

# KIC 004457475

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004457475-01	OBS	No	585.028762	205.733576	697.8	5.735	12.3	5.9	0.85	5300	2.21	0.32
004457475-02	OBS	No	616.288985	263.730944	632.5	7.422	13.4	4.8	0.85	5300	2.24	0.30
004457475-03	OBS	No	468.415281	243.090661	962.4	3.245	13.4	8.6	0.85	5300	2.72	0.43

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004457475-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004457475-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004457475-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—CENT_FEW_DIFFS

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

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

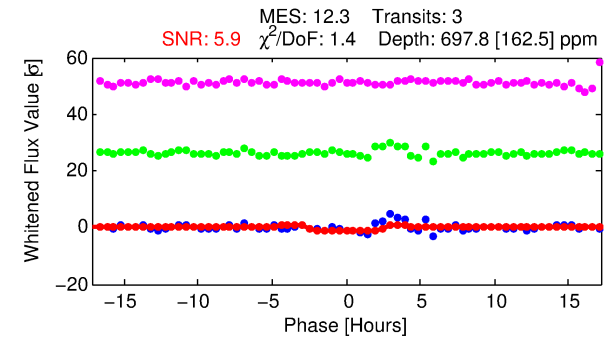
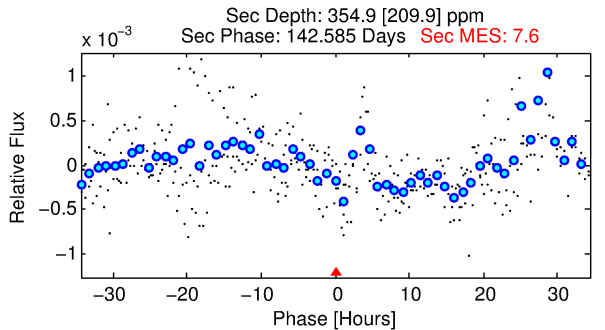
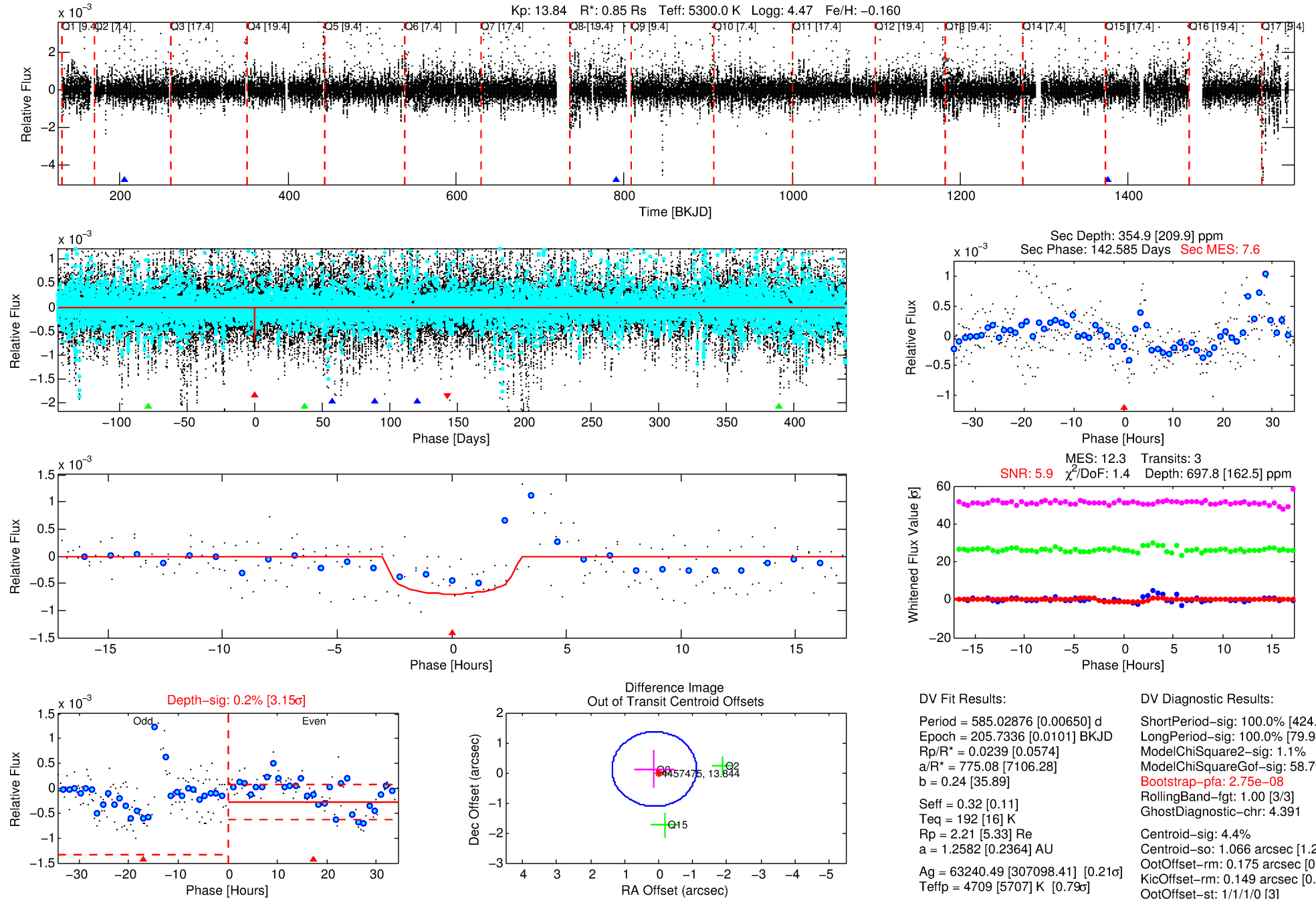
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004457475-01

