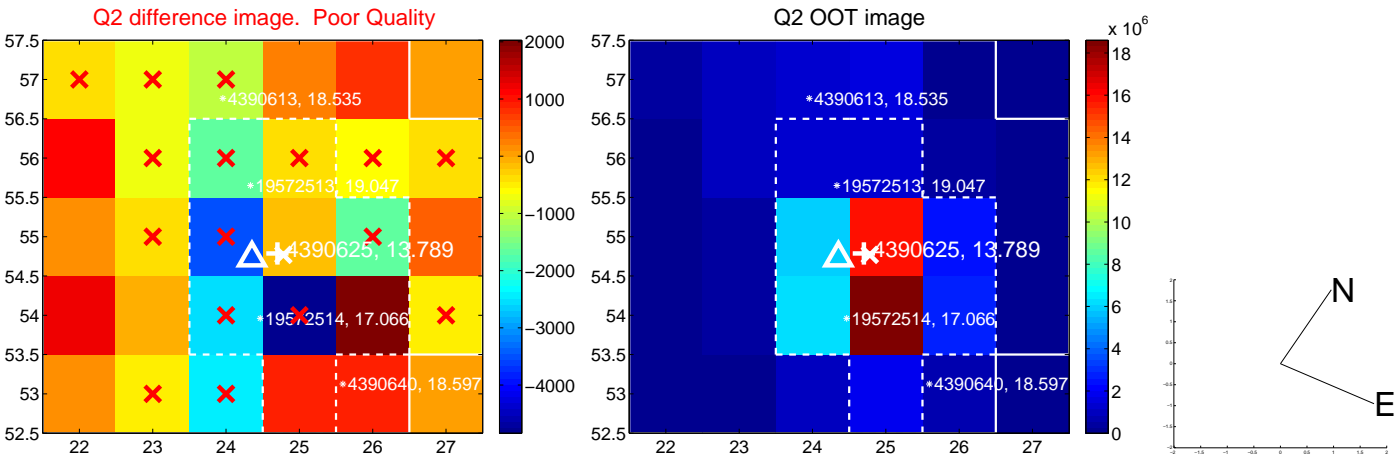
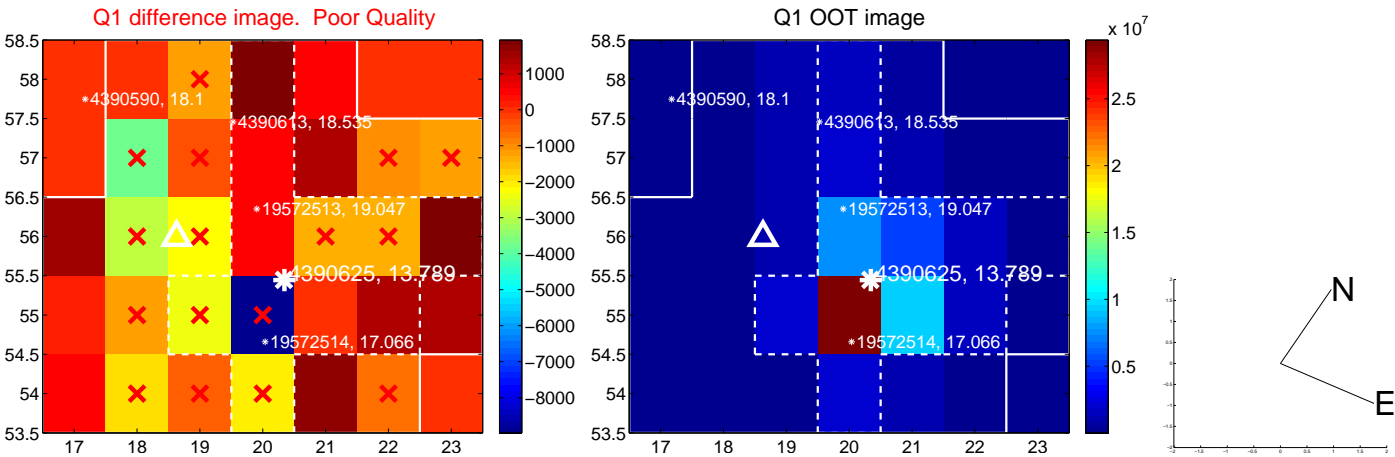
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.372 \pm 0.761$	0.49	$-0.245 \pm 0.722$	$-0.280 \pm 0.700$
PRF-fit source offset from KIC position	$0.416 \pm 0.750$	0.55	$-0.226 \pm 0.737$	$-0.350 \pm 0.692$
photometric centroid source offset	$0.85 \pm 0.53$	1.61	$-0.09 \pm 0.50$	$-0.84 \pm 0.53$



Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

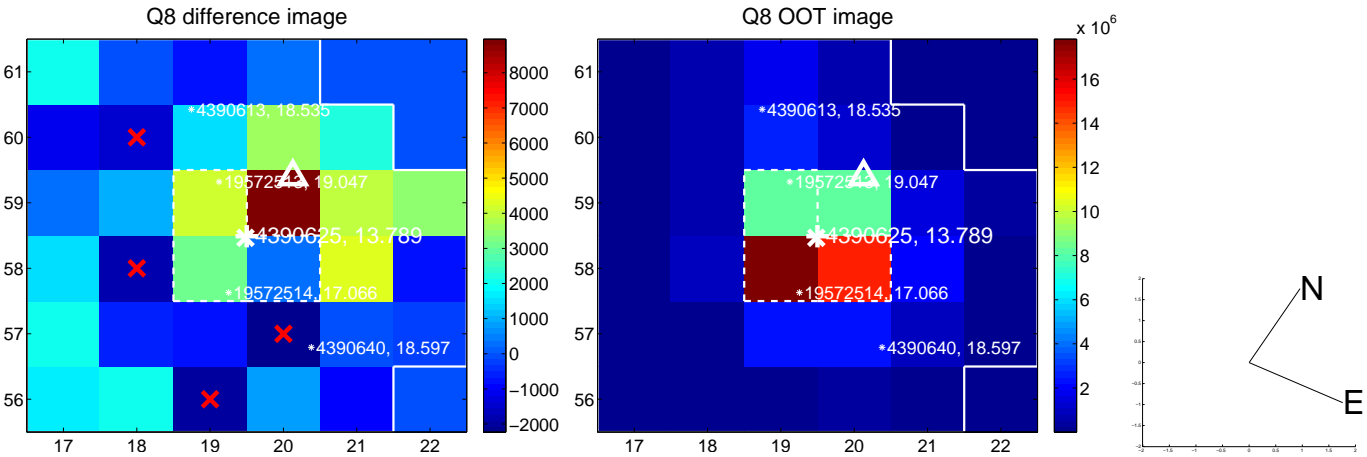
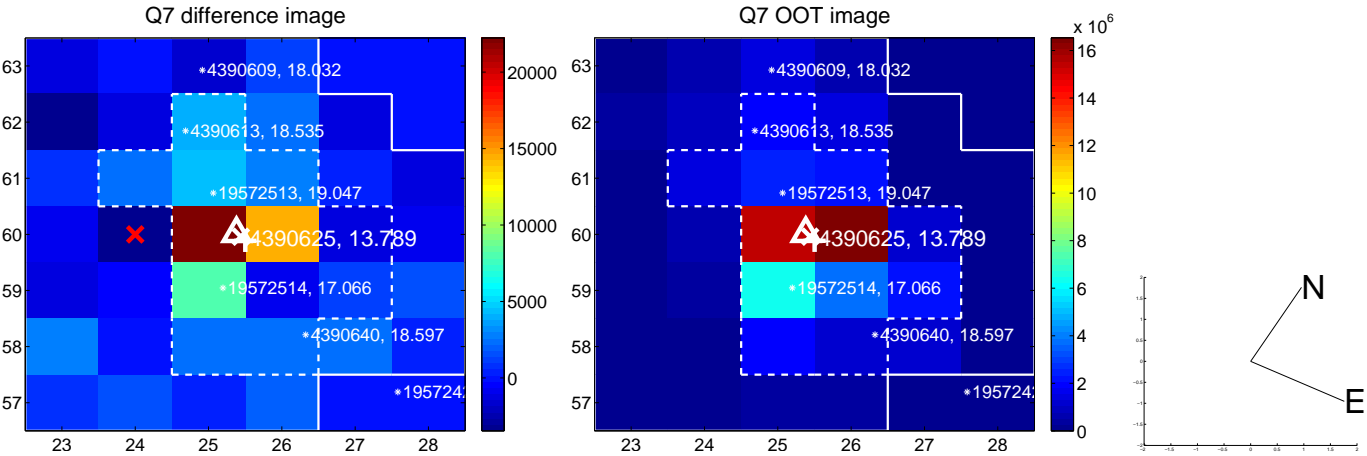
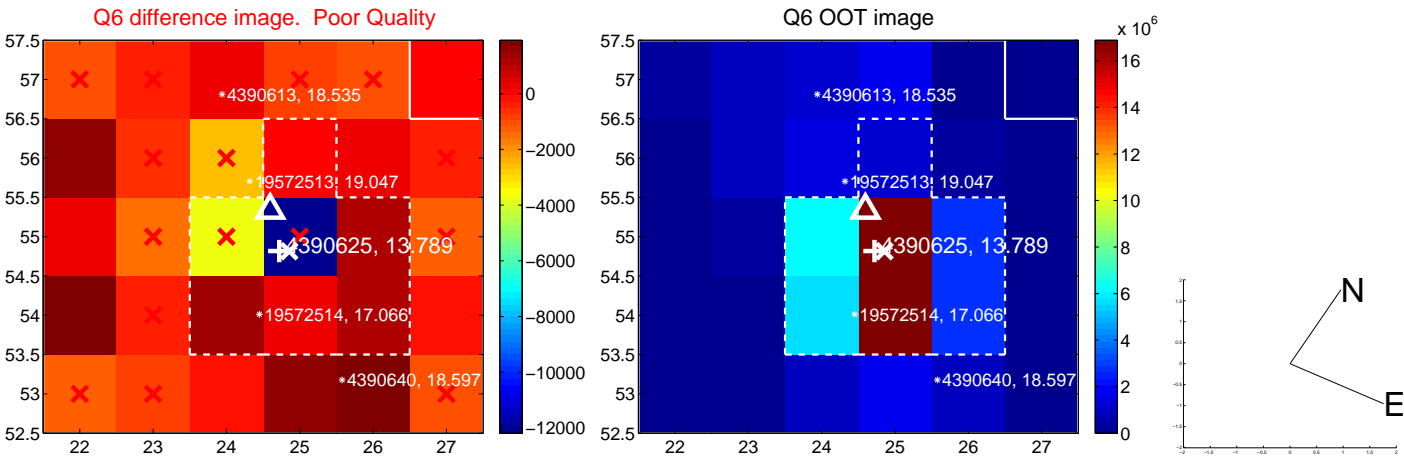
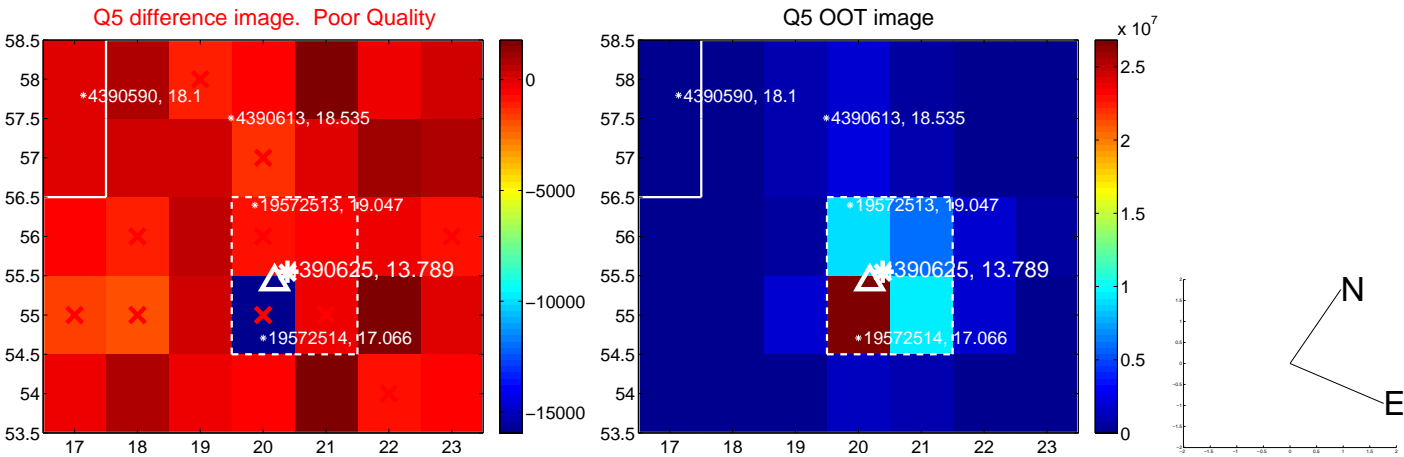


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



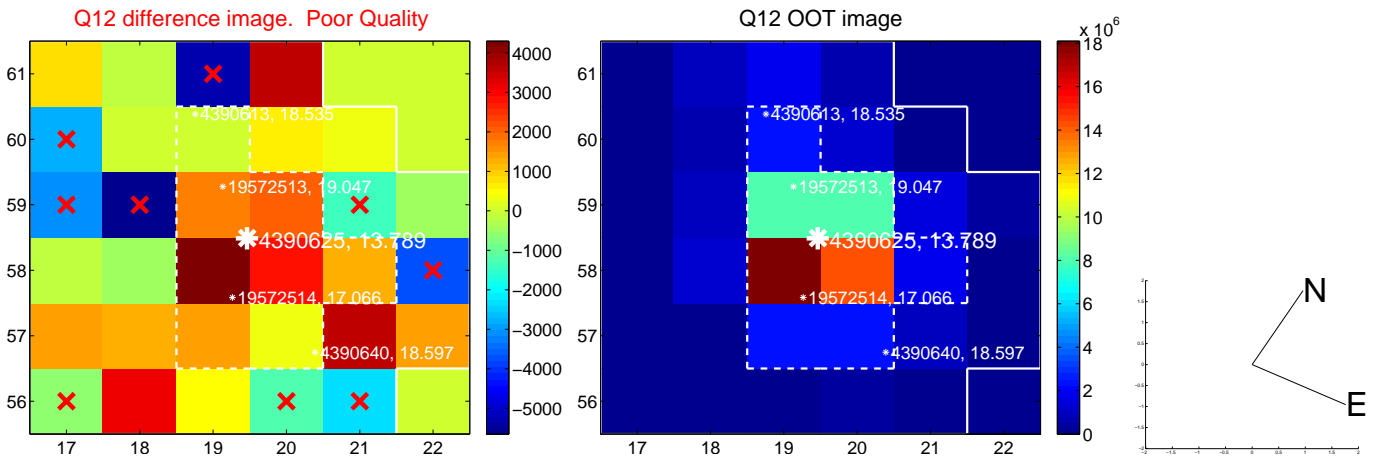
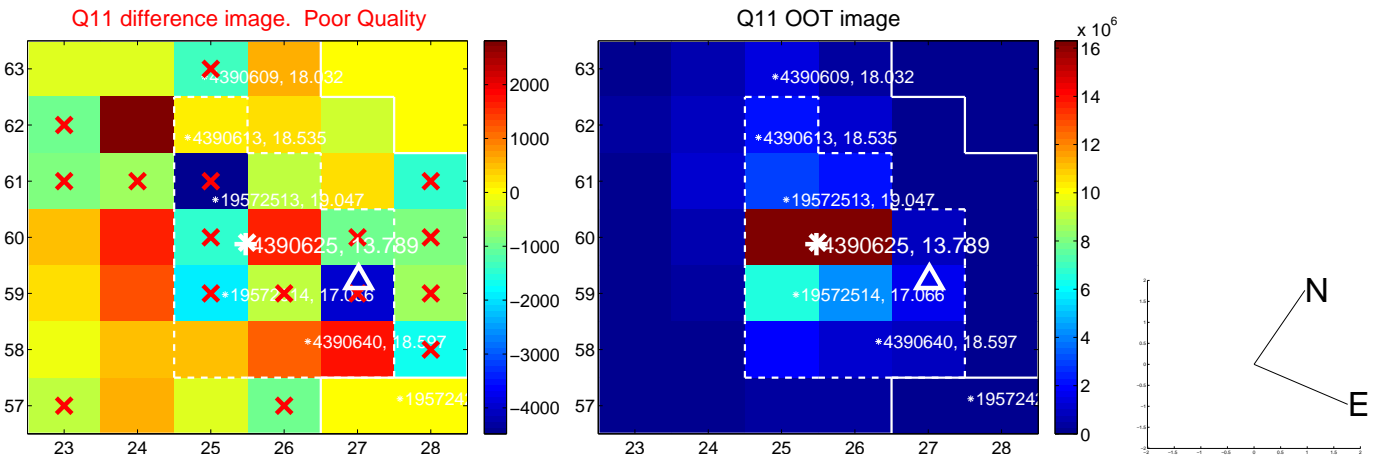
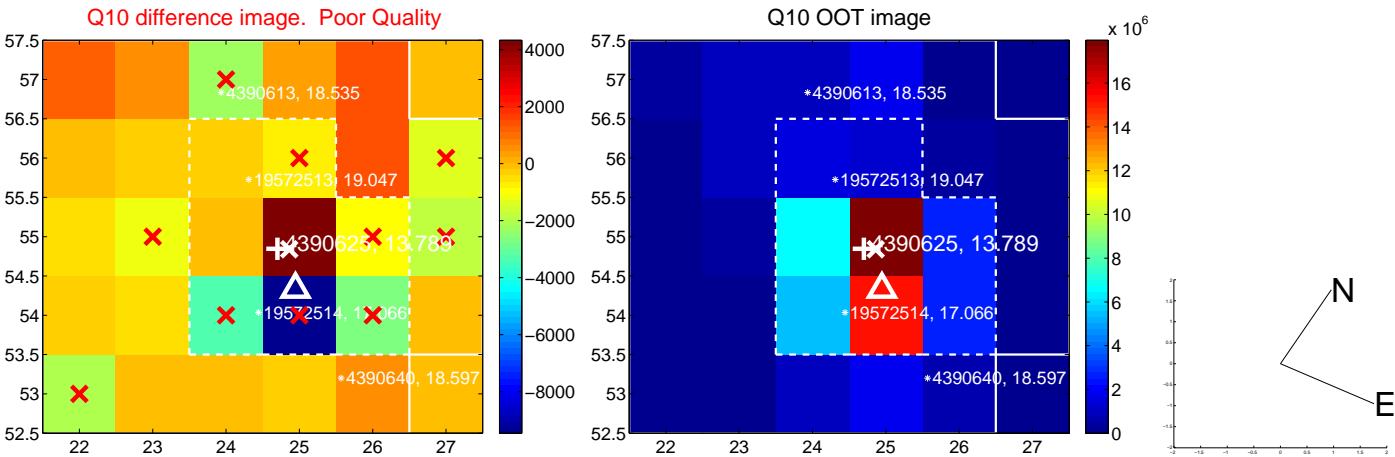
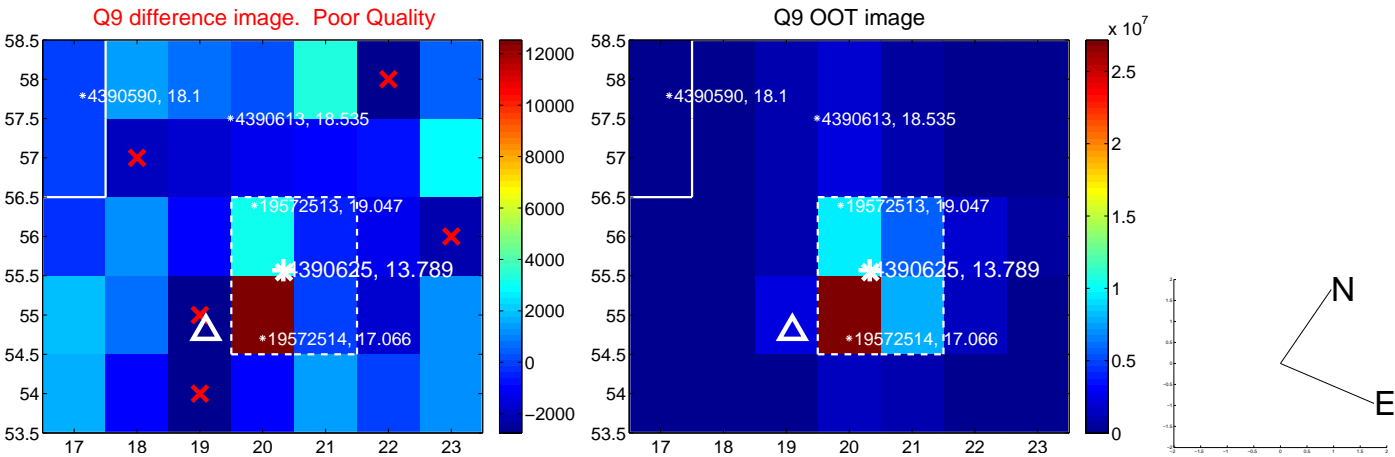


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



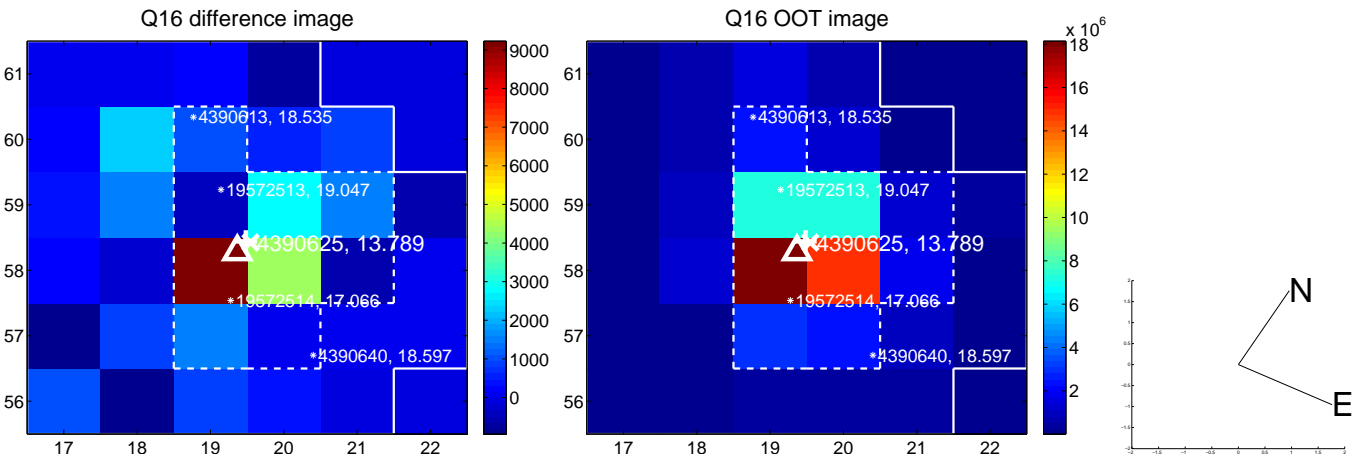
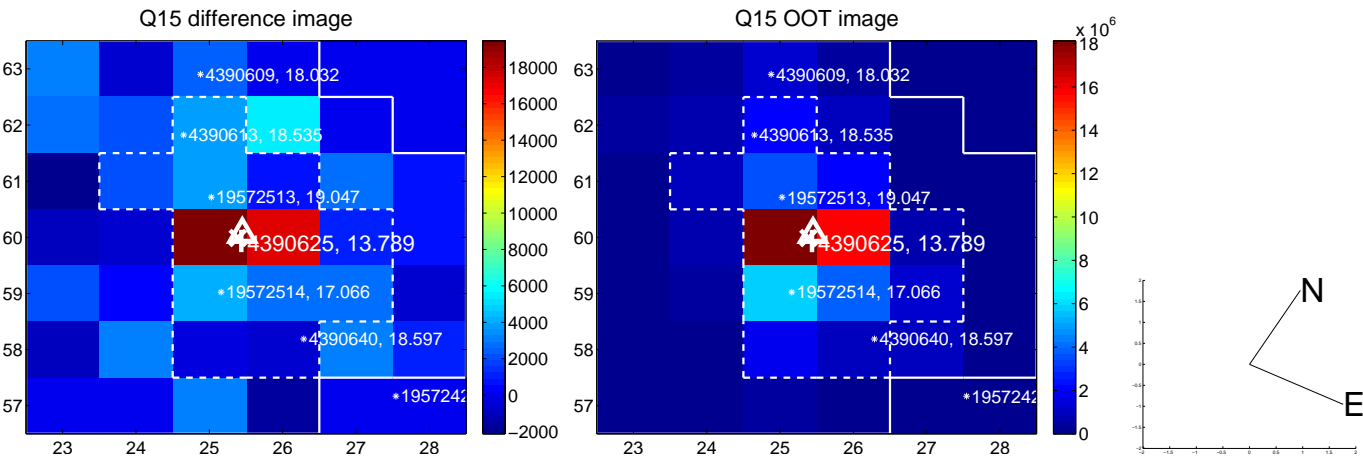
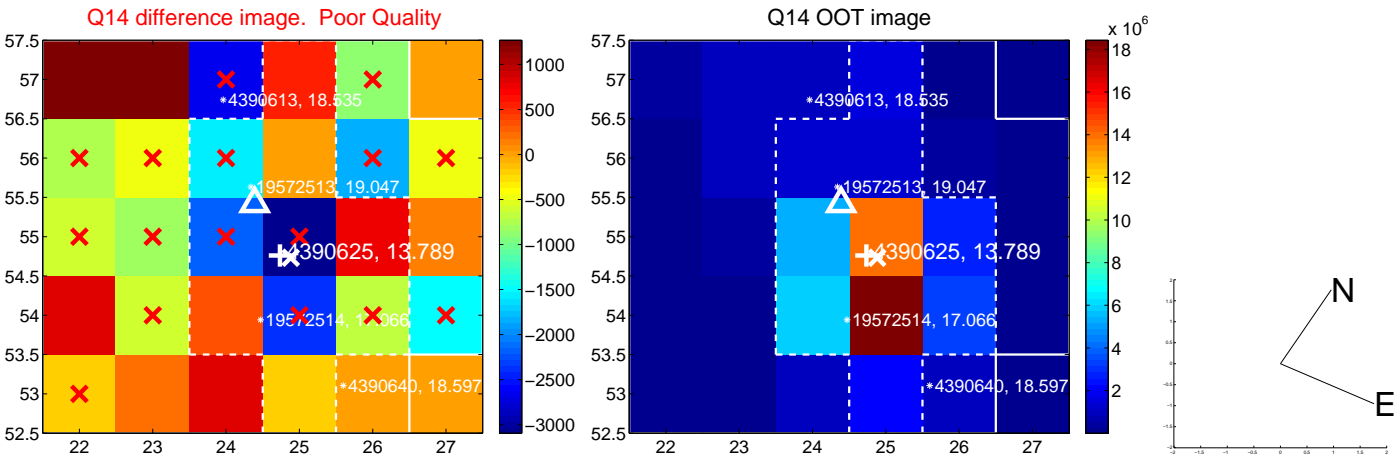
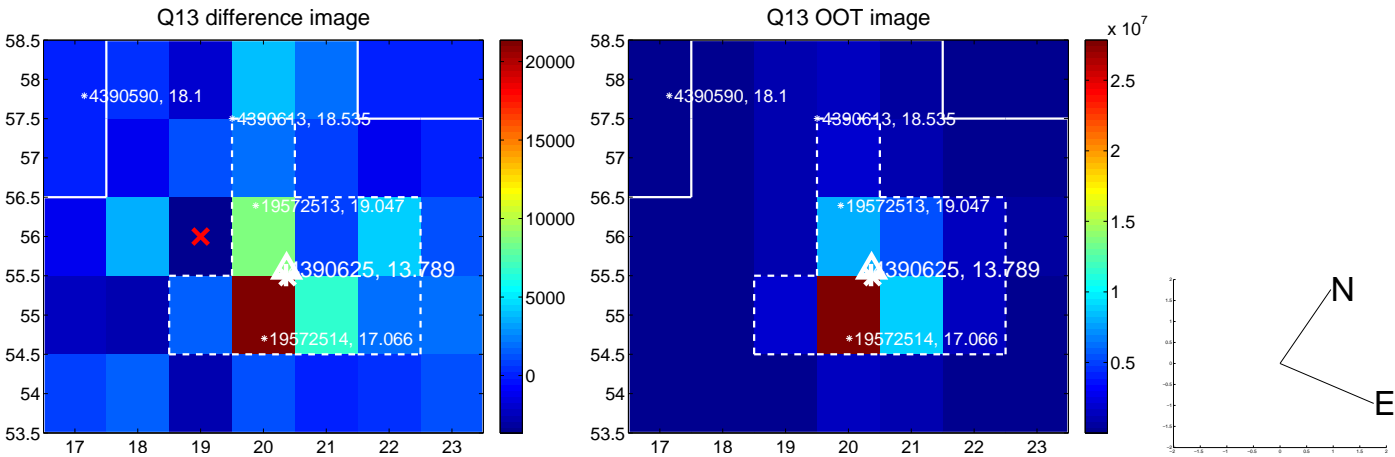


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



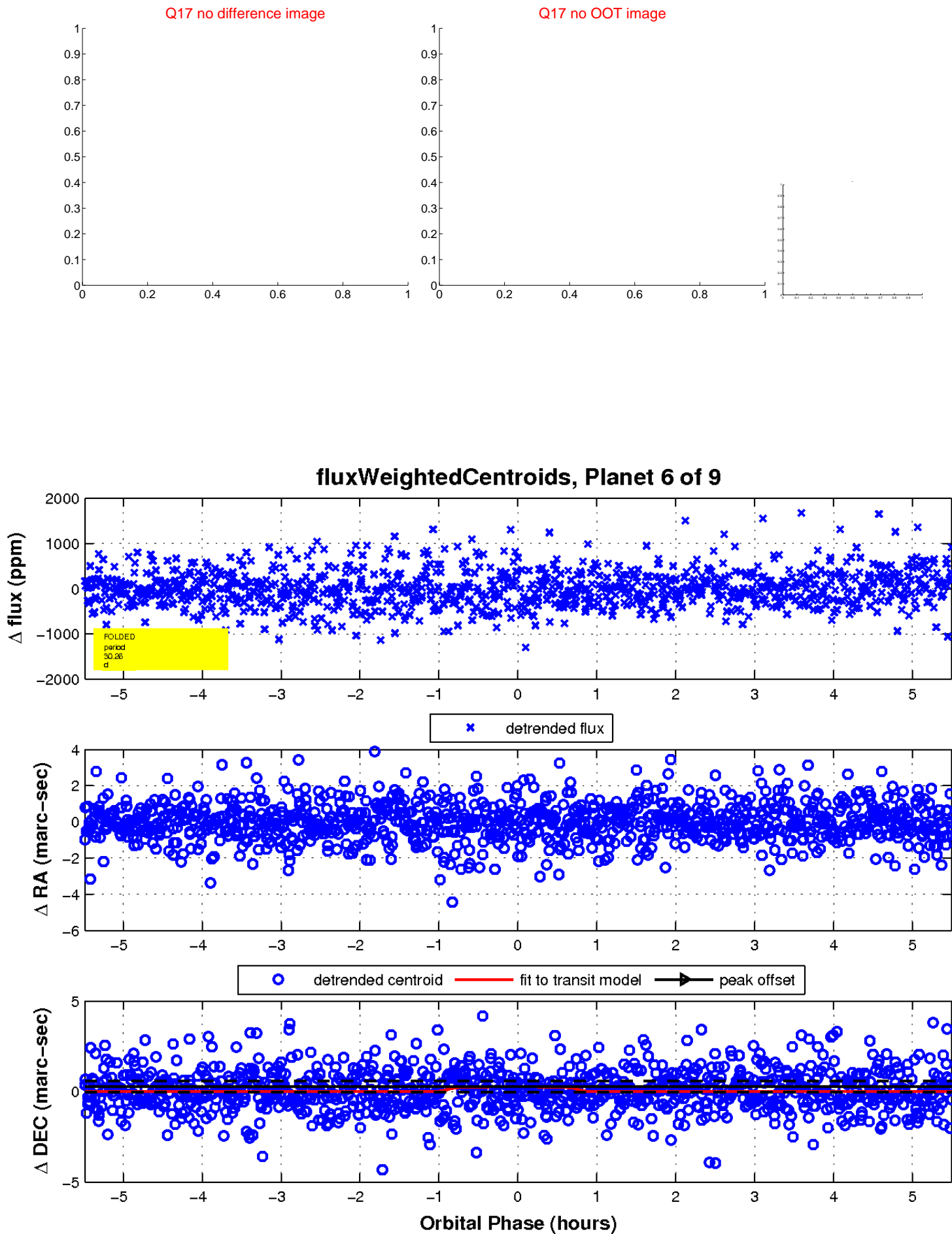


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





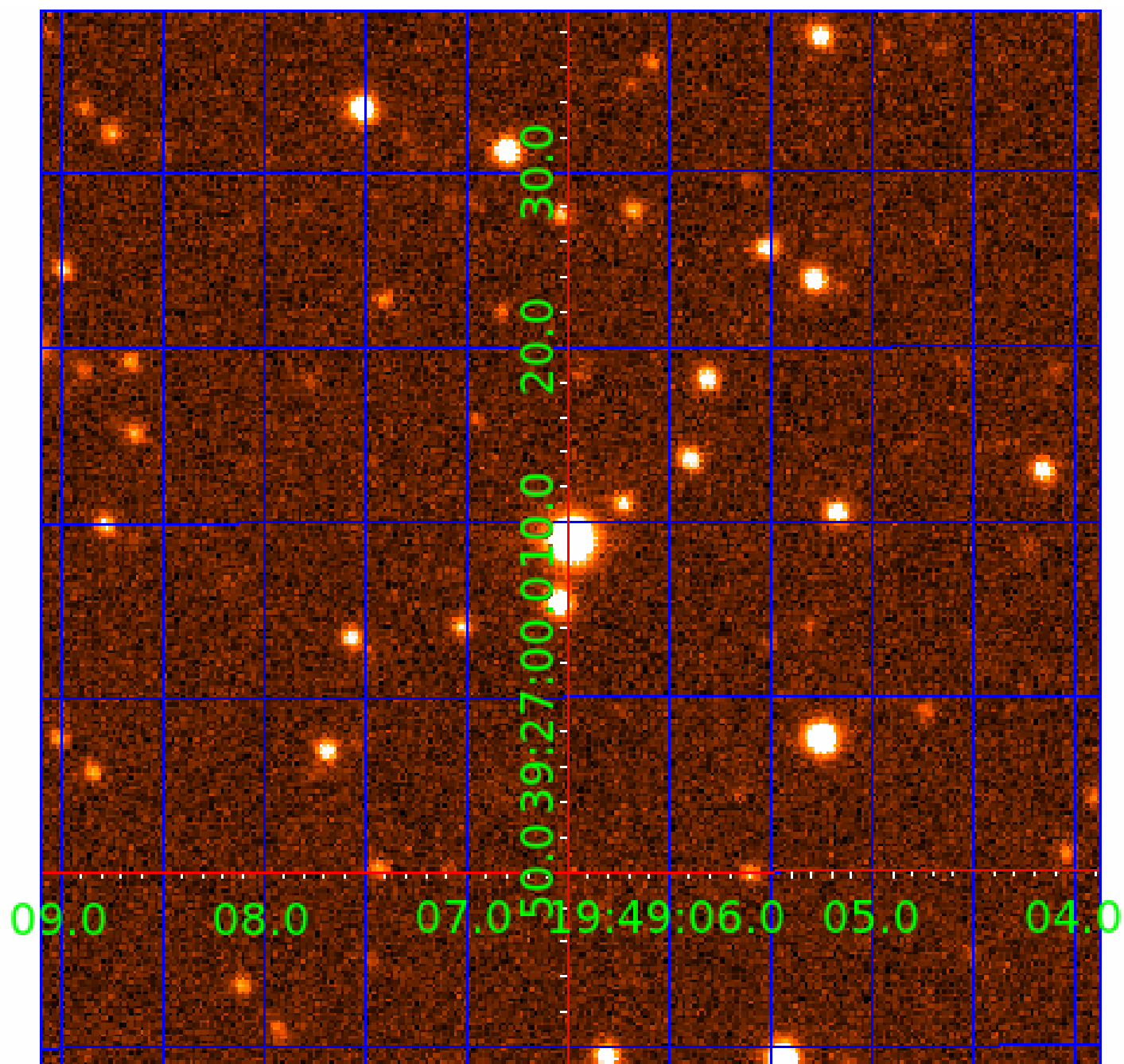
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination





# KIC 004390625

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004390625-01	OBS	No	2.552800	131.778368	45.1	8.820	7.3	6.4	1.40	6995	1.09	2938.38
004390625-02	OBS	No	1.276435	132.389024	60.3	7.984	9.2	9.3	1.40	6995	1.29	7403.98
004390625-03	OBS	No	75.223800	166.434374	900.8	5.821	8.6	9.9	1.40	6995	5.09	32.28
004390625-04	OBS	No	15.287801	143.491037	275.4	2.651	8.6	6.5	1.40	6995	2.56	270.19
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004390625-08	OBS	No	40.289721	146.290226	580.3	5.414	8.1	8.1	1.40	6995	3.58	74.22
004390625-09	OBS	No	638.187757	153.507721	339.7	5.000	7.2	-1.0	1.40	6995	2.61	1.87

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004390625-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004390625-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—SAME_NTL_PERIOD
004390625-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-05	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST
004390625-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004390625-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
004390625-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_NOFITS

