

# KIC 010548640

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010548640-01	OBS	No	0.965300	132.502345	13.3	2.602	12.6	0.5	0.57	3727	0.28	225.89
010548640-02	OBS	No	0.965064	131.532301	87.1	0.658	11.0	1.6	0.57	3727	0.68	225.96
010548640-03	OBS	No	2.894792	131.602945	732.4	9.000	12.5	-1.0	0.57	3727	1.49	52.23
010548640-04	OBS	No	67.517110	172.640910	3659.2	5.462	8.8	7.5	0.57	3727	6.79	0.78
010548640-05	OBS	No	47.962549	173.230188	2043.0	4.445	8.3	7.4	0.57	3727	2.59	1.24
010548640-06	OBS	No	97.600860	146.889886	3916.1	4.666	8.2	6.8	0.57	3727	4.34	0.48

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010548640-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—CENT_KIC_POS
010548640-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—SWEET_NTL—LPP_DV—LPP_ALT—SAME_NTL_PERIOD—CENT_KIC_POS
010548640-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_NOFITS
010548640-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS
010548640-05	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS
010548640-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_KIC_POS

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

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

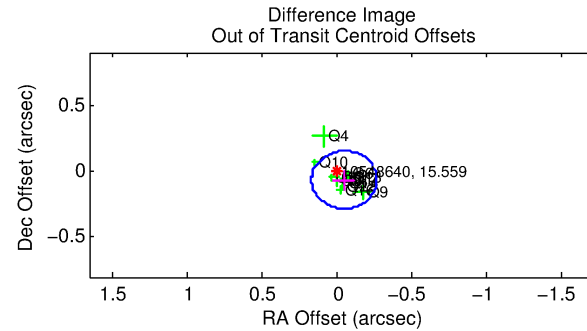
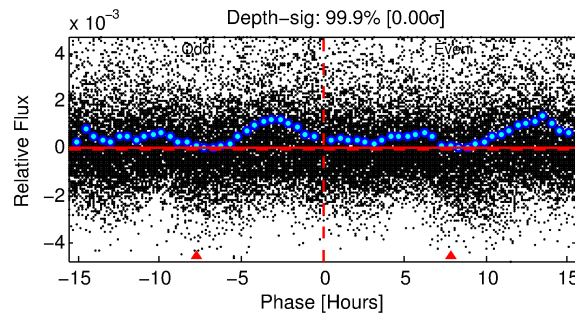
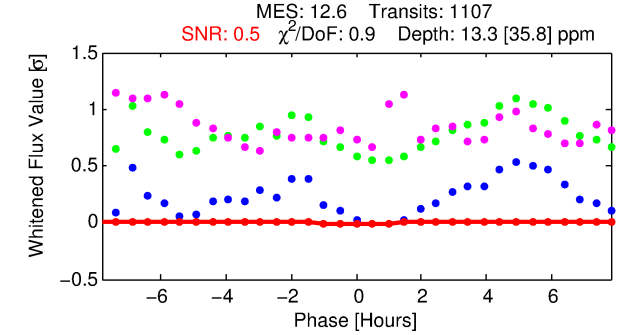
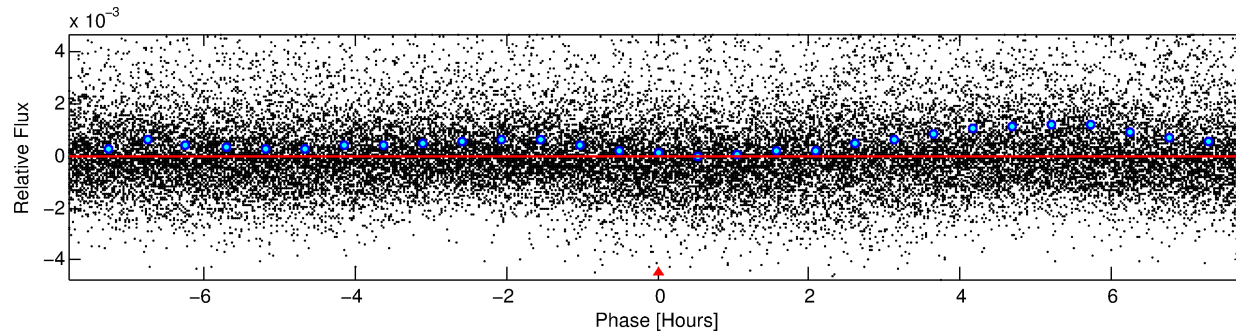
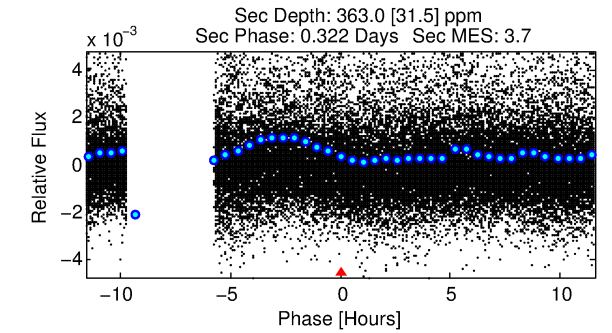
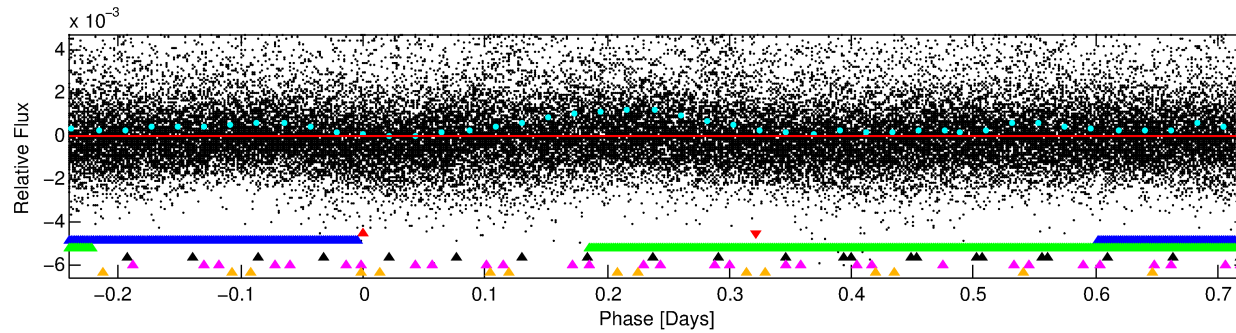
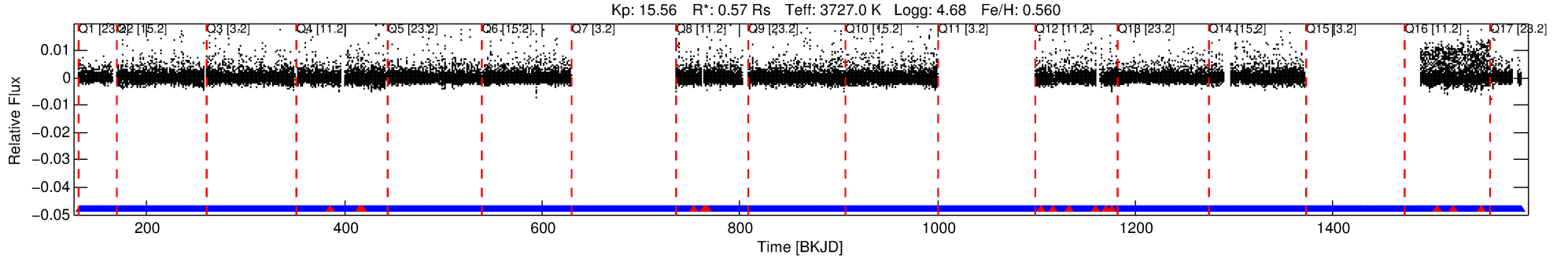
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Ephemeris Match Information For 010548640-01

No Significant Match Found

# DV One-Page Summary

KIC: 10548640 Candidate: 1 of 6 Period: 0.965 d



## DV Fit Results:

Period = 0.96530 [0.00021] d  
Epoch = 132.5023 [0.0441] BKJD  
Rp/R\* = 0.0045 [0.0298]  
a/R\* = 1.32 [16.58]  
b = 0.95 [2.86]  
Seff = 225.89 [46.95]  
Teff = 989 [51] K  
Rp = 0.28 [1.87] Re  
a = 0.0159 [0.0017] AU  
Ag = 641.23 [8531.94] [0.08σ]  
Teffp = 7691 [25584] K [0.26σ]

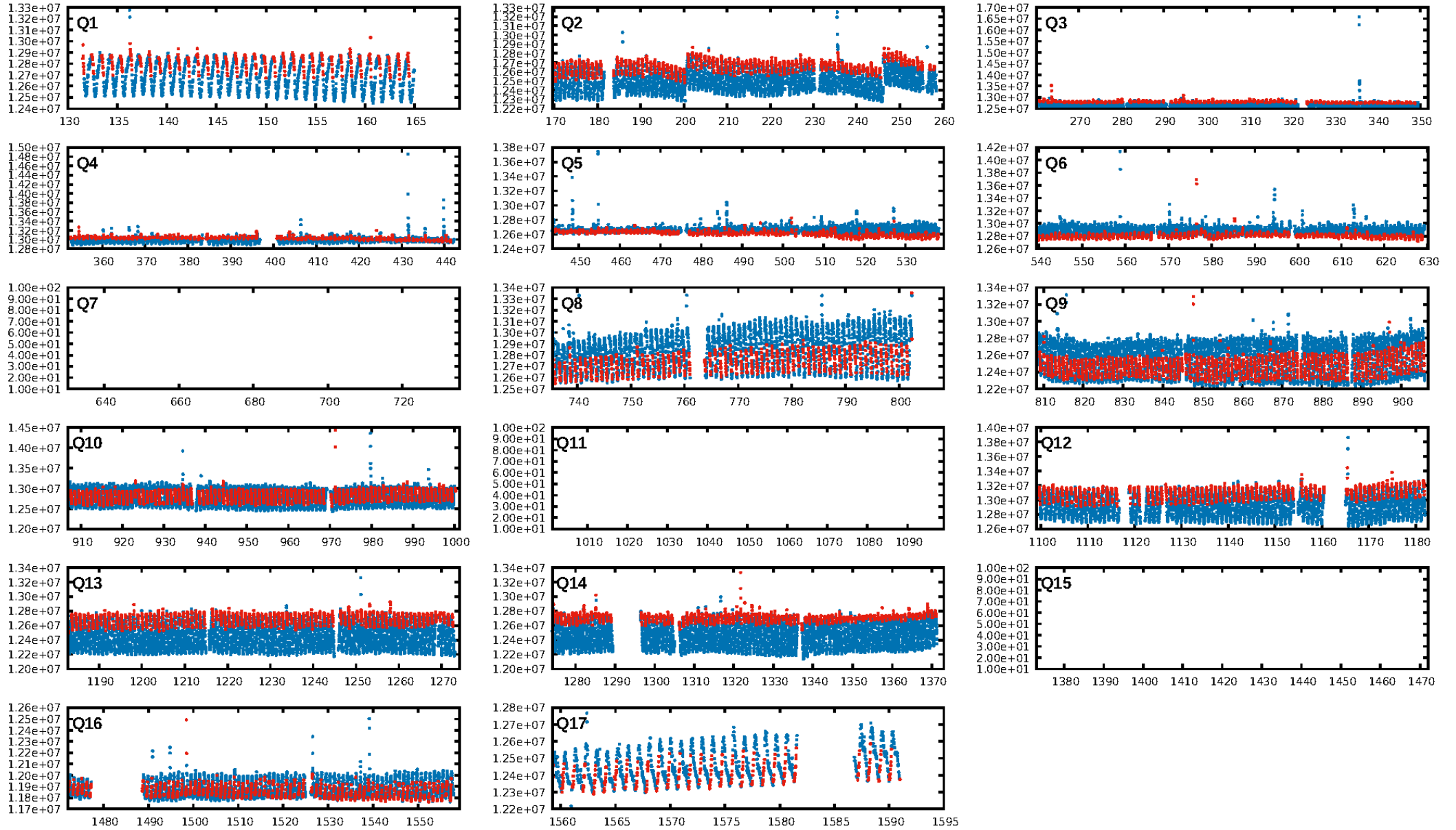
## DV Diagnostic Results:

ShortPeriod-sig: 0.2% [0.00σ]  
LongPeriod-sig: 100.0% [4.94σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 3.05e-33  
RollingBand-fgt: 0.98 [1028/1044]  
GhostDiagnostic-chr: -1.396  
Centroid-sig: 0.0%  
Centroid-so: 33.493 arcsec [3.57σ]  
OotOffset-rm: 0.085 arcsec [1.16σ]  
KicOffset-rm: 0.588 arcsec [7.81σ]  
OotOffset-st: 4/1/4/5 [14]  
KicOffset-st: 4/1/4/5 [14]  
DiffImageQuality-fgm: 0.43 [6/14]  
DiffImageOverlap-fno: 0.14 [2/14]

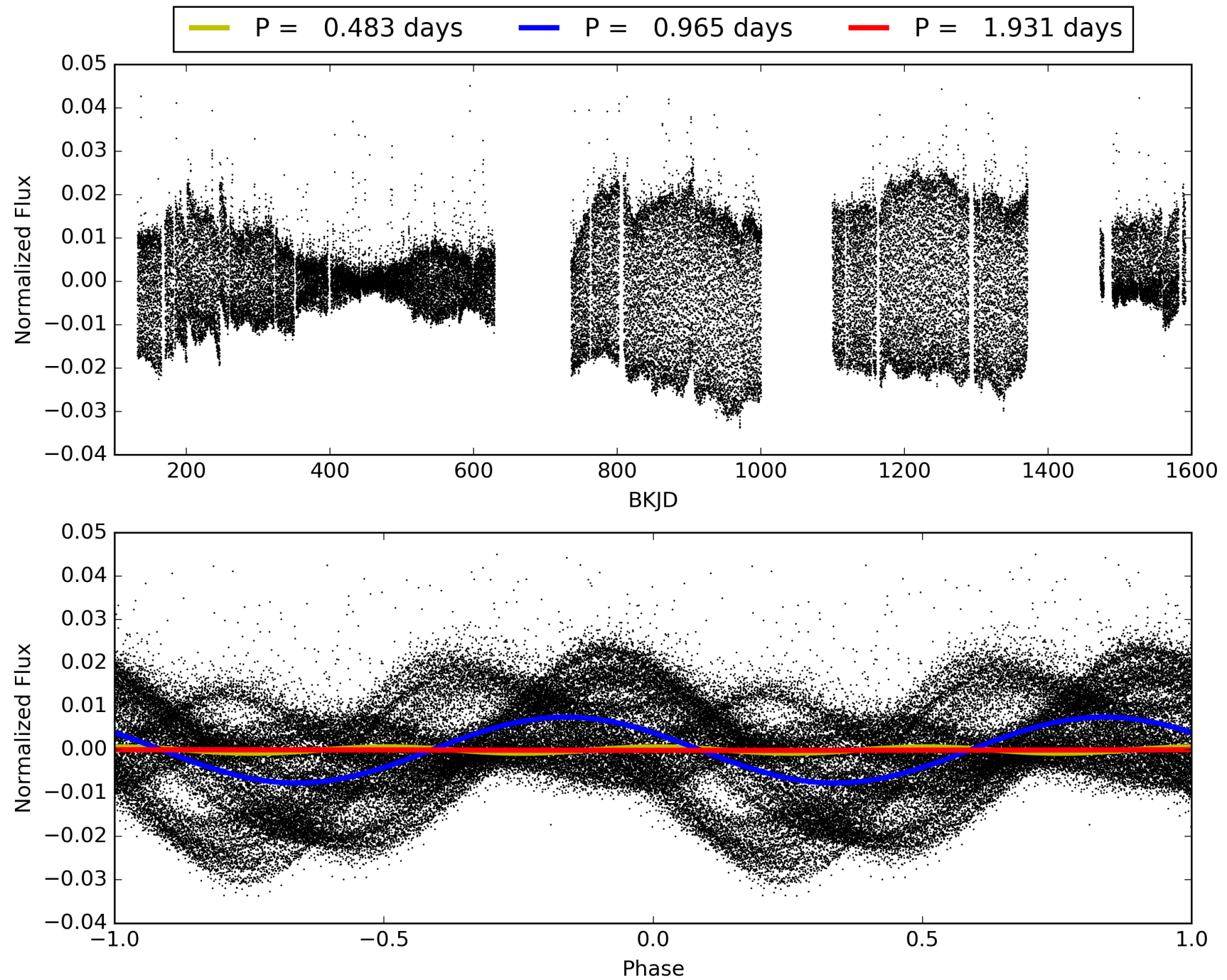
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010548640-01, PDC Light Curves



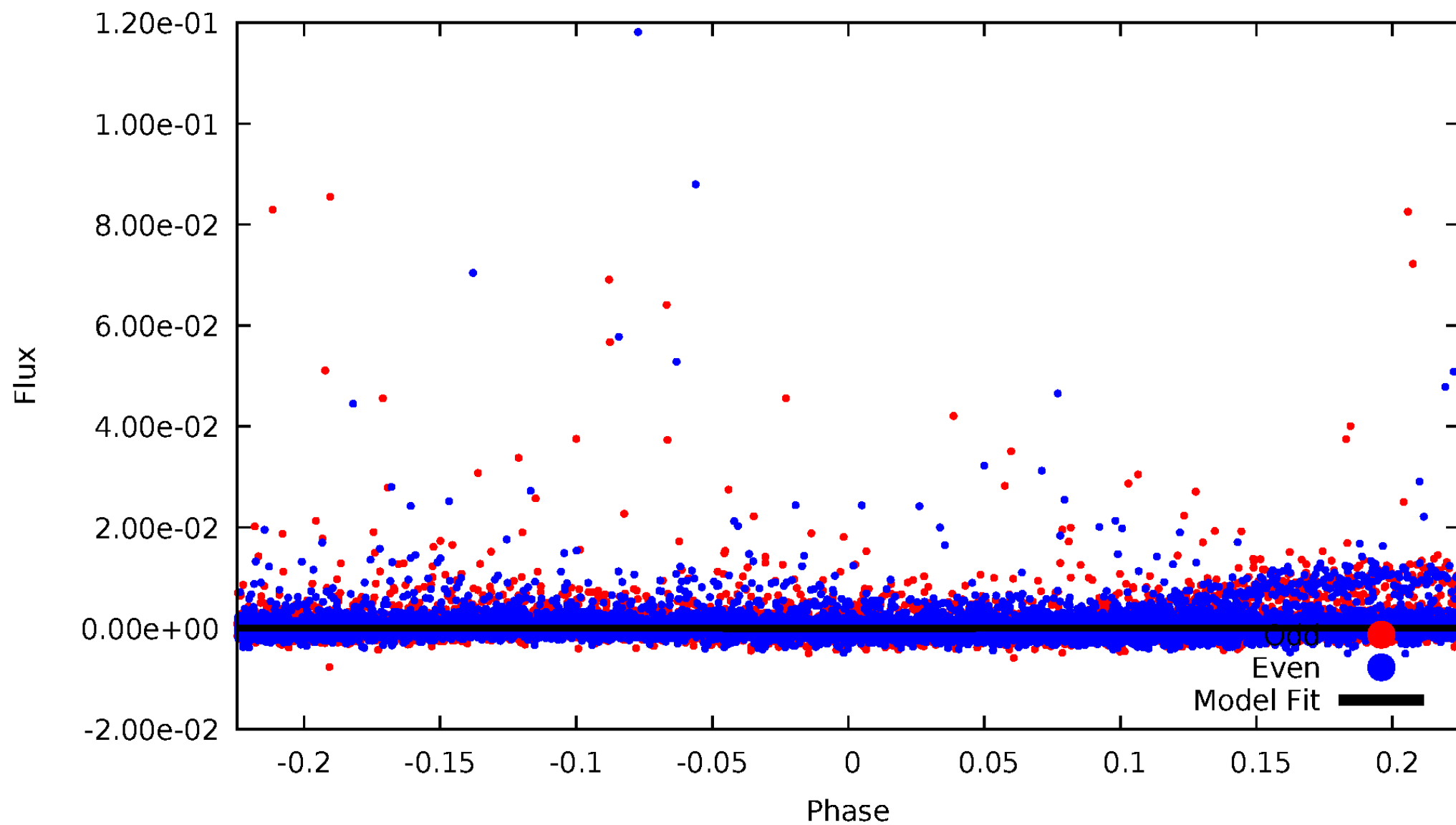
TCE 010548640-01





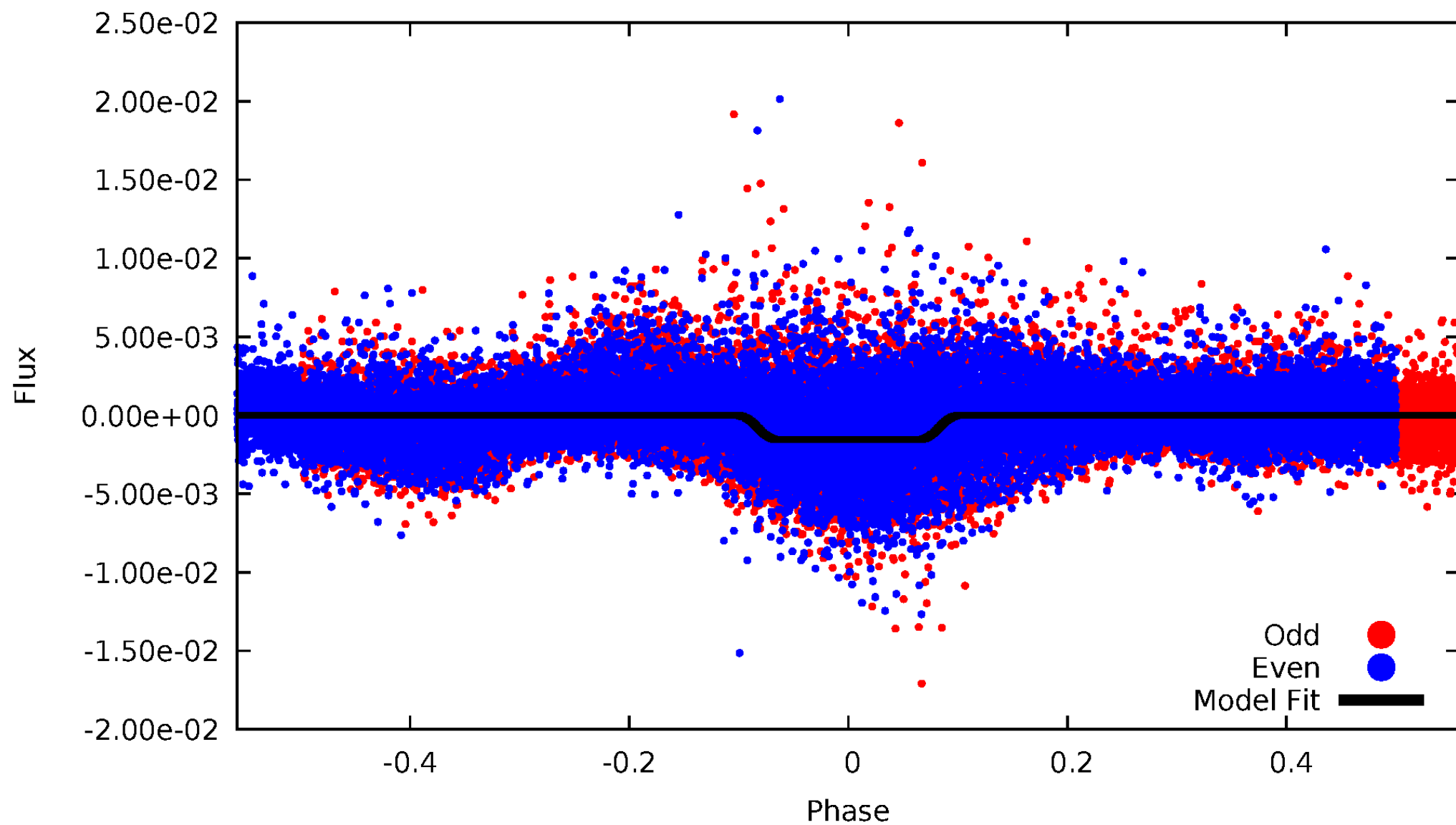
# DV Odd/Even

TCE 010548640-01



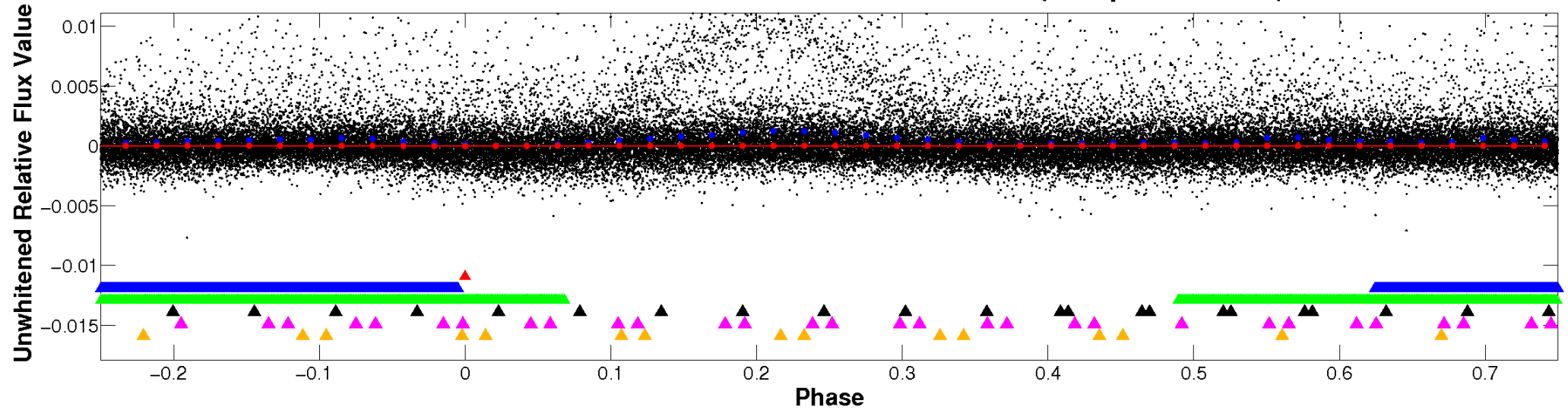
# ALT Odd/Even

TCE 010548640-01

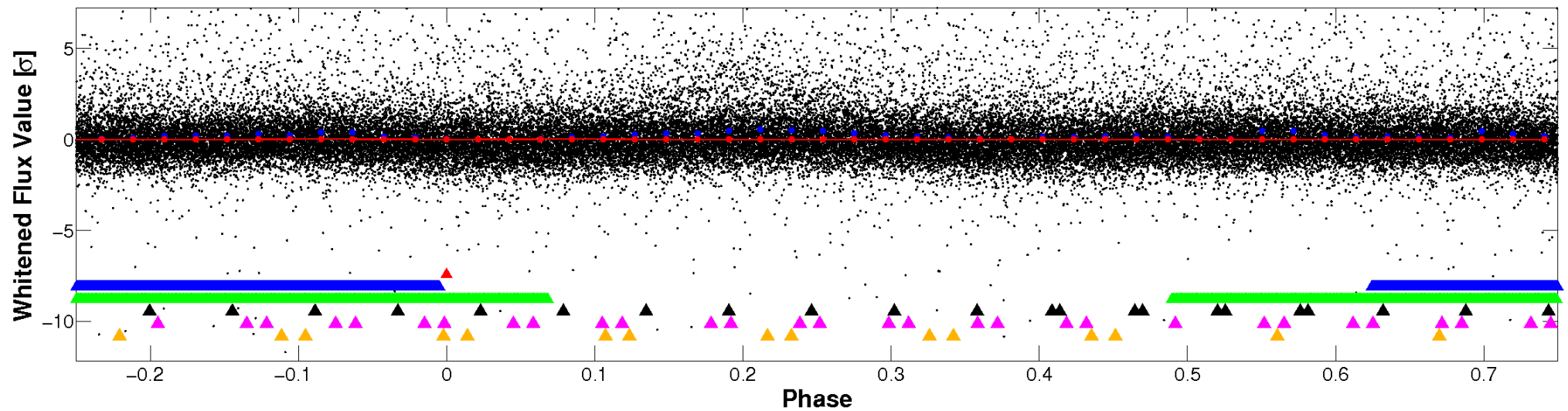


# Non-Whitened Vs. Whitened Light Curve

Planet 1 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

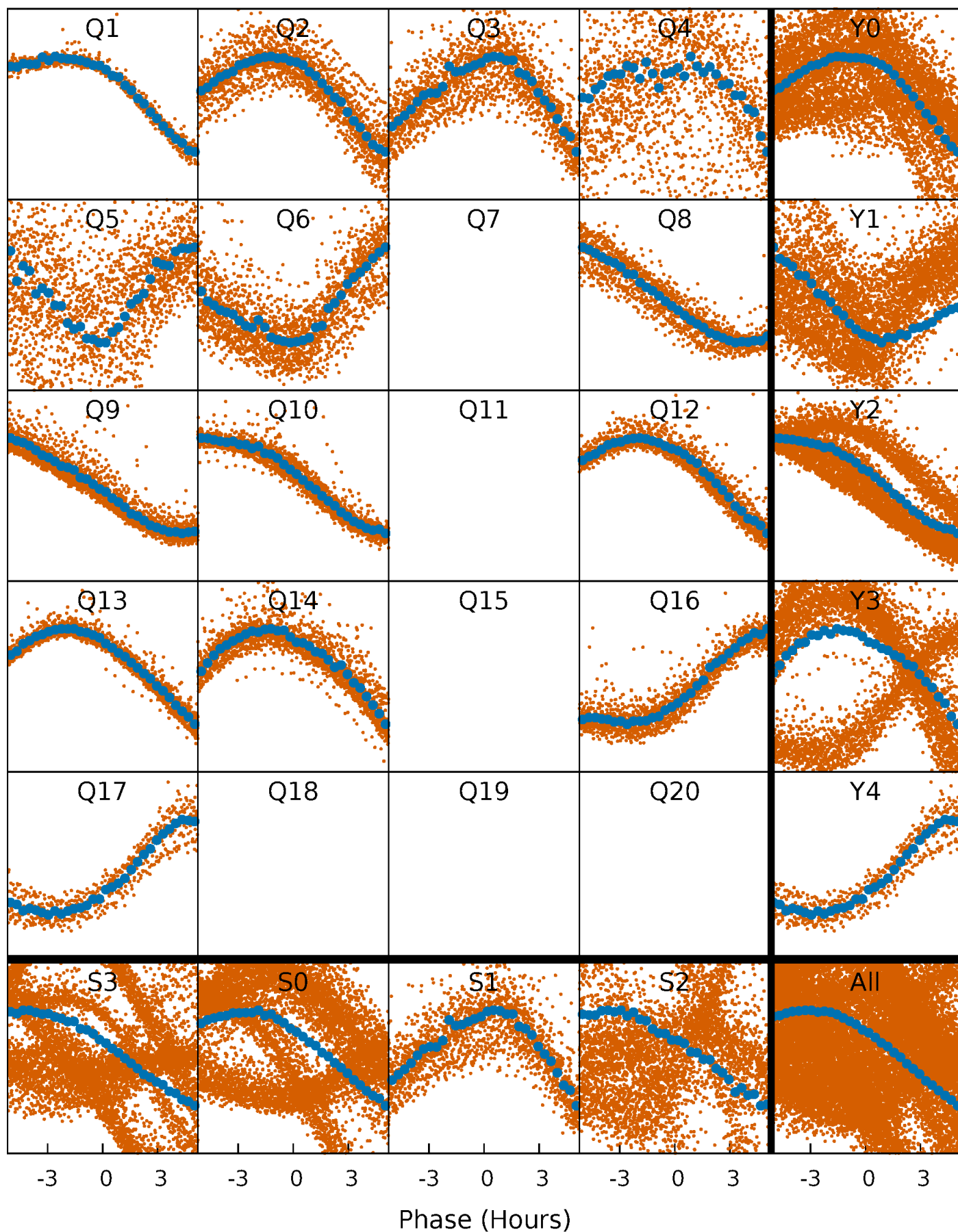


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

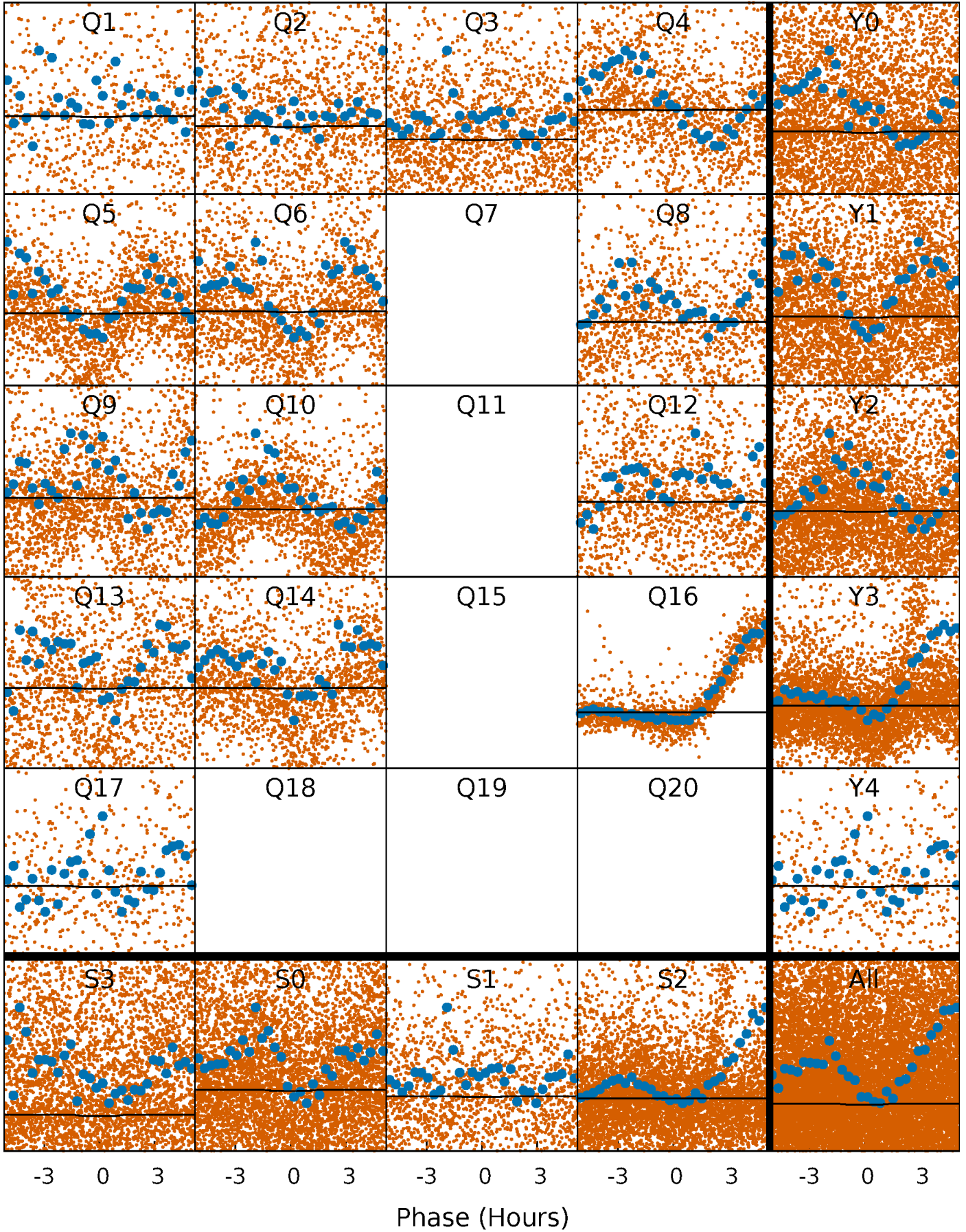
TCE 010548640-01   P= 0.965300 Days    $T_0=132.502345$  (BKJD)





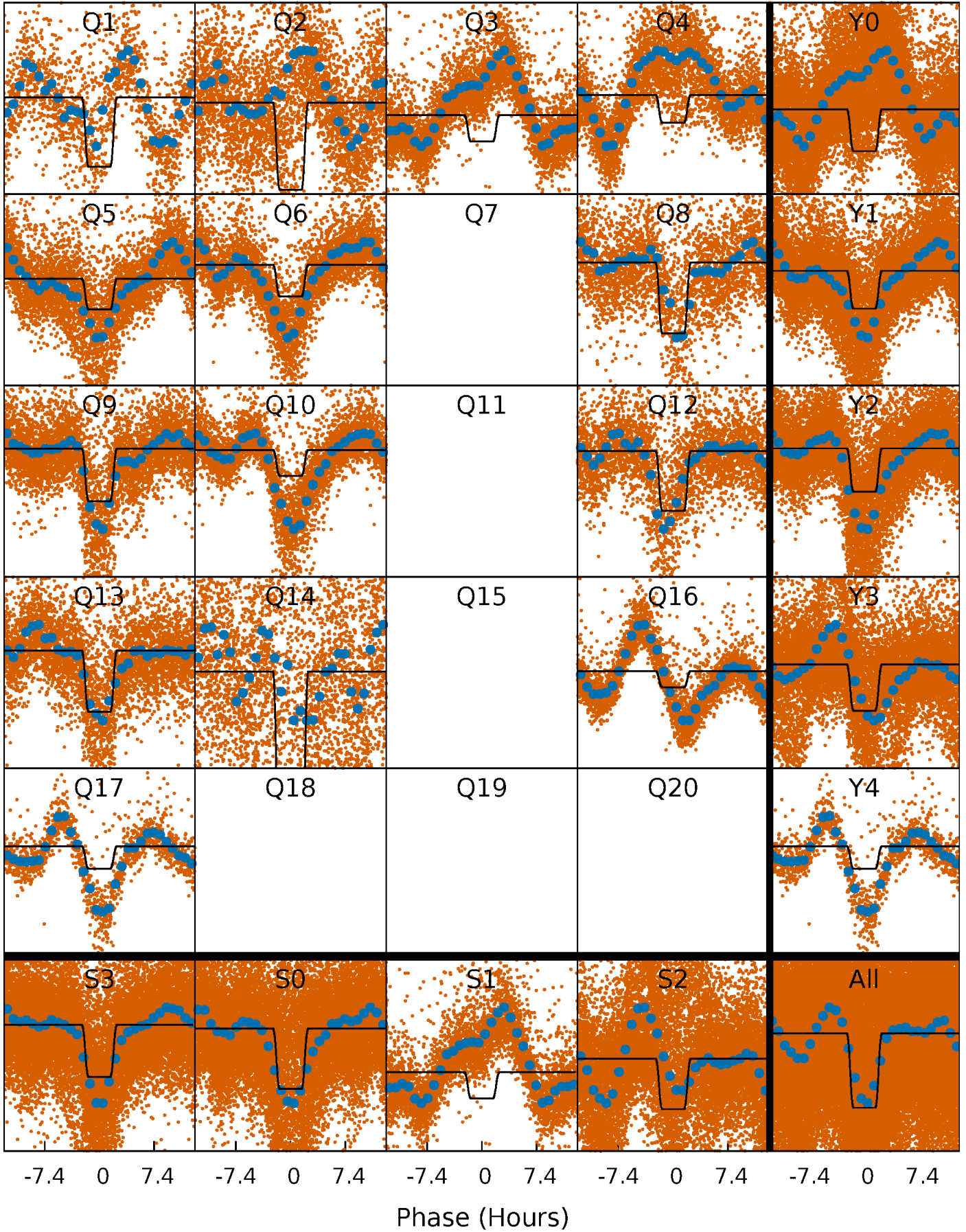
# DV Quarter-Phased Transit Curves

TCE 010548640-01 P= 0.965300 Days  $T_0=132.502345$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

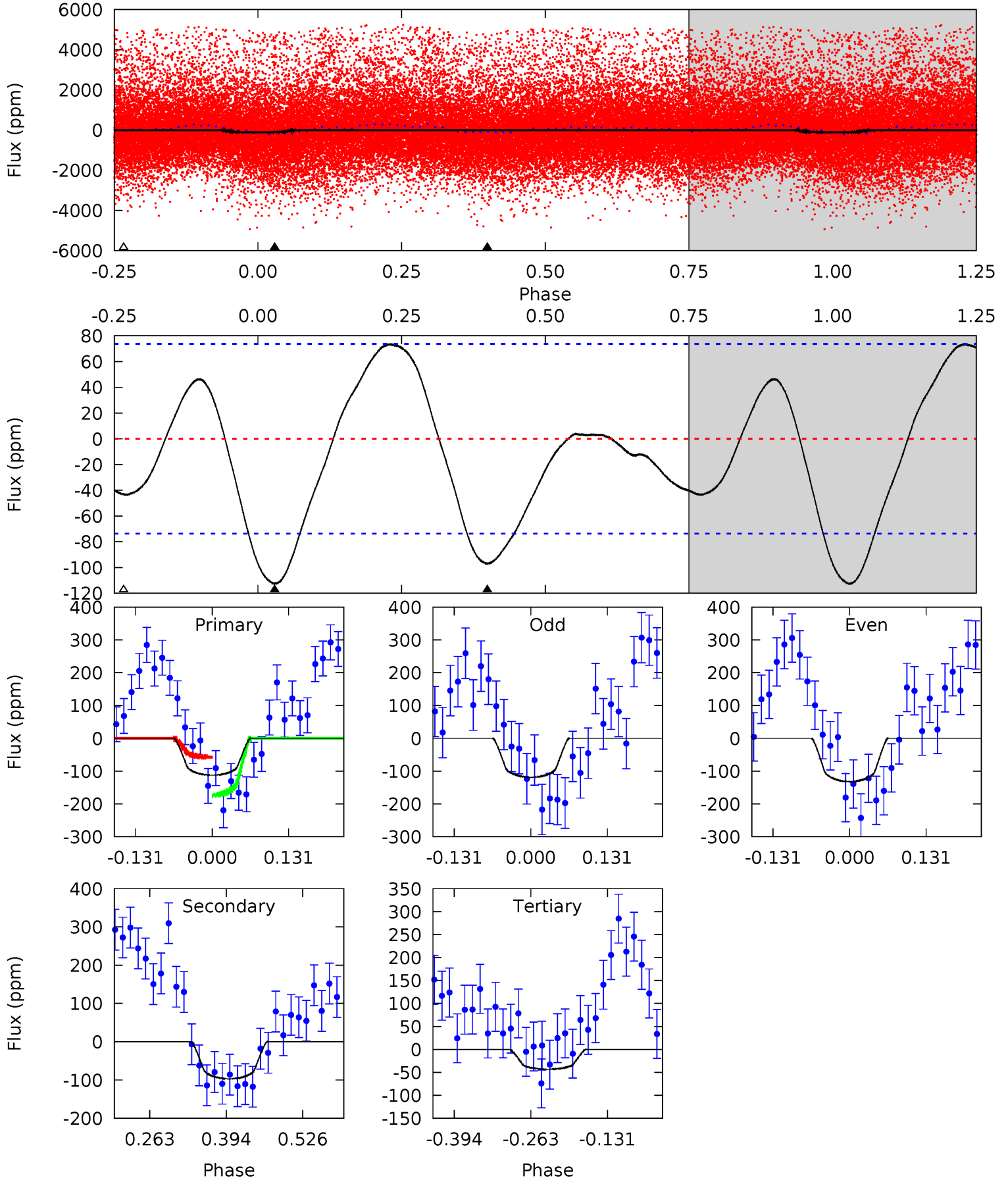
TCE 010548640-01 P= 0.965651 Days  $T_0=132.366274$  (BKJD)



# DV Model-Shift Uniqueness Test

010548640-01, P = 0.965300 Days, E = 130.571745 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
6.89	5.93	2.64	0	4.51	1.51	2.24	4.24	6.89	3.29	5.93	0.40	-2.81	0.39	3.51

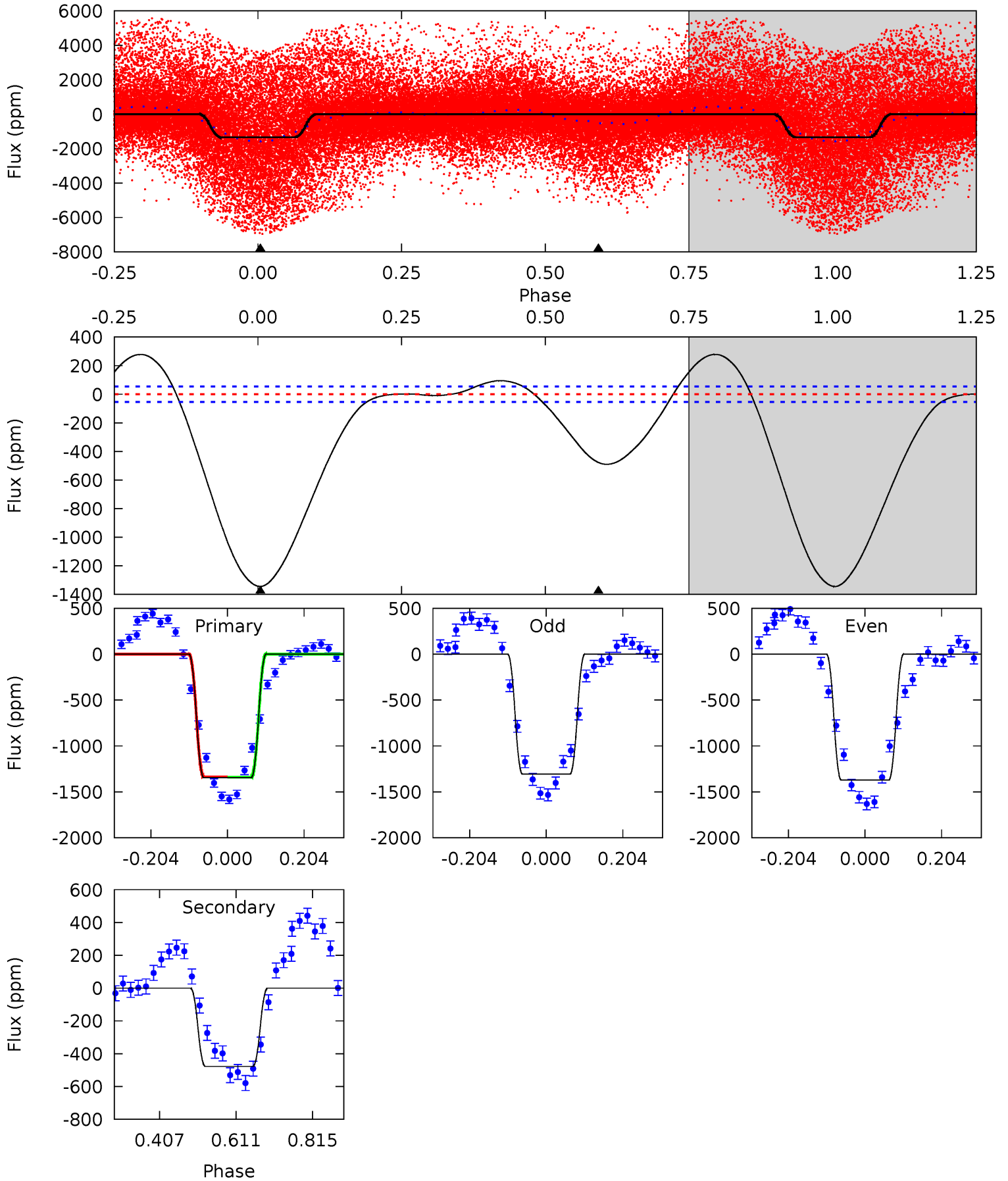




# Alt Model-Shift Uniqueness Test

010548640-01, P = 0.965651 Days, E = 131.400623 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
109.5	38.9	0	0	4.41	1.27	3.70	109.5	109.5	38.9	38.9	2.71	0.94	0.17	0.08





### Stellar Parameters For KIC 010548640

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3727^{+116}_{-142}$	$4.679^{+0.072}_{-0.022}$	$0.560^{+0.050}_{-0.300}$	$0.575^{+0.033}_{-0.076}$	$0.576^{+0.036}_{-0.068}$	$4.261^{+1.573}_{-0.399}$
	+3%/-4%	+2%/-0%	+9%/-54%	+6%/-13%	+6%/-12%	+37%/-9%
Source	KIC0	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 010548640-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-97 \pm 16$	$1.35^{+1.41}_{-0.96}$	$1370^{+51}_{-58}$	$2926^{+1414}_{-549}$	$7.987^{+81.632}_{-6.206}$
Alt.	$-477 \pm 12$	$2.66^{+1.51}_{-1.58}$	$1366^{+49}_{-57}$	$3005^{+1010}_{-379}$	$9.335^{+48.026}_{-5.520}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

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

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

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

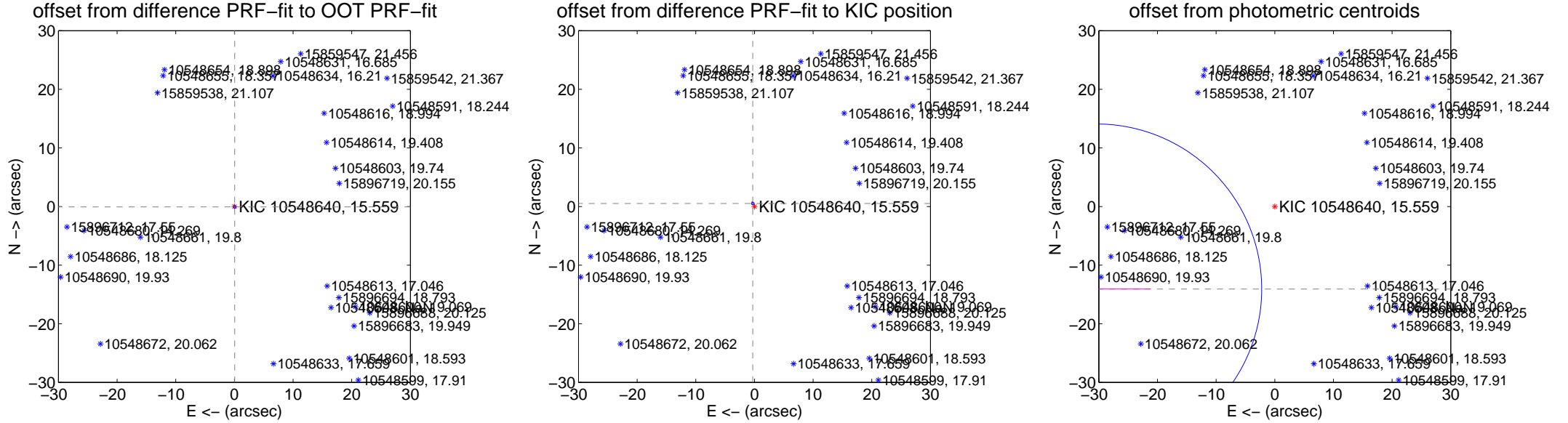
## DV Centroid Data

Supplemental centroid analysis for 010548640-01. Kepler magnitude: 15.56. Transit SNR 0.49

There are 6 quarters with good PRF difference image offsets

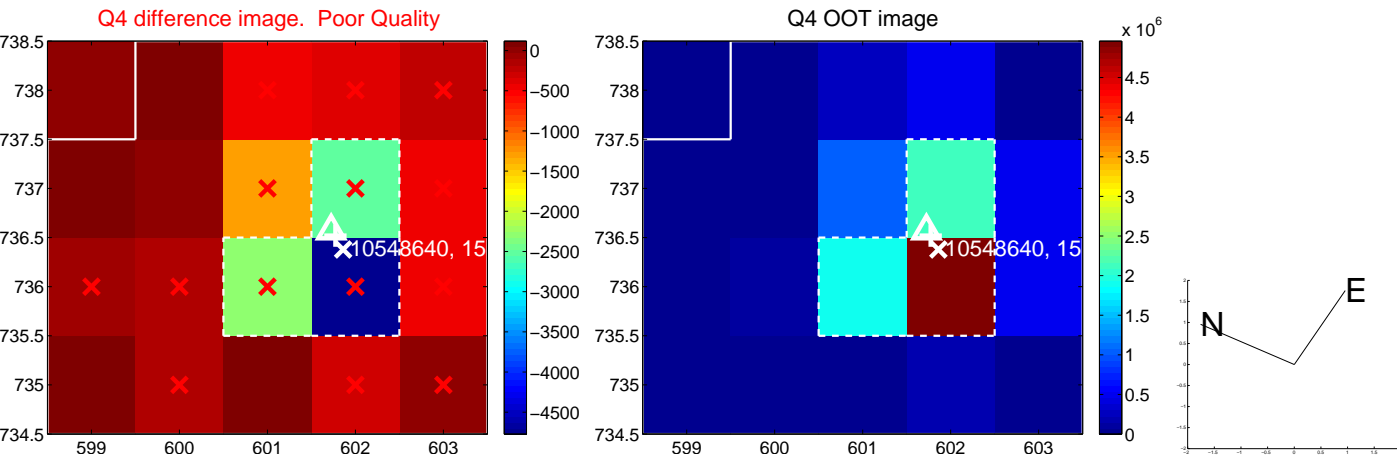
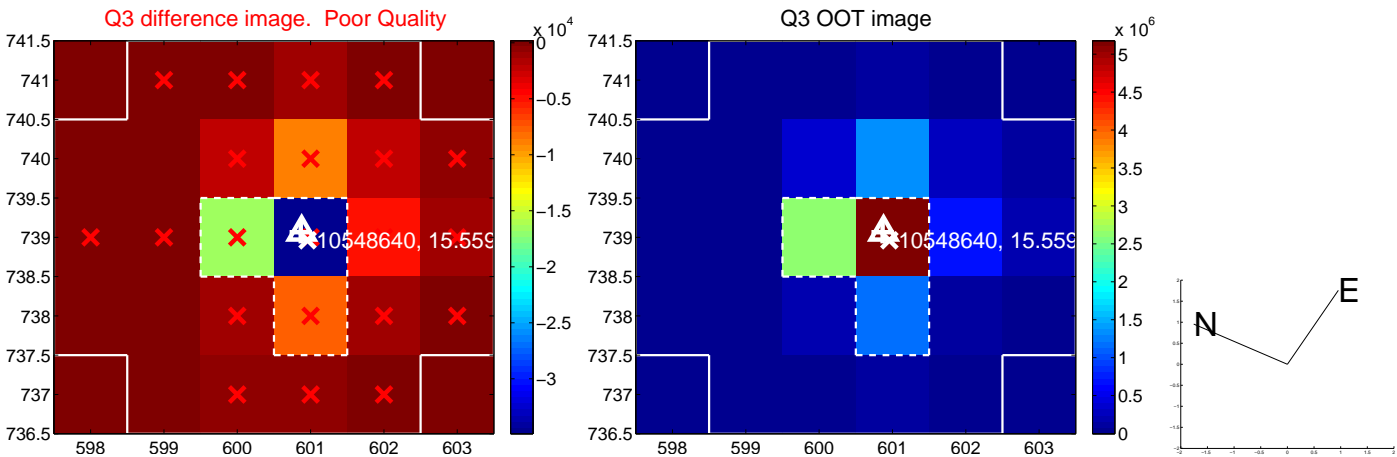
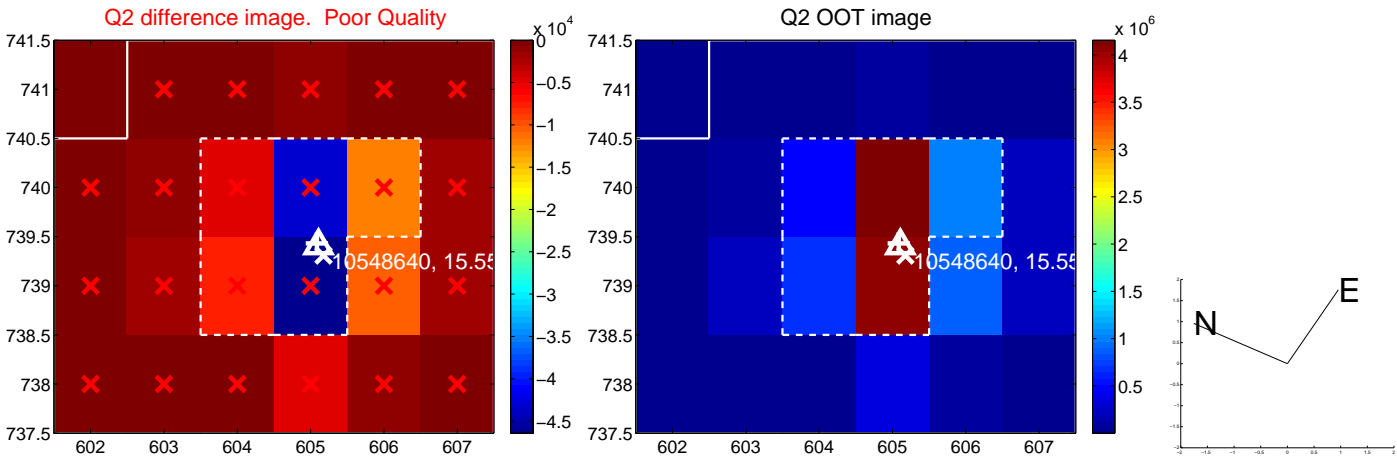
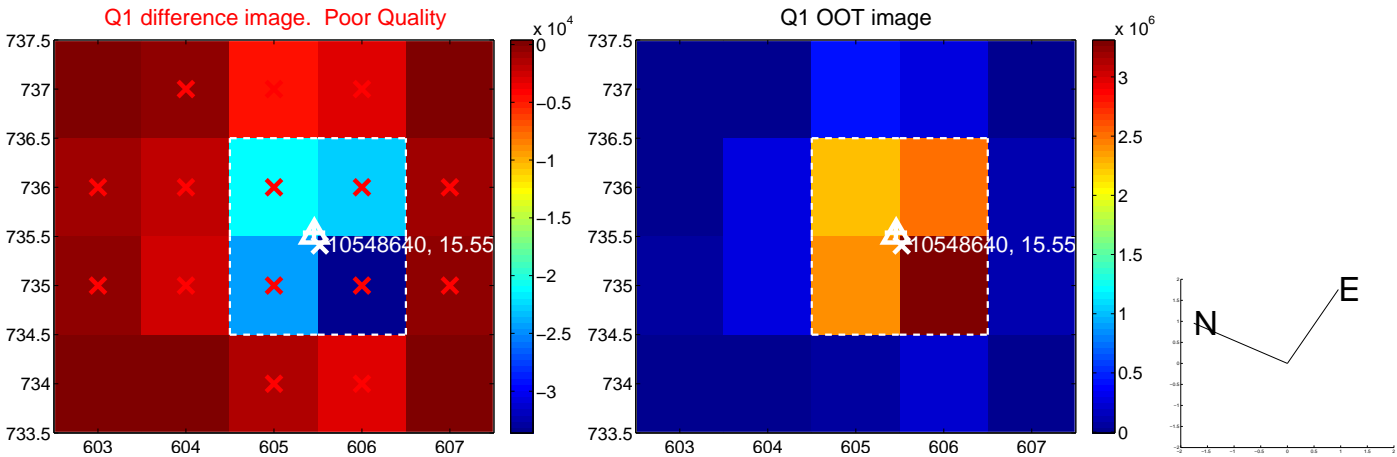
The direct PRF centroid is offset from the target star catalog position by about 0.69 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.085 \pm 0.073$	1.16	$-0.055 \pm 0.069$	$-0.065 \pm 0.071$
PRF-fit source offset from KIC position	$0.588 \pm 0.075$	7.81	$0.287 \pm 0.070$	$0.513 \pm 0.074$
photometric centroid source offset	$33.50 \pm 9.39$	3.57	$30.39 \pm 9.18$	$-14.08 \pm 10.28$

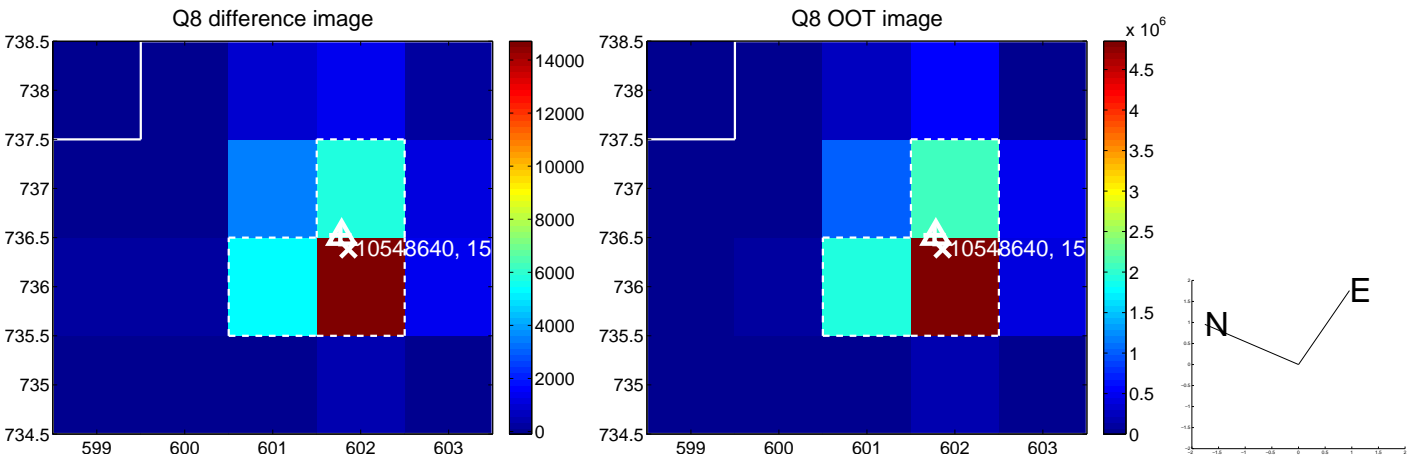
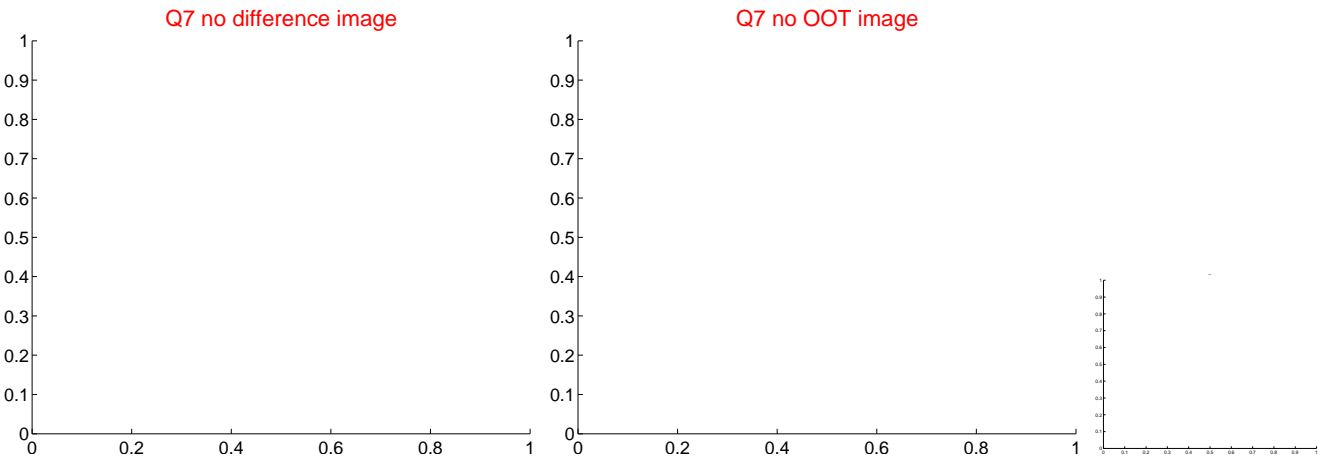
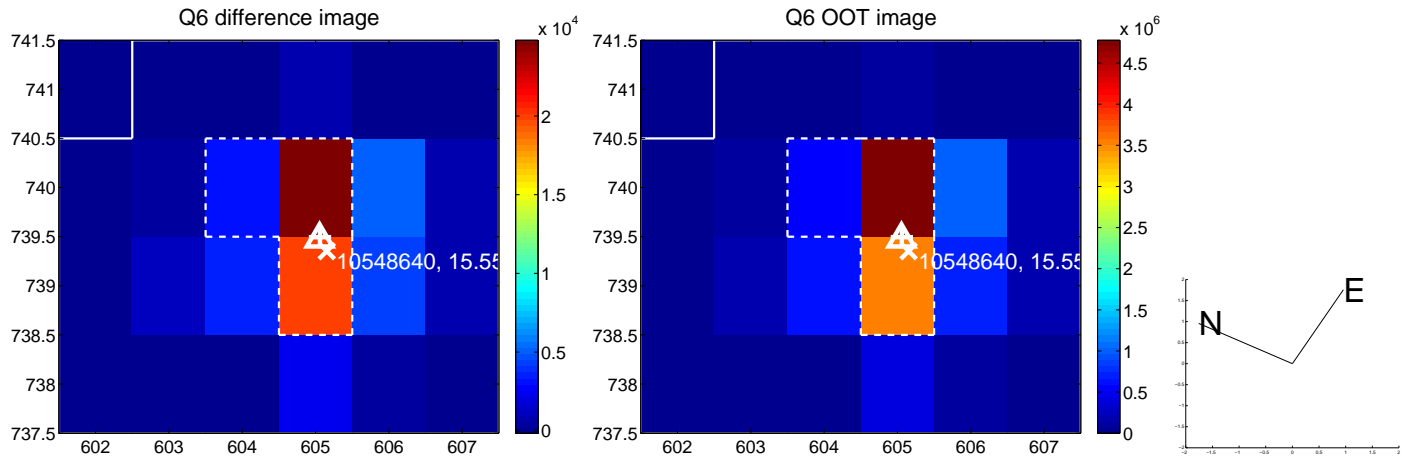
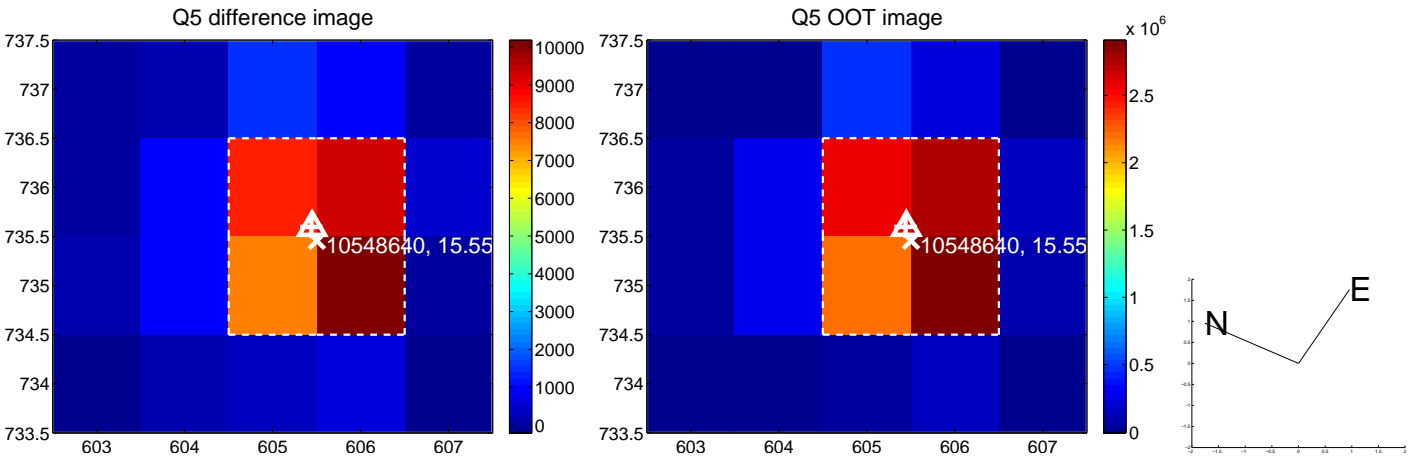


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . 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.