No Significant Match Found

# DV One-Page Summary

KIC: 4457475 Candidate: 1 of 3 Period: 585.029 d



## DV Fit Results:

Period = 585.02876 [0.00650] d  
Epoch = 205.7336 [0.0101] BKJD  
Rp/R\* = 0.0239 [0.0574]  
a/R\* = 775.08 [7106.28]  
b = 0.24 [35.89]  
Seff = 0.32 [0.11]  
Teff = 192 [16] K  
Rp = 2.21 [5.33] Re  
a = 1.2582 [0.2364] AU  
Ag = 63240.49 [307098.41] [0.21 $\sigma$ ]  
Teffp = 4709 [5707] K [0.79 $\sigma$ ]

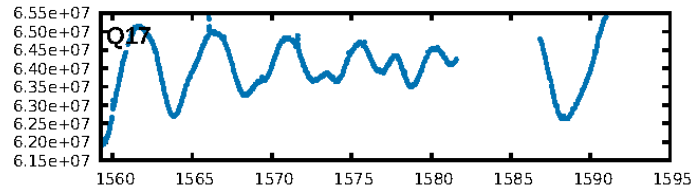
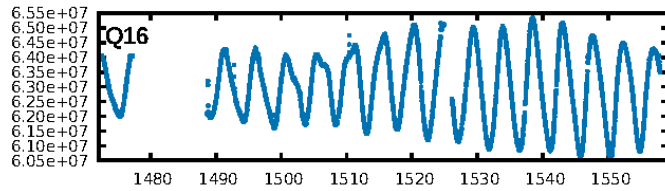
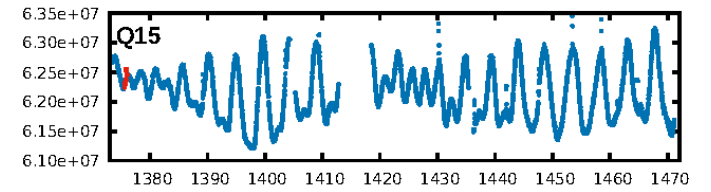
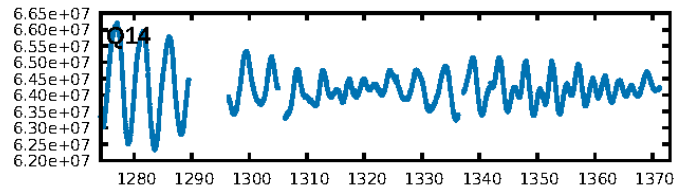
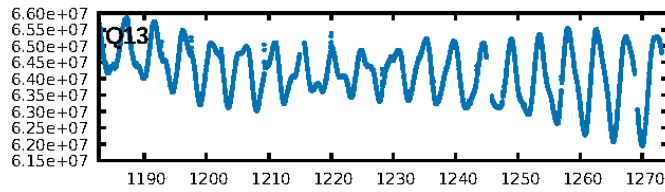
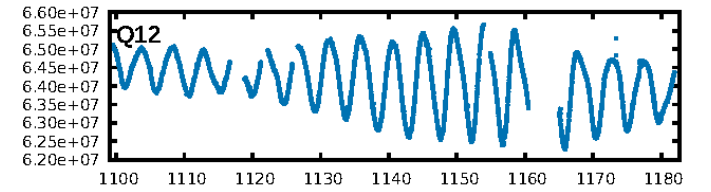
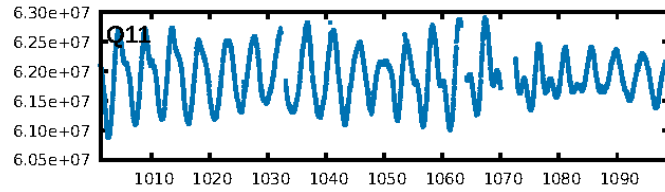
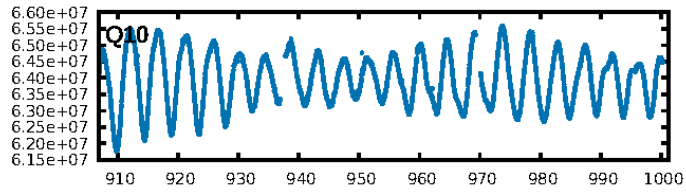
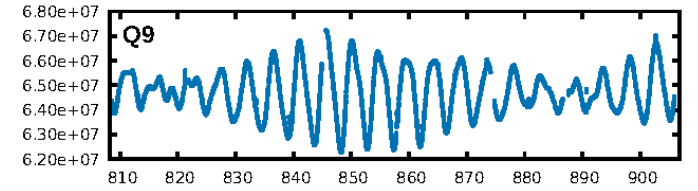
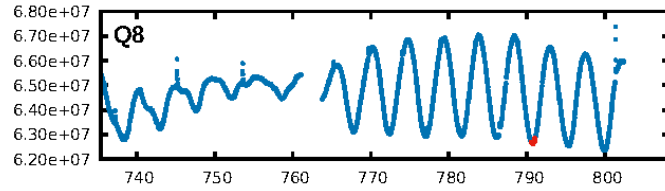