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

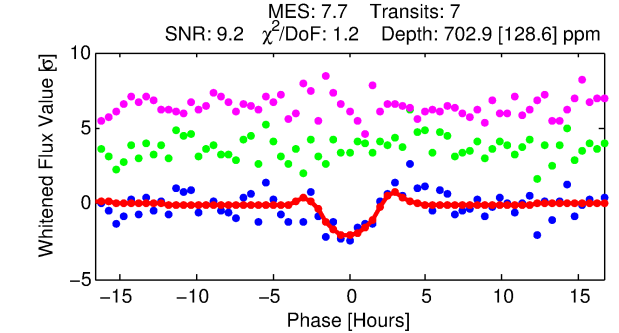
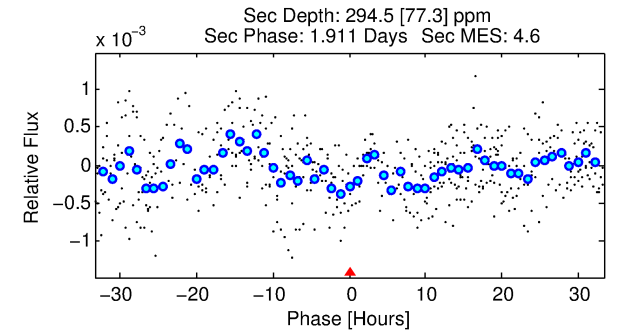
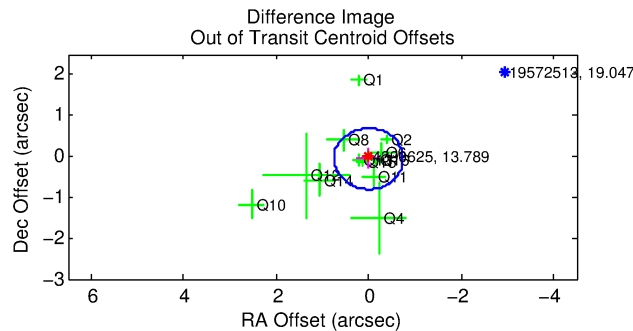
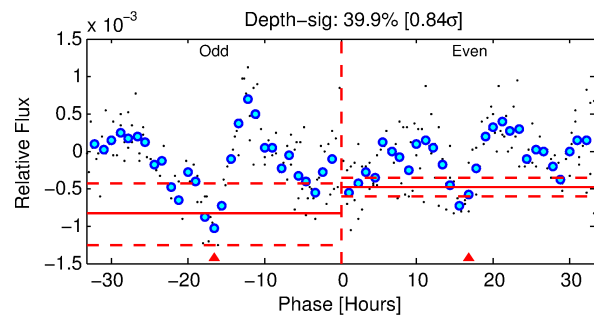
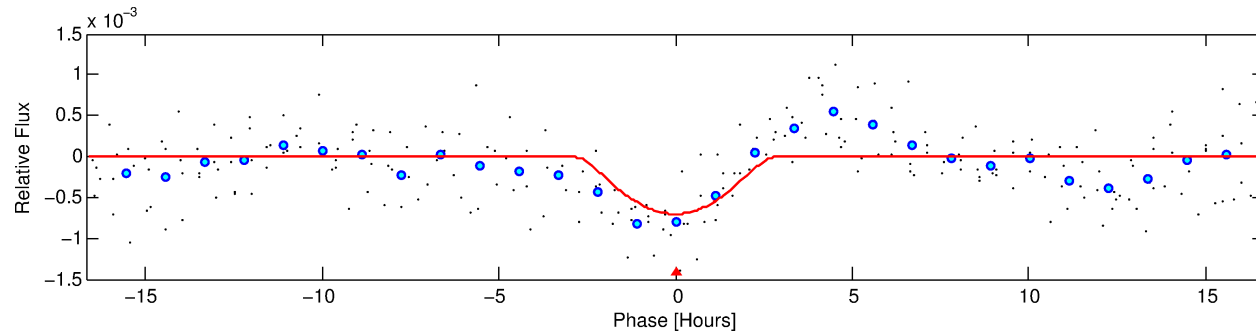
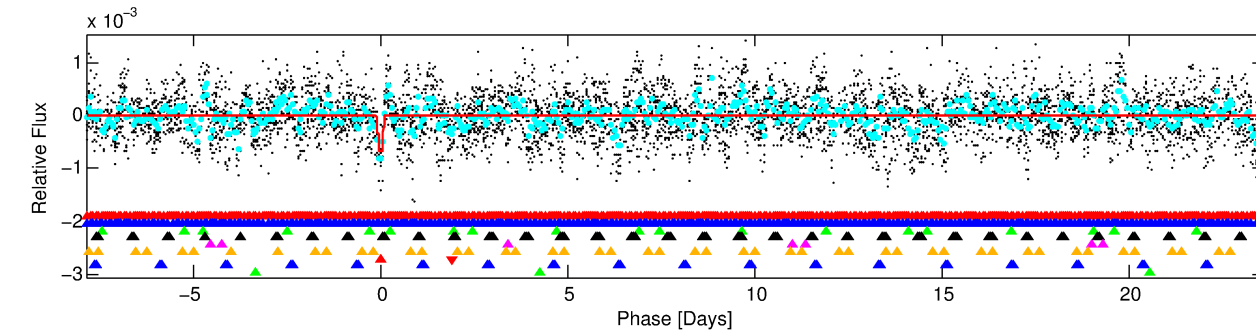
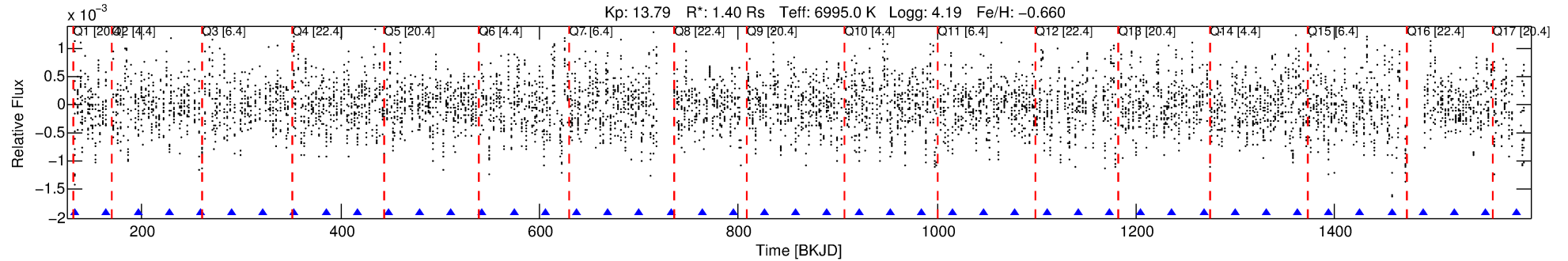
Ephemeris Match Information For 004390625-07

No Significant Match Found



# DV One-Page Summary

KIC: 4390625 Candidate: 7 of 9 Period: 31.529 d



## DV Fit Results:

Period = 31.52885 [0.00043] d  
Epoch = 132.9574 [0.0129] BKJD  
Rp/R\* = 0.0383 [0.0551]  
a/R\* = 13.90 [7.08]  
b = 0.99 [0.10]  
Seff = 102.92 [39.16]  
Teq = 812 [77] K  
Rp = 5.85 [8.58] Re  
a = 0.2021 [0.0472] AU  
Ag = 193.28 [562.69] [0.34 $\sigma$ ]  
Teffp = 4682 [3390] K [1.14 $\sigma$ ]

## DV Diagnostic Results:

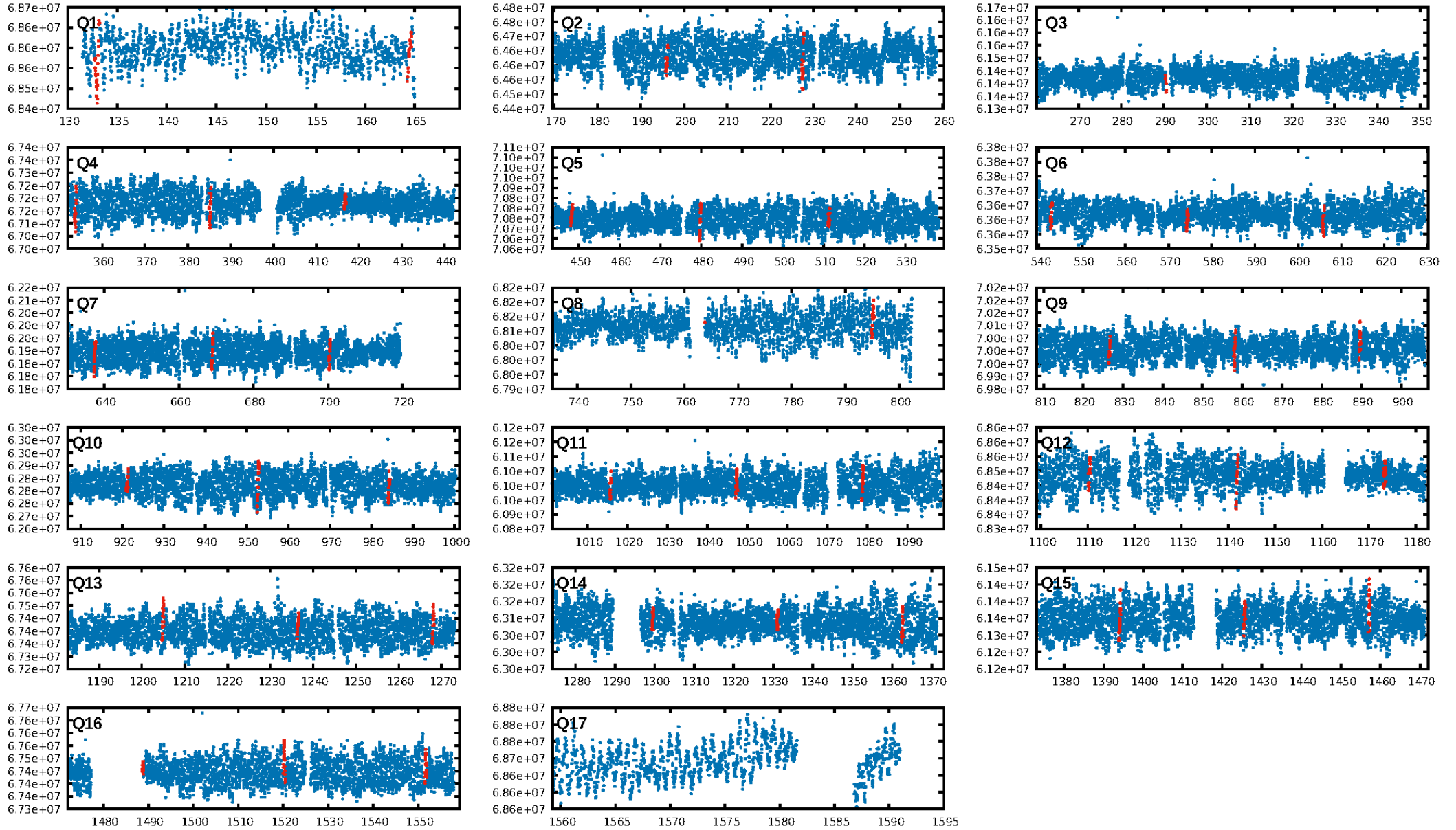
ShortPeriod-sig: 100.0% [5.22 $\sigma$ ]  
LongPeriod-sig: 100.0% [27.10 $\sigma$ ]  
ModelChiSquare2-sig: 26.1%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [6/6]  
GhostDiagnostic-chr: -1.026  
Centroid-sig: N/A  
Centroid-so: 0.251 arcsec [0.91 $\sigma$ ]  
OotOffset-rm: 0.060 arcsec [0.24 $\sigma$ ]  
KicOffset-rm: 0.121 arcsec [0.46 $\sigma$ ]  
OotOffset-st: 4/2/4/2 [12]  
KicOffset-st: 4/2/4/2 [12]  
DiffImageQuality-fgm: 0.25 [3/12]  
DiffImageOverlap-fno: 0.00 [0/15]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 16:27:28 Z

This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

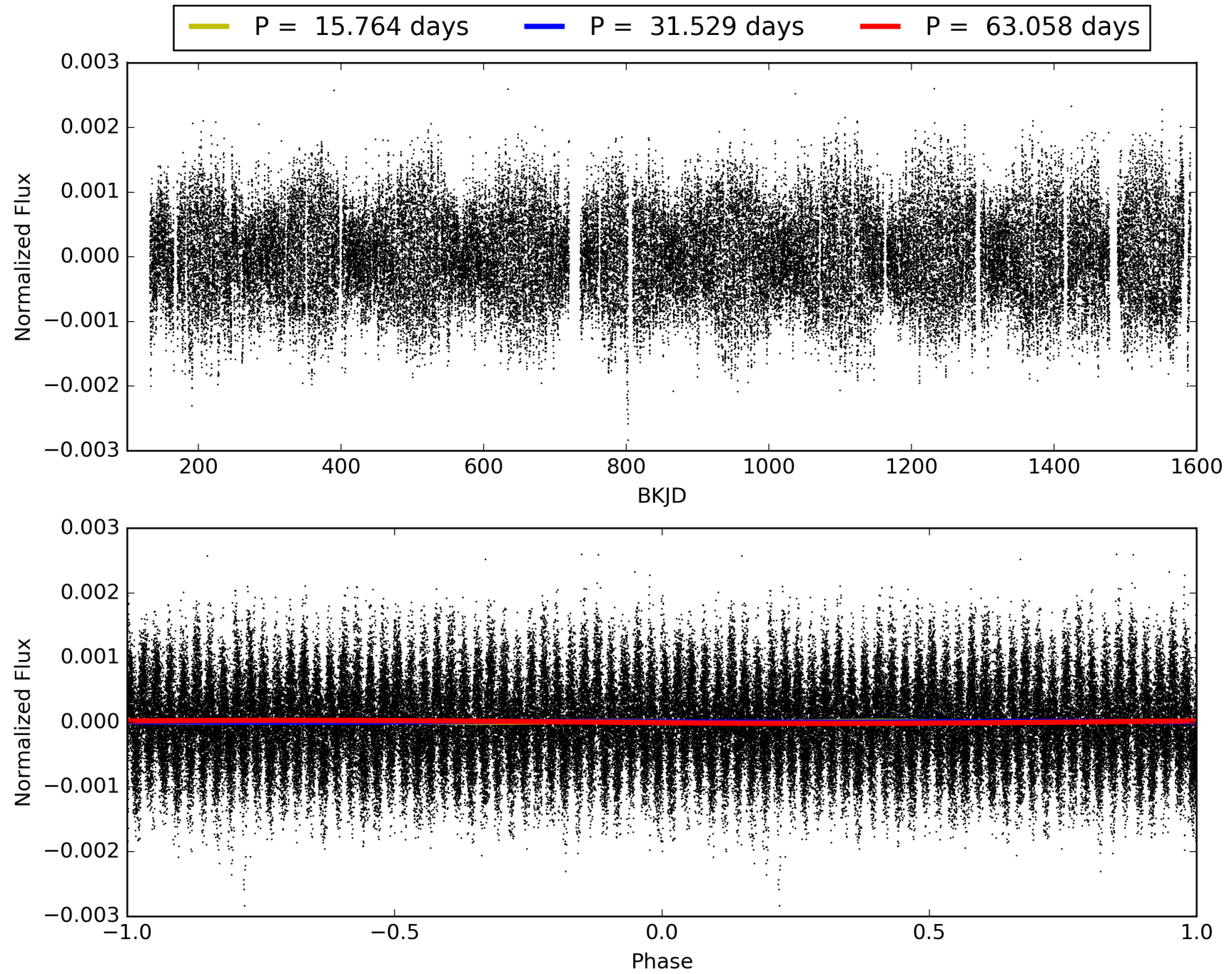


# TCE 004390625-07, PDC Light Curves





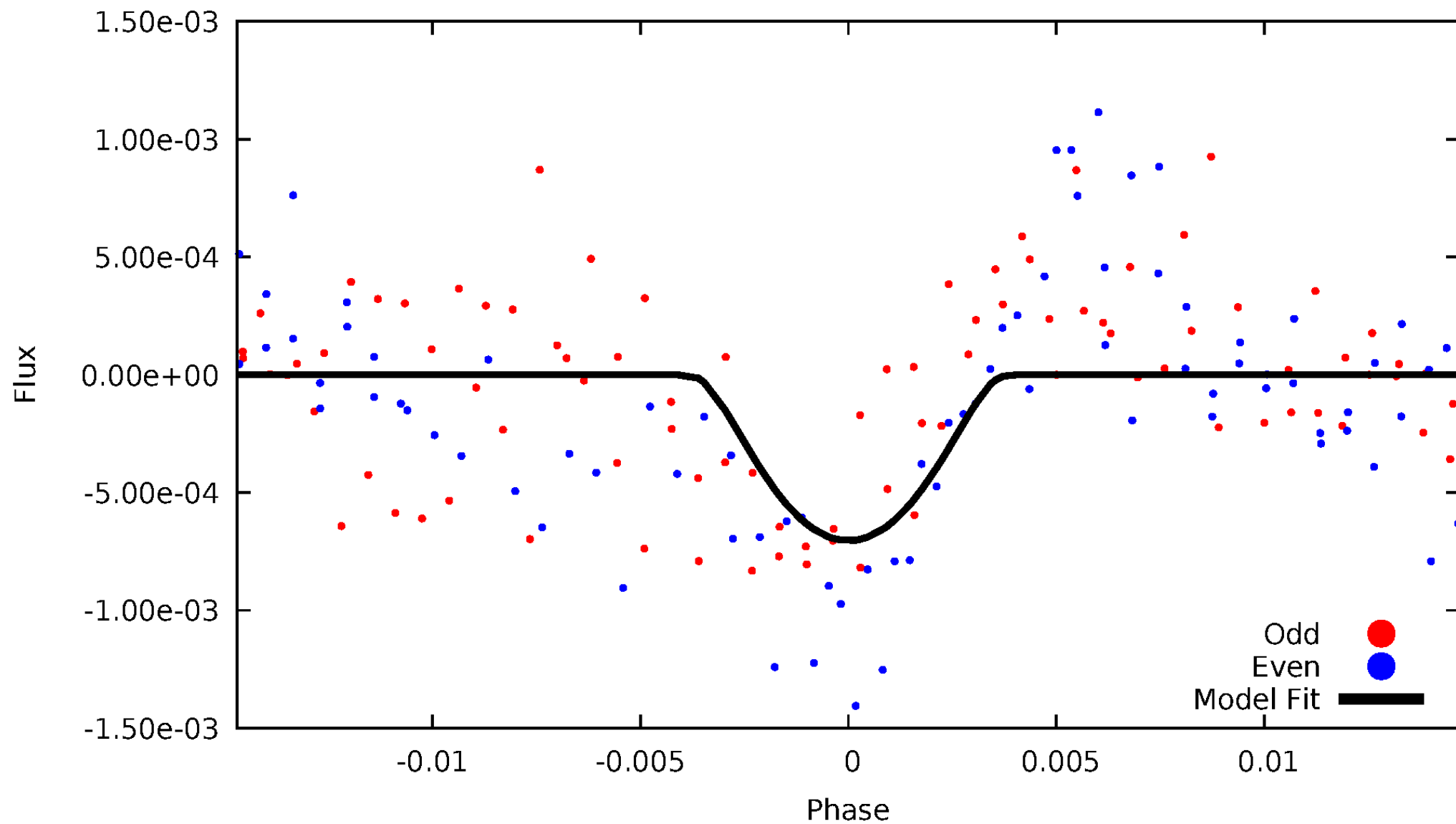
TCE 004390625-07





# DV Odd/Even

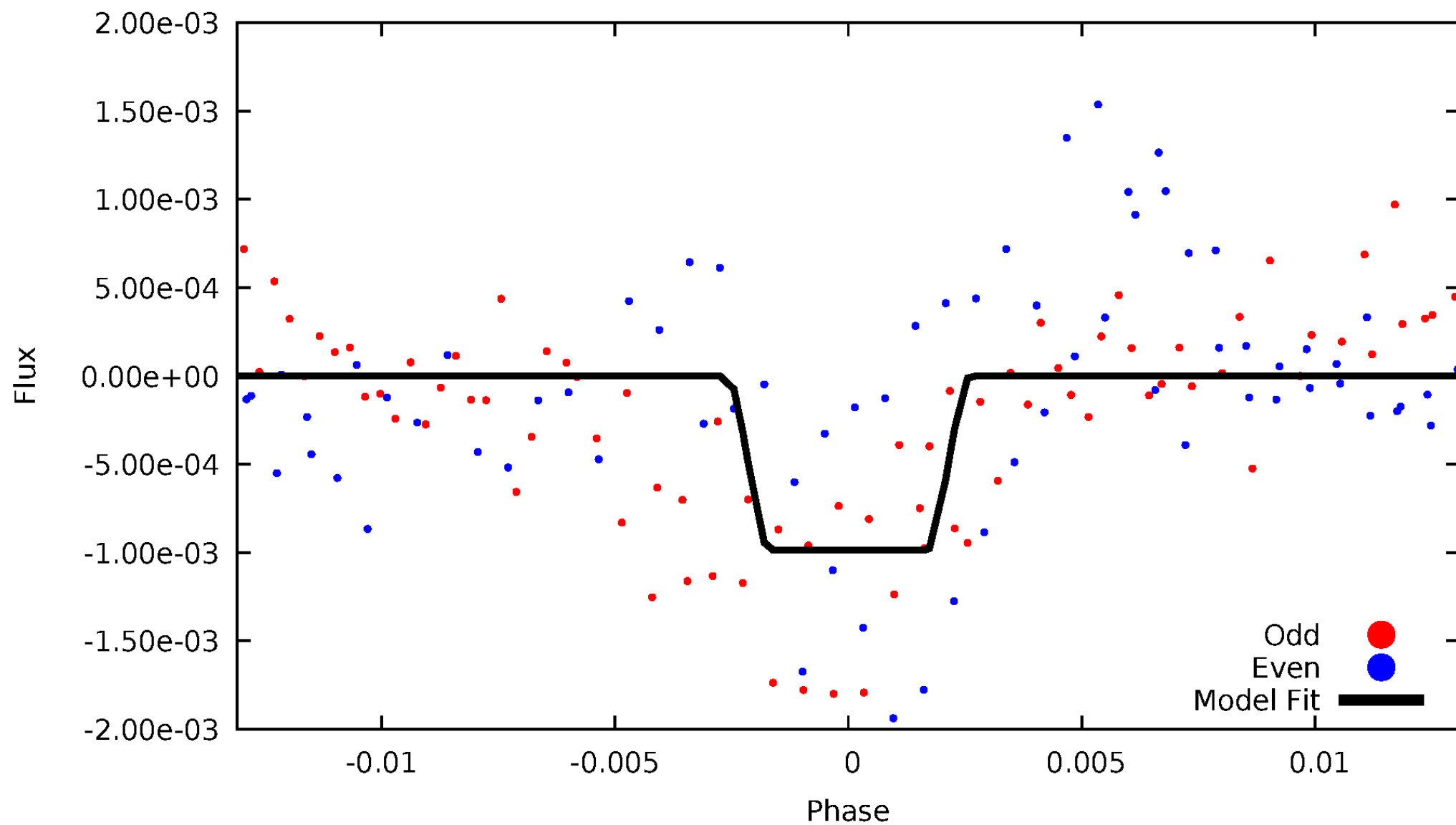
TCE 004390625-07





# ALT Odd/Even

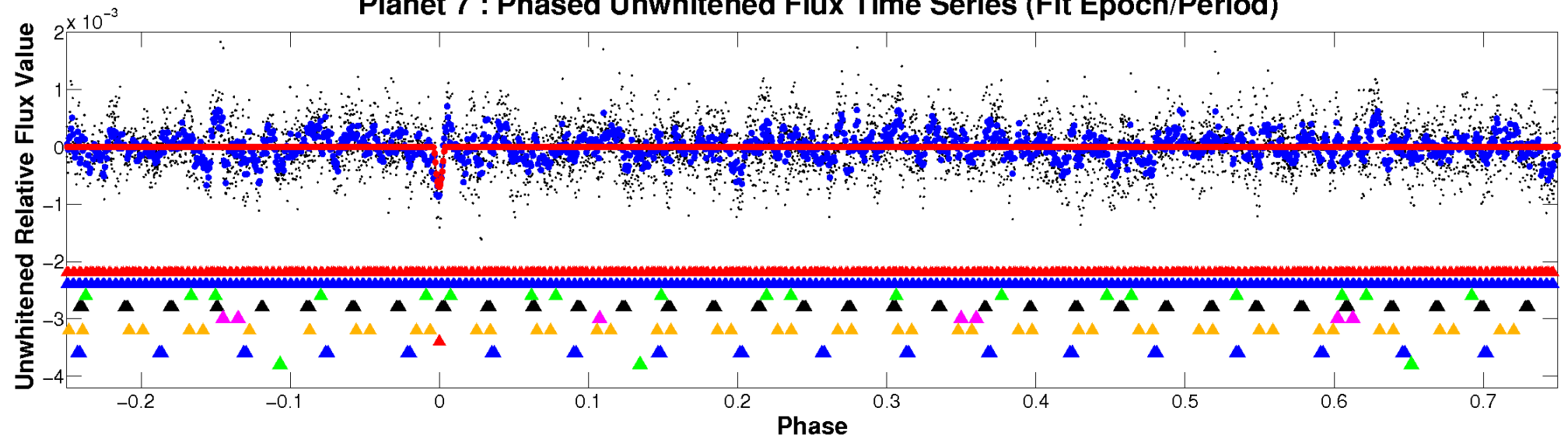
TCE 004390625-07



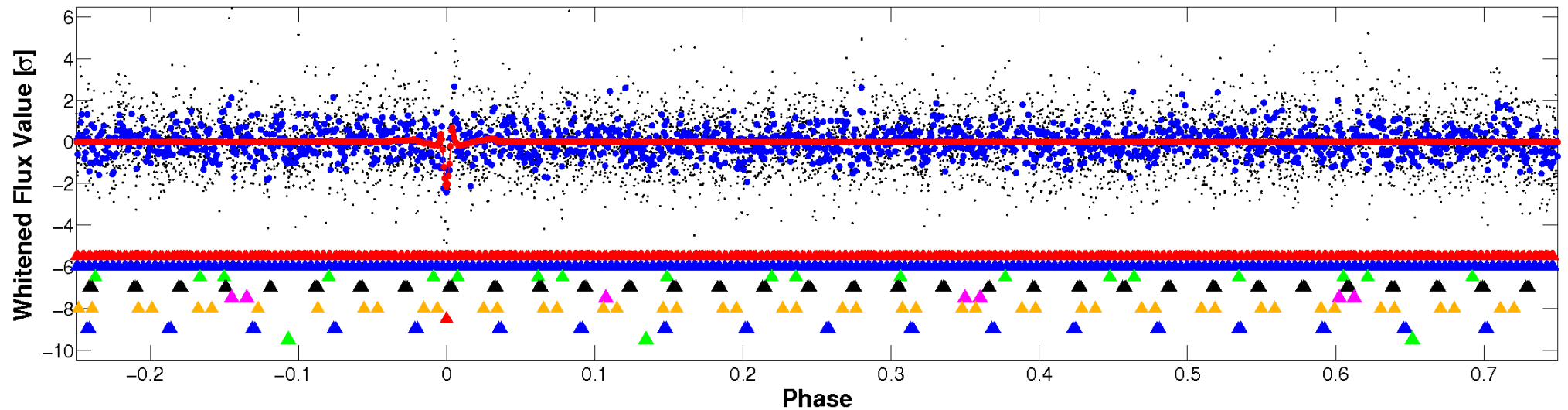


# Non-Whitened Vs. Whitened Light Curve

Planet 7 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



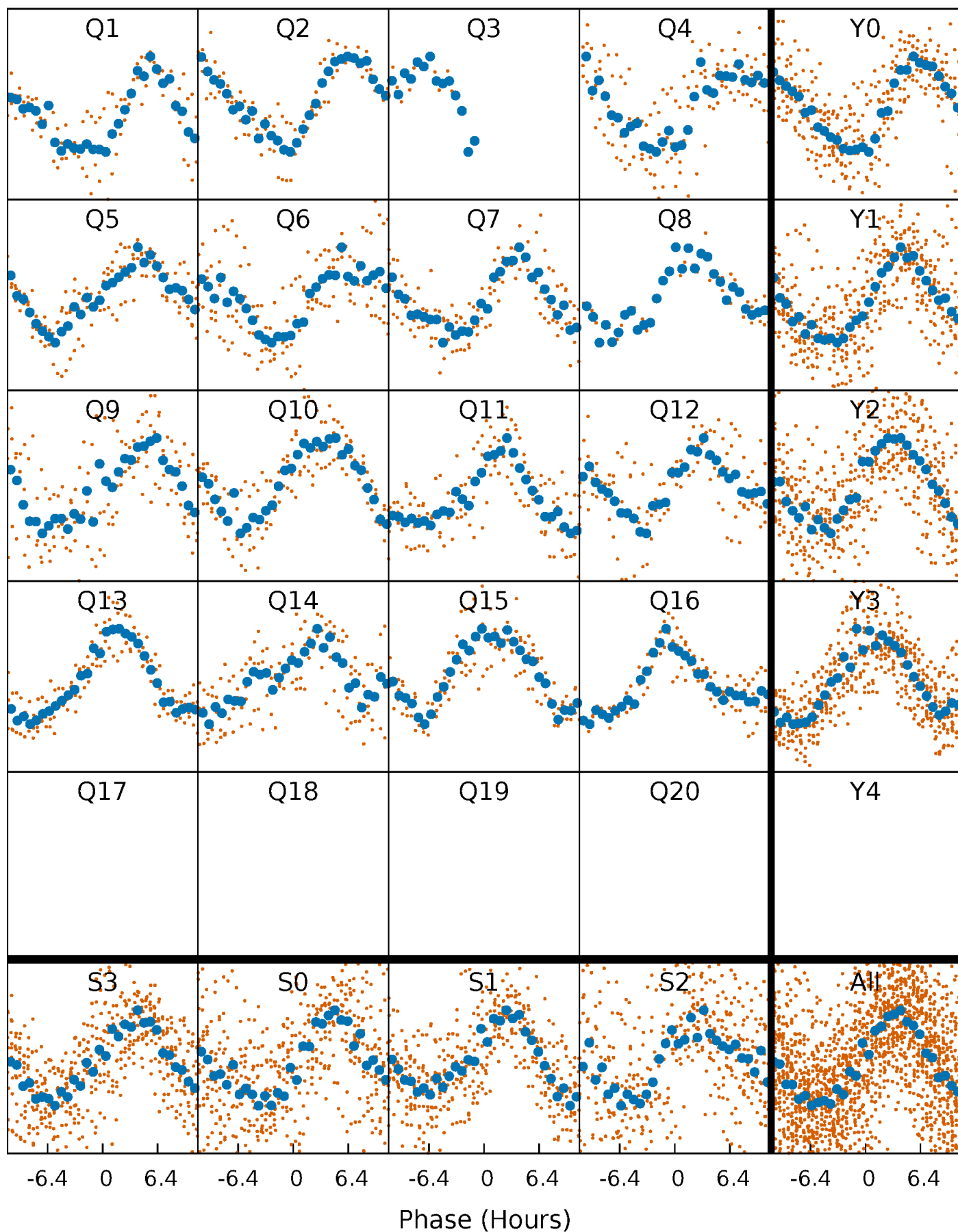
Planet 7 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

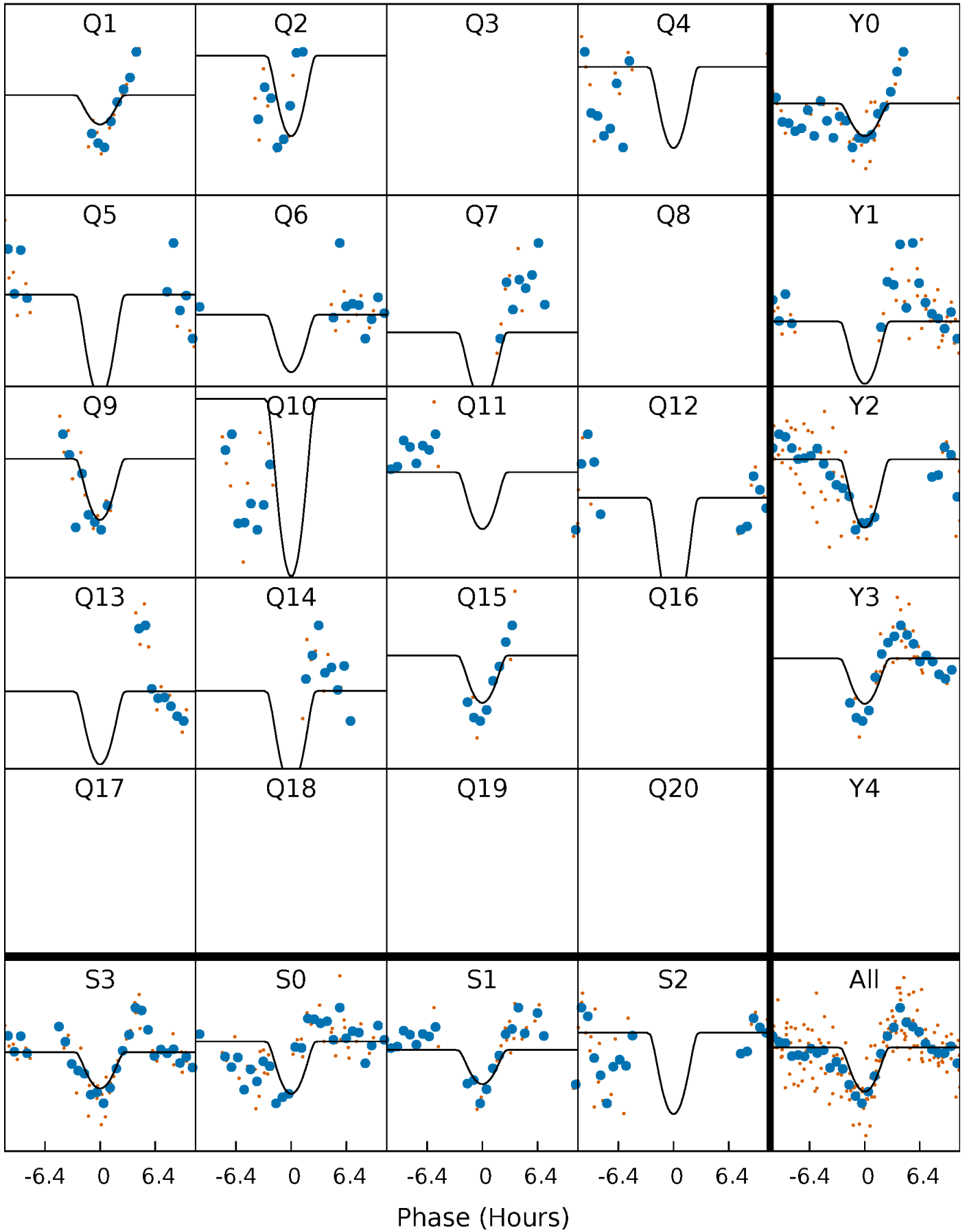
TCE 004390625-07   P= 31.528847 Days    $T_0=132.957413$  (BKJD)





# DV Quarter-Phased Transit Curves

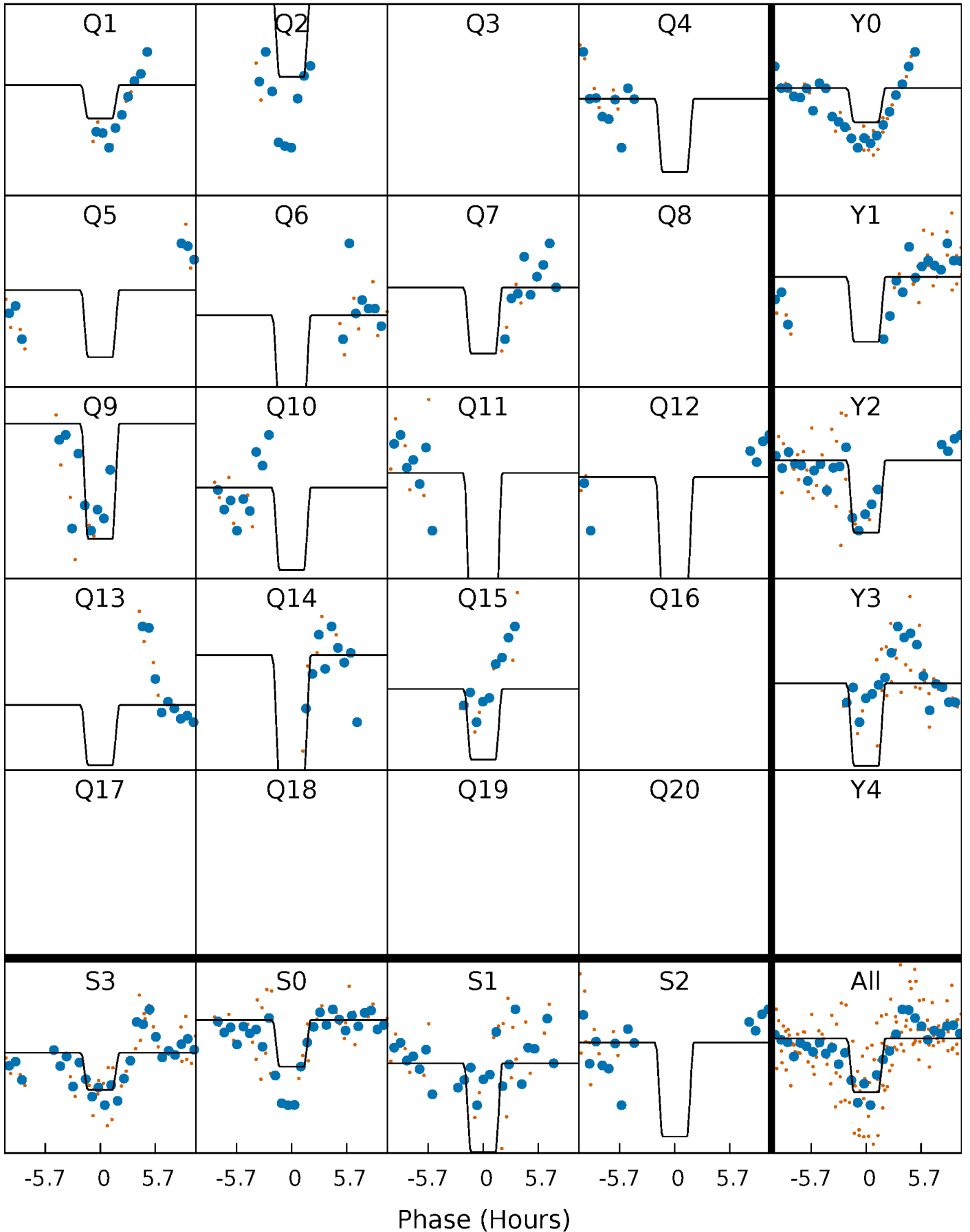
TCE 004390625-07   P= 31.528847 Days    $T_0=132.957413$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 004390625-07     $P = 31.529722$  Days     $T_0 = 132.932590$  (BKJD)