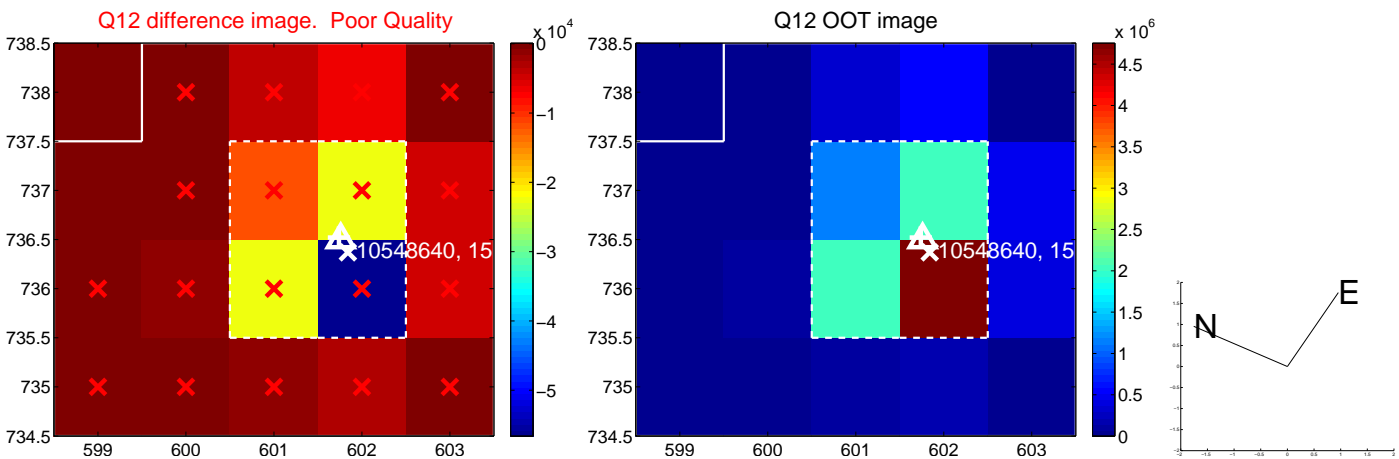
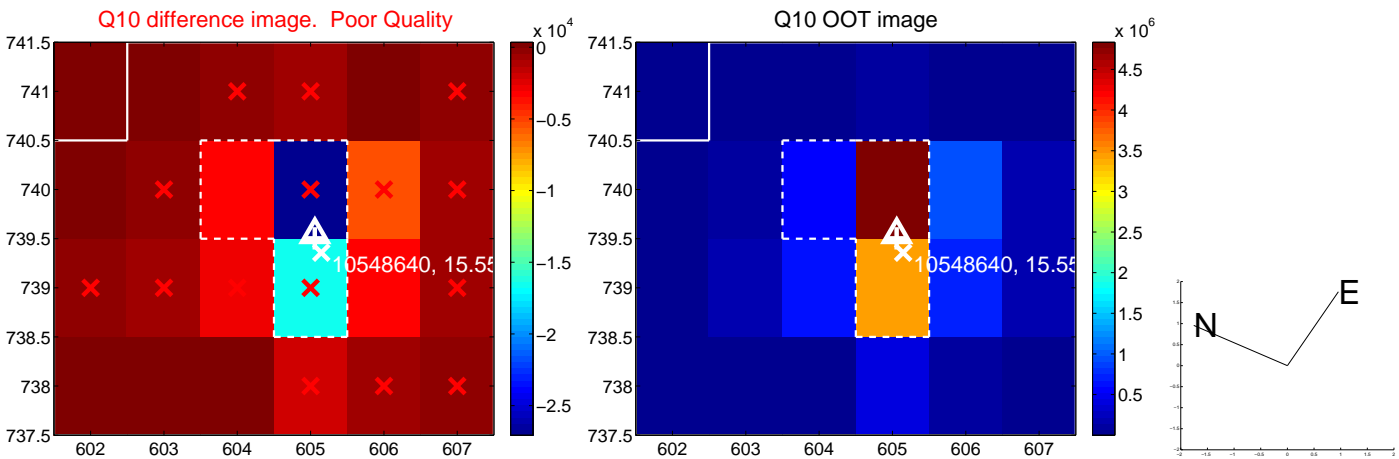
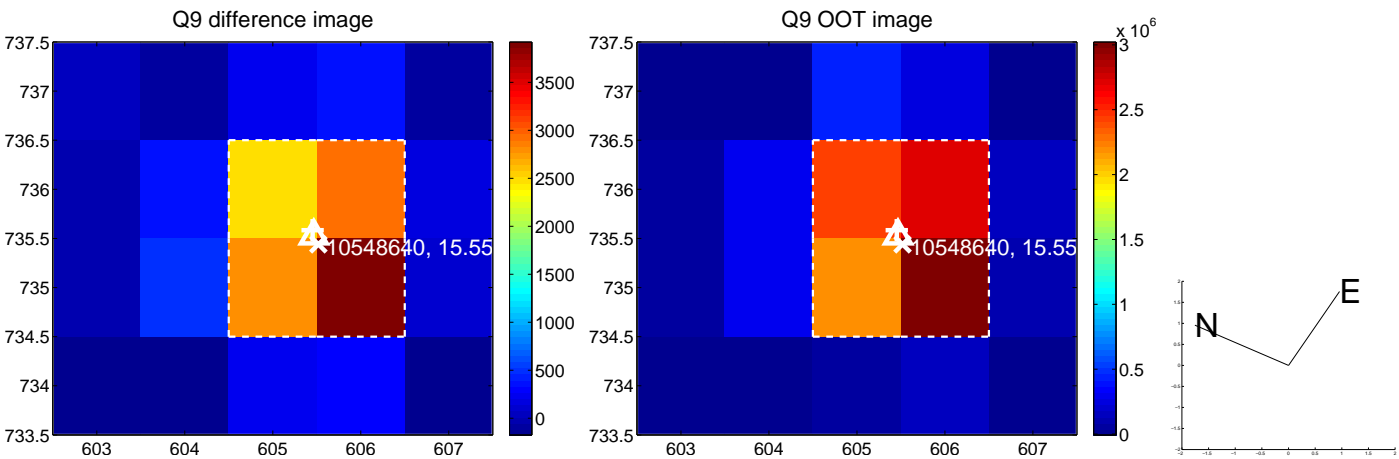


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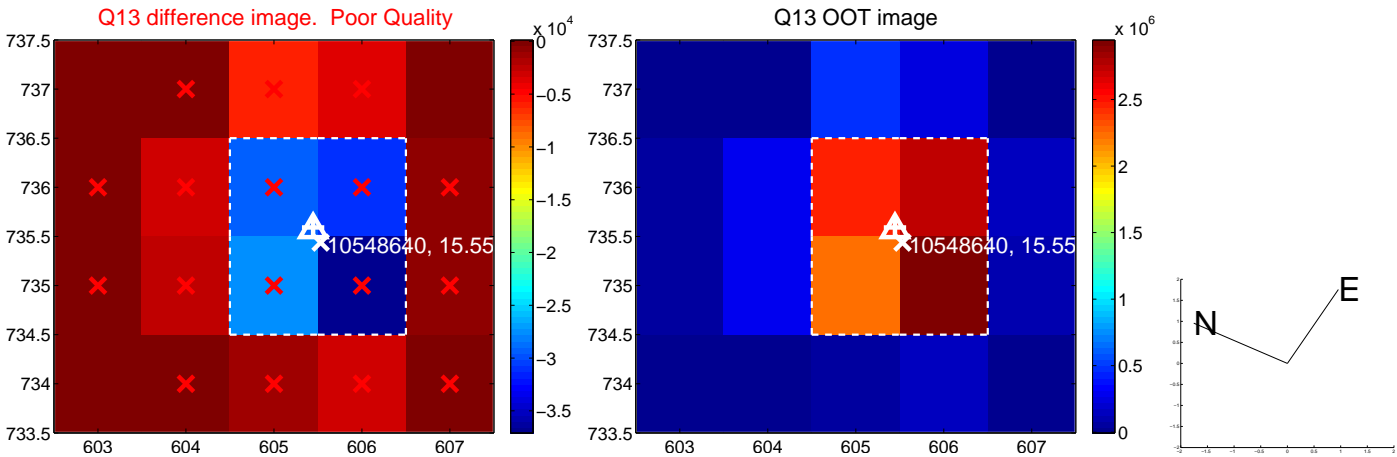




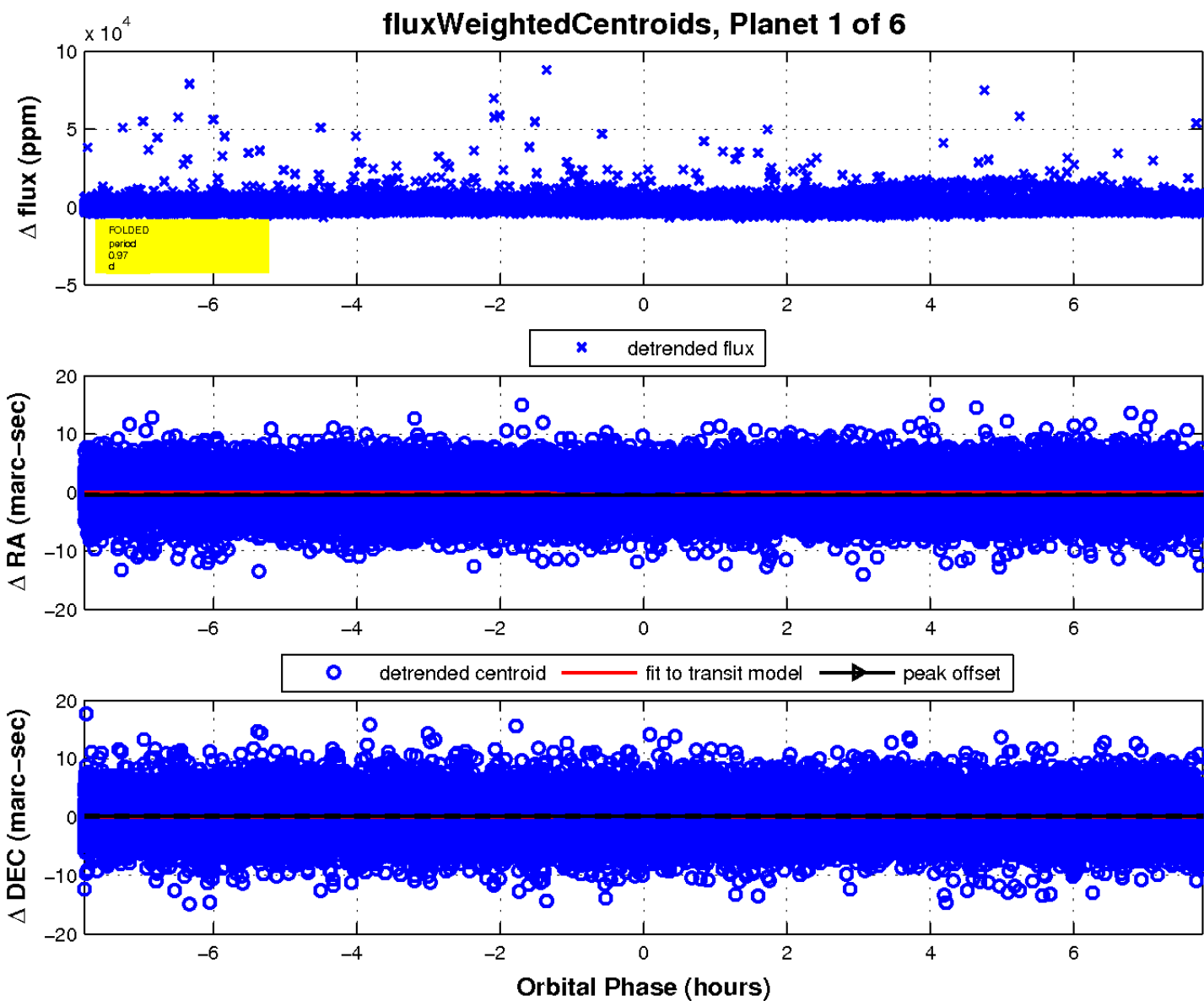
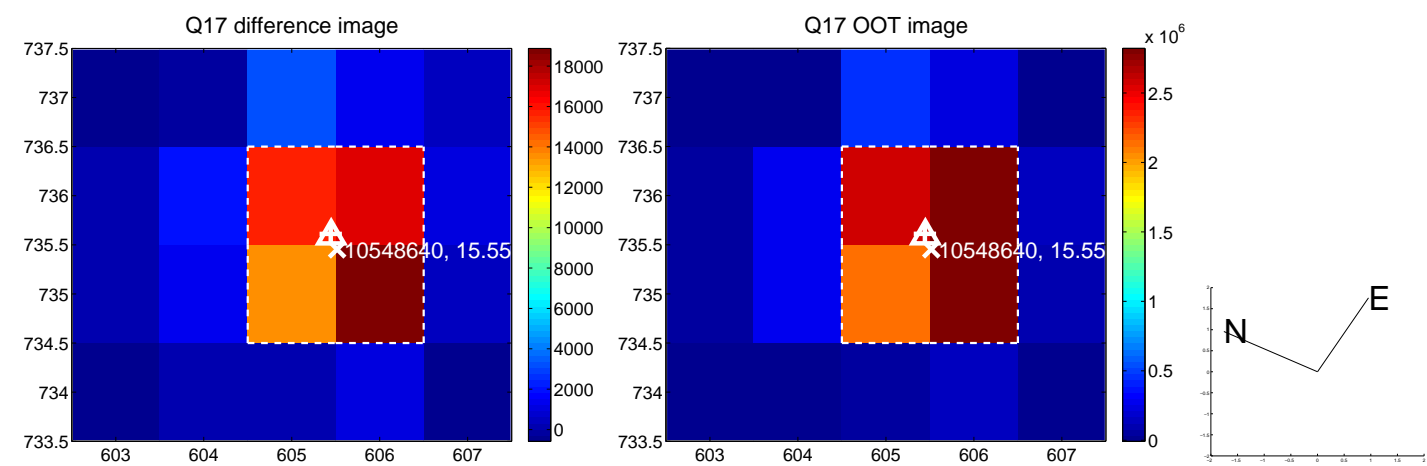
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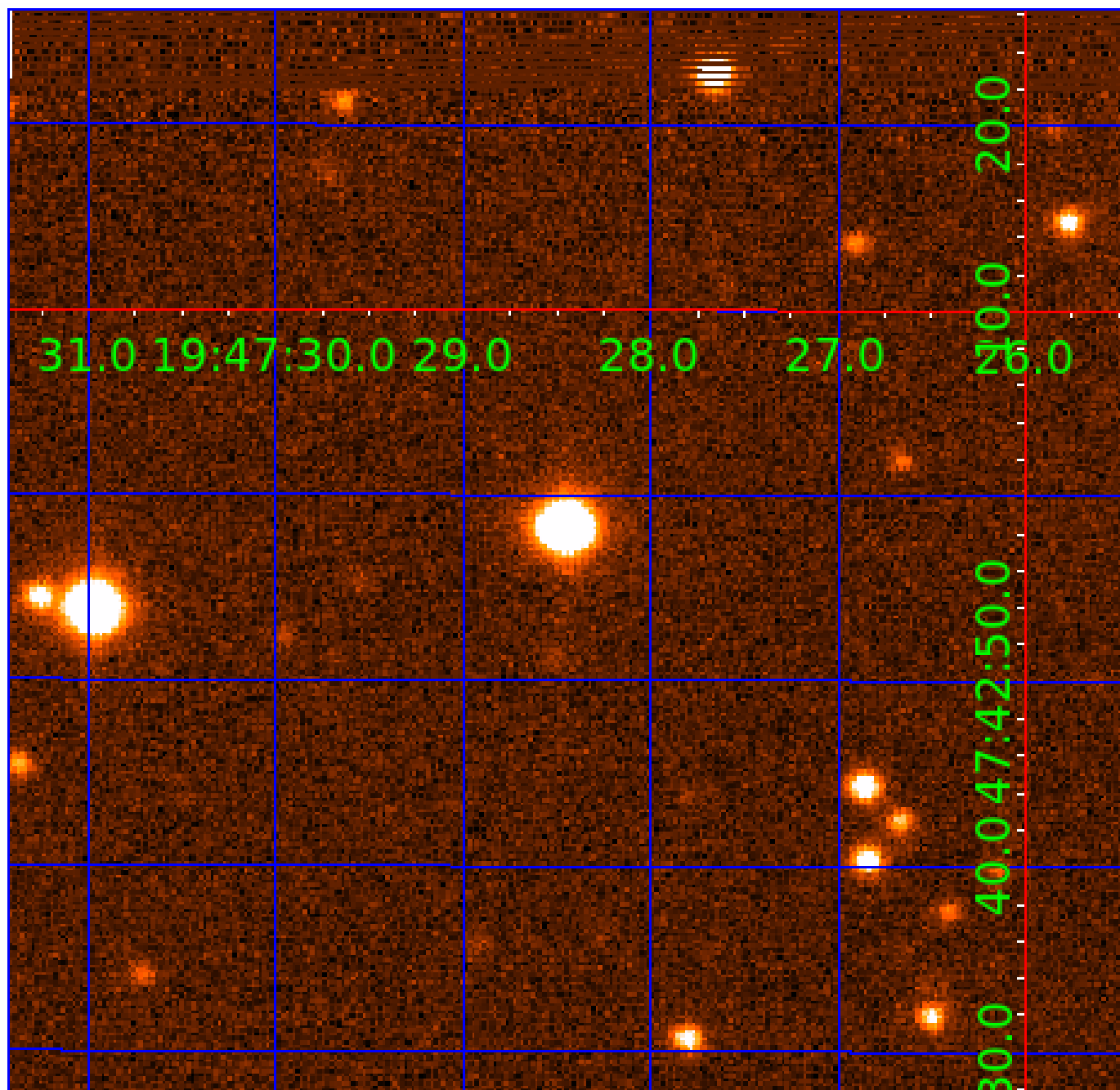


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UKIRT Image

Declination





# KIC 010548640

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
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## Robovetter Results

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010548640-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_KIC_POS

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

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

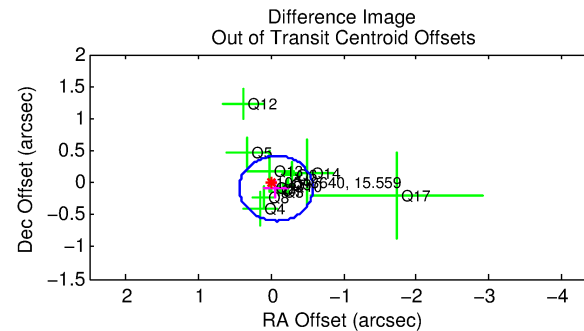
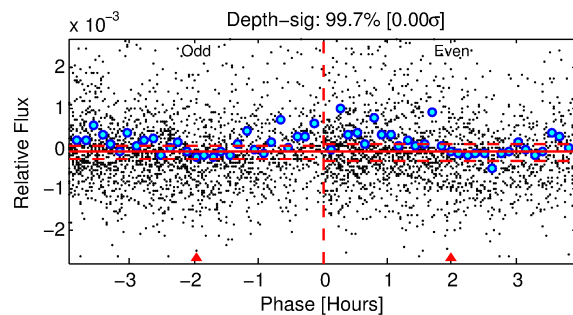
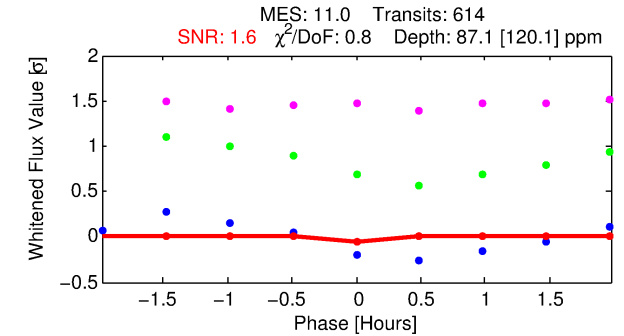
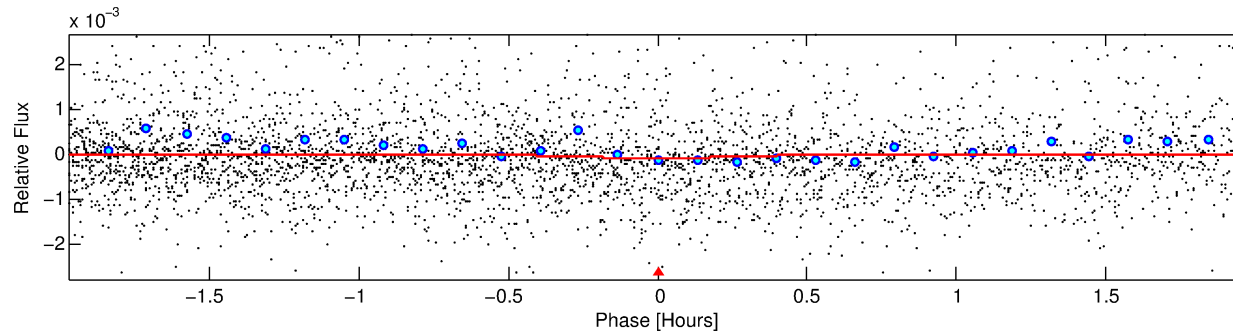
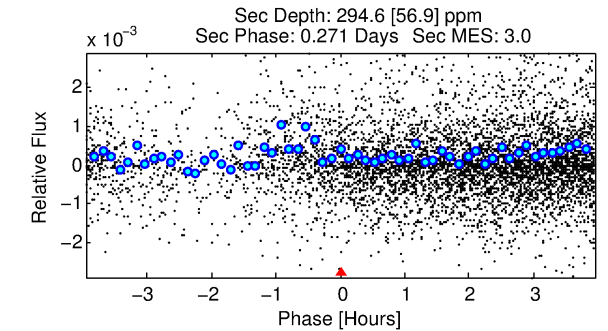
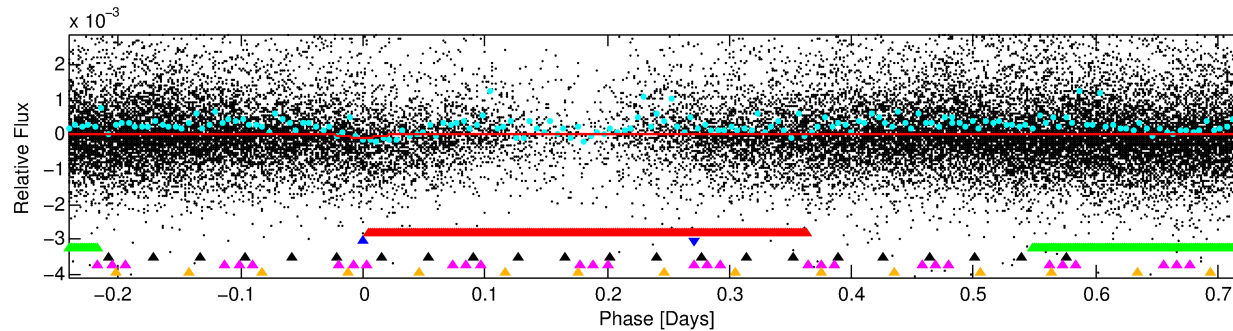
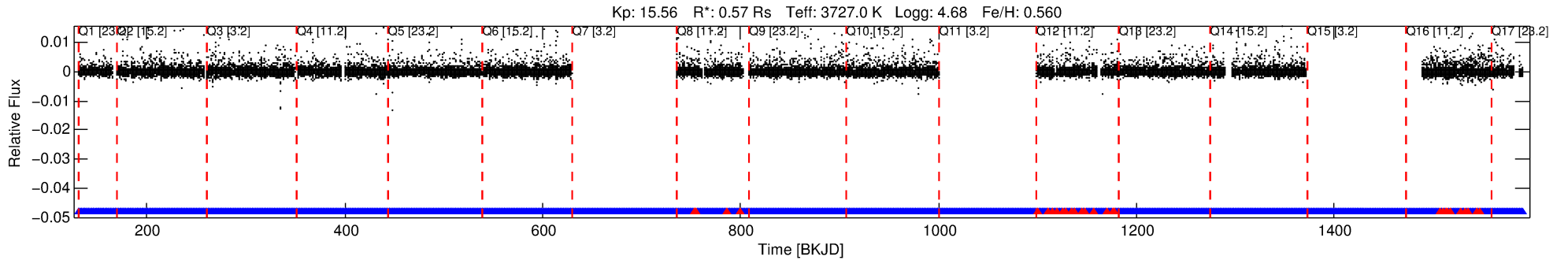
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## Ephemeris Match Information For 010548640-02

No Significant Match Found

# DV One-Page Summary

KIC: 10548640 Candidate: 2 of 6 Period: 0.965 d



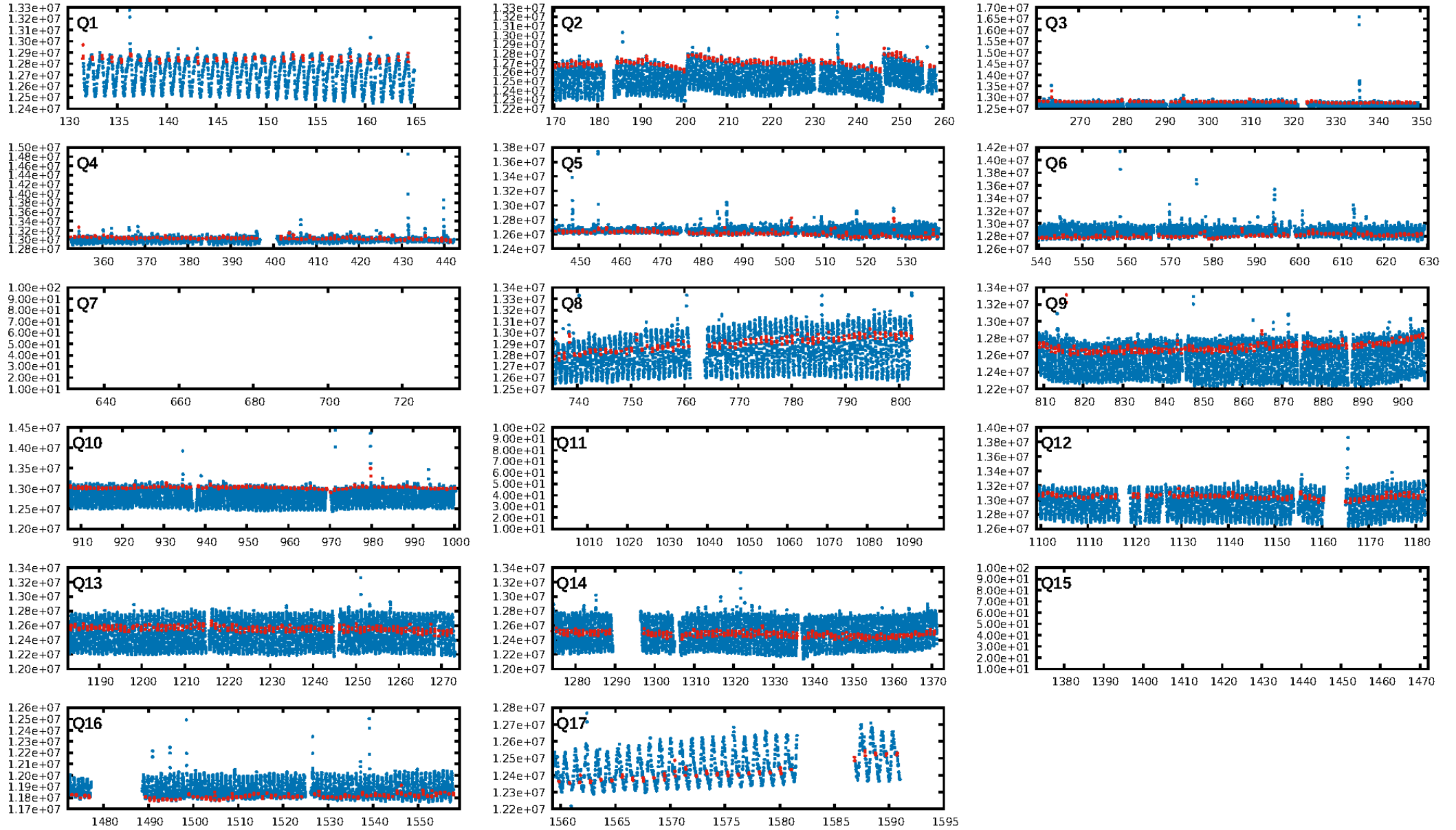
## DV Fit Results:

Period = 0.96506 [0.00012] d  
Epoch = 131.5323 [0.0068] BKJD  
Rp/R\* = 0.0108 [0.0261]  
a/R\* = 5.32 [47.13]  
b = 0.90 [2.05]  
Seff = 225.96 [46.97]  
Teq = 989 [51] K  
Rp = 0.67 [1.64] Re  
a = 0.0159 [0.0017] AU  
Ag = 90.05 [437.72] [0.20σ]  
Teffp = 4709 [5723] K [0.65σ]

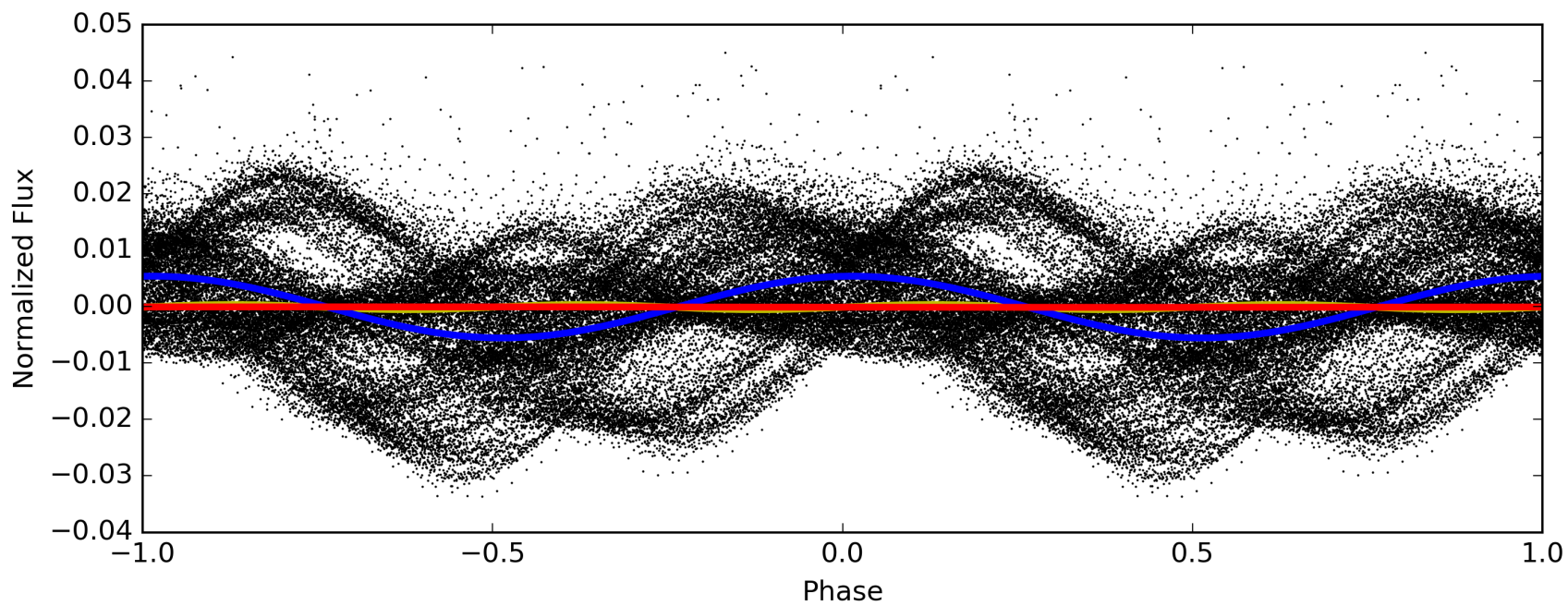
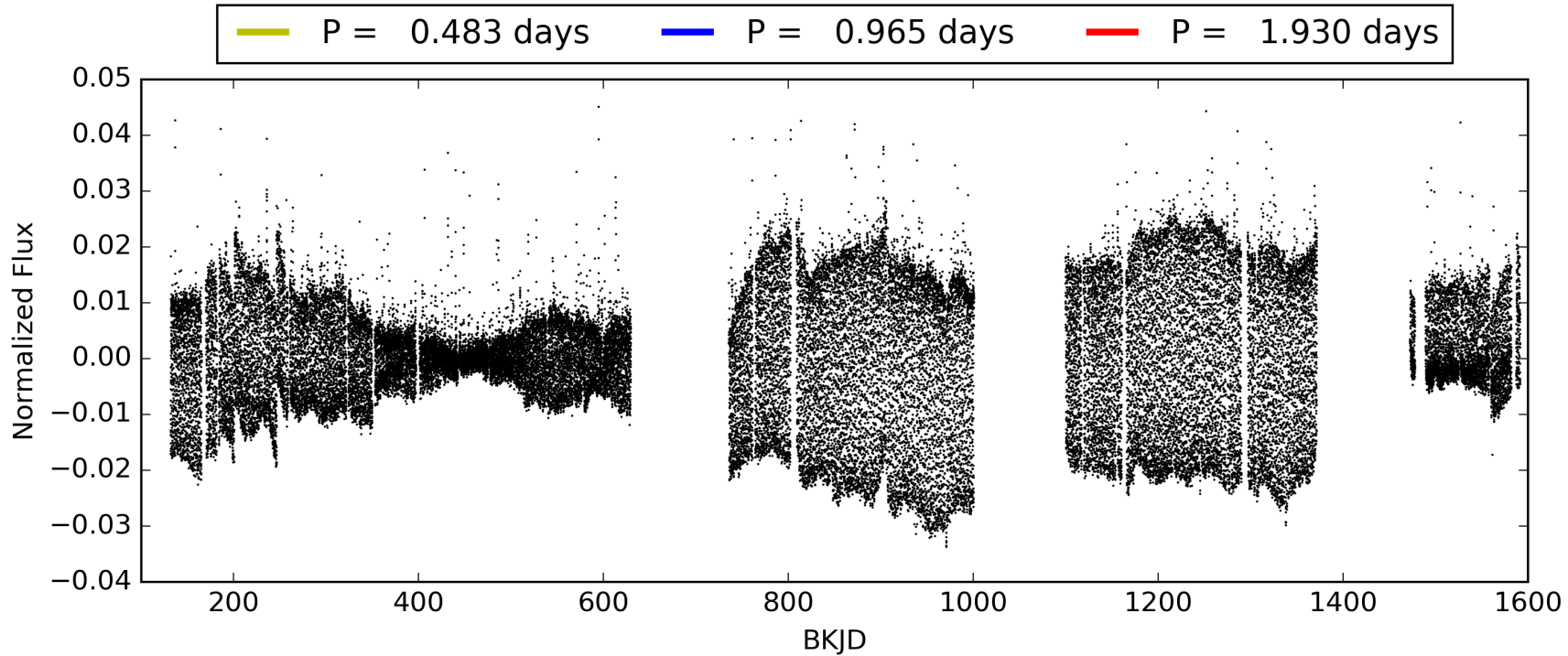
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.2% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 4.01e-26  
RollingBand-fgt: 0.95 [557/586]  
GhostDiagnostic-chr: -5.871  
Centroid-sig: 72.8%  
Centroid-so: 1.951 arcsec [0.61σ]  
OotOffset-rm: 0.115 arcsec [0.68σ]  
KicOffset-rm: 0.489 arcsec [3.33σ]  
OotOffset-st: 4/1/3/5 [13]  
KicOffset-st: 4/1/3/5 [13]  
DiffImageQuality-fgm: 0.23 [3/13]  
DiffImageOverlap-fno: 0.29 [4/14]

# TCE 010548640-02, PDC Light Curves

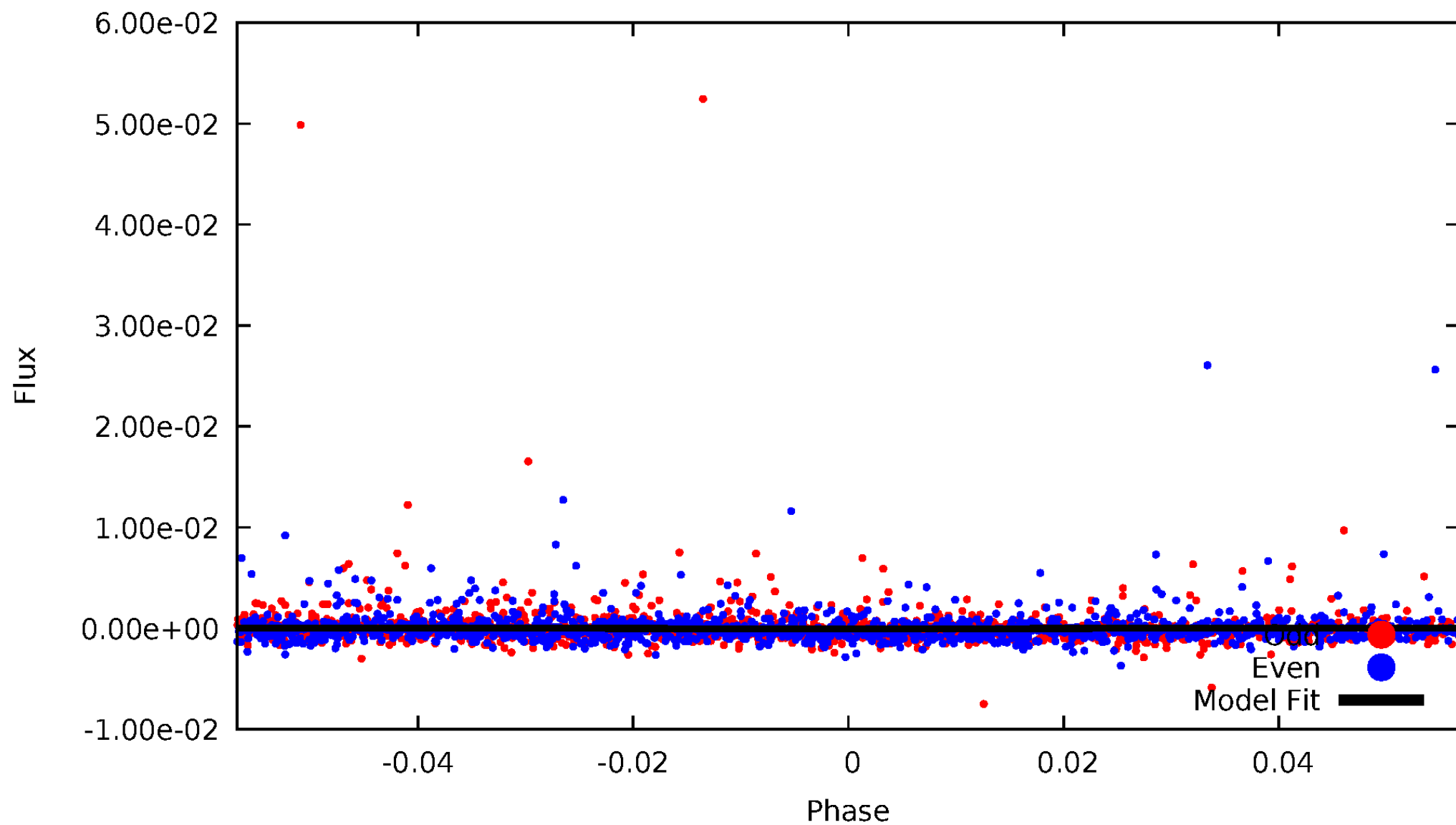


TCE 010548640-02



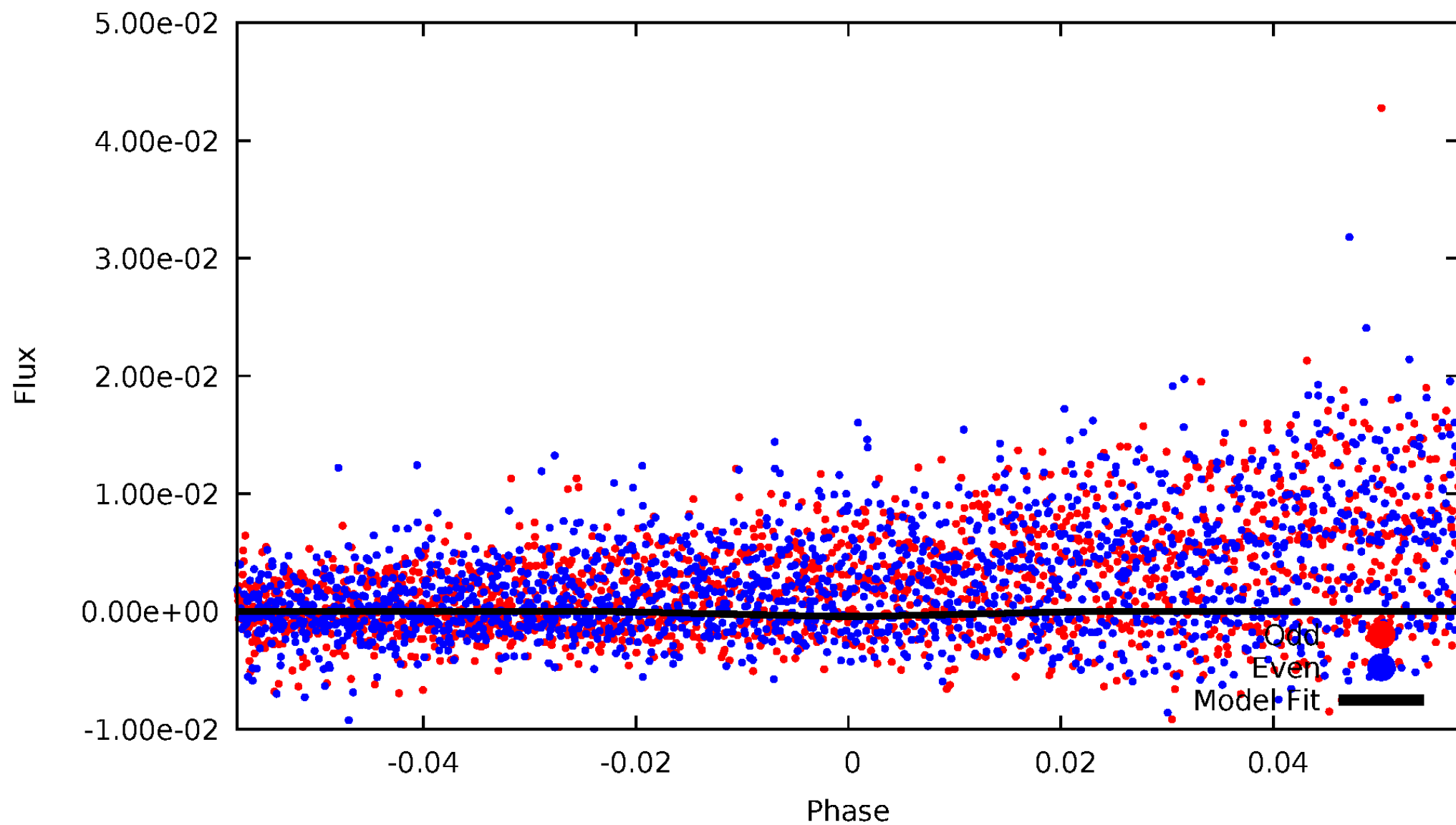
# DV Odd/Even

TCE 010548640-02



# ALT Odd/Even

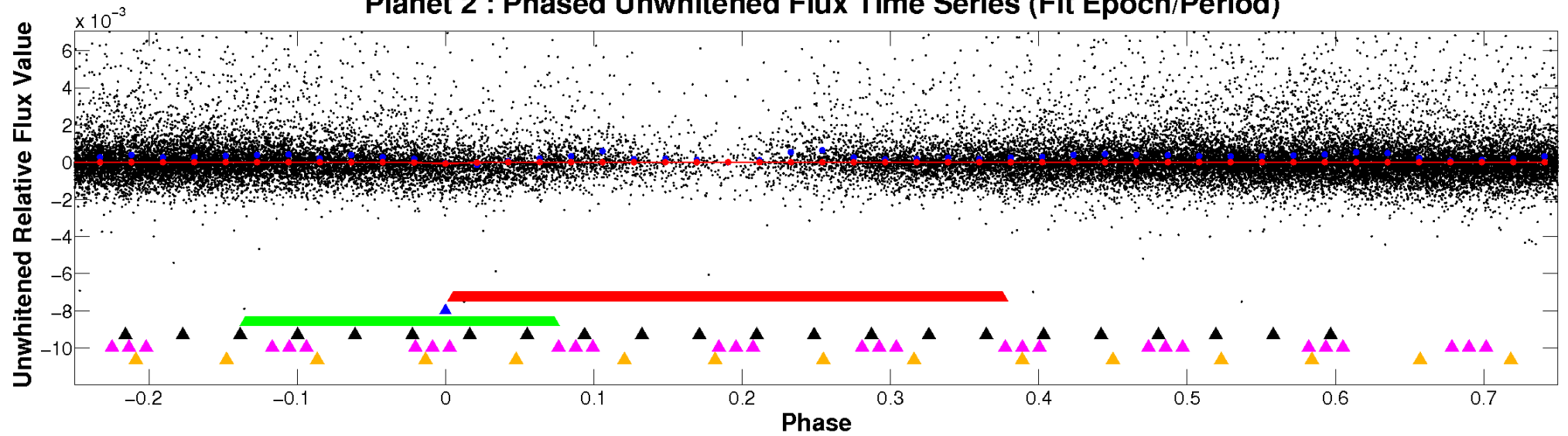
TCE 010548640-02



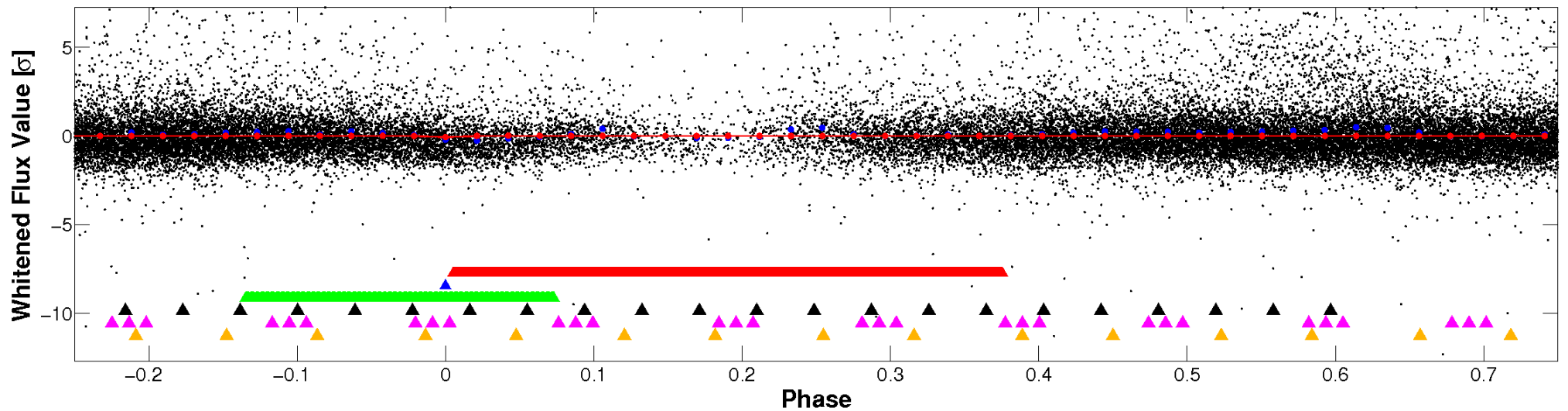


# Non-Whitened Vs. Whitened Light Curve

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

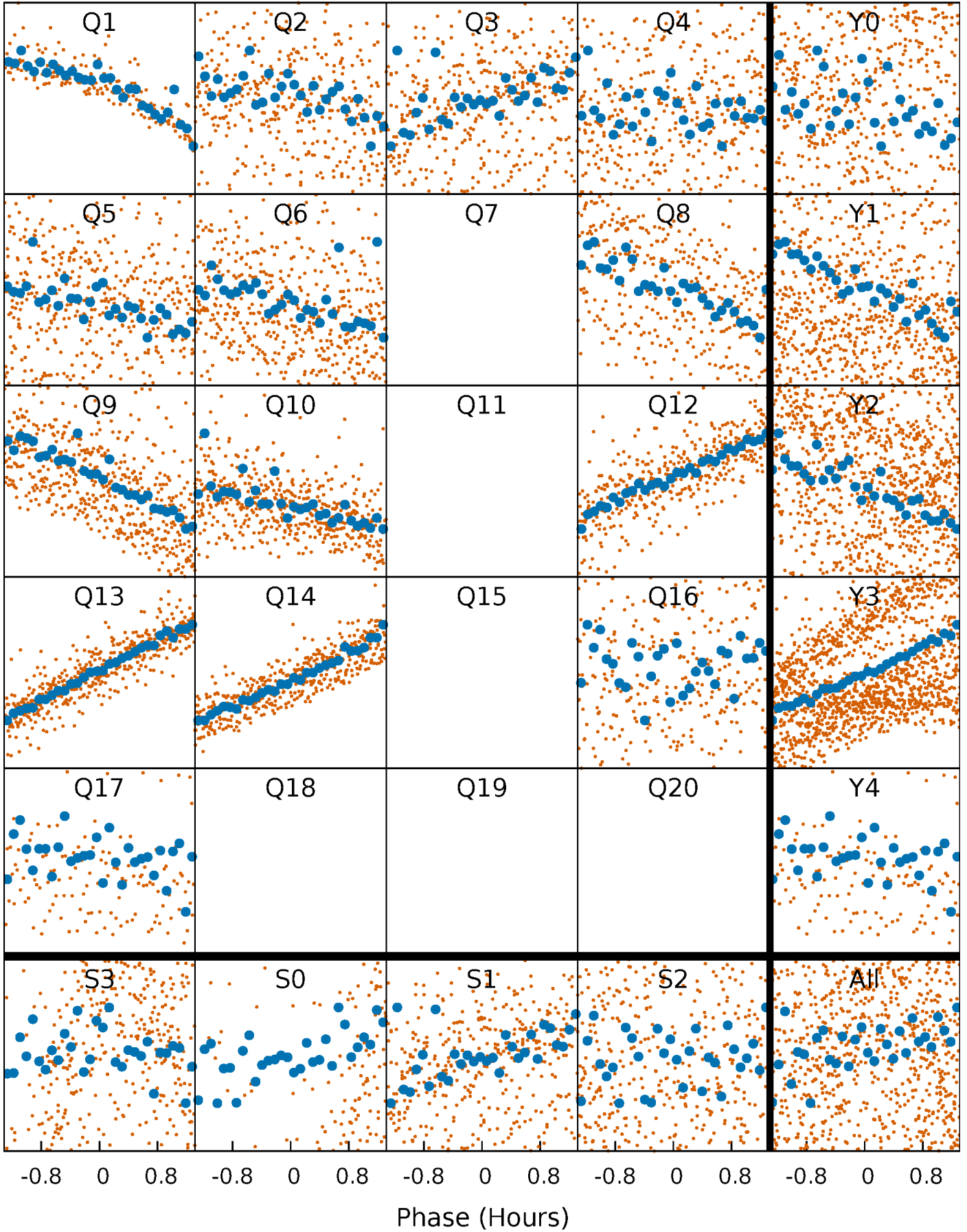


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



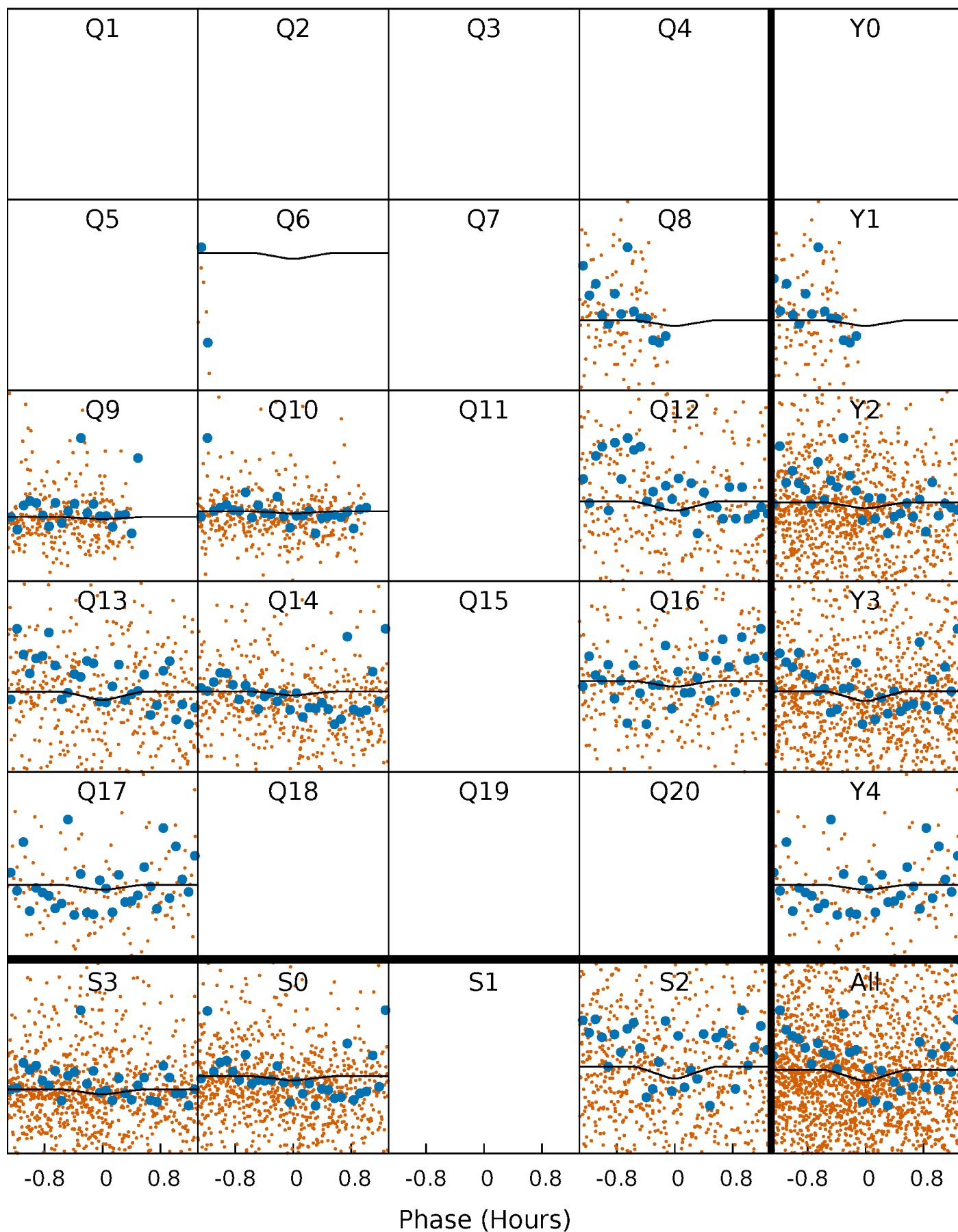
# PDC Quarter-Phased Transit Curves

TCE 010548640-02   P= 0.965064 Days    $T_0=131.532301$  (BKJD)



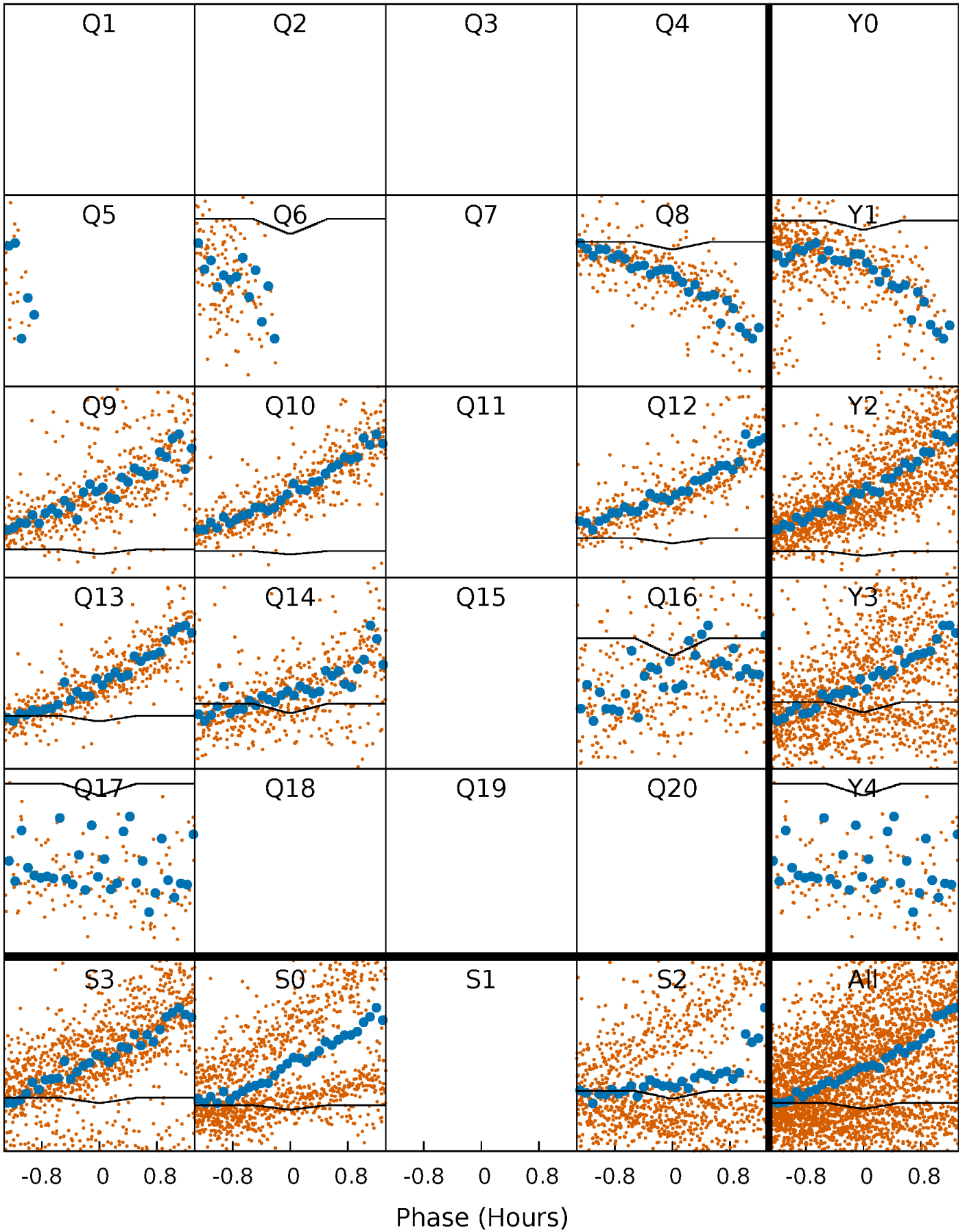
# DV Quarter-Phased Transit Curves

TCE 010548640-02     $P = 0.965064$  Days     $T_0 = 131.532301$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