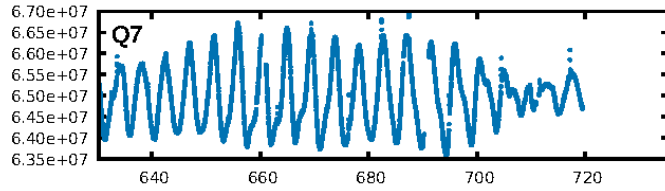
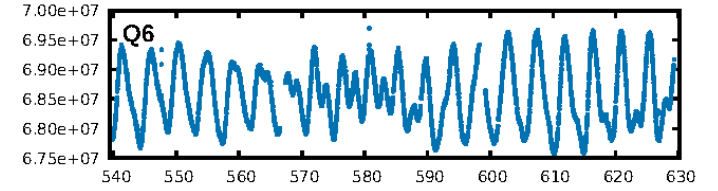
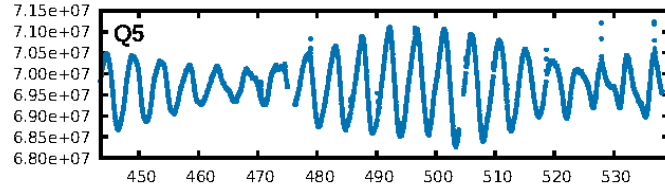
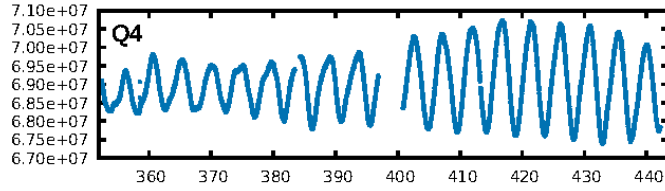
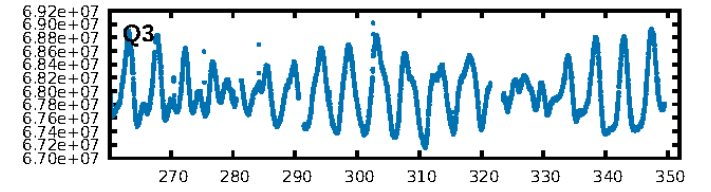
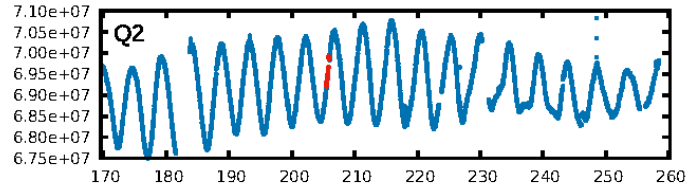
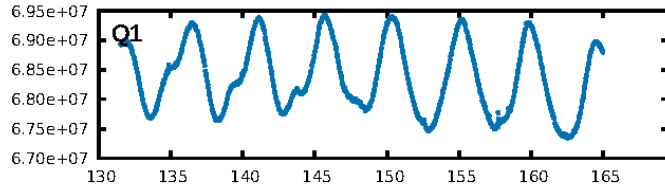
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [424.70 $\sigma$ ]  
LongPeriod-sig: 100.0% [79.98 $\sigma$ ]  
ModelChiSquare2-sig: 1.1%  
ModelChiSquareGof-sig: 58.7%  
Bootstrap-pfa: 2.75e-08  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 4.391  
Centroid-sig: 4.4%  
Centroid-so: 1.066 arcsec [1.28 $\sigma$ ]  
OotOffset-rm: 0.175 arcsec [0.42 $\sigma$ ]  
KicOffset-rm: 0.149 arcsec [0.31 $\sigma$ ]  
OotOffset-st: 1/1/1/0 [3]  
KicOffset-st: 1/1/1/0 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