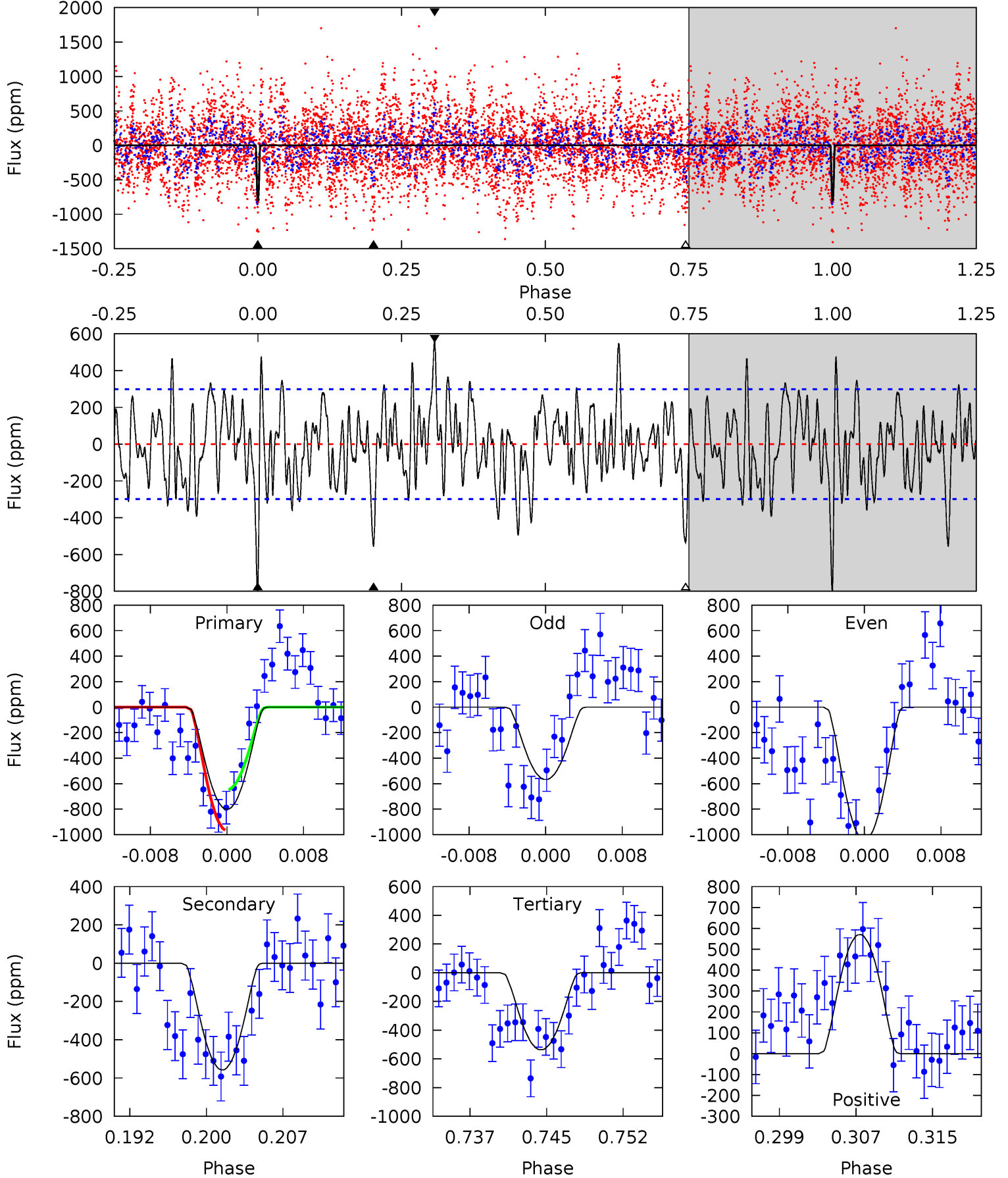




# DV Model-Shift Uniqueness Test

004390625-07,  $P = 31.528847$  Days,  $E = 101.428566$  Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.6	9.47	9.12	9.69	5.08	2.67	2.98	4.48	3.92	0.35	-0.22	4.02	0.91	0.42	2.69

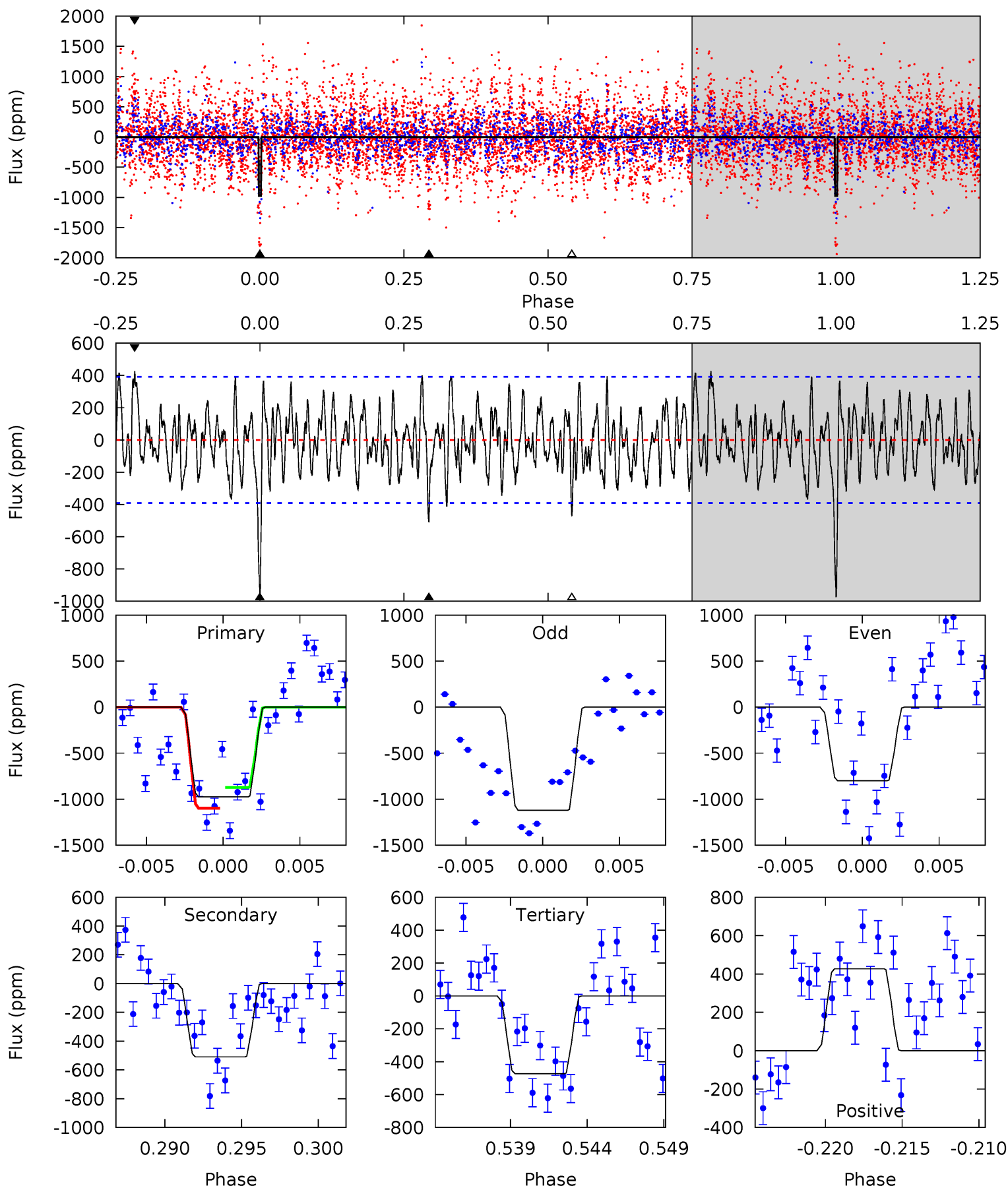




# Alt Model-Shift Uniqueness Test

004390625-07, P = 31.529722 Days, E = 101.402868 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.8	6.71	6.23	5.62	5.16	2.81	2.12	6.61	7.22	0.48	1.09	2.14	1.31	0.30	1.45





### Stellar Parameters For KIC 004390625

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6995^{+219}_{-301}$	$4.190^{+0.185}_{-0.167}$	$-0.660^{+0.250}_{-0.300}$	$1.400^{+0.390}_{-0.319}$	$1.106^{+0.160}_{-0.131}$	$0.568^{+0.534}_{-0.277}$
	+3%/-4%	+4%/-4%	+38%/-45%	+28%/-23%	+14%/-12%	+94%/-49%
Source	PHO1	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 004390625-07 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-557 \pm 59$	$8.53^{+7.64}_{-5.67}$	$1136^{+83}_{-84}$	$4676^{+3320}_{-954}$	$176^{+1303}_{-129}$
Alt.	$-509 \pm 76$	$7.51^{+7.57}_{-5.20}$	$1124^{+92}_{-83}$	$4780^{+3775}_{-1070}$	$209^{+1972}_{-159}$

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature

$T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$



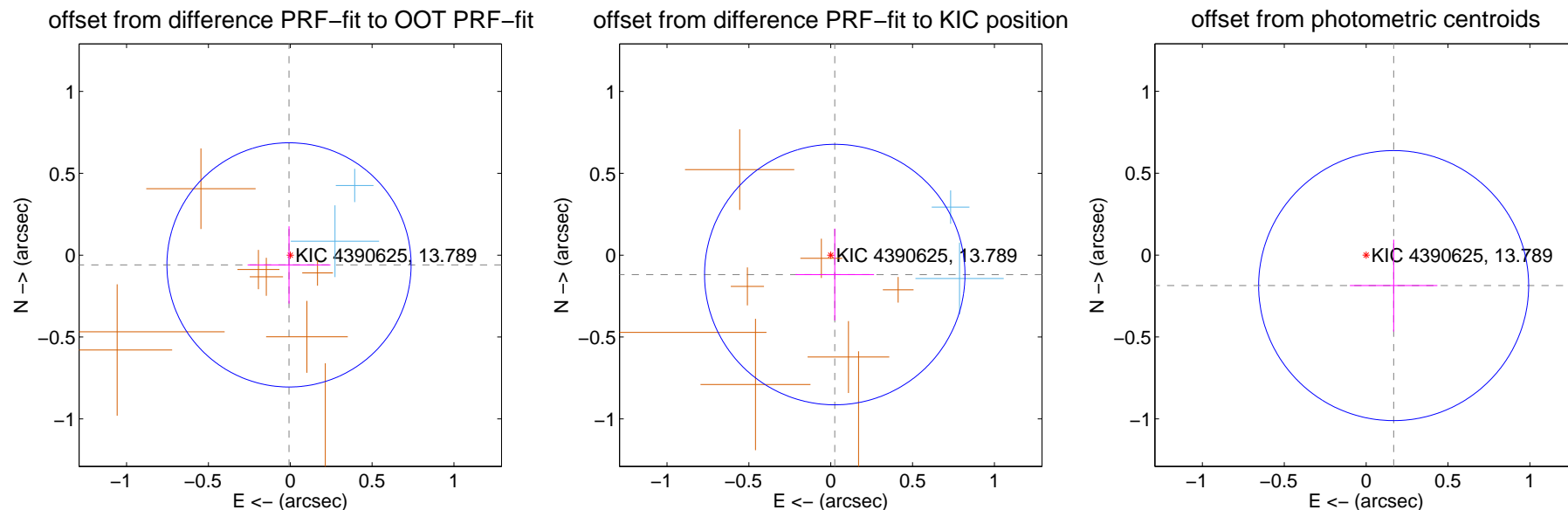
## DV Centroid Data

Supplemental centroid analysis for 004390625-07. Kepler magnitude: 13.79. Transit SNR 9.20

There are 3 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.27 arcsec

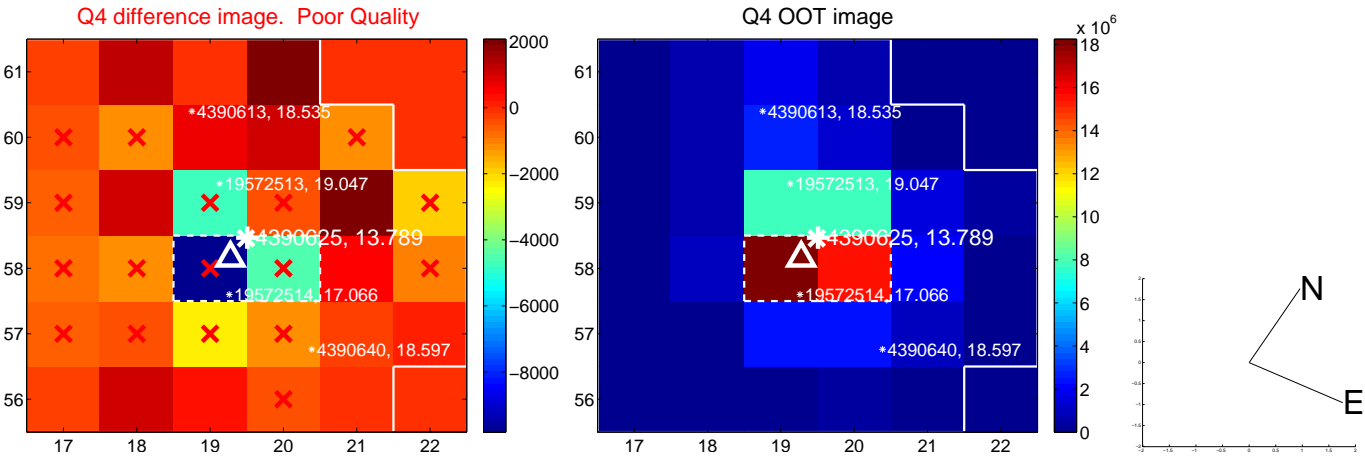
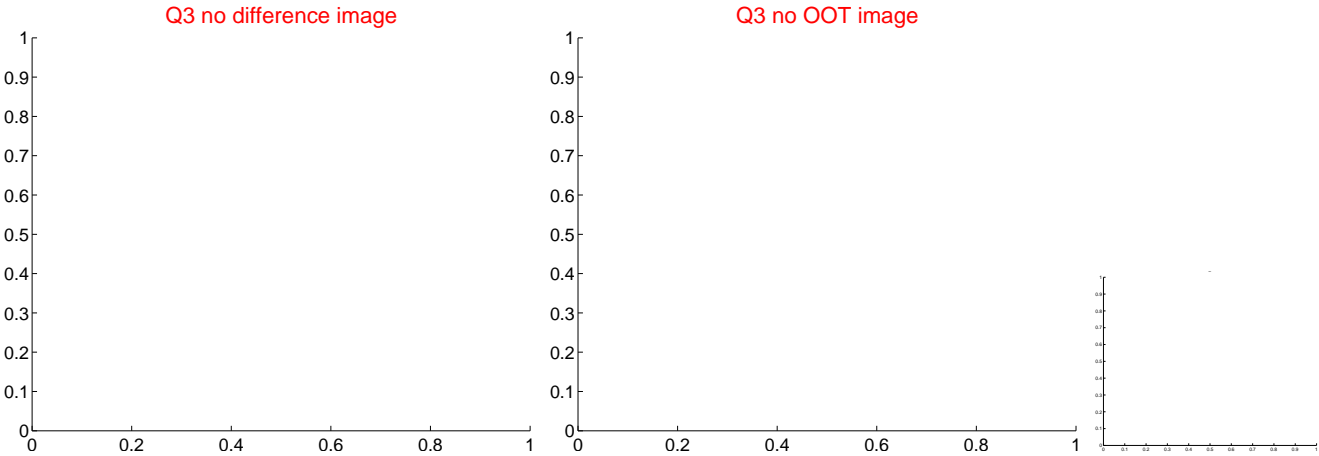
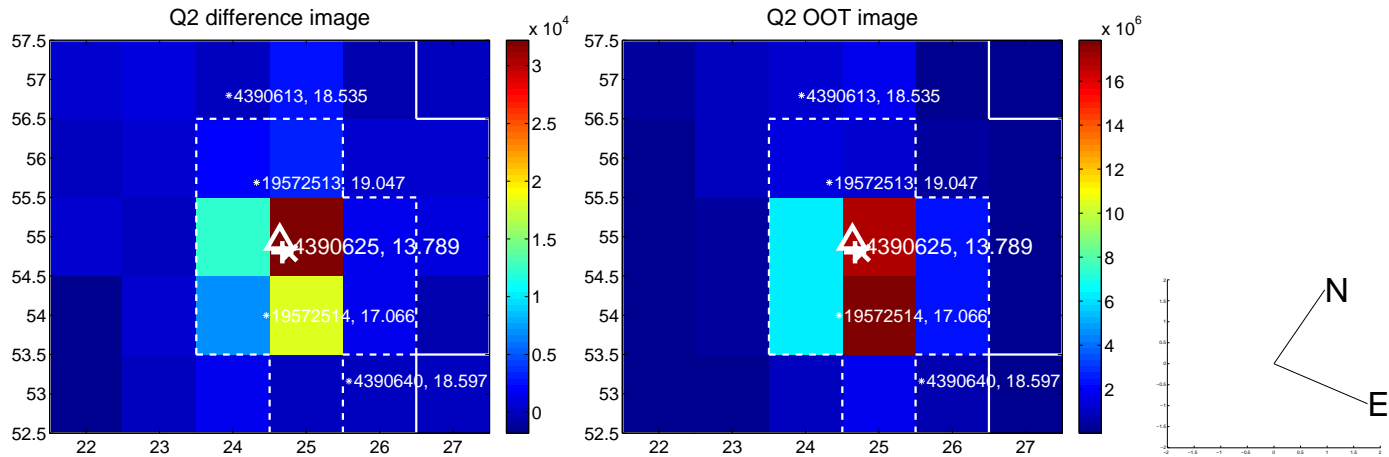
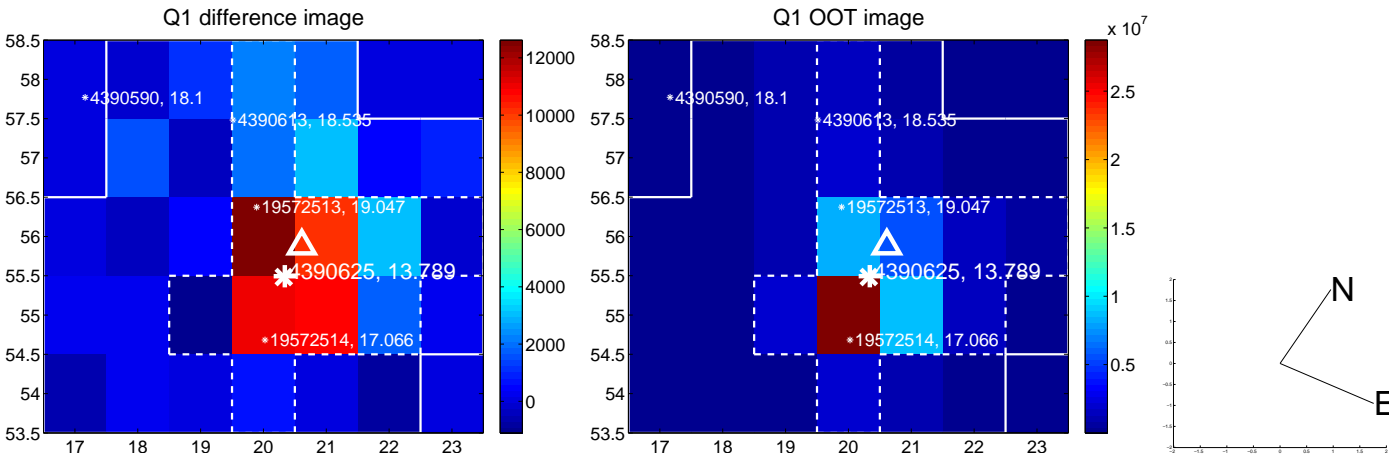
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.060 \pm 0.249$	0.24	$0.008 \pm 0.253$	$-0.059 \pm 0.236$
PRF-fit source offset from KIC position	$0.121 \pm 0.265$	0.46	$-0.025 \pm 0.240$	$-0.119 \pm 0.280$
photometric centroid source offset	$0.25 \pm 0.27$	0.91	$-0.17 \pm 0.27$	$-0.19 \pm 0.28$



Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

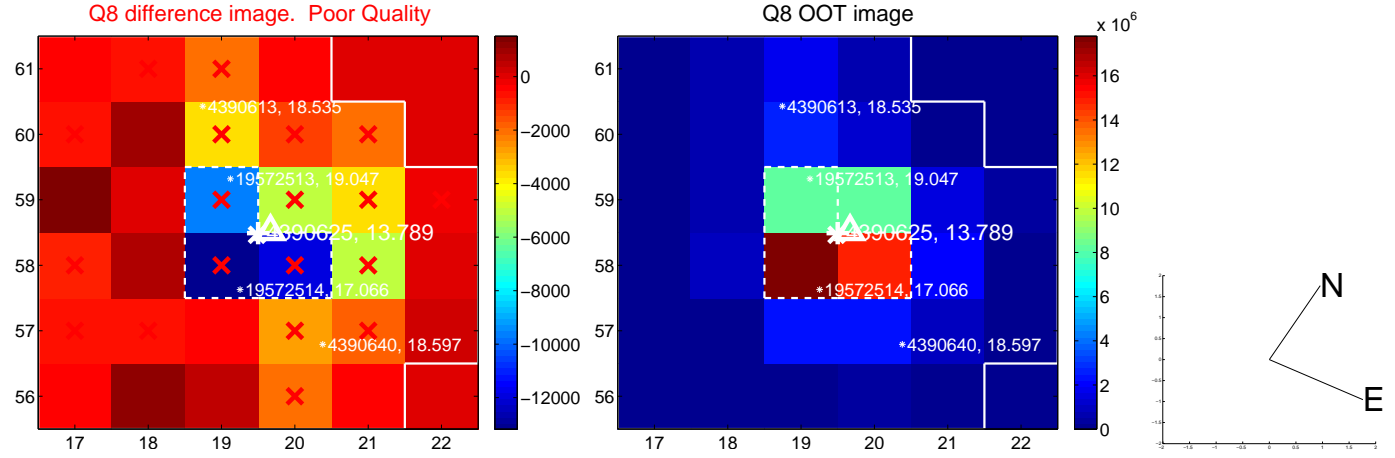
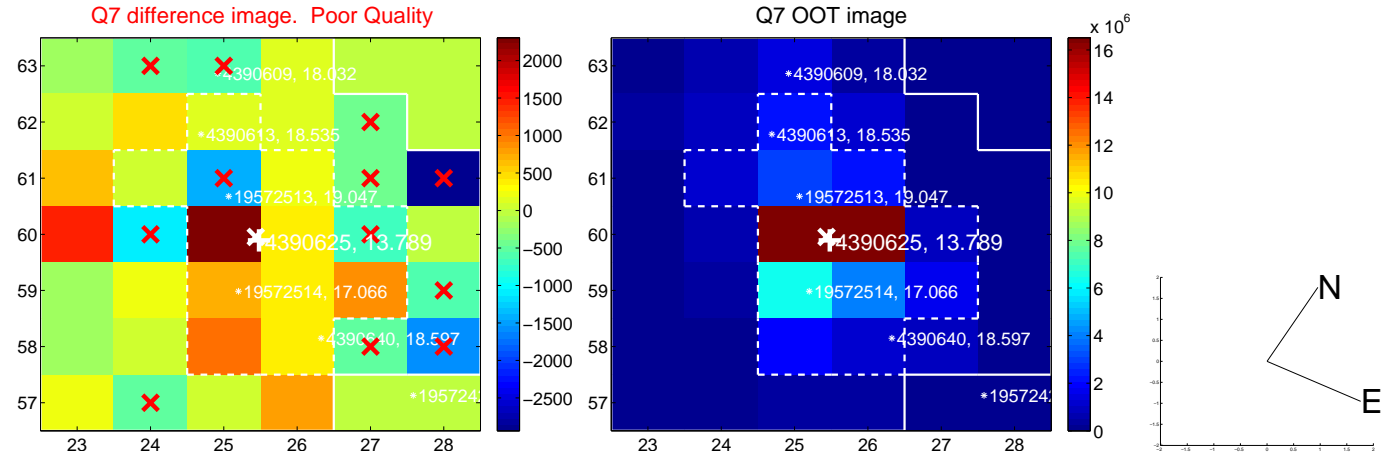
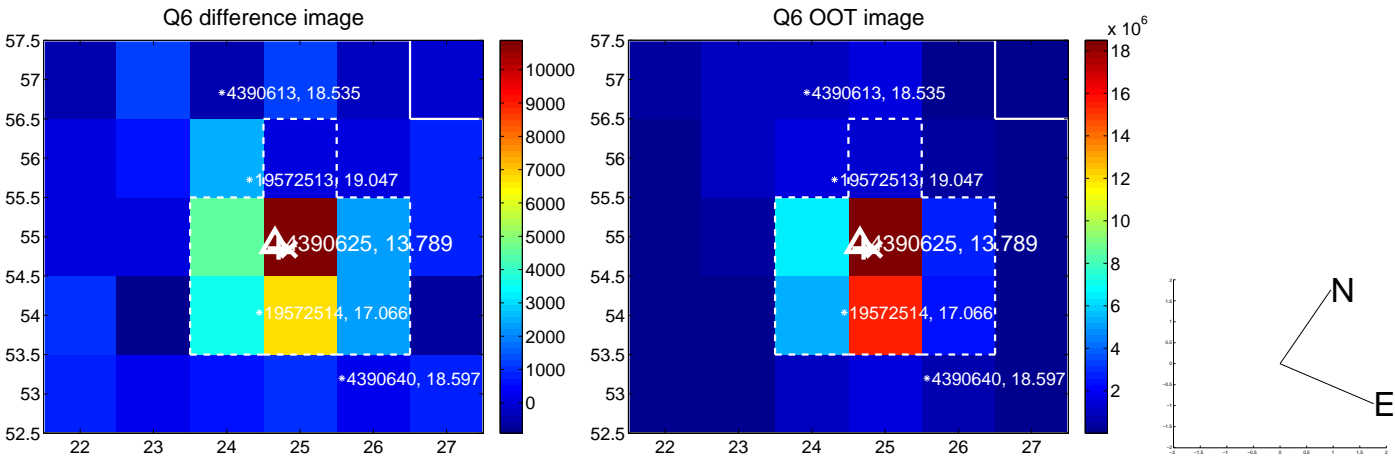
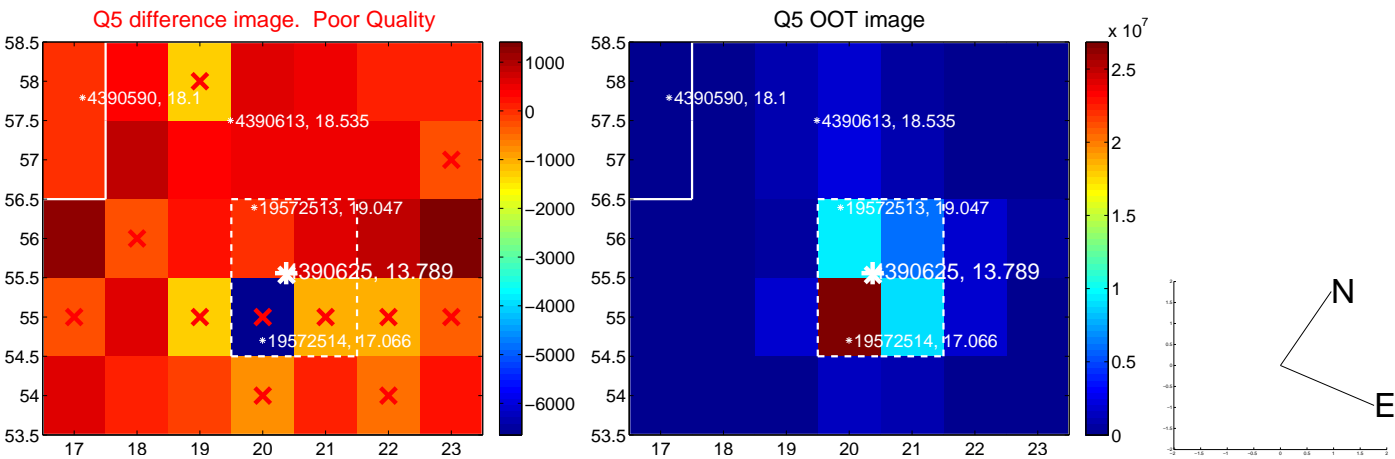


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



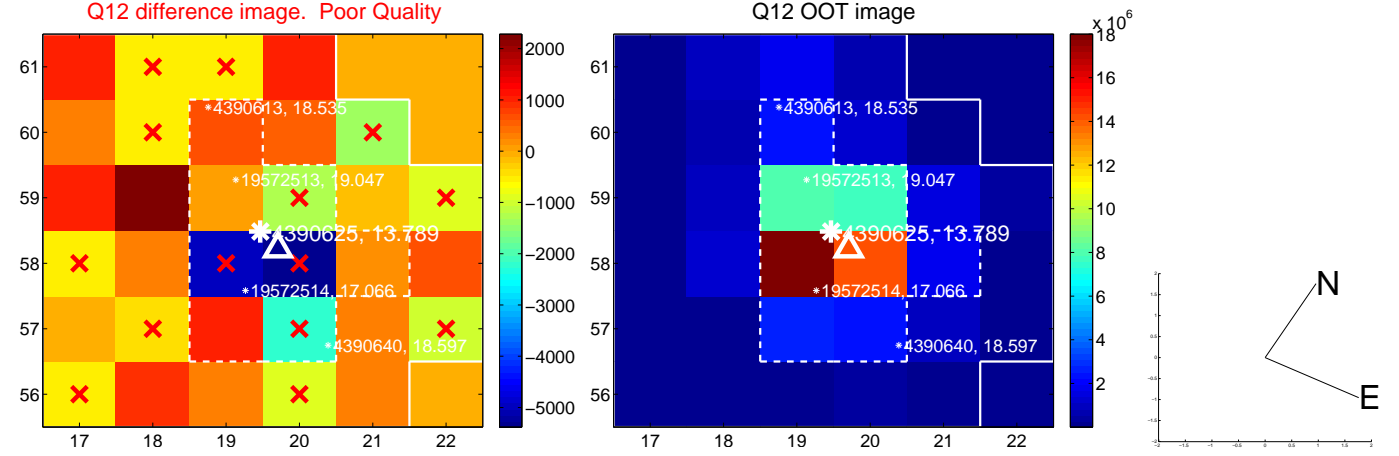
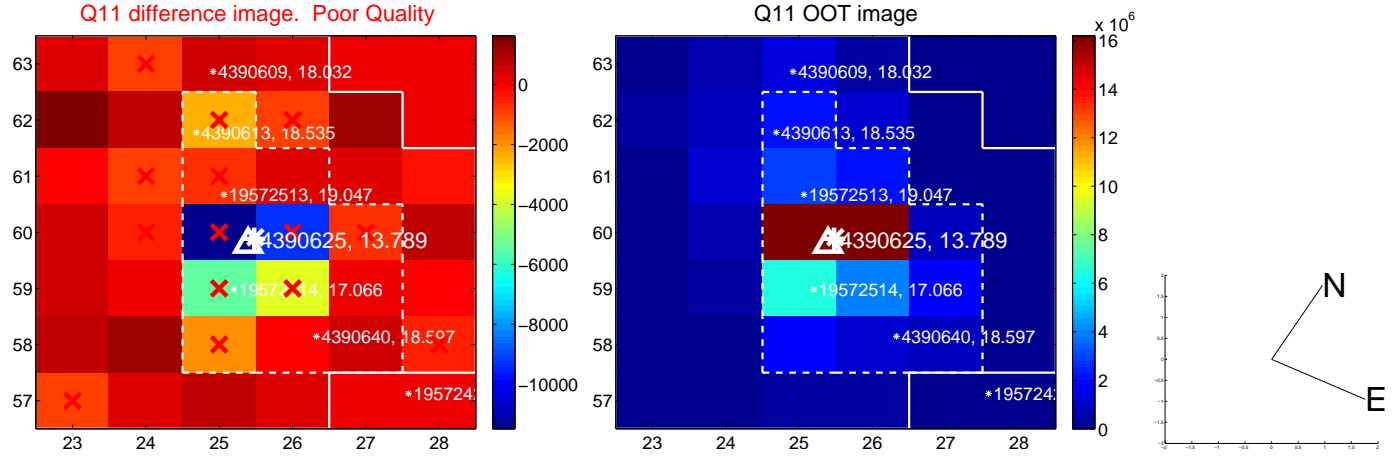
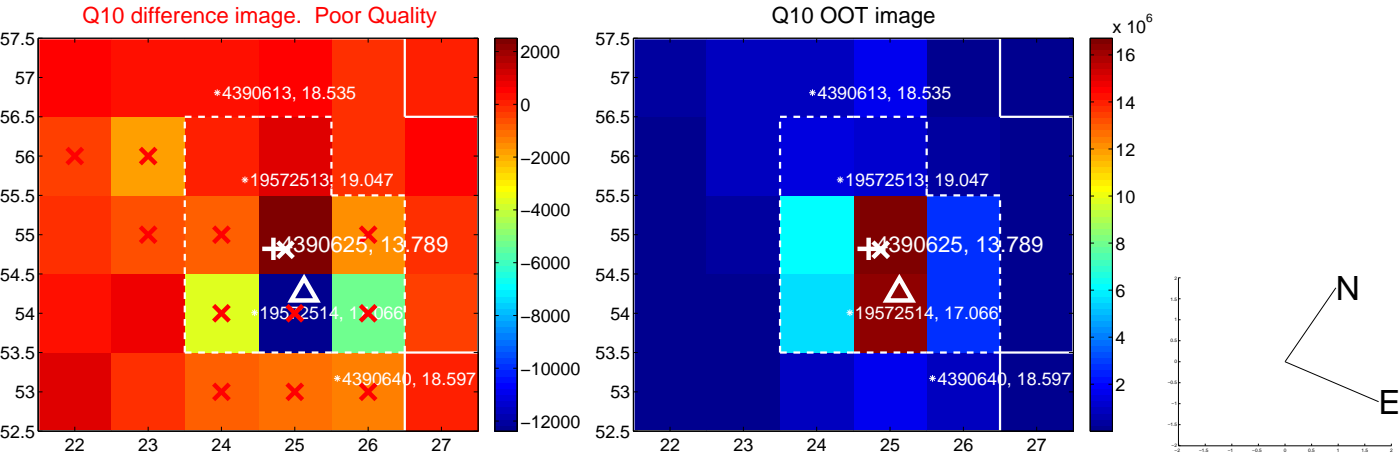
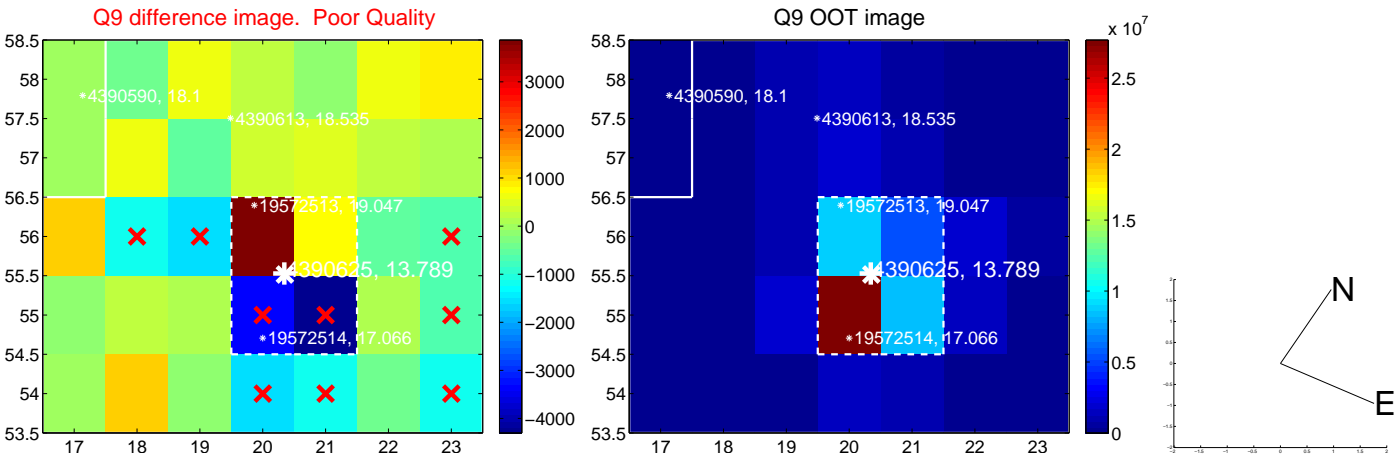