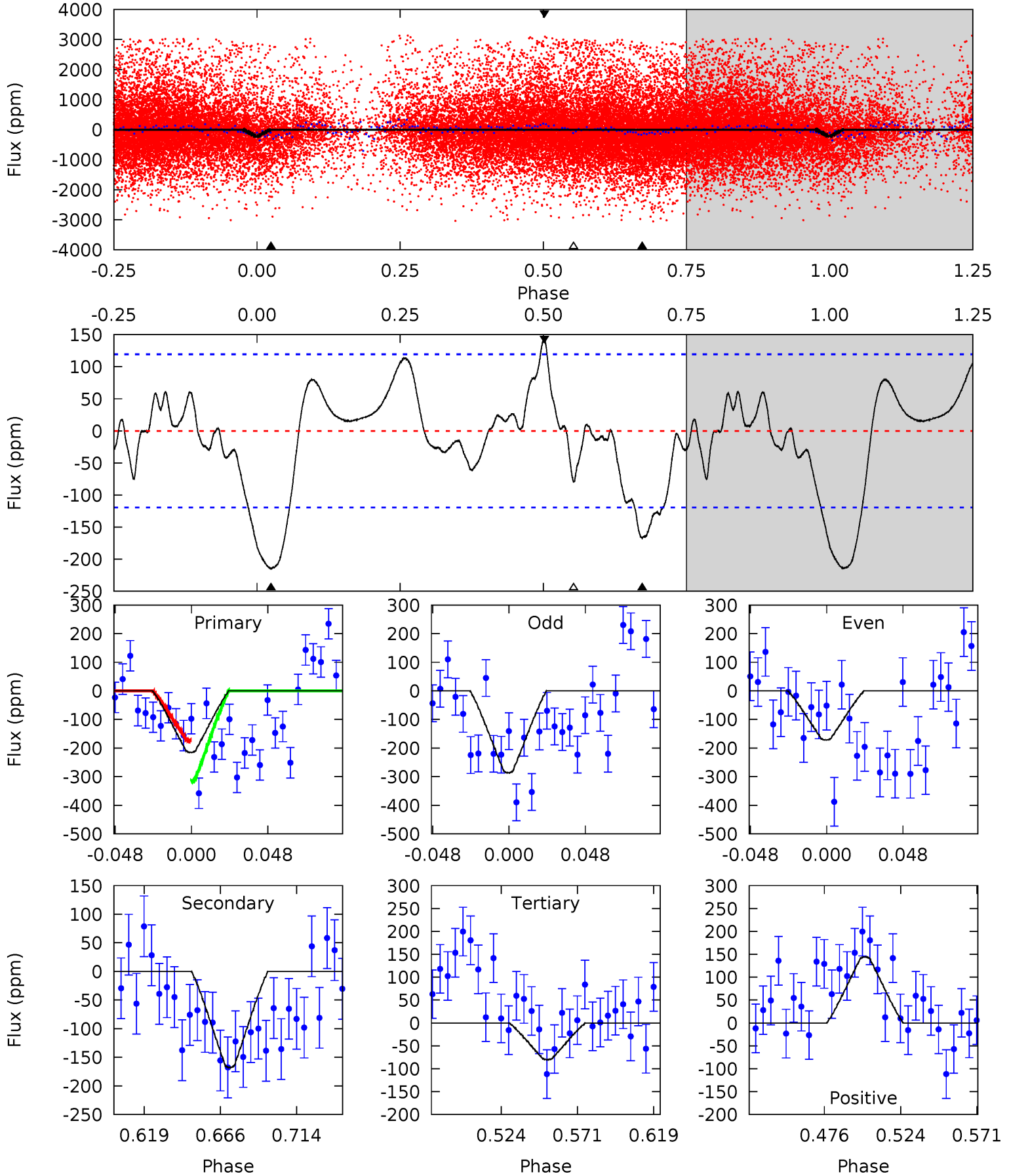
TCE 010548640-02     $P = 0.964976$  Days     $T_0 = 131.537066$  (BKJD)



# DV Model-Shift Uniqueness Test

010548640-02, P = 0.965064 Days, E = 131.532301 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
8.49	6.63	3.16	5.69	4.72	1.98	1.75	5.33	2.80	3.47	0.93	2.29	0.46	0.40	2.83

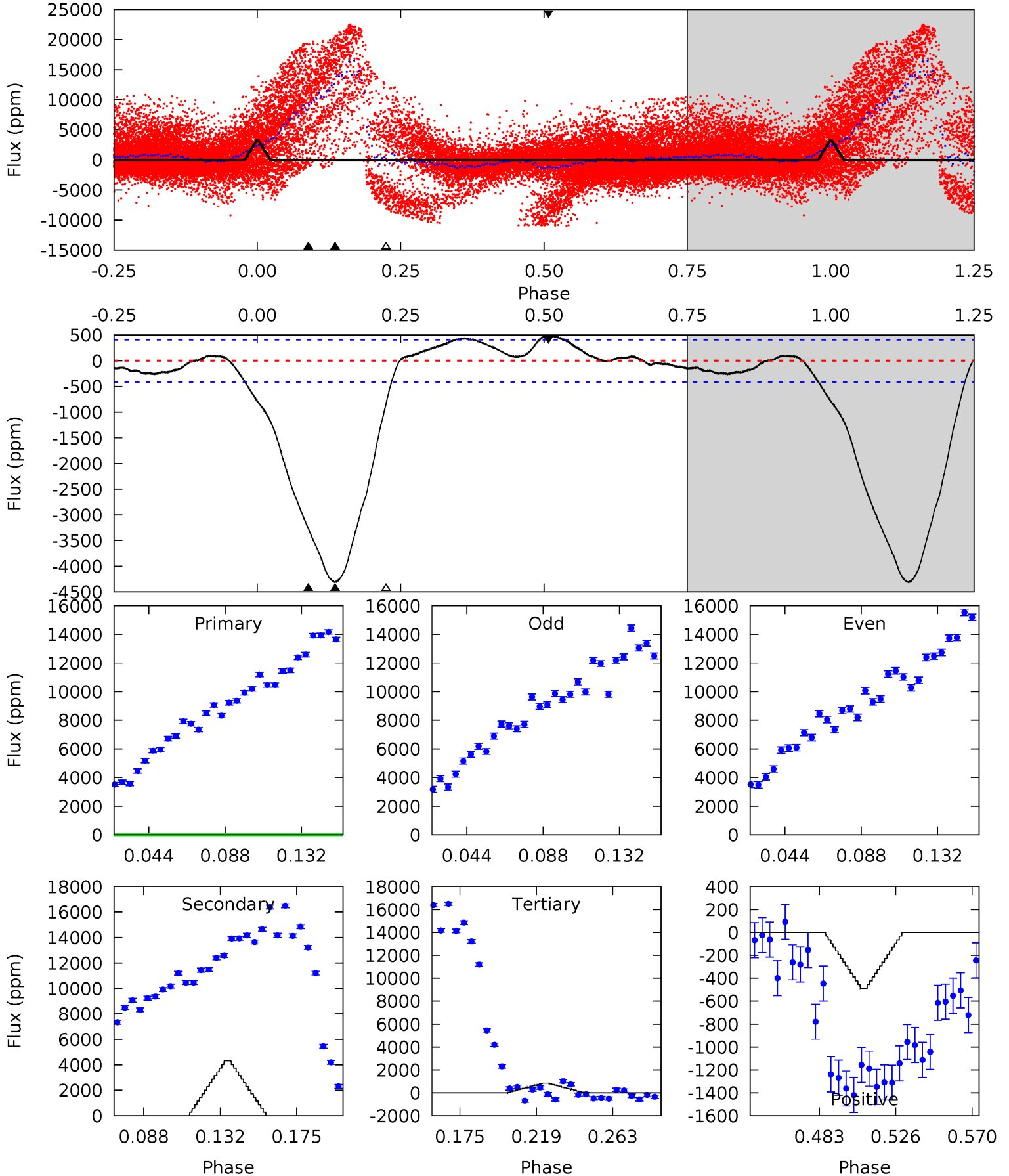




# Alt Model-Shift Uniqueness Test

010548640-02, P = 0.964976 Days, E = 131.537066 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
37.7	49.7	9.75	5.62	4.73	2.02	4.59	27.9	32.0	40.0	44.1	1.47	1.15	0.10	4.62



### Stellar Parameters For KIC 010548640

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3727^{+116}_{-142}$	$4.679^{+0.072}_{-0.022}$	$0.560^{+0.050}_{-0.300}$	$0.575^{+0.033}_{-0.076}$	$0.576^{+0.036}_{-0.068}$	$4.261^{+1.573}_{-0.399}$
	+3%/-4%	+2%/-0%	+9%/-54%	+6%/-13%	+6%/-12%	+37%/-9%
Source	KIC0	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 010548640-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-168 \pm 25$	$1.38^{+1.38}_{-0.96}$	$1367^{+50}_{-58}$	$3120^{+1592}_{-576}$	$12^{+123}_{-9}$
Alt.	$-4308 \pm 87$	$1.68^{+1.44}_{-1.08}$	$1368^{+52}_{-60}$	$5173^{+3839}_{-1112}$	$216^{+1490}_{-153}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

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

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

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



## DV Centroid Data

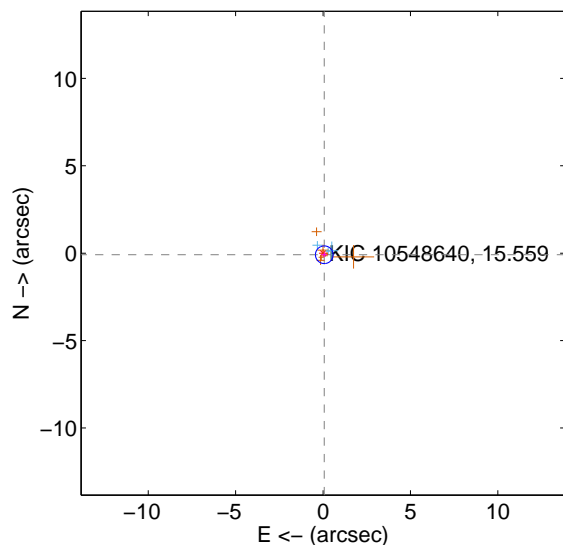
Supplemental centroid analysis for 010548640-02. Kepler magnitude: 15.56. Transit SNR 1.62

There are 3 quarters with good PRF difference image offsets

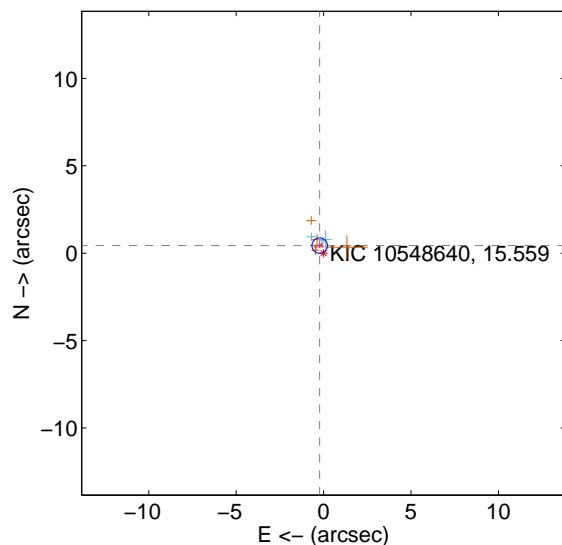
The direct PRF centroid is offset from the target star catalog position by about 0.69 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.115 \pm 0.169$	0.68	$-0.072 \pm 0.159$	$-0.090 \pm 0.135$
PRF-fit source offset from KIC position	<b><math>0.489 \pm 0.147</math></b>	<b>3.33</b>	$0.224 \pm 0.145$	$0.435 \pm 0.136$
photometric centroid source offset	$1.95 \pm 3.19$	0.61	$0.73 \pm 2.91$	$1.81 \pm 3.24$

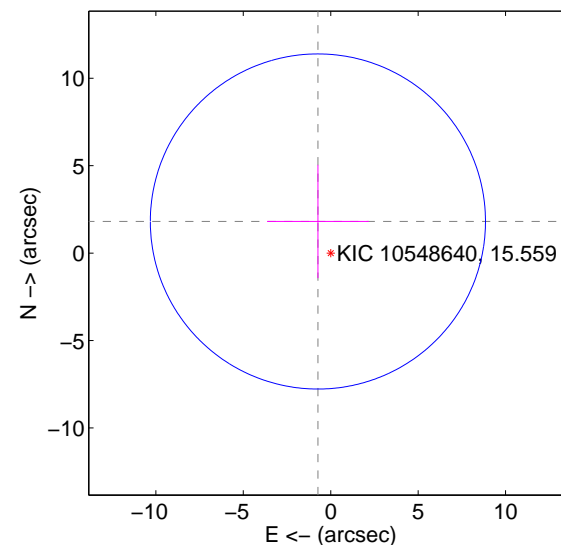
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

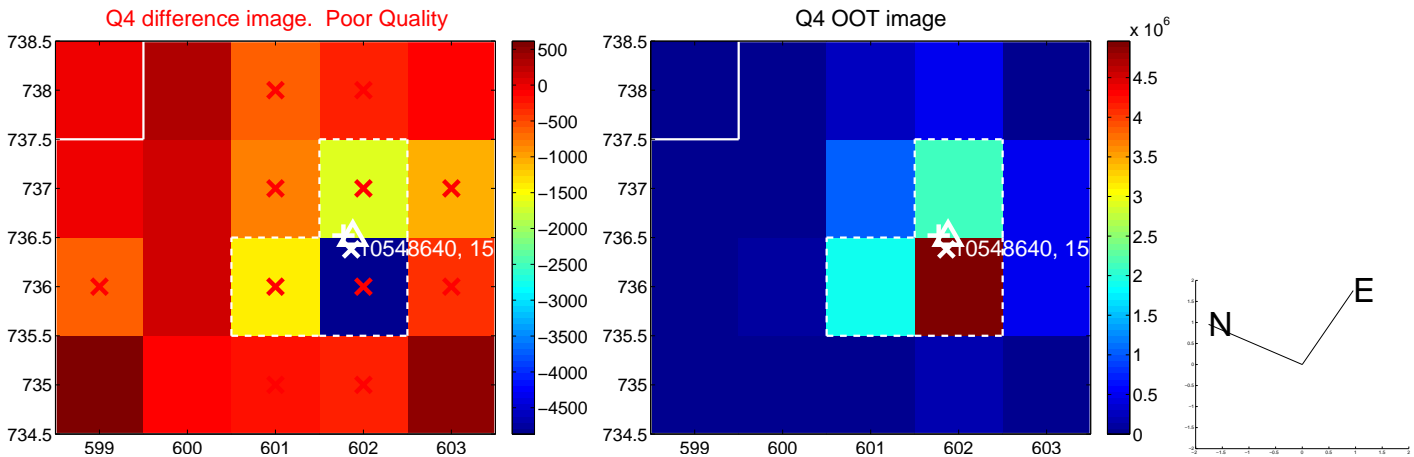
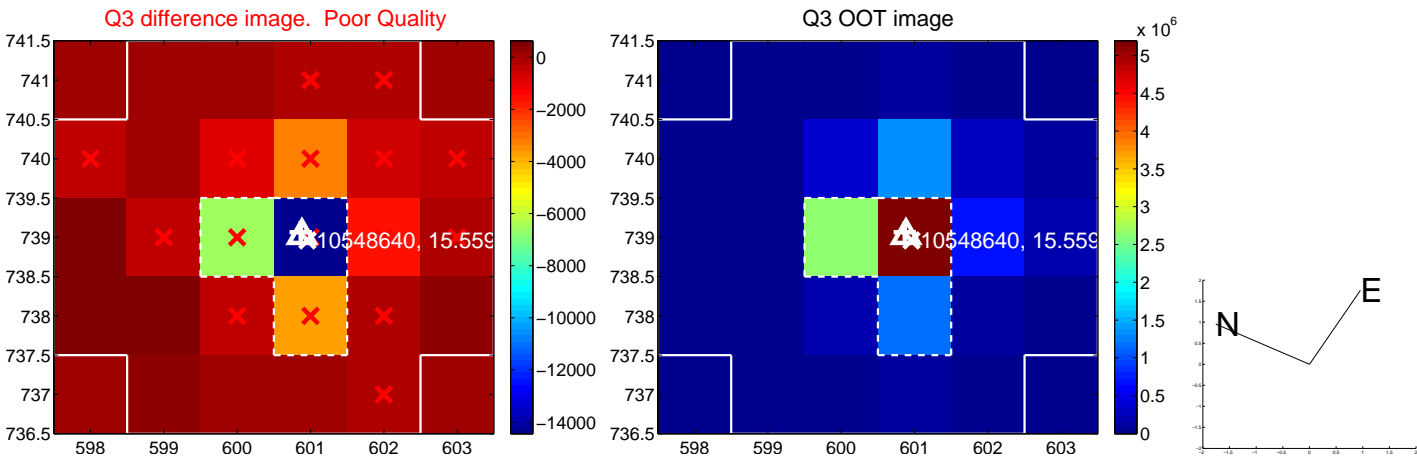
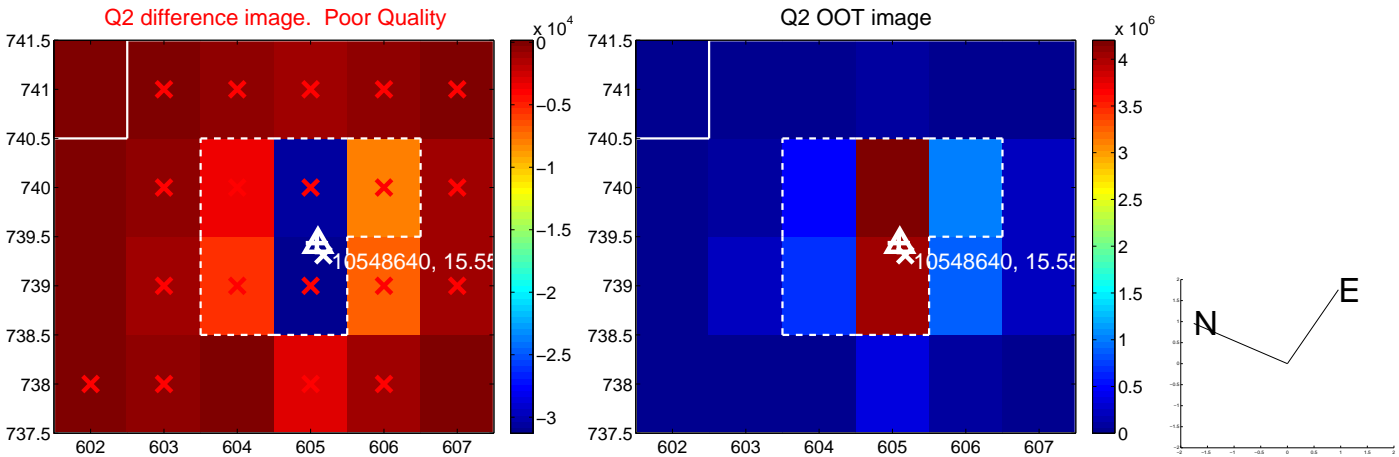
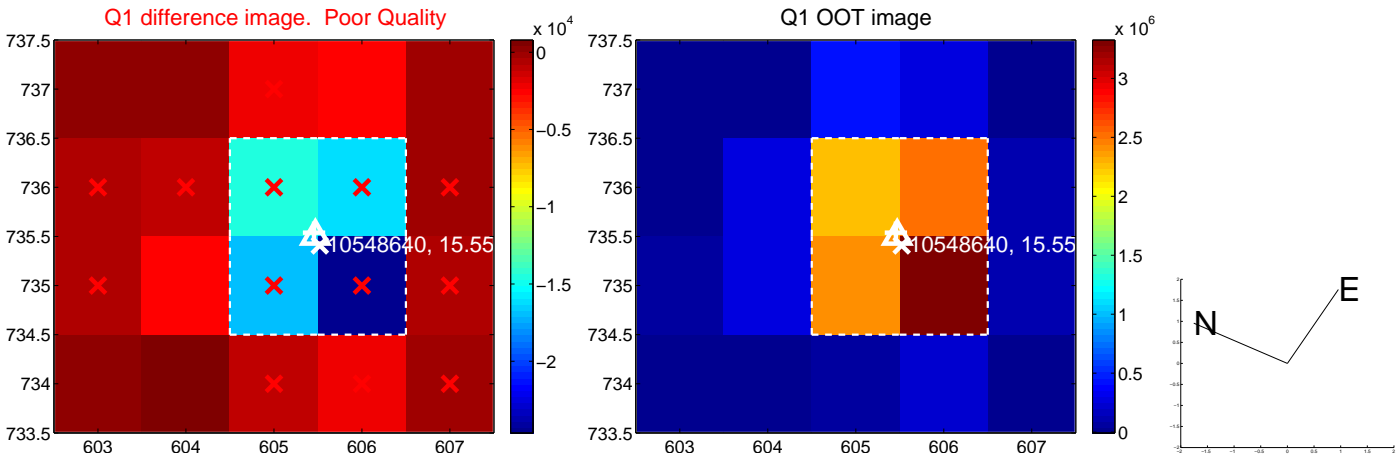


offset from photometric centroids

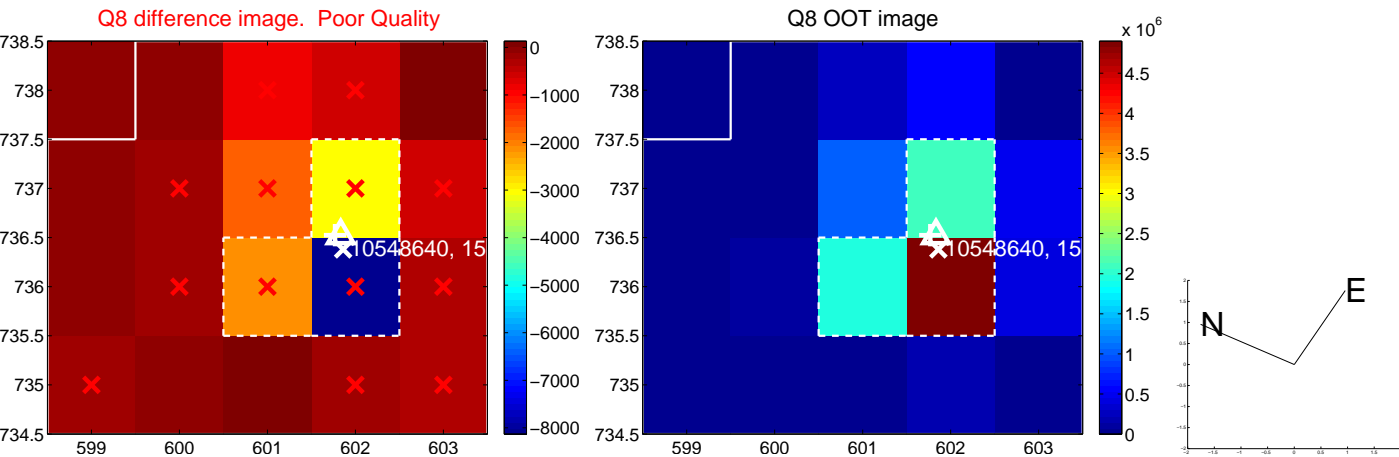
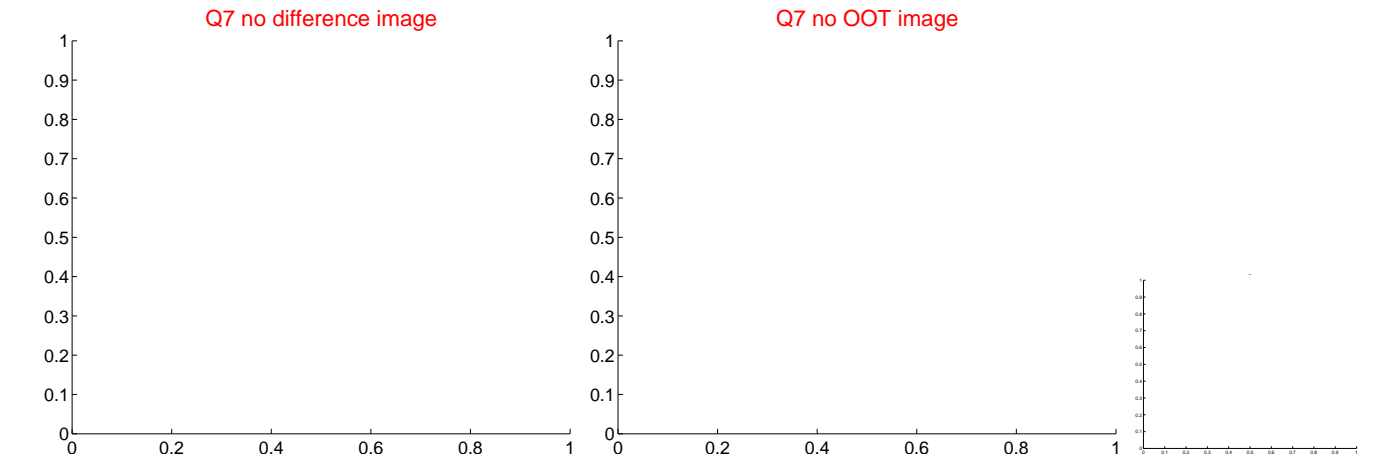
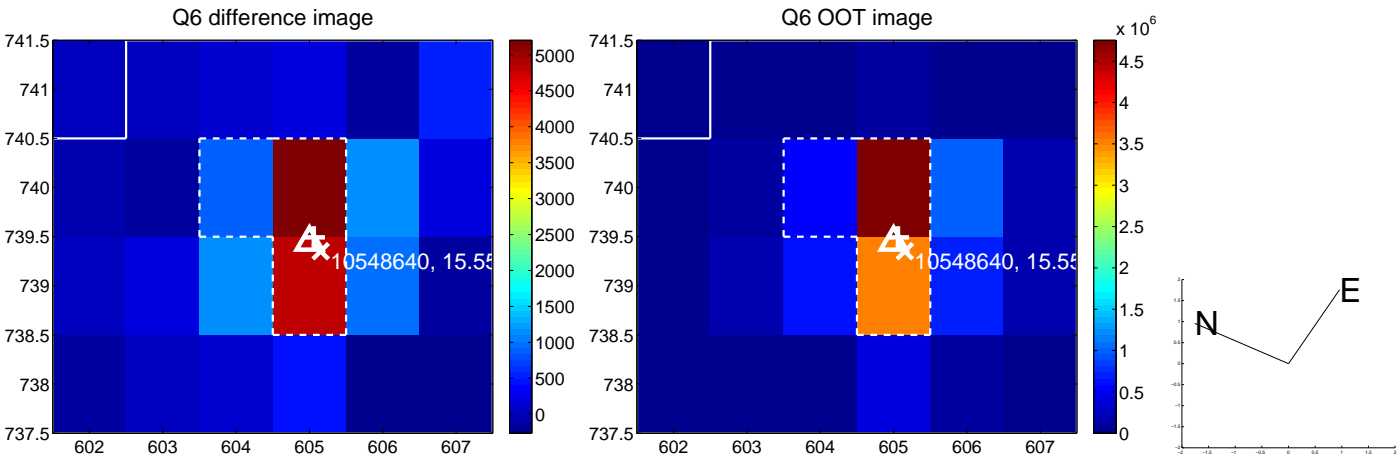
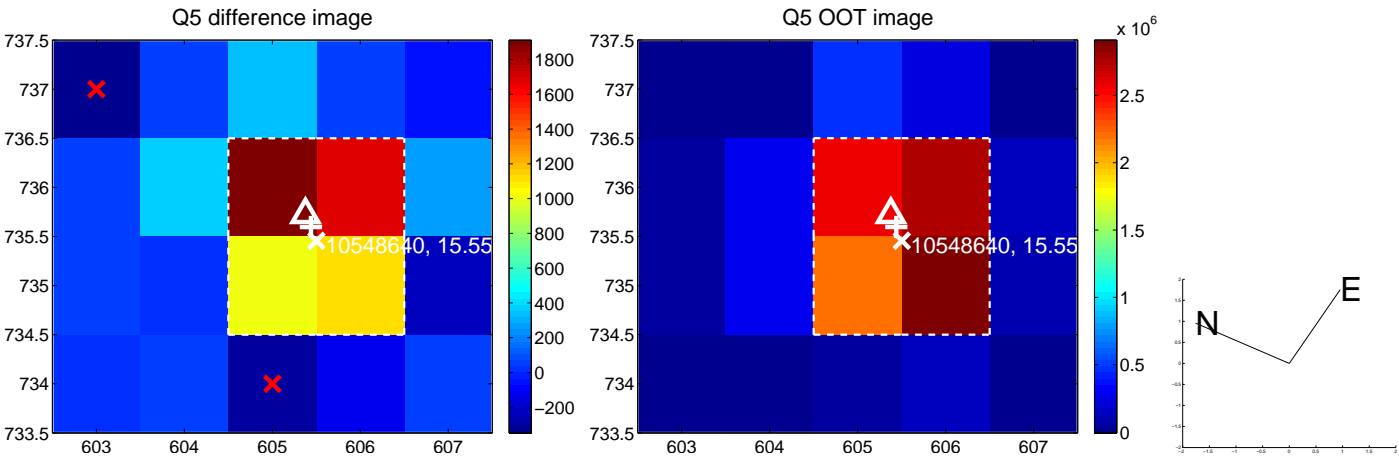


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . 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.

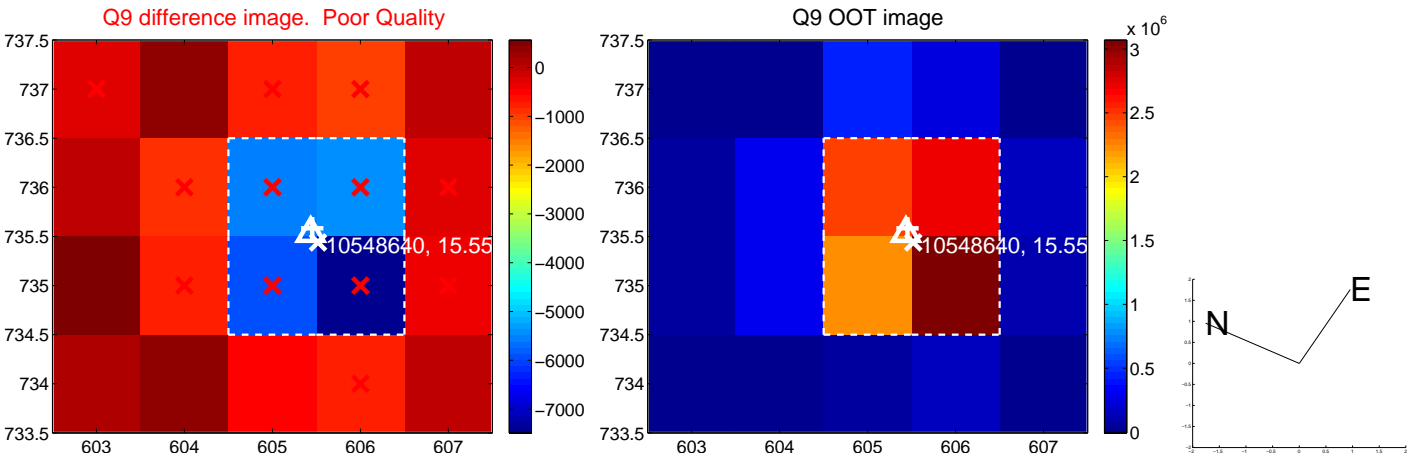
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



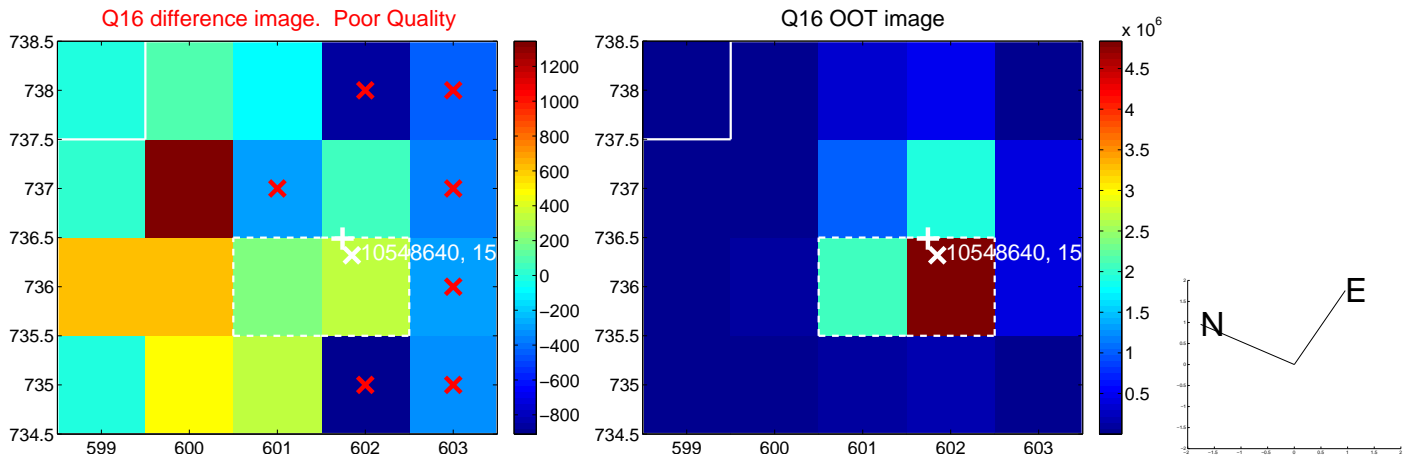
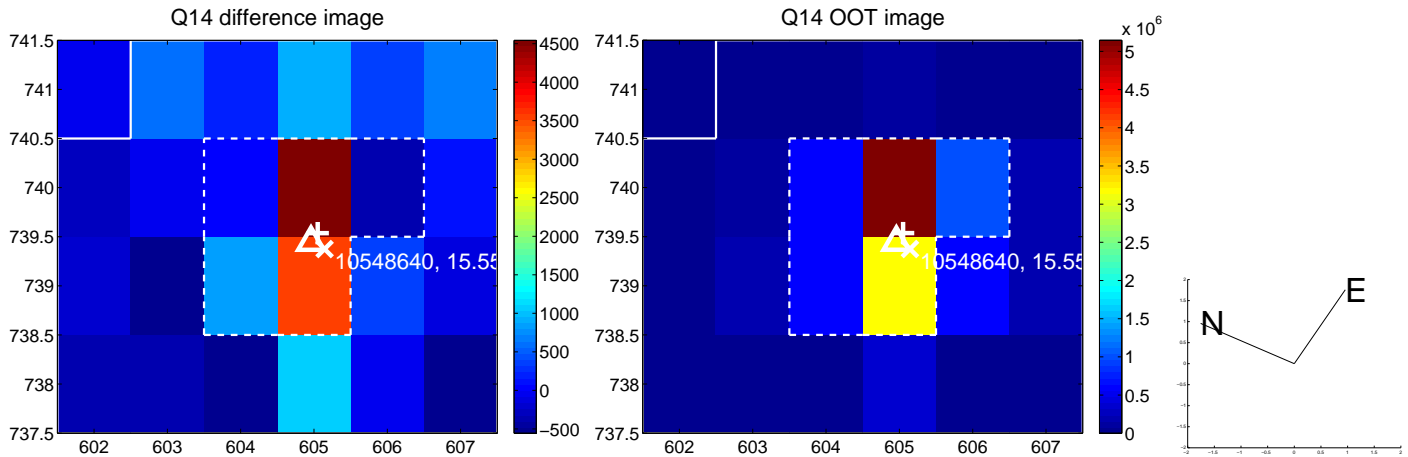
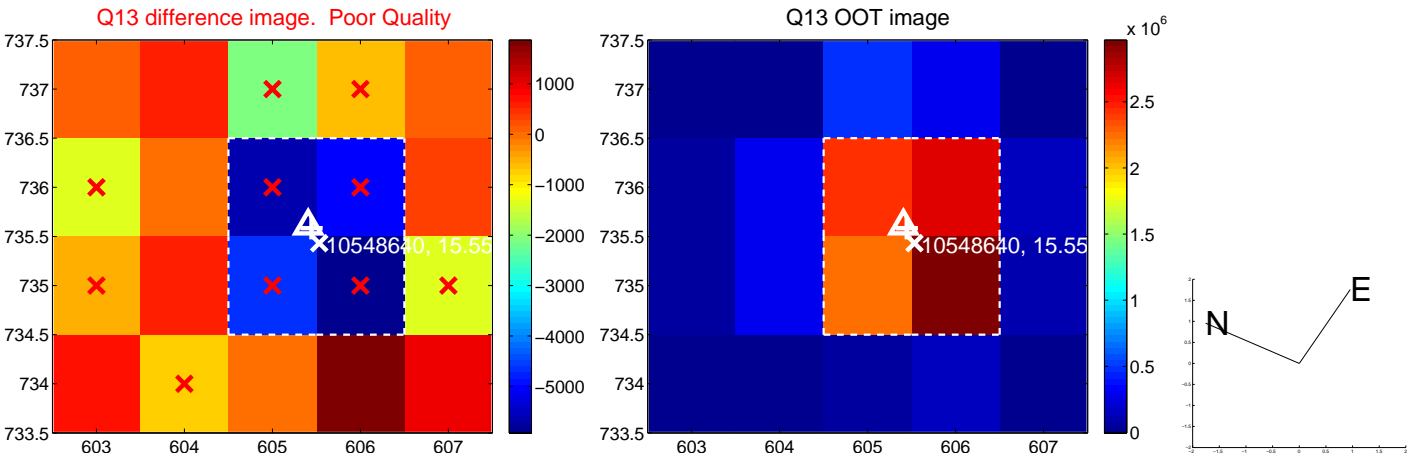
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



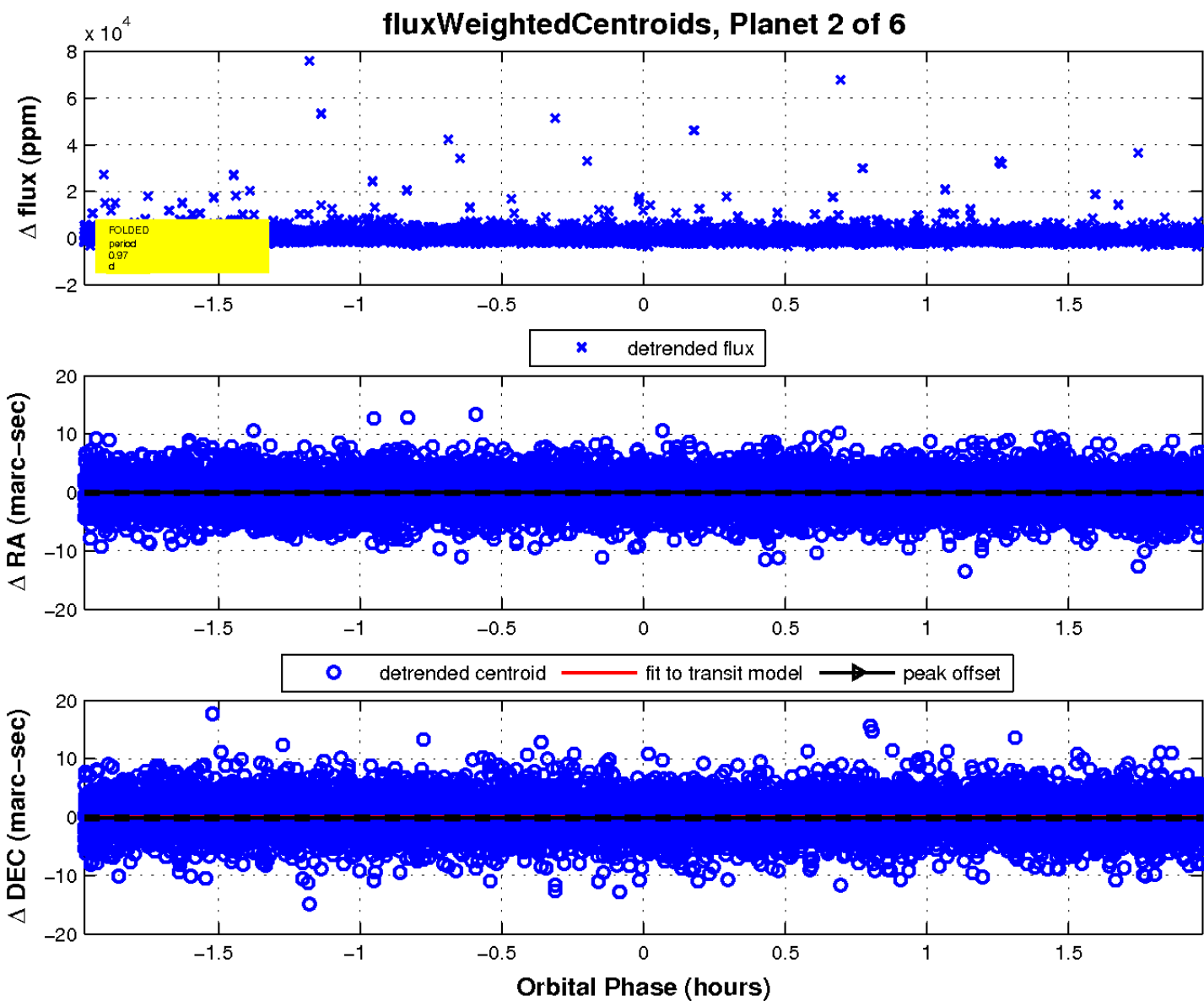
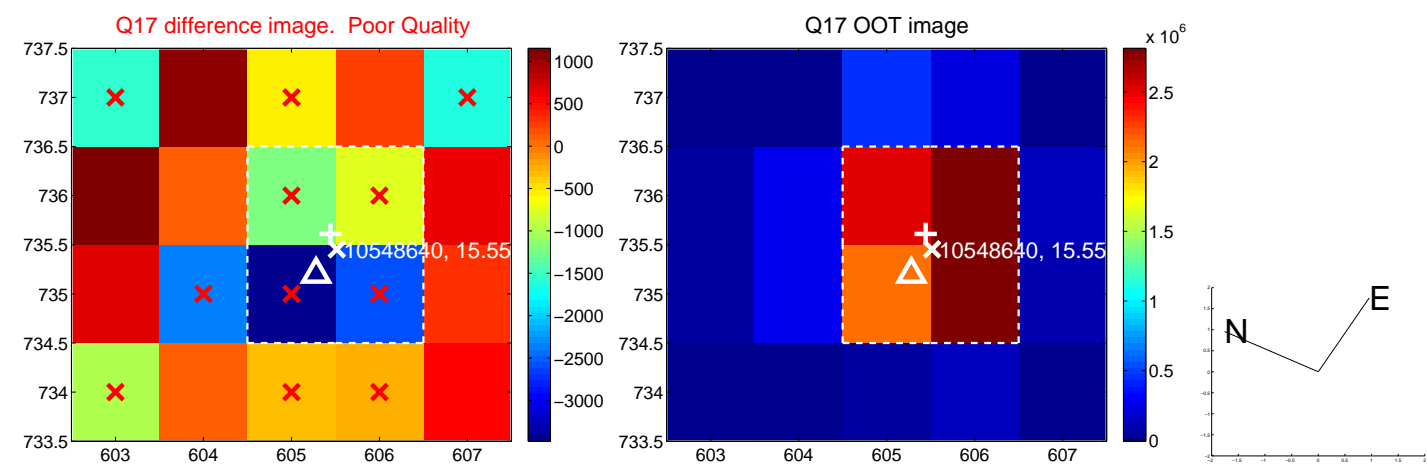
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

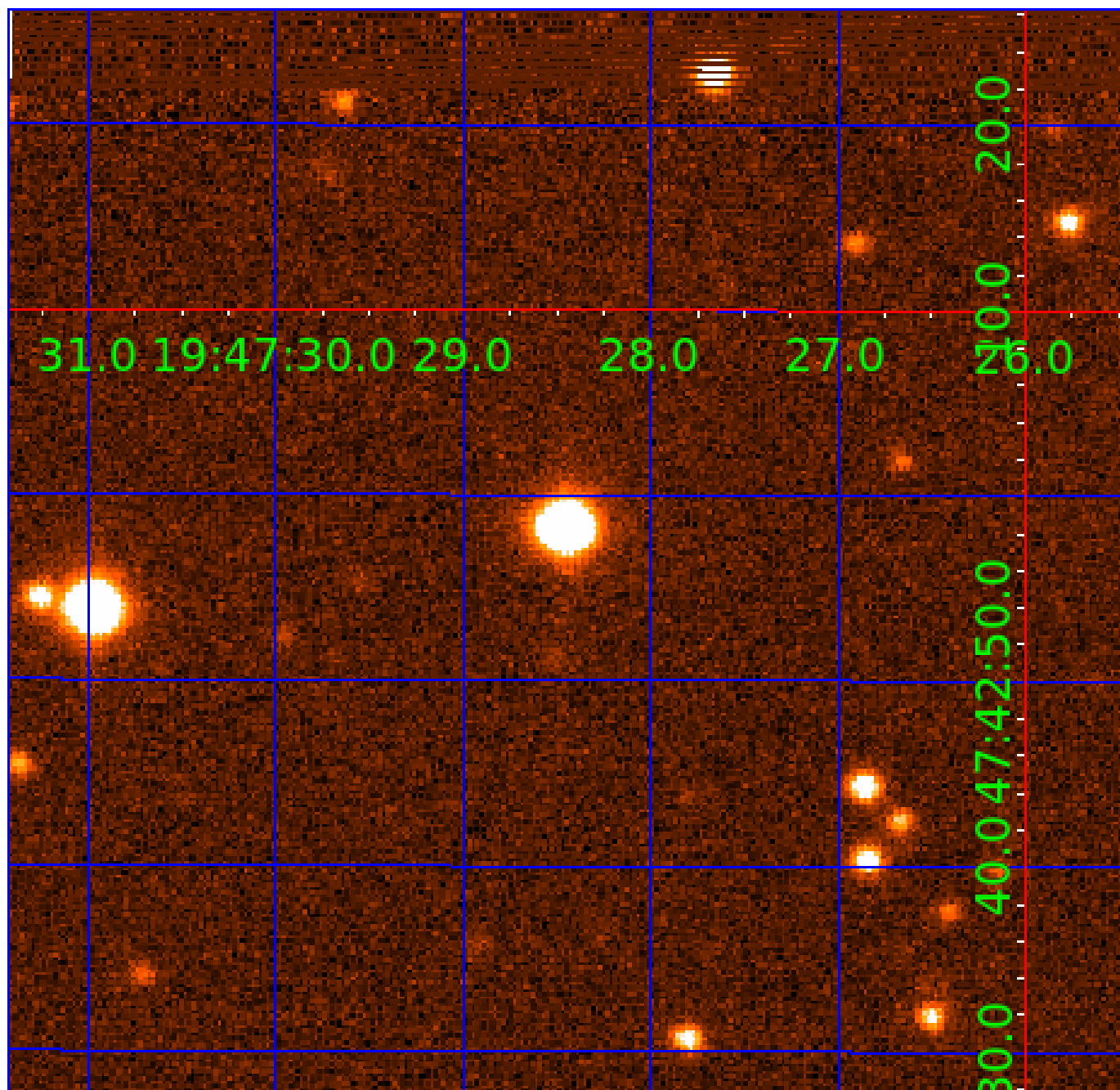


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 010548640

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010548640-01	OBS	No	0.965300	132.502345	13.3	2.602	12.6	0.5	0.57	3727	0.28	225.89
010548640-02	OBS	No	0.965064	131.532301	87.1	0.658	11.0	1.6	0.57	3727	0.68	225.96
010548640-03	OBS	No	2.894792	131.602945	732.4	9.000	12.5	-1.0	0.57	3727	1.49	52.23
010548640-04	OBS	No	67.517110	172.640910	3659.2	5.462	8.8	7.5	0.57	3727	6.79	0.78
010548640-05	OBS	No	47.962549	173.230188	2043.0	4.445	8.3	7.4	0.57	3727	2.59	1.24
010548640-06	OBS	No	97.600860	146.889886	3916.1	4.666	8.2	6.8	0.57	3727	4.34	0.48

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010548640-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—CENT_KIC_POS
010548640-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—SWEET_NTL—LPP_DV—LPP_ALT—SAME_NTL_PERIOD—CENT_KIC_POS
010548640-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_NOFITS
010548640-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS
010548640-05	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS
010548640-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_KIC_POS

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

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

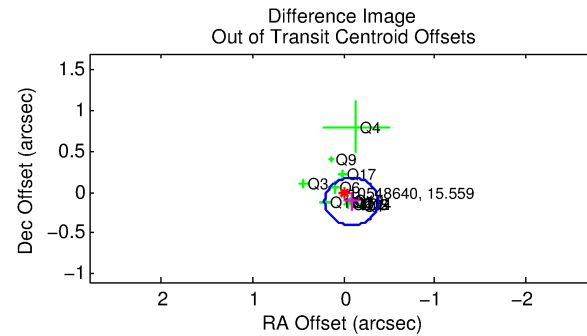
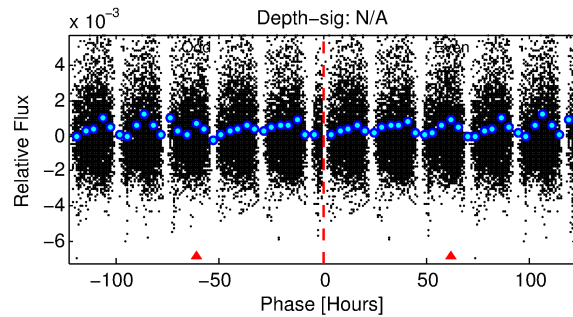
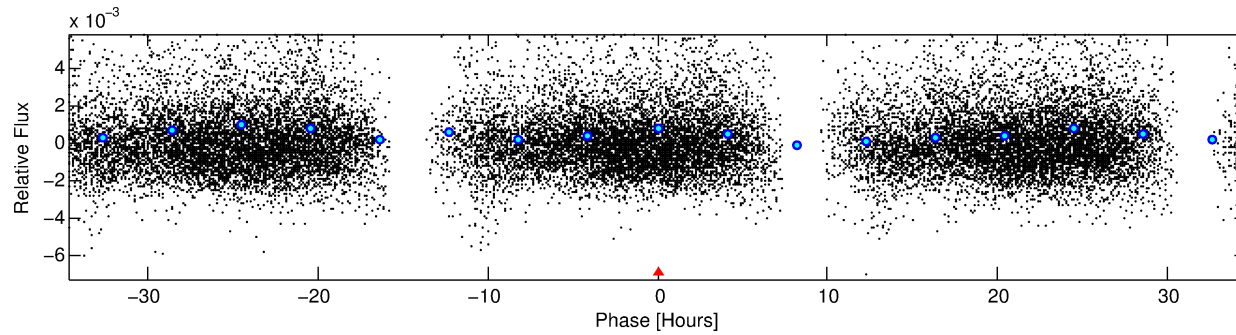
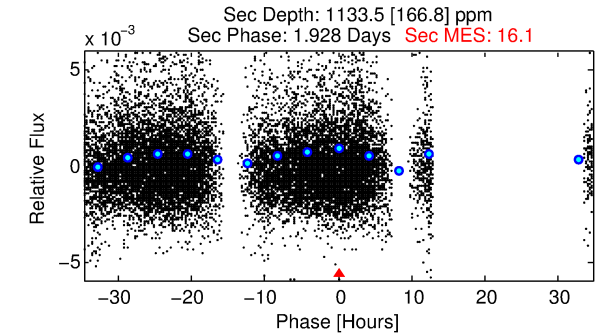
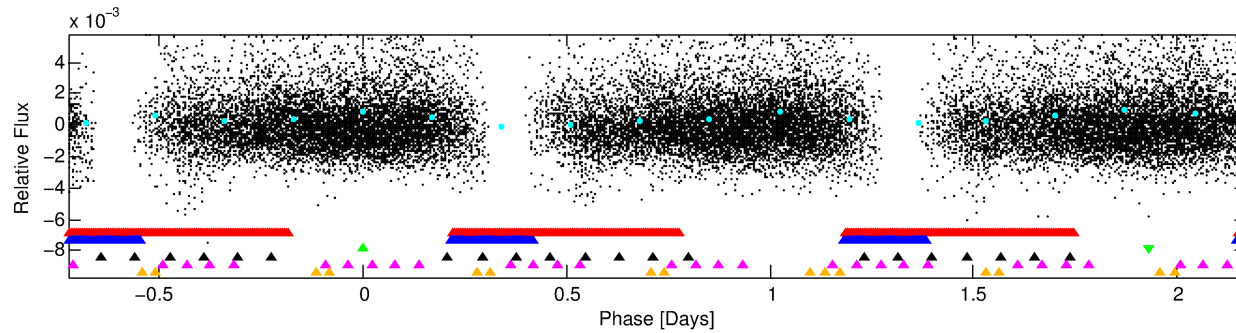
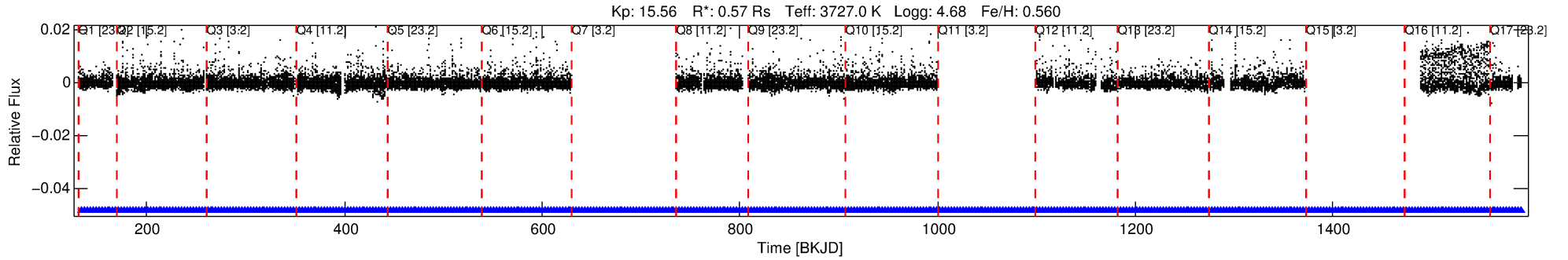
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010548640-03

No Significant Match Found

# DV One-Page Summary

KIC: 10548640 Candidate: 3 of 6 Period: 2.895 d



## TPS TCE Results:

Period = 2.89479 d  
Epoch = 131.6029 BKJD

**DV fit results are unavailable**

## DV Diagnostic Results:

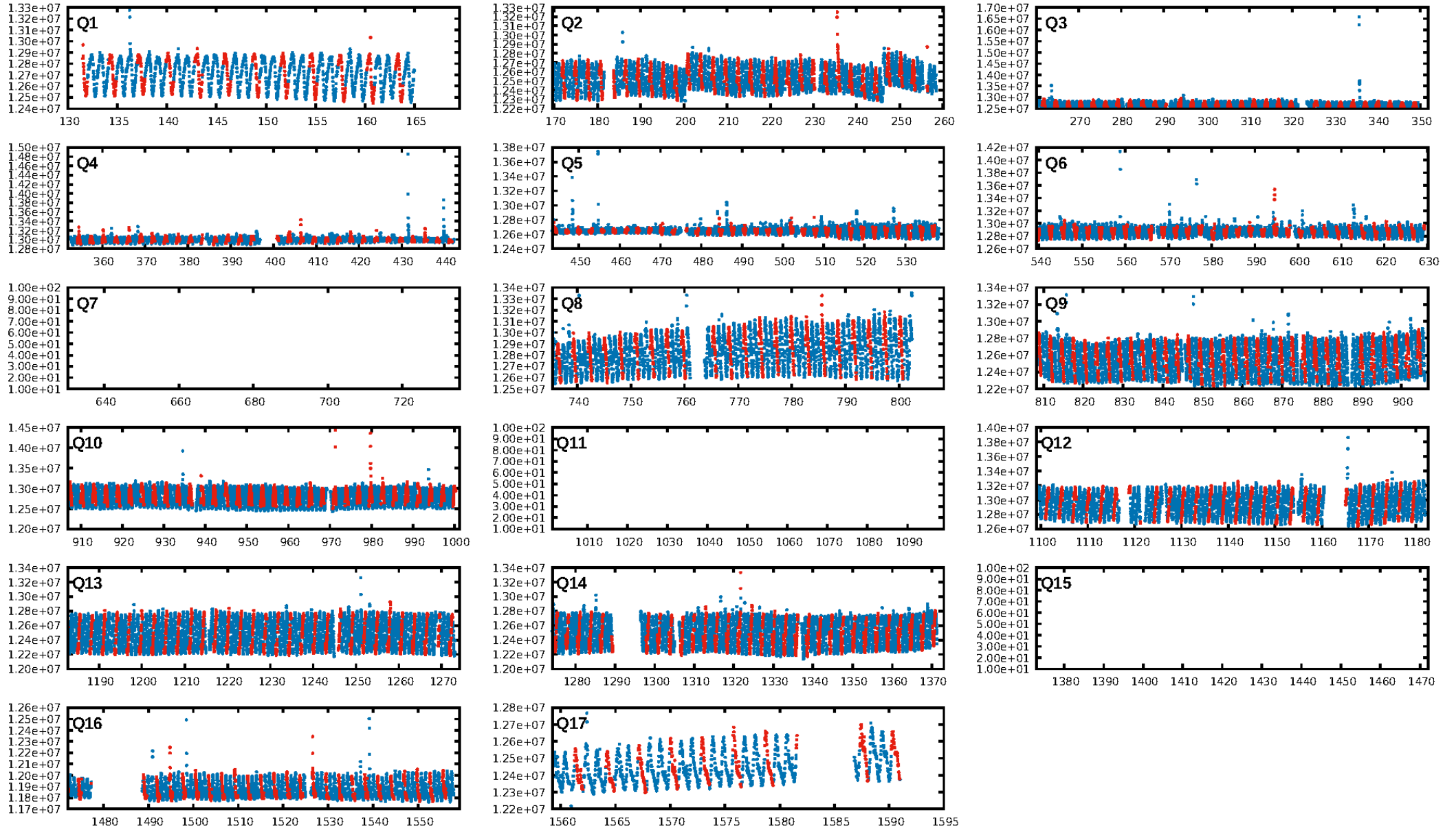
ShortPeriod-sig: 100.0% [4.94 $\sigma$ ]  
LongPeriod-sig: 100.0% [107.76 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 9.53e-31  
RollingBand-fgt: 1.00 [356/356]  
GhostDiagnostic-chr: 1.75

**Centroid-sig: 0.0%**  
**Centroid-so: 0.635 arcsec [11.10 $\sigma$ ]**  
**OotOffset-rm: 0.141 arcsec [1.44 $\sigma$ ]**  
**KicOffset-rm: 0.571 arcsec [5.73 $\sigma$ ]**  
**OotOffset-st: 4/1/4/4 [13]**  
**KicOffset-st: 4/1/4/4 [13]**  
DiffImageQuality-fgm: 0.46 [6/13]  
DiffImageOverlap-fno: 0.00 [0/14]

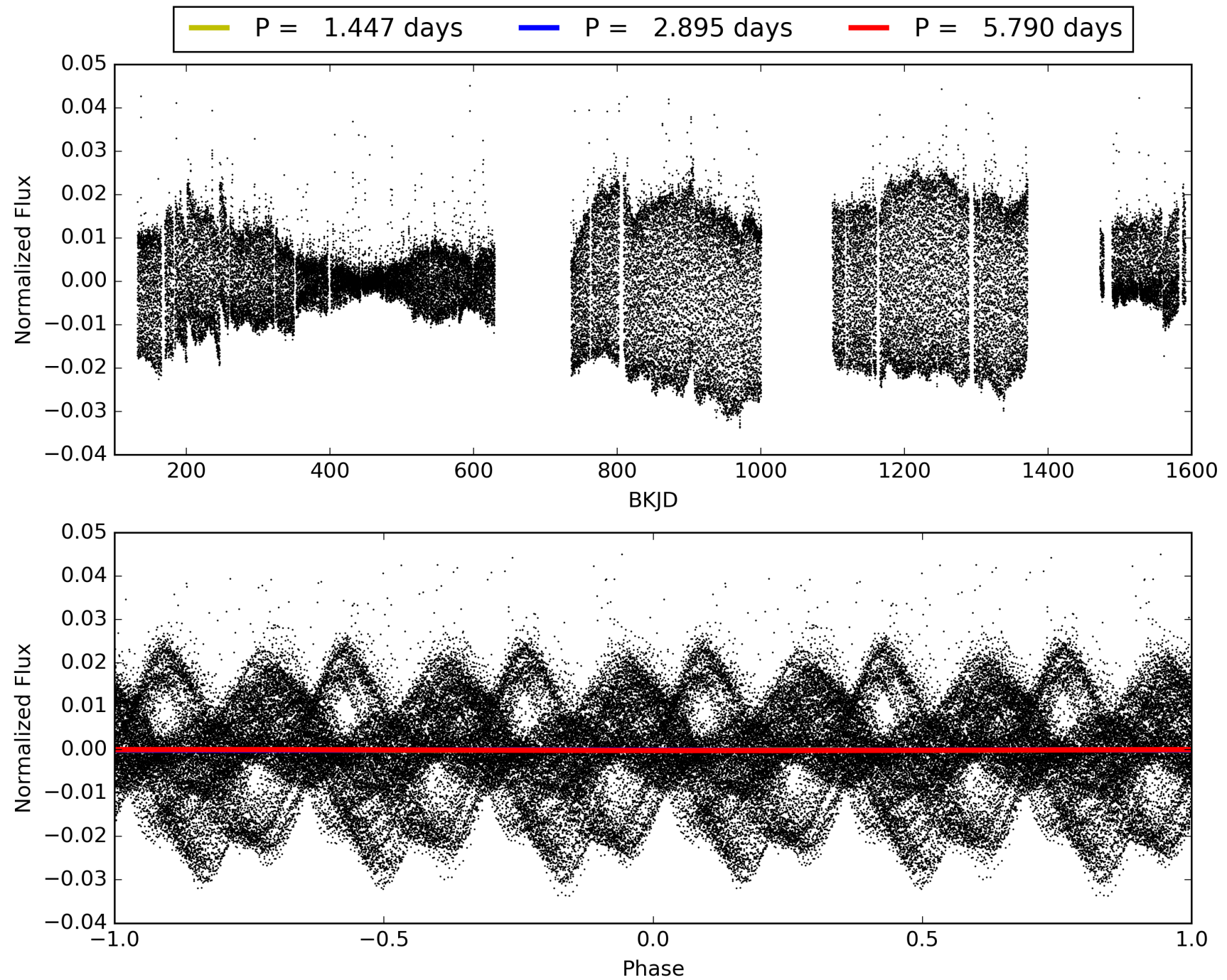
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:37:14 Z