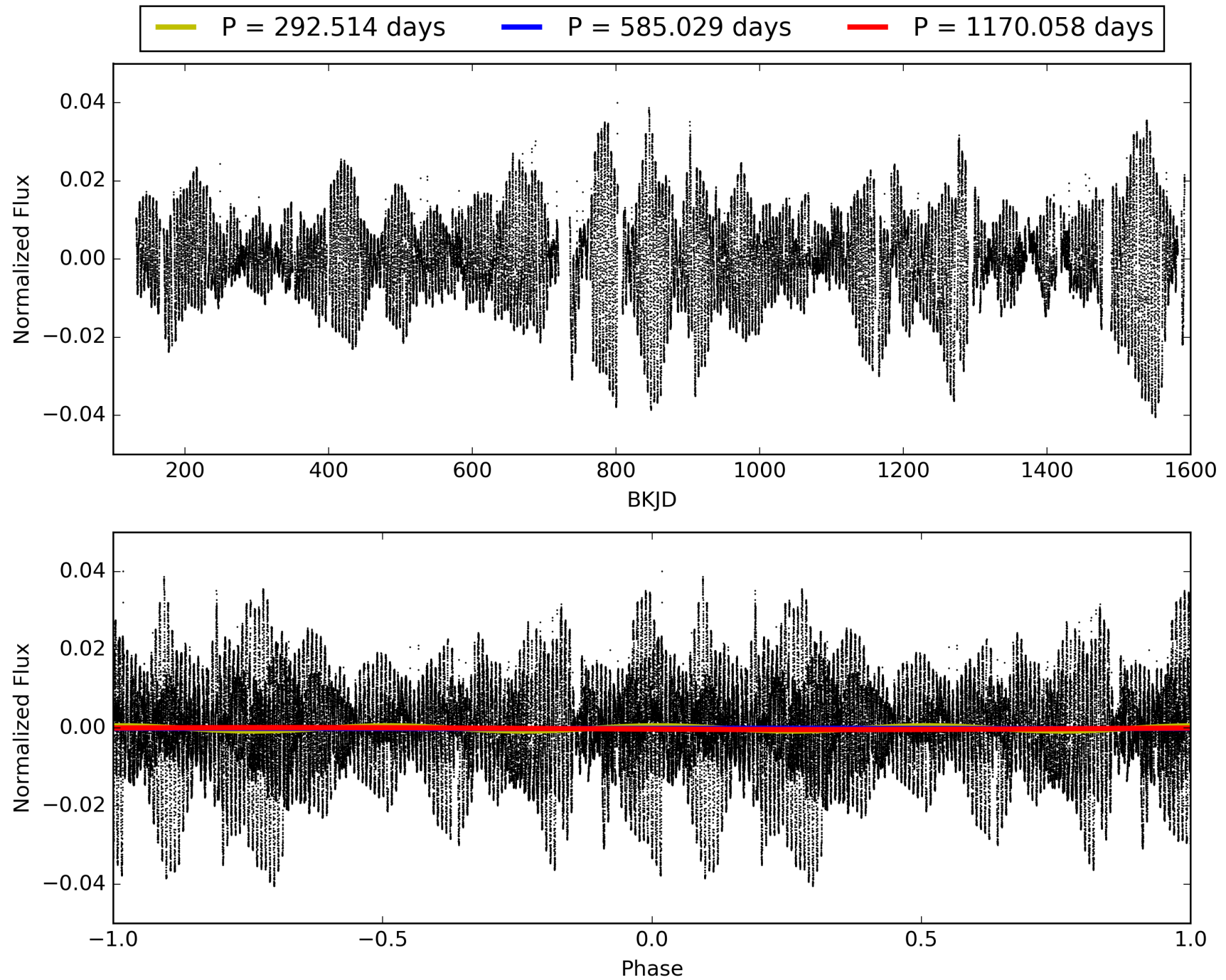
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 15:43:19 Z