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



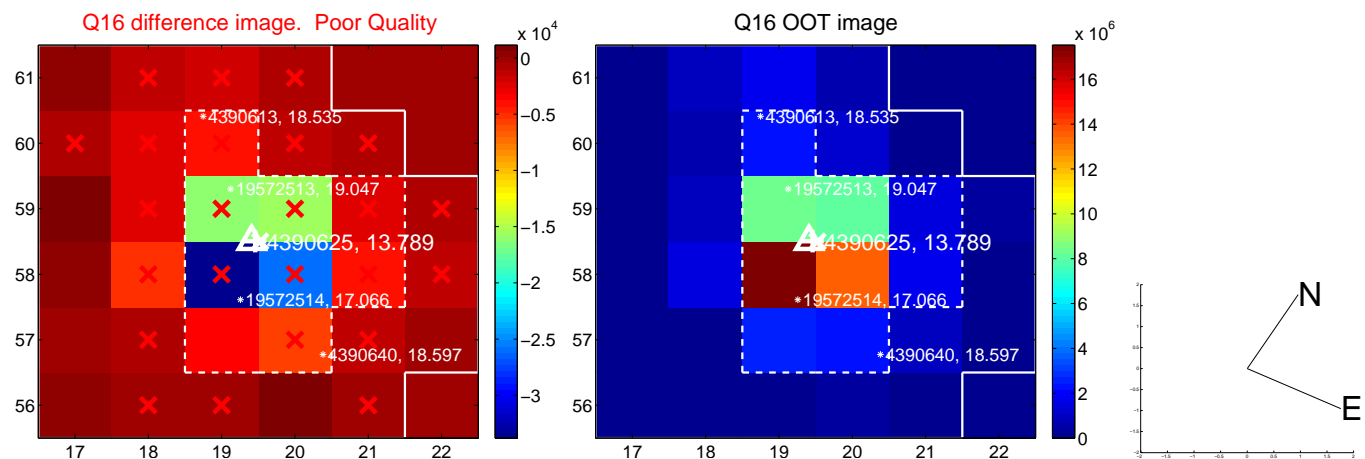
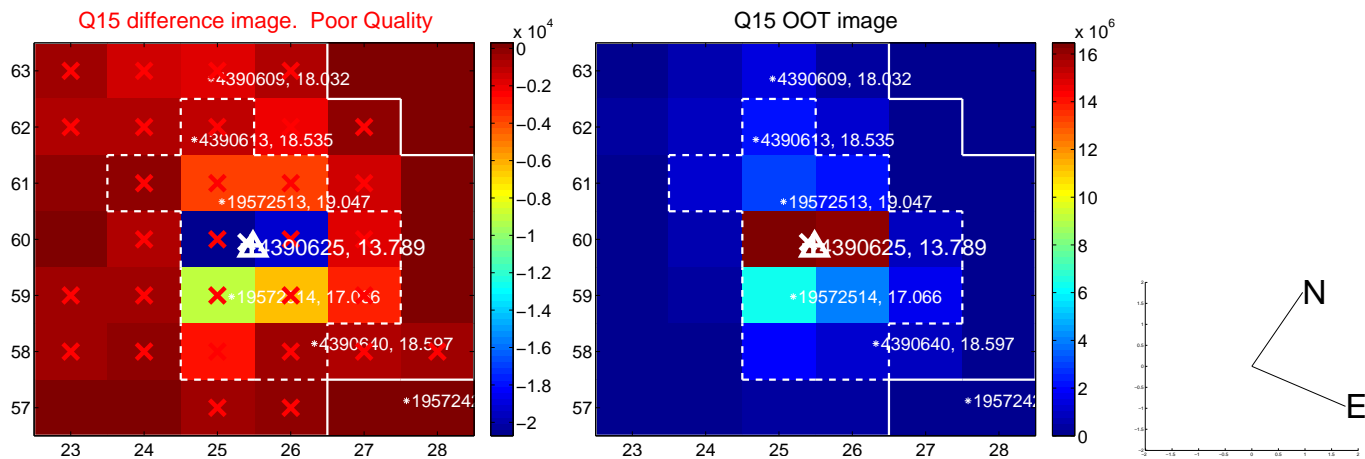
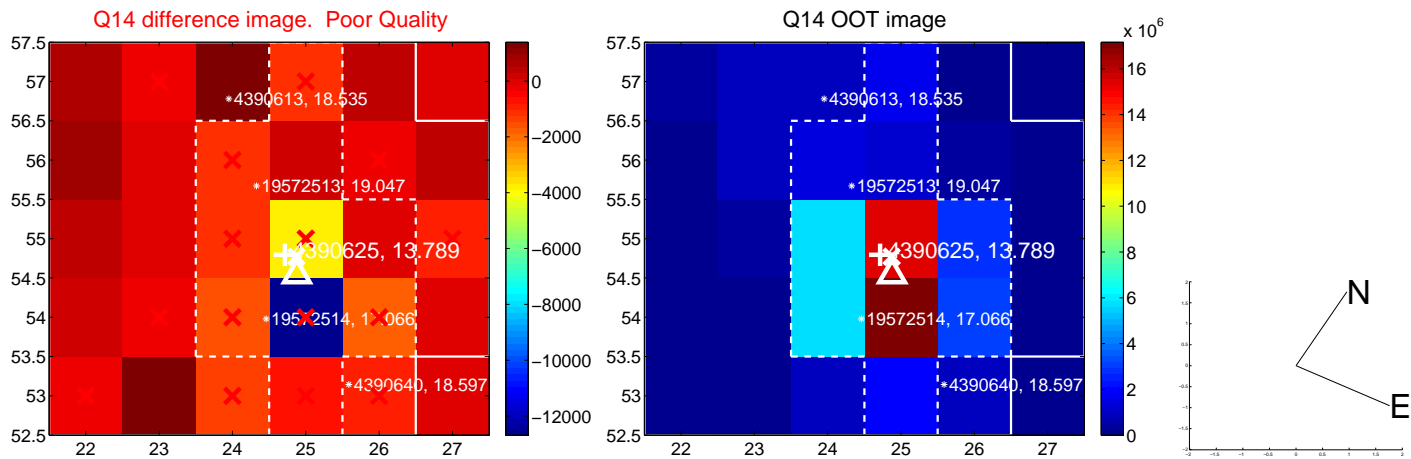
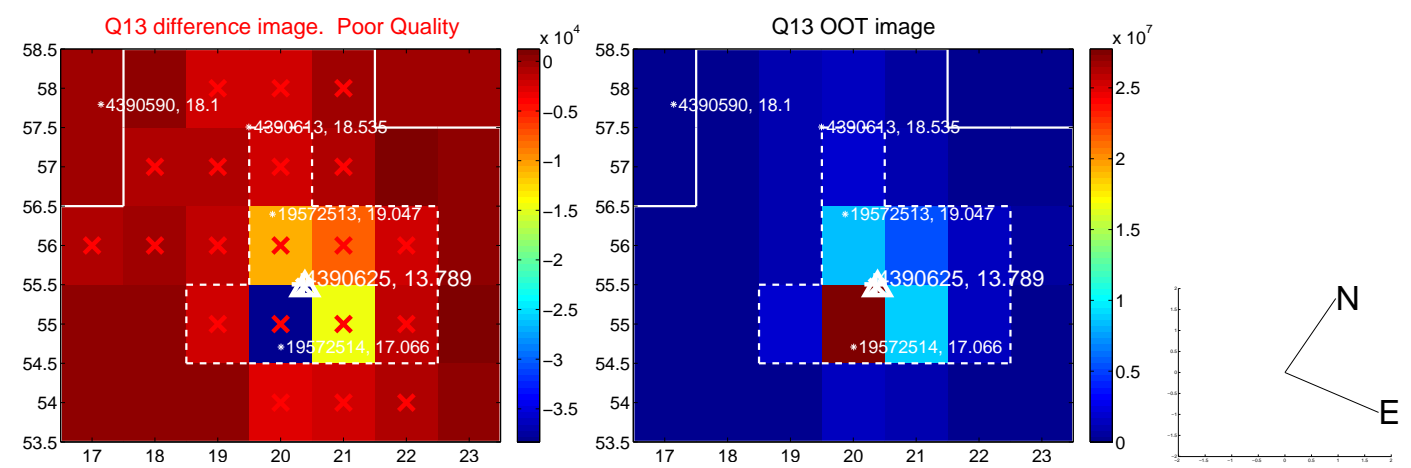


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



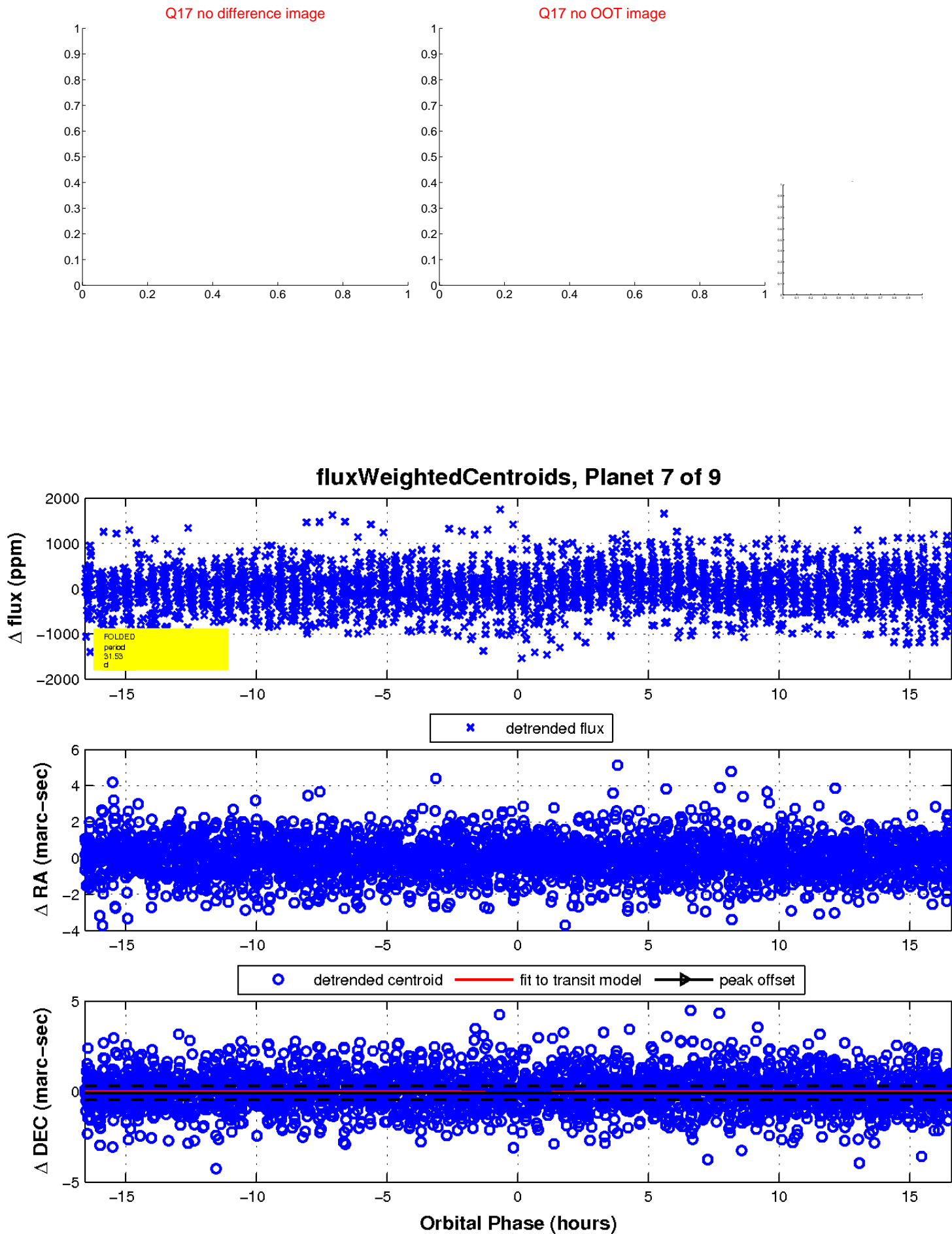


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





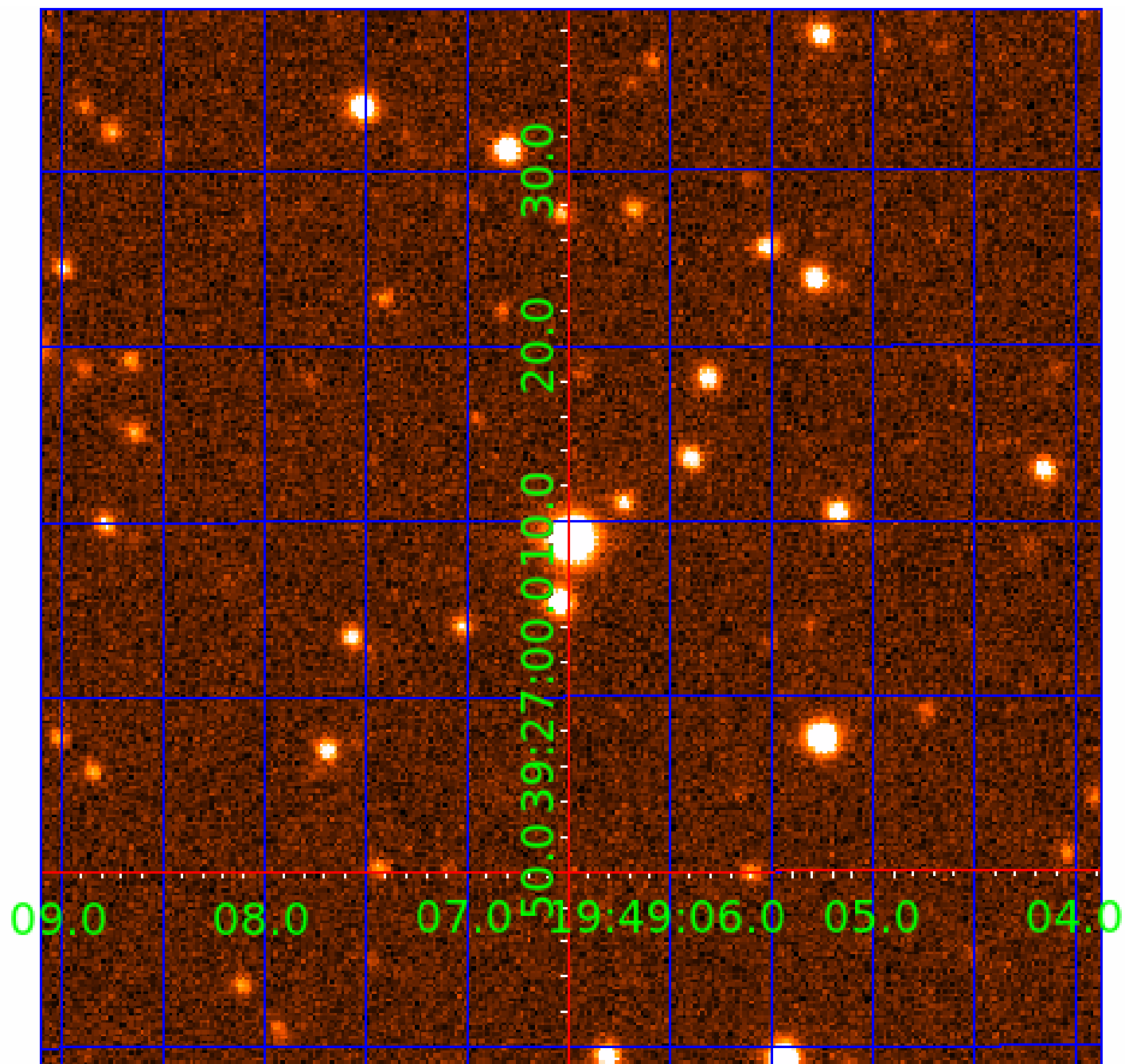
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination





# KIC 004390625

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004390625-01	OBS	No	2.552800	131.778368	45.1	8.820	7.3	6.4	1.40	6995	1.09	2938.38
004390625-02	OBS	No	1.276435	132.389024	60.3	7.984	9.2	9.3	1.40	6995	1.29	7403.98
004390625-03	OBS	No	75.223800	166.434374	900.8	5.821	8.6	9.9	1.40	6995	5.09	32.28
004390625-04	OBS	No	15.287801	143.491037	275.4	2.651	8.6	6.5	1.40	6995	2.56	270.19
004390625-05	OBS	No	212.739706	191.761958	712.0	4.822	9.5	9.0	1.40	6995	4.65	8.07
004390625-06	OBS	No	30.256104	159.489605	471.5	1.835	8.5	8.0	1.40	6995	3.48	108.74
004390625-07	OBS	No	31.528847	132.957413	702.9	5.557	7.7	9.2	1.40	6995	5.85	102.92
004390625-08	OBS	No	40.289721	146.290226	580.3	5.414	8.1	8.1	1.40	6995	3.58	74.22
004390625-09	OBS	No	638.187757	153.507721	339.7	5.000	7.2	-1.0	1.40	6995	2.61	1.87

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004390625-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004390625-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—SAME_NTL_PERIOD
004390625-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-05	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST
004390625-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004390625-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
004390625-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_NOFITS

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

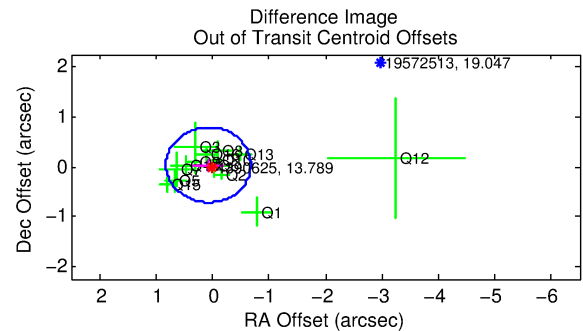
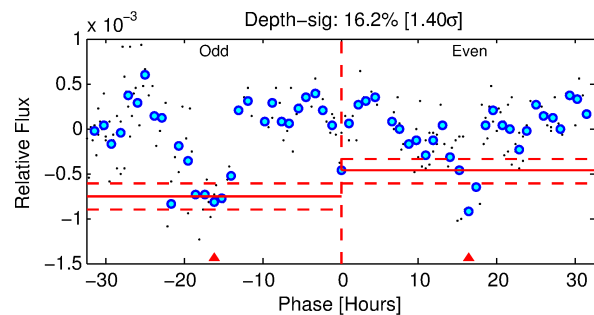
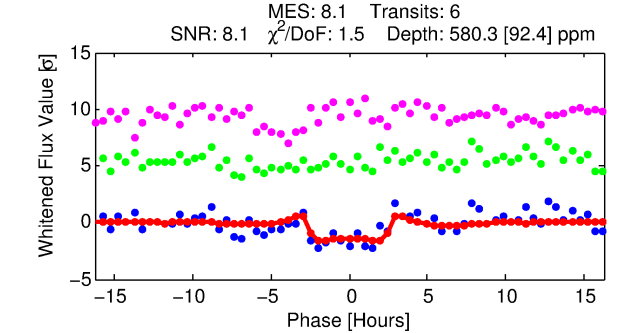
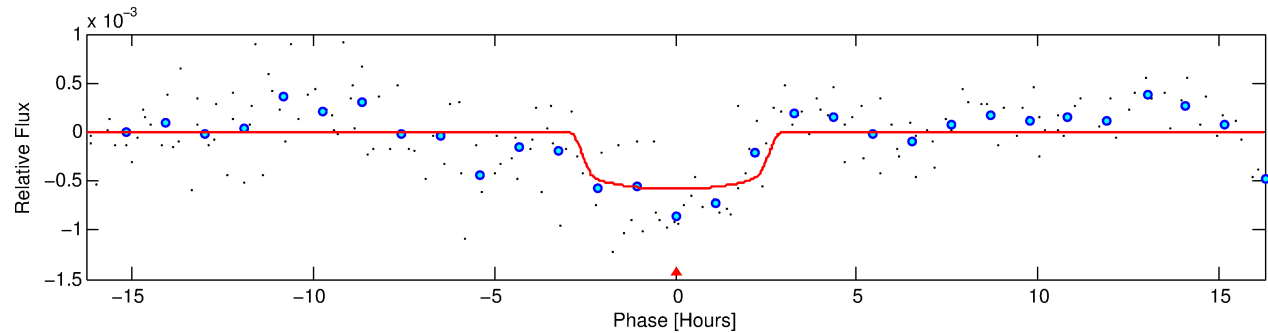
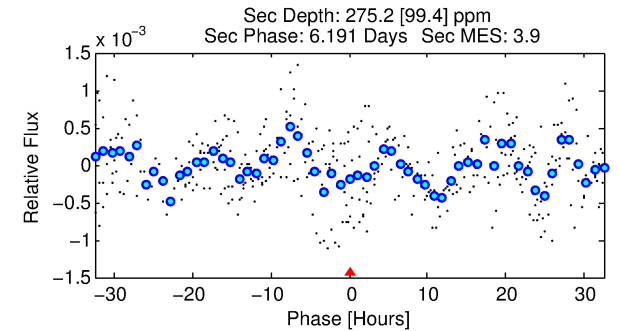
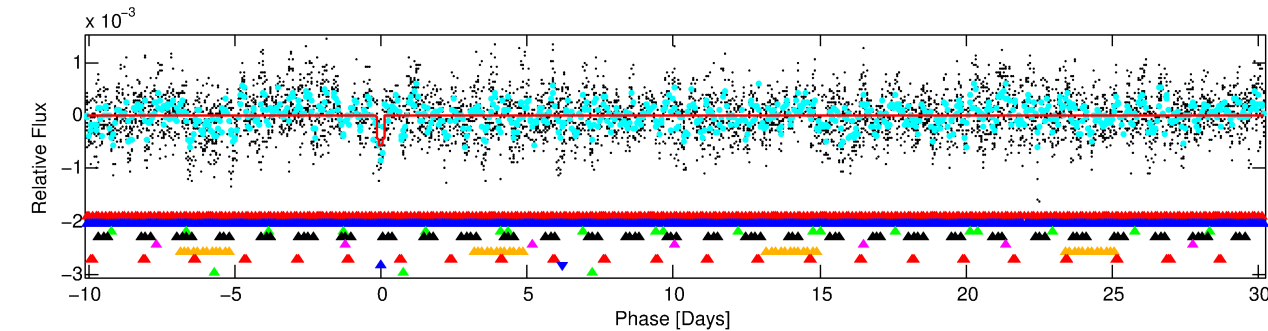
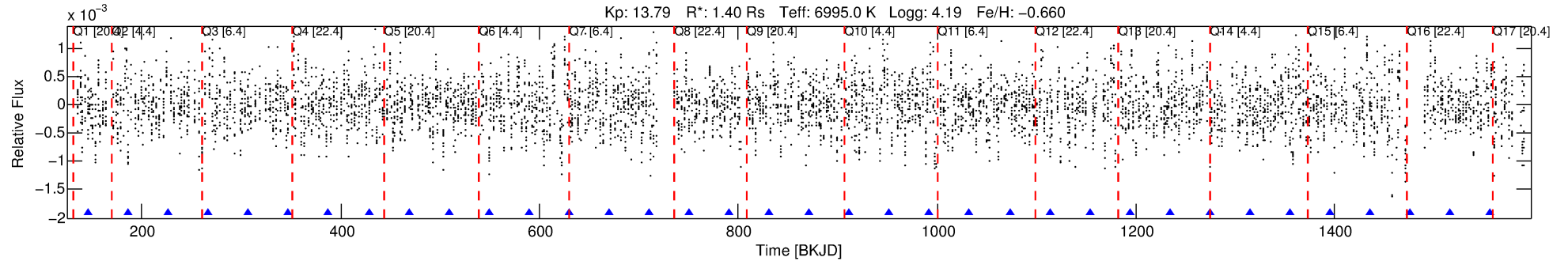
Ephemeris Match Information For 004390625-08

No Significant Match Found



# DV One-Page Summary

KIC: 4390625 Candidate: 8 of 9 Period: 40.290 d



## DV Fit Results:

Period = 40.28972 [0.00072] d  
Epoch = 146.2902 [0.0113] BKJD  
Rp/R\* = 0.0234 [0.0187]  
a/R\* = 44.77 [208.50]  
b = 0.65 [4.11]  
Seff = 74.22 [28.24]  
Teq = 748 [71] K  
Rp = 3.58 [3.03] Re  
a = 0.2380 [0.0556] AU  
Ag = 669.91 [1122.01] [0.60 $\sigma$ ]  
Teffp = 5887 [2427] K [2.12 $\sigma$ ]

## DV Diagnostic Results:

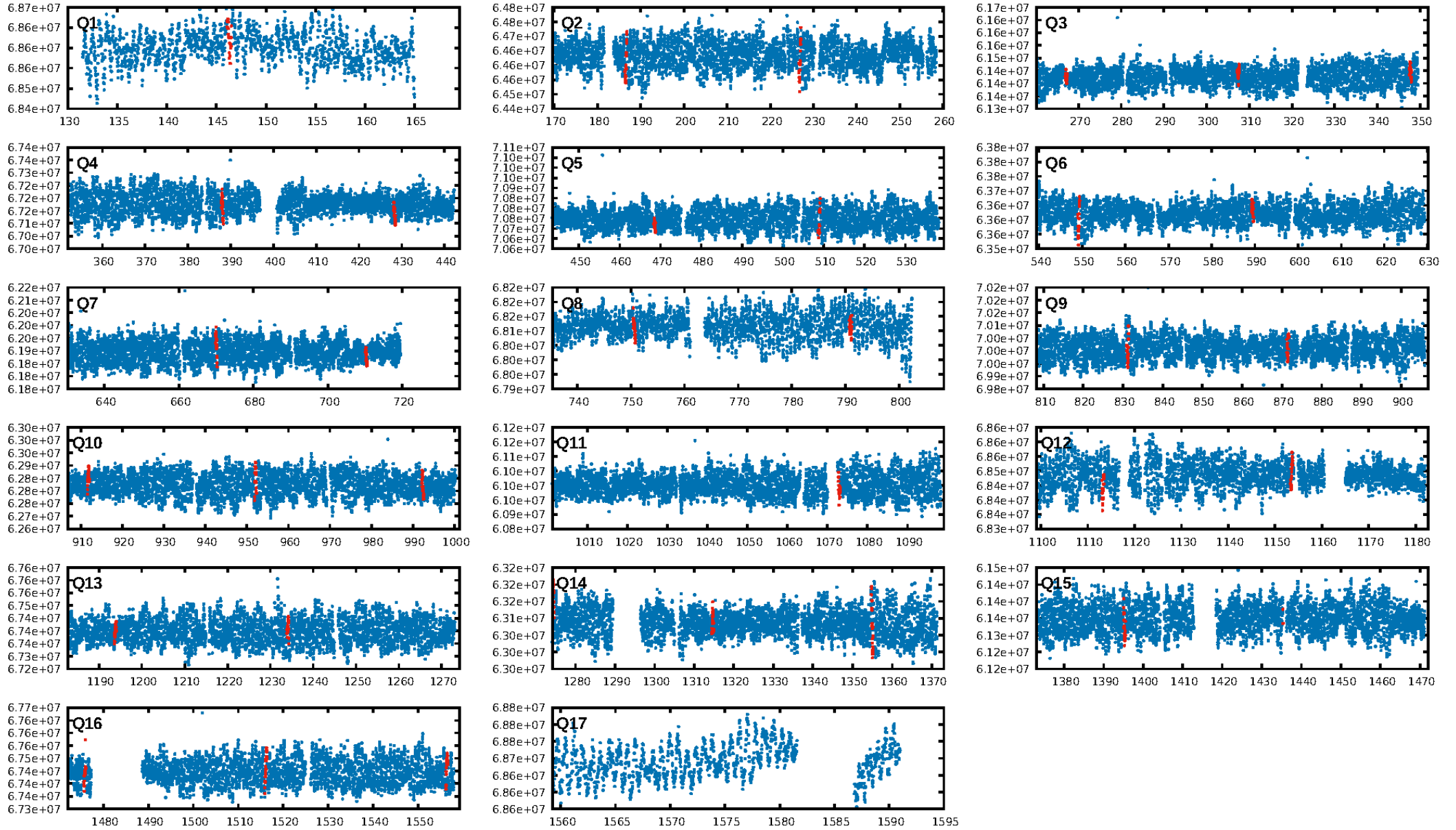
ShortPeriod-sig: 100.0% [27.10 $\sigma$ ]  
LongPeriod-sig: 100.0% [105.46 $\sigma$ ]  
ModelChiSquare2-sig: 0.6%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [6/6]  
GhostDiagnostic-chr: 1.372  
Centroid-sig: N/A  
Centroid-so: 0.405 arcsec [1.43 $\sigma$ ]  
OotOffset-rm: 0.079 arcsec [0.32 $\sigma$ ]  
KicOffset-rm: 0.245 arcsec [0.98 $\sigma$ ]  
OotOffset-st: 4/3/3/4 [14]  
KicOffset-st: 4/3/3/4 [14]  
DiffImageQuality-fgm: 0.57 [8/14]  
DiffImageOverlap-fno: 0.00 [0/15]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 16:27:31 Z