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

# TCE 010548640-03, PDC Light Curves

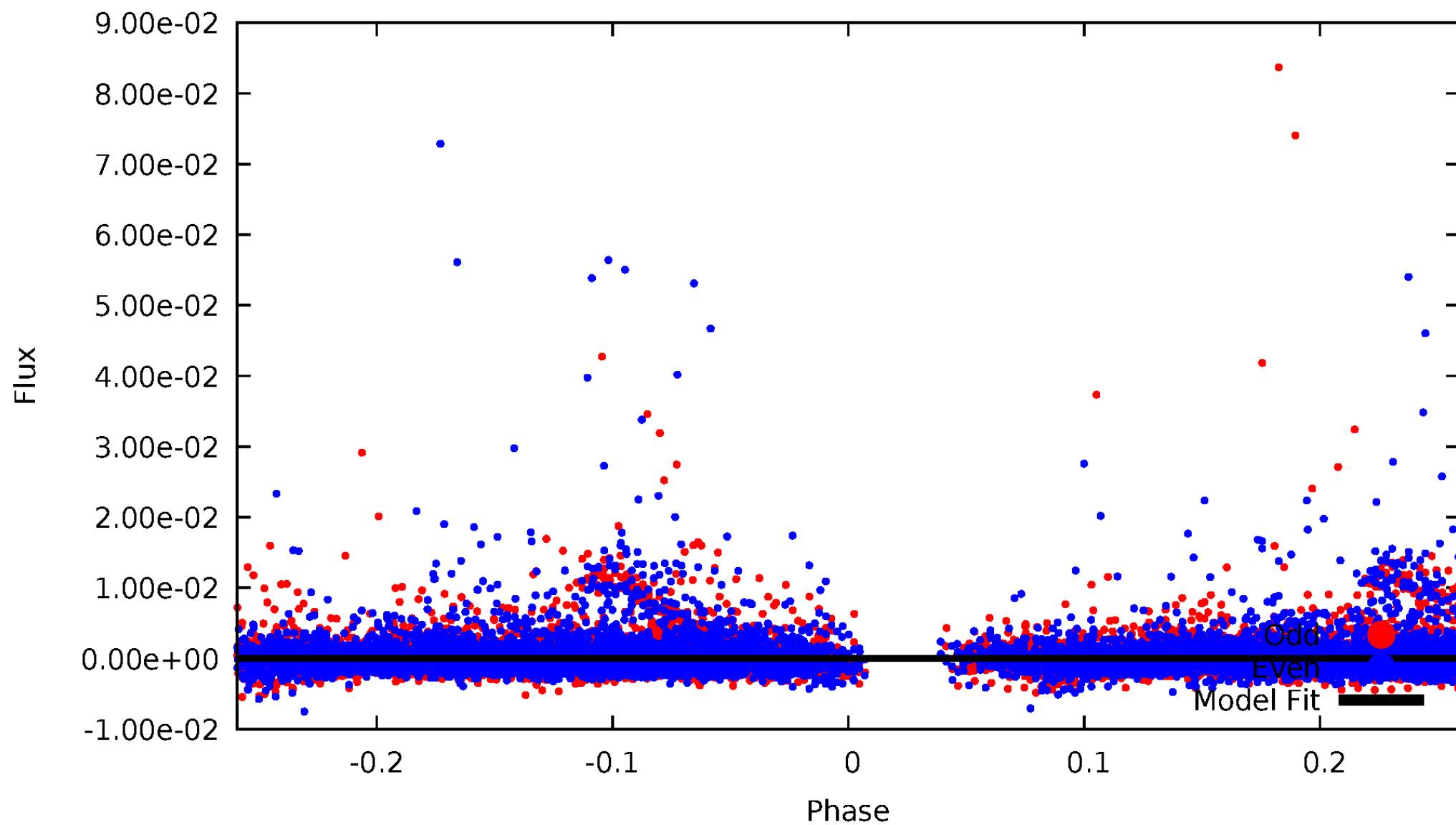


TCE 010548640-03



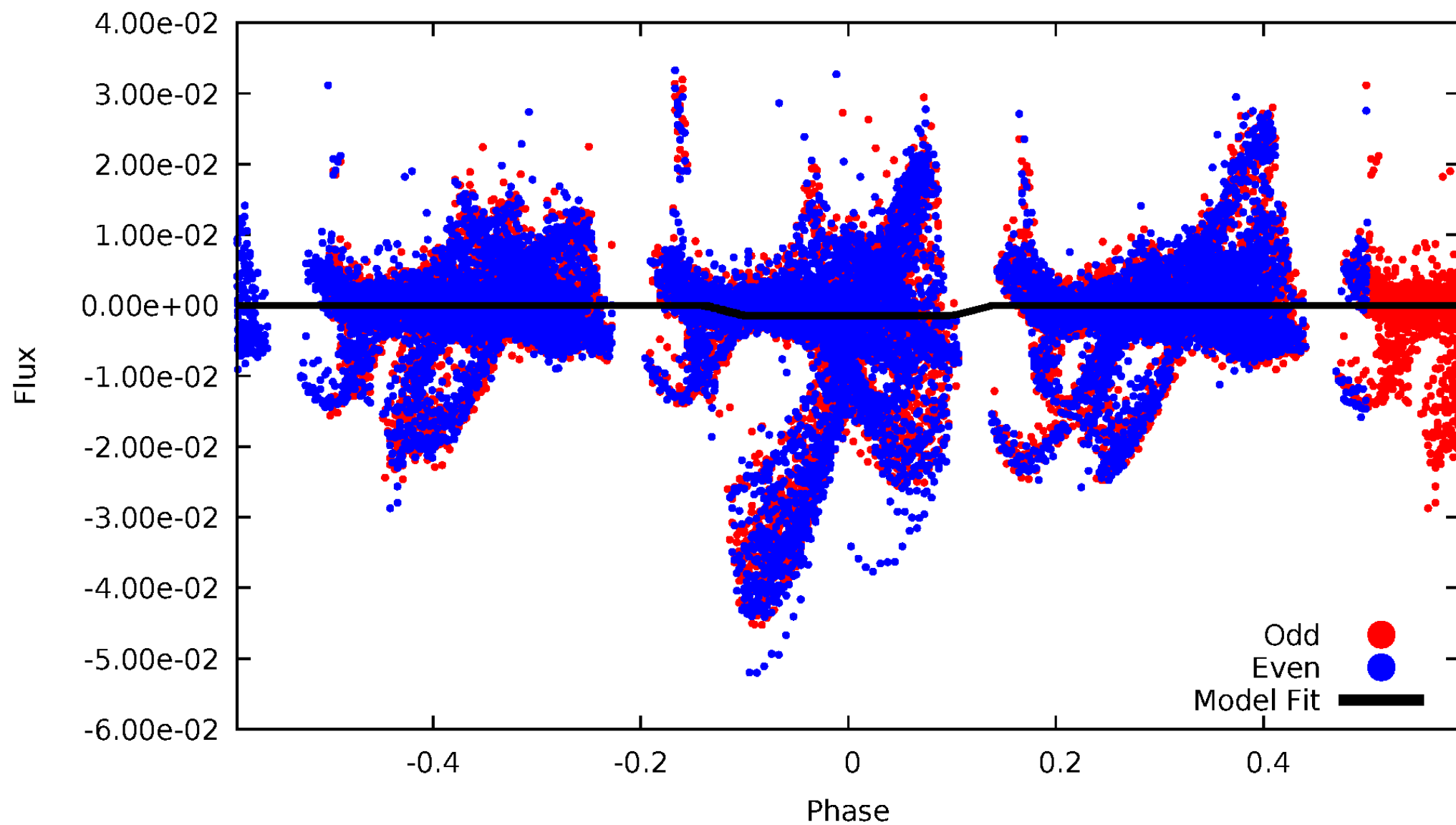
# DV Odd/Even

TCE 010548640-03



# ALT Odd/Even

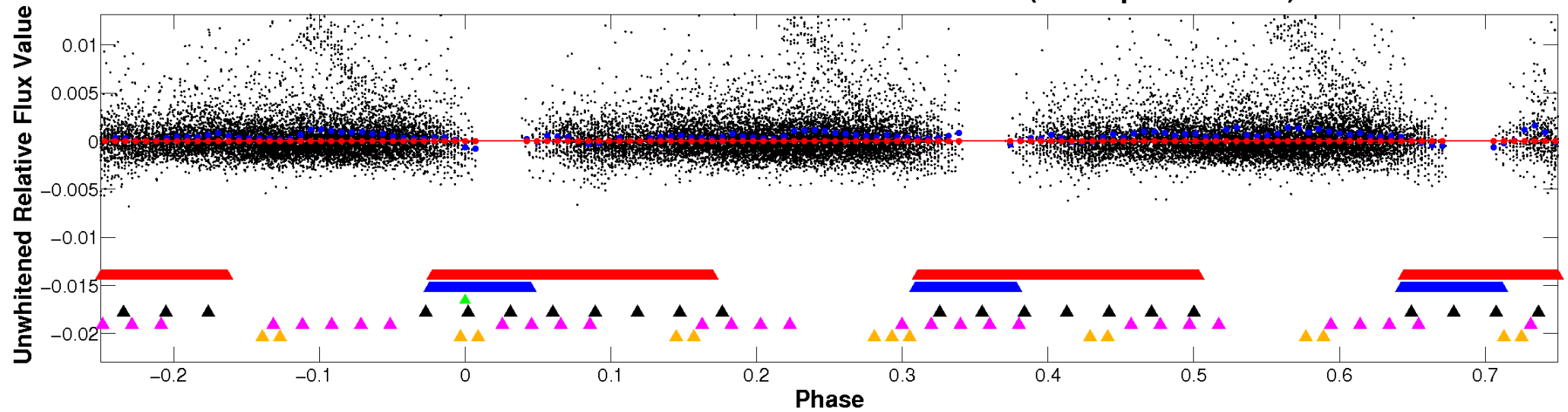
TCE 010548640-03



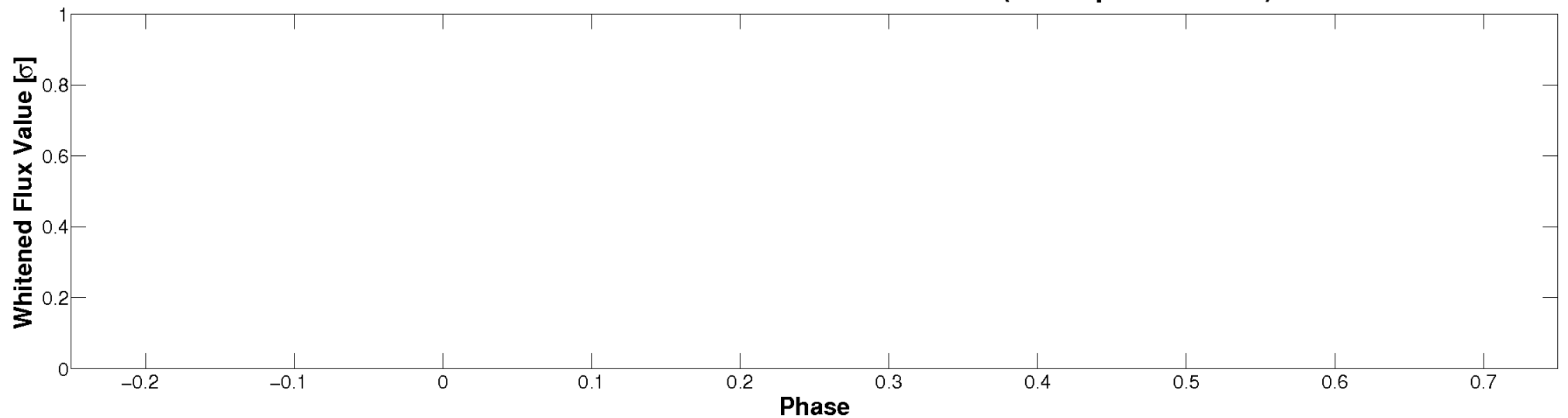


# Non-Whitened Vs. Whitened Light Curve

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

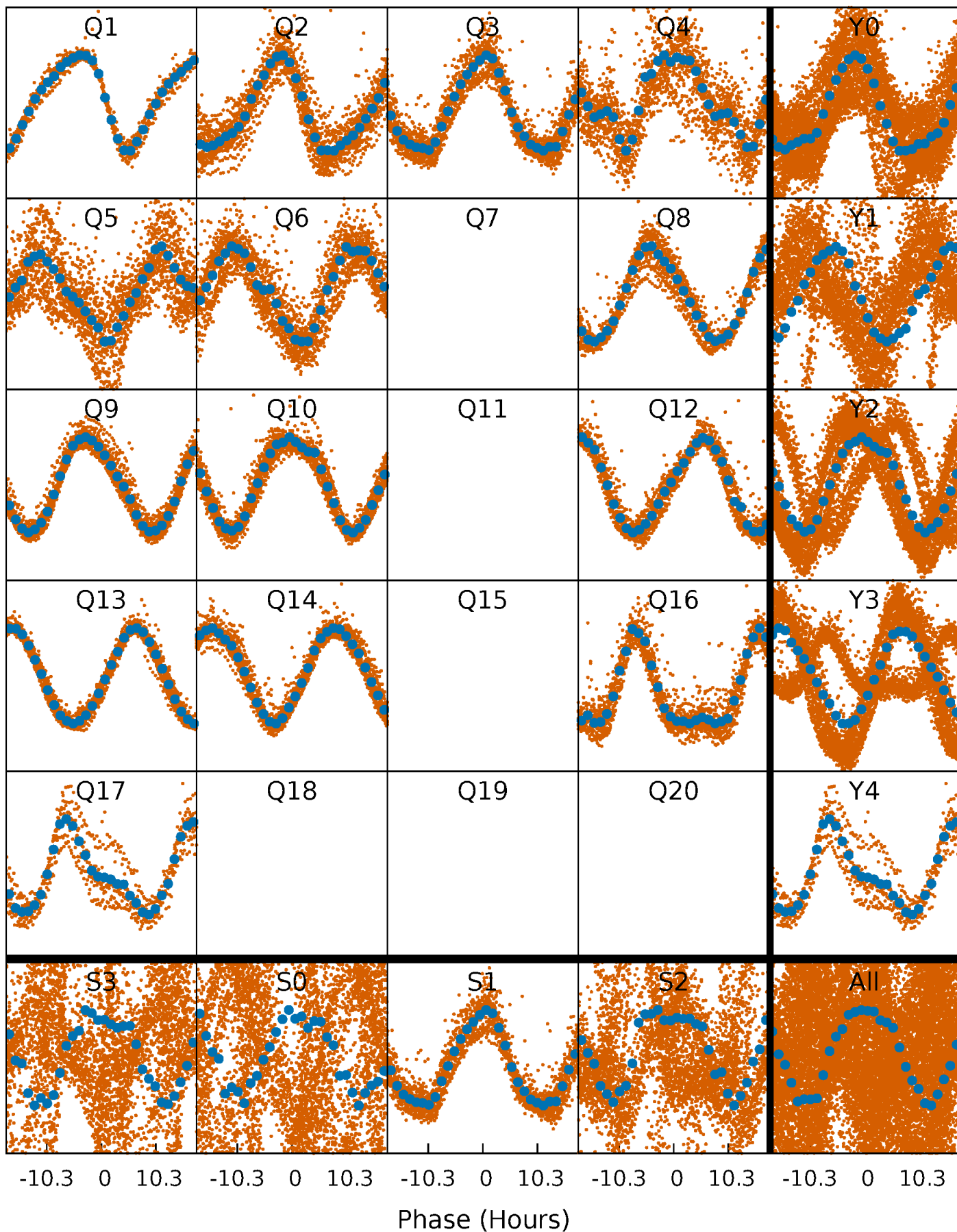


**Planet 3 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



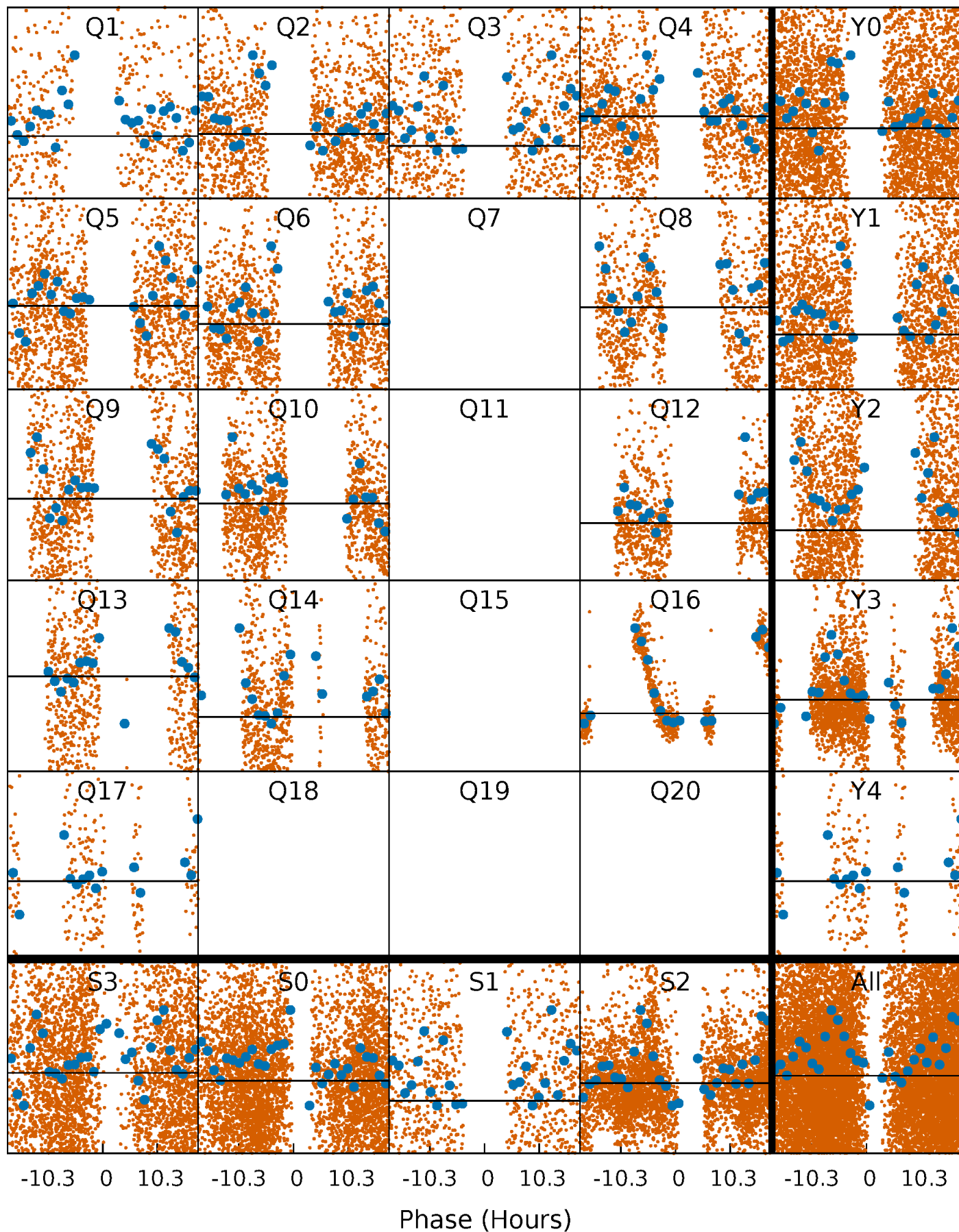
# PDC Quarter-Phased Transit Curves

TCE 010548640-03   P= 2.894792 Days    $T_0=131.602945$  (BKJD)



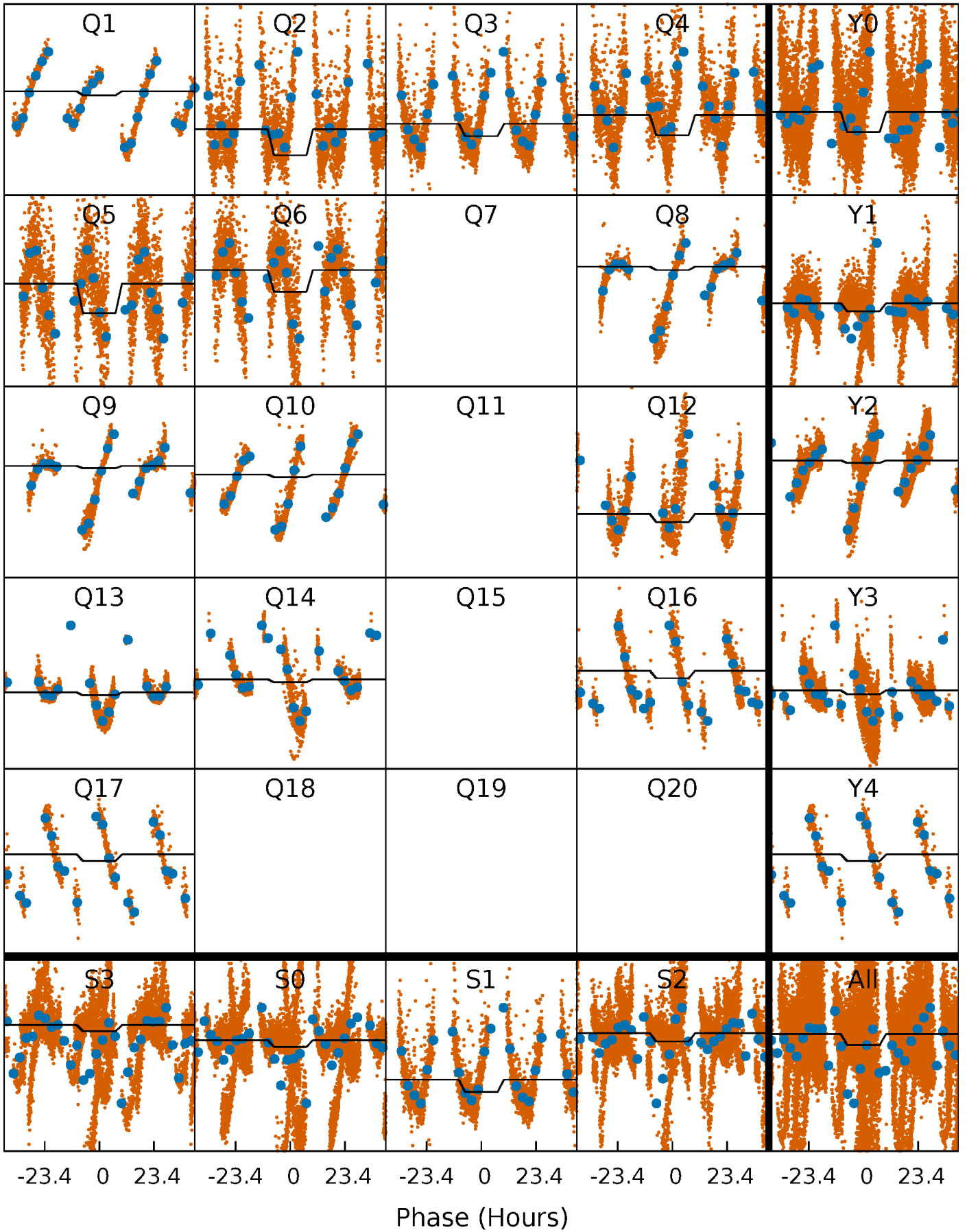
# DV Quarter-Phased Transit Curves

TCE 010548640-03   P= 2.894792 Days    $T_0=131.602945$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

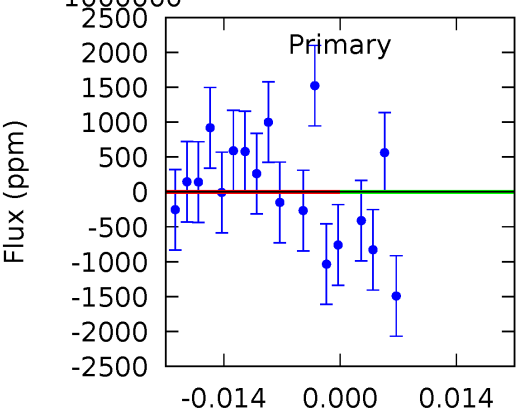
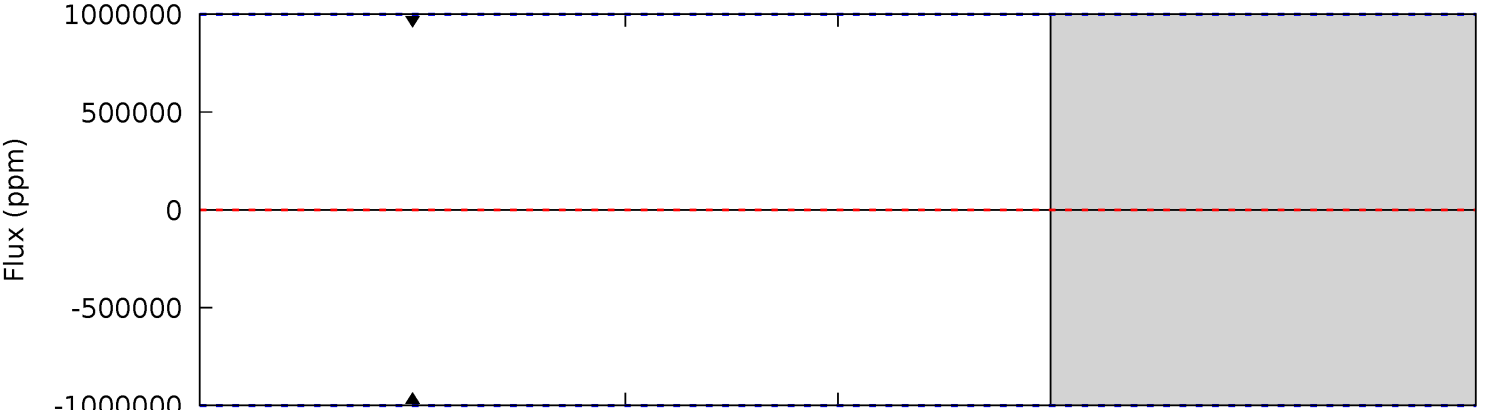
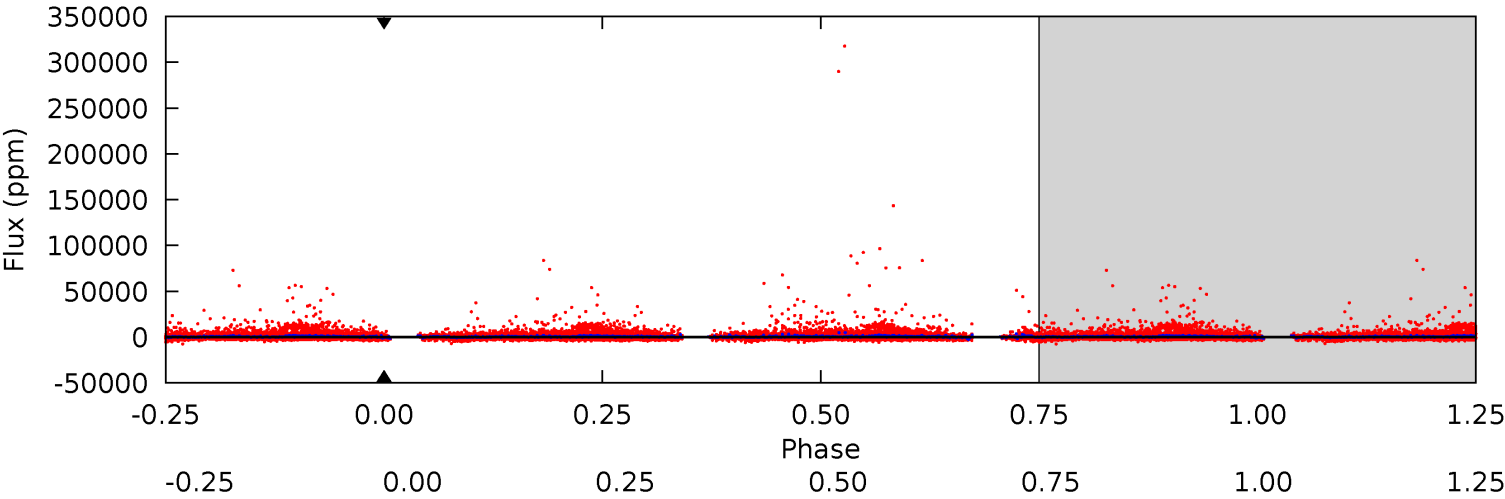
TCE 010548640-03   P= 2.894792 Days    $T_0=134.210617$  (BKJD)



DV Model-Shift Uniqueness Test

010548640-03, P = 2.894792 Days, E = 131.602945 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

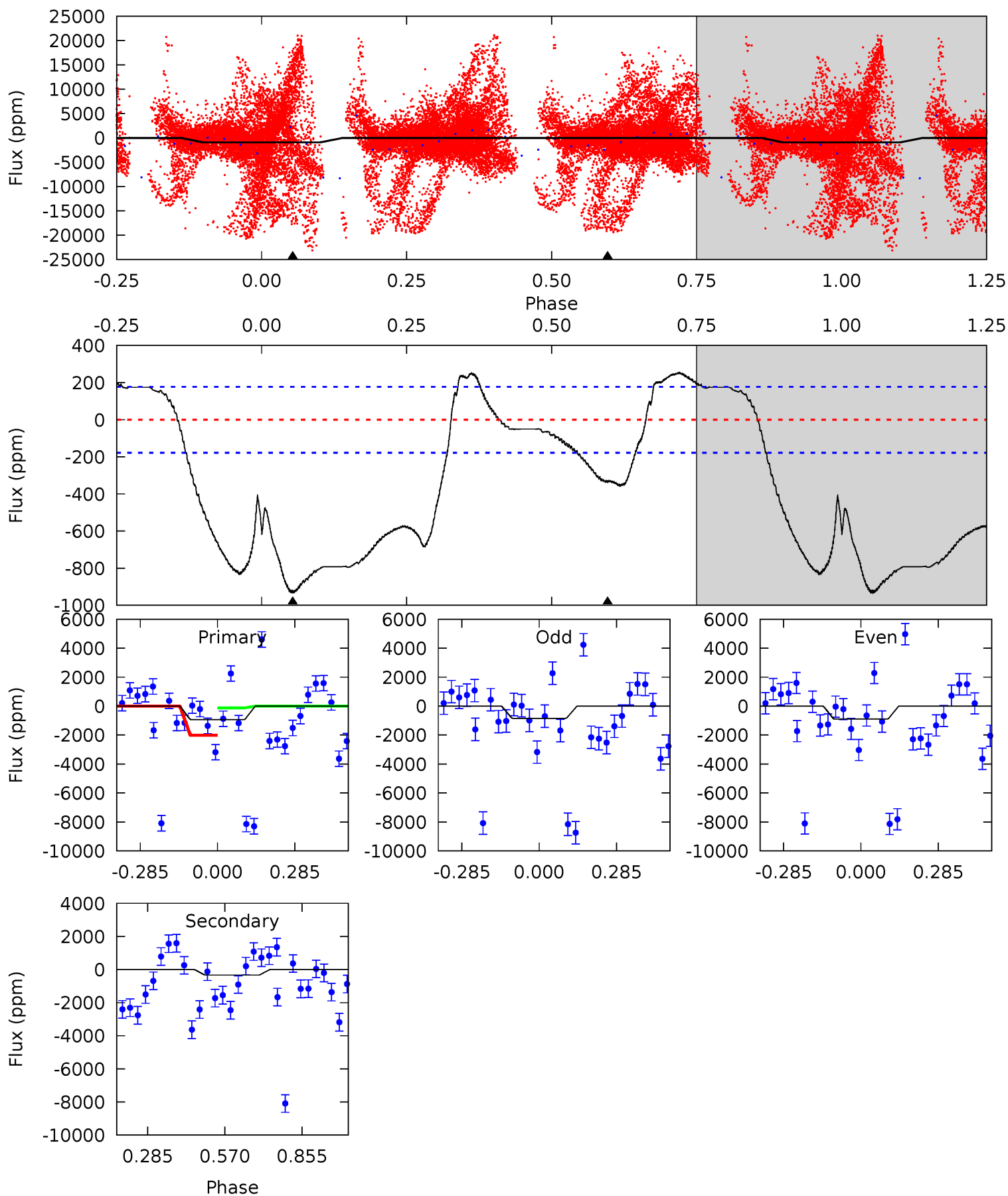




# Alt Model-Shift Uniqueness Test

010548640-03, P = 2.894792 Days, E = 131.315825 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
22.8	8.22	0	0	4.34	1.07	6.06	22.8	22.8	8.22	8.22	0.63	6.68	0.21	14.4



### Stellar Parameters For KIC 010548640

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3727^{+116}_{-142}$	$4.679^{+0.072}_{-0.022}$	$0.560^{+0.050}_{-0.300}$	$0.575^{+0.033}_{-0.076}$	$0.576^{+0.036}_{-0.068}$	$4.261^{+1.573}_{-0.399}$
	+3%/-4%	+2%/-0%	+9%/-54%	+6%/-13%	+6%/-12%	+37%/-9%
Source	KIC0	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 010548640-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$0 \pm 1000000$	$4.91^{+4.68}_{-3.39}$	$948^{+35}_{-40}$	$-2773^{+10850}_{-5174}$	$-27.100^{+4596.022}_{-4508.108}$
Alt.	$-336 \pm 41$	$5.33^{+5.38}_{-3.52}$	$947^{+34}_{-41}$	$2386^{+832}_{-352}$	$7.116^{+55.696}_{-5.293}$

$T_{\text{max}}$  = 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

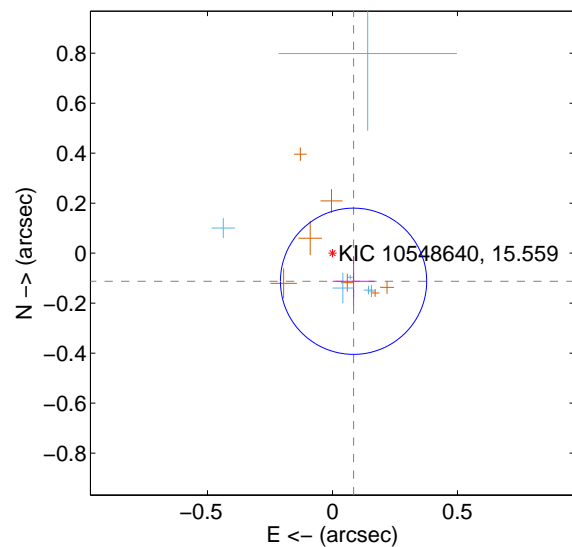
Supplemental centroid analysis for 010548640-03. Kepler magnitude: 15.56. Transit SNR -1.00

There are 6 quarters with good PRF difference image offsets

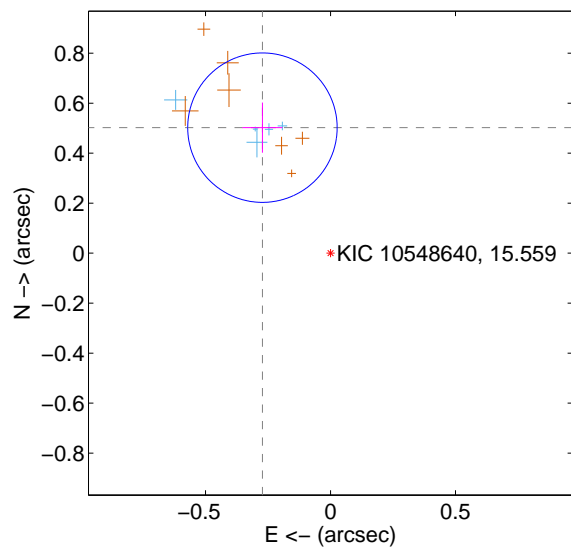
The direct PRF centroid is offset from the target star catalog position by about 0.69 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.141 \pm 0.098$	1.44	$-0.084 \pm 0.083$	$-0.112 \pm 0.099$
PRF-fit source offset from KIC position	$0.571 \pm 0.100$	5.73	$0.272 \pm 0.080$	$0.502 \pm 0.100$
photometric centroid source offset	$0.64 \pm 0.06$	11.10	$0.15 \pm 0.05$	$0.62 \pm 0.06$

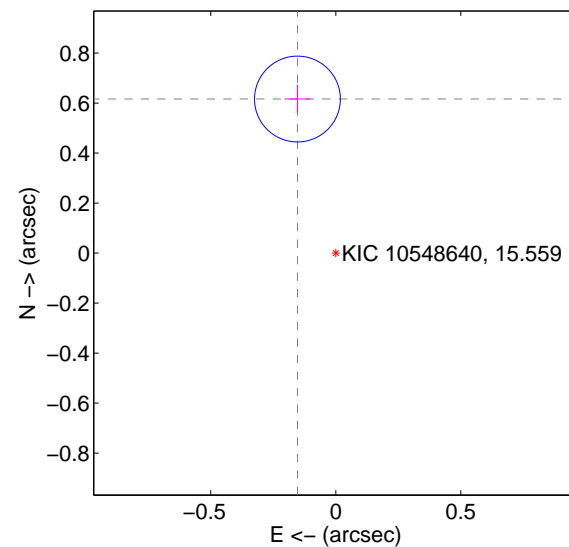
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

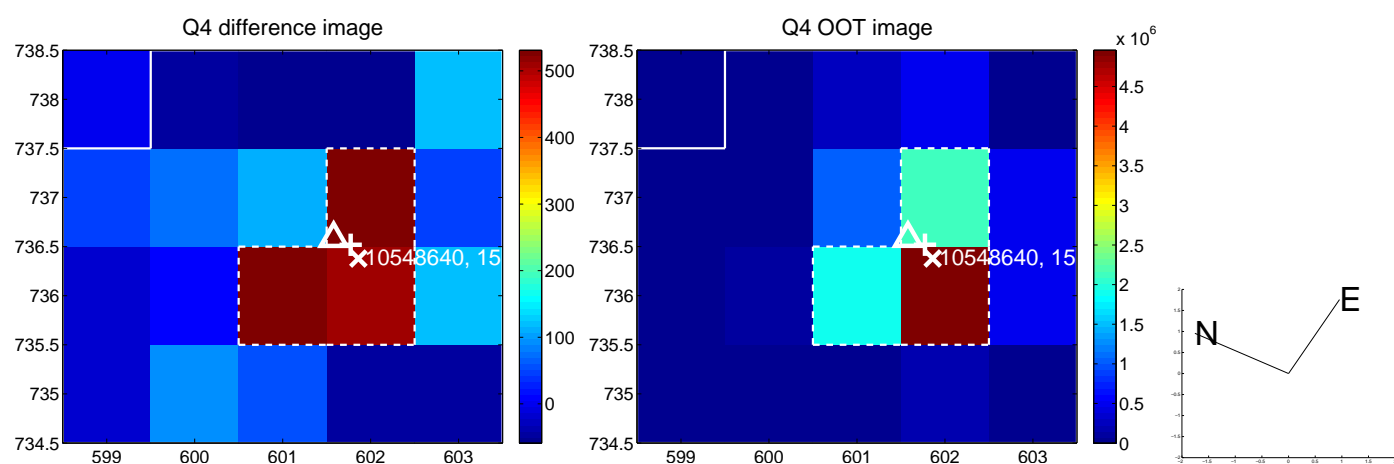
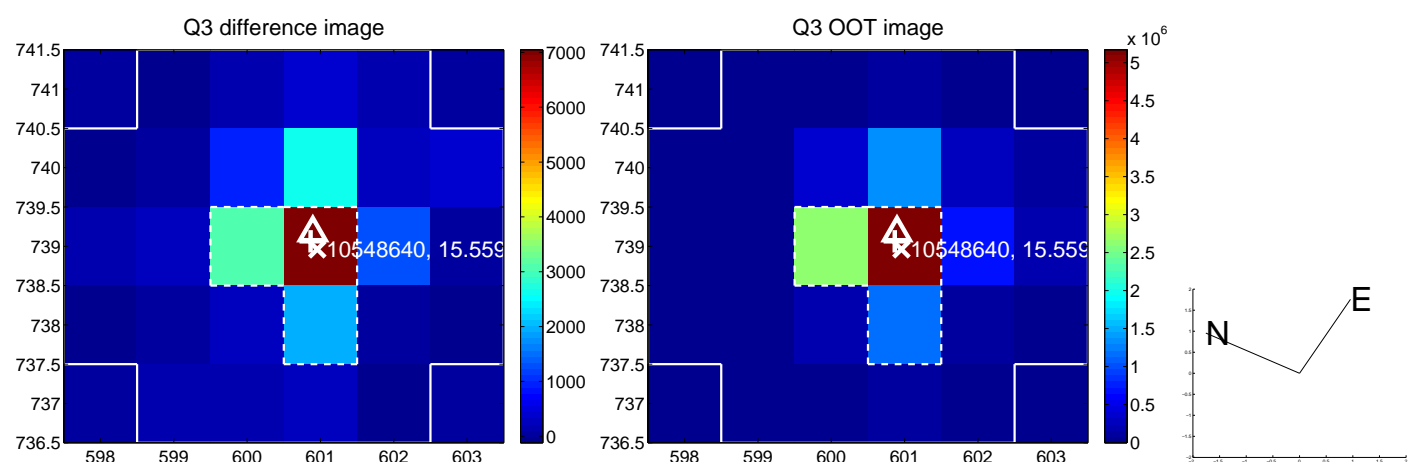
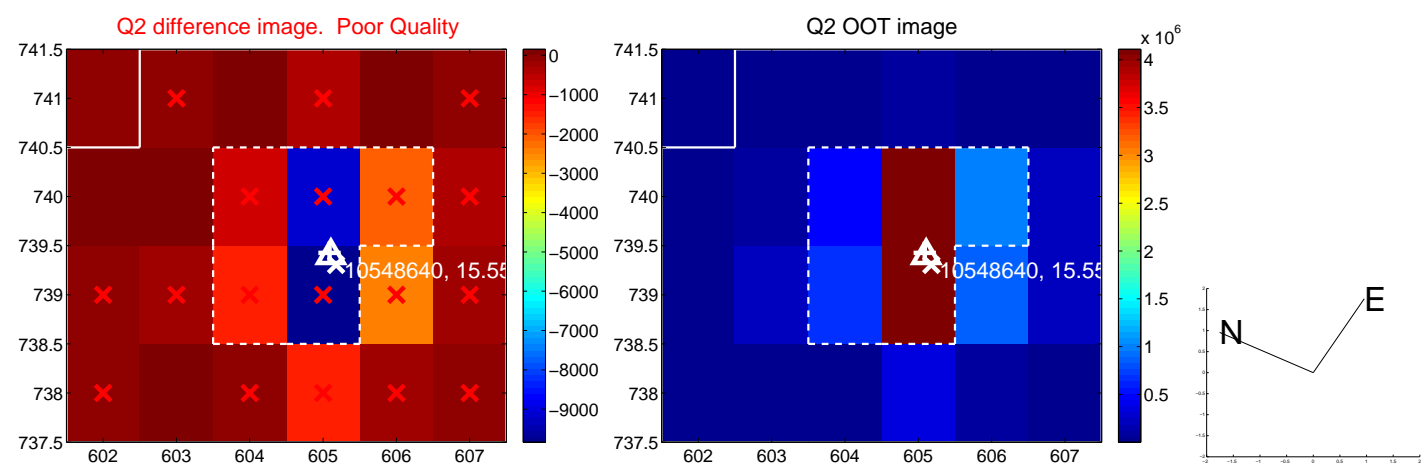
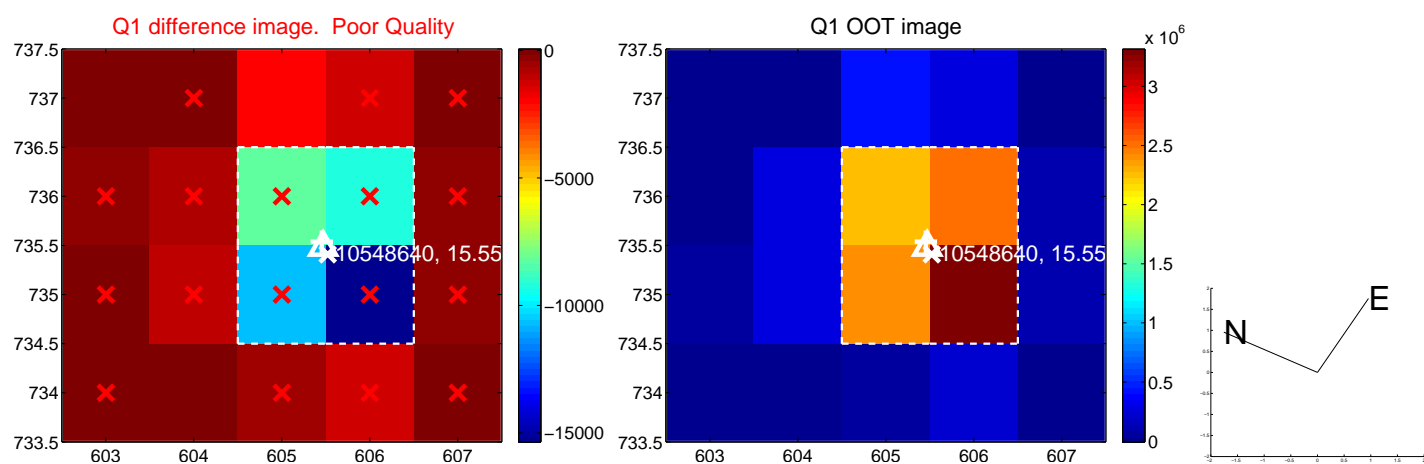


offset from photometric centroids

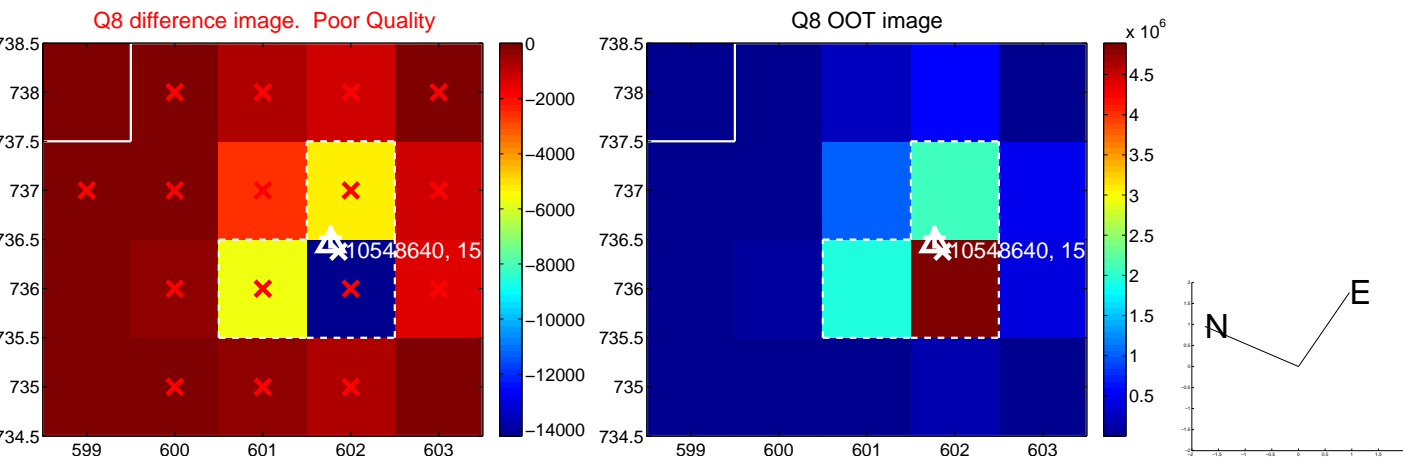
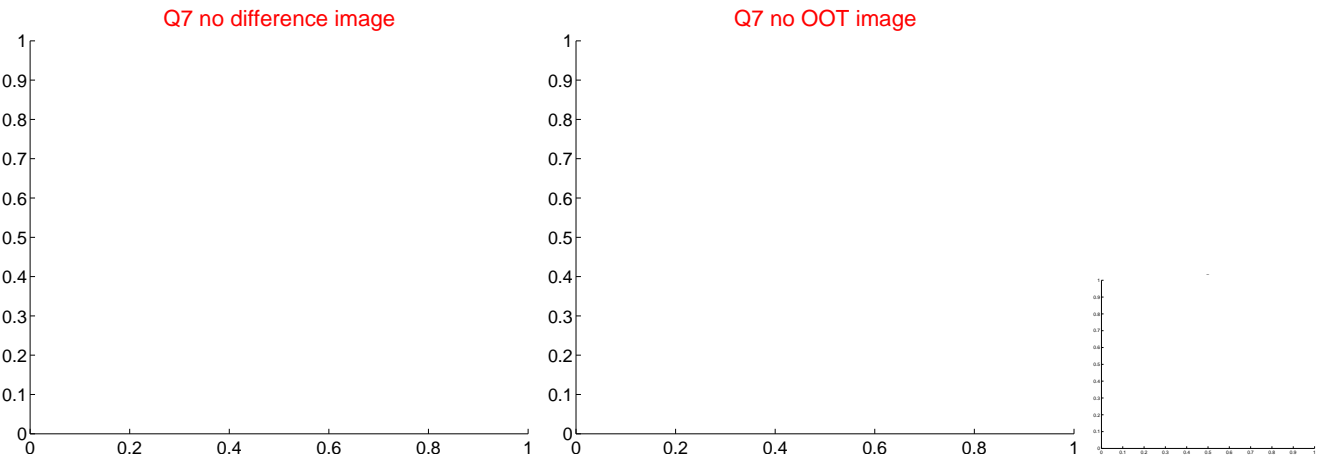
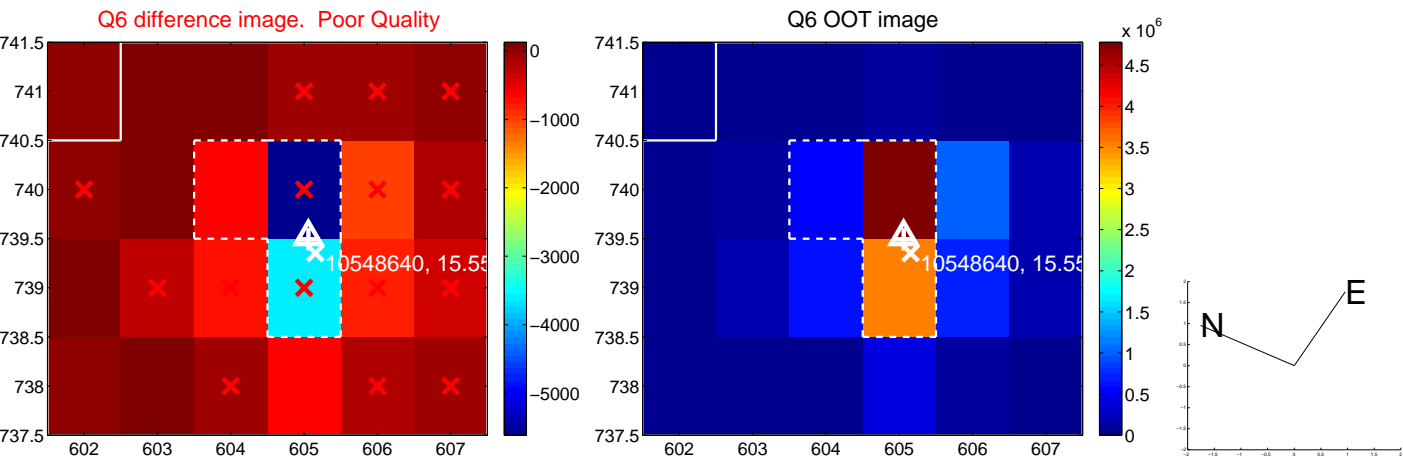
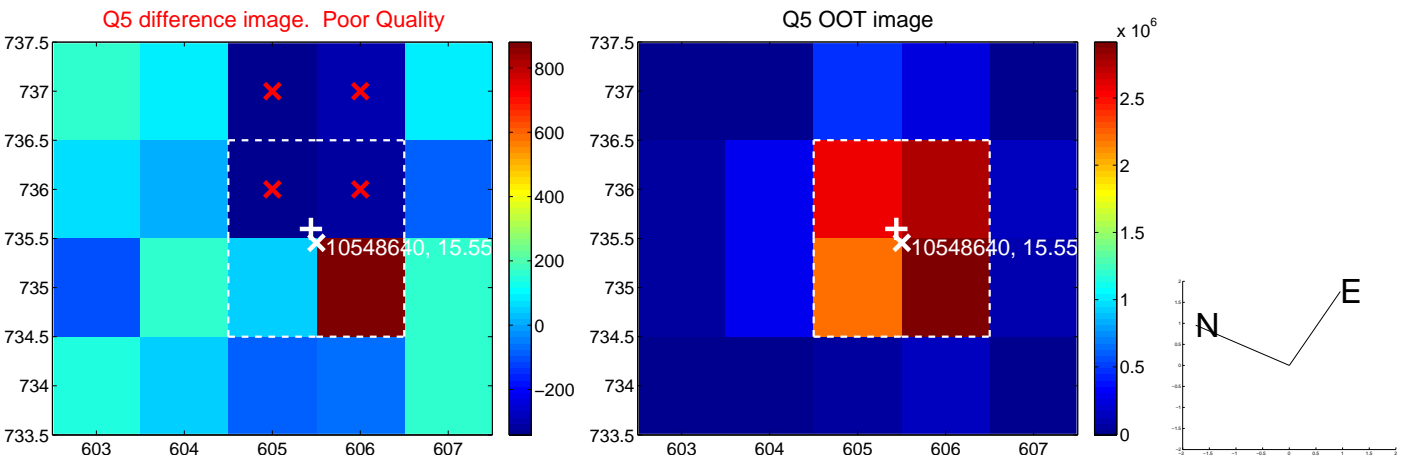


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: 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.

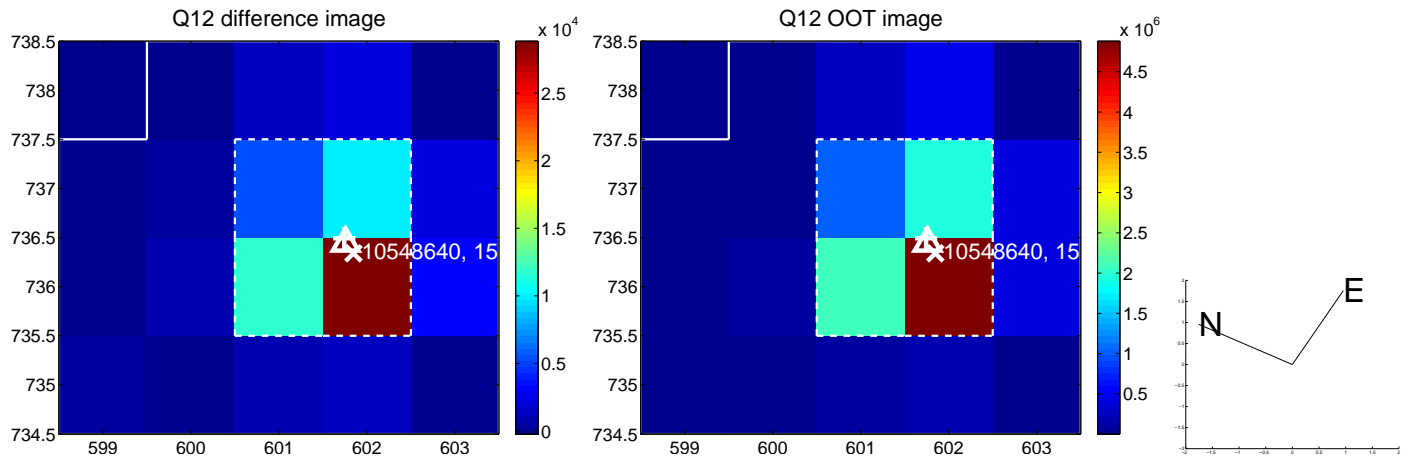
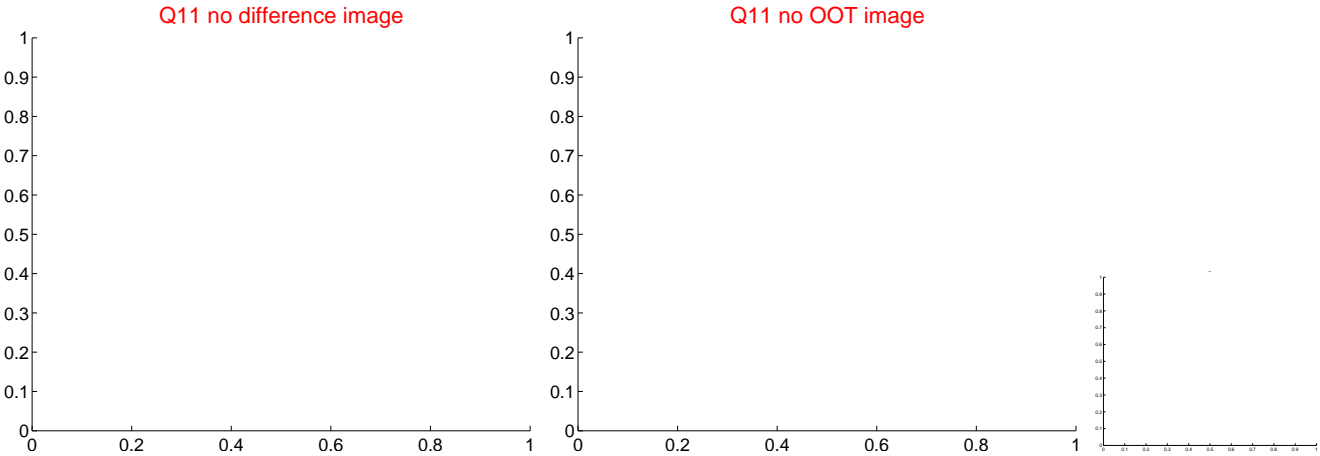
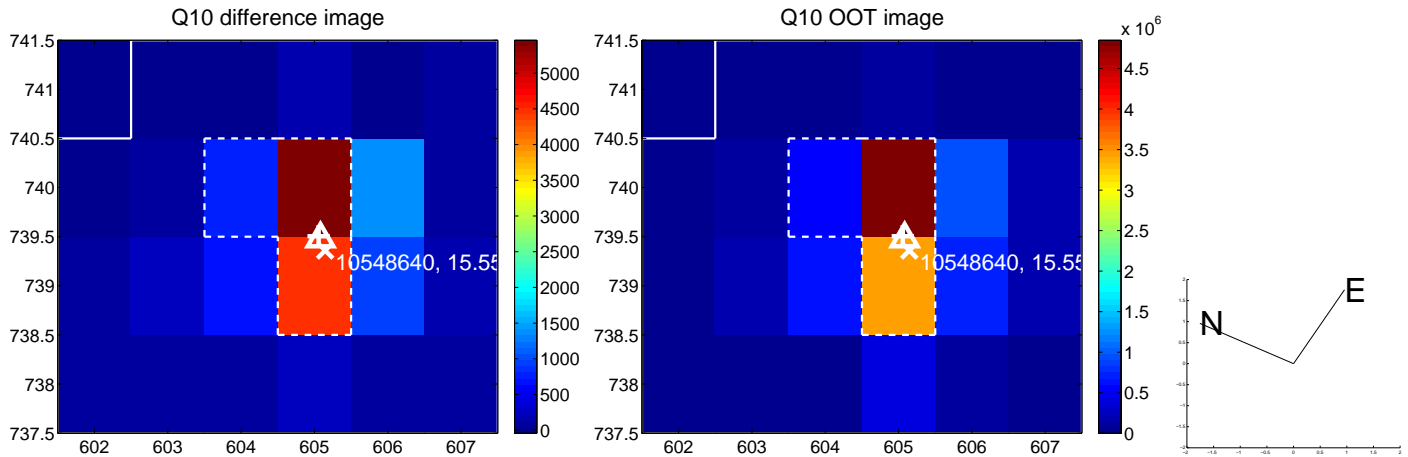
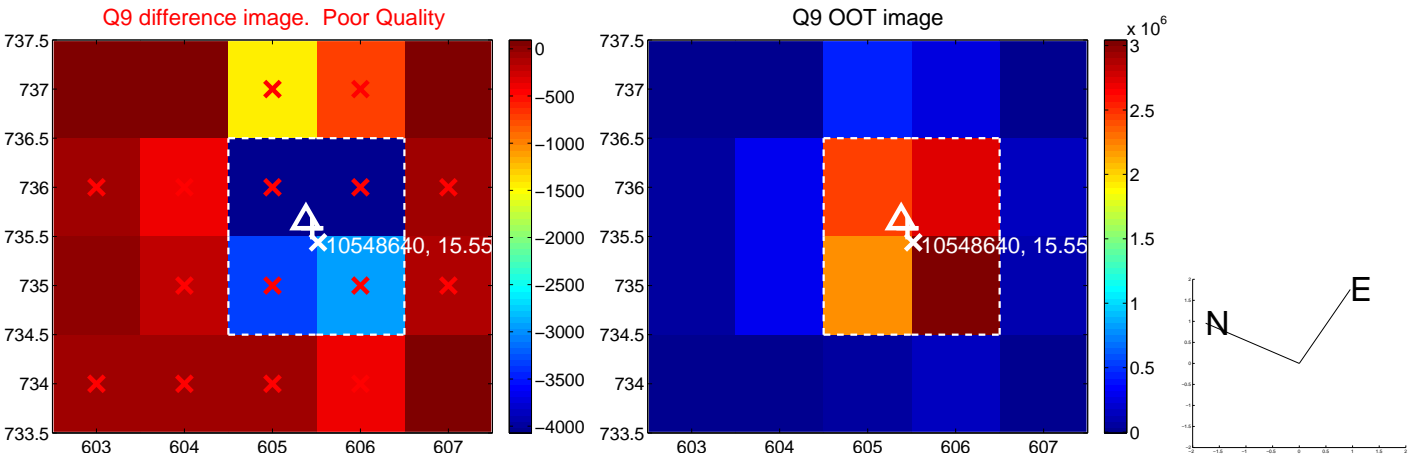
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