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

# TCE 004457475-01, PDC Light Curves

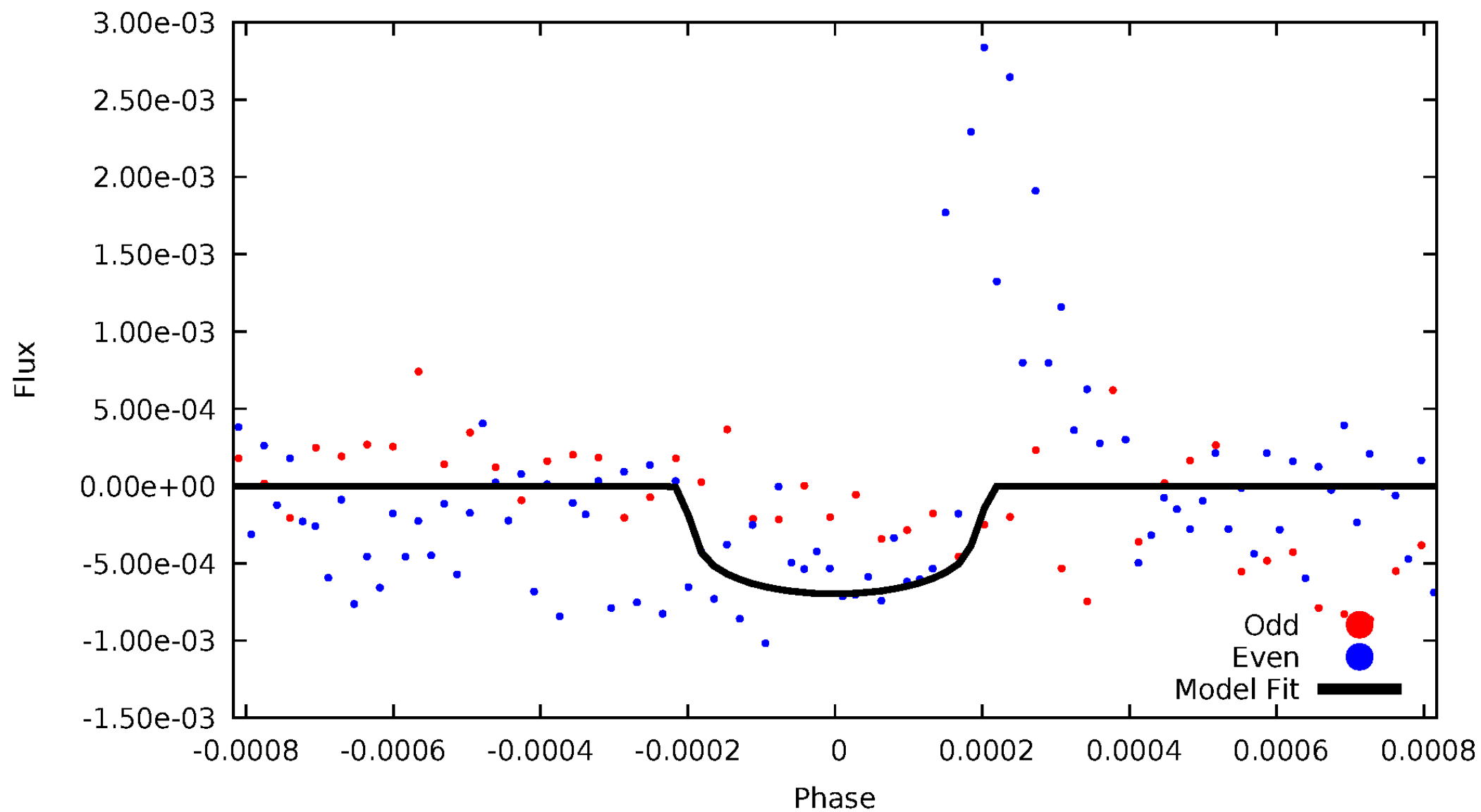


TCE 004457475-01



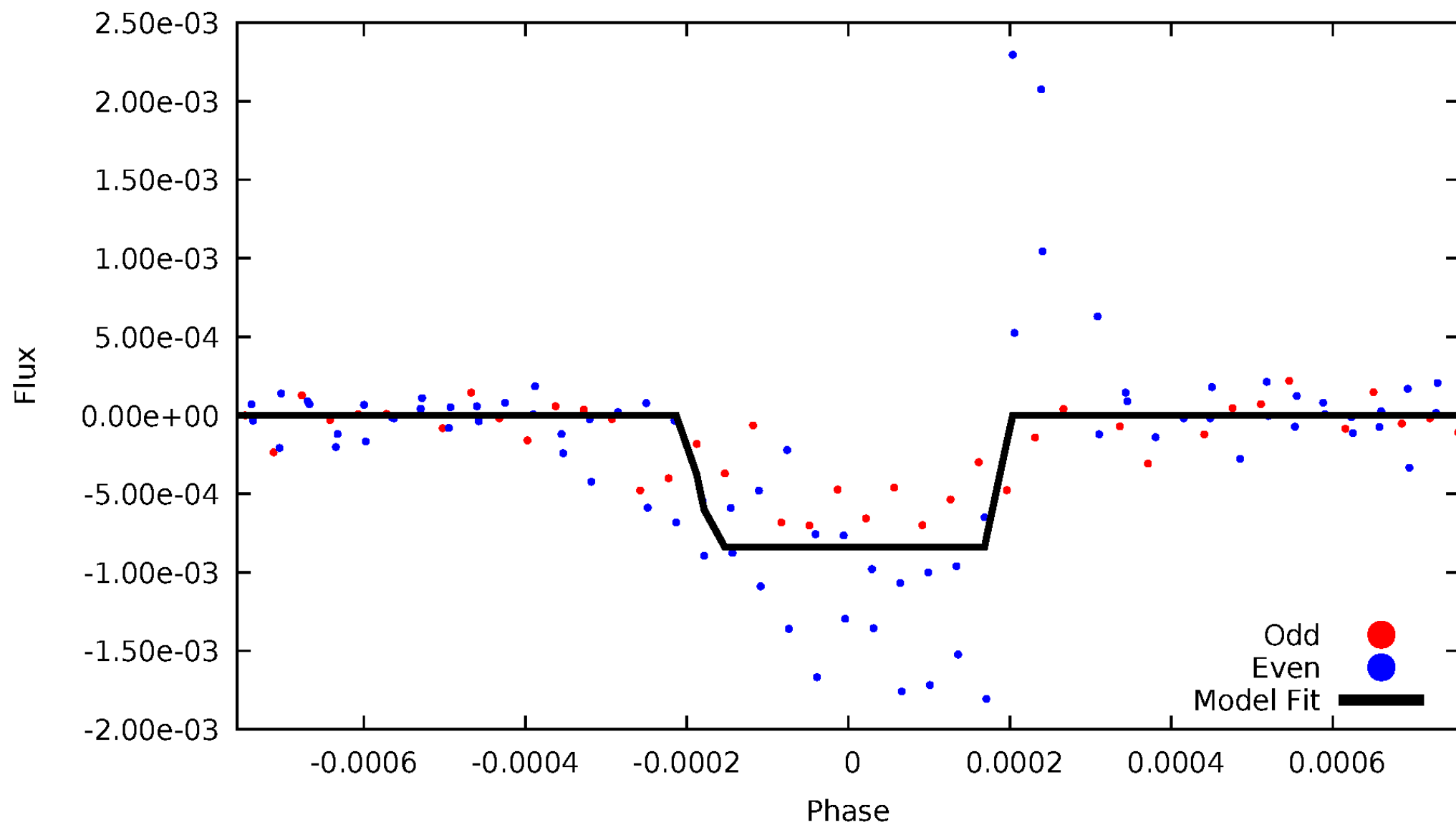
# DV Odd/Even

TCE 004457475-01