This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

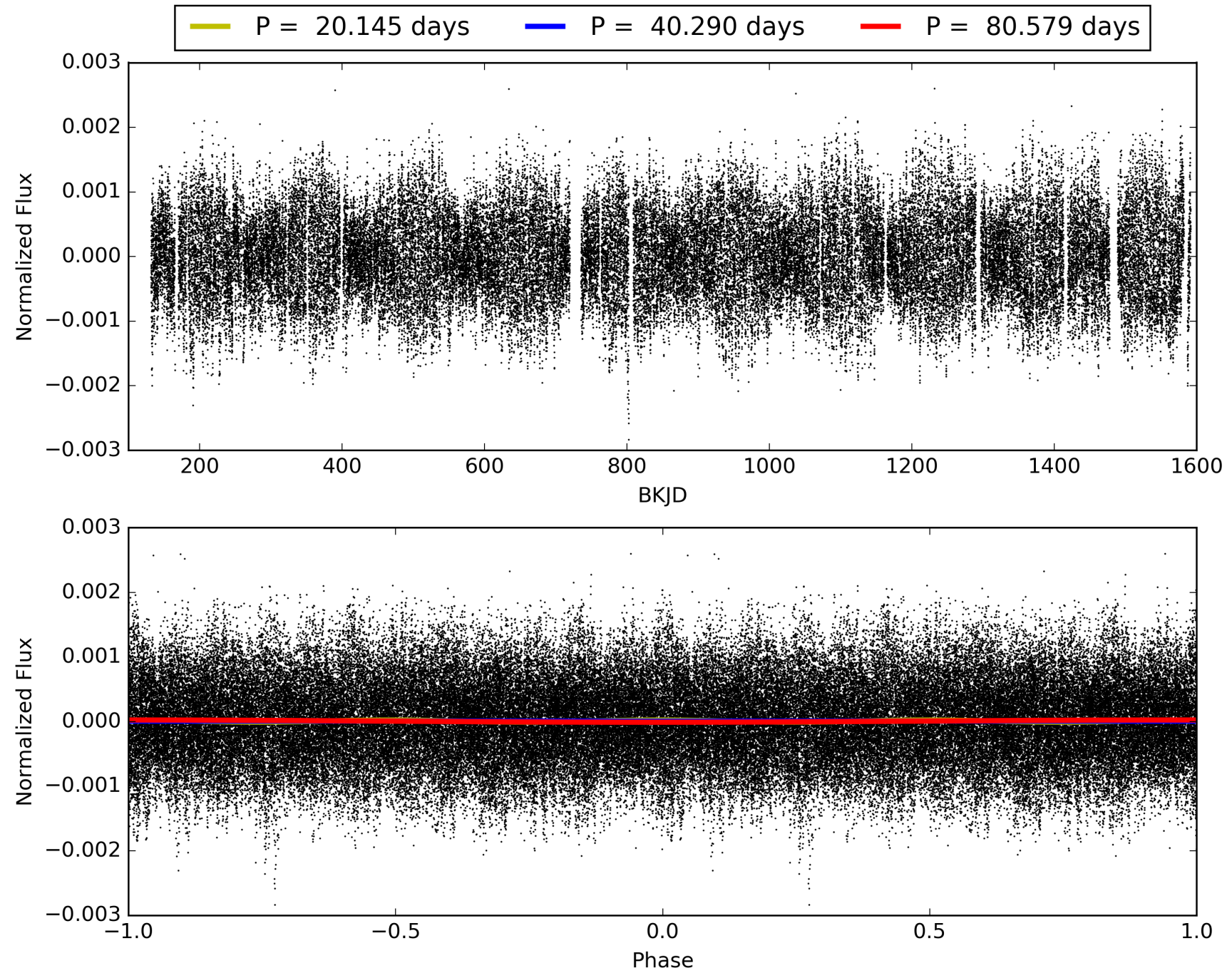


# TCE 004390625-08, PDC Light Curves





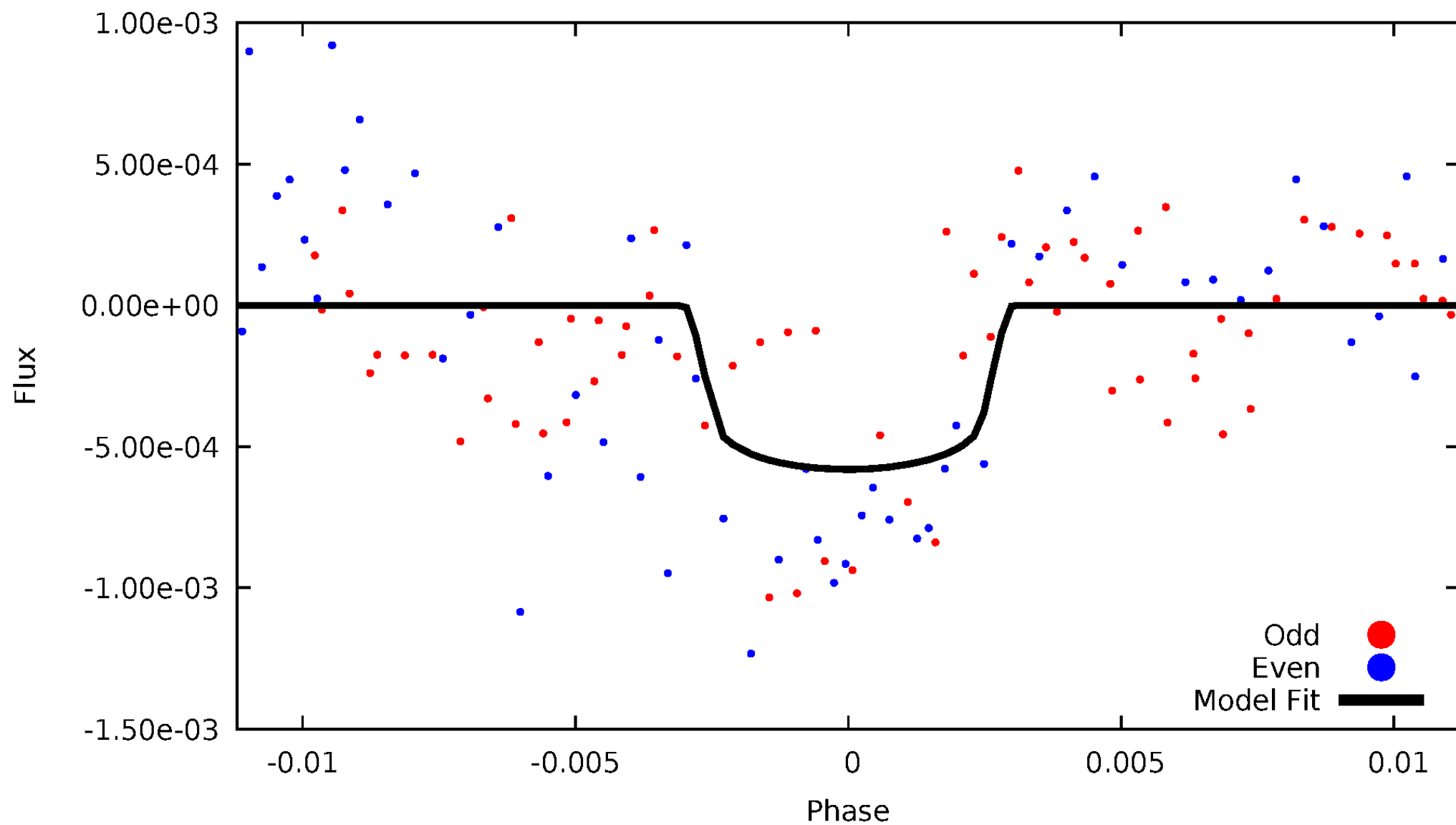
TCE 004390625-08





# DV Odd/Even

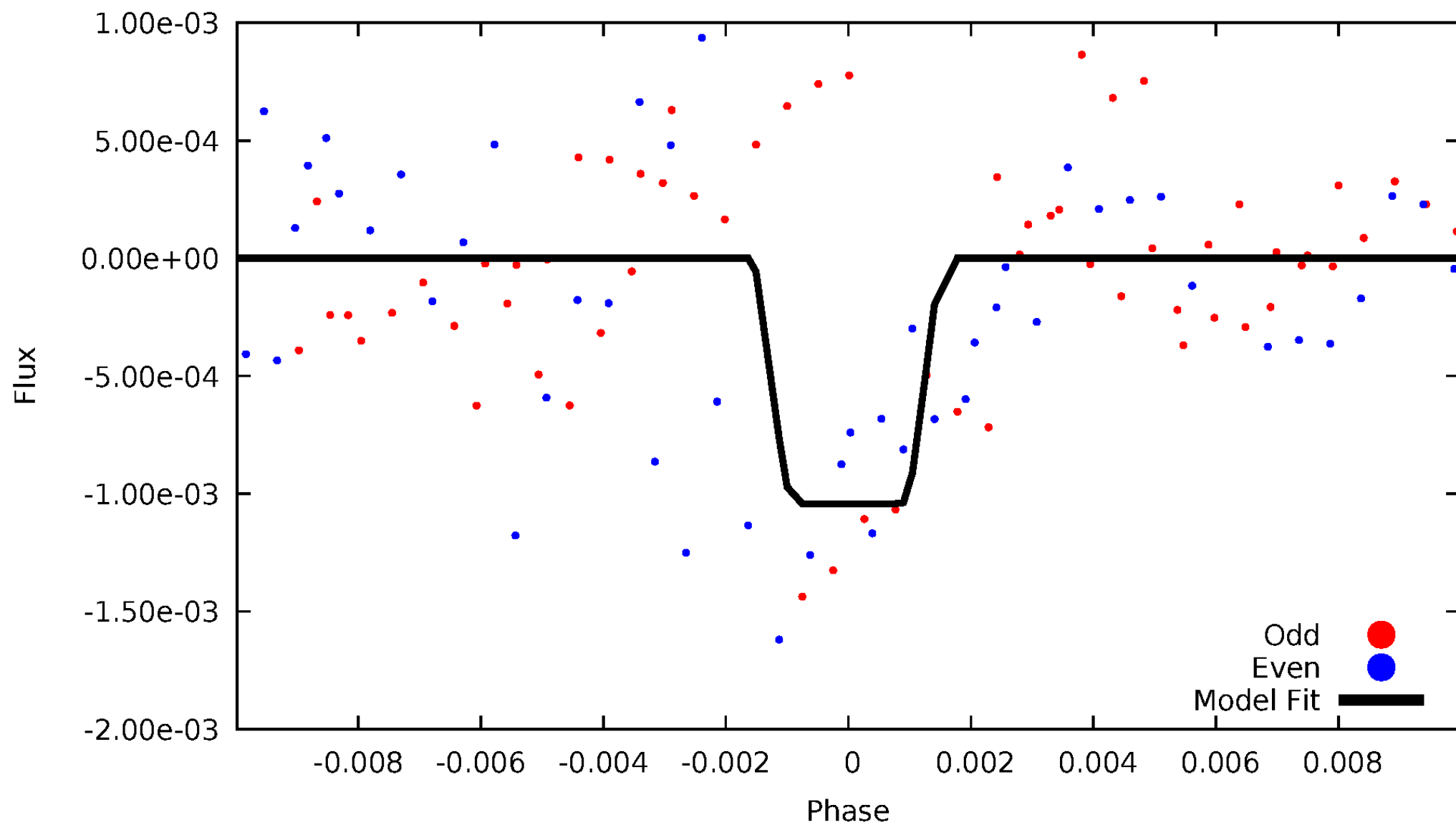
TCE 004390625-08





# ALT Odd/Even

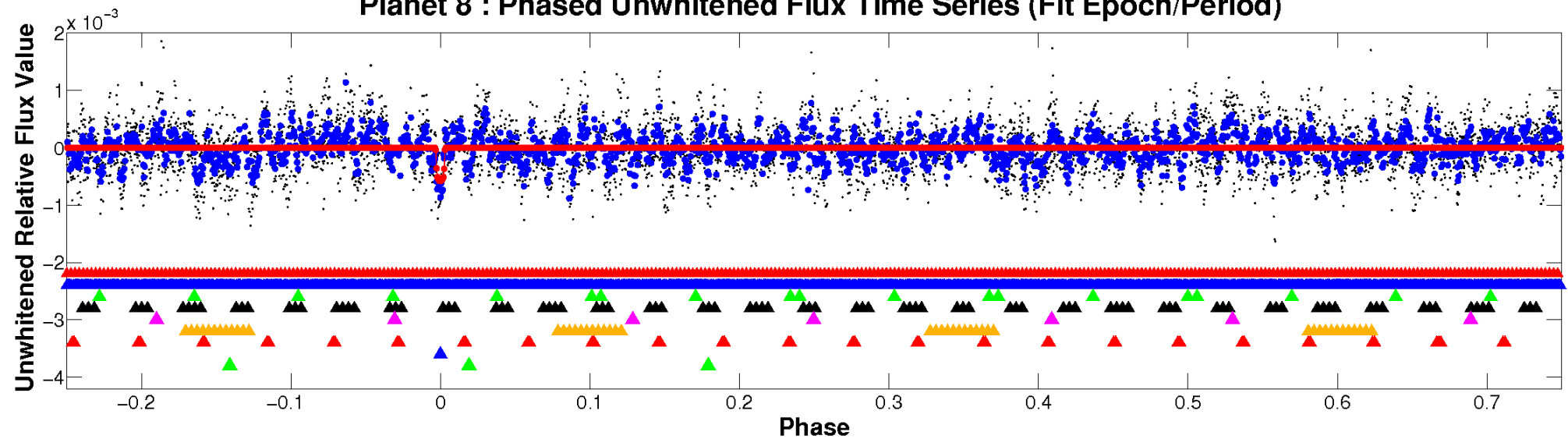
TCE 004390625-08



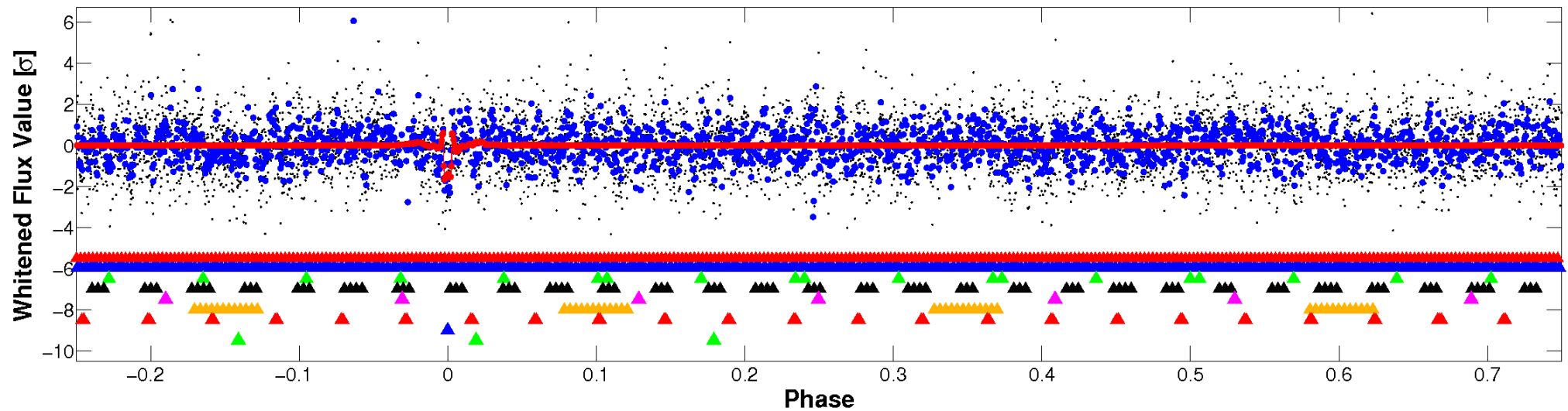


# Non-Whitened Vs. Whitened Light Curve

## Planet 8 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



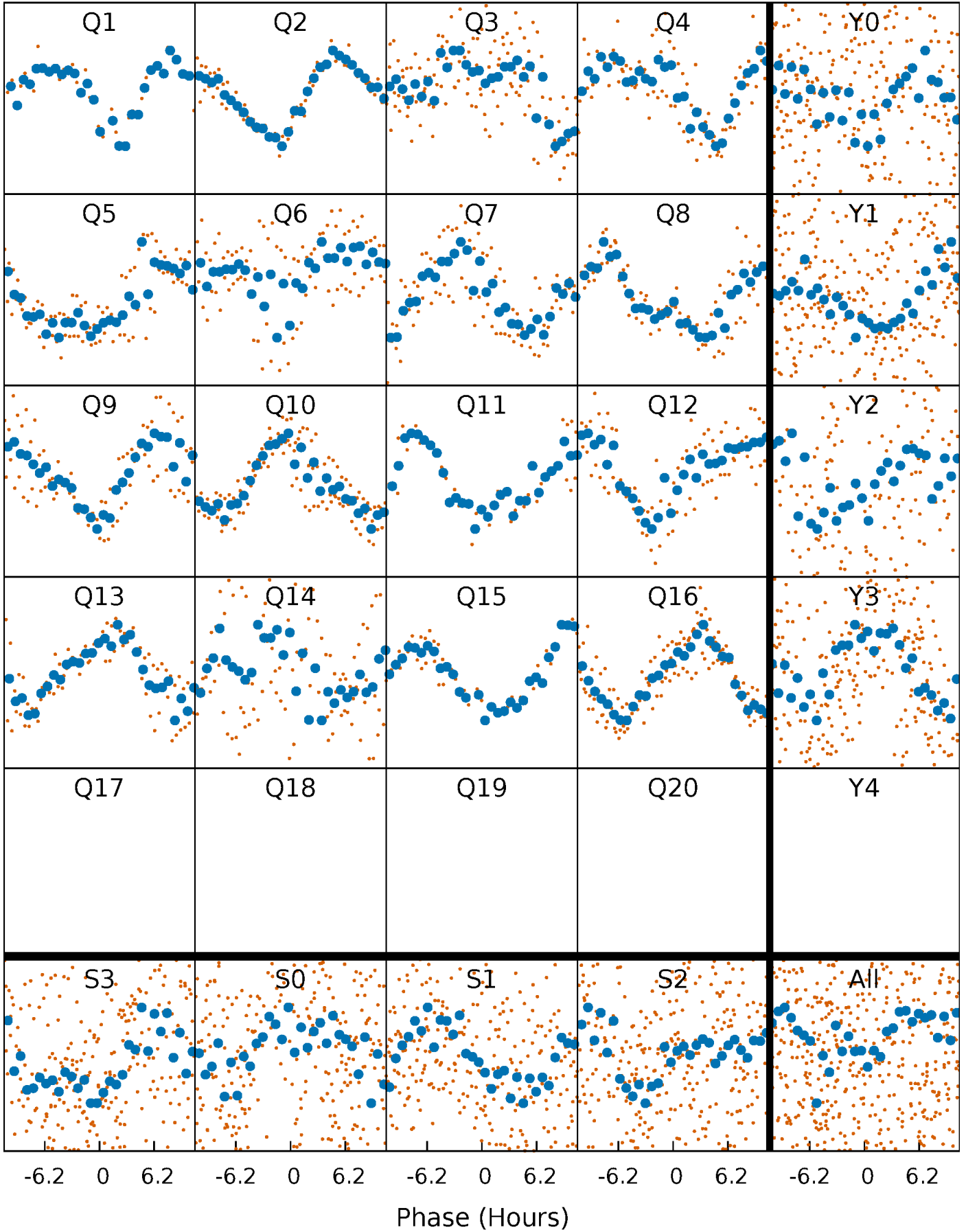
## Planet 8 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

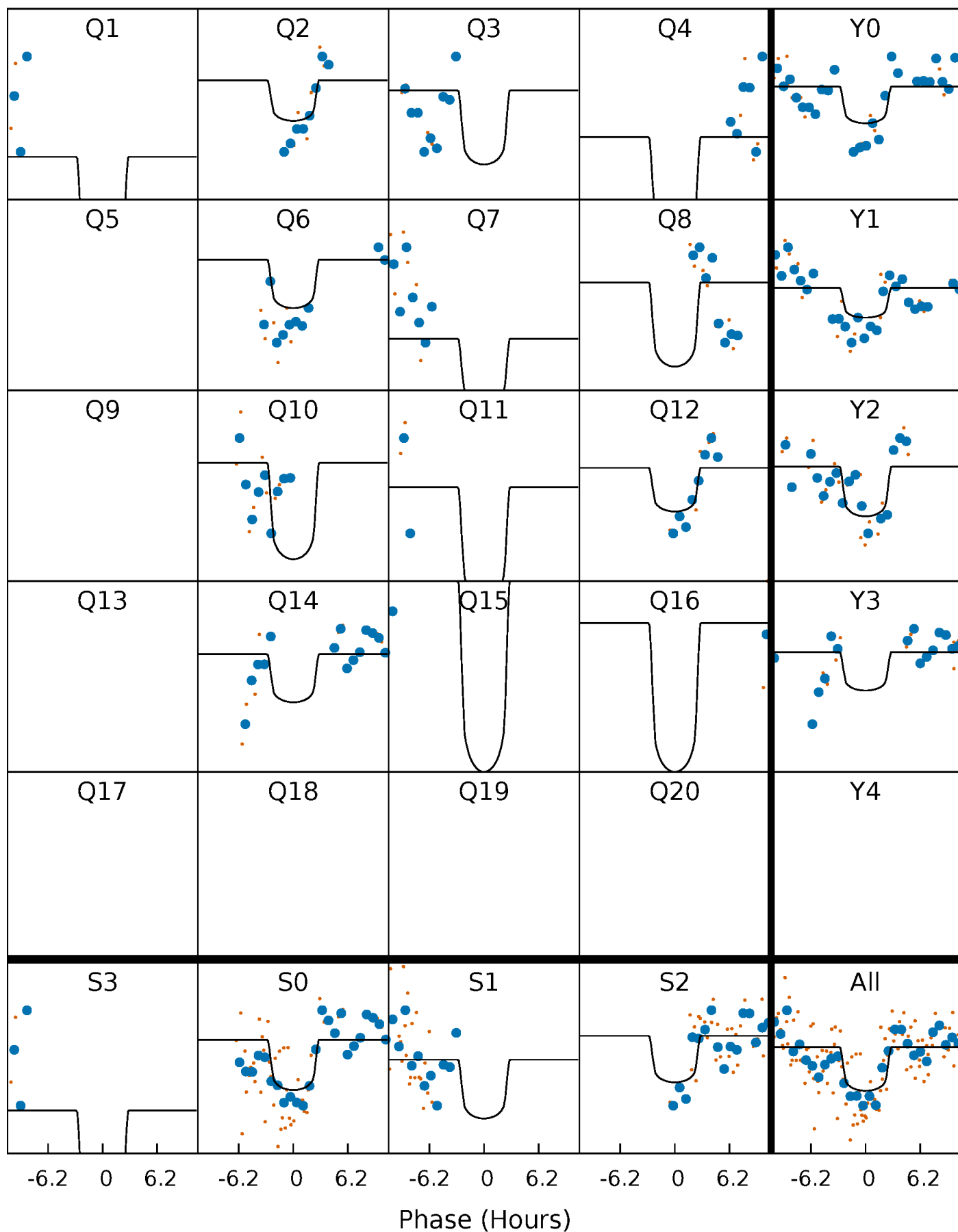
TCE 004390625-08   P= 40.289721 Days    $T_0=146.290226$  (BKJD)





# DV Quarter-Phased Transit Curves

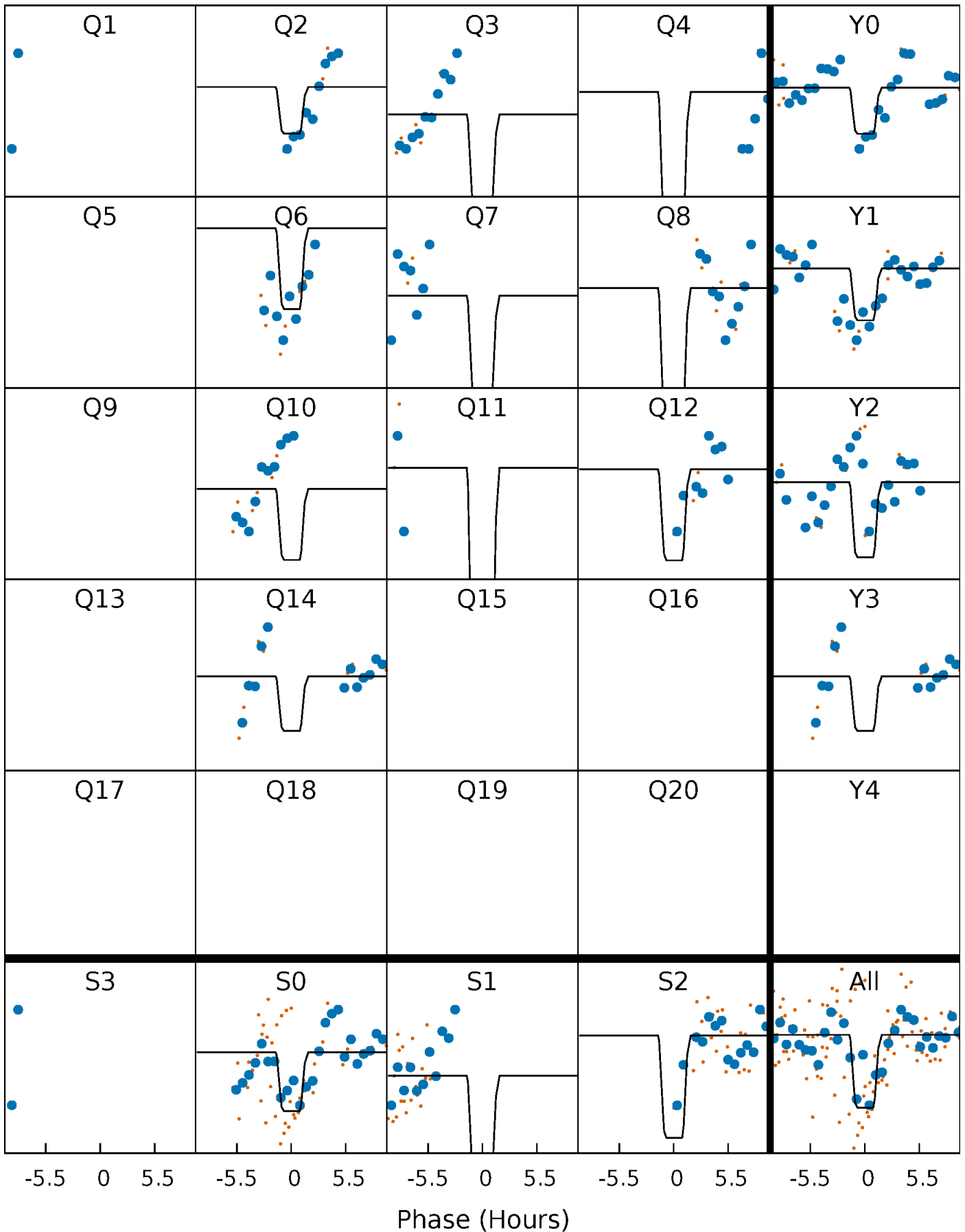
TCE 004390625-08     $P = 40.289721$  Days     $T_0 = 146.290226$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 004390625-08 P= 40.289902 Days  $T_0=146.262047$  (BKJD)

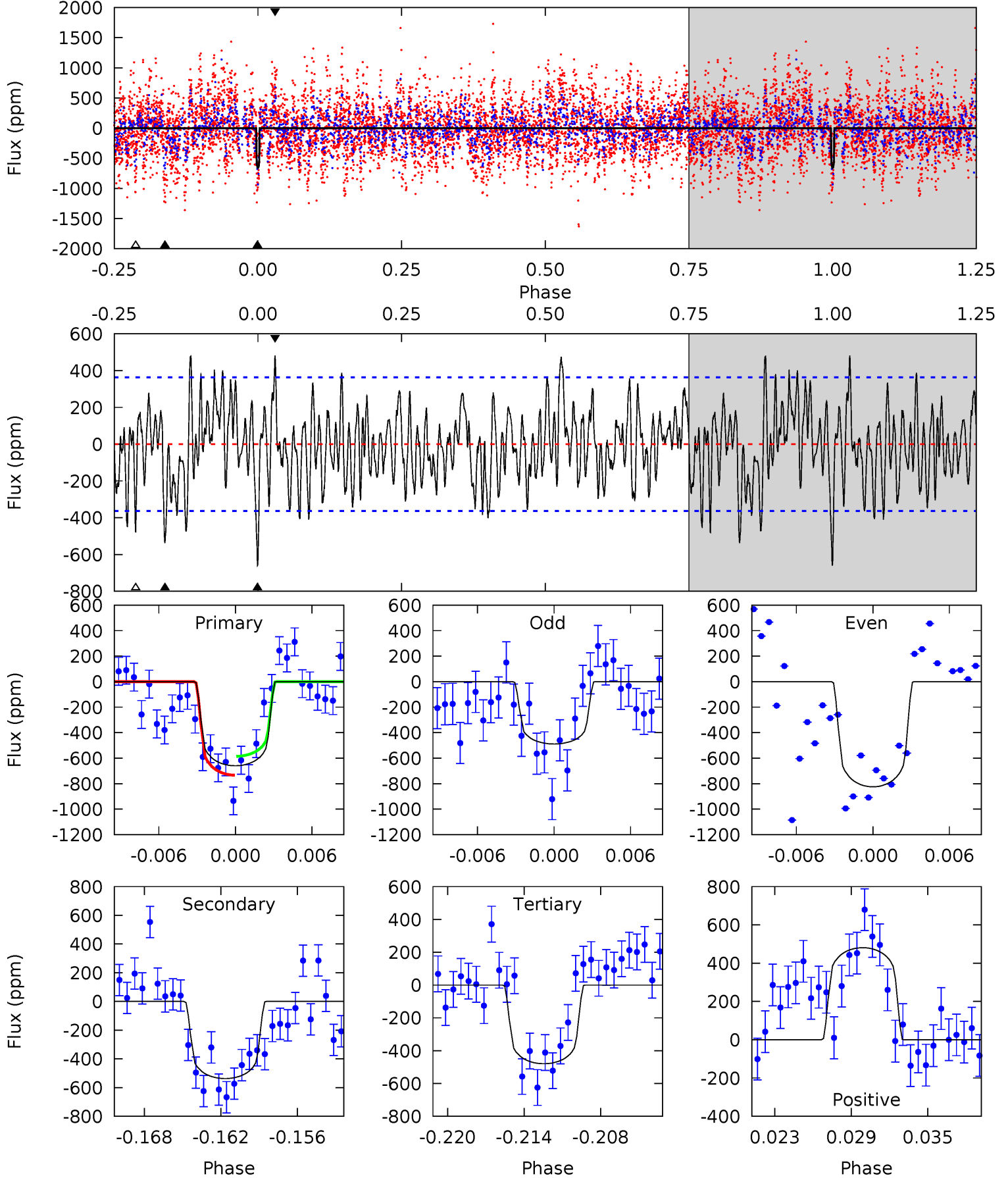




# DV Model-Shift Uniqueness Test

004390625-08, P = 40.289721 Days, E = 106.000505 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.32	7.59	6.78	6.80	5.13	2.76	2.50	2.54	2.52	0.81	0.80	2.36	0.61	0.42	1.04

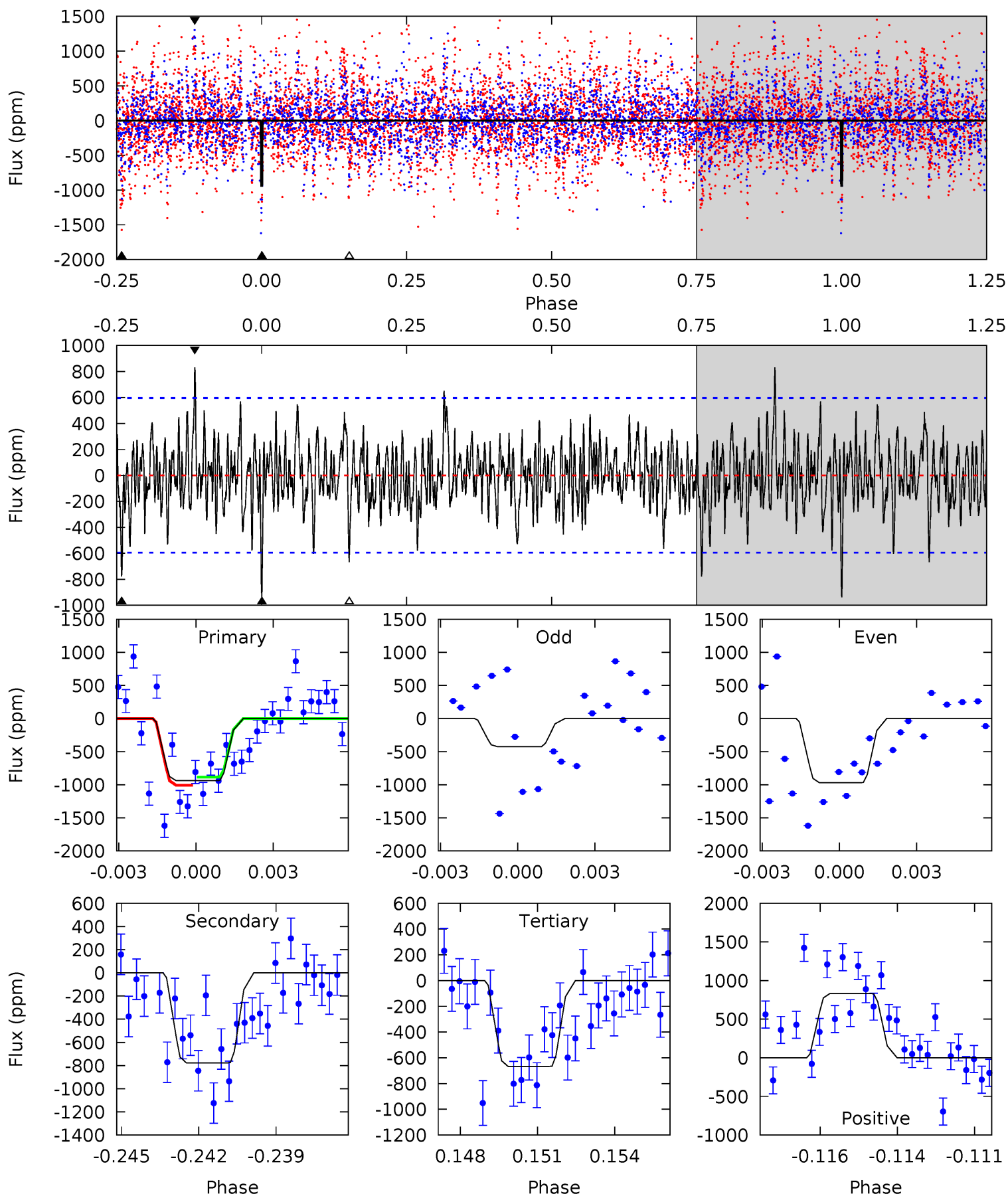




# Alt Model-Shift Uniqueness Test

004390625-08,  $P = 40.289902$  Days,  $E = 105.972145$  Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.30	6.88	5.90	7.35	5.26	2.98	1.81	2.40	0.95	0.97	-0.48	2.64	0.63	0.47	0.52





### Stellar Parameters For KIC 004390625

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6995^{+219}_{-301}$	$4.190^{+0.185}_{-0.167}$	$-0.660^{+0.250}_{-0.300}$	$1.400^{+0.390}_{-0.319}$	$1.106^{+0.160}_{-0.131}$	$0.568^{+0.534}_{-0.277}$
	+3%/-4%	+4%/-4%	+38%/-45%	+28%/-23%	+14%/-12%	+94%/-49%
Source	PHO1	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 004390625-08 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-537 \pm 71$	$3.90^{+2.83}_{-2.32}$	$1036^{+81}_{-79}$	$6584^{+5388}_{-1506}$	$1109^{+5360}_{-740}$
Alt.	$-778 \pm 113$	$5.02^{+3.08}_{-2.74}$	$1045^{+80}_{-82}$	$6310^{+4061}_{-1199}$	$940^{+3861}_{-573}$

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature

$T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$



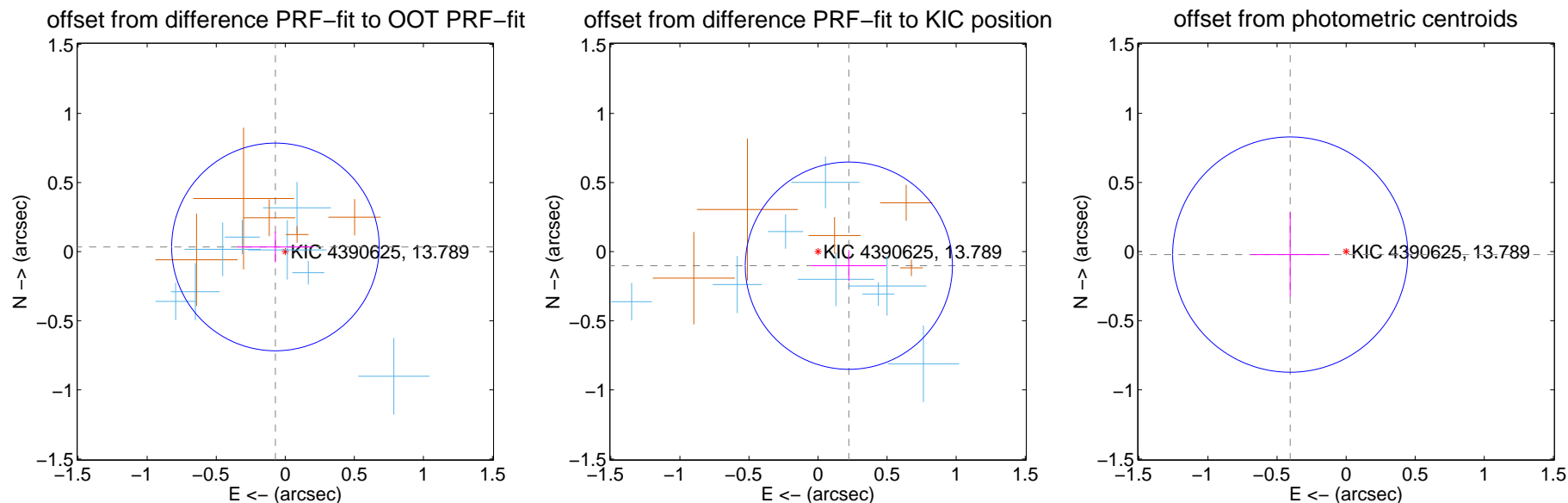
## DV Centroid Data

Supplemental centroid analysis for 004390625-08. Kepler magnitude: 13.79. Transit SNR 8.11

There are 8 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.27 arcsec

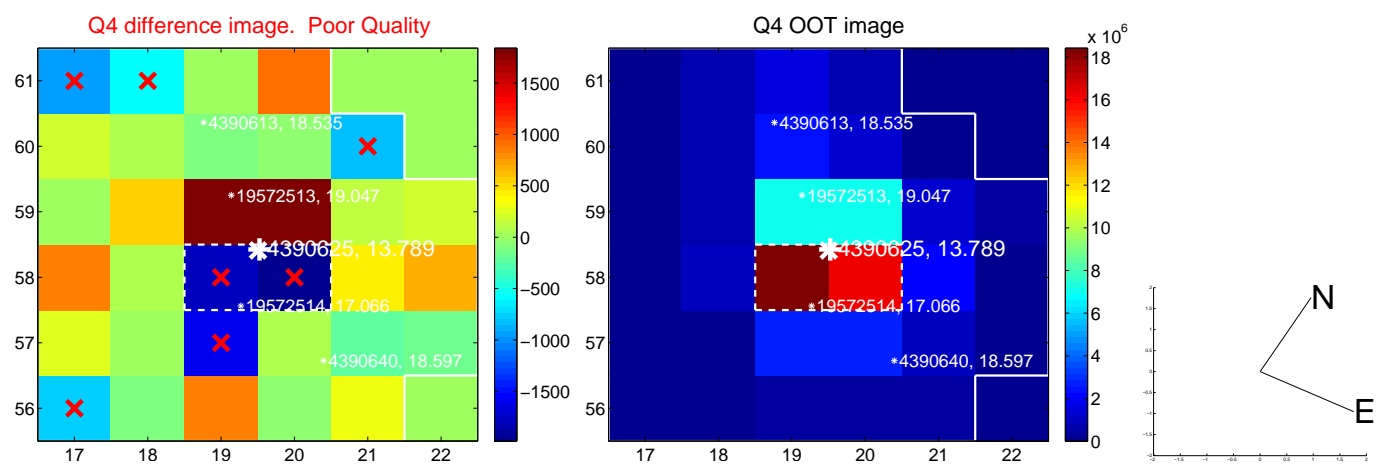
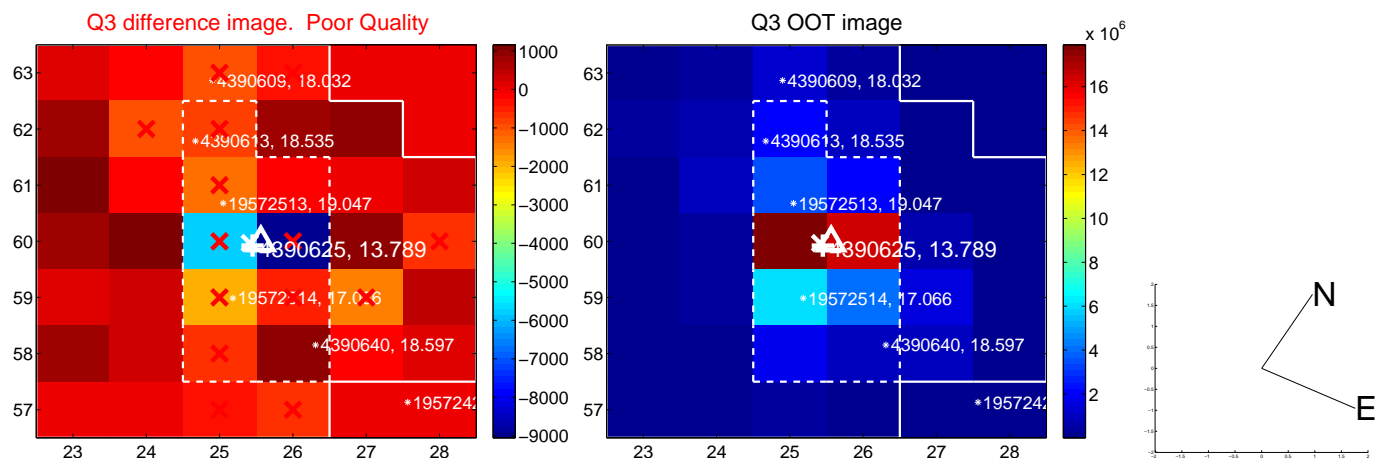
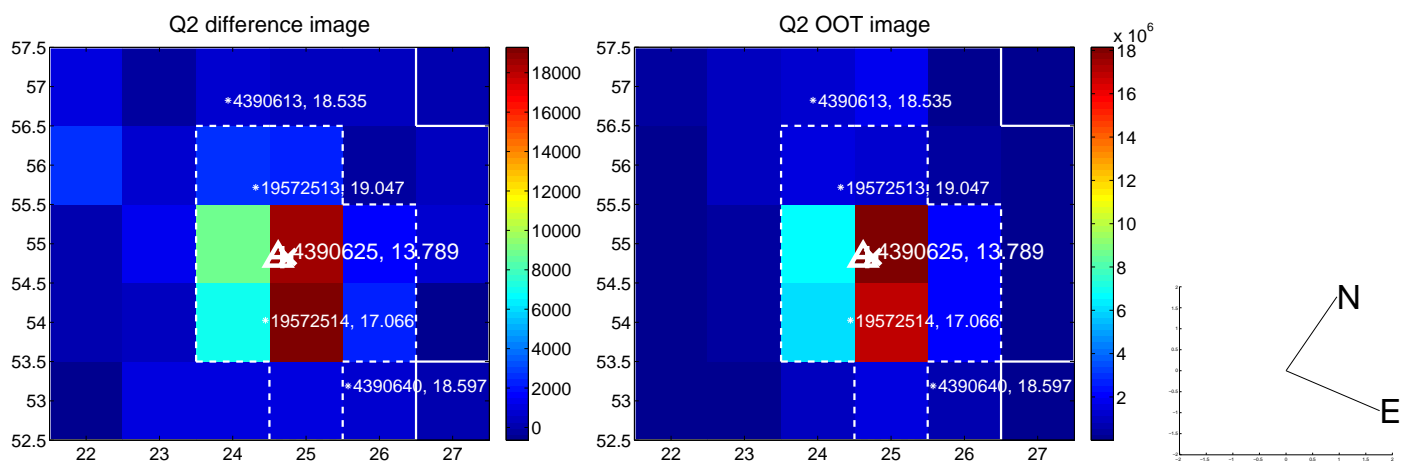
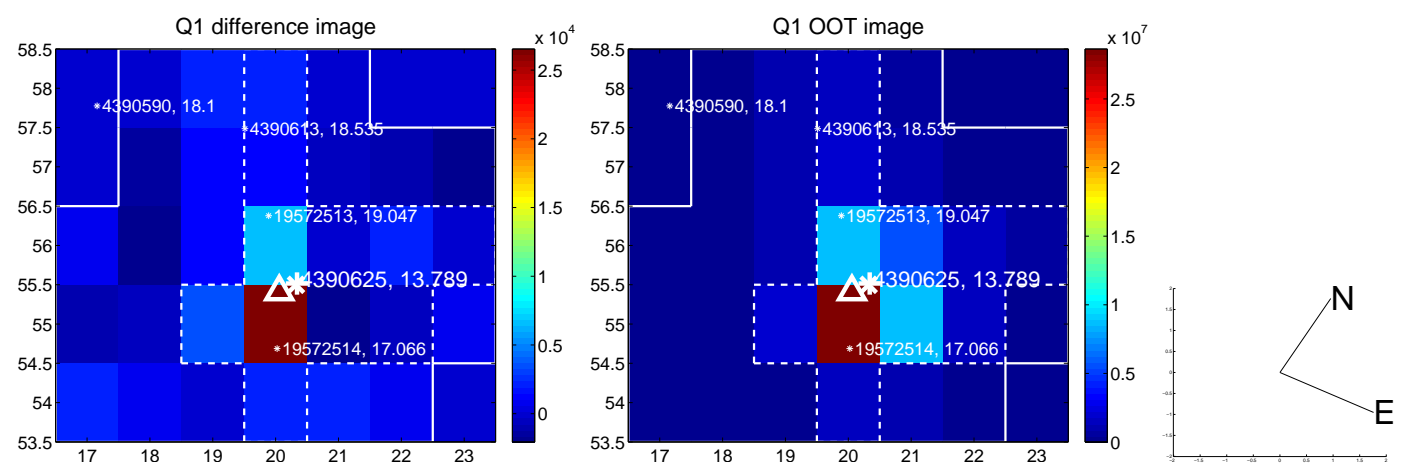
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.079 \pm 0.250$	0.32	$0.071 \pm 0.274$	$0.034 \pm 0.111$
PRF-fit source offset from KIC position	$0.245 \pm 0.250$	0.98	$-0.223 \pm 0.270$	$-0.101 \pm 0.112$
photometric centroid source offset	$0.41 \pm 0.28$	1.43	$0.40 \pm 0.28$	$-0.02 \pm 0.31$



Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

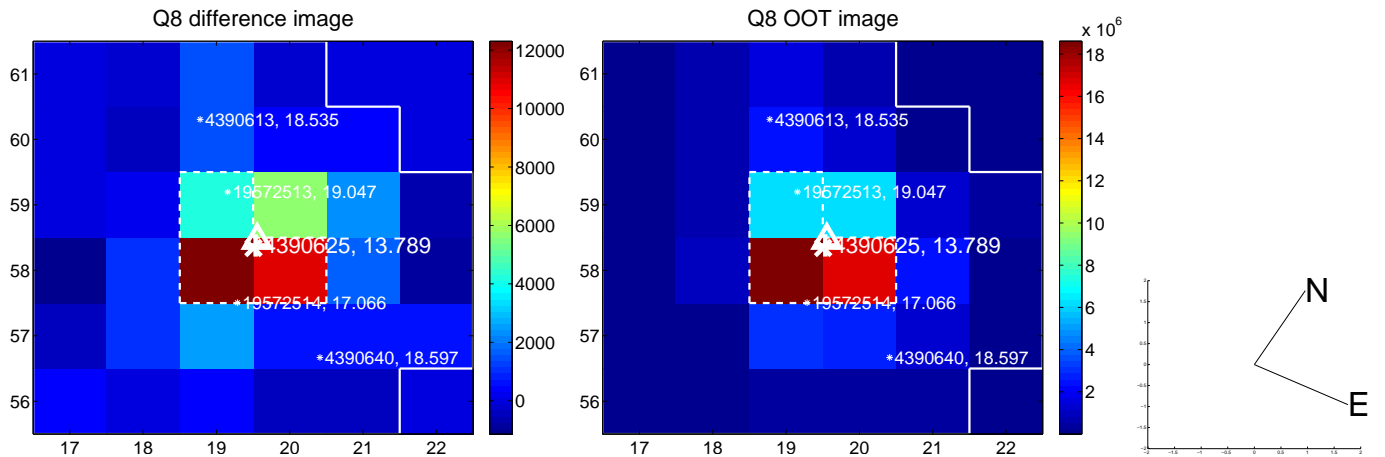
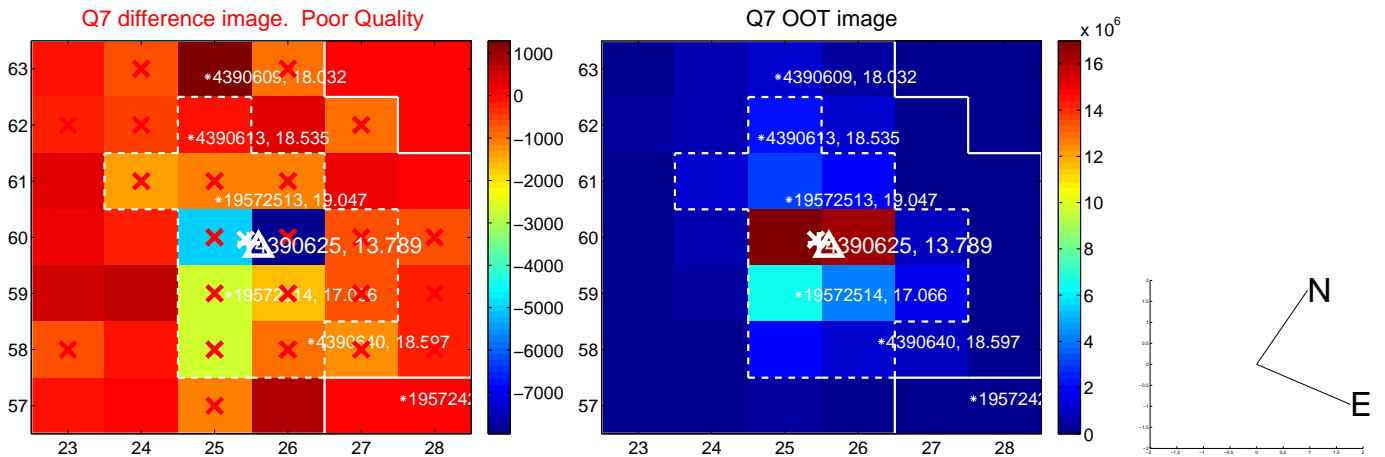
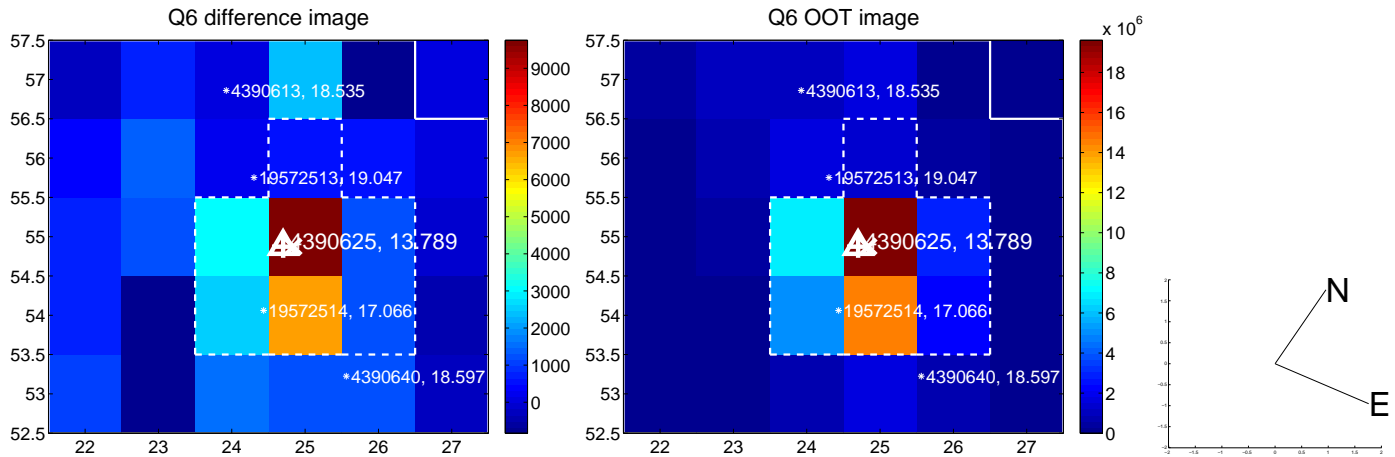
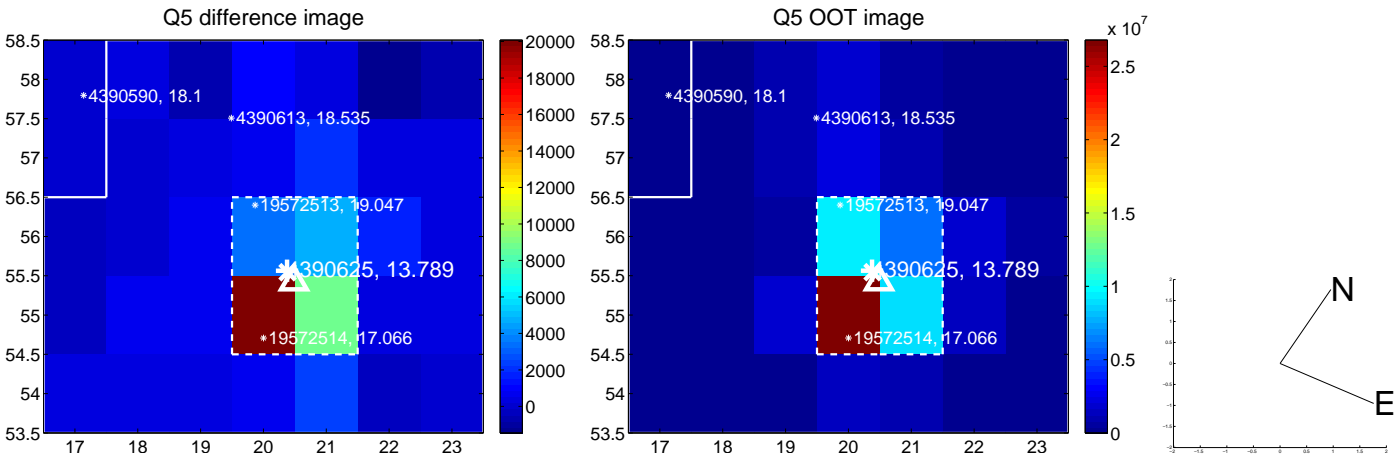


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



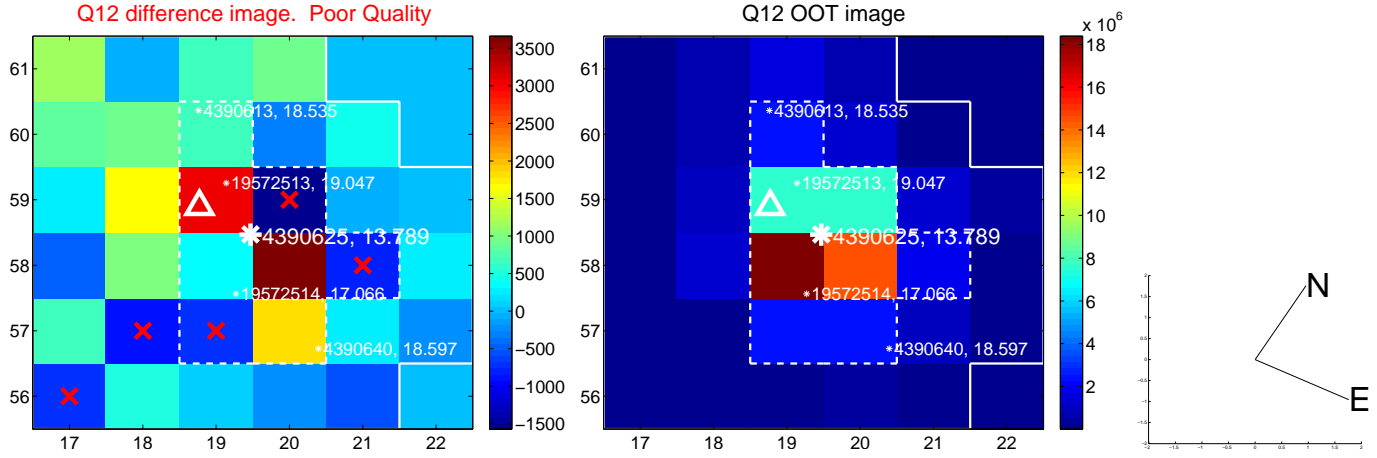
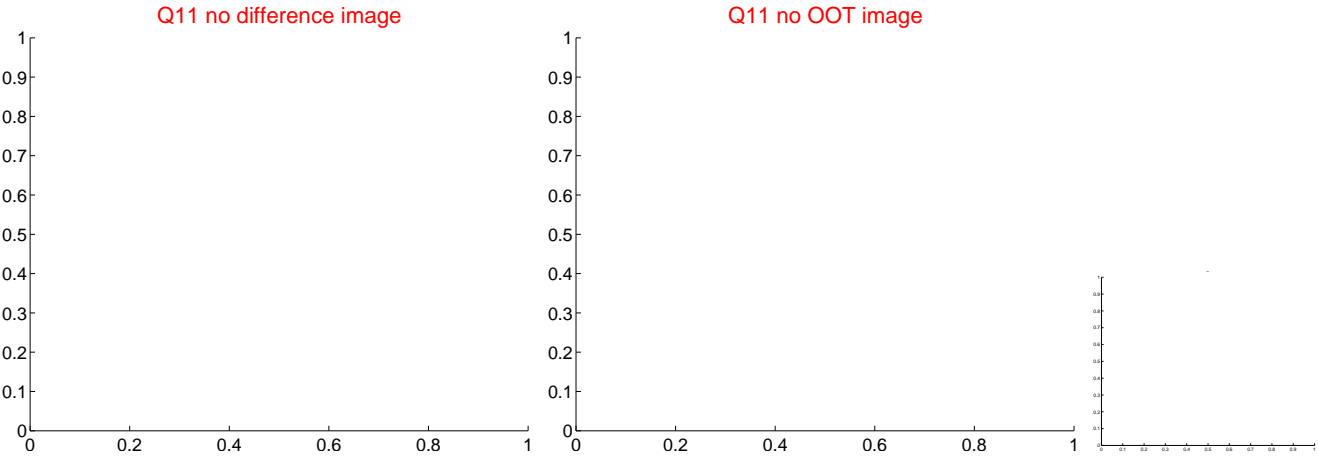
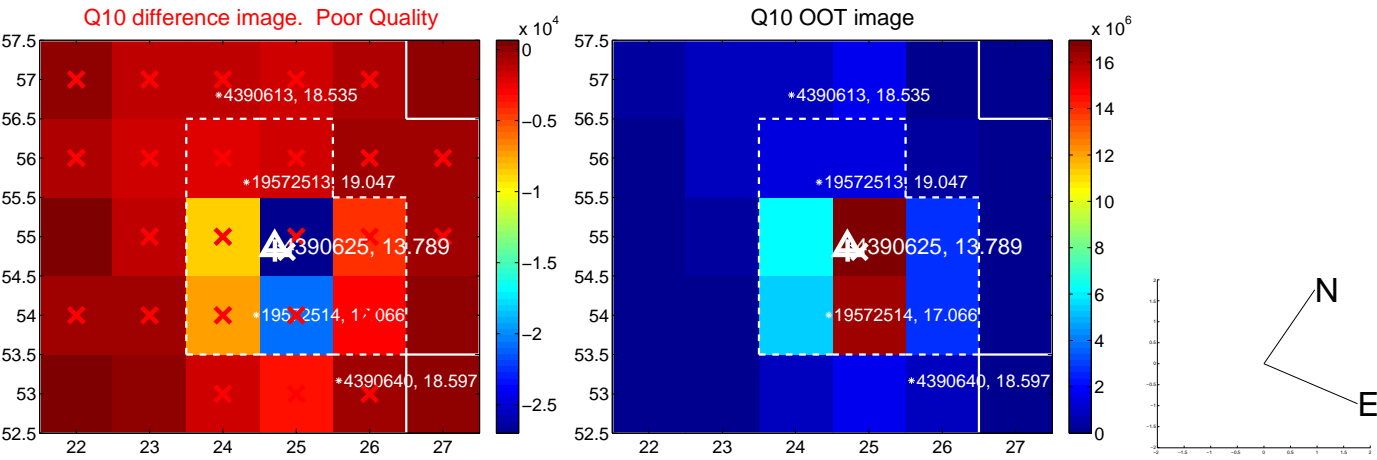
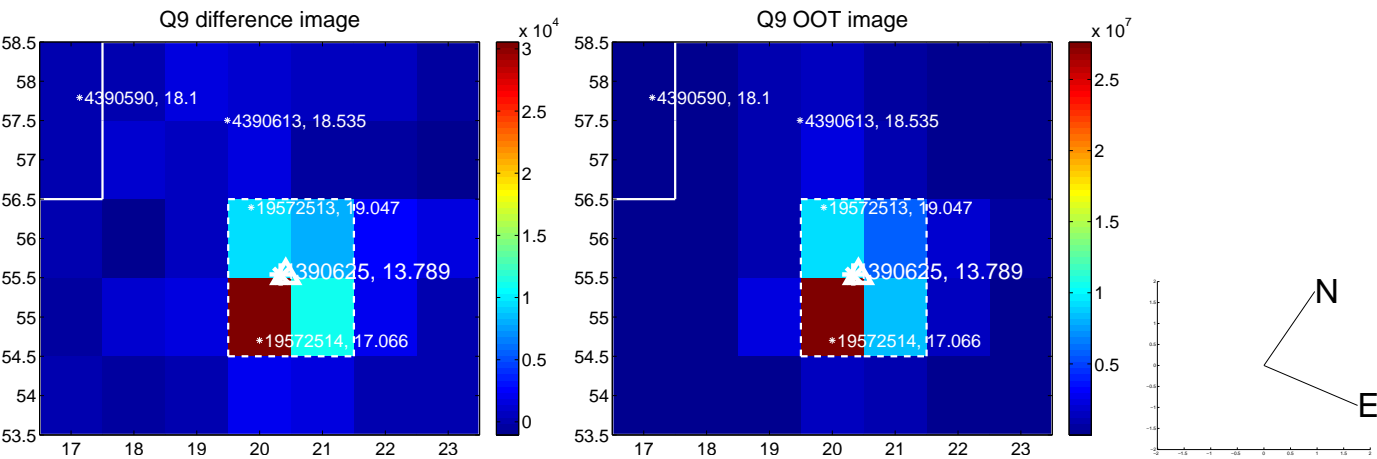


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



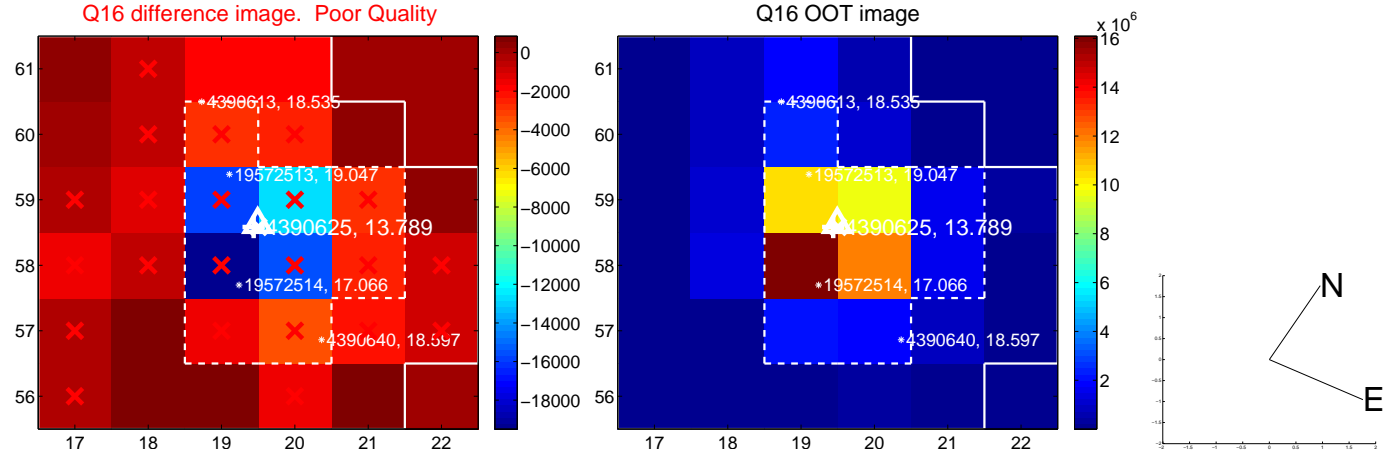
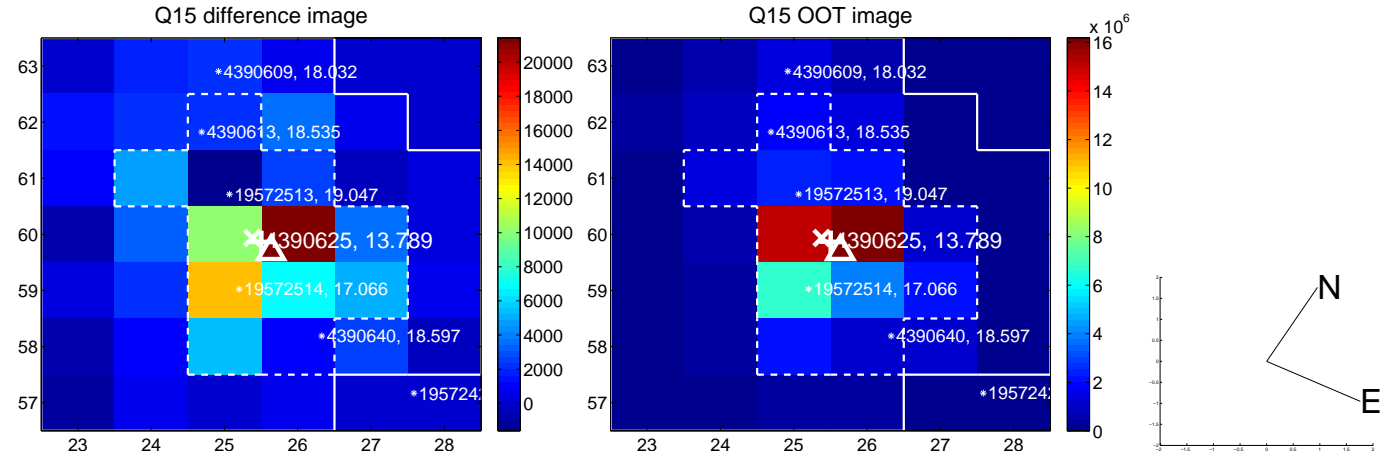
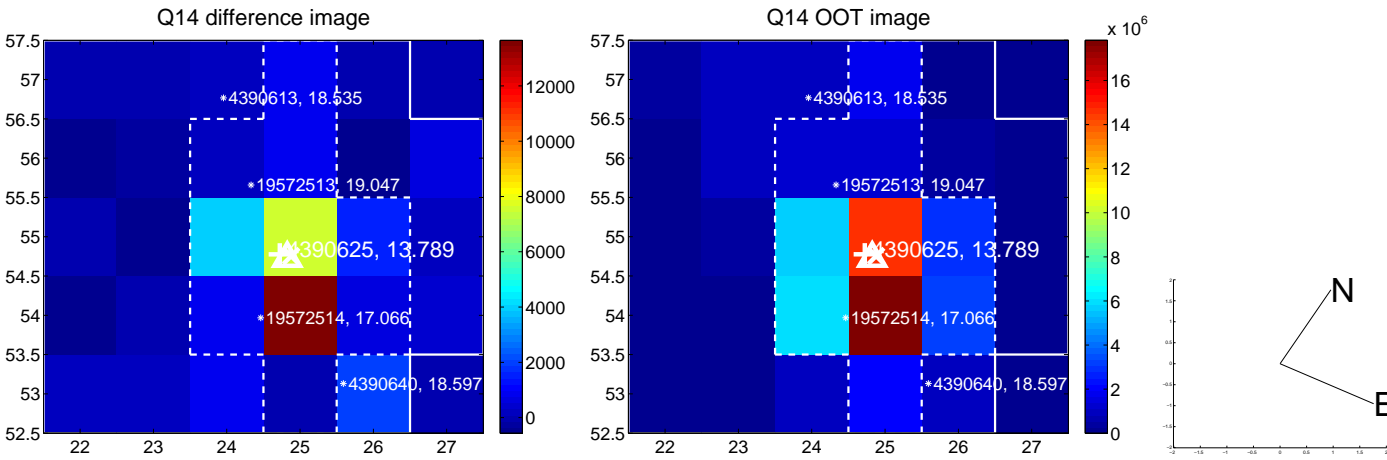
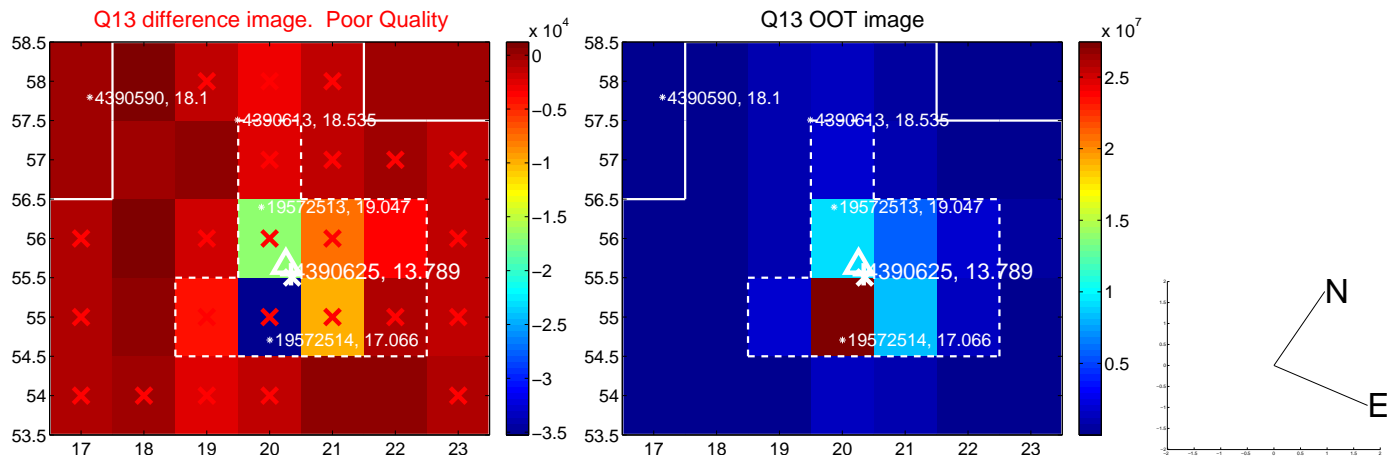


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



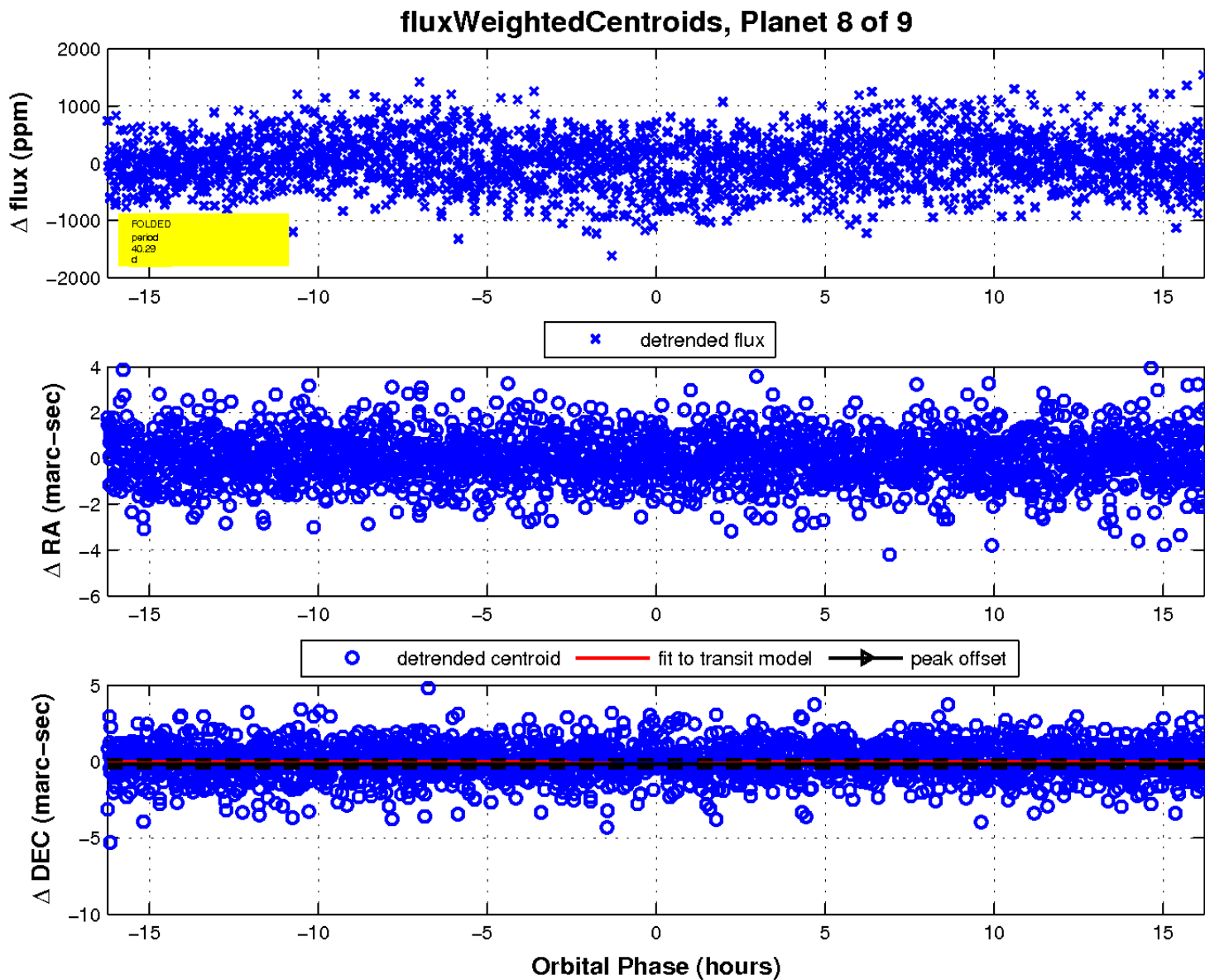
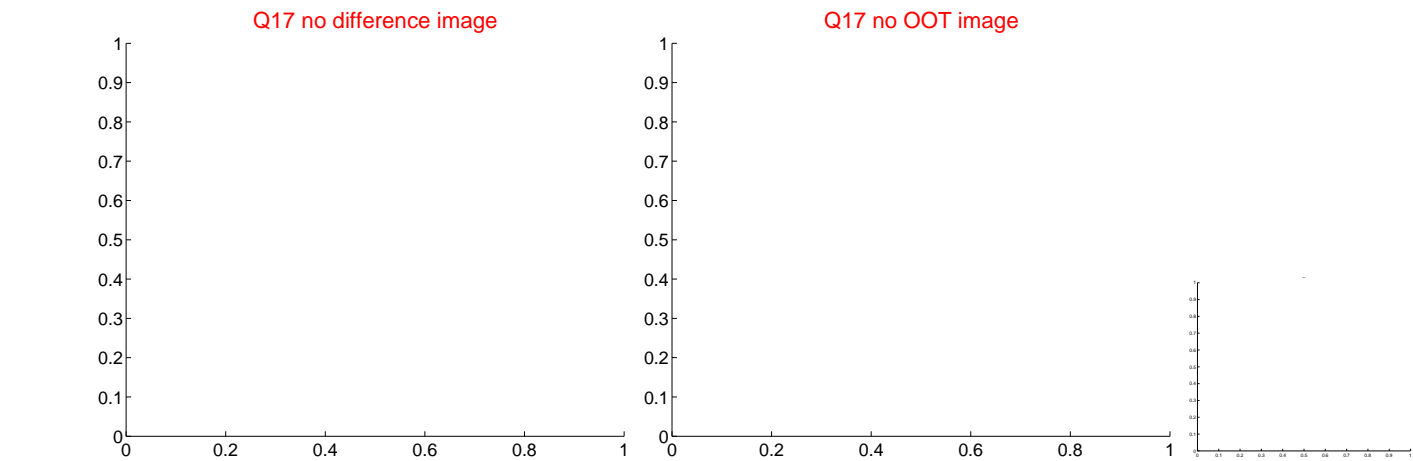


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





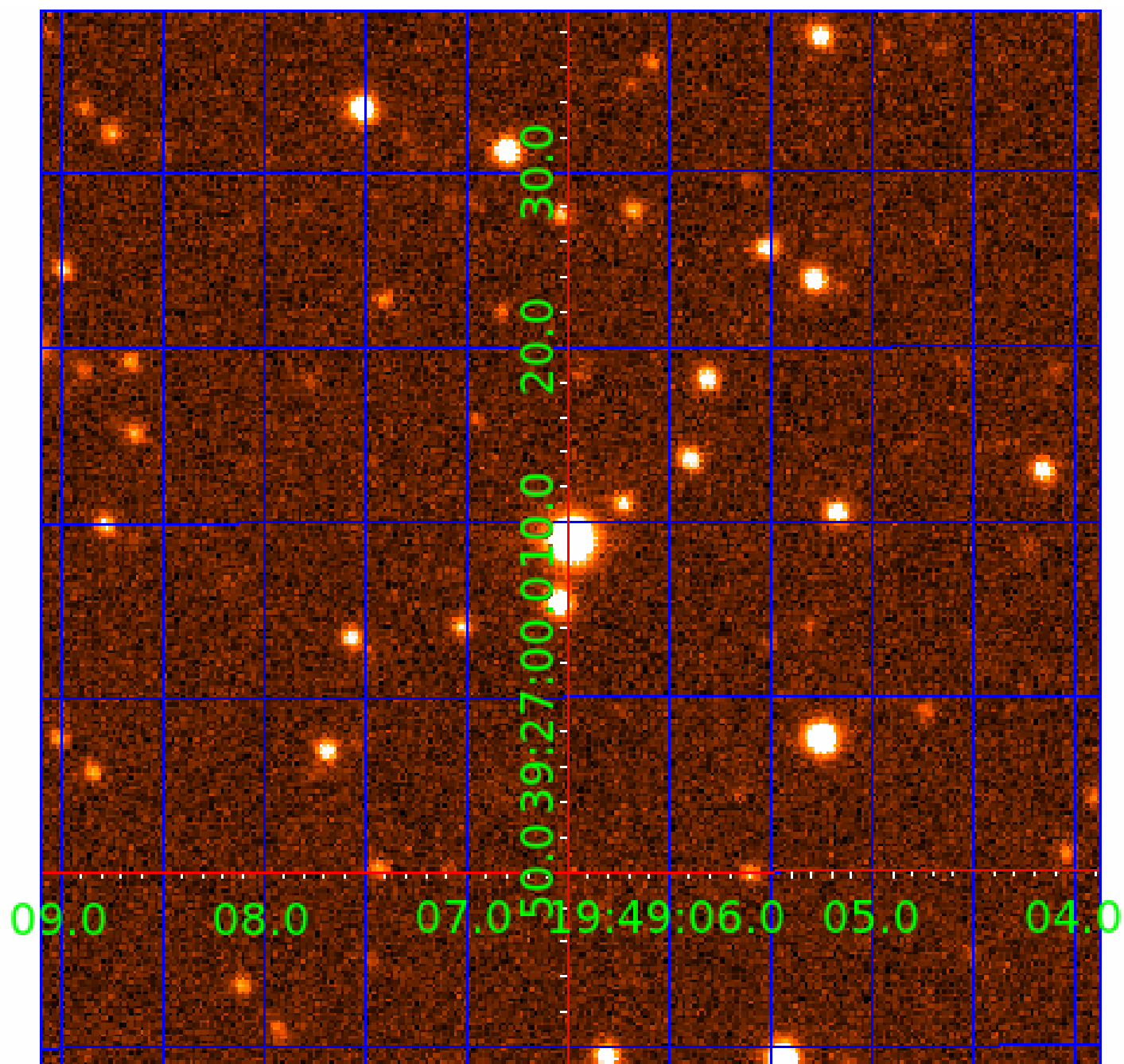
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination





## KIC 004390625

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004390625-01	OBS	No	2.552800	131.778368	45.1	8.820	7.3	6.4	1.40	6995	1.09	2938.38
004390625-02	OBS	No	1.276435	132.389024	60.3	7.984	9.2	9.3	1.40	6995	1.29	7403.98
004390625-03	OBS	No	75.223800	166.434374	900.8	5.821	8.6	9.9	1.40	6995	5.09	32.28
004390625-04	OBS	No	15.287801	143.491037	275.4	2.651	8.6	6.5	1.40	6995	2.56	270.19
004390625-05	OBS	No	212.739706	191.761958	712.0	4.822	9.5	9.0	1.40	6995	4.65	8.07
004390625-06	OBS	No	30.256104	159.489605	471.5	1.835	8.5	8.0	1.40	6995	3.48	108.74
004390625-07	OBS	No	31.528847	132.957413	702.9	5.557	7.7	9.2	1.40	6995	5.85	102.92
004390625-08	OBS	No	40.289721	146.290226	580.3	5.414	8.1	8.1	1.40	6995	3.58	74.22
004390625-09	OBS	No	638.187757	153.507721	339.7	5.000	7.2	-1.0	1.40	6995	2.61	1.87

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004390625-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004390625-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—SAME_NTL_PERIOD
004390625-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-05	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST
004390625-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
004390625-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004390625-08	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT
004390625-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_NOFITS

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

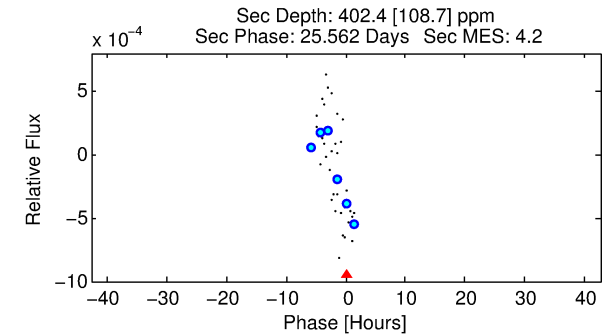
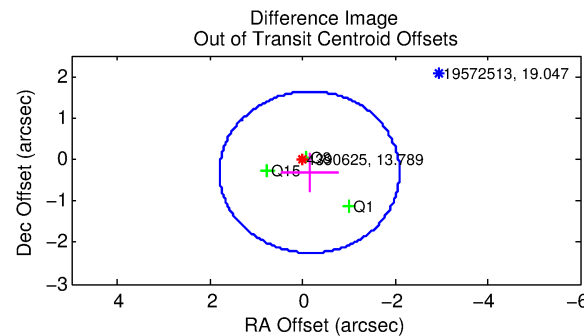
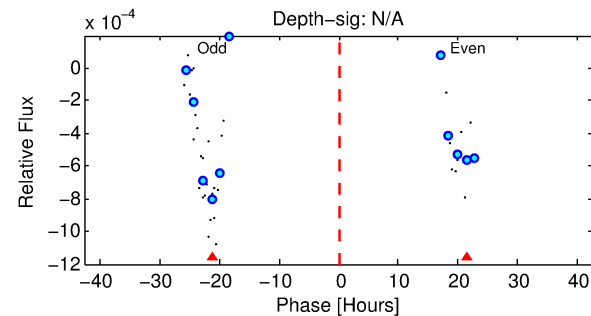
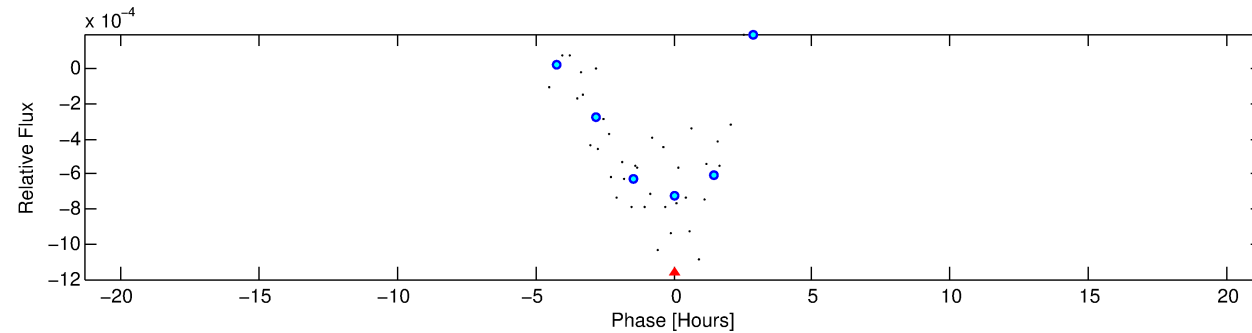
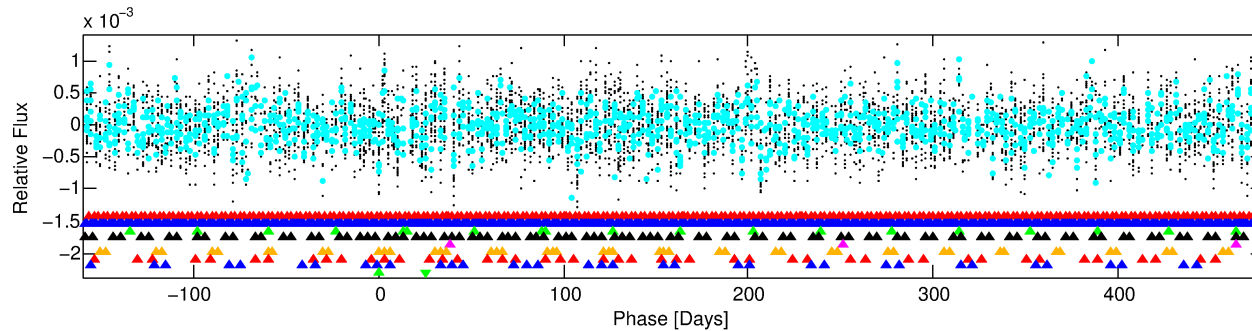
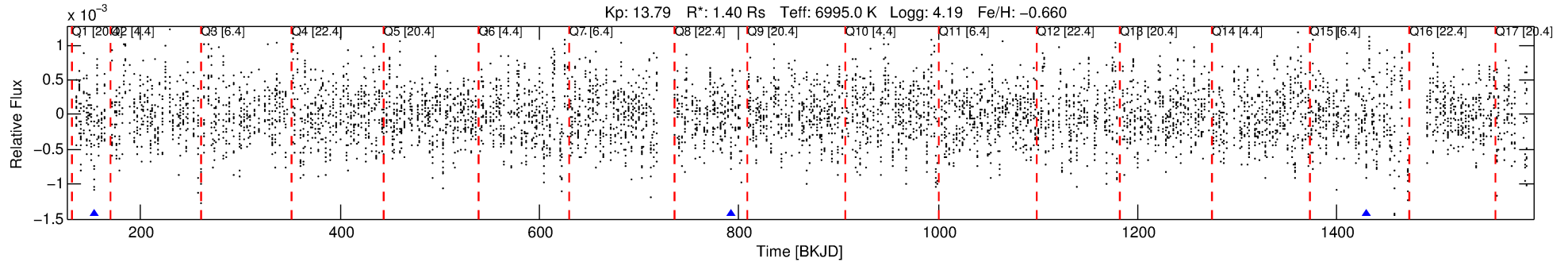
Ephemeris Match Information For 004390625-09