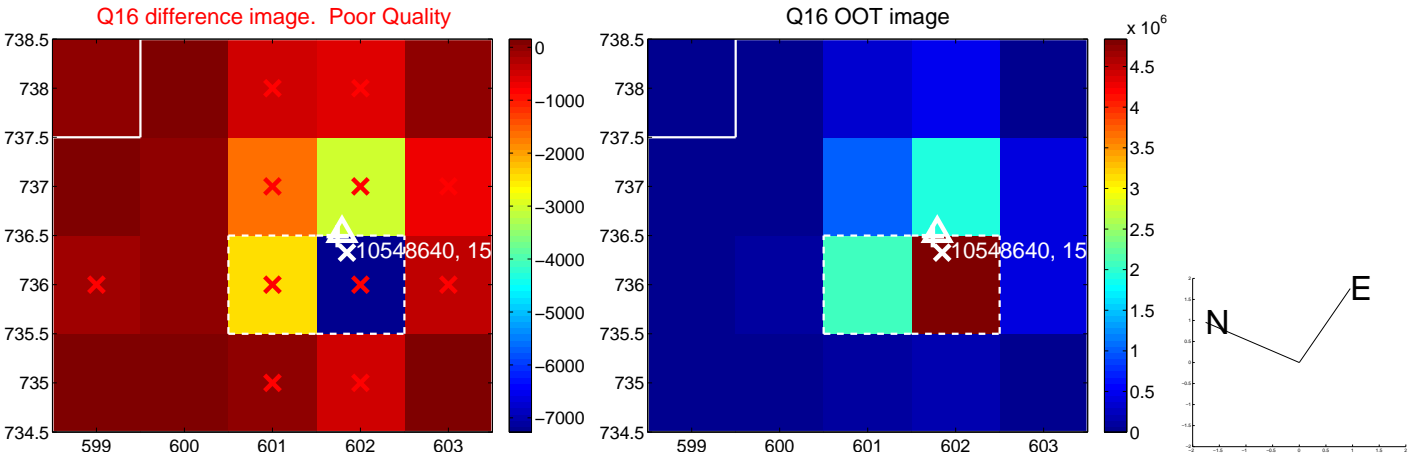
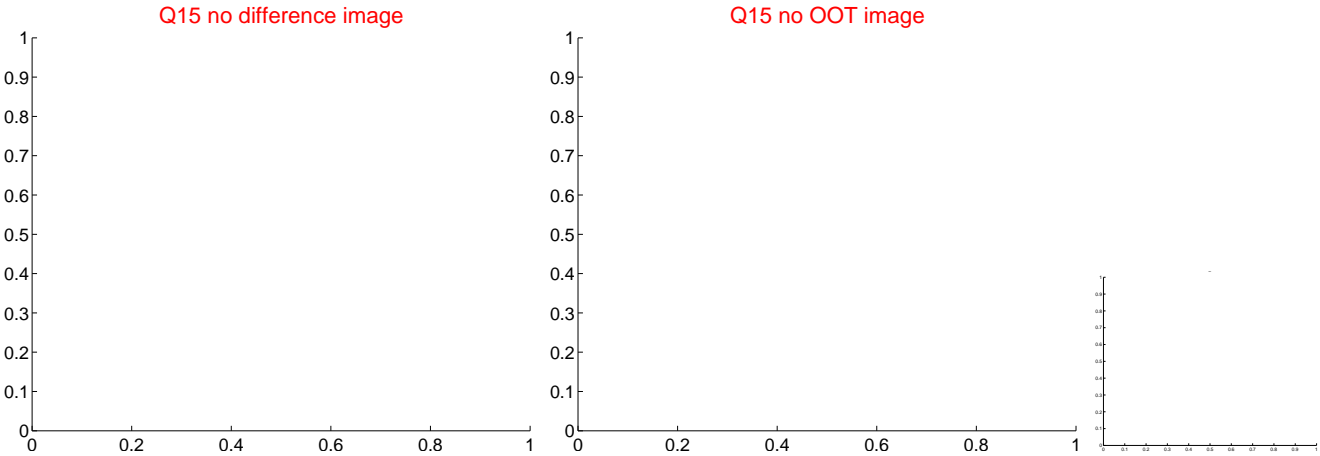
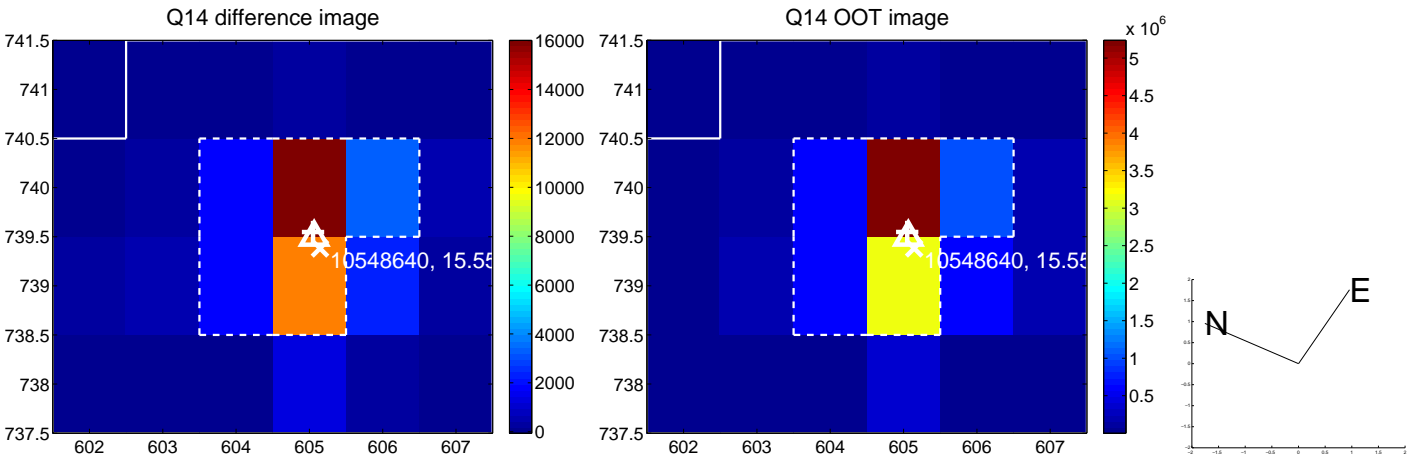
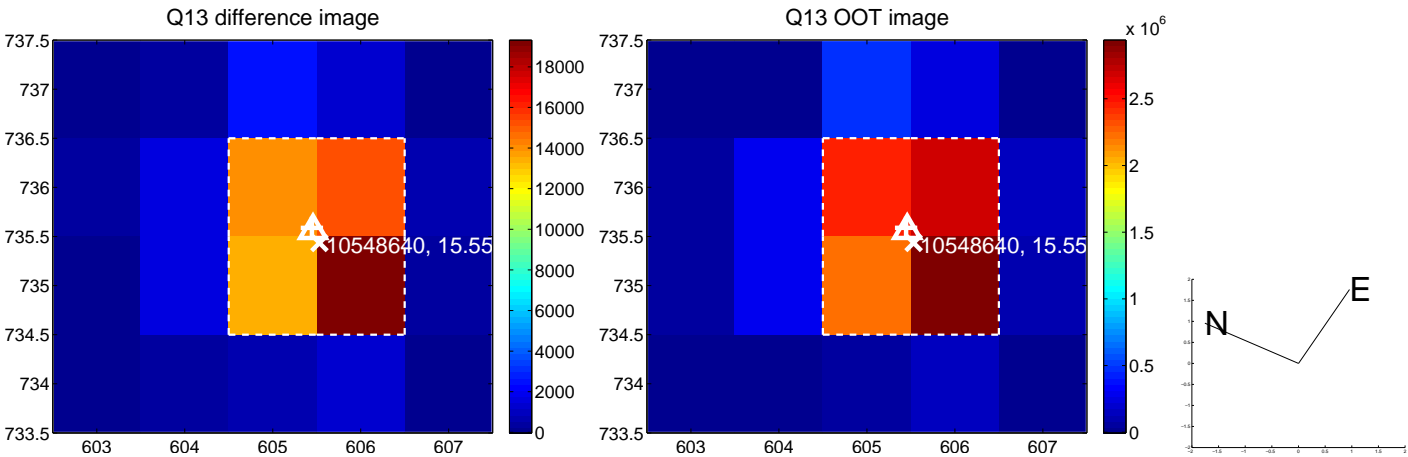
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



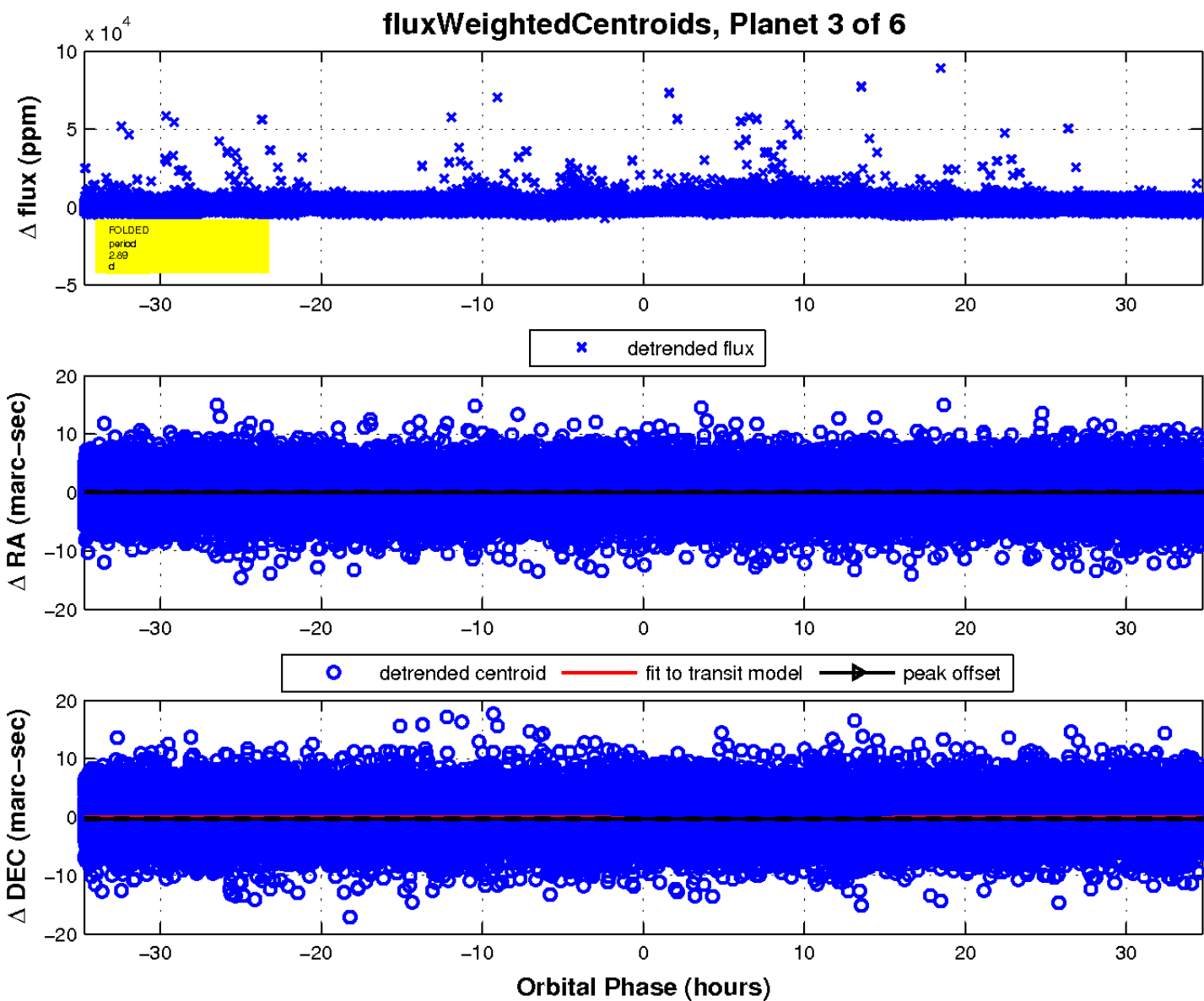
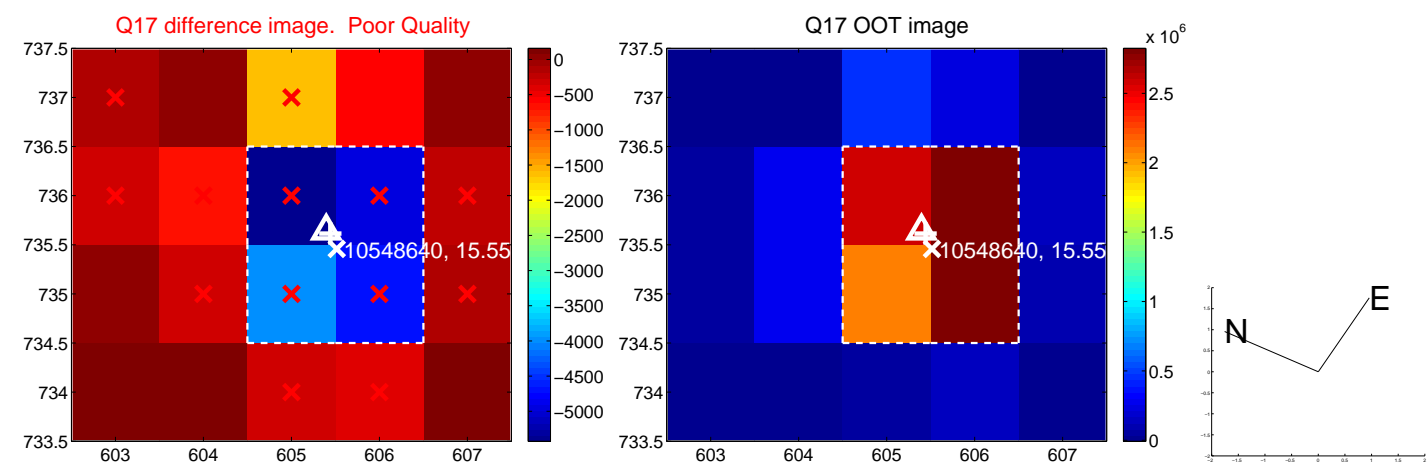
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

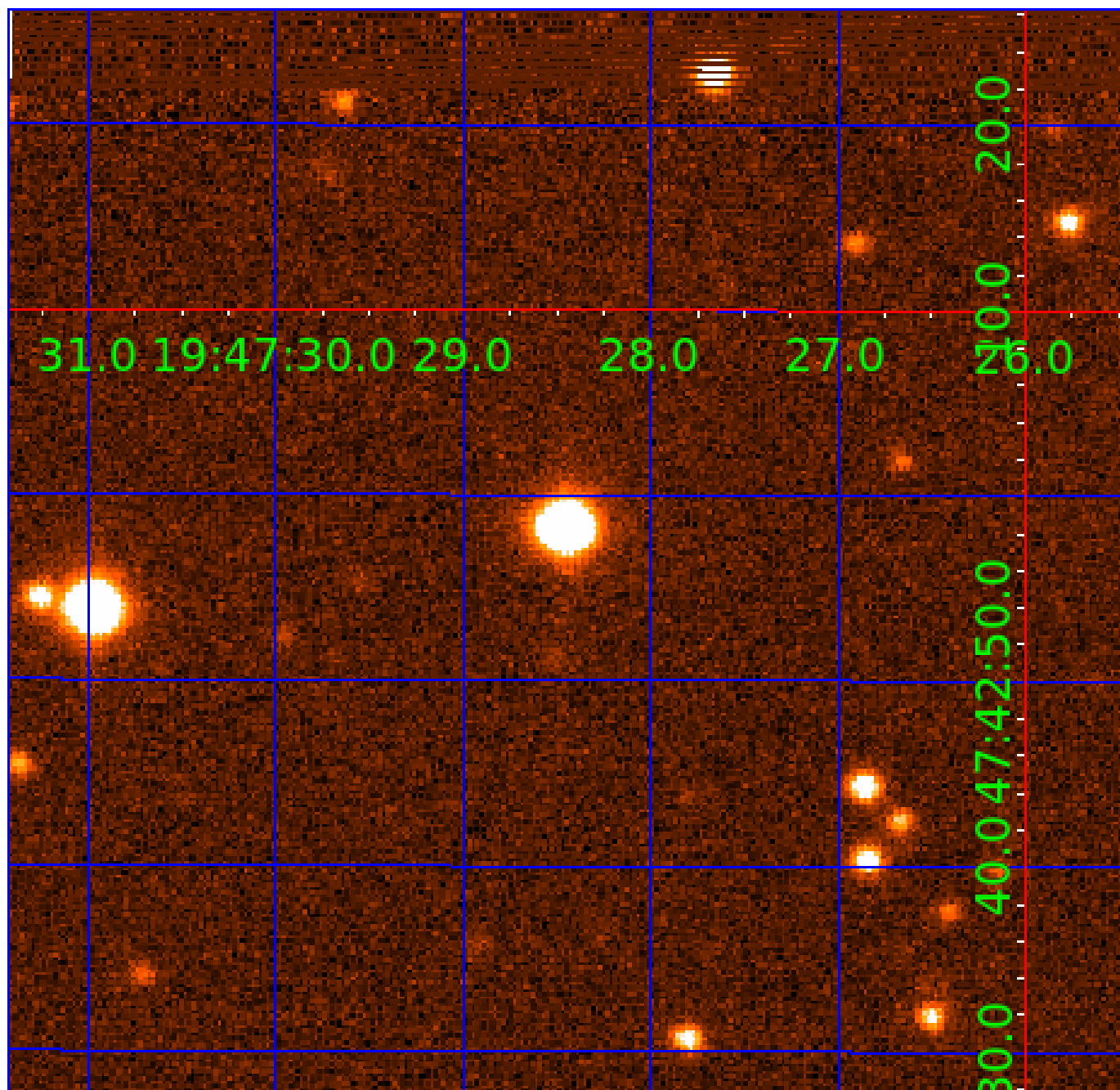


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 010548640

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010548640-01	OBS	No	0.965300	132.502345	13.3	2.602	12.6	0.5	0.57	3727	0.28	225.89
010548640-02	OBS	No	0.965064	131.532301	87.1	0.658	11.0	1.6	0.57	3727	0.68	225.96
010548640-03	OBS	No	2.894792	131.602945	732.4	9.000	12.5	-1.0	0.57	3727	1.49	52.23
010548640-04	OBS	No	67.517110	172.640910	3659.2	5.462	8.8	7.5	0.57	3727	6.79	0.78
010548640-05	OBS	No	47.962549	173.230188	2043.0	4.445	8.3	7.4	0.57	3727	2.59	1.24
010548640-06	OBS	No	97.600860	146.889886	3916.1	4.666	8.2	6.8	0.57	3727	4.34	0.48

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010548640-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—CENT_KIC_POS
010548640-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—SWEET_NTL—LPP_DV—LPP_ALT—SAME_NTL_PERIOD—CENT_KIC_POS
010548640-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_NOFITS
010548640-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS
010548640-05	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS
010548640-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_KIC_POS

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

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

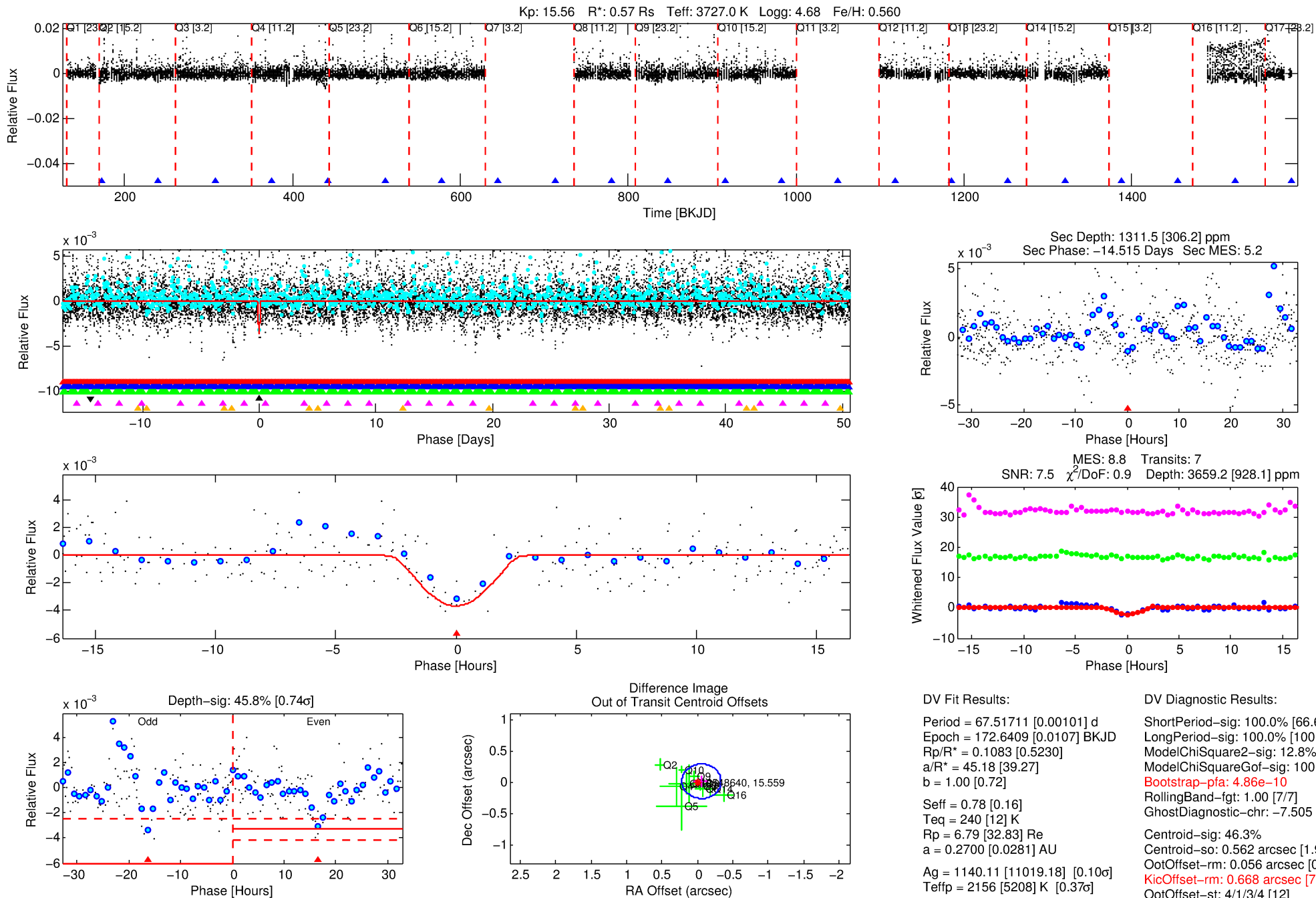
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010548640-04

No Significant Match Found

# DV One-Page Summary

KIC: 10548640 Candidate: 4 of 6 Period: 67.517 d



## DV Fit Results:

Period = 67.51711 [0.00101] d  
Epoch = 172.6409 [0.0107] BKJD  
Rp/R\* = 0.1083 [0.5230]  
a/R\* = 45.18 [39.27]  
b = 1.00 [0.72]  
Seff = 0.78 [0.16]  
Teq = 240 [12] K  
Rp = 6.79 [32.83] Re  
a = 0.2700 [0.0281] AU  
Ag = 1140.11 [11019.18] [0.10σ]  
Teffp = 2156 [5208] K [0.37σ]

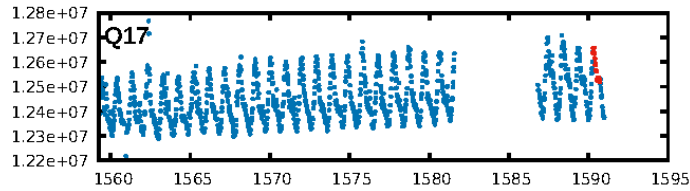
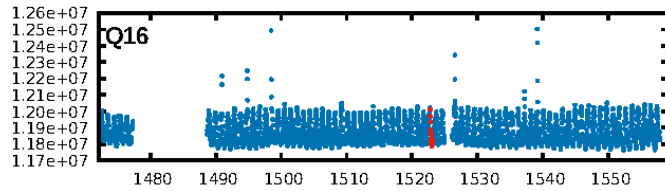
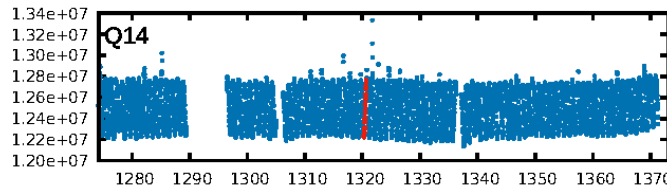
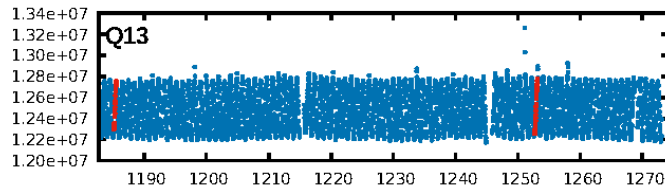
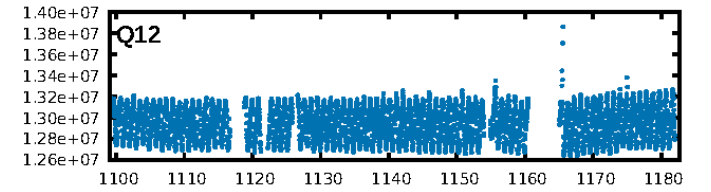
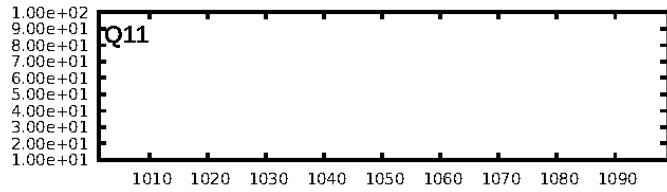
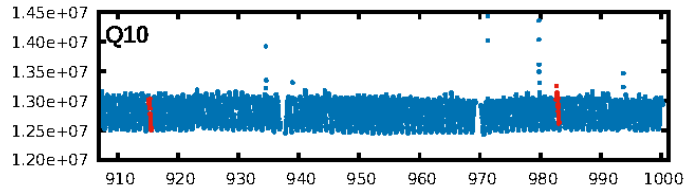
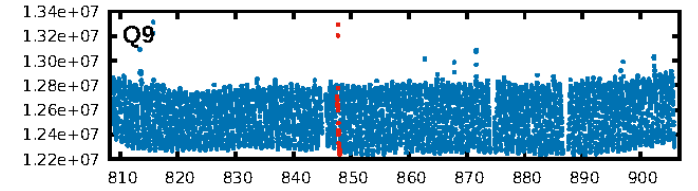
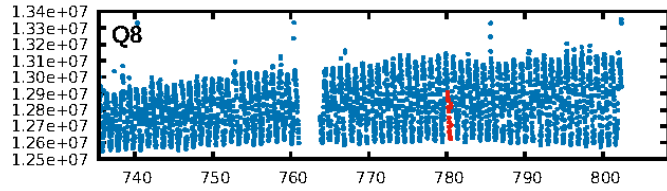
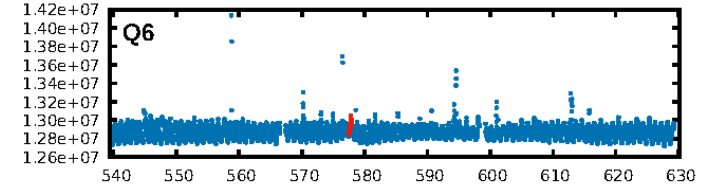
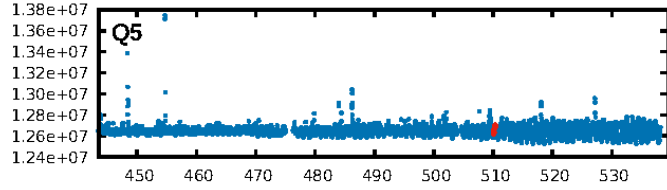
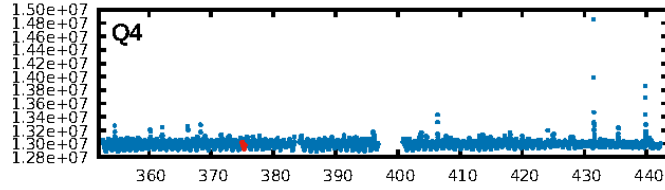
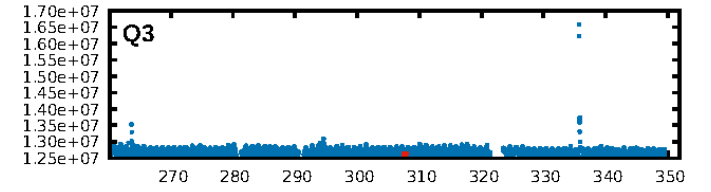
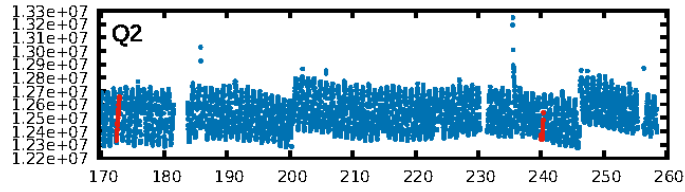
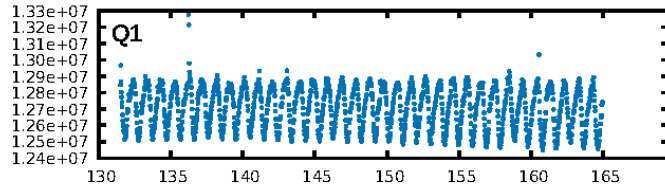
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [66.64σ]  
LongPeriod-sig: 100.0% [100.50σ]  
ModelChiSquare2-sig: 12.8%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 4.86e-10**  
RollingBand-fgt: 1.00 [7/7]  
GhostDiagnostic-chr: -7.505  
Centroid-sig: 46.3%  
Centroid-so: 0.562 arcsec [1.97σ]  
OotOffset-rm: 0.056 arcsec [0.61σ]  
OotOffset-st: 4/1/3/4 [12]  
KicOffset-rm: **0.668 arcsec [7.49σ]**  
KicOffset-st: 4/1/3/4 [12]  
DiffImageQuality-fgm: 0.58 [7/12]  
DiffImageOverlap-fno: 0.00 [0/12]

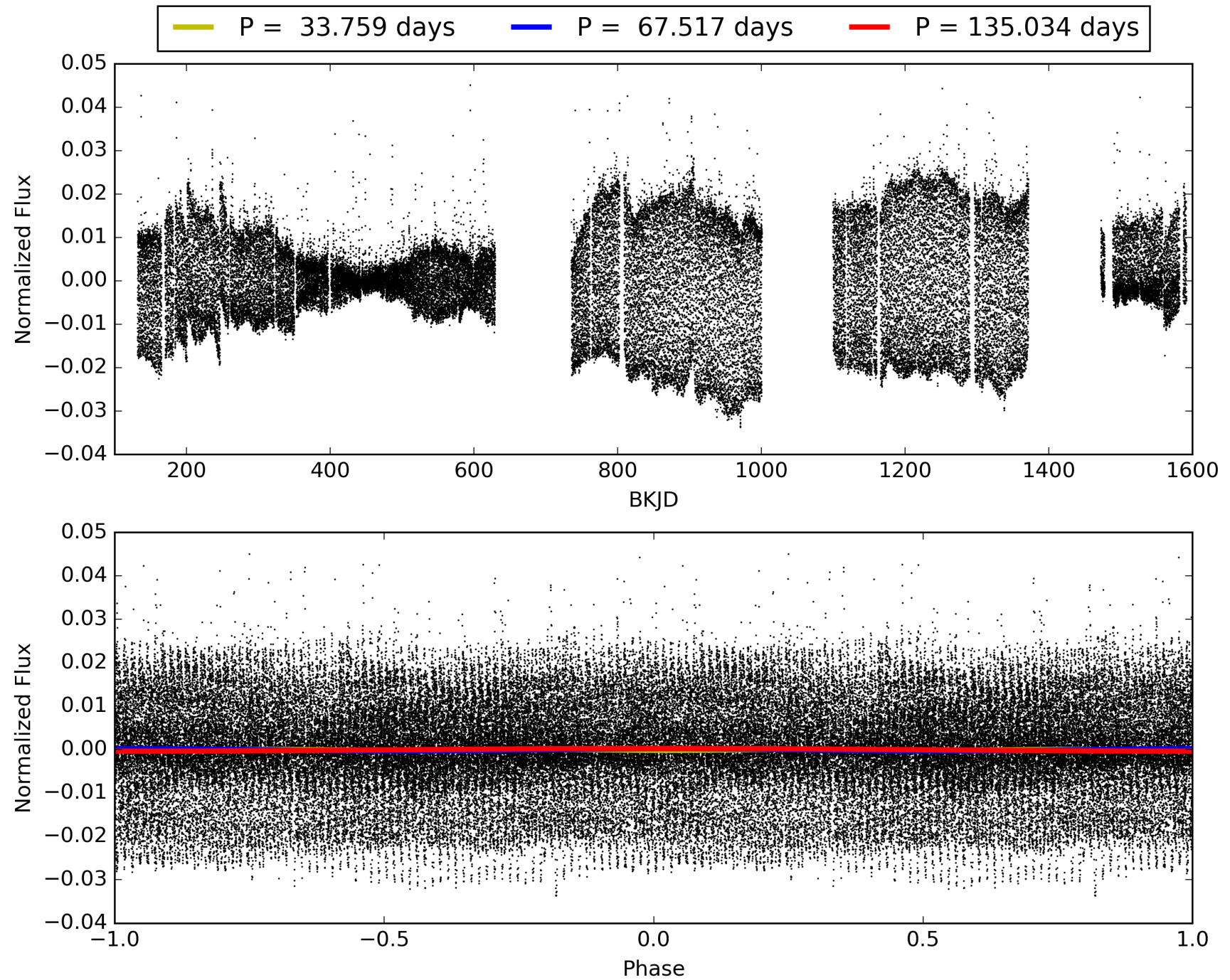
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:37:21 Z

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

# TCE 010548640-04, PDC Light Curves

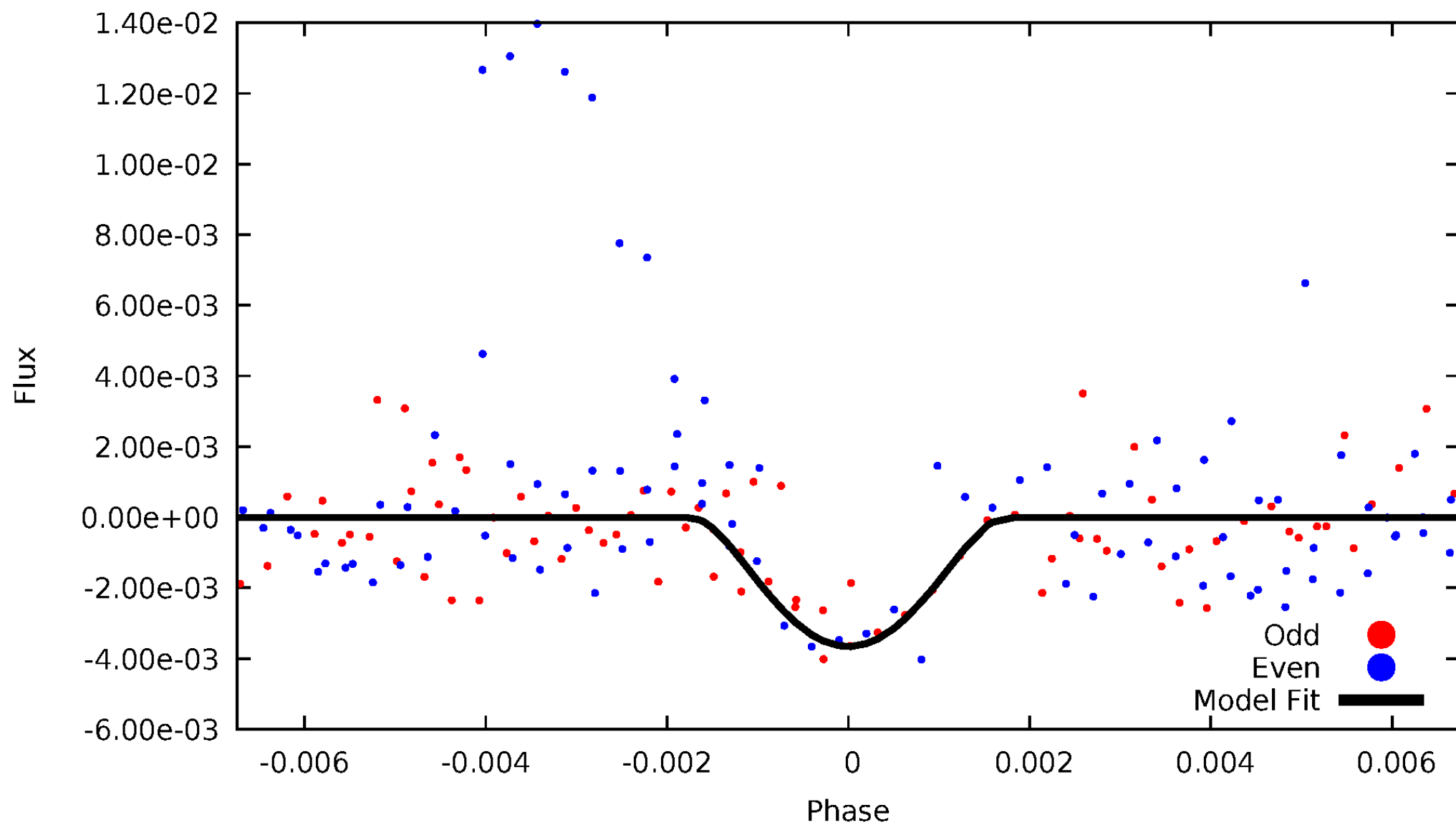


# TCE 010548640-04



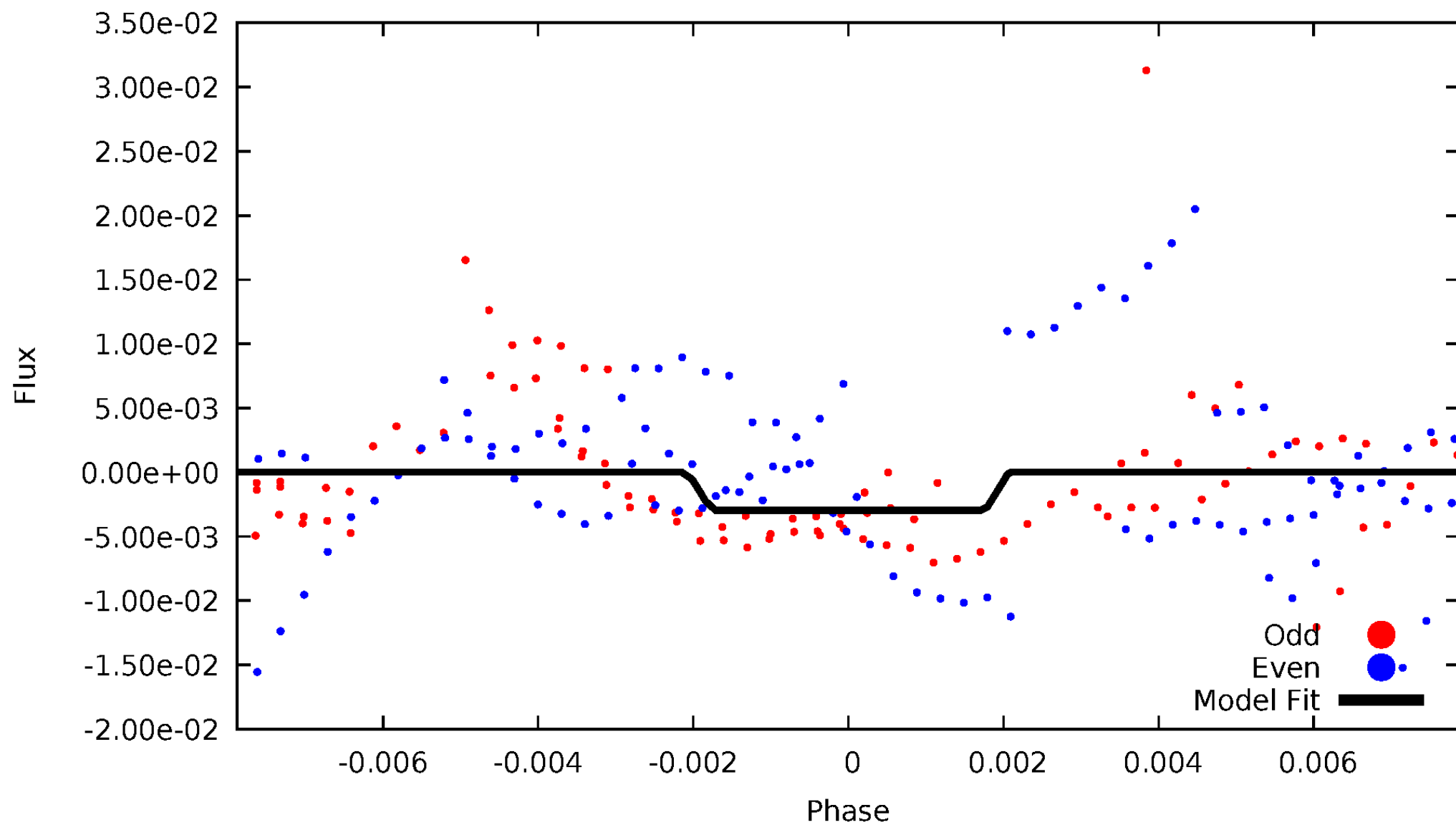
# DV Odd/Even

TCE 010548640-04



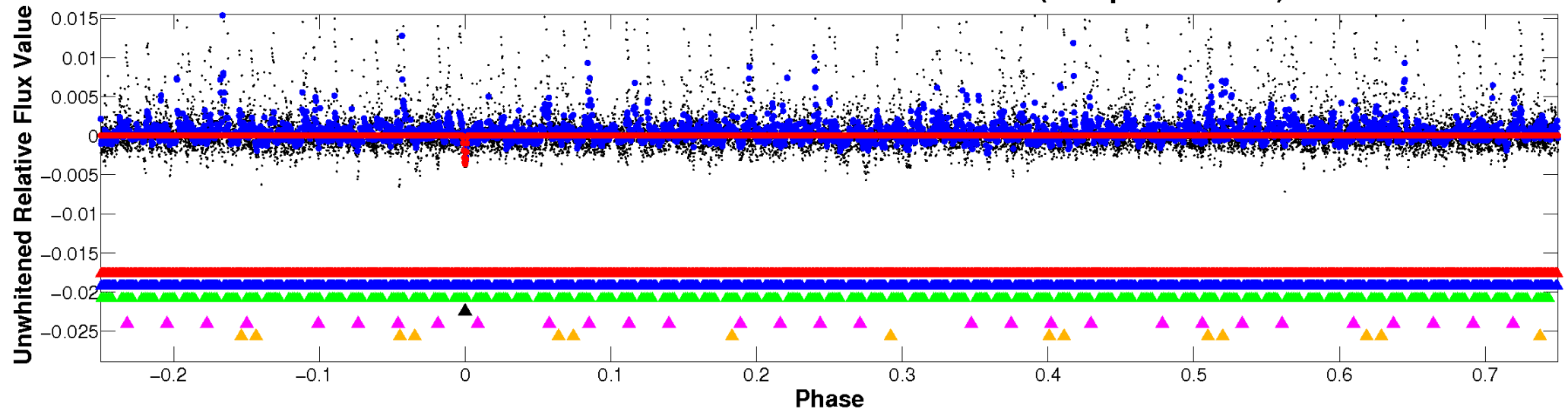
# ALT Odd/Even

TCE 010548640-04

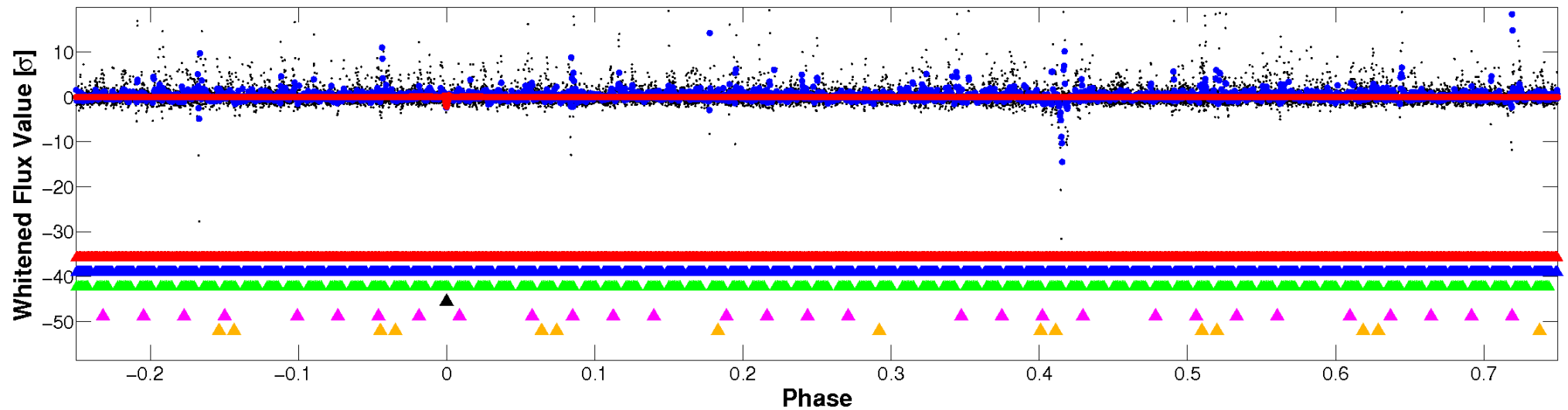


# Non-Whitened Vs. Whitened Light Curve

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



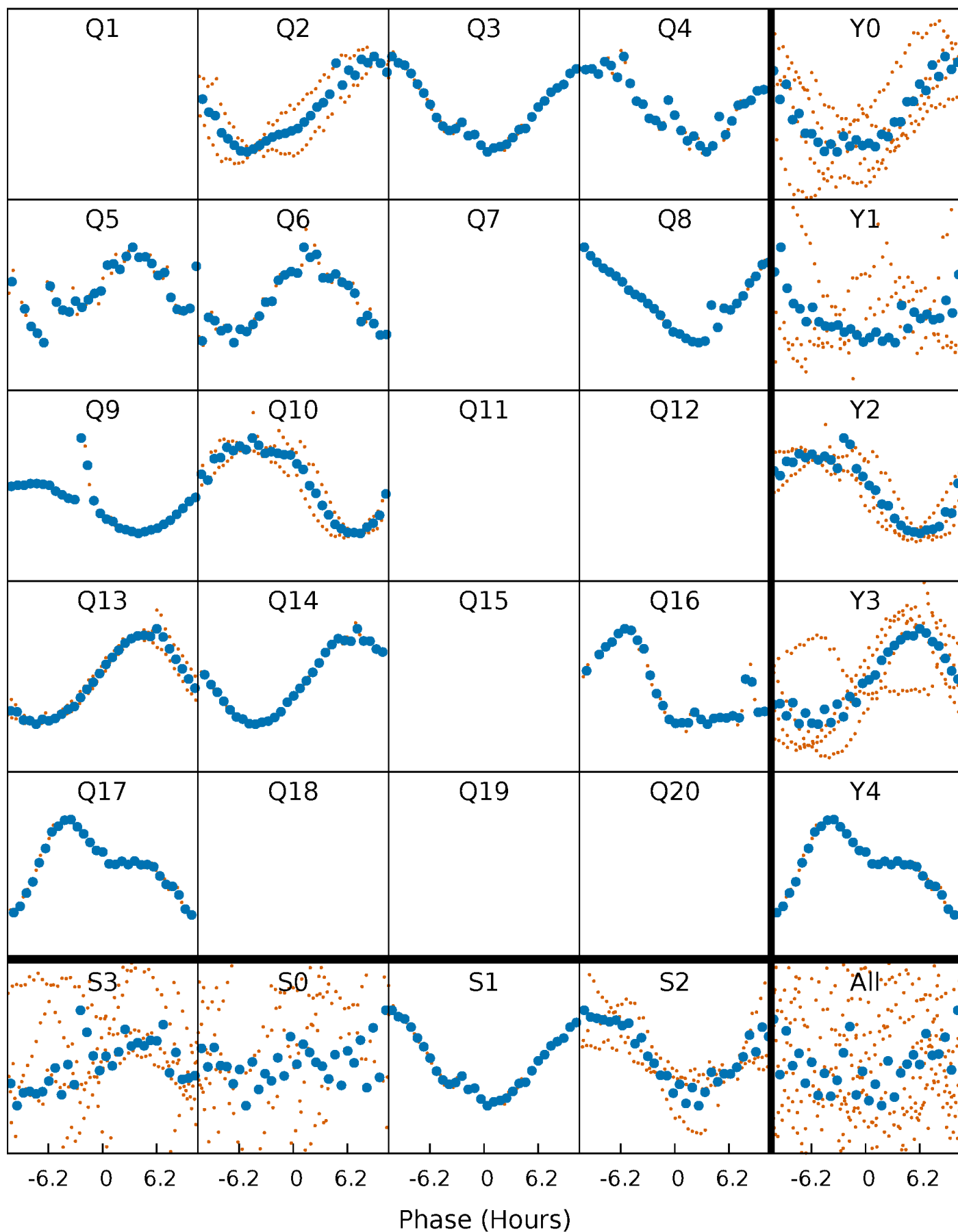
## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)





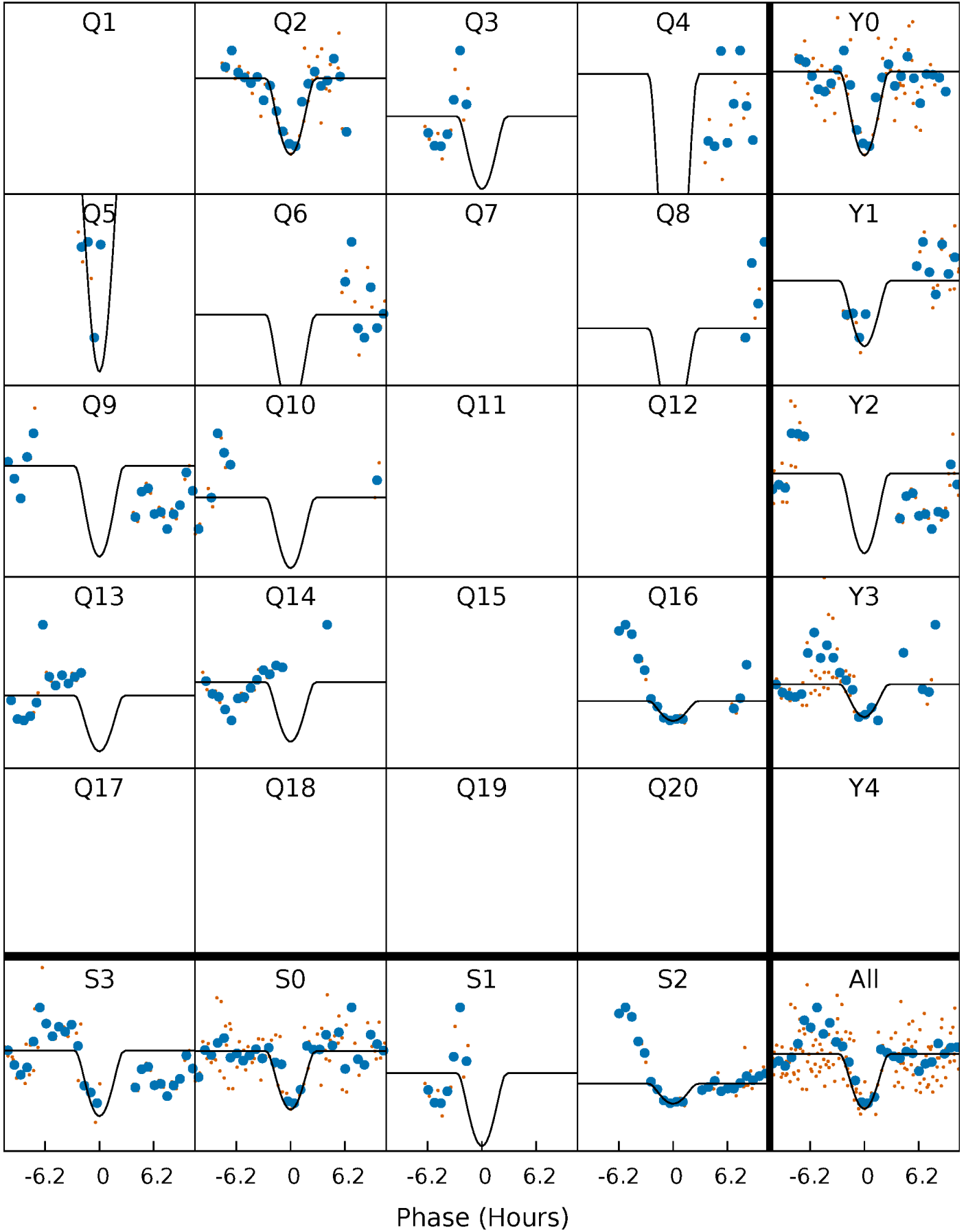
# PDC Quarter-Phased Transit Curves

TCE 010548640-04 P= 67.517110 Days  $T_0=172.640910$  (BKJD)



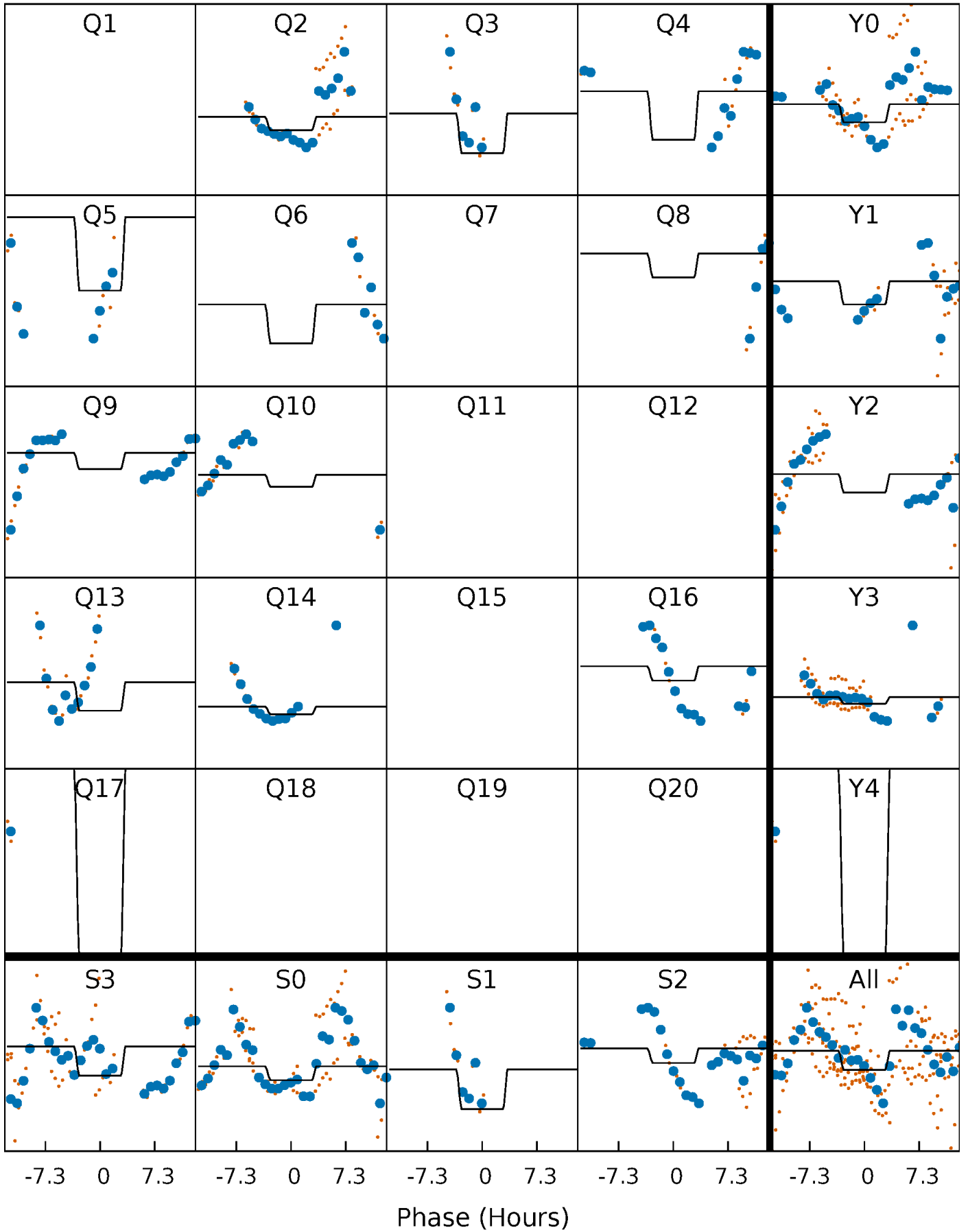
# DV Quarter-Phased Transit Curves

TCE 010548640-04   P= 67.517110 Days    $T_0=172.640910$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

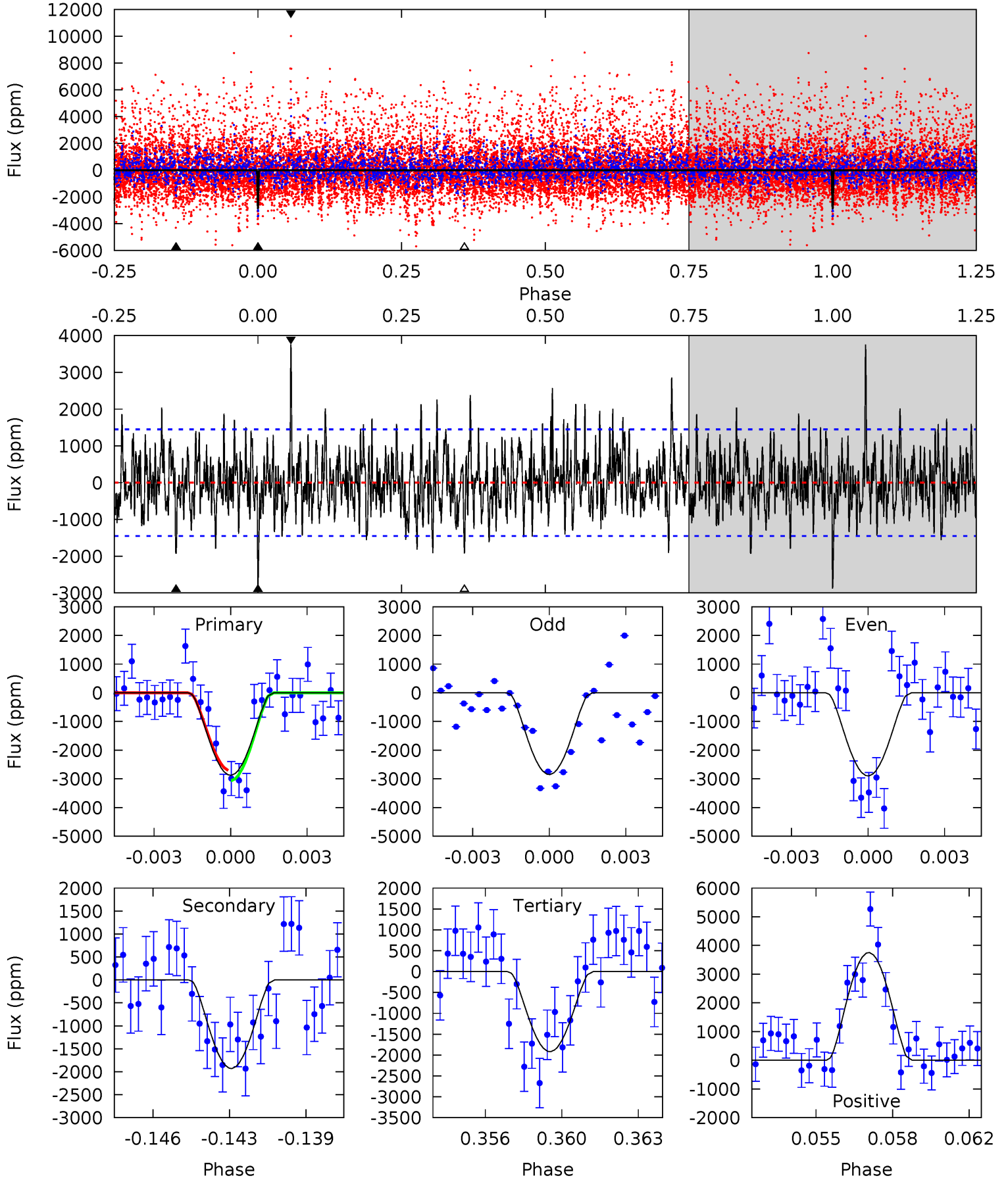
TCE 010548640-04 P= 67.516359 Days  $T_0=172.568950$  (BKJD)



# DV Model-Shift Uniqueness Test

010548640-04,  $P = 67.517110$  Days,  $E = 105.123800$  Days

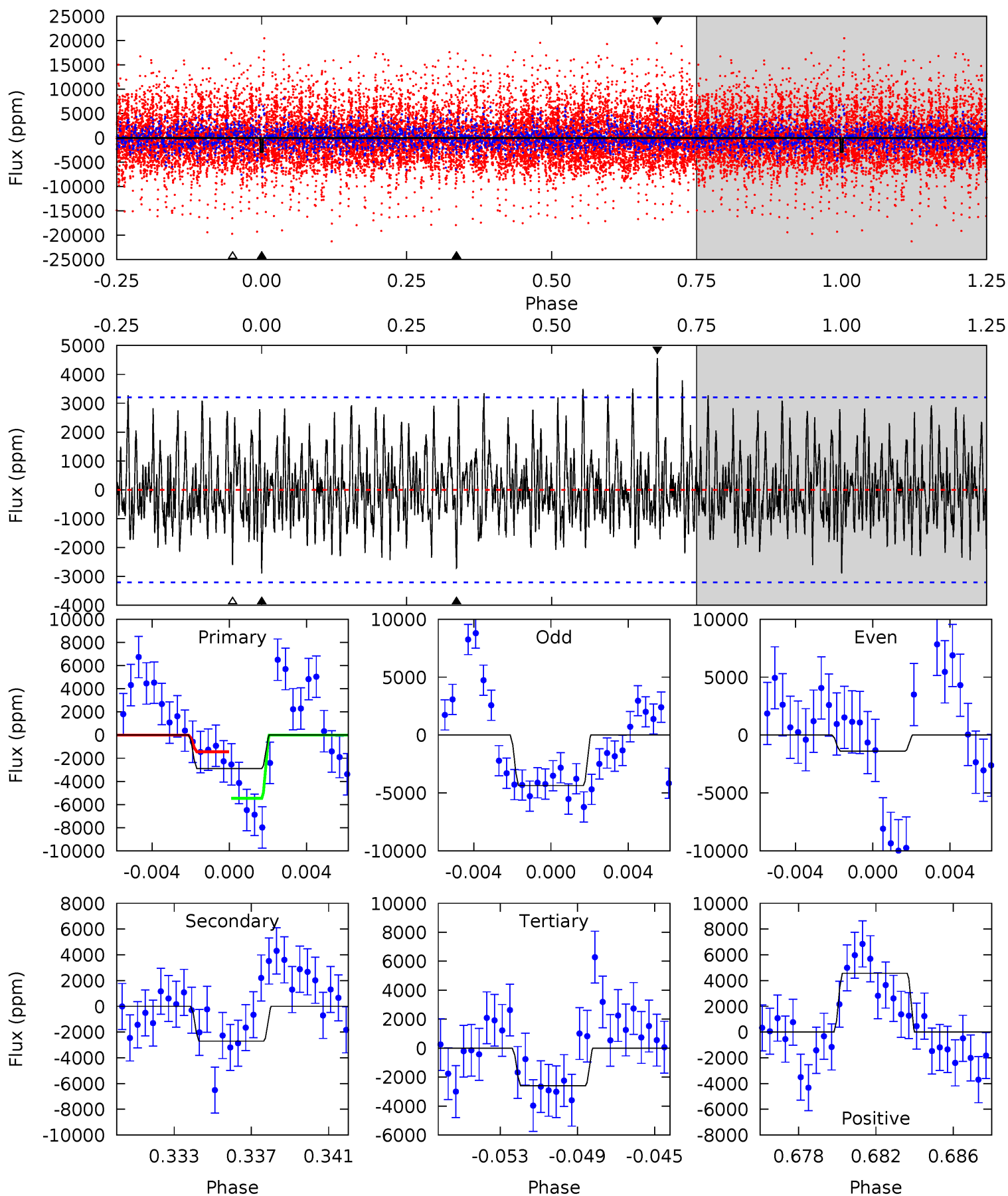
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.4	6.97	6.93	13.6	5.24	2.94	2.52	3.45	-3.17	0.04	-6.59	0.07	0.33	0.57	0.62



# Alt Model-Shift Uniqueness Test

010548640-04, P = 67.516359 Days, E = 105.052591 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
4.69	4.38	4.22	7.40	5.20	2.87	1.76	0.47	-2.71	0.16	-3.02	2.38	0.80	0.61	3.13



### Stellar Parameters For KIC 010548640

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3727^{+116}_{-142}$	$4.679^{+0.072}_{-0.022}$	$0.560^{+0.050}_{-0.300}$	$0.575^{+0.033}_{-0.076}$	$0.576^{+0.036}_{-0.068}$	$4.261^{+1.573}_{-0.399}$
	+3%/-4%	+2%/-0%	+9%/-54%	+6%/-13%	+6%/-12%	+37%/-9%
Source	KIC0	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 010548640-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	-1931 $\pm$ 277	$23.48^{+26.50}_{-16.39}$	$332^{+13}_{-14}$	$2108^{+673}_{-306}$	$140^{+1375}_{-109}$
Alt.	-2702 $\pm$ 617	$23.46^{+26.27}_{-16.92}$	$331^{+13}_{-12}$	$2176^{+821}_{-318}$	$199^{+2274}_{-158}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

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

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

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

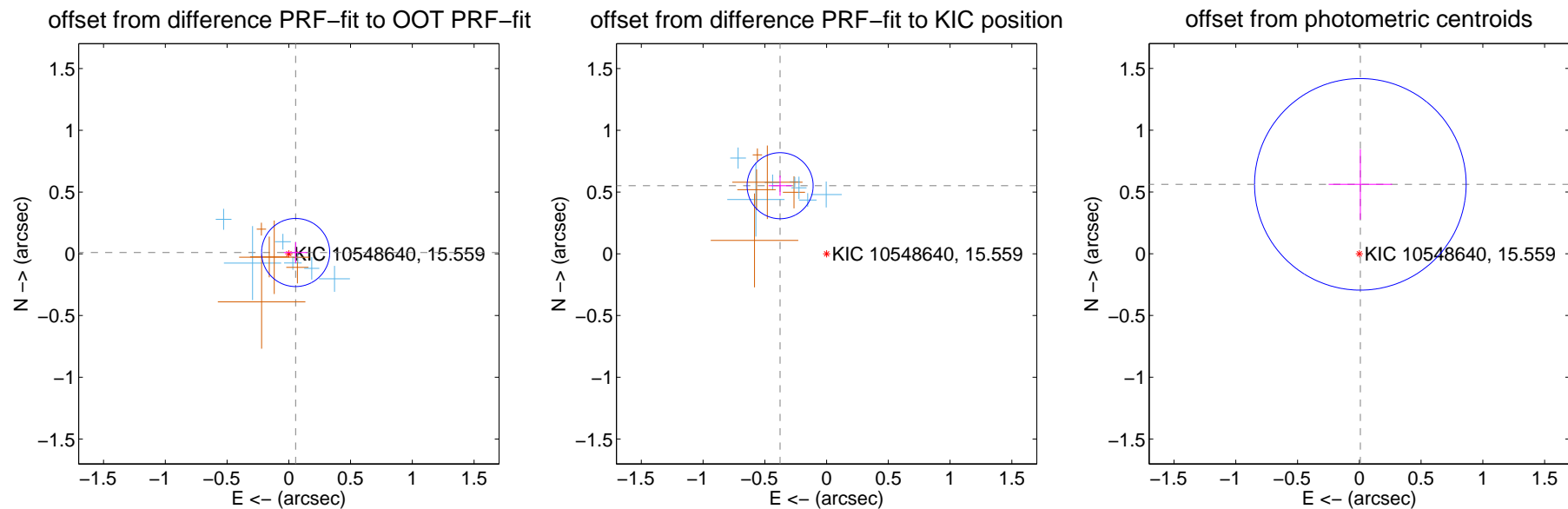
## DV Centroid Data

Supplemental centroid analysis for 010548640-04. Kepler magnitude: 15.56. Transit SNR 7.46

There are 7 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.68 arcsec

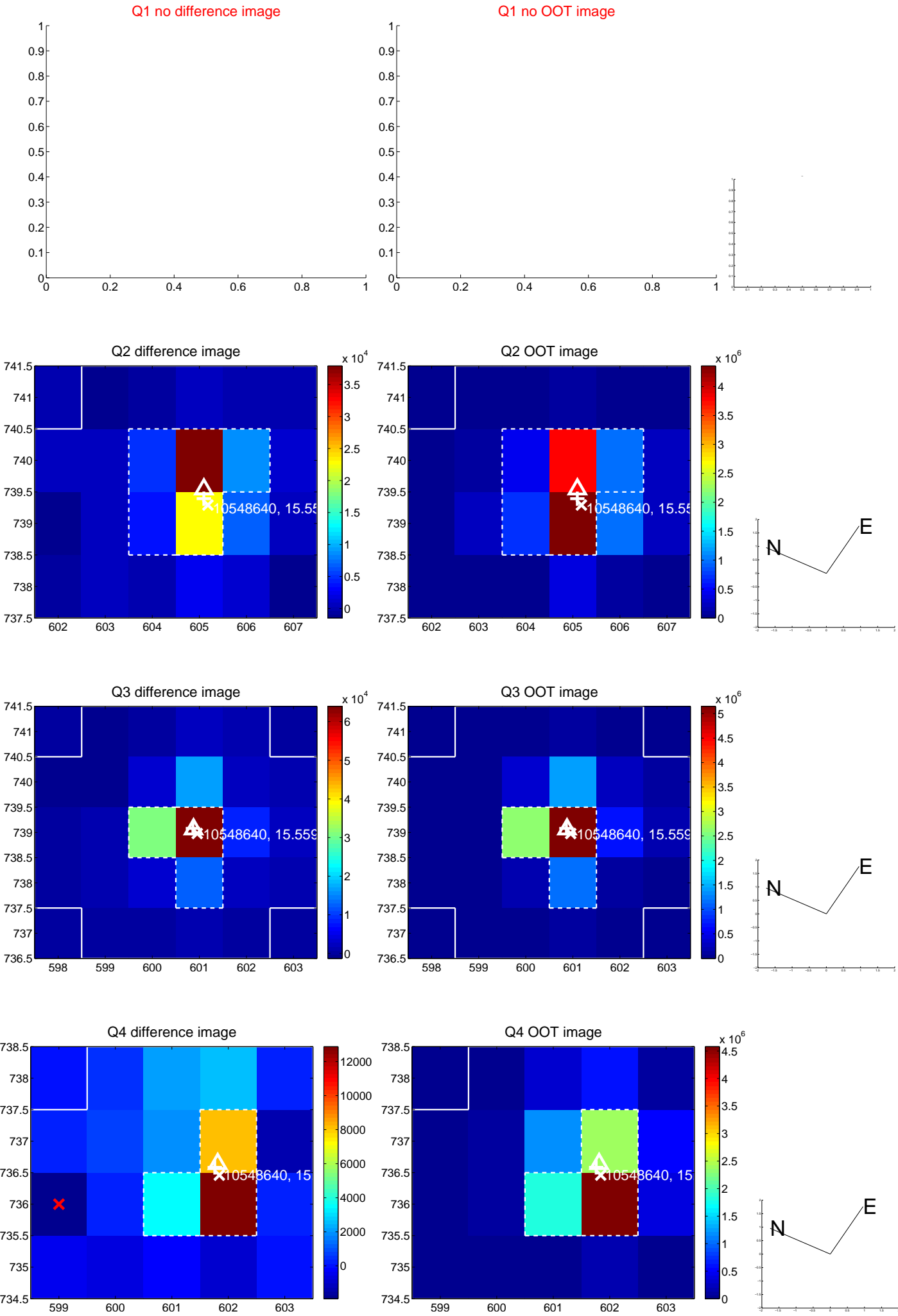
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.056 \pm 0.092$	0.61	$-0.055 \pm 0.095$	$0.010 \pm 0.084$
PRF-fit source offset from KIC position	$0.668 \pm 0.089$	7.49	$0.376 \pm 0.093$	$0.551 \pm 0.082$
photometric centroid source offset	$0.56 \pm 0.29$	1.97	$-0.01 \pm 0.26$	$0.56 \pm 0.29$



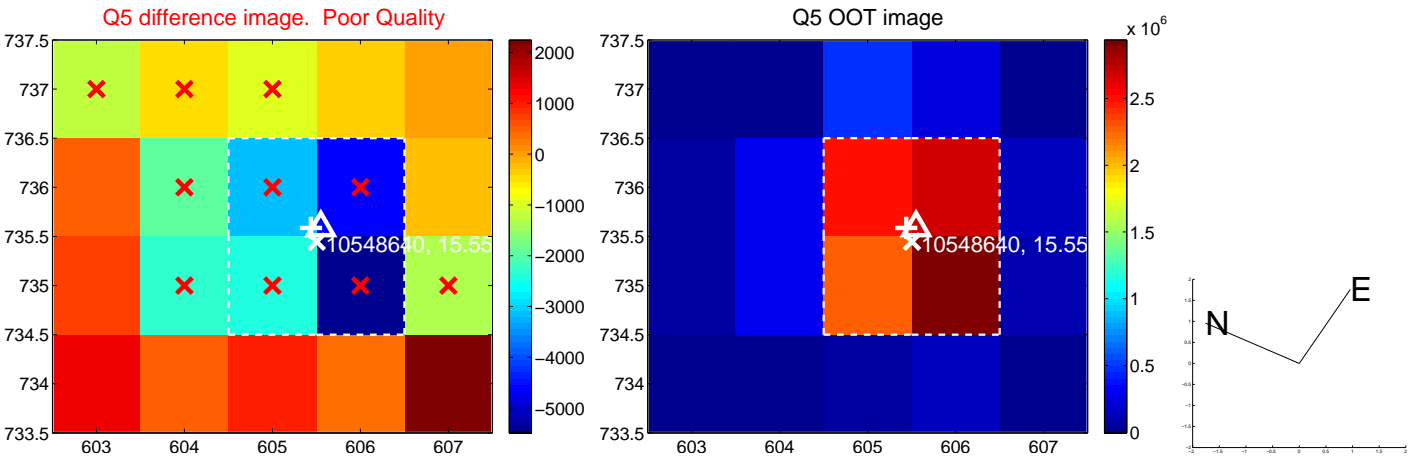
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: 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.