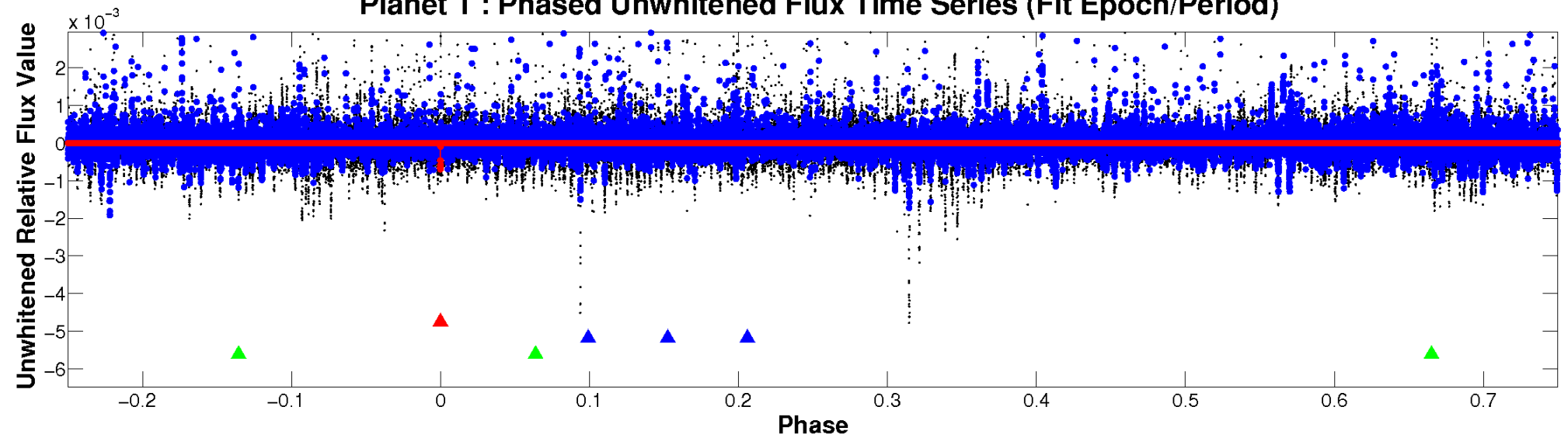
# ALT Odd/Even

TCE 004457475-01

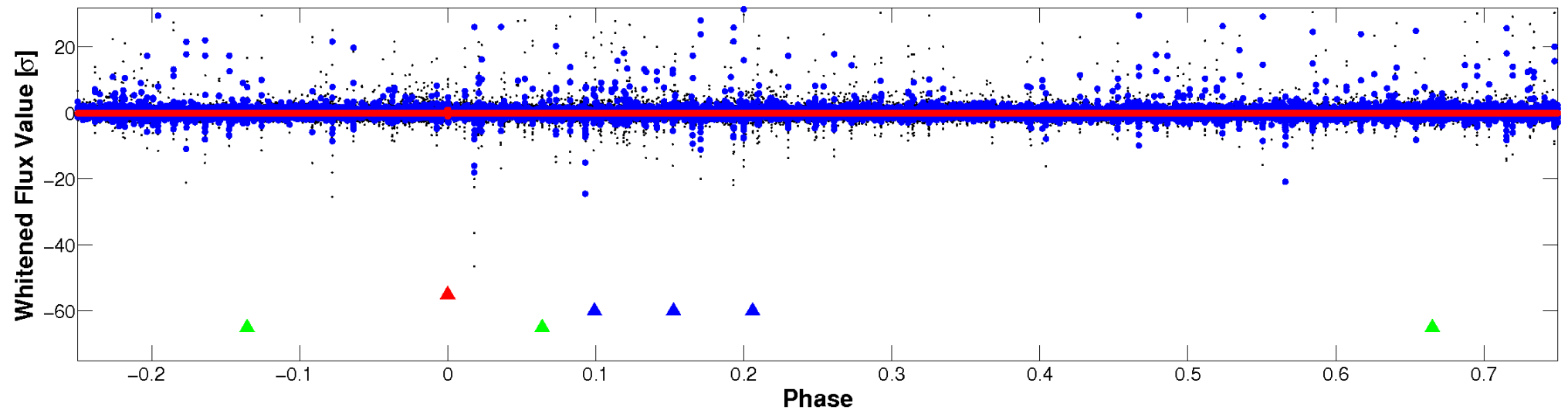


# Non-Whitened Vs. Whitened Light Curve

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