No Significant Match Found



# DV One-Page Summary

KIC: 4390625 Candidate: 9 of 9 Period: 638.188 d



## TPS TCE Results:

Period = 638.18776 d  
Epoch = 153.5077 BKJD

DV fit results are unavailable

## DV Diagnostic Results:

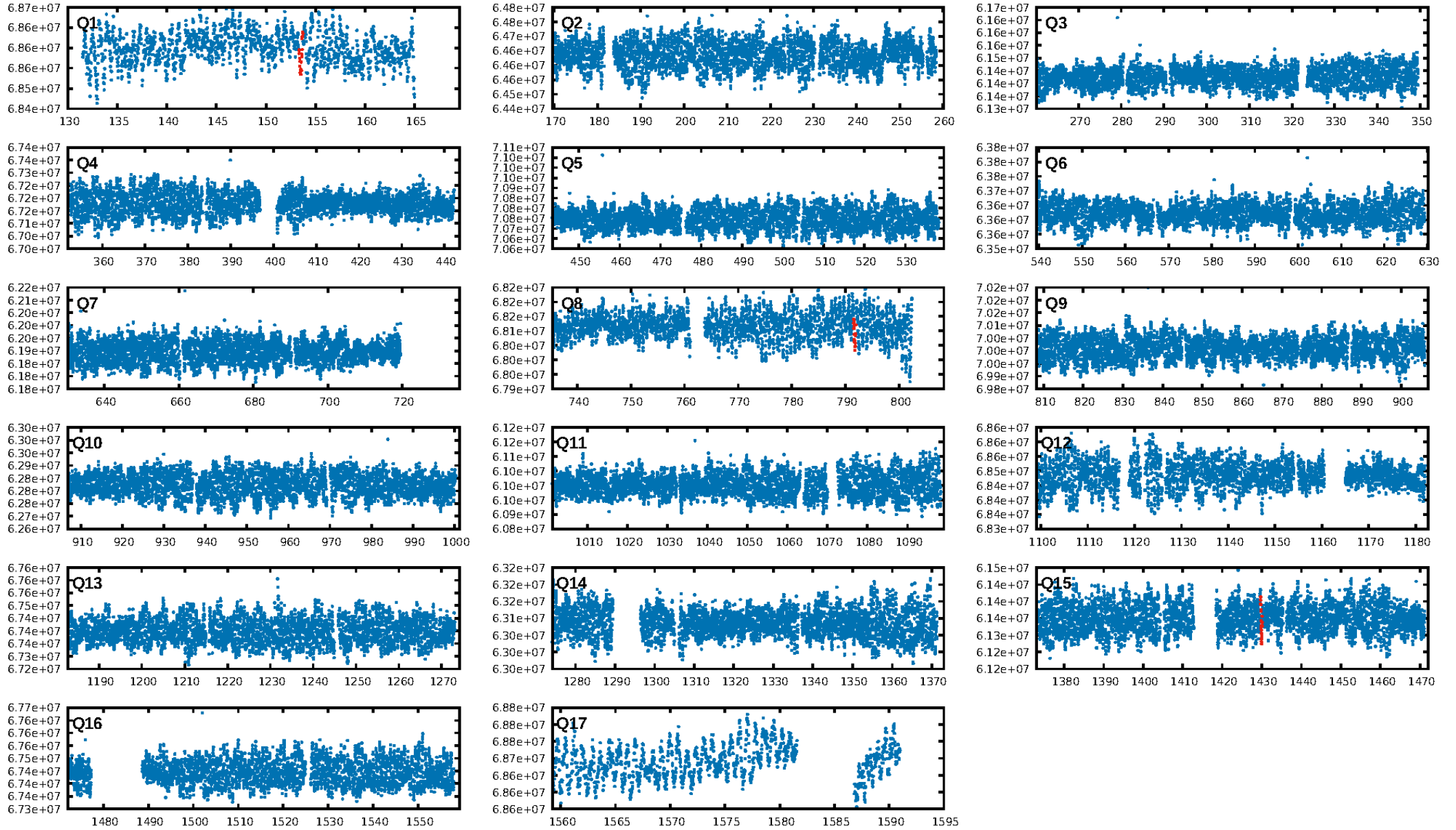
ShortPeriod-sig: 100.0% [1469.93σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: 13.43  
Centroid-sig: N/A  
Centroid-so: 0.464 arcsec [0.84σ]  
OotOffset-rm: 0.342 arcsec [0.53σ]  
KicOffset-rm: 0.265 arcsec [0.58σ]  
OotOffset-st: 0/1/1/1 [3]  
KicOffset-st: 0/1/1/1 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 0.00 [0/3]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 16:27:35 Z

This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

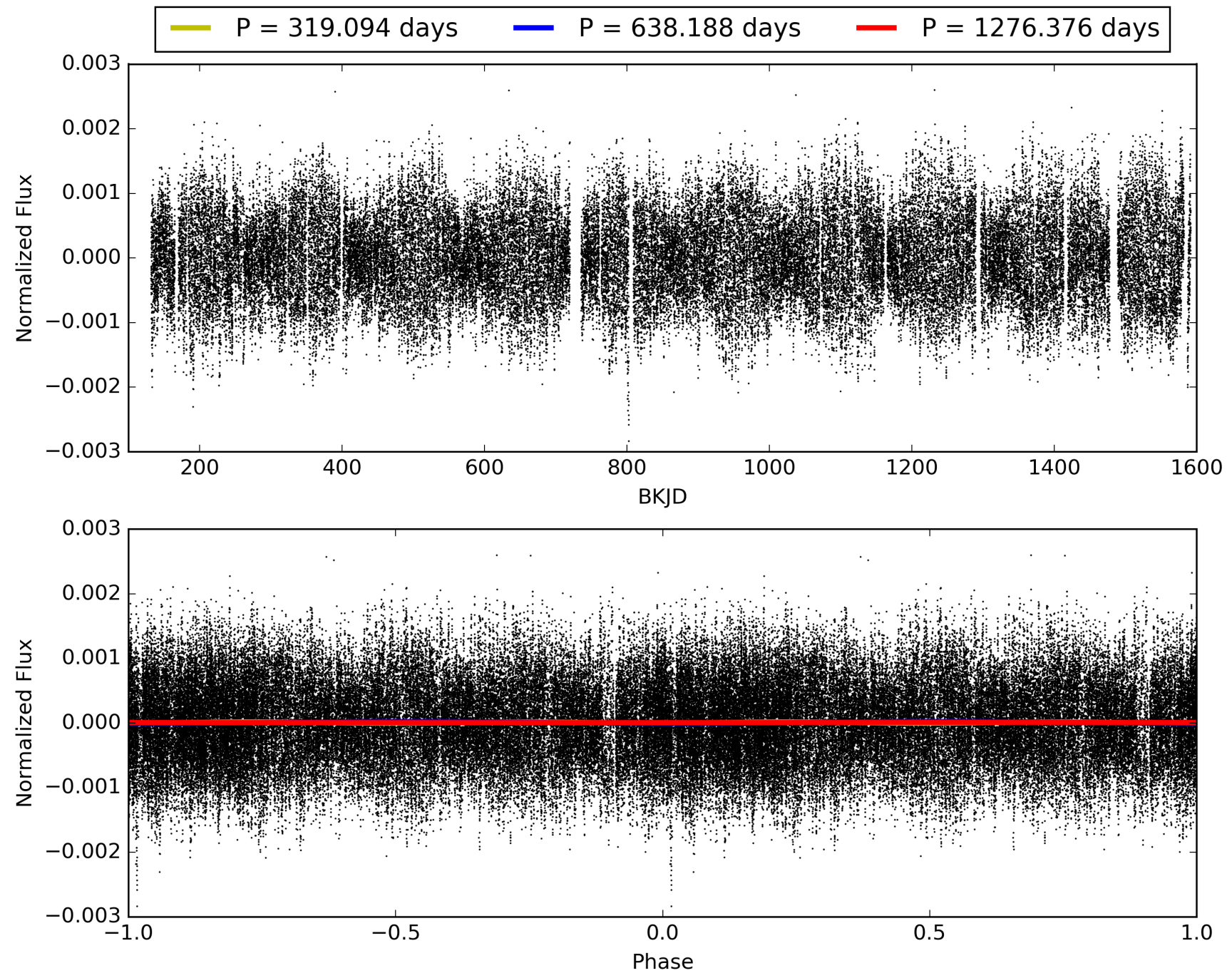


# TCE 004390625-09, PDC Light Curves





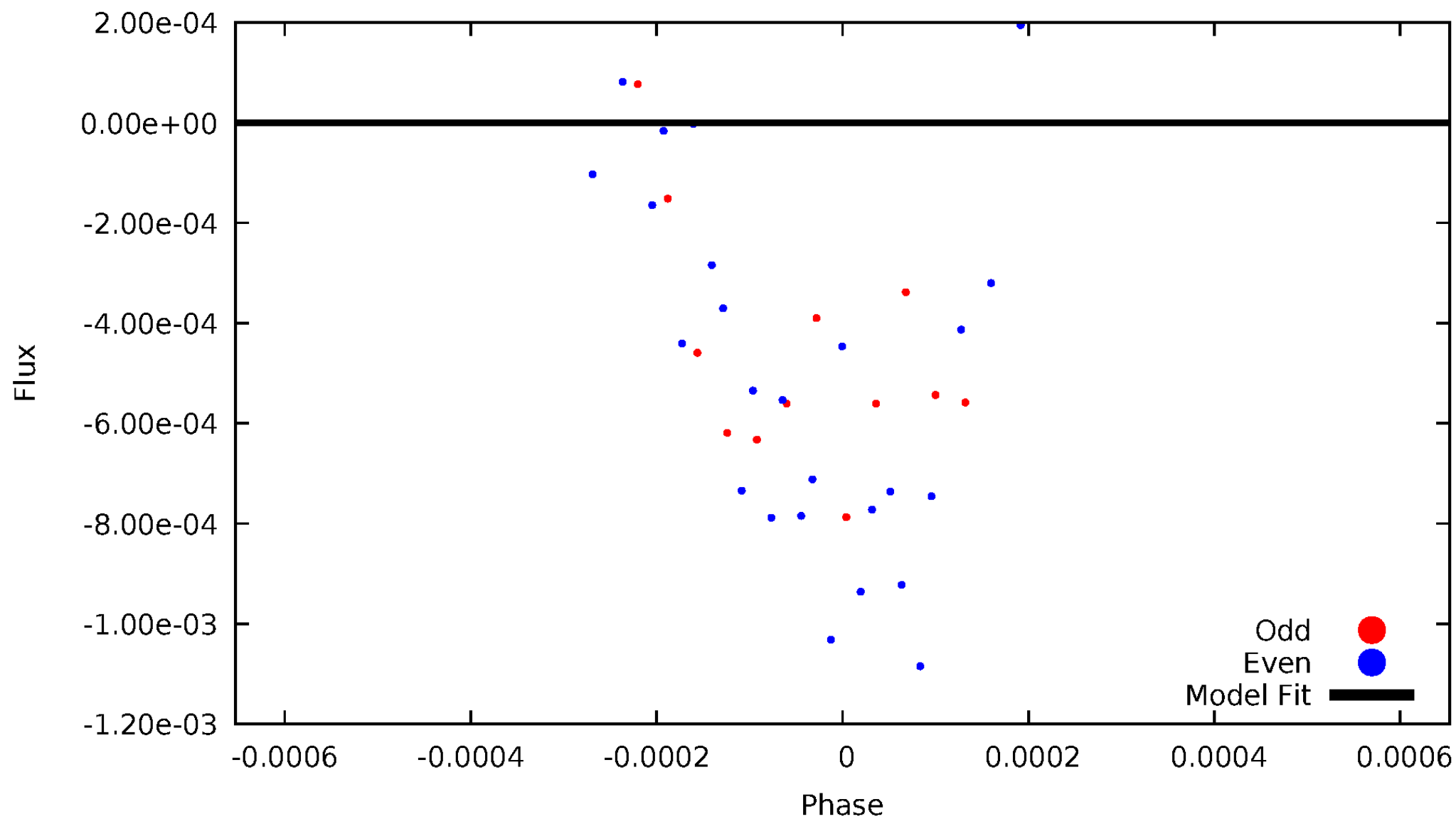
TCE 004390625-09





# DV Odd/Even

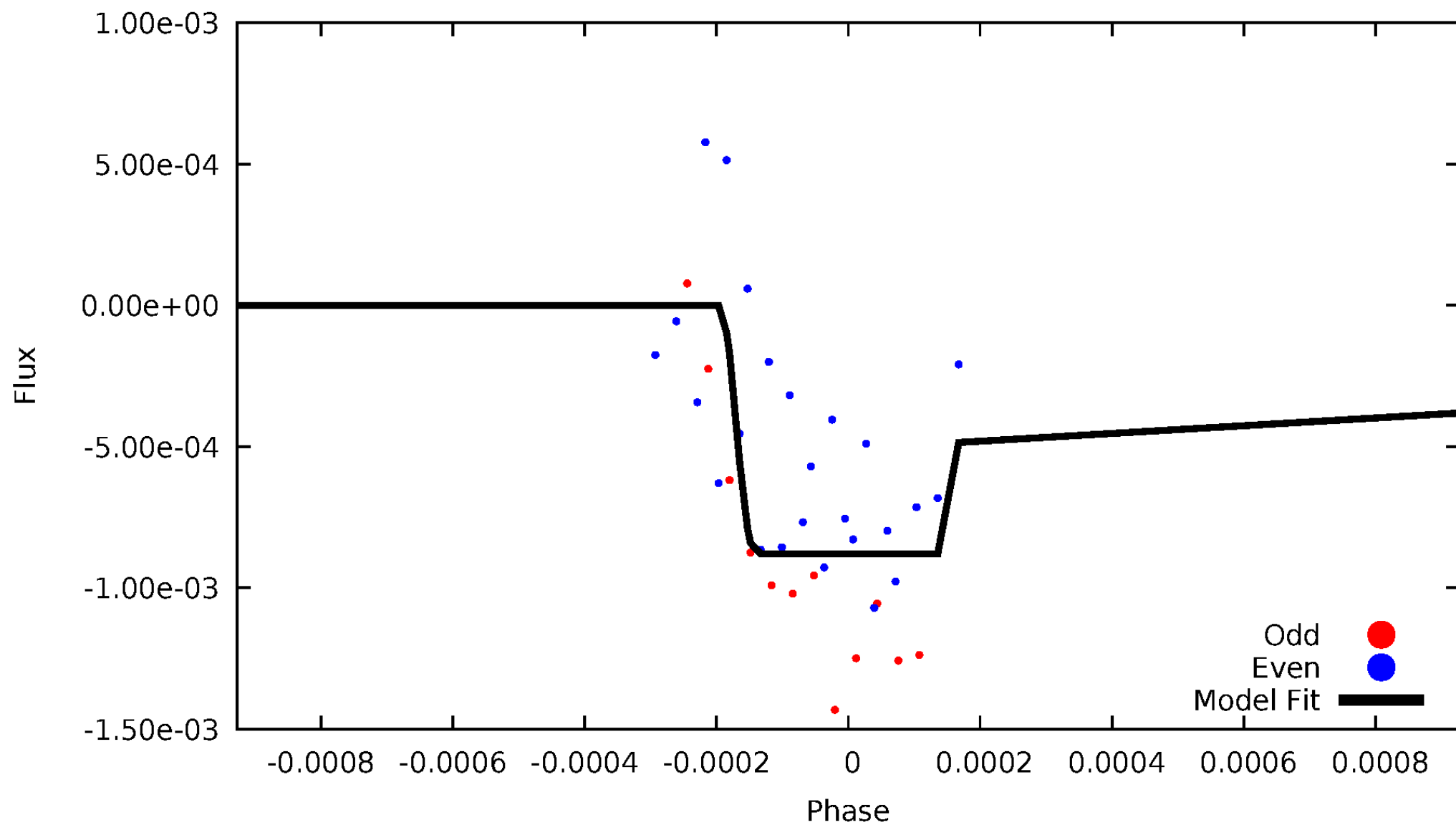
TCE 004390625-09





# ALT Odd/Even

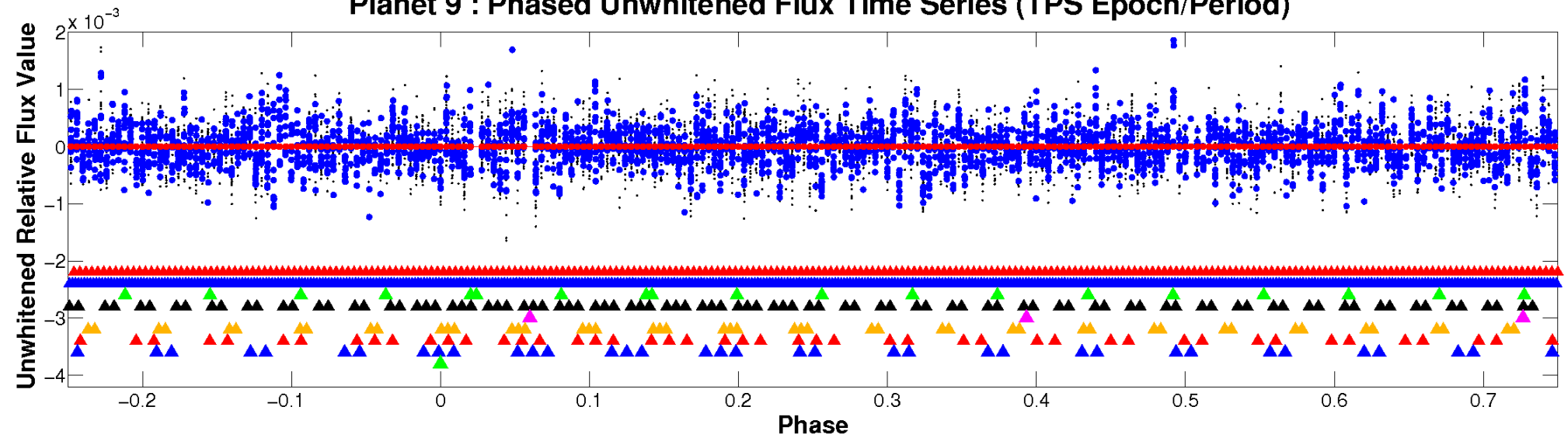
TCE 004390625-09



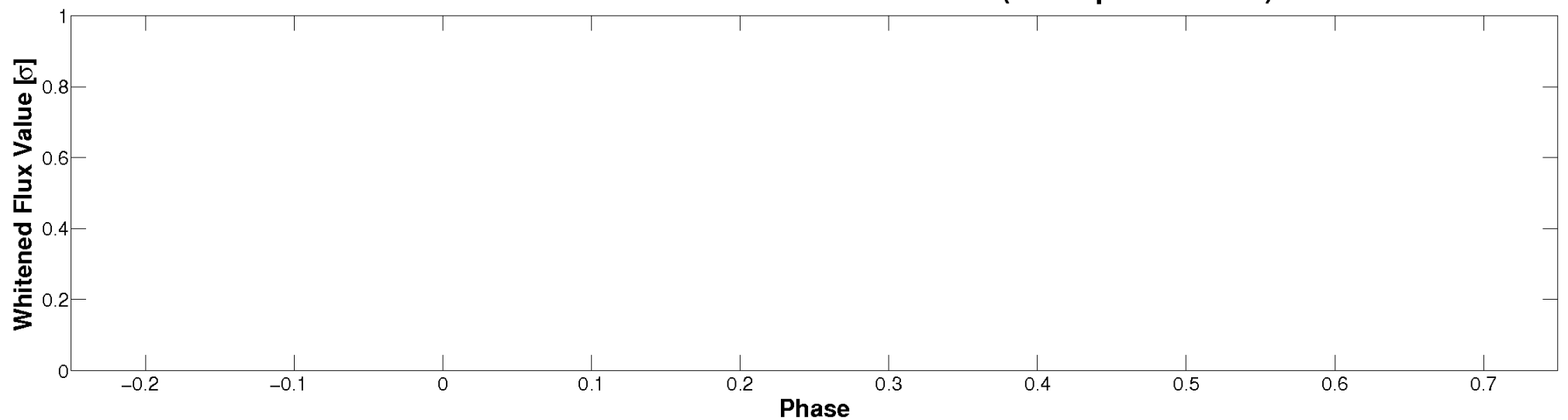


# Non-Whitened Vs. Whitened Light Curve

**Planet 9 : Phased Unwhitened Flux Time Series (TPS Epoch/Period)**



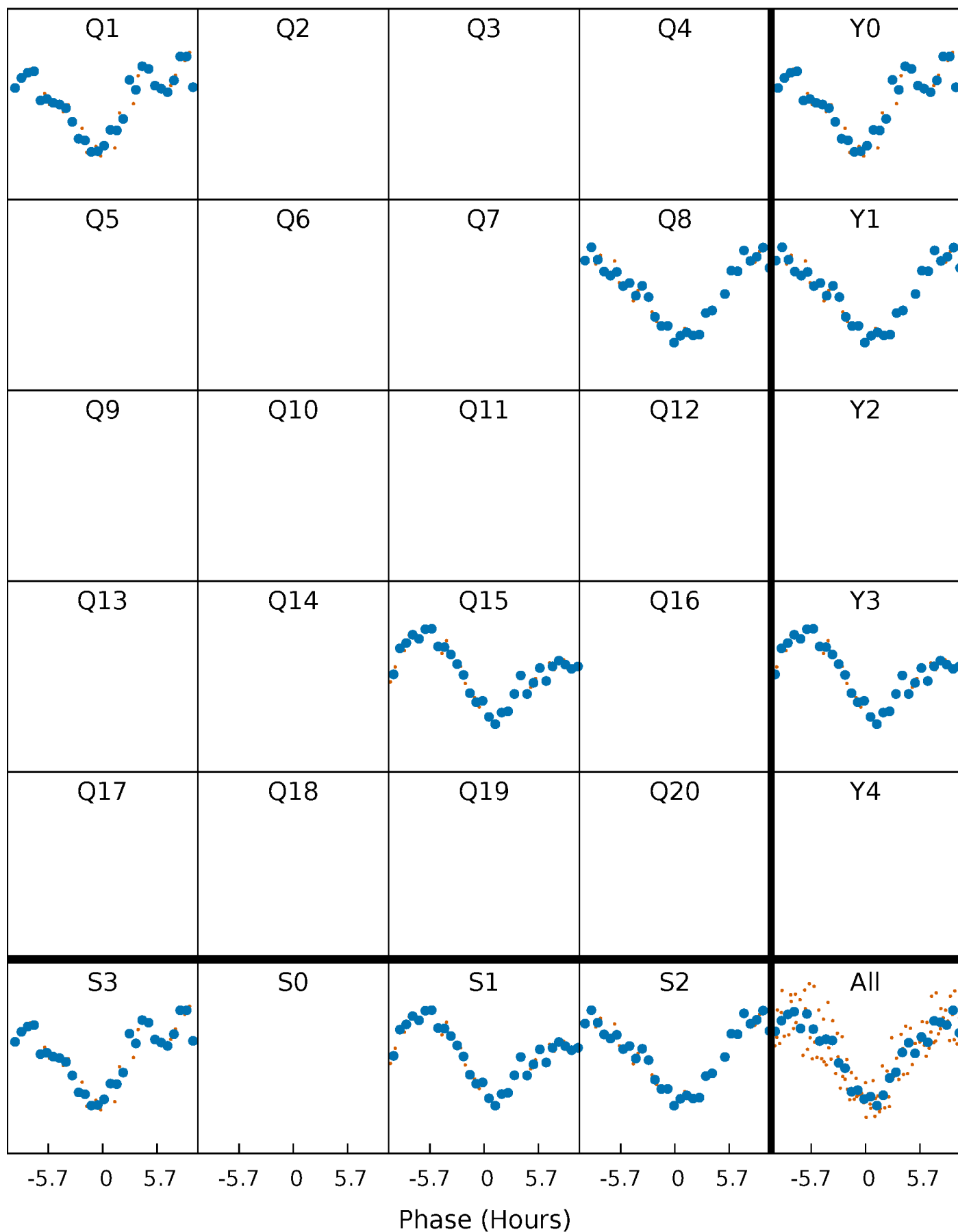
**Planet 9 : Phased Whitened Flux Time Series (TPS Epoch/Period)**





# PDC Quarter-Phased Transit Curves

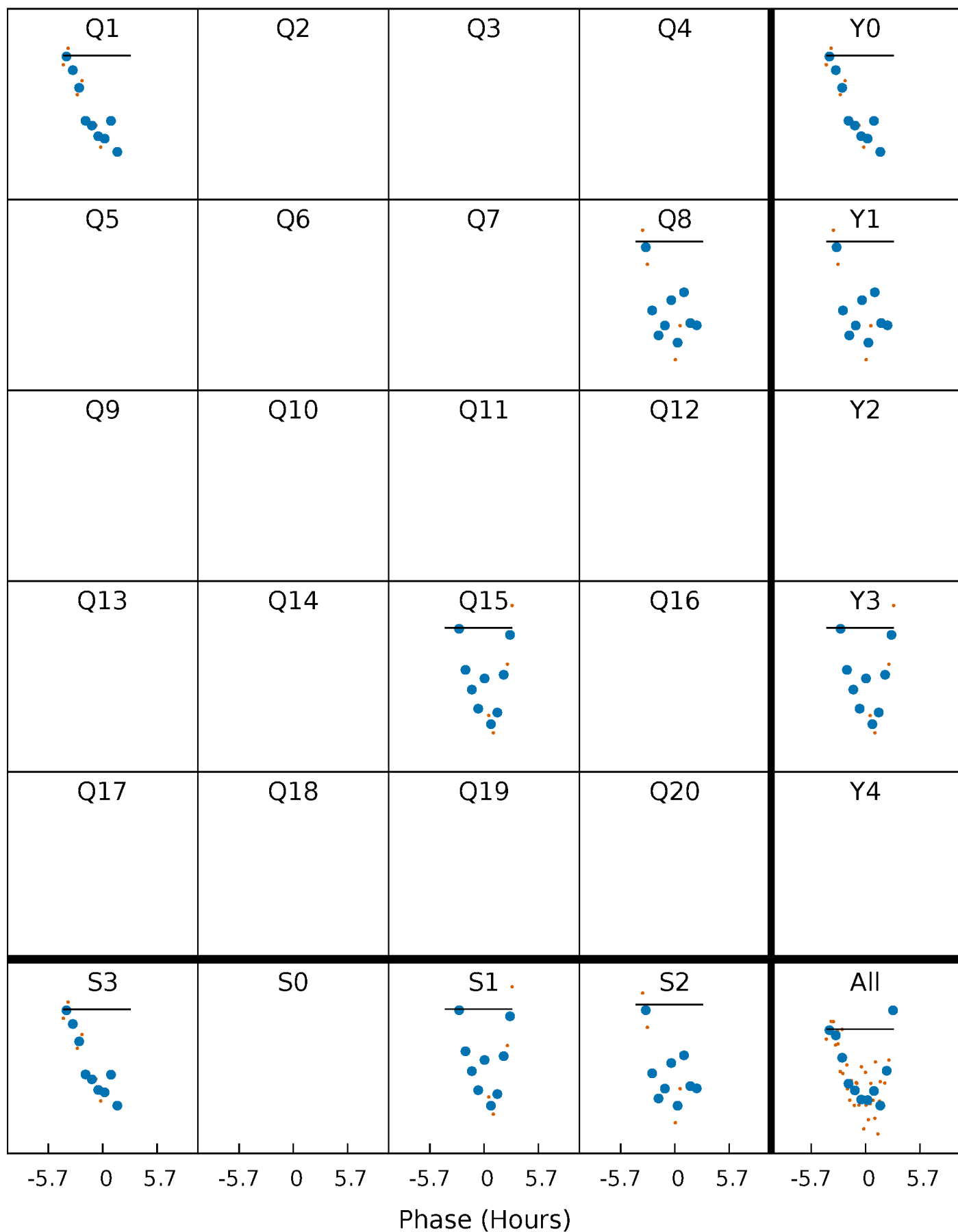
TCE 004390625-09     $P=638.187757$  Days     $T_0=153.507721$  (BKJD)





# DV Quarter-Phased Transit Curves

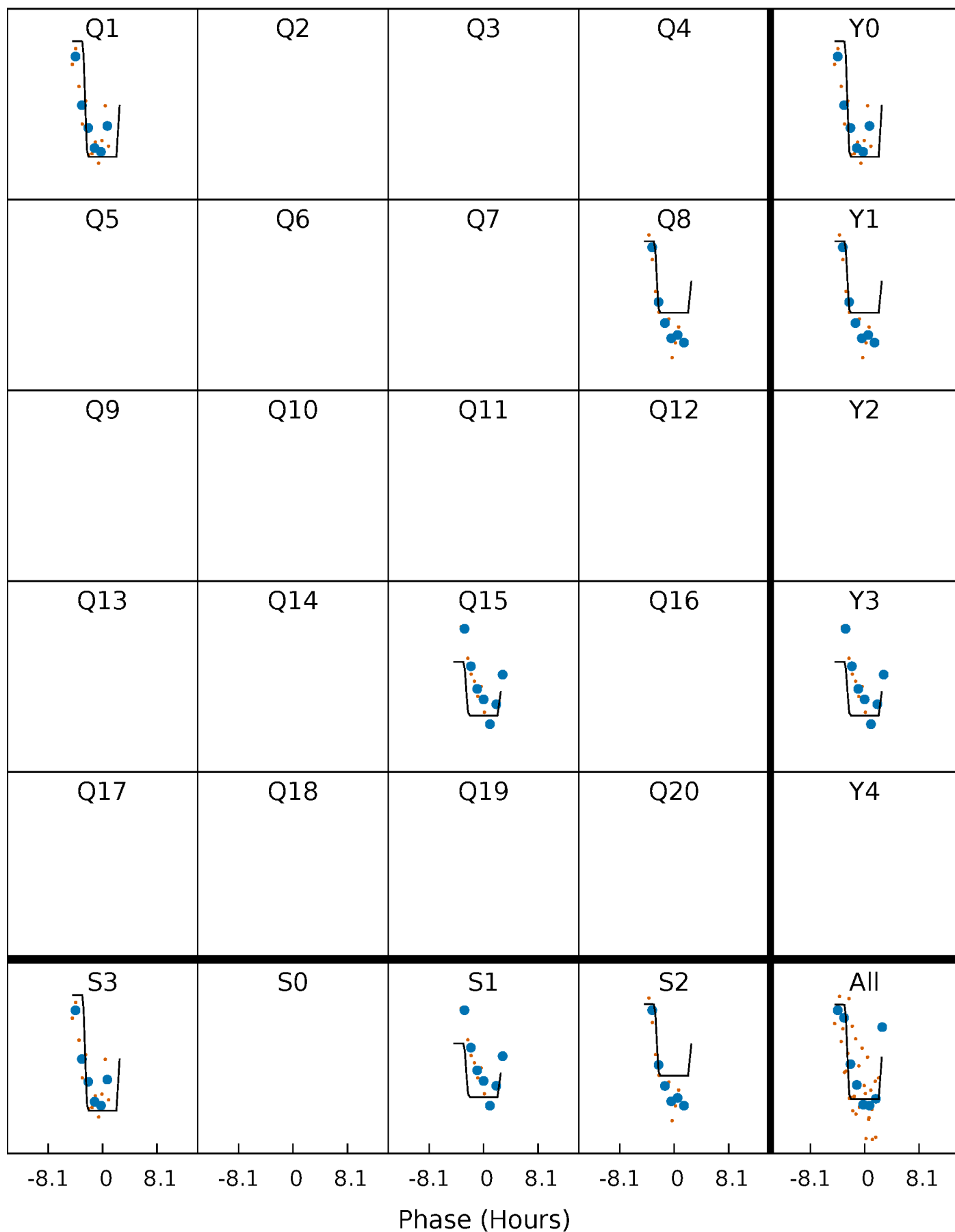
TCE 004390625-09 P=638.187757 Days  $T_0=153.507721$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 004390625-09 P=638.187757 Days  $T_0=153.523213$  (BKJD)

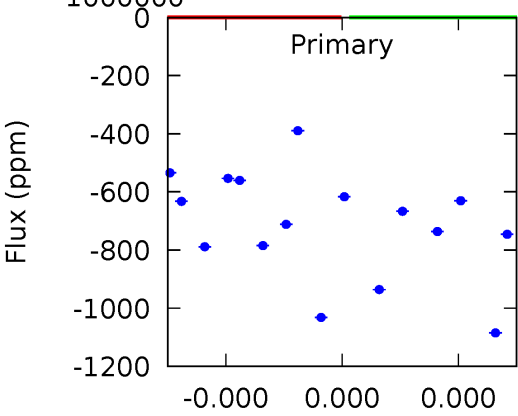
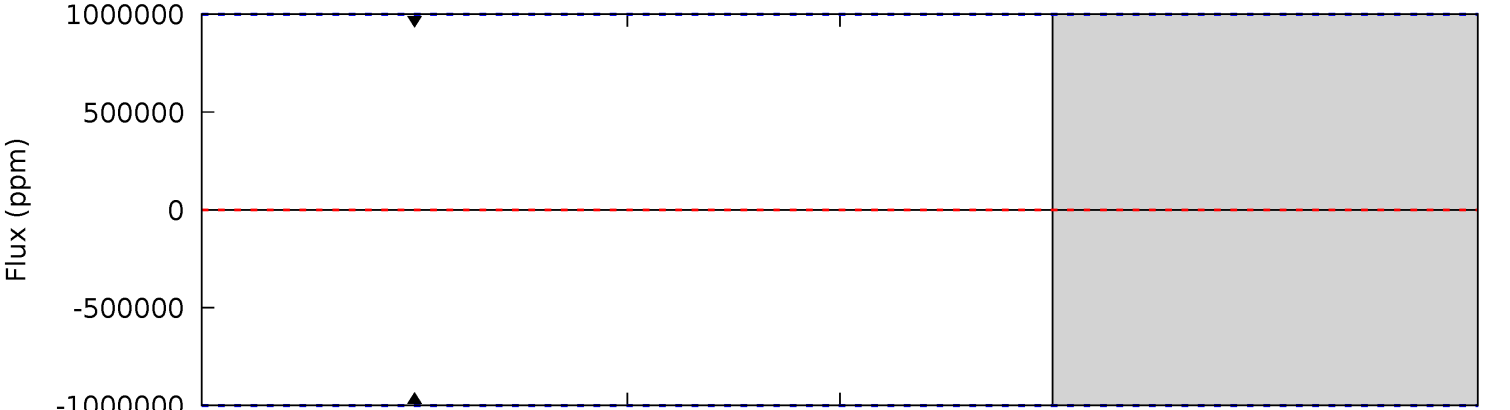
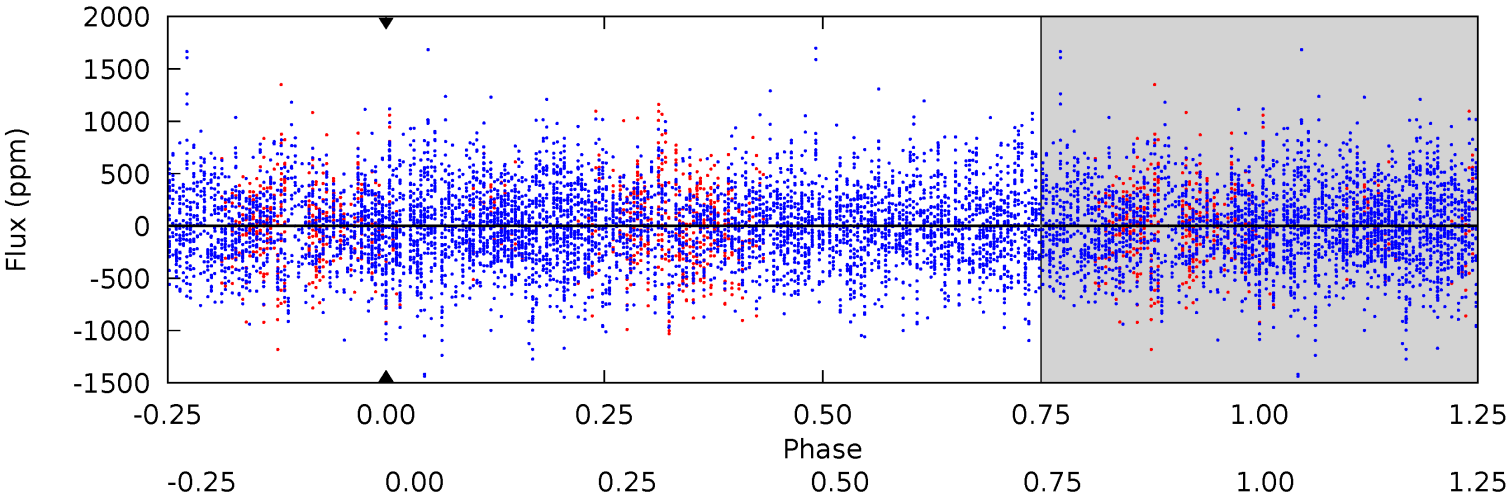




# DV Model-Shift Uniqueness Test

004390625-09, P = 638.187757 Days, E = 153.507721 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0