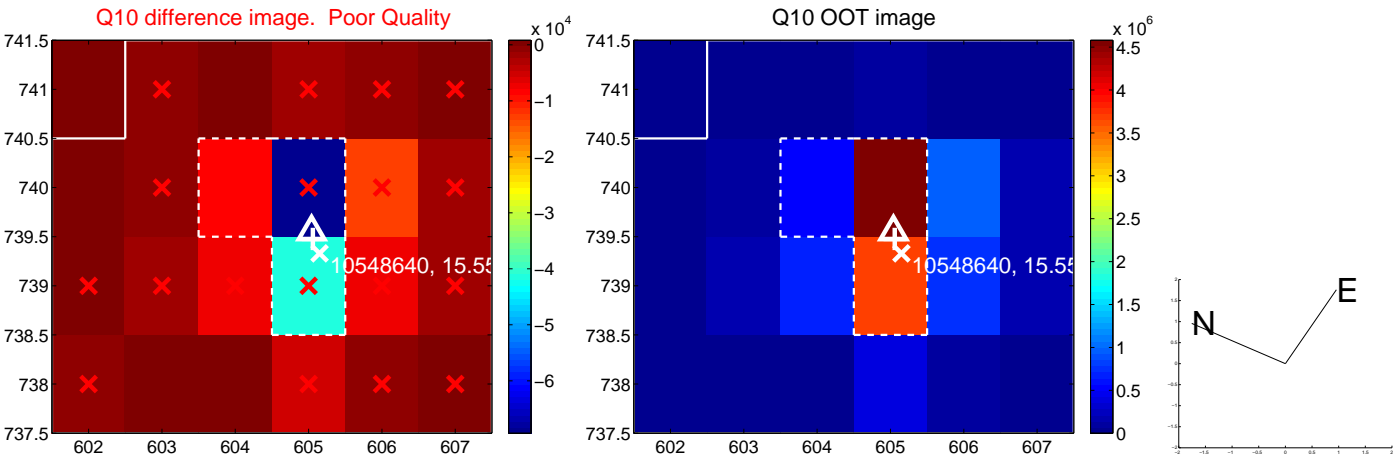
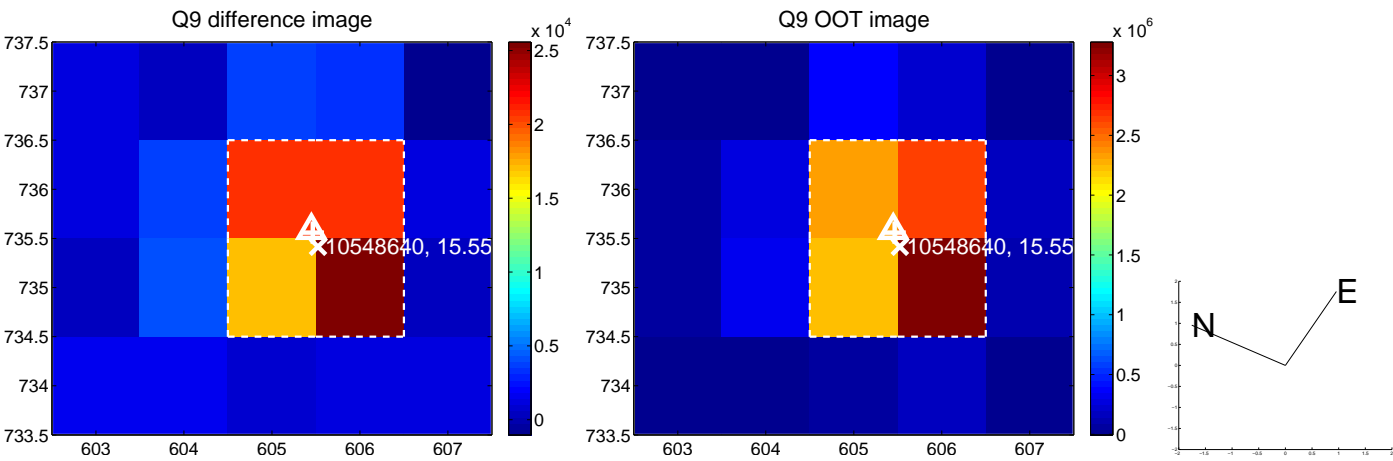
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



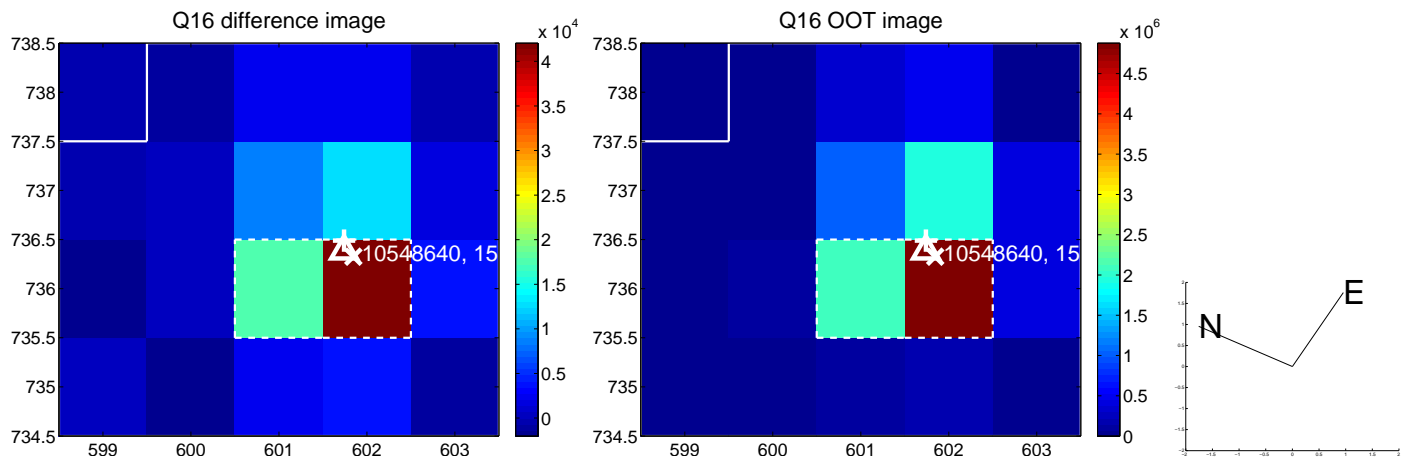
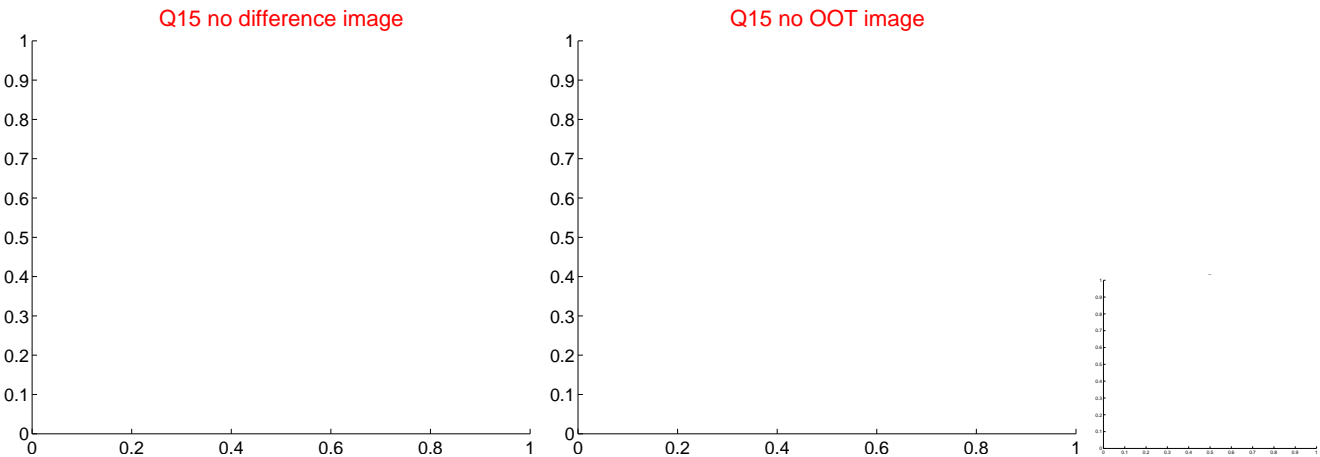
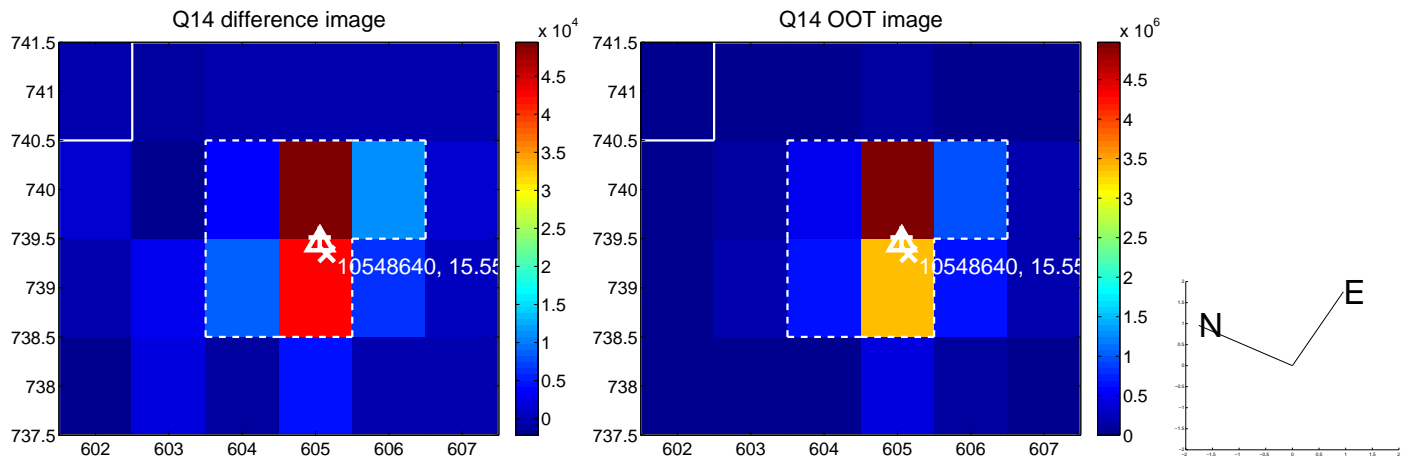
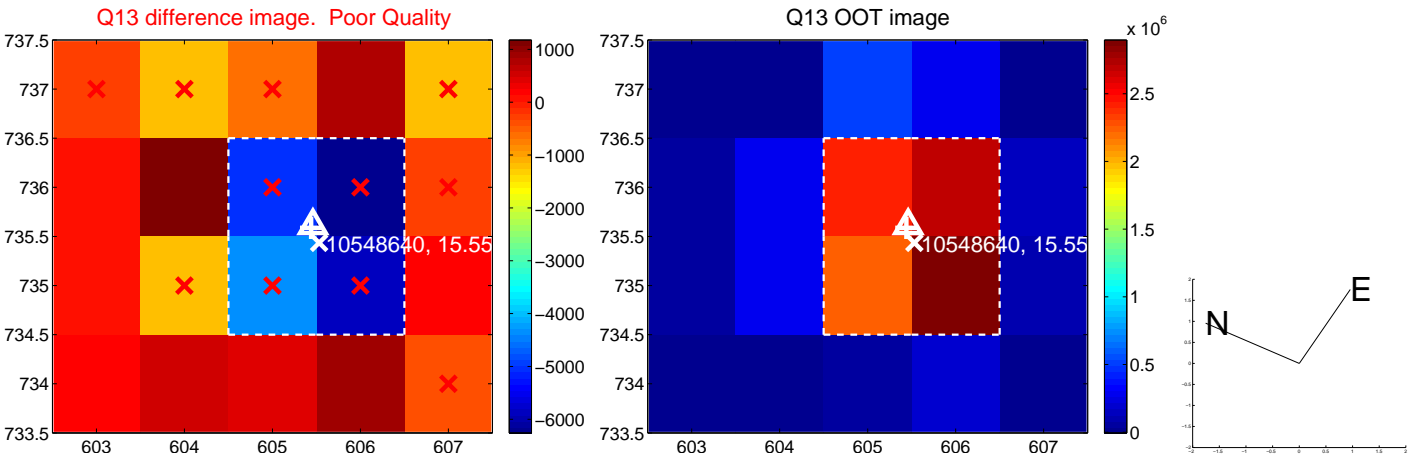
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



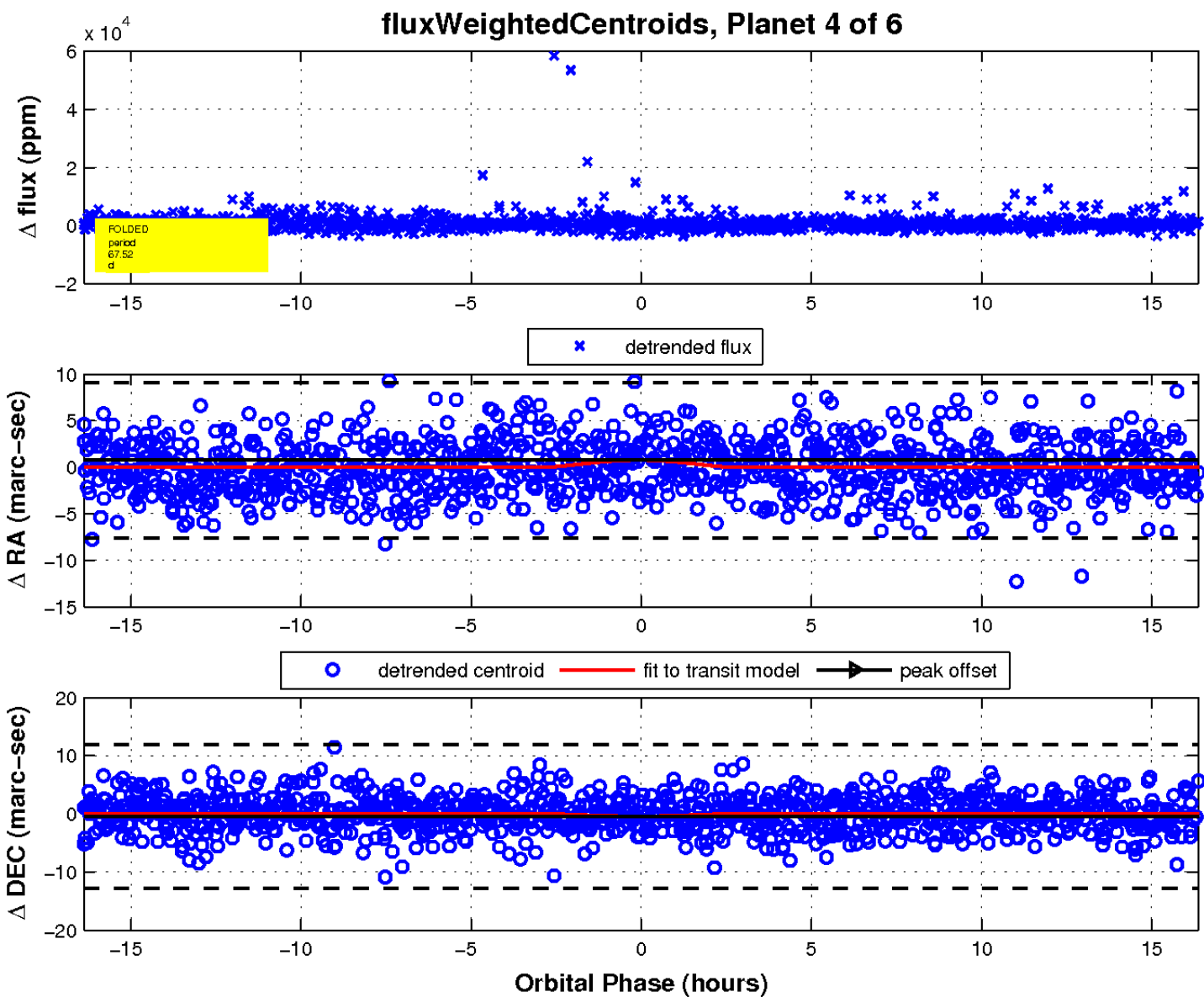
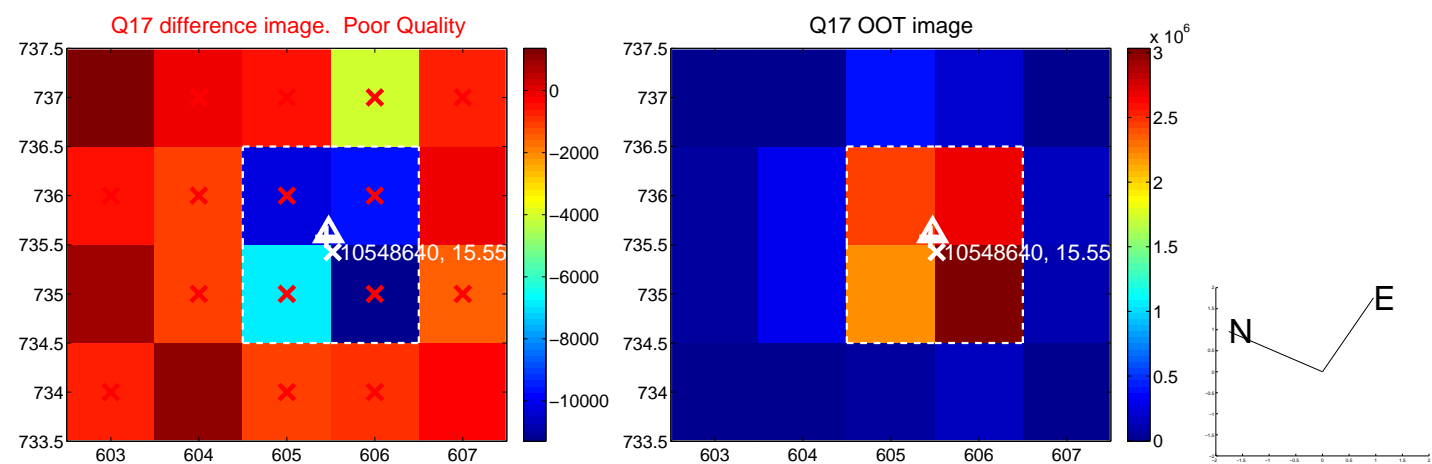
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

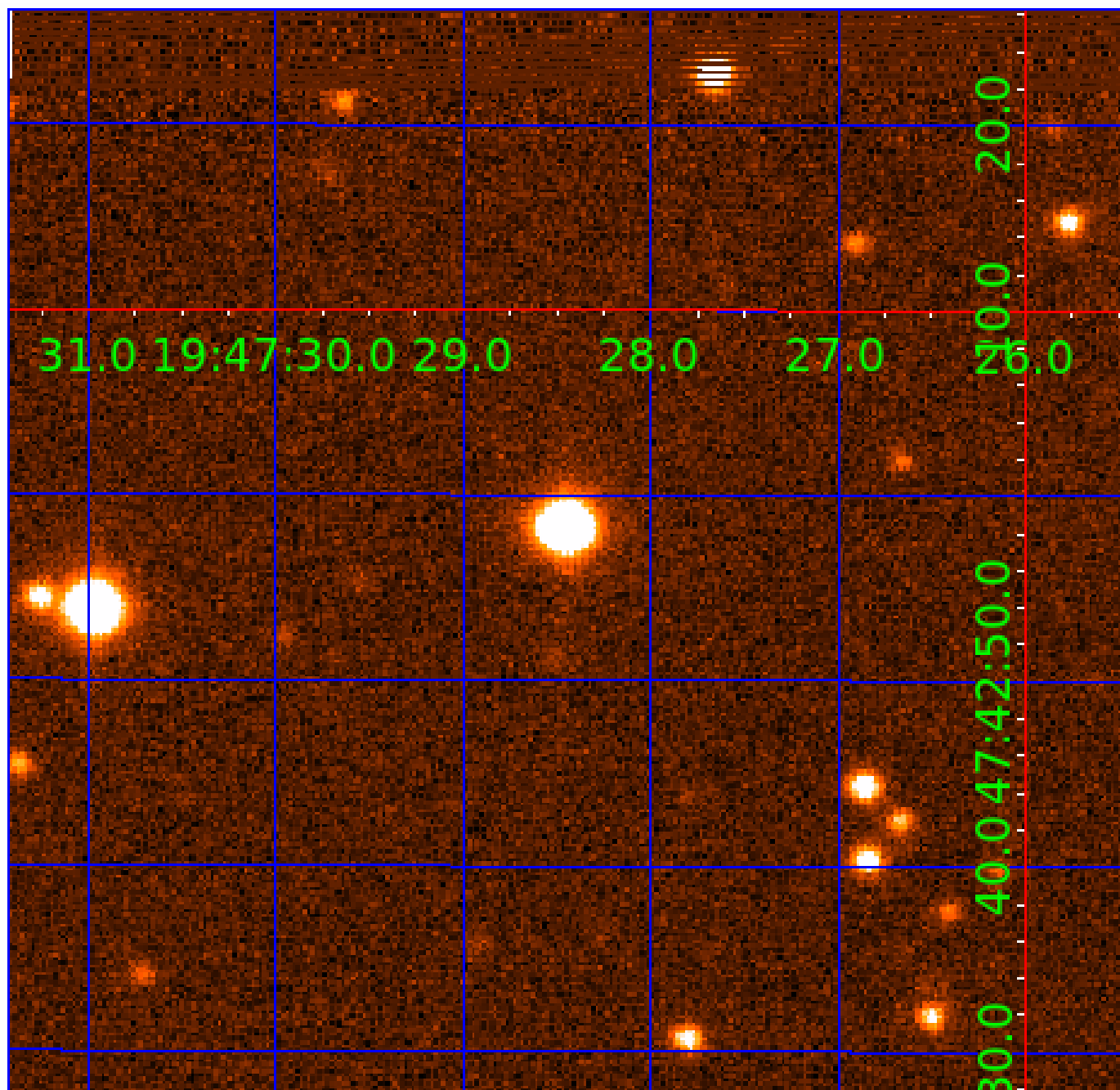


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 010548640

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010548640-01	OBS	No	0.965300	132.502345	13.3	2.602	12.6	0.5	0.57	3727	0.28	225.89
010548640-02	OBS	No	0.965064	131.532301	87.1	0.658	11.0	1.6	0.57	3727	0.68	225.96
010548640-03	OBS	No	2.894792	131.602945	732.4	9.000	12.5	-1.0	0.57	3727	1.49	52.23
010548640-04	OBS	No	67.517110	172.640910	3659.2	5.462	8.8	7.5	0.57	3727	6.79	0.78
010548640-05	OBS	No	47.962549	173.230188	2043.0	4.445	8.3	7.4	0.57	3727	2.59	1.24
010548640-06	OBS	No	97.600860	146.889886	3916.1	4.666	8.2	6.8	0.57	3727	4.34	0.48

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010548640-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—CENT_KIC_POS
010548640-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—SWEET_NTL—LPP_DV—LPP_ALT—SAME_NTL_PERIOD—CENT_KIC_POS
010548640-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_NOFITS
010548640-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS
010548640-05	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS
010548640-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_KIC_POS

**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.

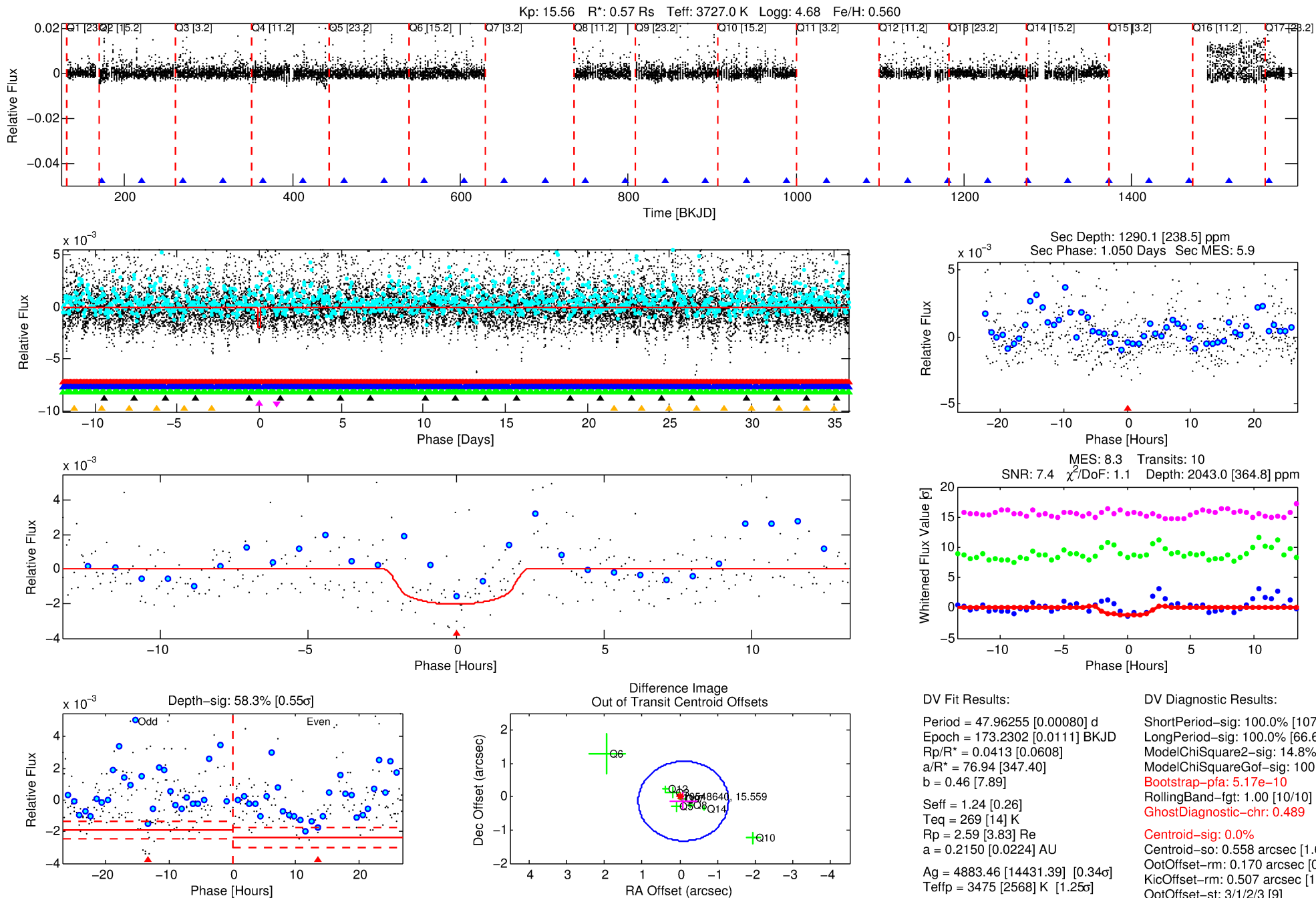
## Ephemeris Match Information For 010548640-05

No Significant Match Found



# DV One-Page Summary

KIC: 10548640 Candidate: 5 of 6 Period: 47.963 d



## DV Fit Results:

Period = 47.96255 [0.00080] d  
Epoch = 173.2302 [0.0111] BKJD  
Rp/R\* = 0.0413 [0.0608]  
a/R\* = 76.94 [347.40]  
b = 0.46 [7.89]  
Seff = 1.24 [0.26]  
Teq = 269 [14] K  
Rp = 2.59 [3.83] Re  
a = 0.2150 [0.0224] AU  
Ag = 4883.46 [14431.39] [0.34 $\sigma$ ]  
Teffp = 3475 [2568] K [1.25 $\sigma$ ]

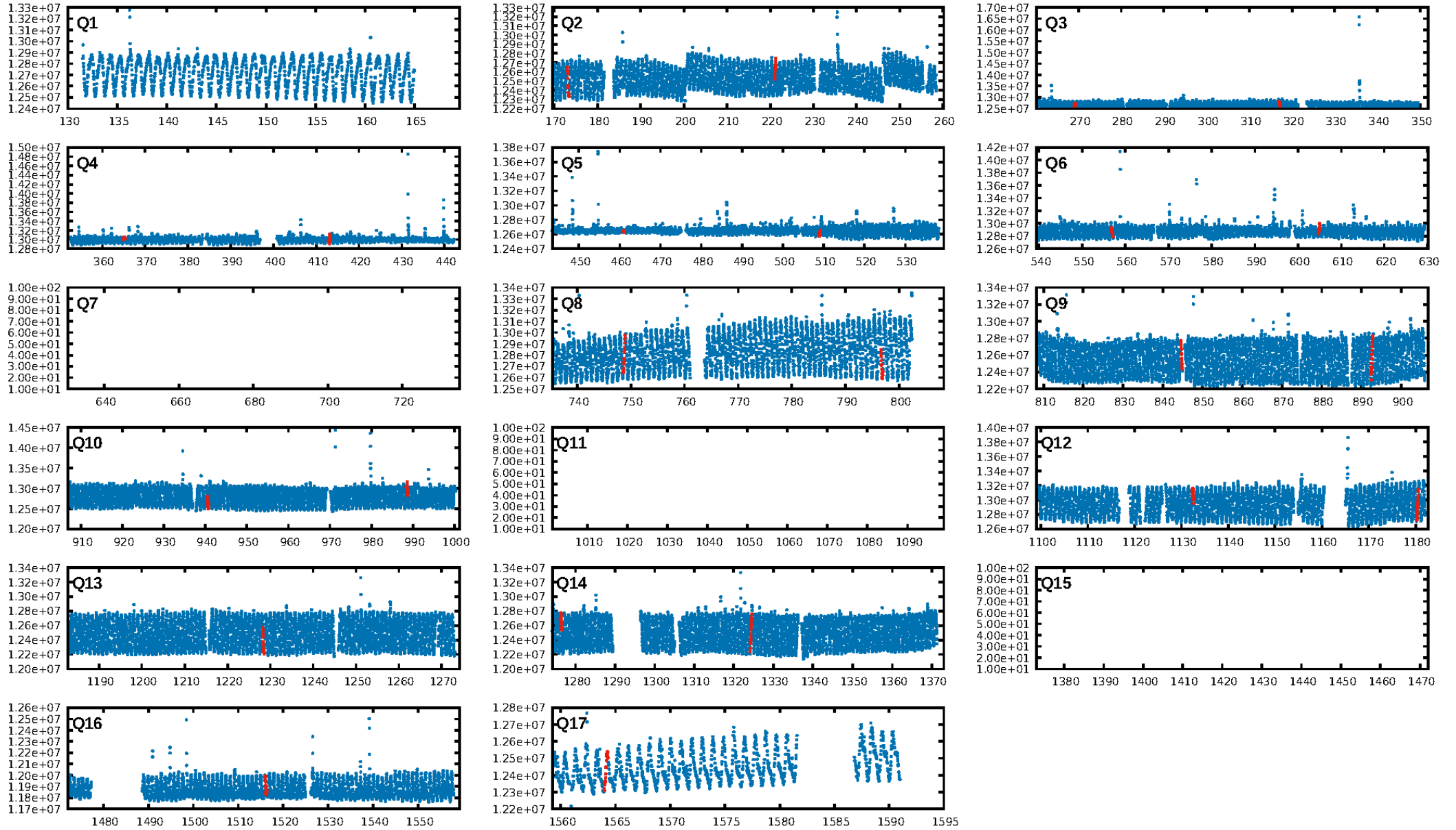
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [107.76 $\sigma$ ]  
LongPeriod-sig: 100.0% [66.64 $\sigma$ ]  
ModelChiSquare2-sig: 14.8%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 5.17e-10**  
RollingBand-fgt: 1.00 [10/10]  
**GhostDiagnostic-chr: 0.489**  
**Centroid-sig: 0.0%**  
Centroid-so: 0.558 arcsec [1.60 $\sigma$ ]  
OotOffset-rm: 0.170 arcsec [0.43 $\sigma$ ]  
KicOffset-rm: 0.507 arcsec [1.35 $\sigma$ ]  
OotOffset-st: 3/1/2/3 [9]  
KicOffset-st: 3/1/2/3 [9]  
DiffImageQuality-fgm: 0.44 [4/9]  
DiffImageOverlap-fno: 0.00 [0/11]

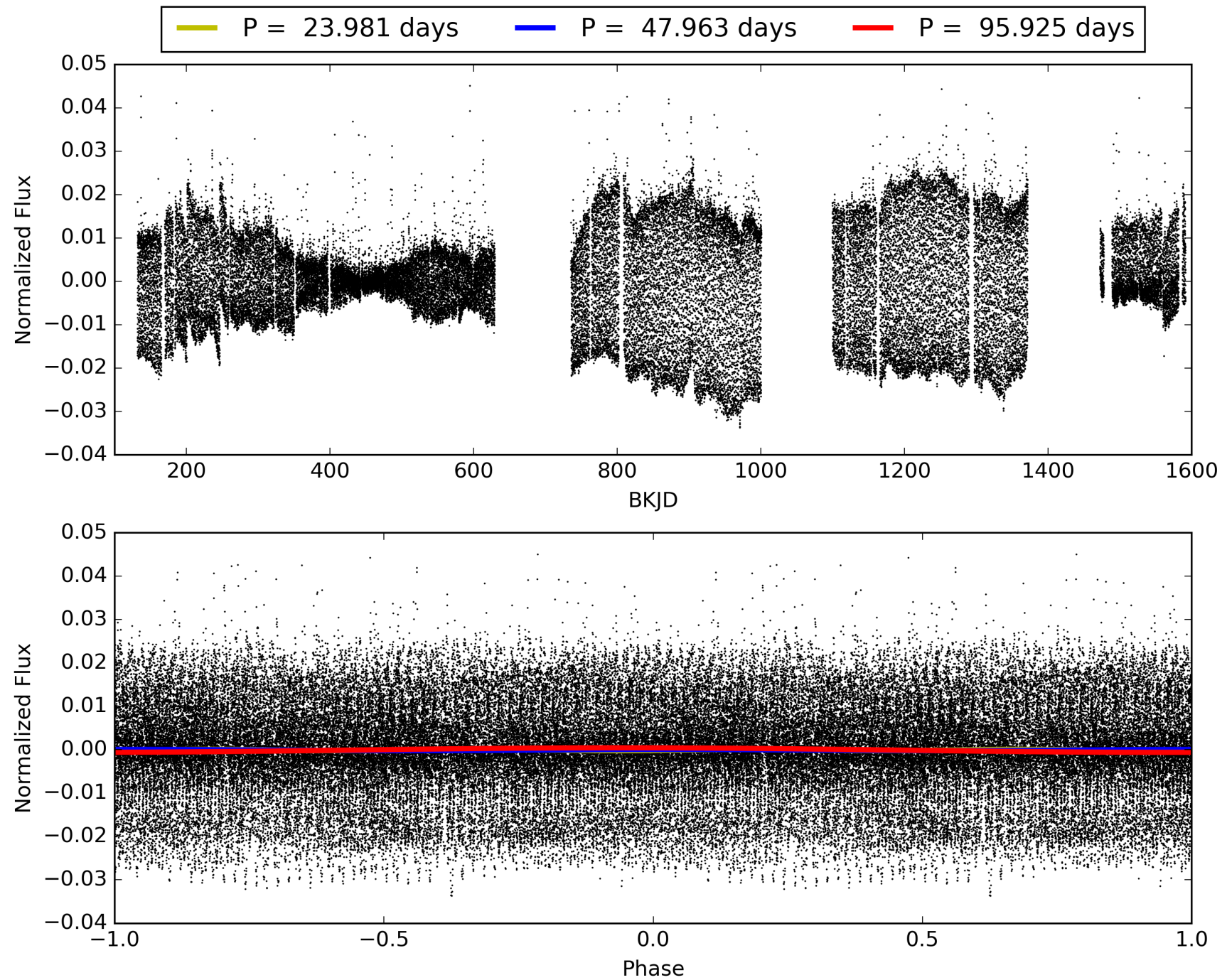
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:37:25 Z

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

# TCE 010548640-05, PDC Light Curves

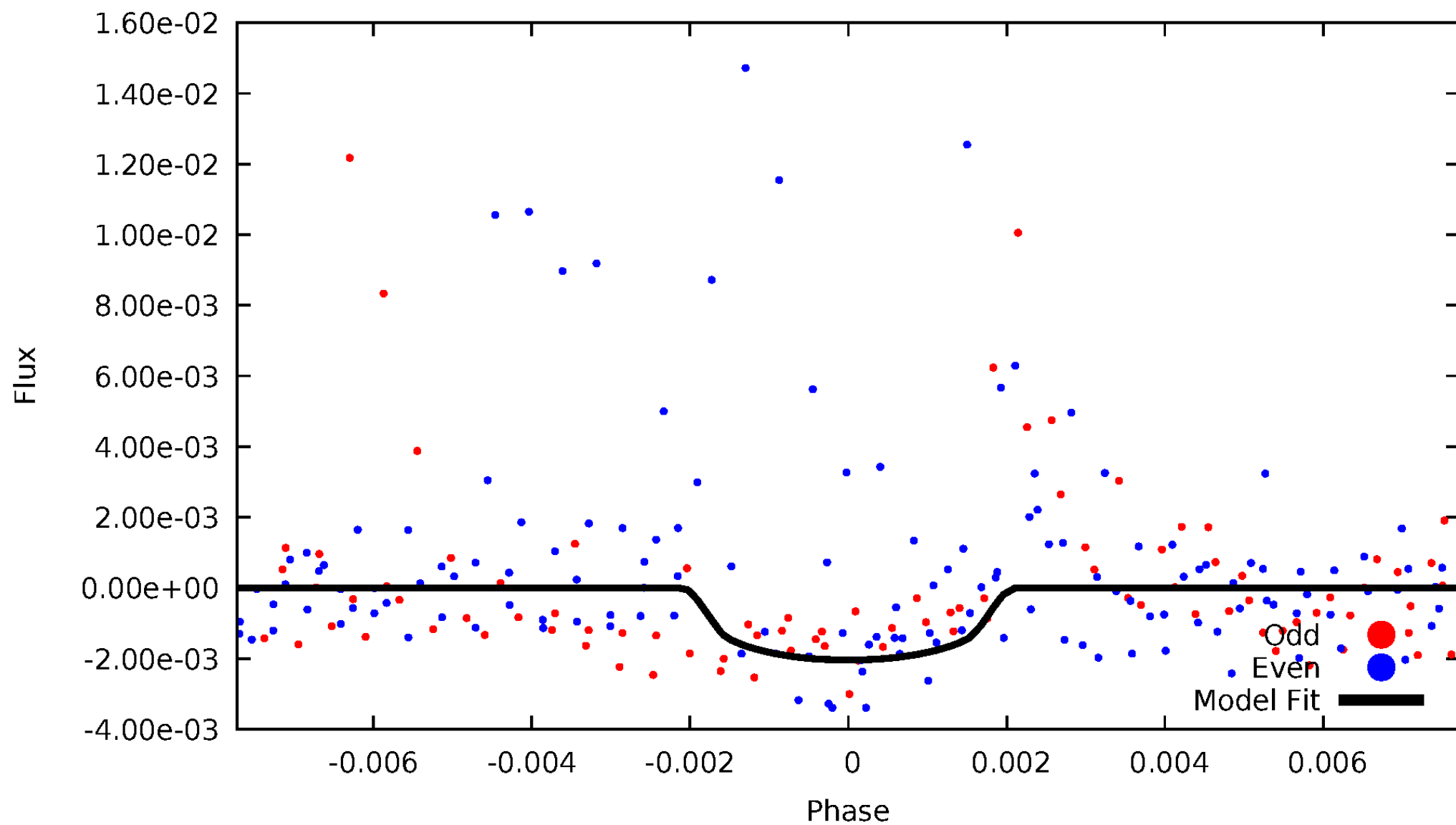


# TCE 010548640-05



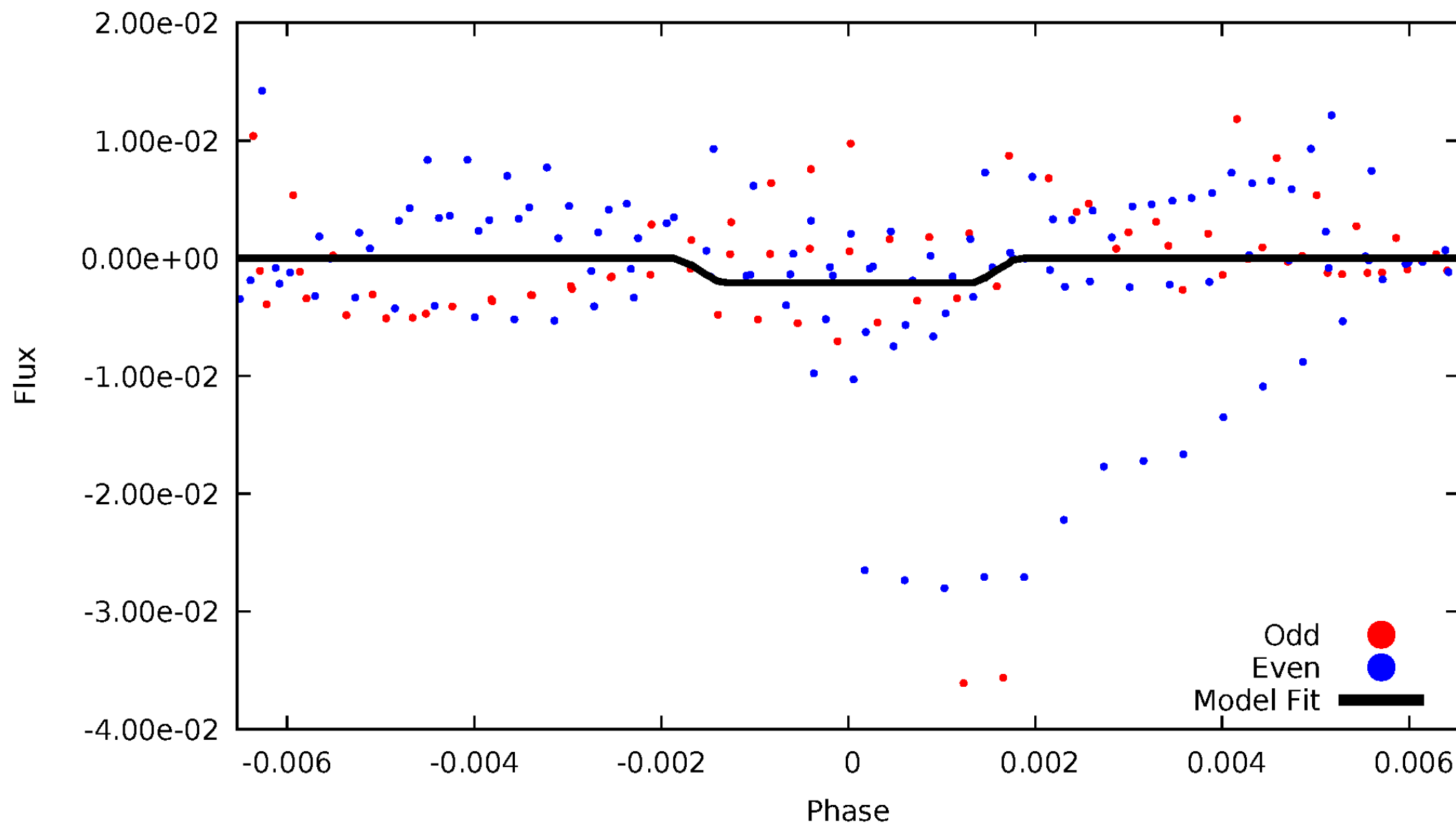
# DV Odd/Even

TCE 010548640-05



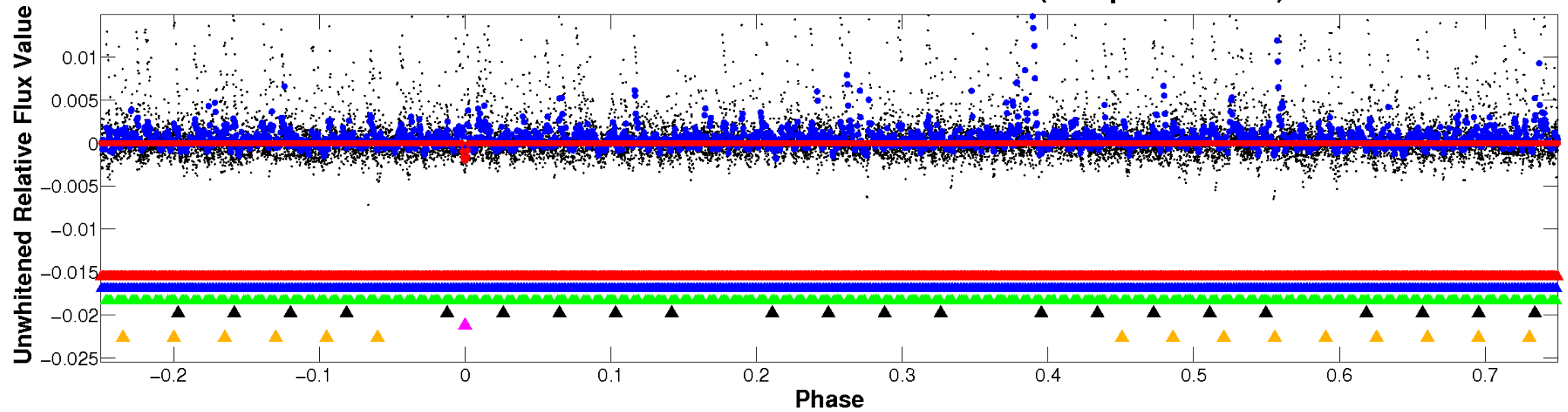
# ALT Odd/Even

TCE 010548640-05

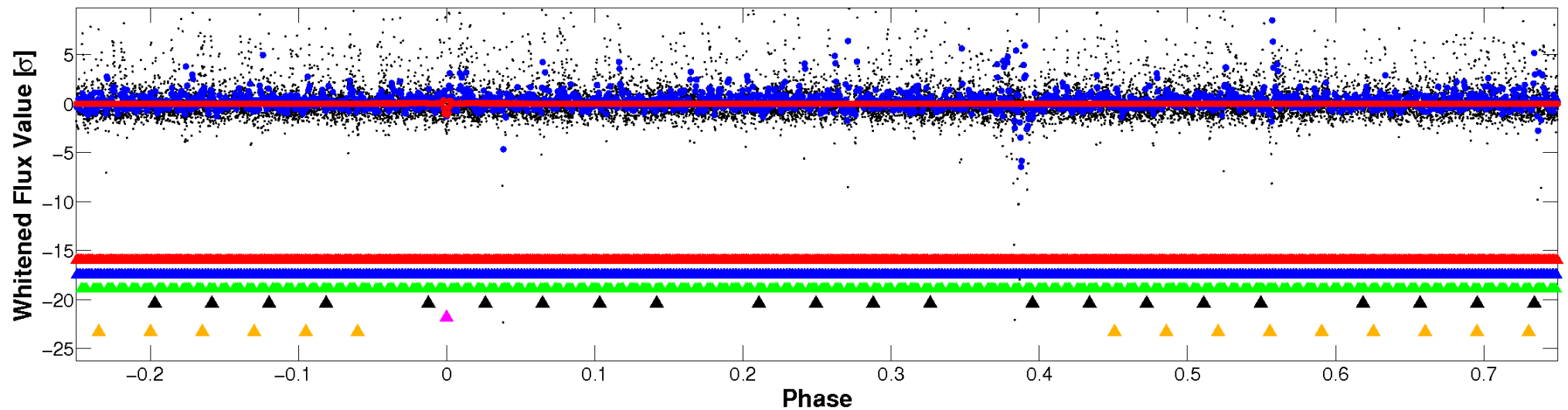


# Non-Whitened Vs. Whitened Light Curve

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

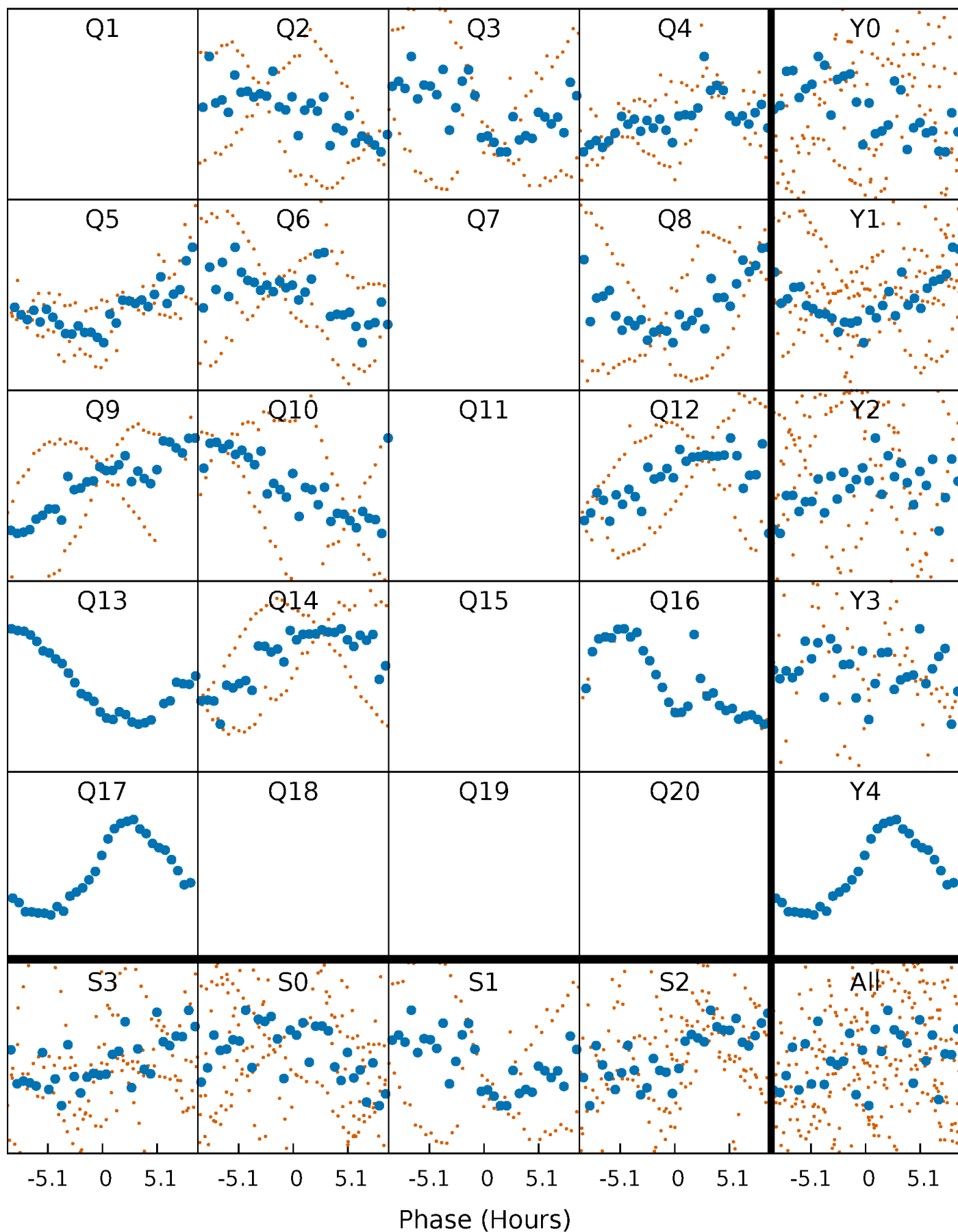


## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

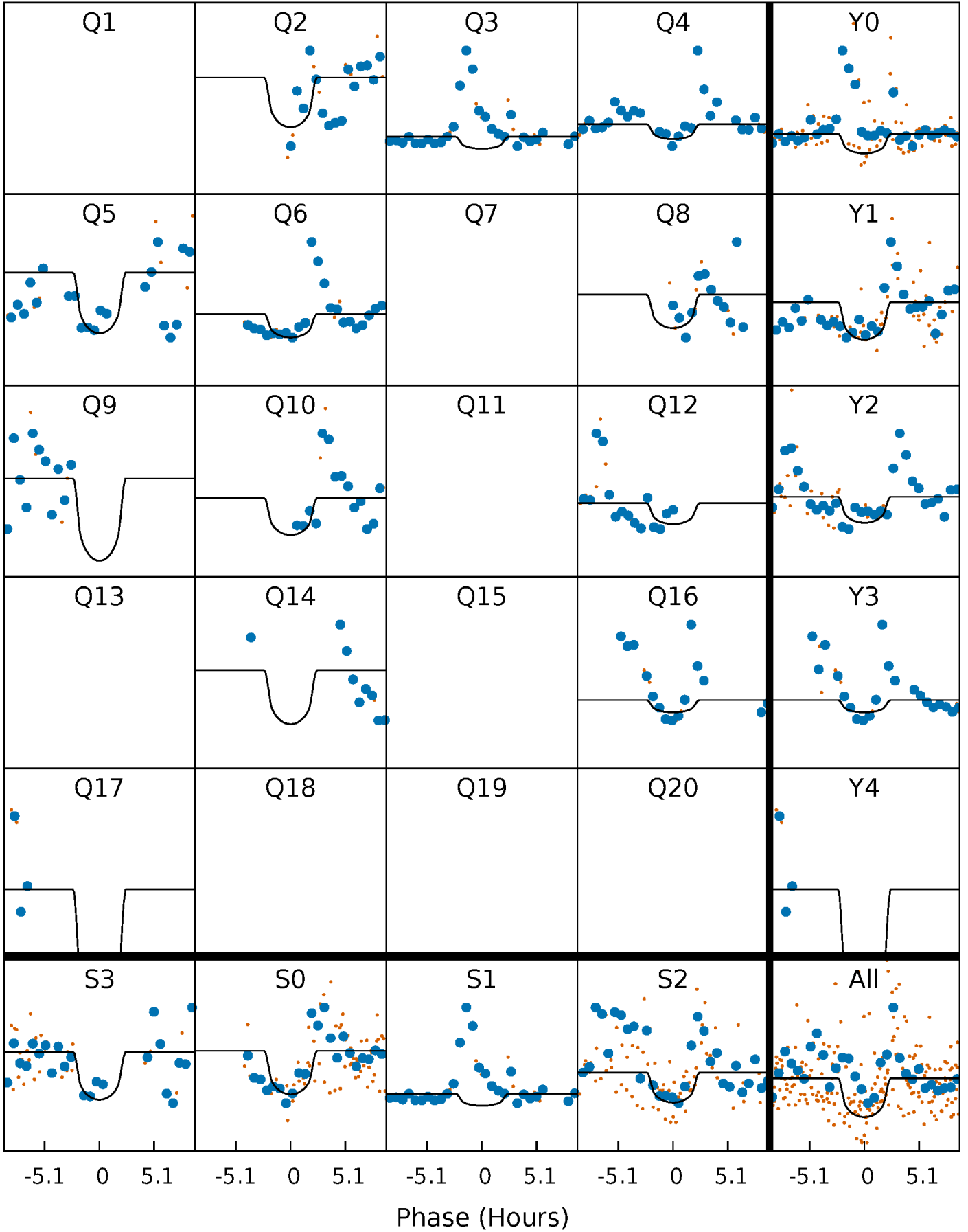
TCE 010548640-05     $P = 47.962549$  Days     $T_0 = 173.230188$  (BKJD)