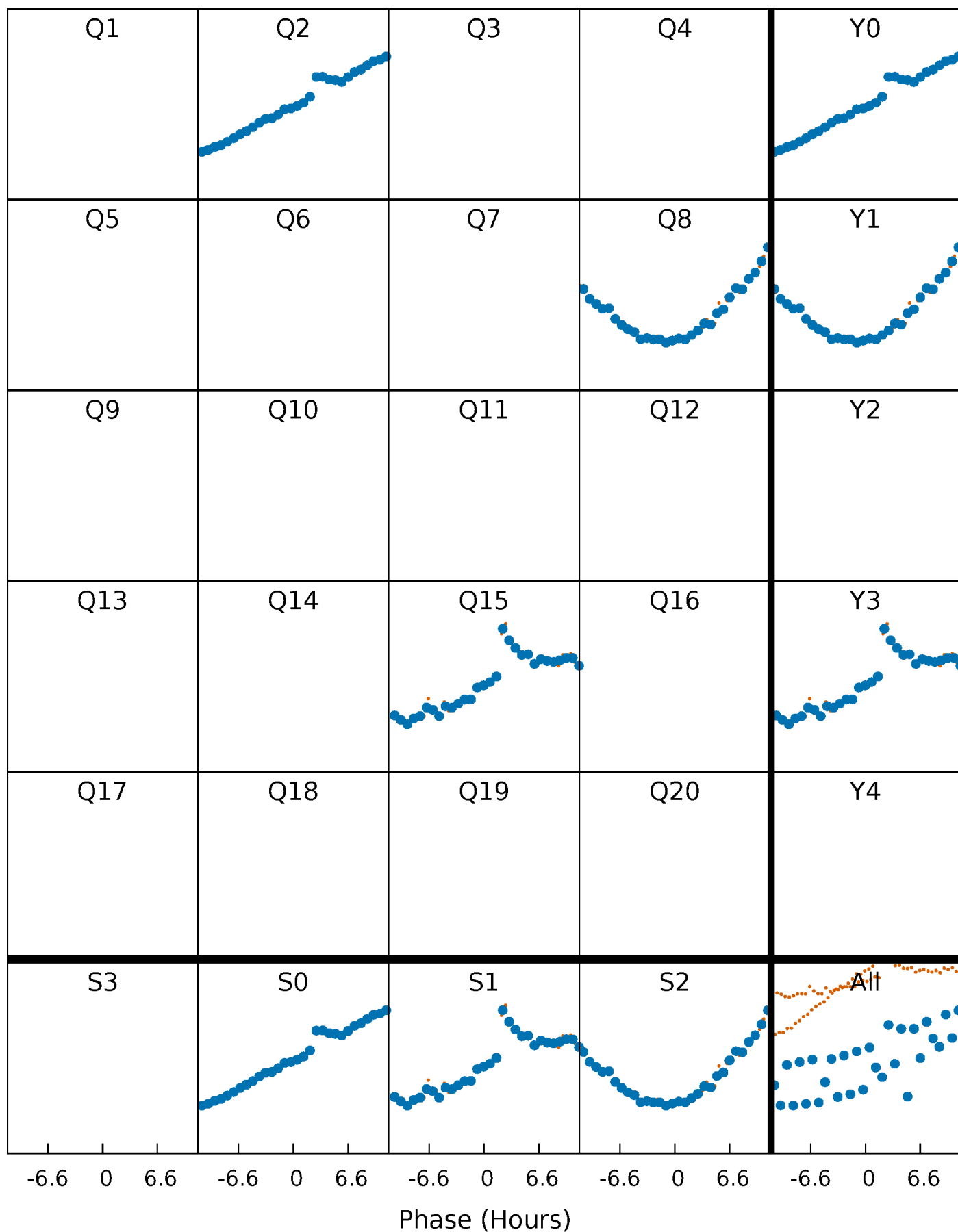


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

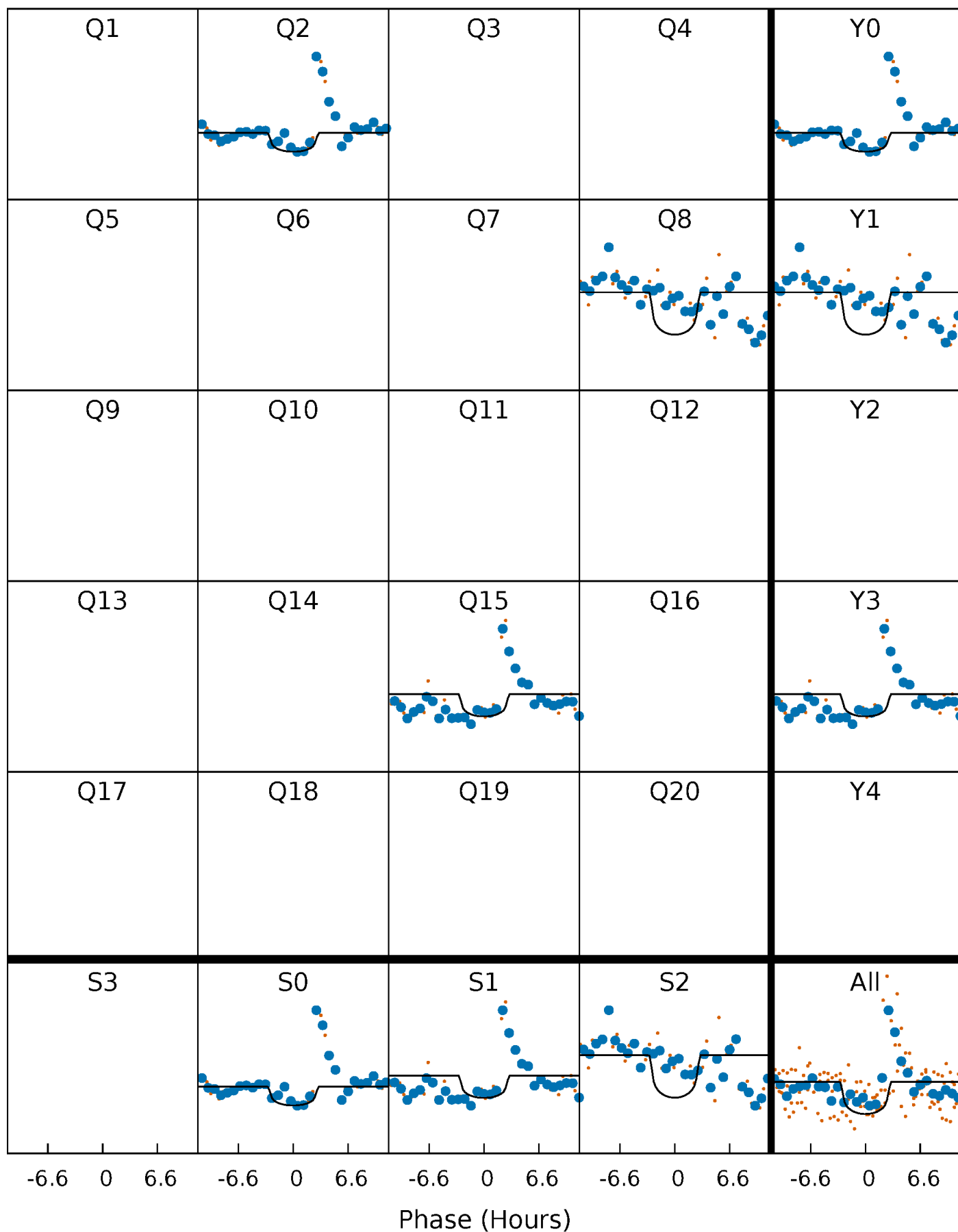
TCE 004457475-01 P=585.028762 Days  $T_0=205.733576$  (BKJD)