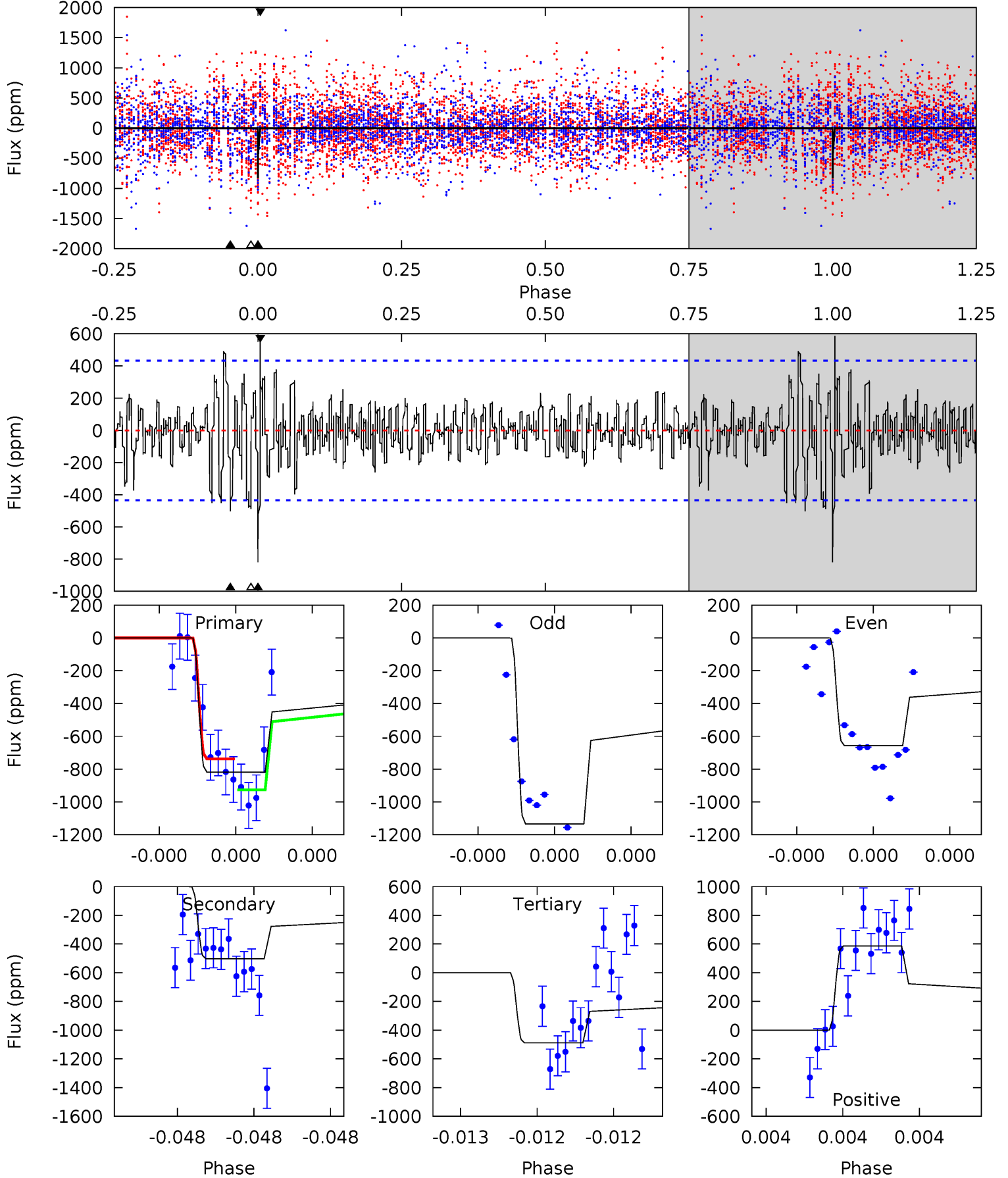




# Alt Model-Shift Uniqueness Test

004390625-09, P = 638.187757 Days, E = 153.523213 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.6	6.52	6.35	7.62	5.63	3.57	1.68	4.29	3.01	0.18	-1.10	2.99	1.06	0.42	1.20





### Stellar Parameters For KIC 004390625

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6995^{+219}_{-301}$	$4.190^{+0.185}_{-0.167}$	$-0.660^{+0.250}_{-0.300}$	$1.400^{+0.390}_{-0.319}$	$1.106^{+0.160}_{-0.131}$	$0.568^{+0.534}_{-0.277}$
	+3%/-4%	+4%/-4%	+38%/-45%	+28%/-23%	+14%/-12%	+94%/-49%
Source	PHO1	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 004390625-09 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$0 \pm 1000000$	$10.97^{+11.91}_{-7.66}$	$414^{+30}_{-27}$	$4985^{+35776}_{-35252}$	$12040^{+2239437}_{-1489960}$
Alt.	$-502 \pm 77$	$11.75^{+12.99}_{-8.06}$	$414^{+32}_{-30}$	$4033^{+2557}_{-842}$	$4592^{+39268}_{-3571}$

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature

$T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$



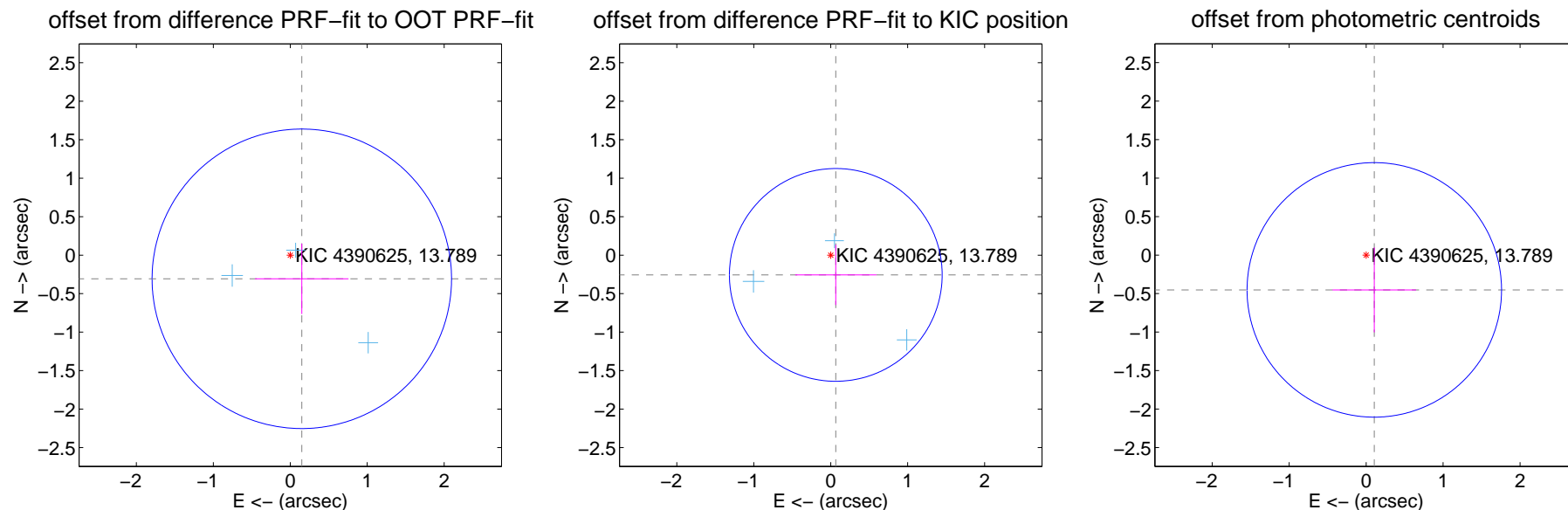
## DV Centroid Data

Supplemental centroid analysis for 004390625-09. Kepler magnitude: 13.79. Transit SNR -1.00

There are 3 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.26 arcsec

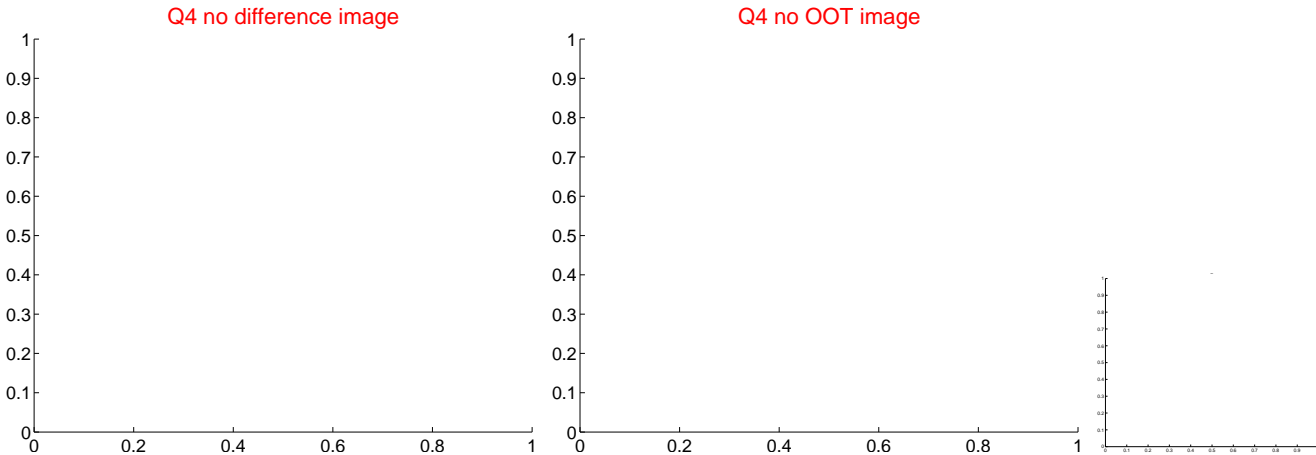
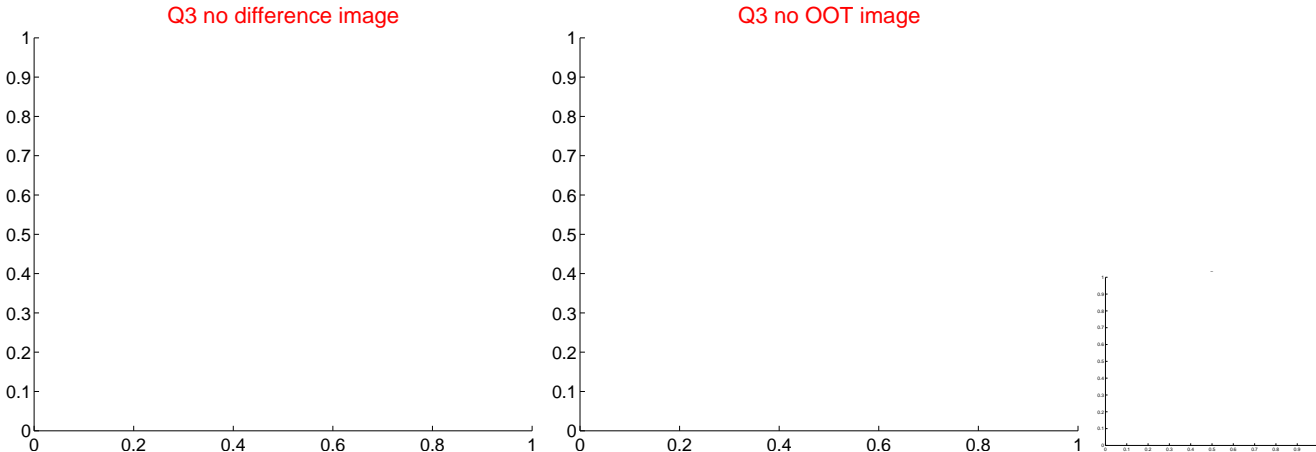
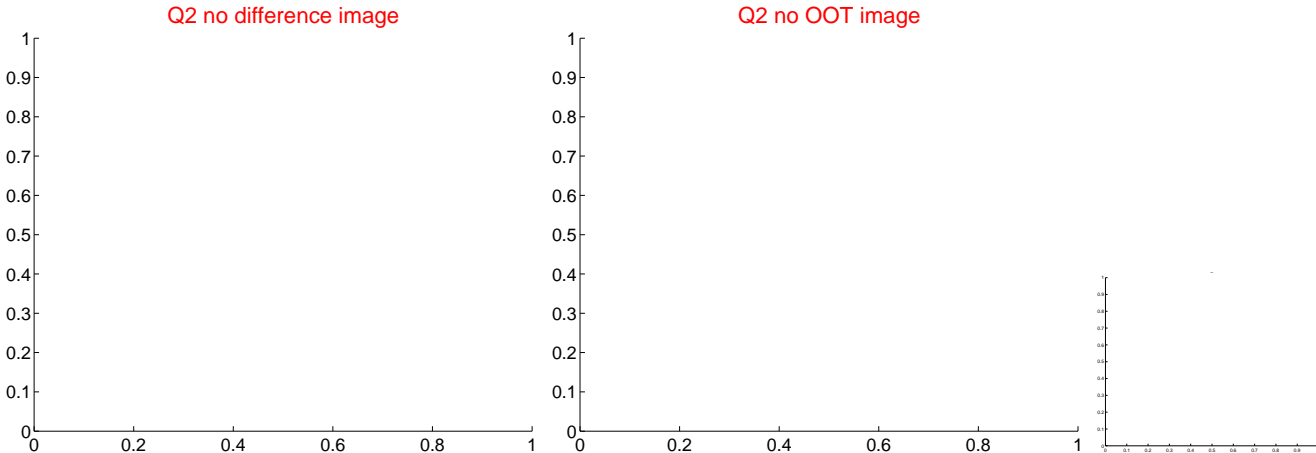
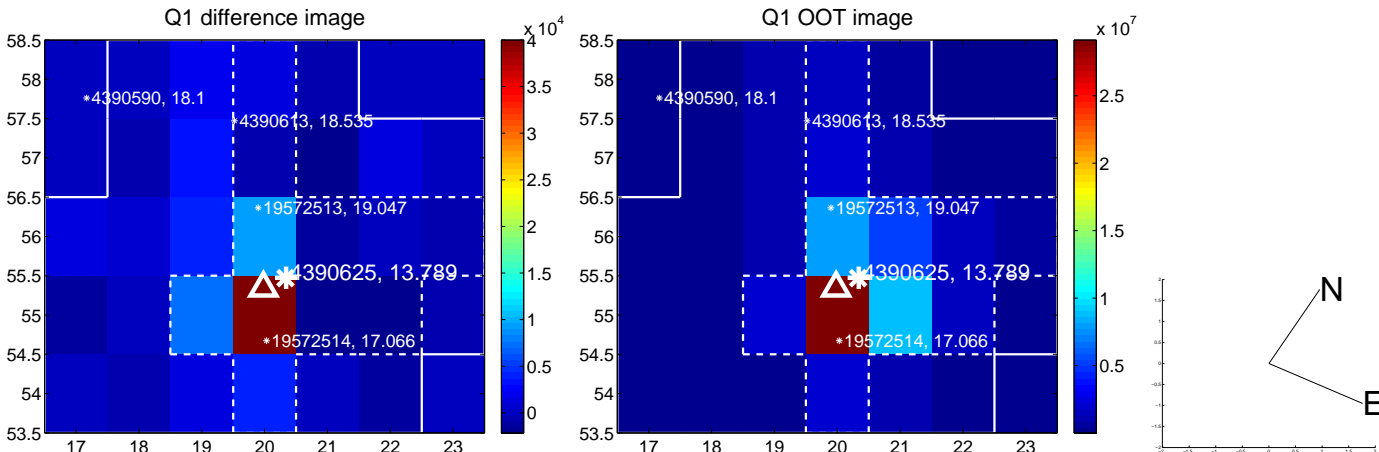
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.342 \pm 0.648$	0.53	$-0.150 \pm 0.607$	$-0.307 \pm 0.457$
PRF-fit source offset from KIC position	$0.265 \pm 0.461$	0.58	$-0.066 \pm 0.528$	$-0.257 \pm 0.391$
photometric centroid source offset	$0.46 \pm 0.55$	0.84	$-0.11 \pm 0.54$	$-0.45 \pm 0.55$



Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

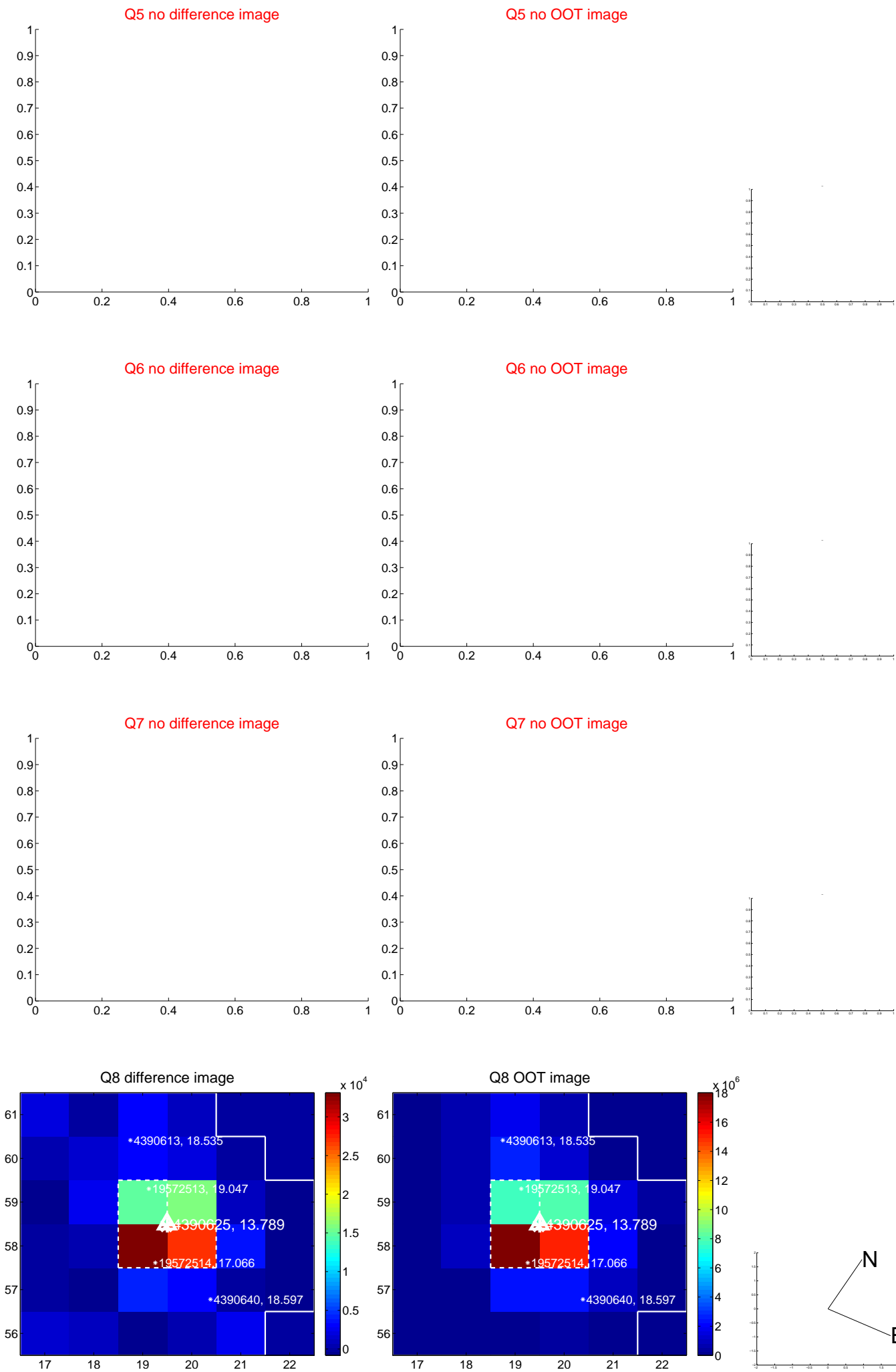


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



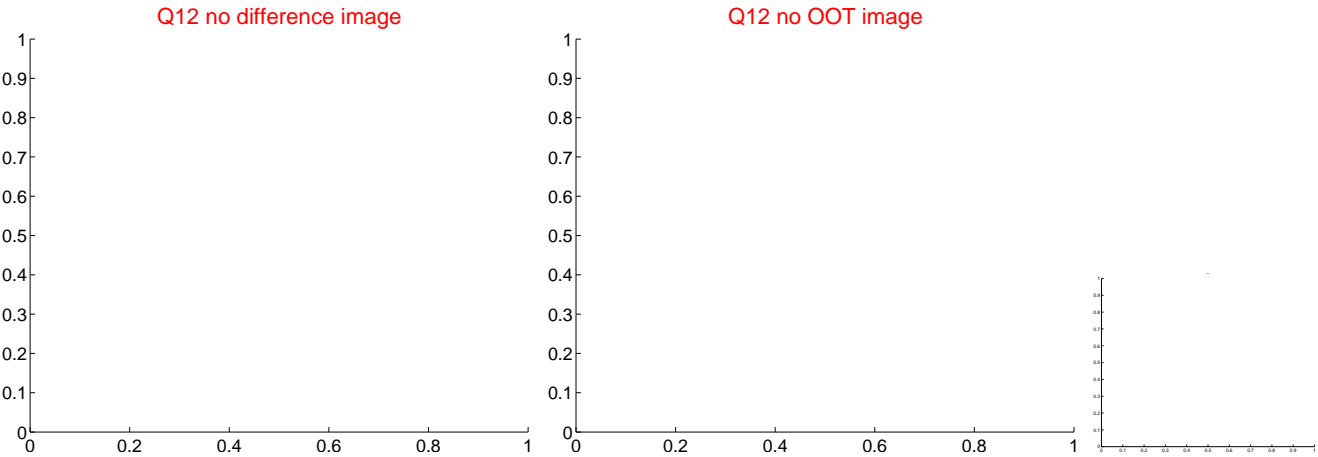
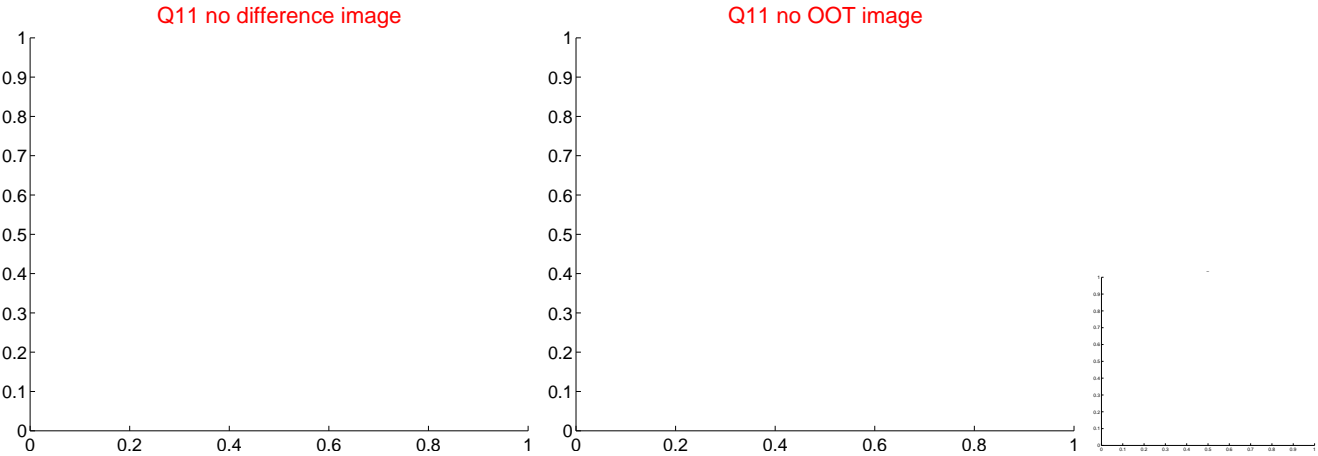
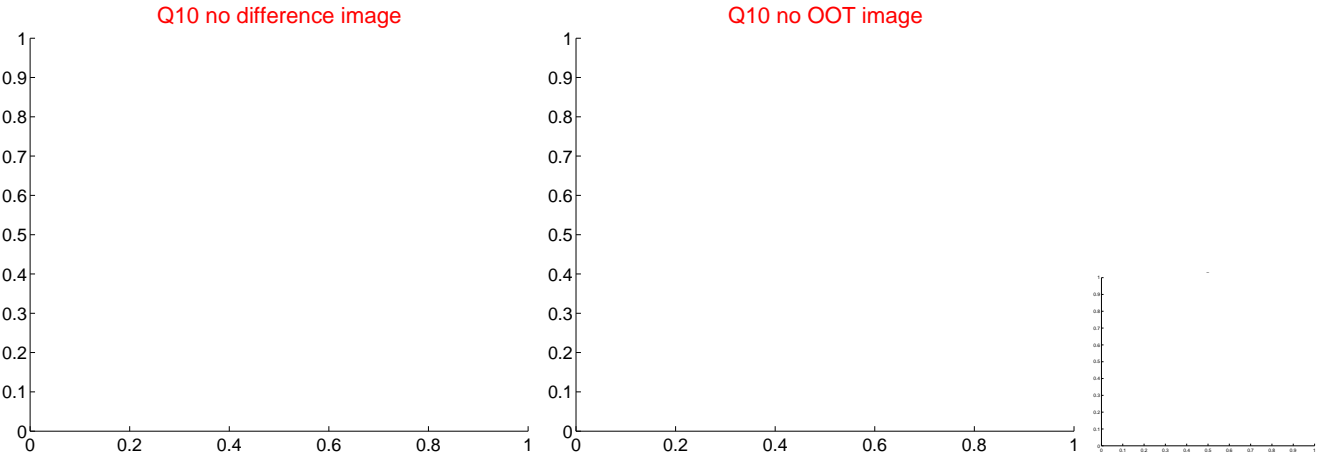
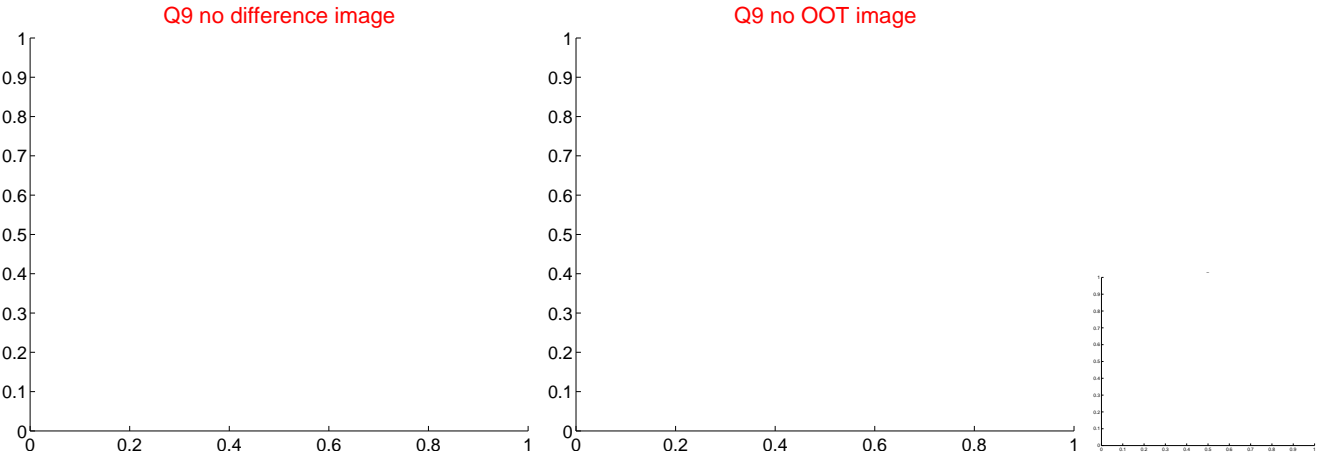


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



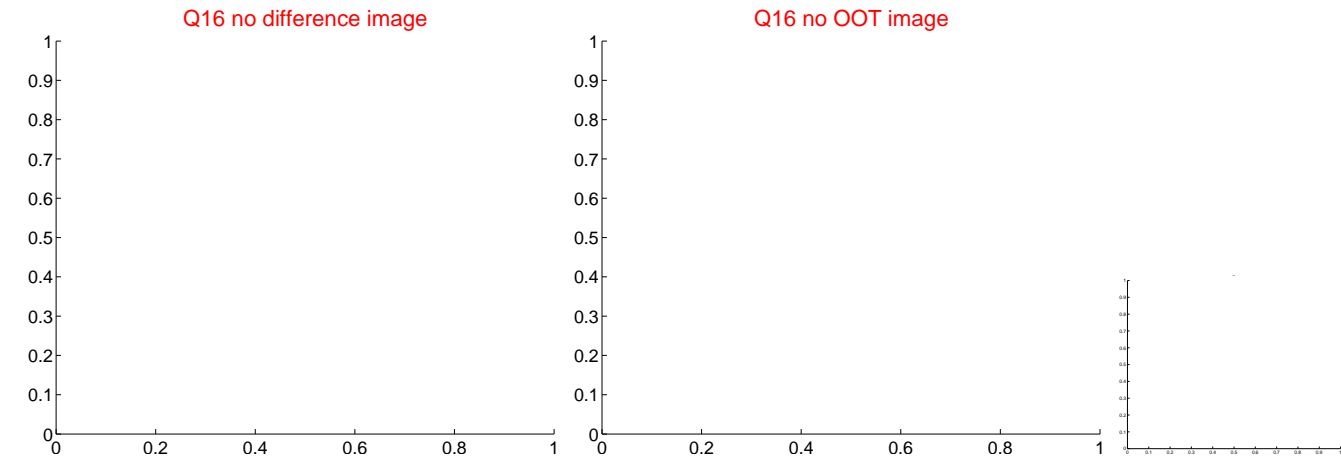
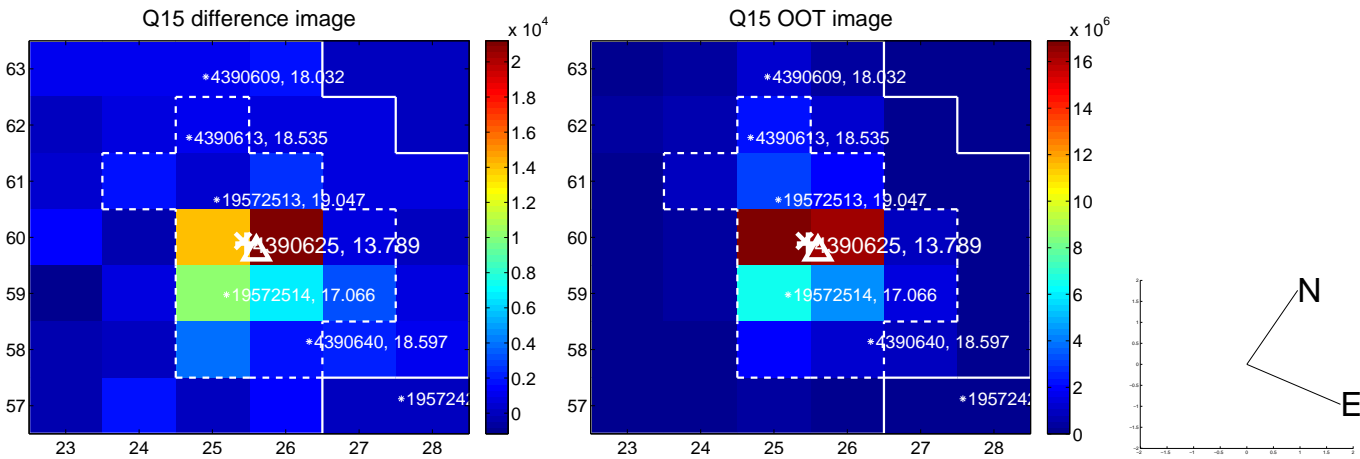
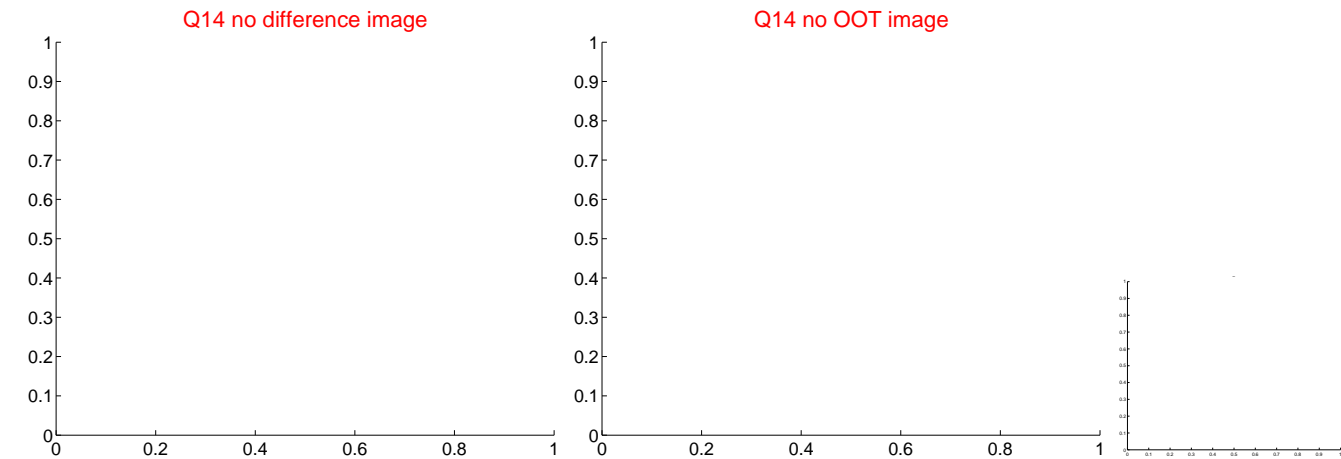
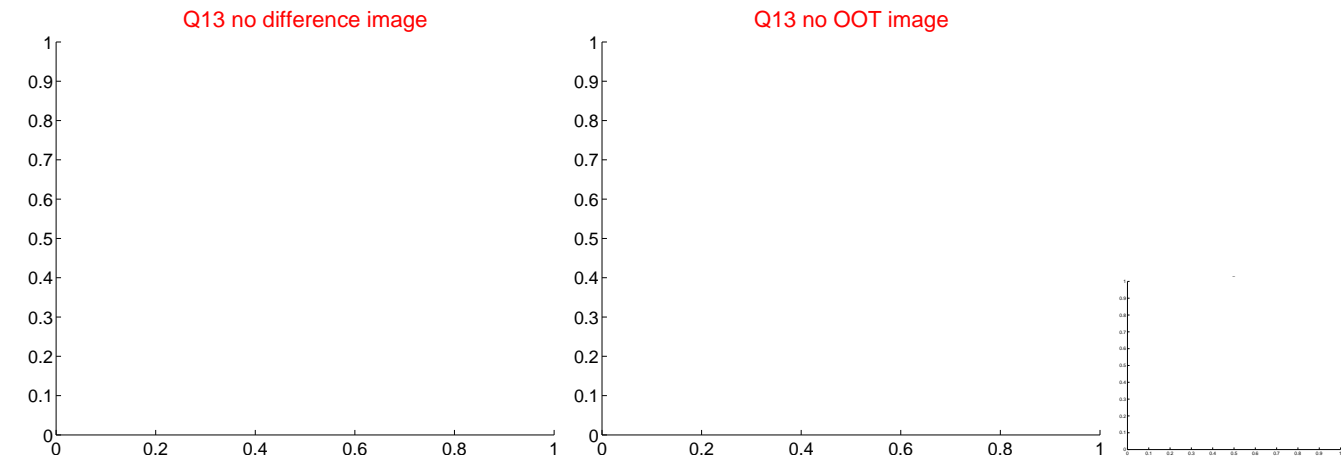


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



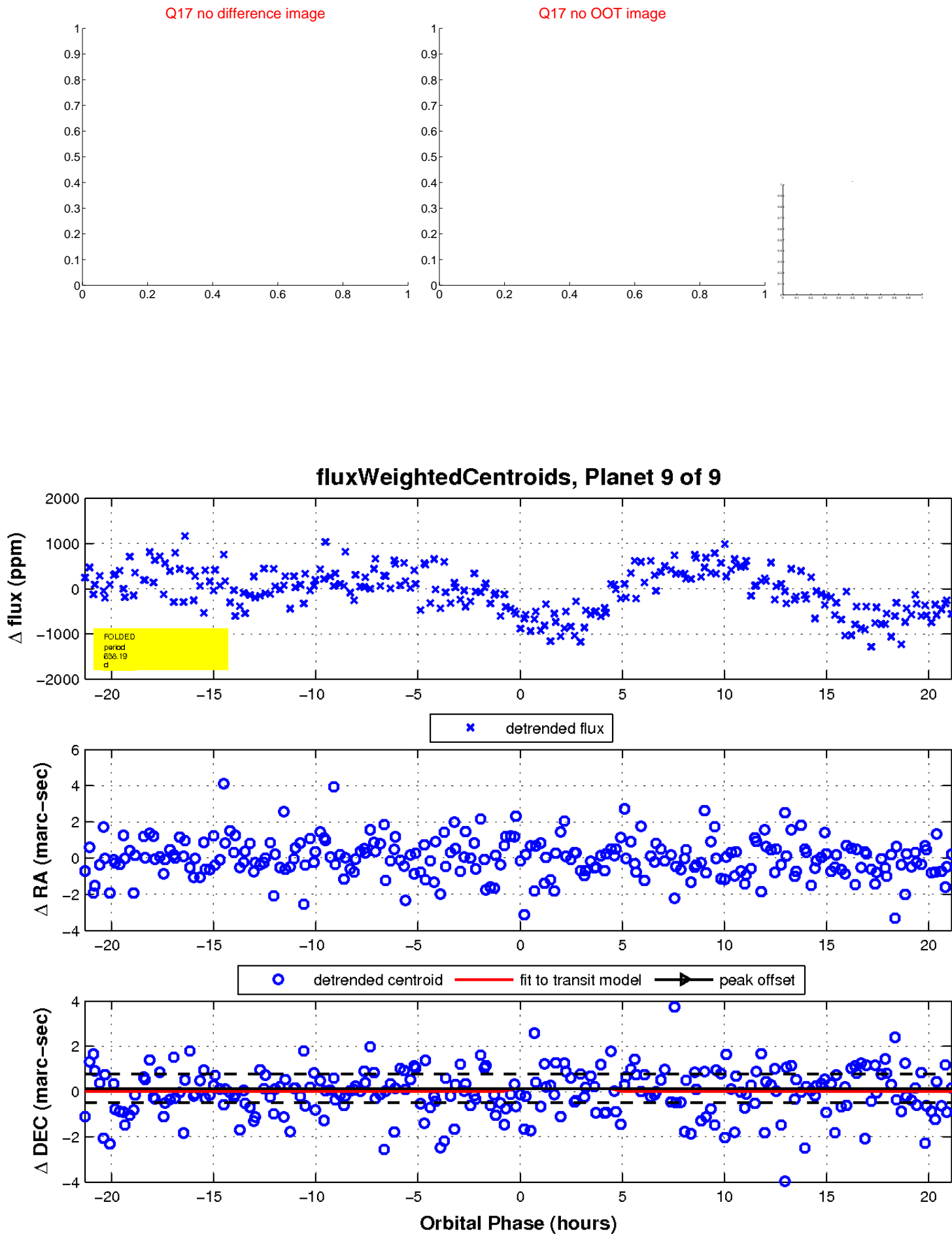


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination