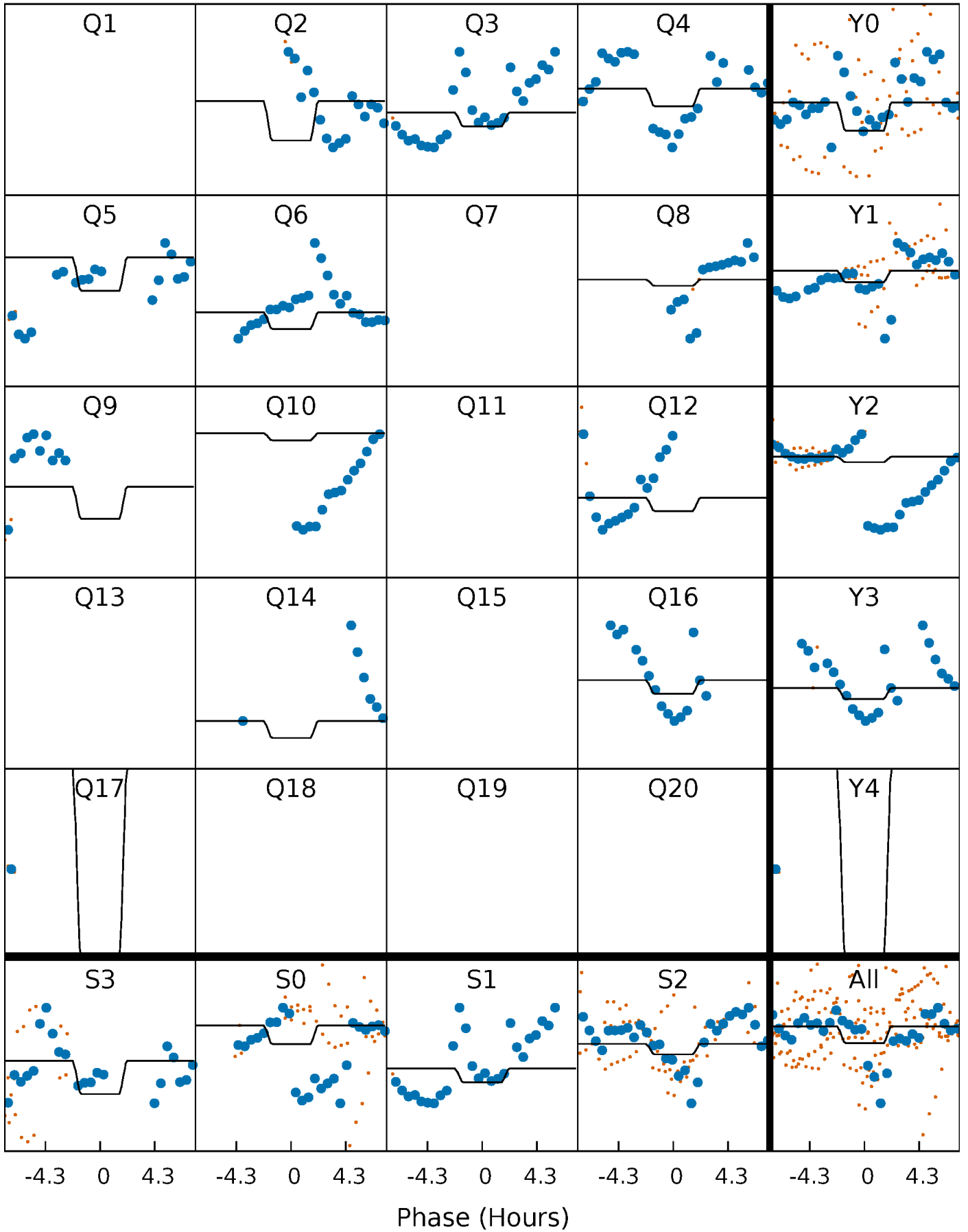
# DV Quarter-Phased Transit Curves

TCE 010548640-05     $P = 47.962549$  Days     $T_0 = 173.230188$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

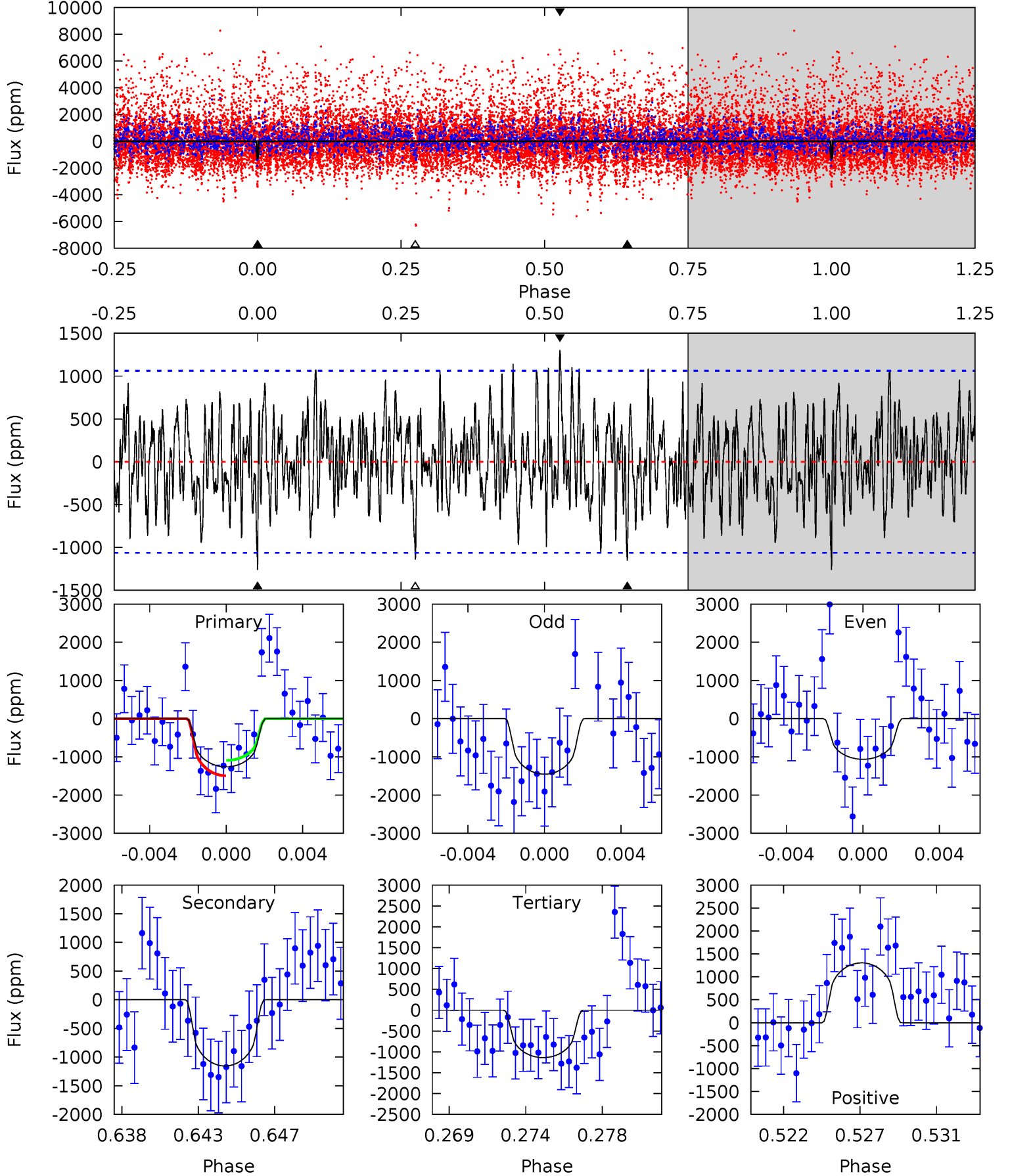
TCE 010548640-05   P= 47.962357 Days    $T_0=173.237334$  (BKJD)



# DV Model-Shift Uniqueness Test

010548640-05, P = 47.962549 Days, E = 125.267639 Days

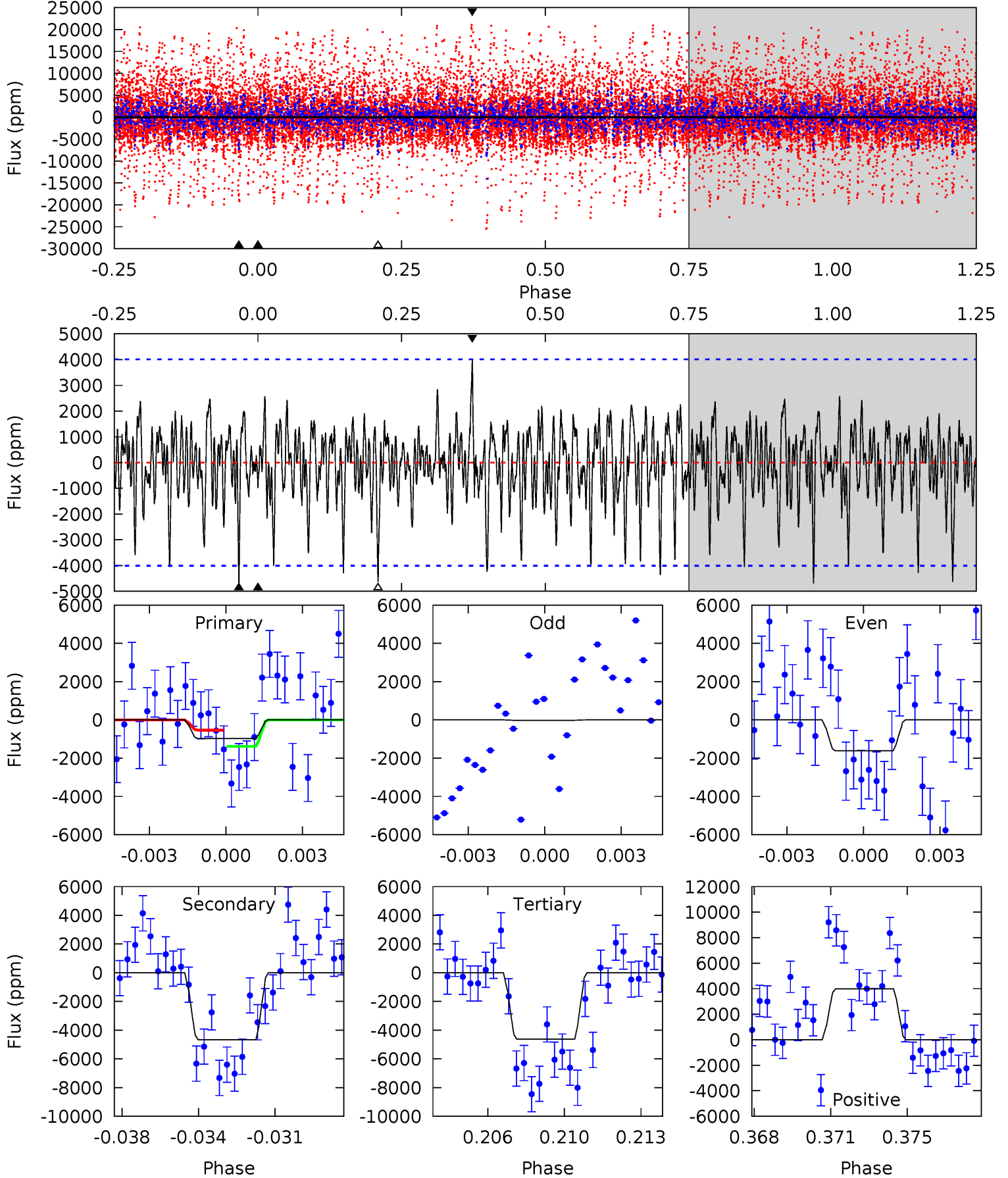
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.16	5.64	5.56	6.37	5.19	2.87	1.99	0.60	-0.21	0.08	-0.73	0.90	0.43	0.51	0.96



# Alt Model-Shift Uniqueness Test

010548640-05,  $P = 47.962357$  Days,  $E = 125.274977$  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
1.28	6.09	6.04	5.21	5.23	2.93	1.60	-4.77	-3.93	0.05	0.88	1.00	3.69	0.46	0.57



### Stellar Parameters For KIC 010548640

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3727^{+116}_{-142}$	$4.679^{+0.072}_{-0.022}$	$0.560^{+0.050}_{-0.300}$	$0.575^{+0.033}_{-0.076}$	$0.576^{+0.036}_{-0.068}$	$4.261^{+1.573}_{-0.399}$
	+3%/-4%	+2%/-0%	+9%/-54%	+6%/-13%	+6%/-12%	+37%/-9%
Source	KIC0	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 010548640-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1155 \pm 205$	$3.90^{+2.98}_{-2.66}$	$371^{+15}_{-16}$	$3049^{+1424}_{-432}$	$2003^{+17324}_{-1386}$
Alt.	$-4669 \pm 767$	$3.90^{+3.10}_{-2.48}$	$371^{+14}_{-16}$	$3801^{+1945}_{-627}$	$8195^{+55005}_{-5778}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

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

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

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

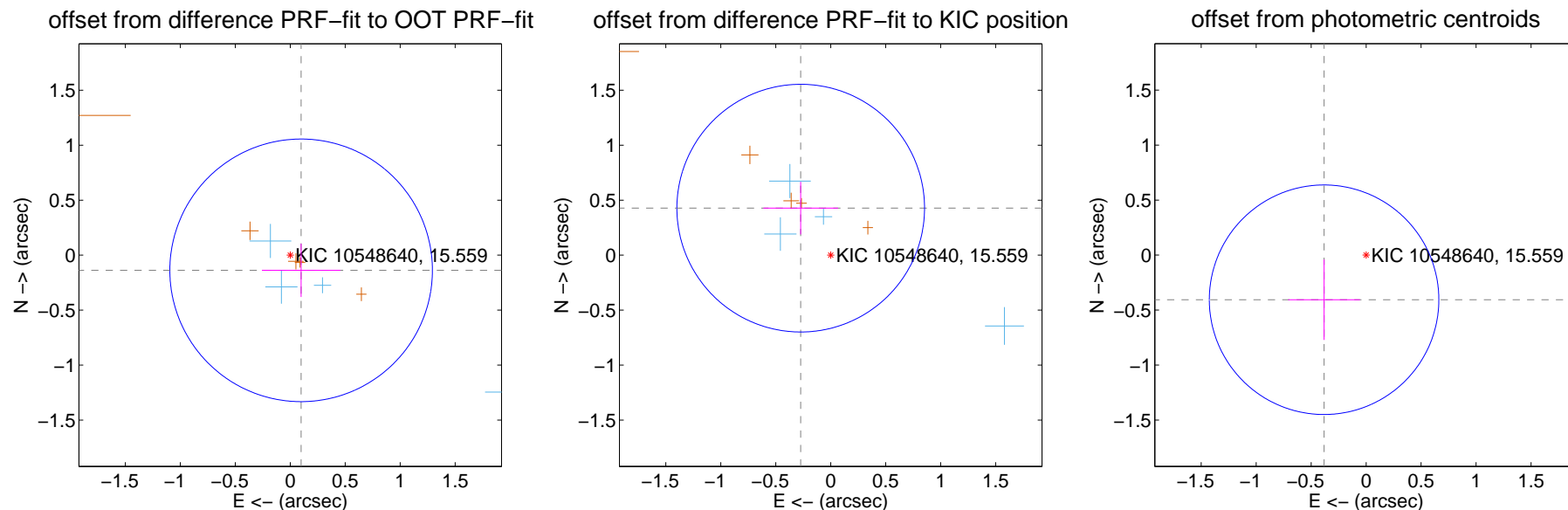
## DV Centroid Data

Supplemental centroid analysis for 010548640-05. Kepler magnitude: 15.56. Transit SNR 7.43

There are 4 quarters with good PRF difference image offsets

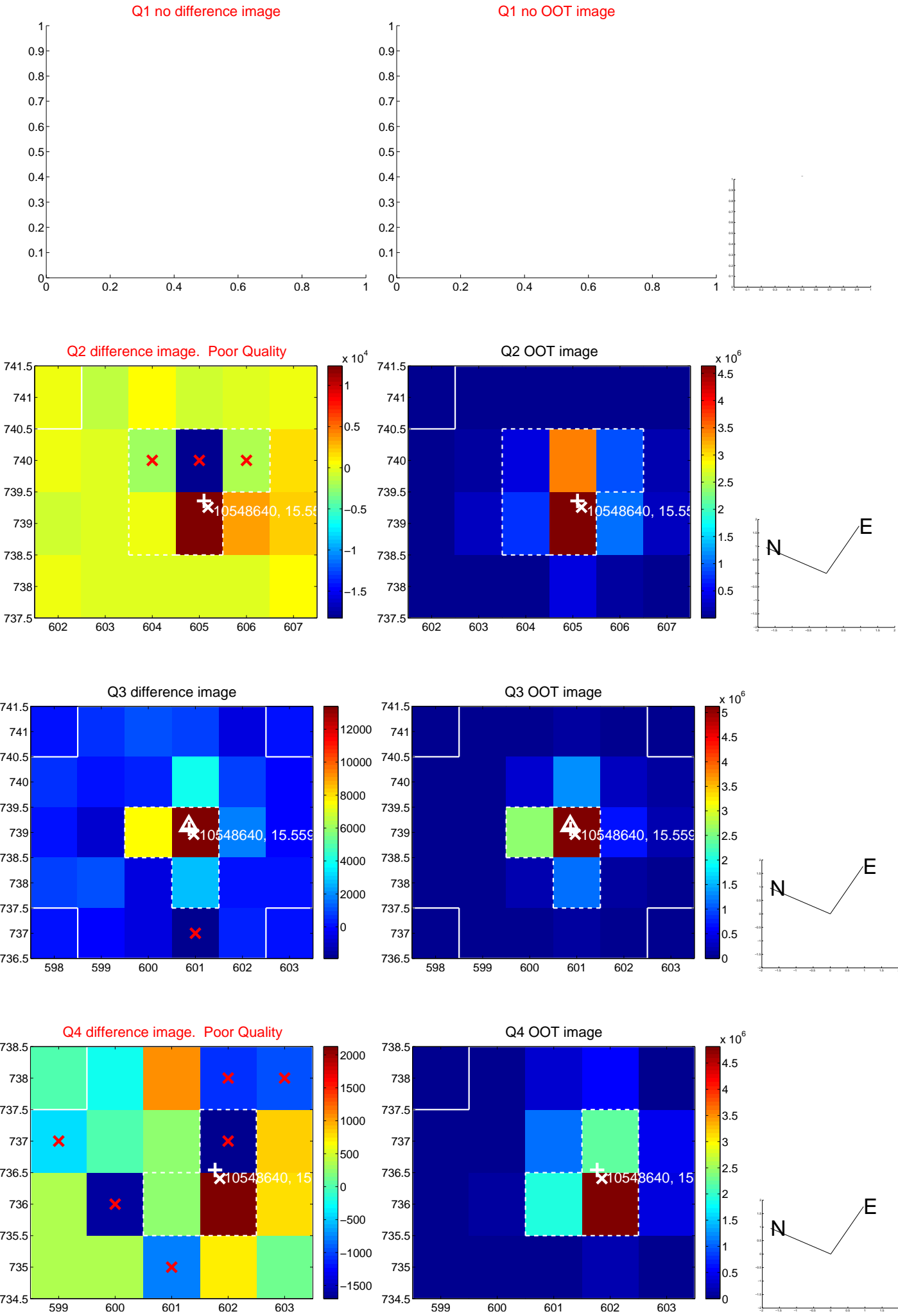
The direct PRF centroid is offset from the target star catalog position by about 0.69 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.170 \pm 0.398$	0.43	$-0.099 \pm 0.357$	$-0.138 \pm 0.242$
PRF-fit source offset from KIC position	$0.507 \pm 0.375$	1.35	$0.273 \pm 0.340$	$0.427 \pm 0.239$
photometric centroid source offset	$0.56 \pm 0.35$	1.60	$0.38 \pm 0.33$	$-0.41 \pm 0.37$



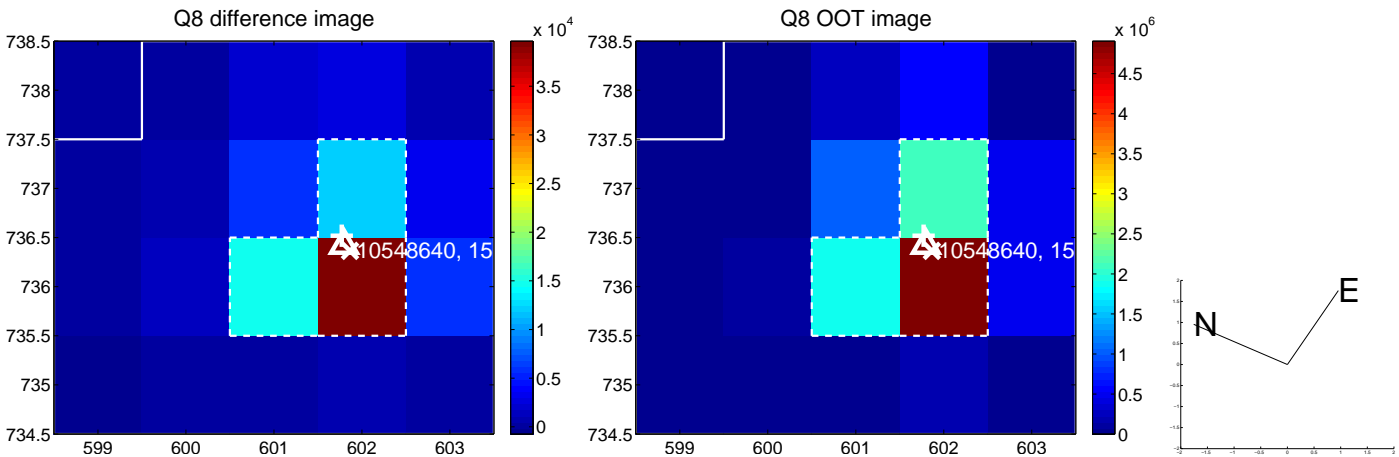
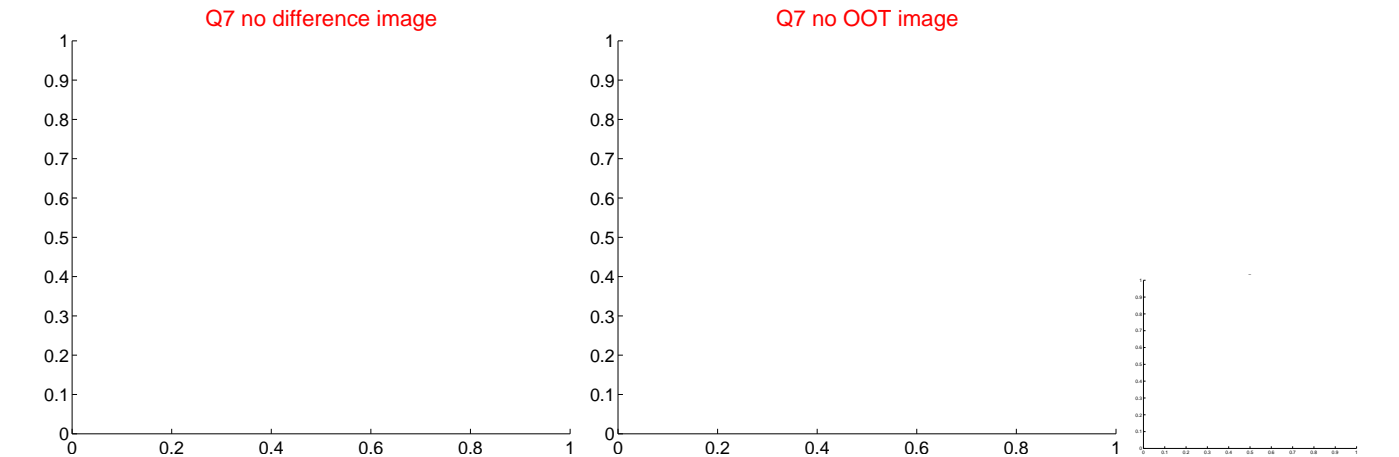
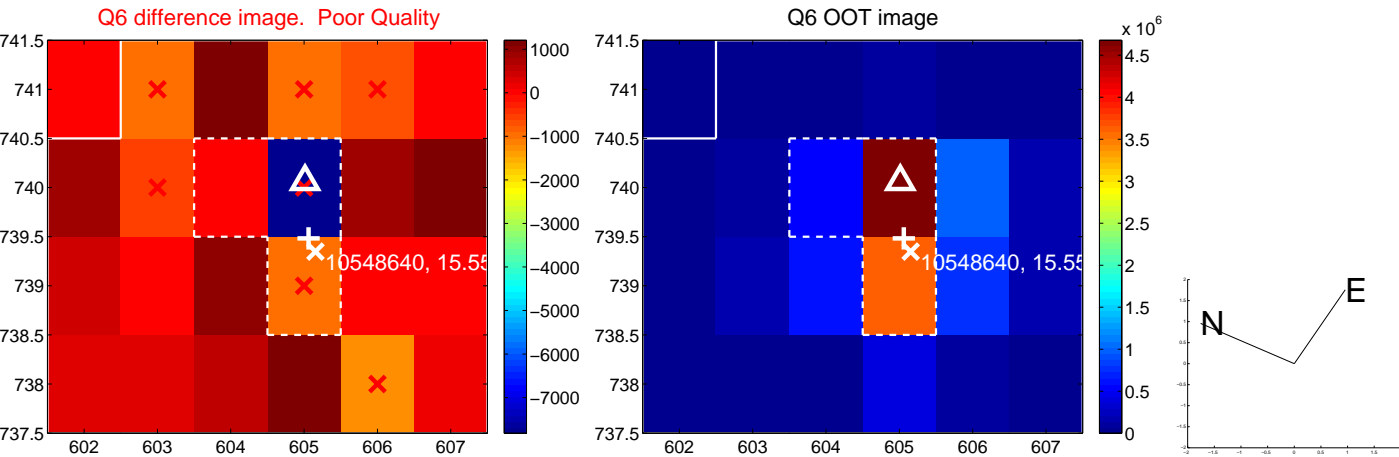
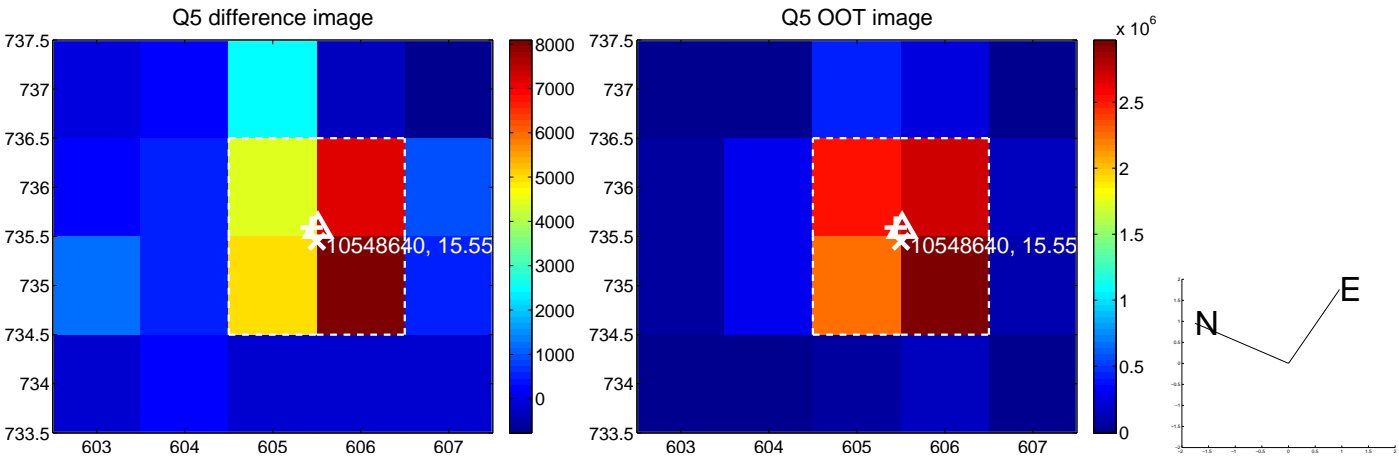
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: 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.

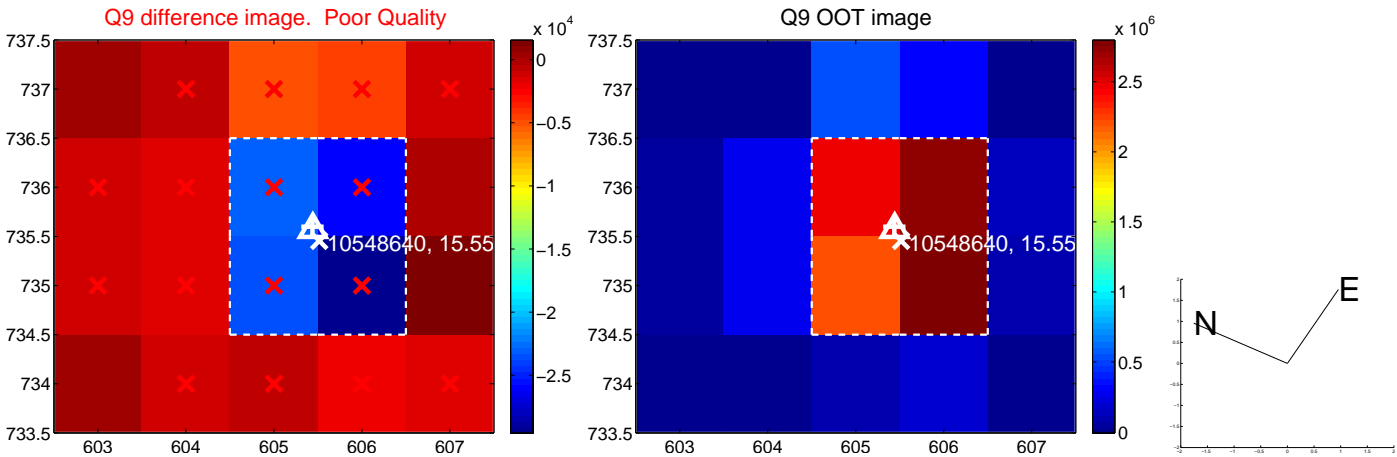




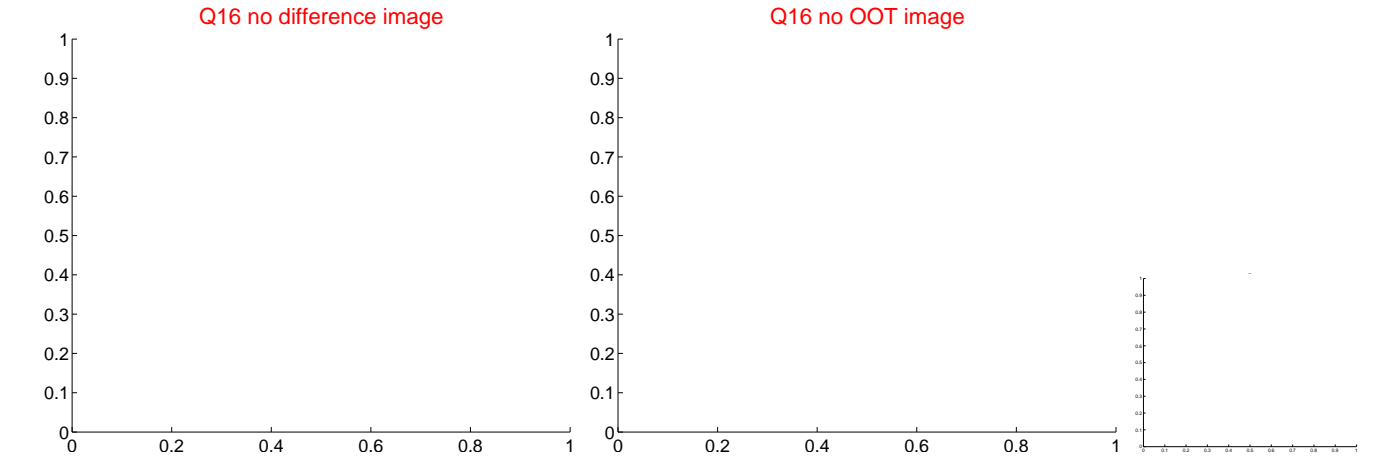
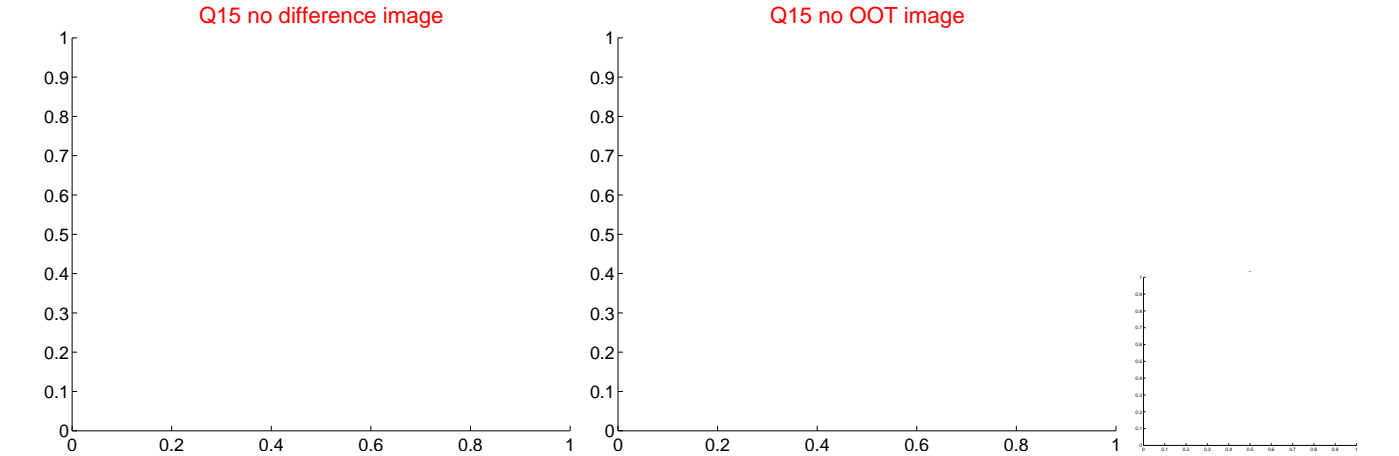
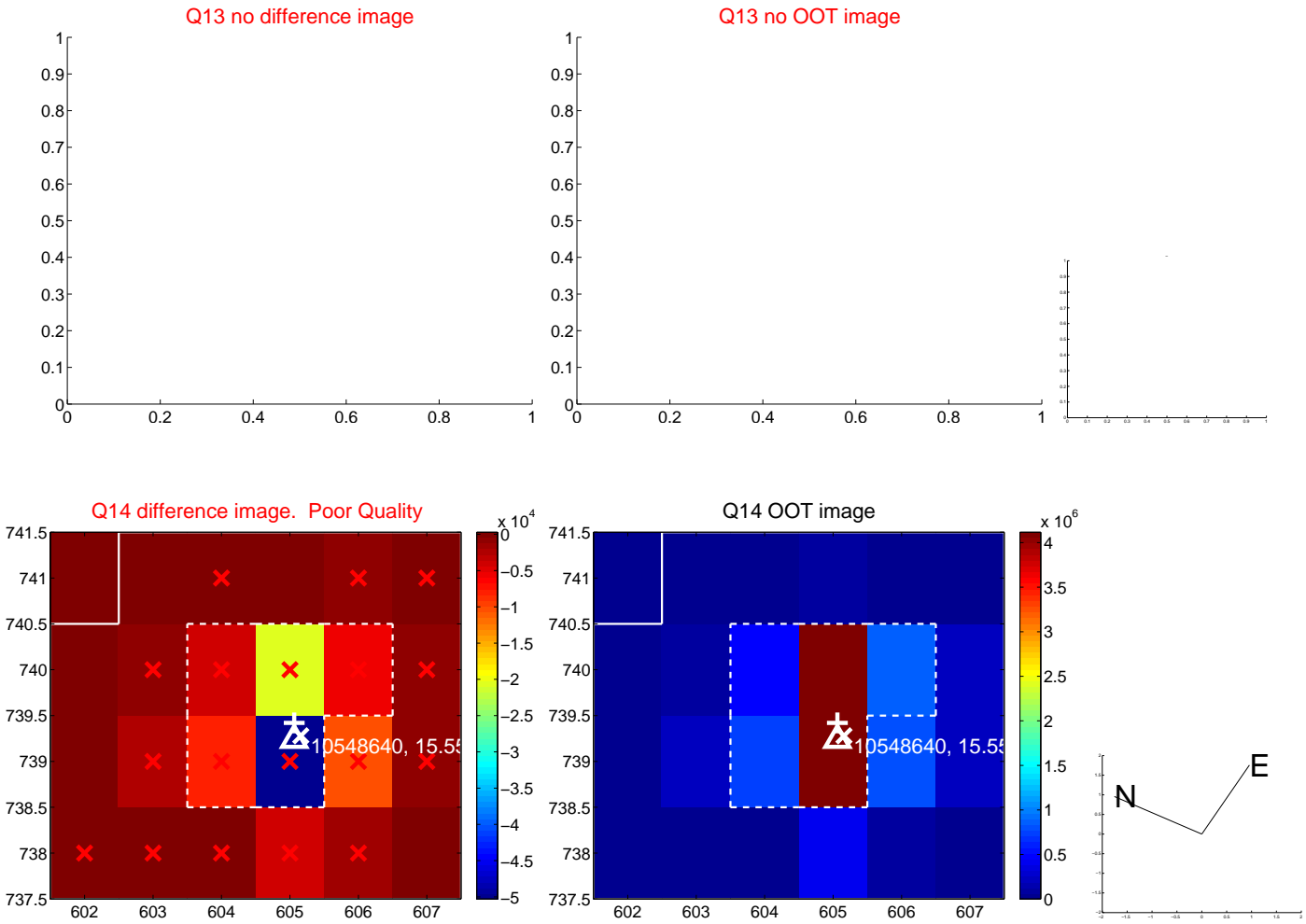
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



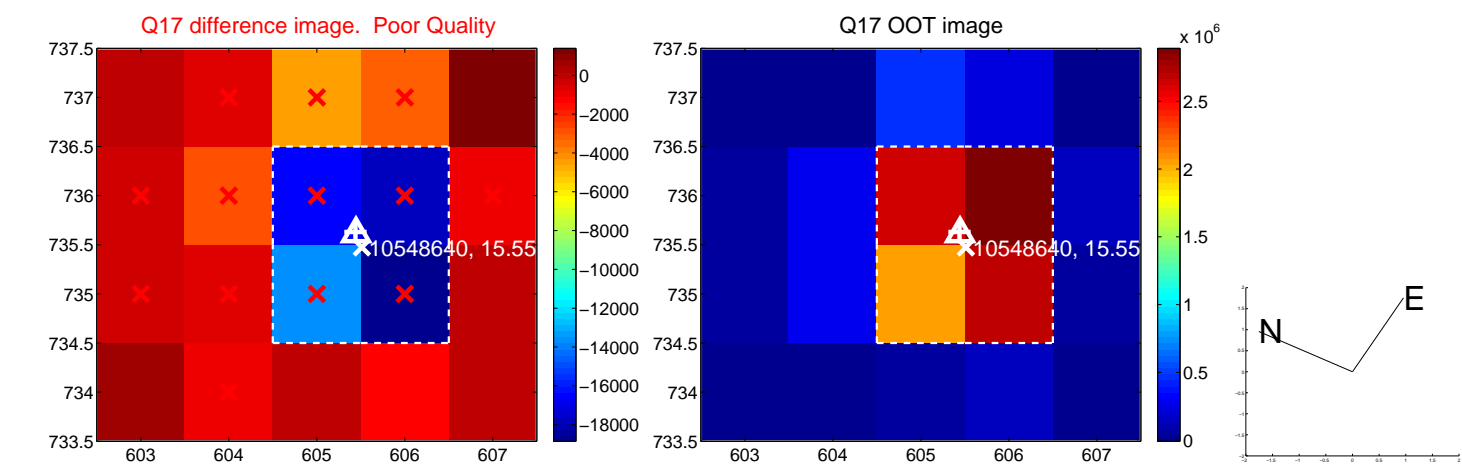
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



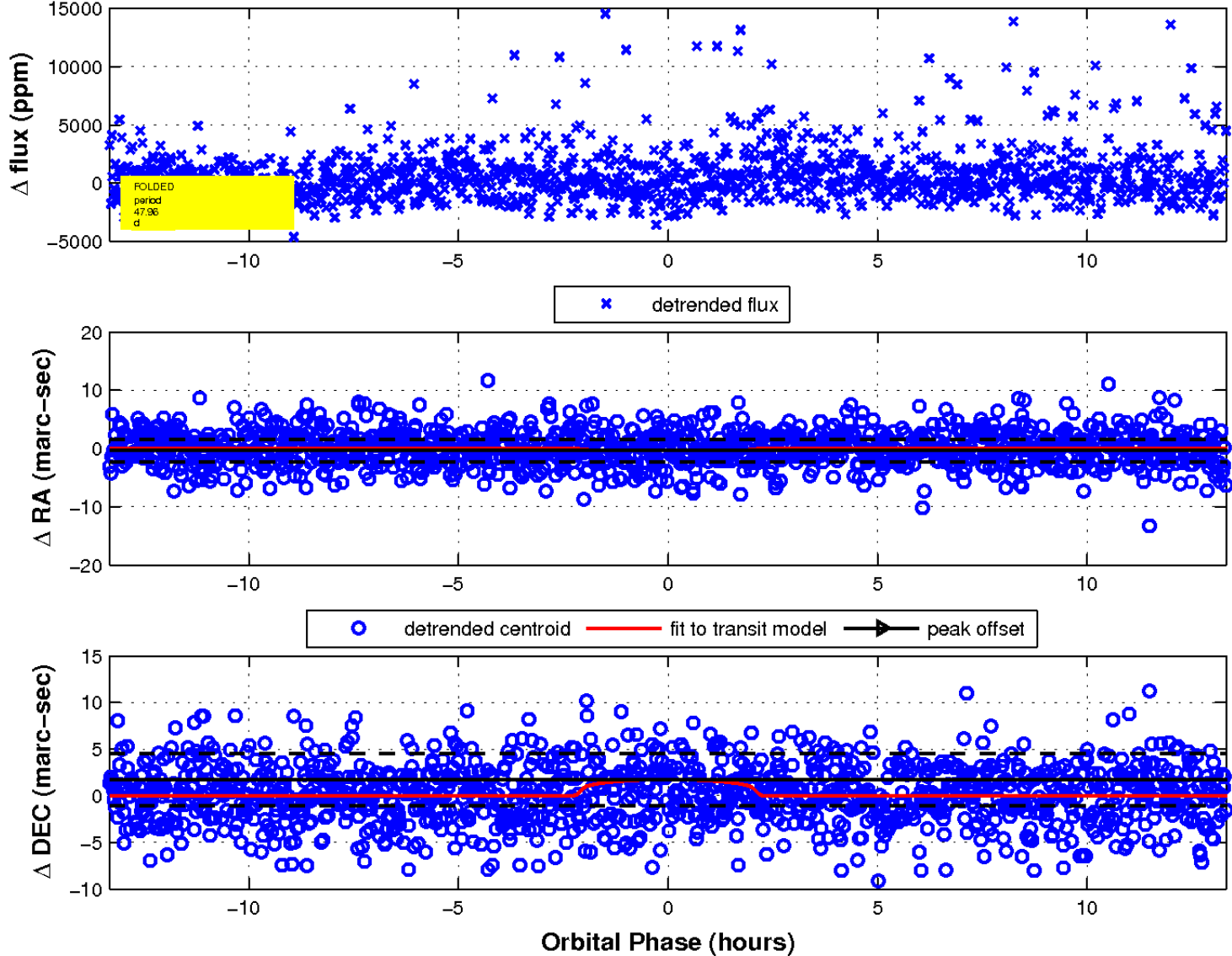
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

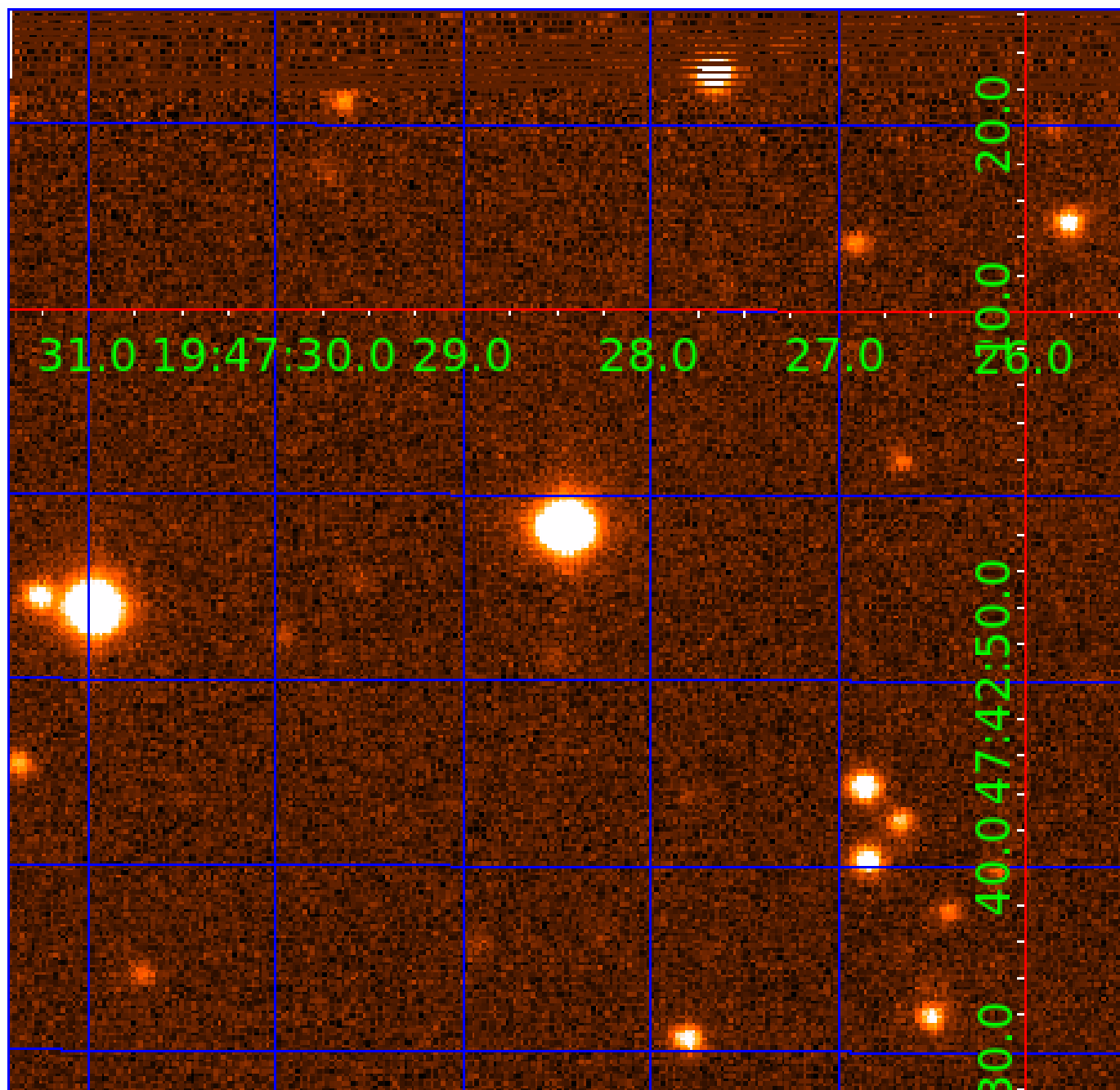


fluxWeightedCentroids, Planet 5 of 6



UKIRT Image

Declination



# KIC 010548640

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010548640-01	OBS	No	0.965300	132.502345	13.3	2.602	12.6	0.5	0.57	3727	0.28	225.89
010548640-02	OBS	No	0.965064	131.532301	87.1	0.658	11.0	1.6	0.57	3727	0.68	225.96
010548640-03	OBS	No	2.894792	131.602945	732.4	9.000	12.5	-1.0	0.57	3727	1.49	52.23
010548640-04	OBS	No	67.517110	172.640910	3659.2	5.462	8.8	7.5	0.57	3727	6.79	0.78
010548640-05	OBS	No	47.962549	173.230188	2043.0	4.445	8.3	7.4	0.57	3727	2.59	1.24
010548640-06	OBS	No	97.600860	146.889886	3916.1	4.666	8.2	6.8	0.57	3727	4.34	0.48

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010548640-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—CENT_KIC_POS
010548640-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—SWEET_NTL—LPP_DV—LPP_ALT—SAME_NTL_PERIOD—CENT_KIC_POS
010548640-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_NOFITS
010548640-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS
010548640-05	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_KIC_POS
010548640-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_KIC_POS

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

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

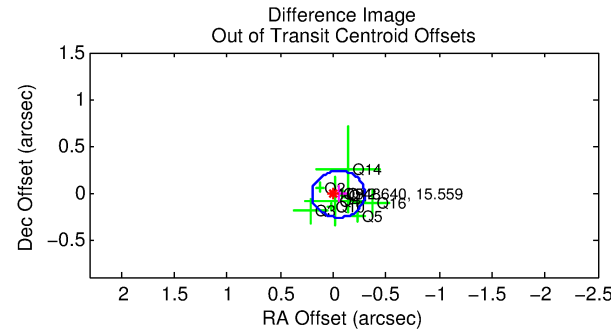
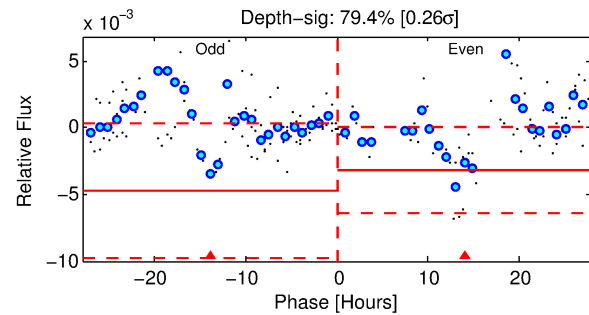
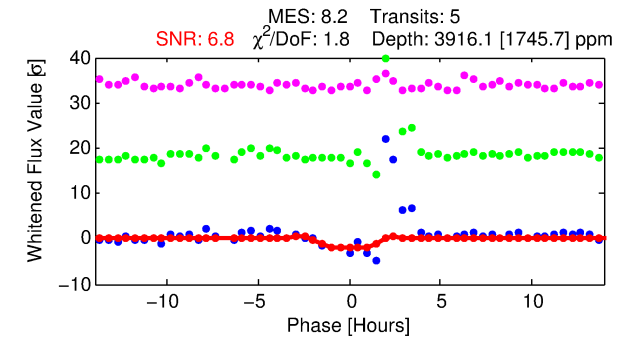
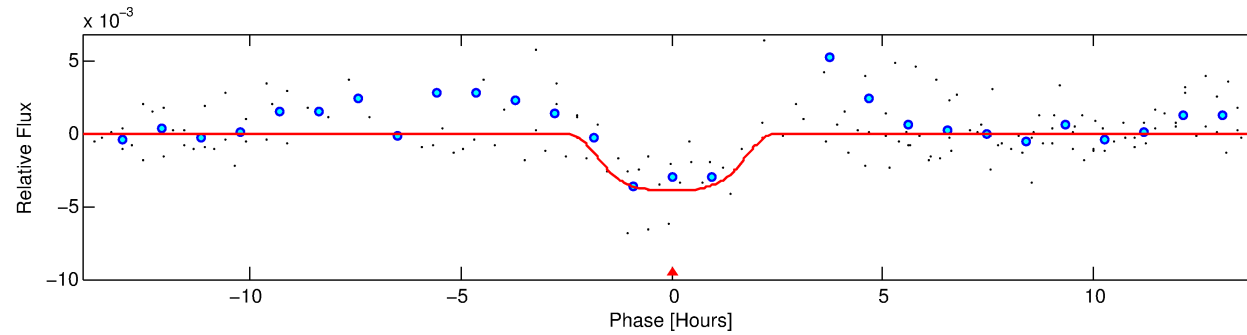
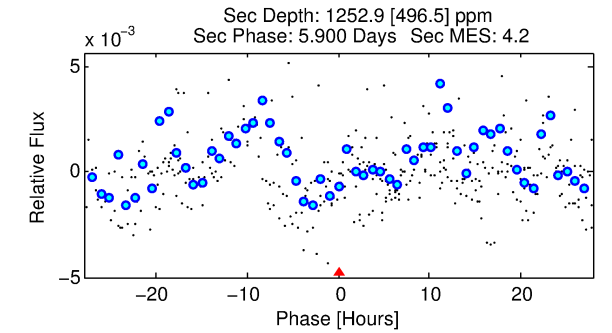
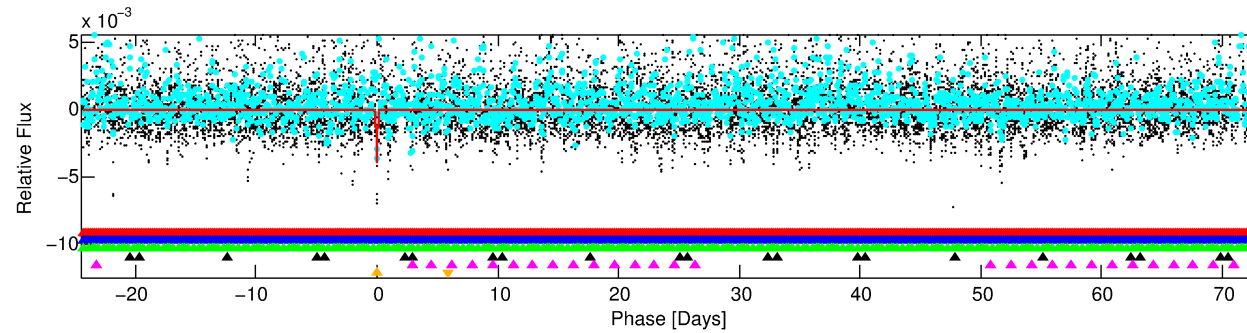
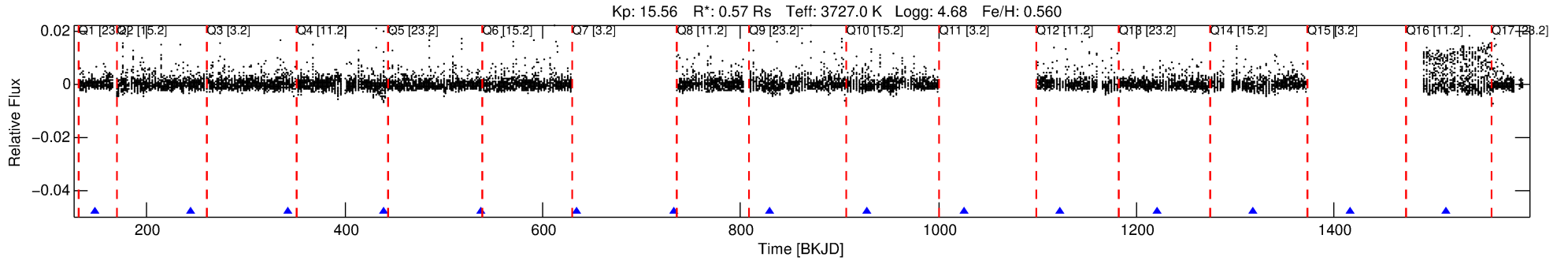
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010548640-06

No Significant Match Found

# DV One-Page Summary

KIC: 10548640 Candidate: 6 of 6 Period: 97.601 d



## DV Fit Results:

Period = 97.60086 [0.00389] d  
Epoch = 146.8899 [0.0355] BKJD  
Rp/R\* = 0.0692 [0.0256]  
a/R\* = 96.64 [79.82]  
b = 0.88 [0.22]  
Seff = 0.48 [0.10]  
Teq = 212 [11] K  
Rp = 4.34 [1.71] Re  
a = 0.3452 [0.0359] AU  
Ag = 4362.98 [3717.86] [1.17σ]  
Teffp = 2666 [569] K [4.31σ]

## DV Diagnostic Results:

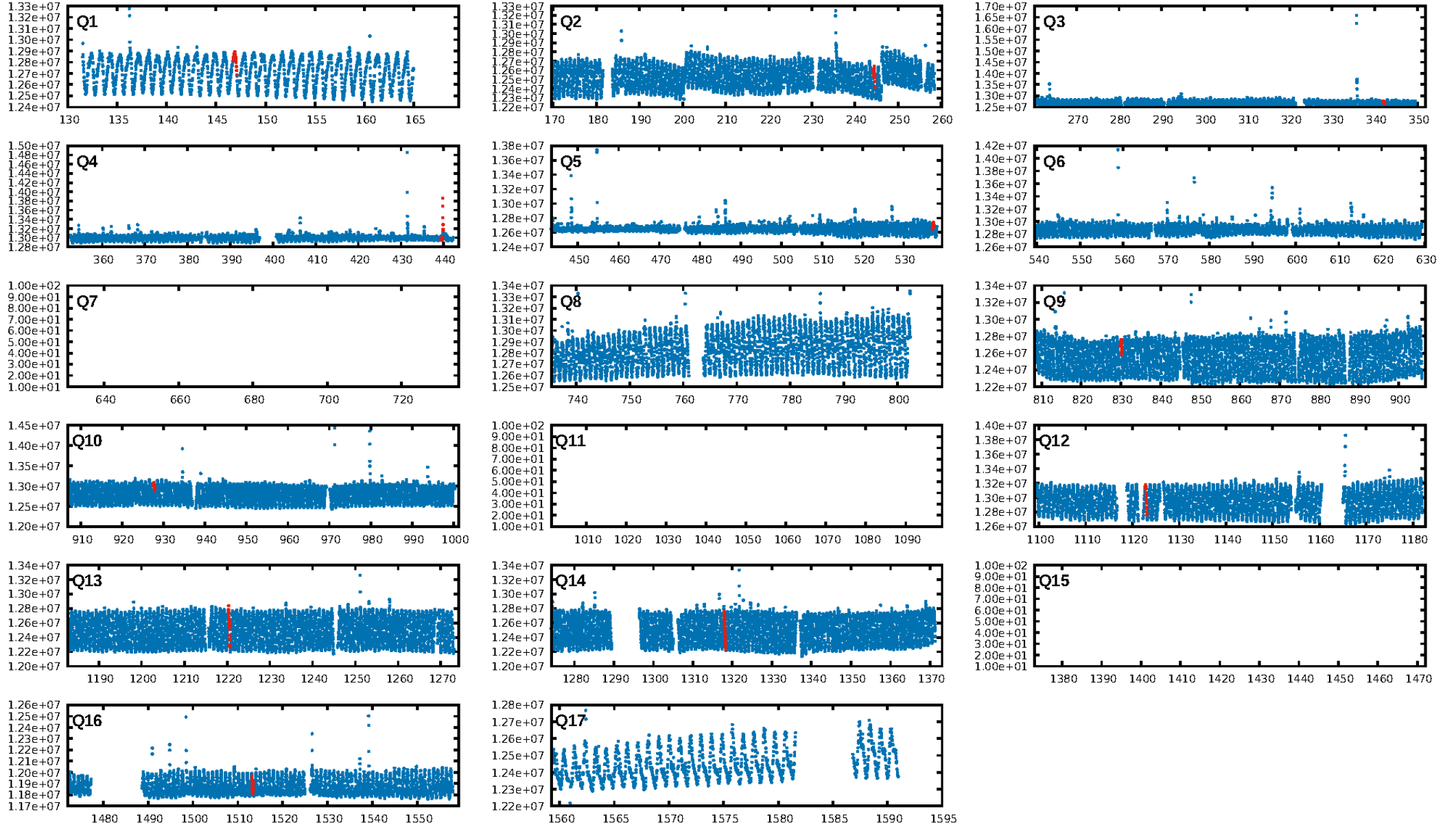
ShortPeriod-sig: 100.0% [100.50σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 33.2%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 1.39e-09**  
RollingBand-fgt: 1.00 [4/4]  
**GhostDiagnostic-chr: -0.4085**  
Centroid-sig: 20.9%  
Centroid-so: 0.529 arcsec [1.85σ]  
OotOffset-rm: 0.052 arcsec [0.63σ]  
**KicOffset-rm: 0.551 arcsec [6.21σ]**  
OotOffset-st: 3/1/3/3 [10]  
KicOffset-st: 3/1/3/3 [10]  
DiffImageQuality-fgm: 0.30 [3/10]  
DiffImageOverlap-fno: 0.00 [0/10]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:37:29 Z

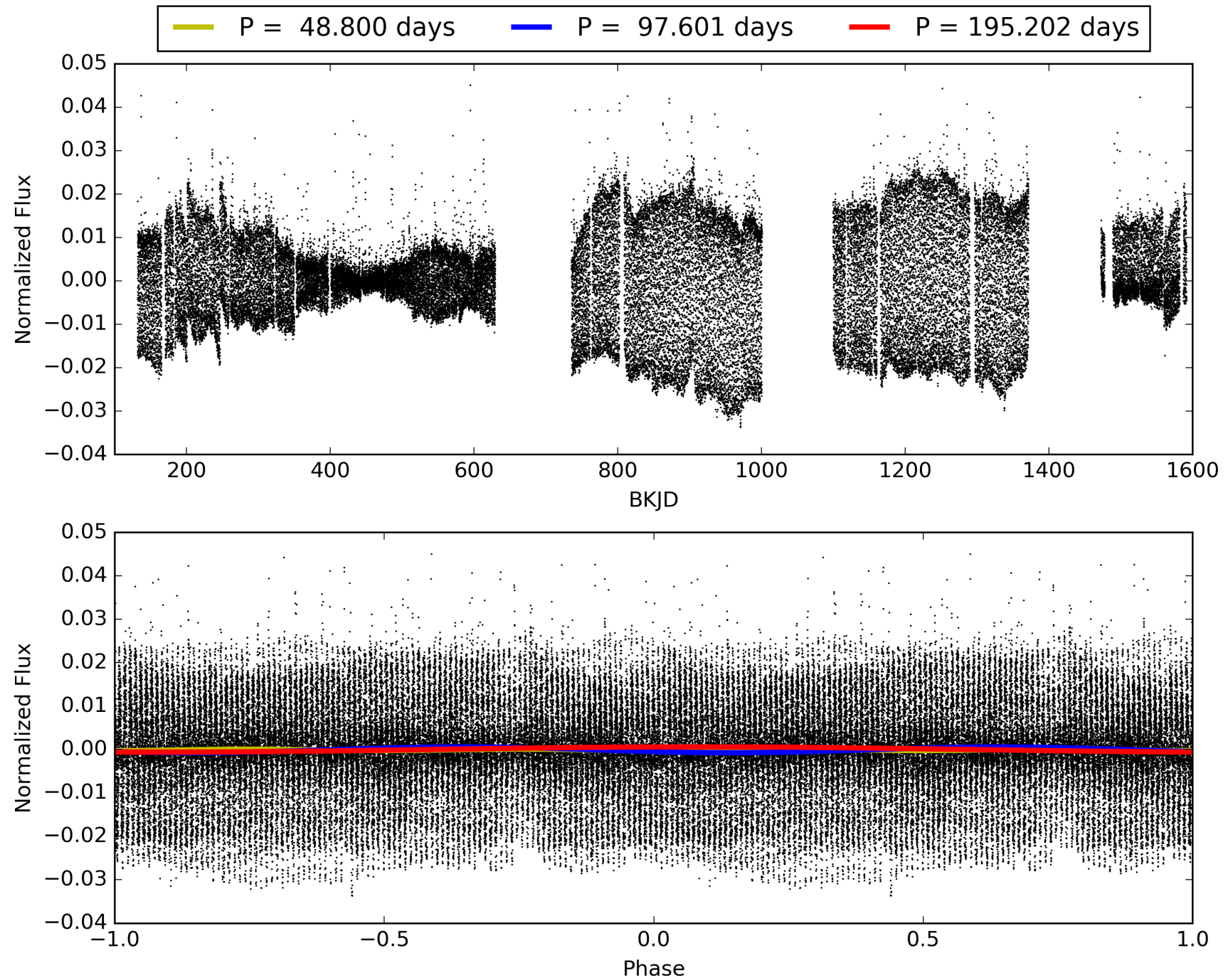
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 010548640-06, PDC Light Curves

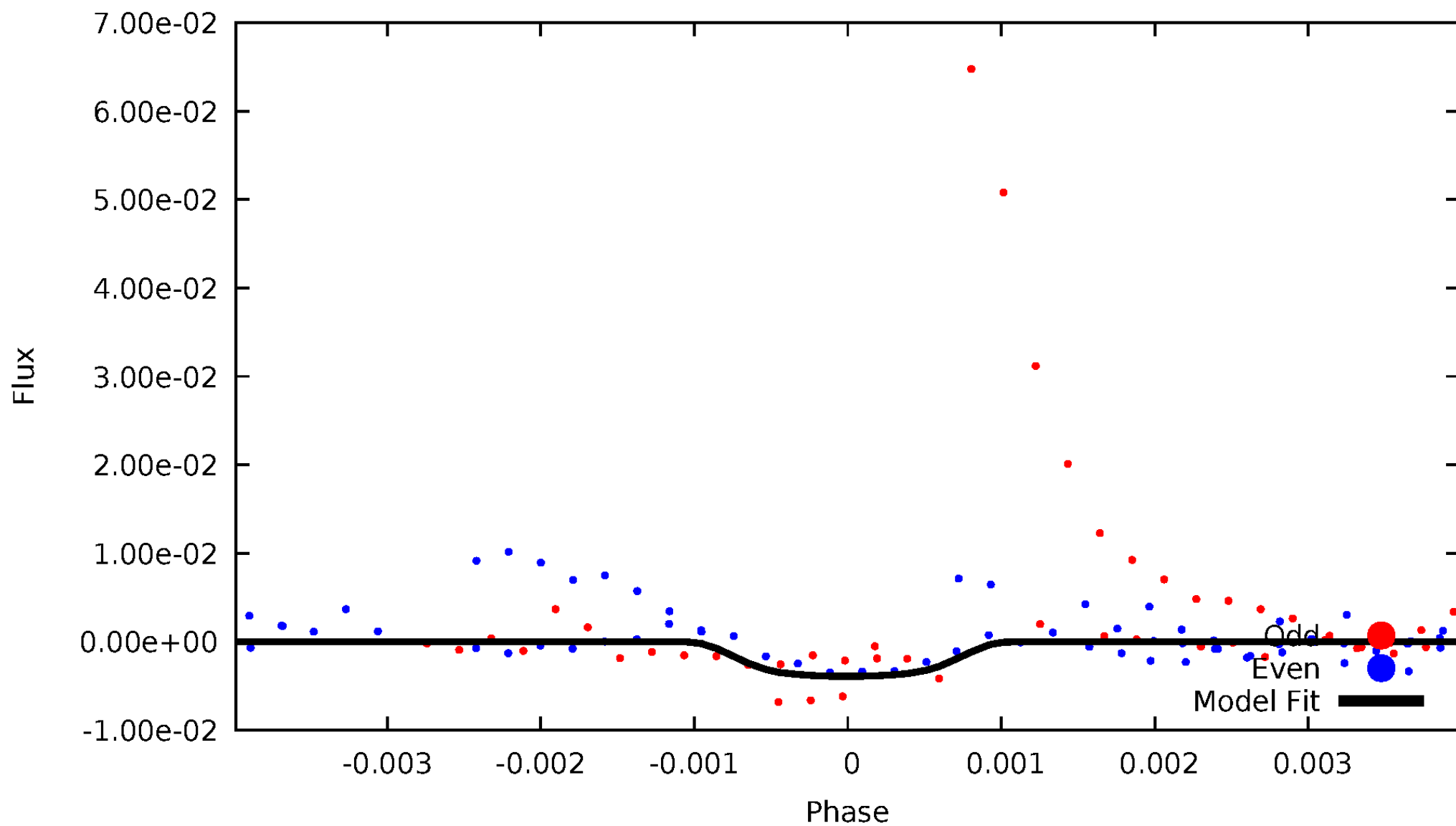


# TCE 010548640-06



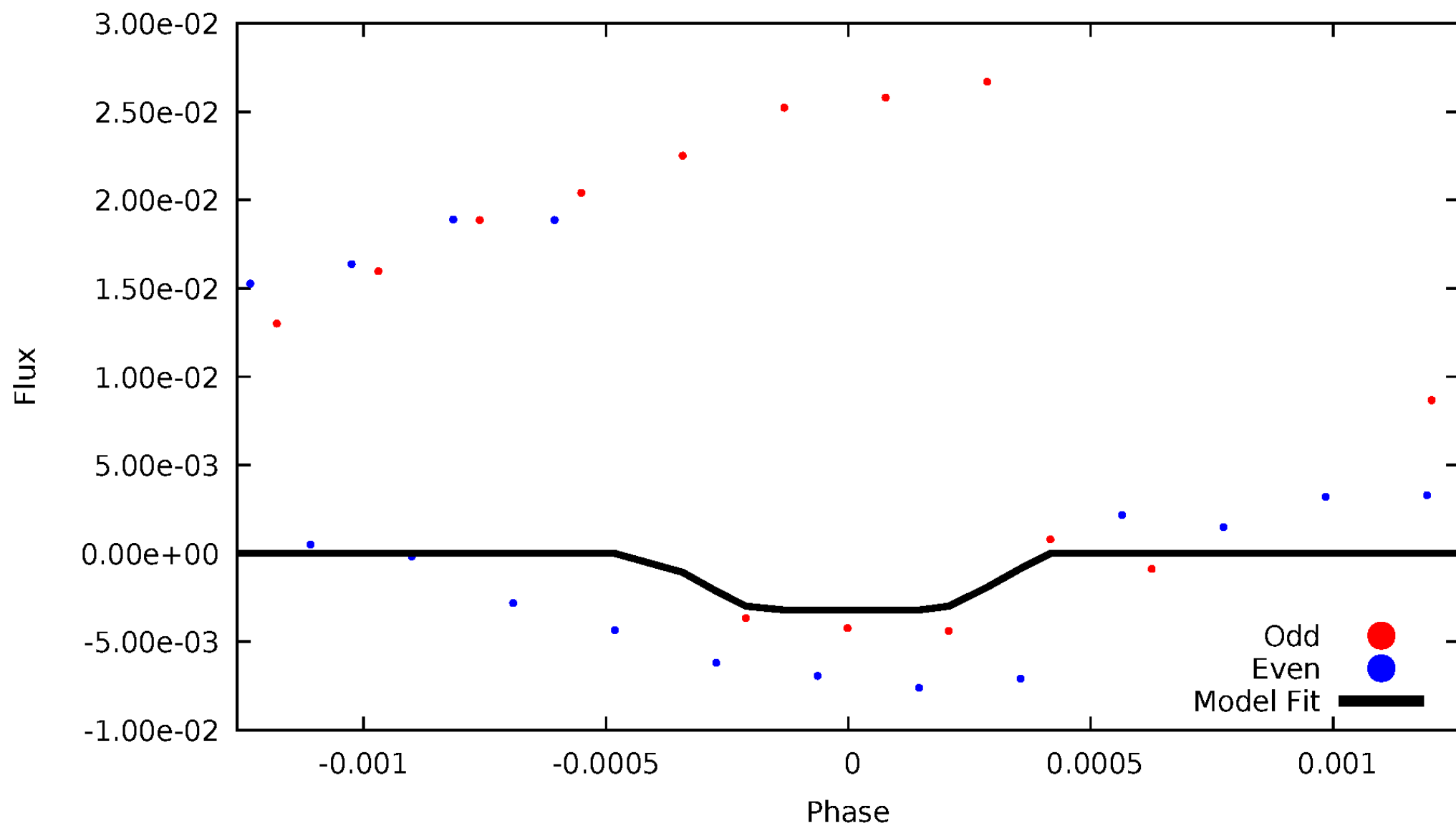
# DV Odd/Even

TCE 010548640-06



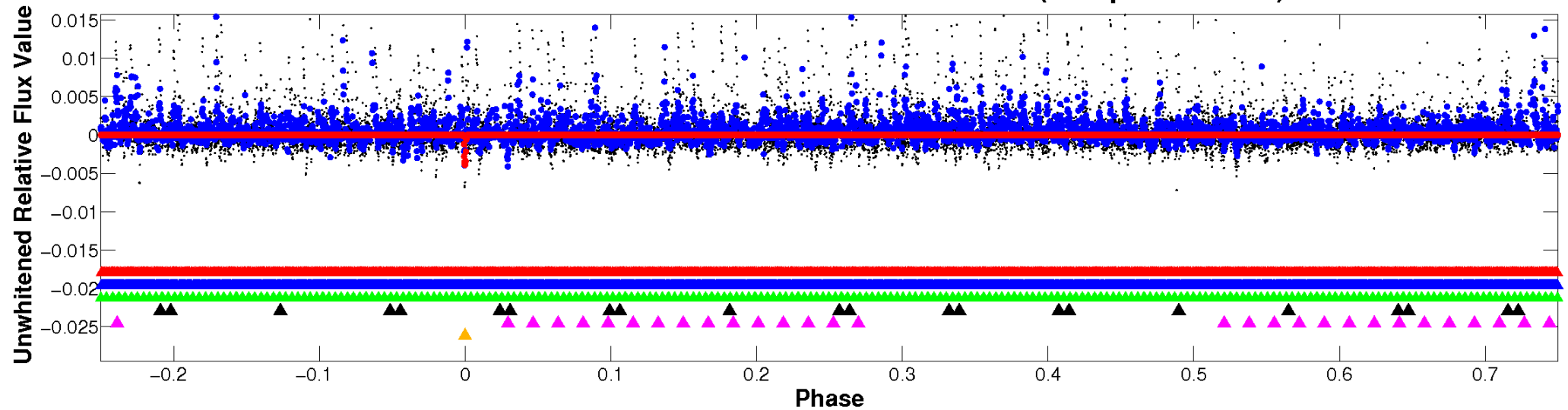
# ALT Odd/Even

TCE 010548640-06

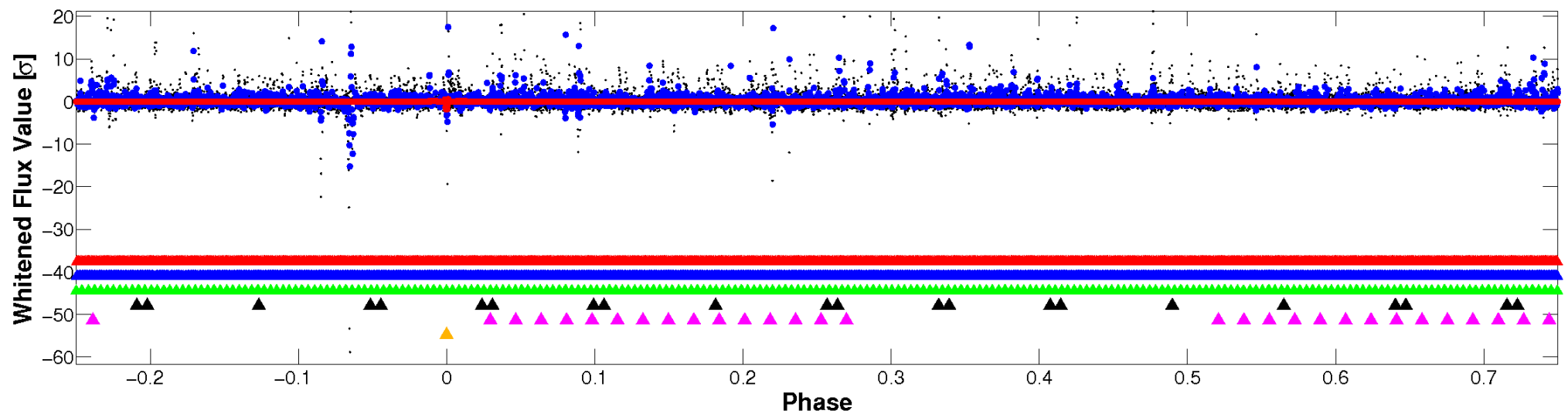


# Non-Whitened Vs. Whitened Light Curve

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

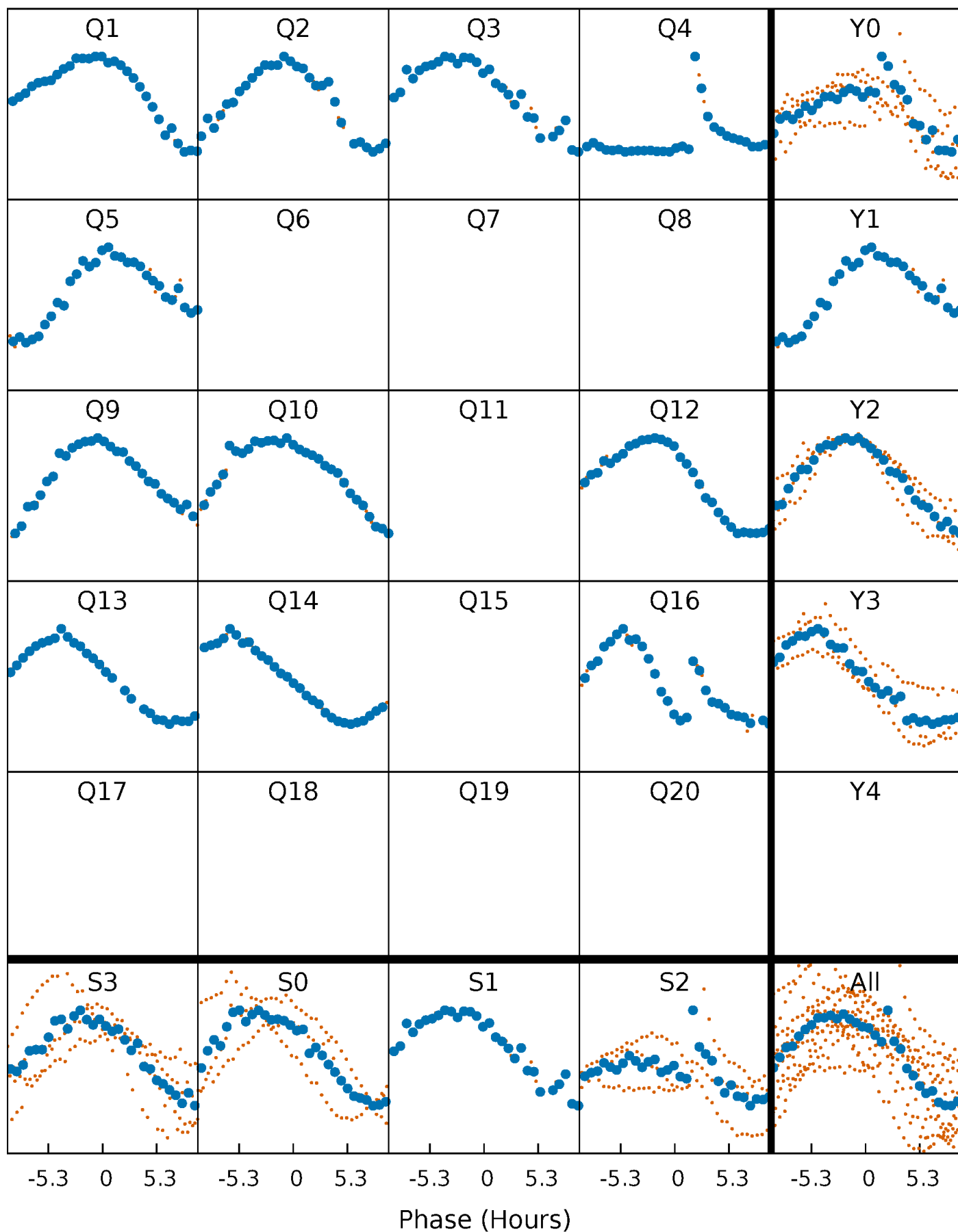


## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



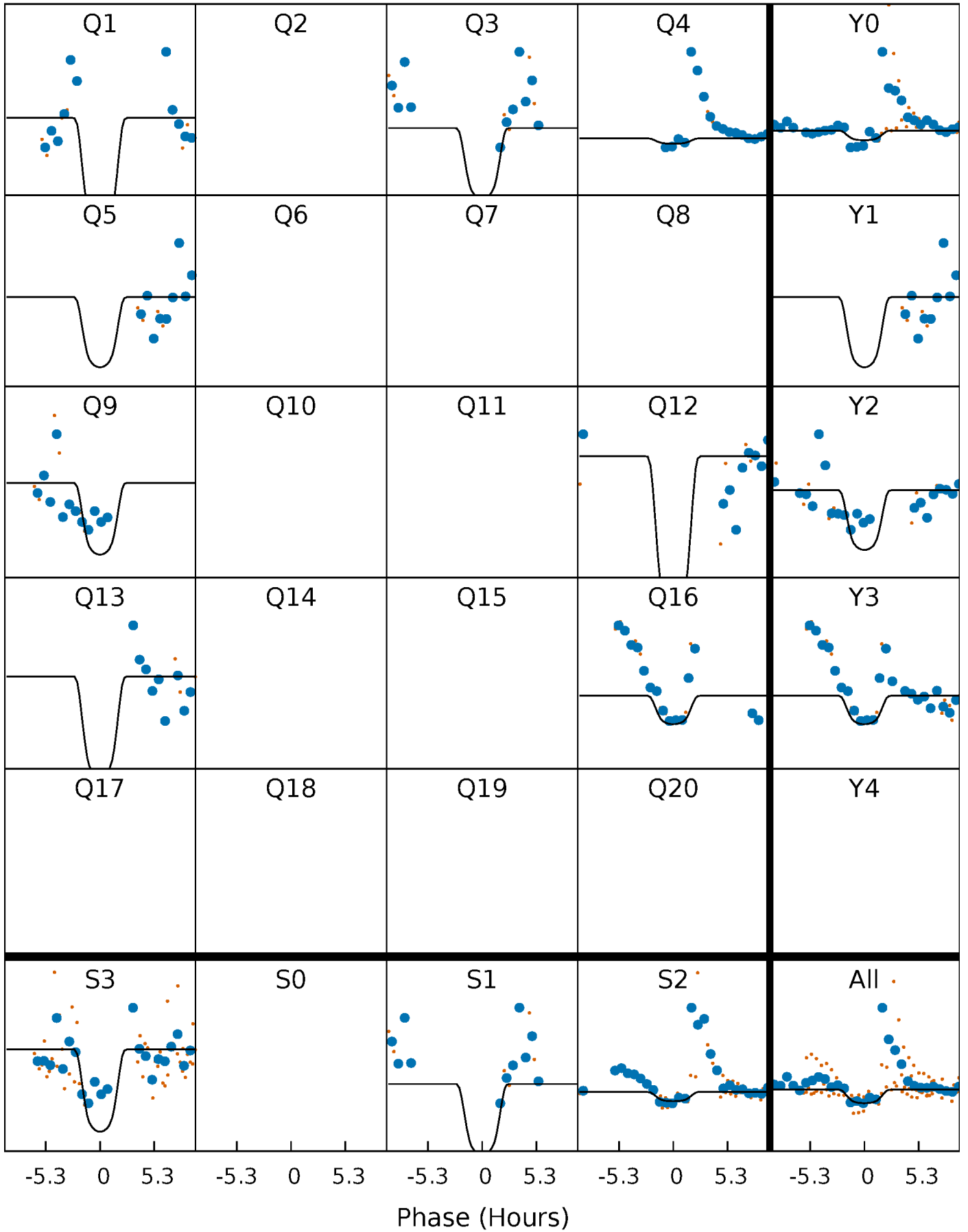
# PDC Quarter-Phased Transit Curves

TCE 010548640-06 P= 97.600860 Days  $T_0=146.889886$  (BKJD)



# DV Quarter-Phased Transit Curves

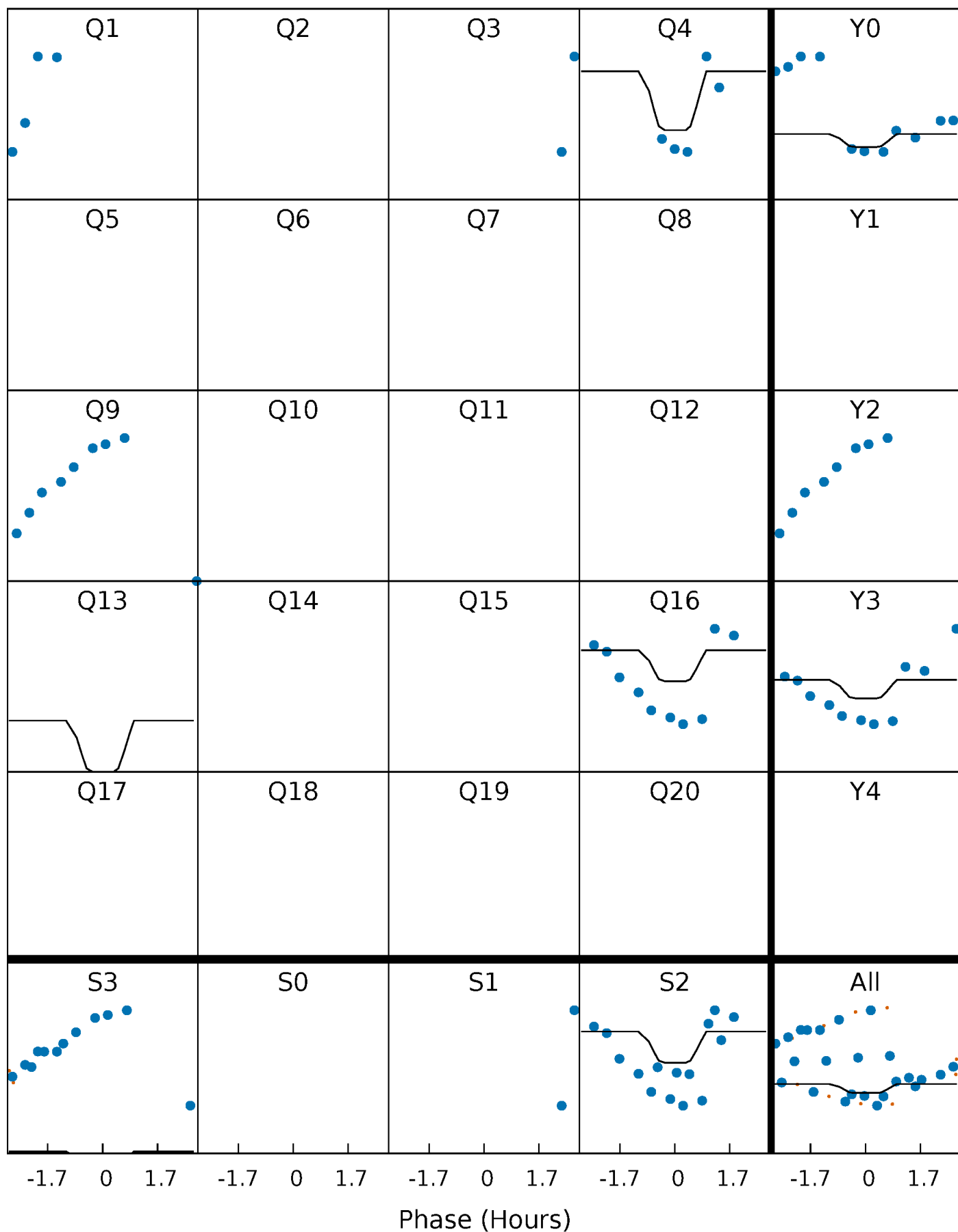
TCE 010548640-06     $P = 97.600860$  Days     $T_0 = 146.889886$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

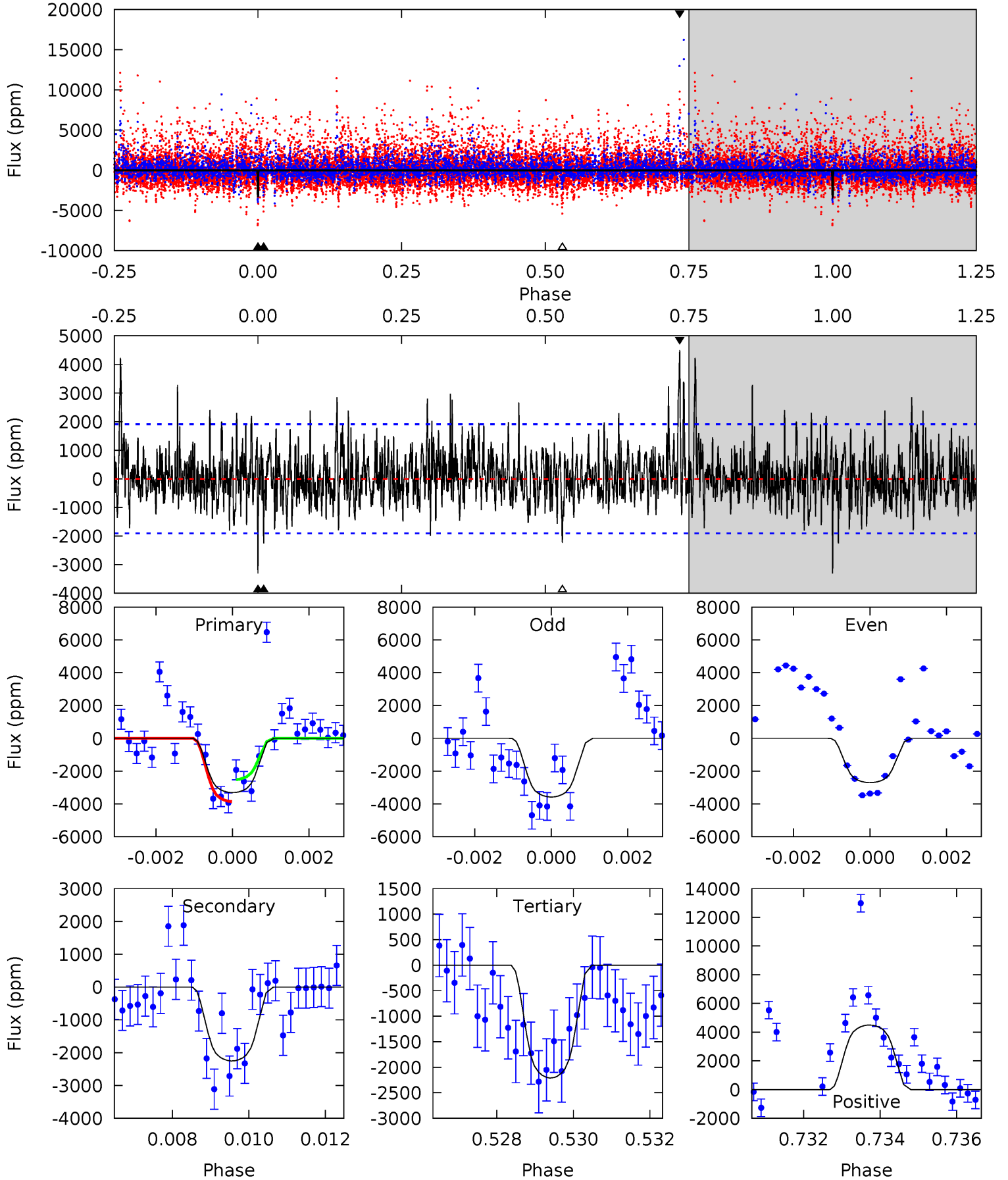
TCE 010548640-06 P= 97.604390 Days  $T_0=146.855879$  (BKJD)



# DV Model-Shift Uniqueness Test

010548640-06, P = 97.600860 Days, E = 49.289026 Days

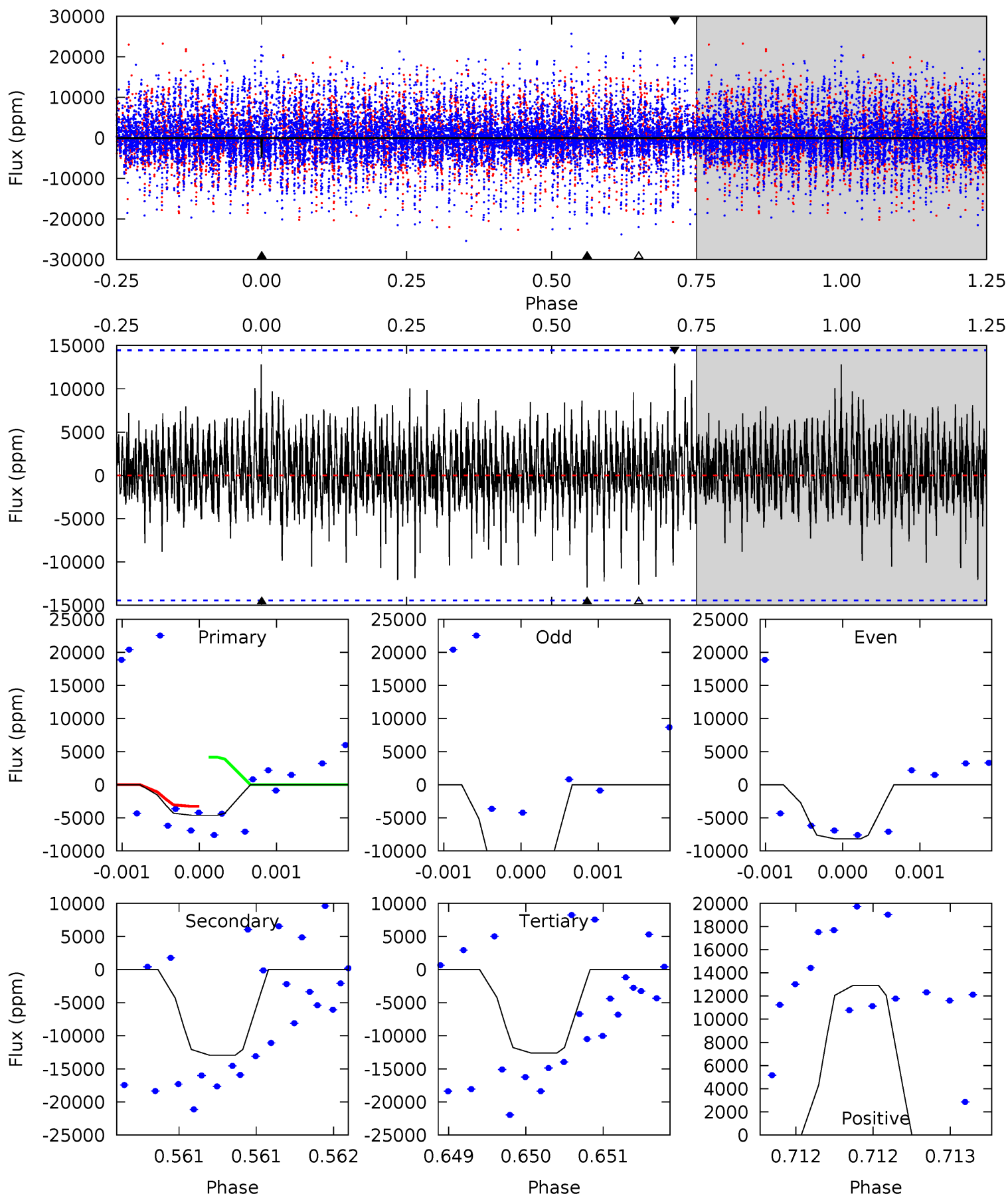
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.23	6.28	6.16	12.5	5.32	3.08	2.05	3.06	-3.31	0.12	-6.26	1.06	0.91	0.58	1.83



# Alt Model-Shift Uniqueness Test

010548640-06, P = 97.604390 Days, E = 49.251489 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
1.77	4.96	4.84	4.95	5.53	3.42	1.14	-3.07	-3.18	0.12	0.01	1.66	-1.38	0.50	0.19



### Stellar Parameters For KIC 010548640

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3727^{+116}_{-142}$	$4.679^{+0.072}_{-0.022}$	$0.560^{+0.050}_{-0.300}$	$0.575^{+0.033}_{-0.076}$	$0.576^{+0.036}_{-0.068}$	$4.261^{+1.573}_{-0.399}$
	+3%/-4%	+2%/-0%	+9%/-54%	+6%/-13%	+6%/-12%	+37%/-9%
Source	KIC0	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 010548640-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-2253 \pm 359$	$4.23^{+1.78}_{-1.57}$	$293^{+10}_{-12}$	$3300^{+567}_{-336}$	$8137^{+13755}_{-3956}$
Alt.	$-12939 \pm 2609$	$3.54^{+1.60}_{-1.64}$	$293^{+10}_{-12}$	$4810^{+1637}_{-712}$	$68222^{+180302}_{-37904}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

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

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

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

## DV Centroid Data

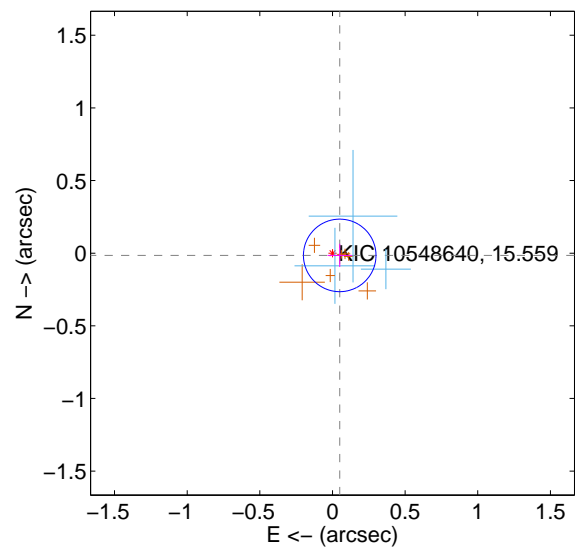
Supplemental centroid analysis for 010548640-06. Kepler magnitude: 15.56. Transit SNR 6.79

There are 3 quarters with good PRF difference image offsets

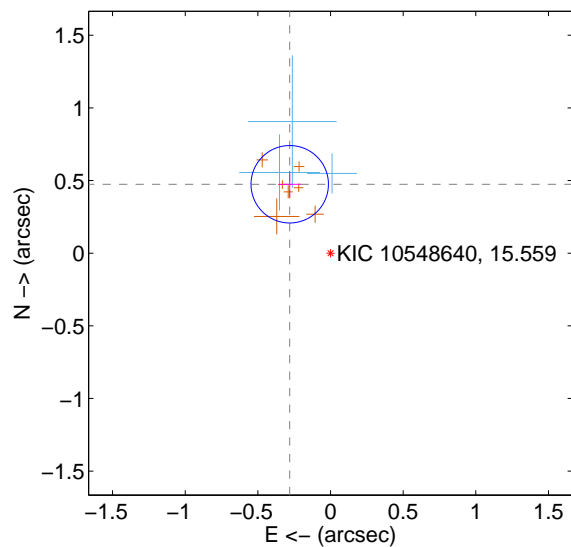
The direct PRF centroid is offset from the target star catalog position by about 0.75 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.052 \pm 0.083$	0.63	$-0.050 \pm 0.083$	$-0.015 \pm 0.080$
PRF-fit source offset from KIC position	$0.551 \pm 0.089$	6.21	$0.281 \pm 0.078$	$0.474 \pm 0.091$
photometric centroid source offset	$0.53 \pm 0.29$	1.85	$-0.21 \pm 0.26$	$0.48 \pm 0.29$

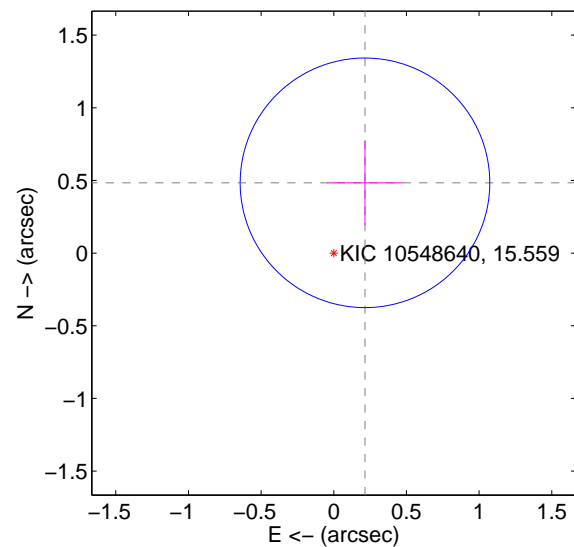
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

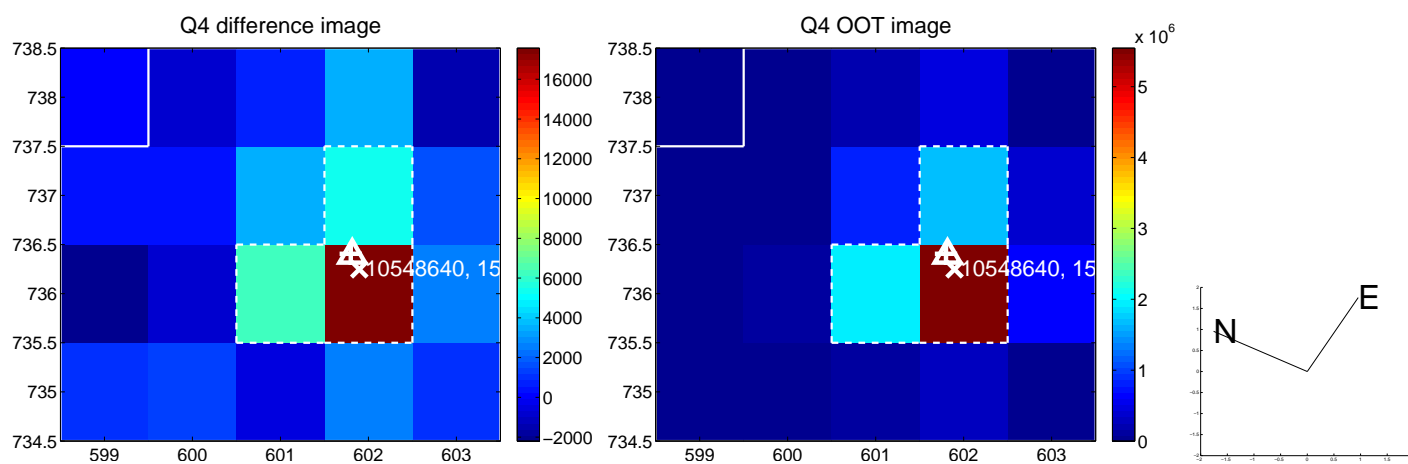
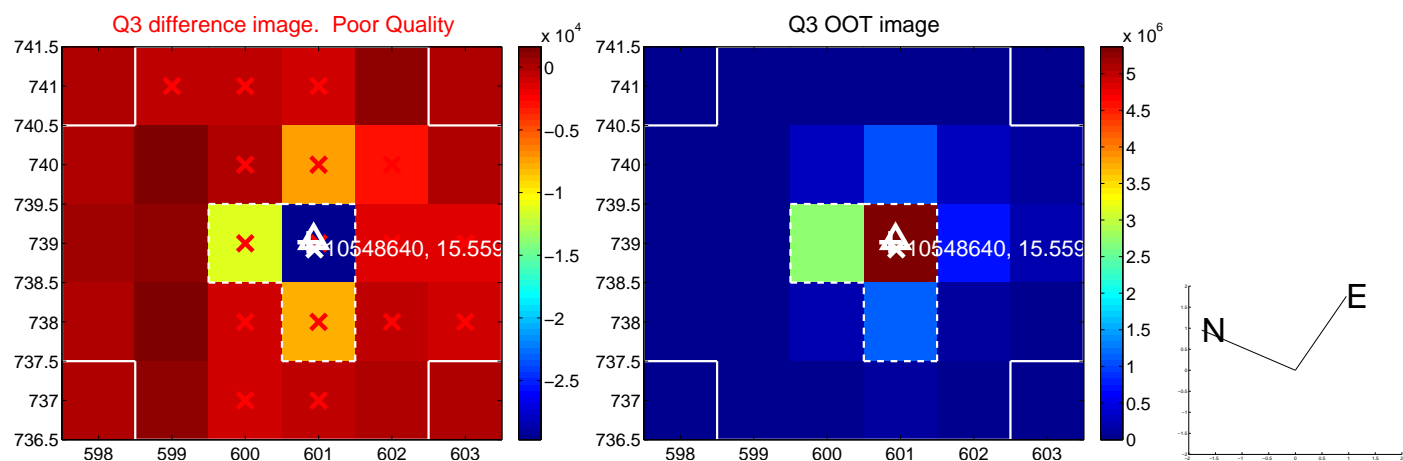
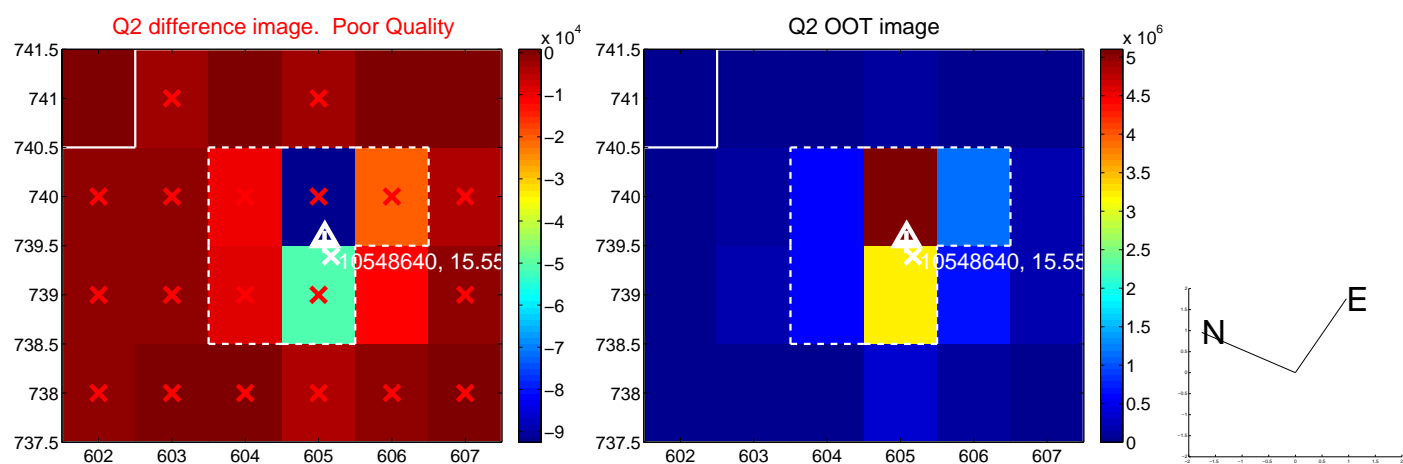
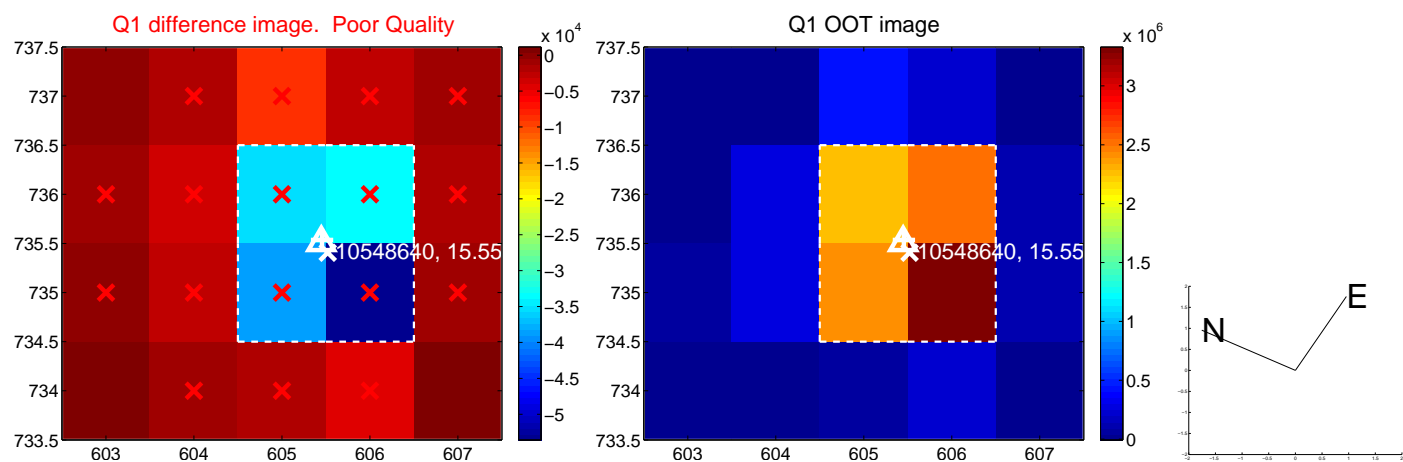


offset from photometric centroids

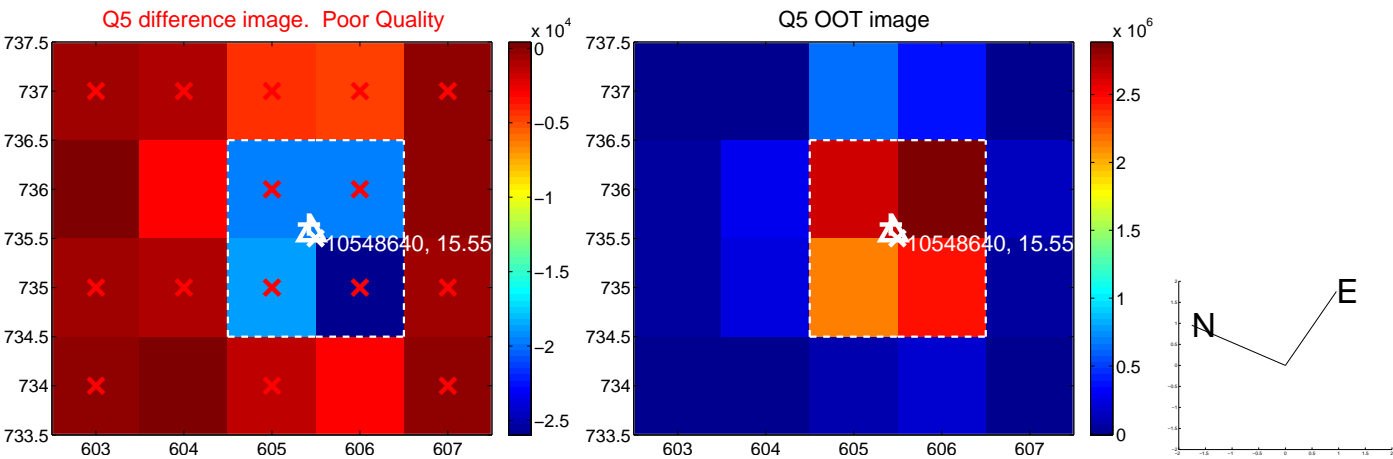


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . 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.

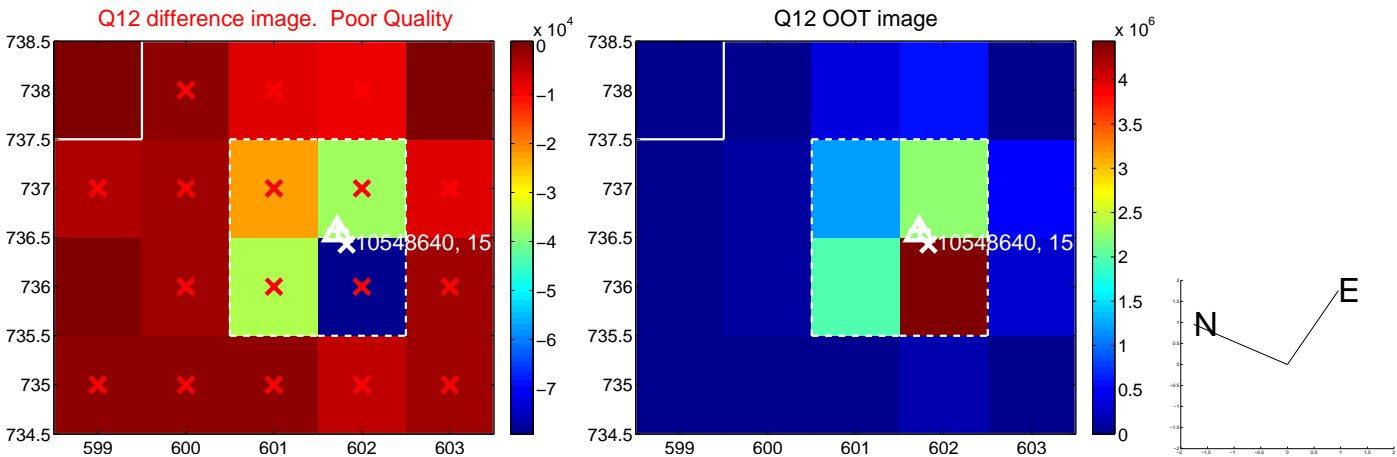
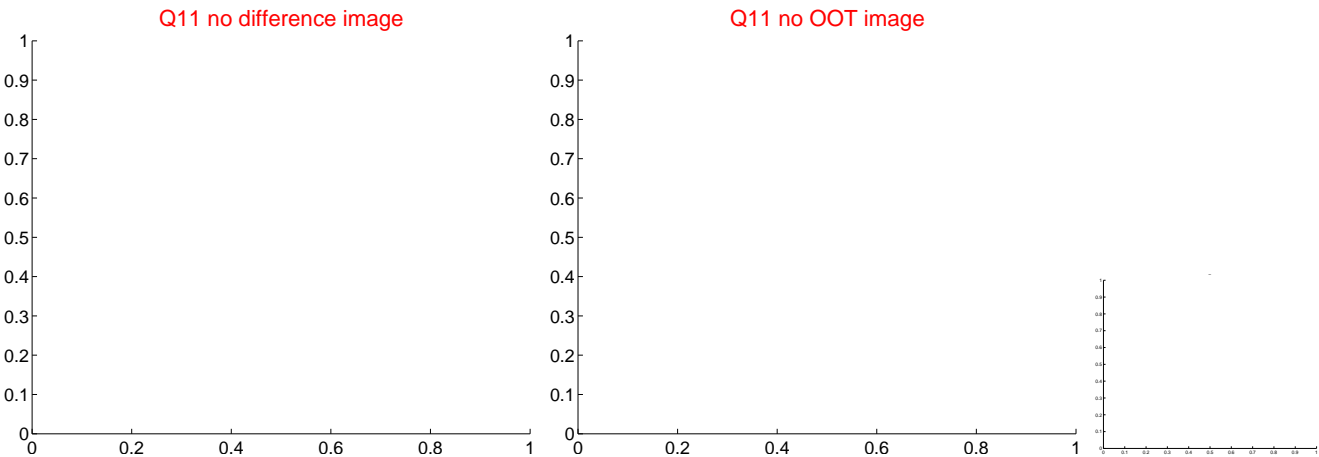
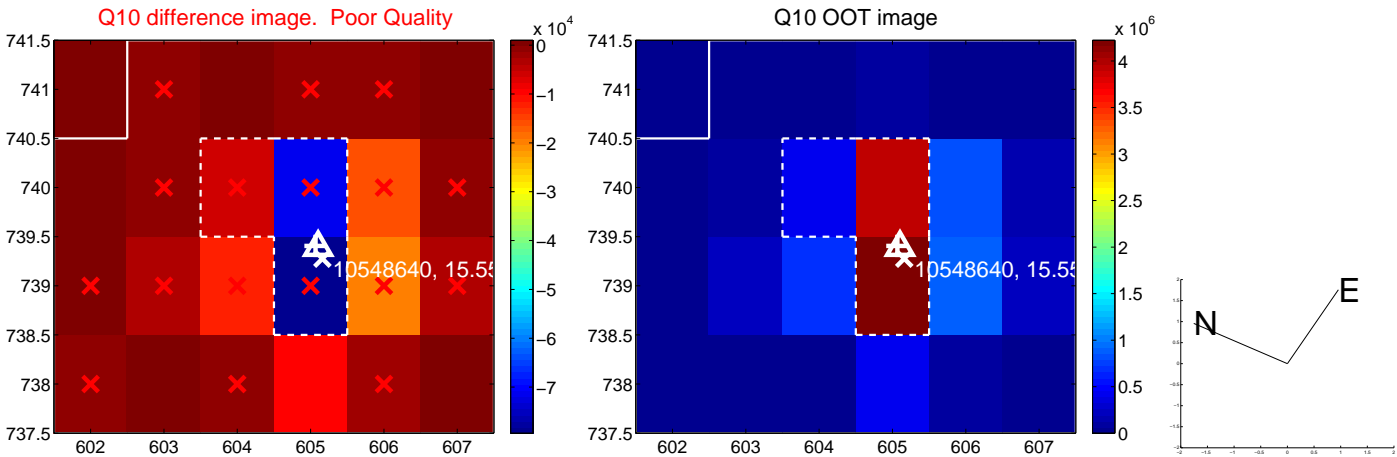
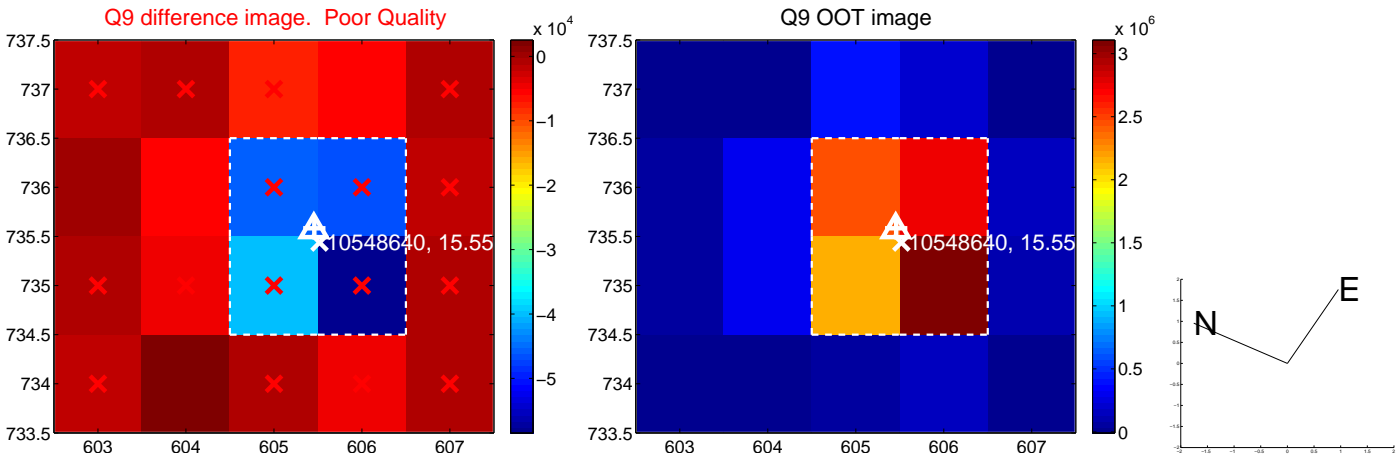
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

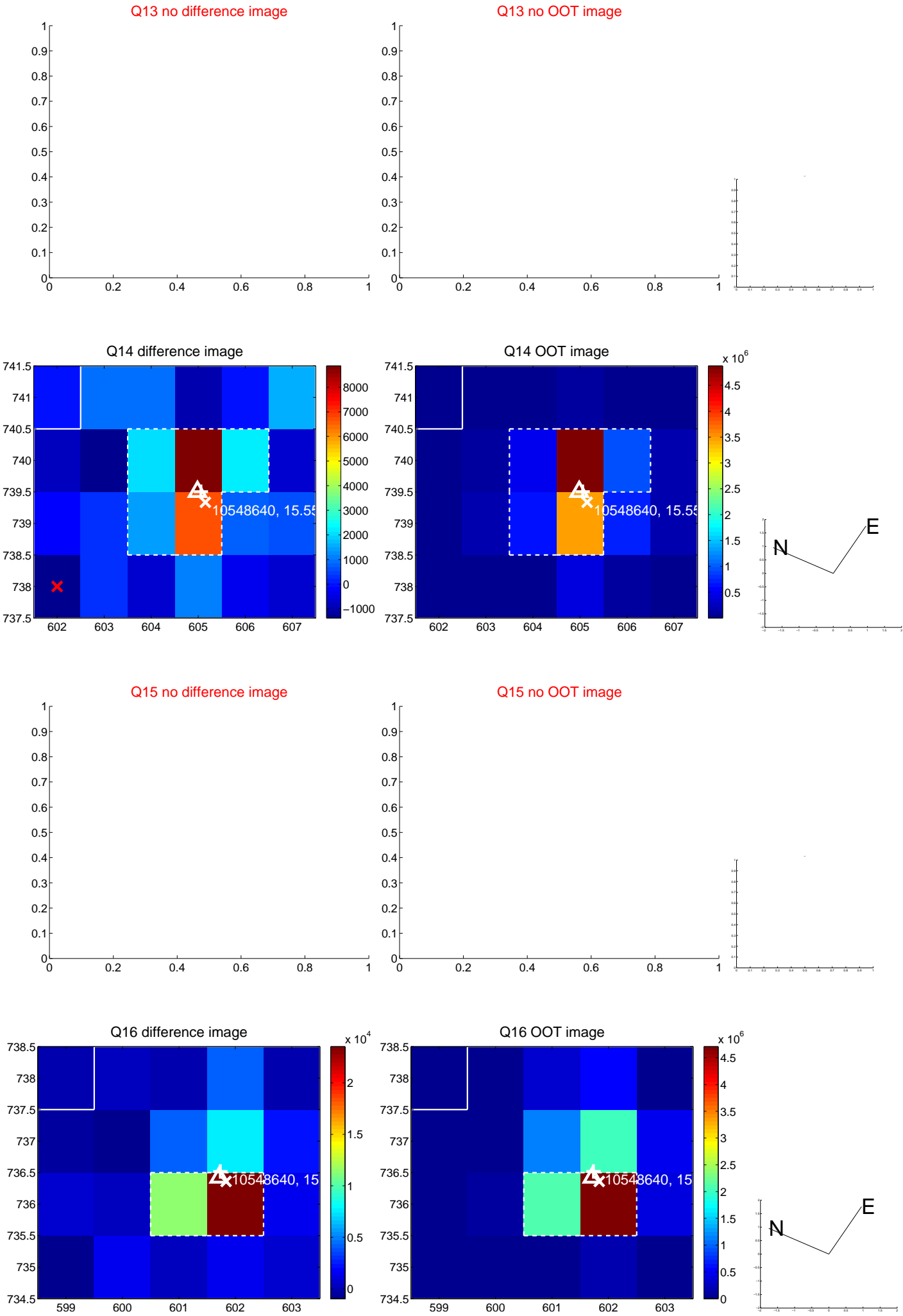


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

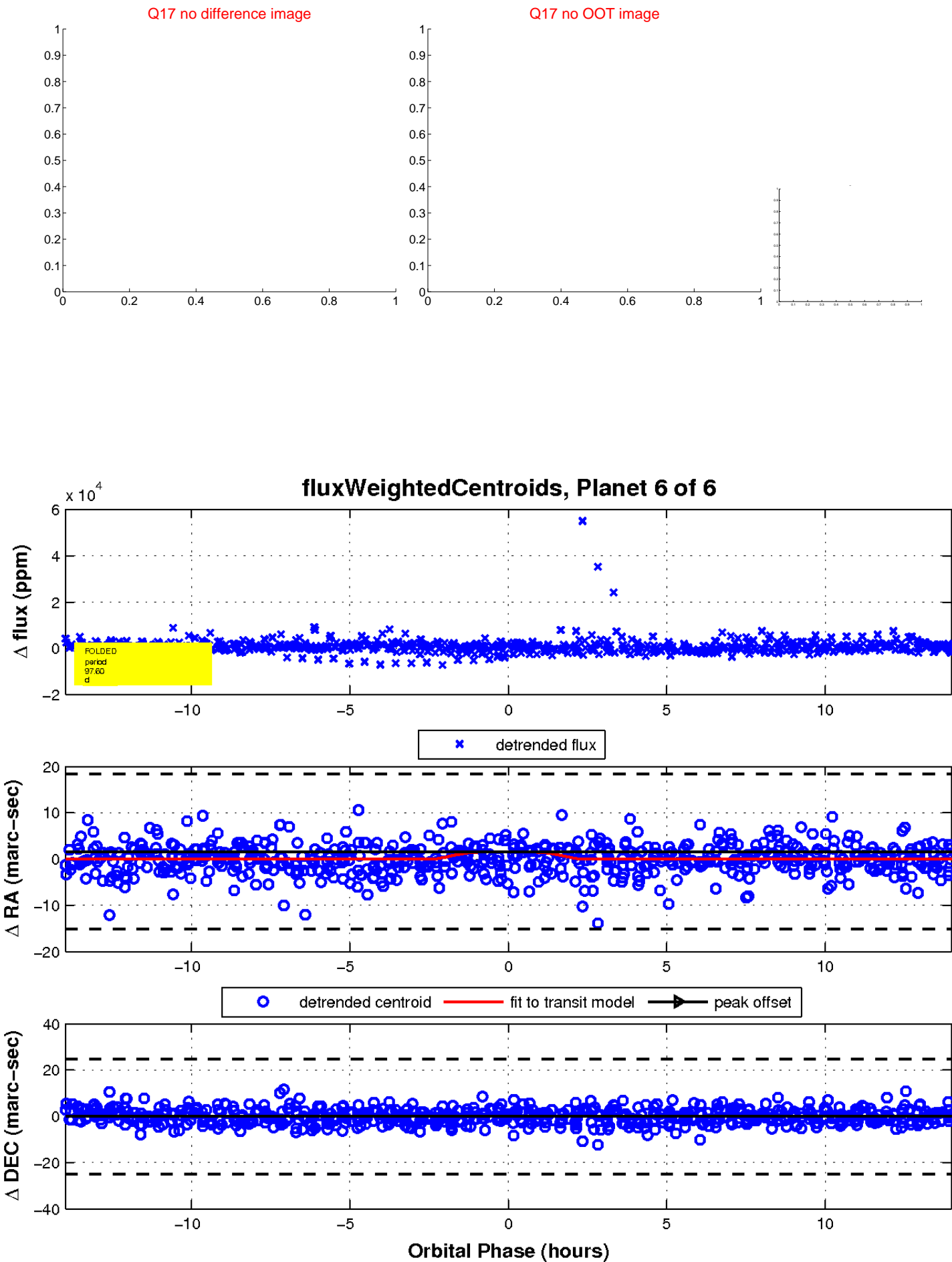




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image

Declination