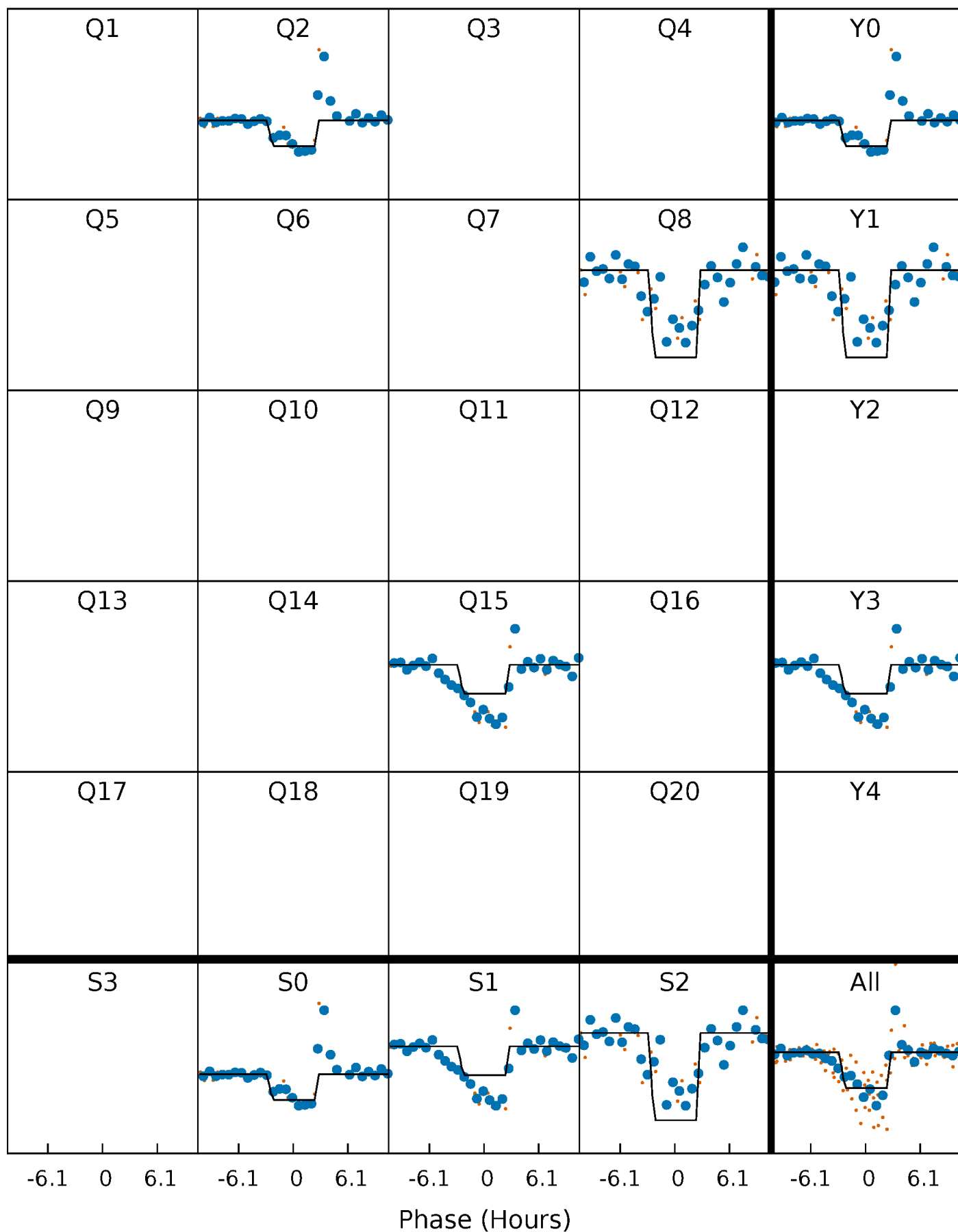
# DV Quarter-Phased Transit Curves

TCE 004457475-01 P=585.028762 Days  $T_0=205.733576$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

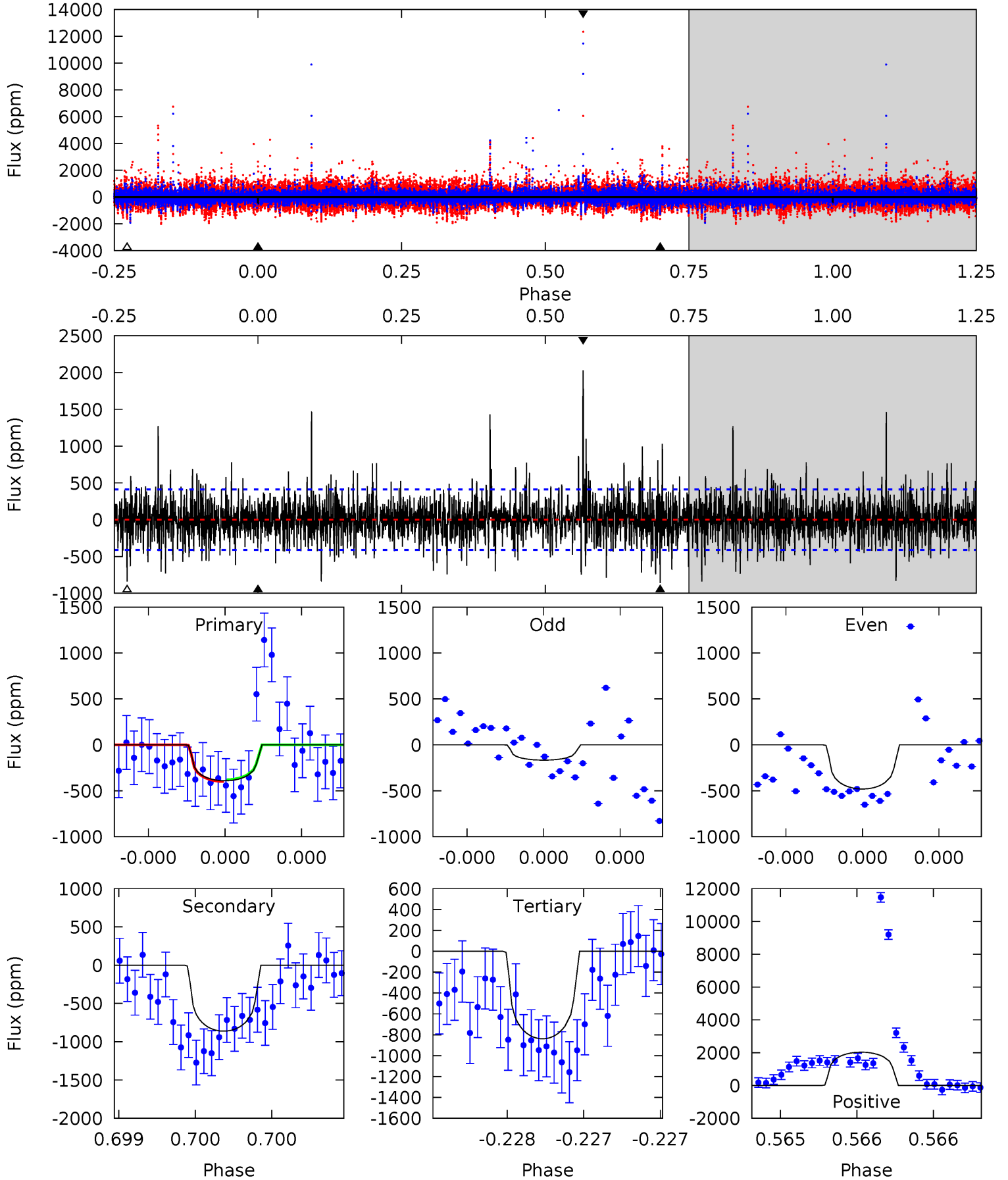
TCE 004457475-01 P=585.012823 Days  $T_0=205.732902$  (BKJD)



# DV Model-Shift Uniqueness Test

004457475-01,  $P = 585.028762$  Days,  $E = 205.733576$  Days

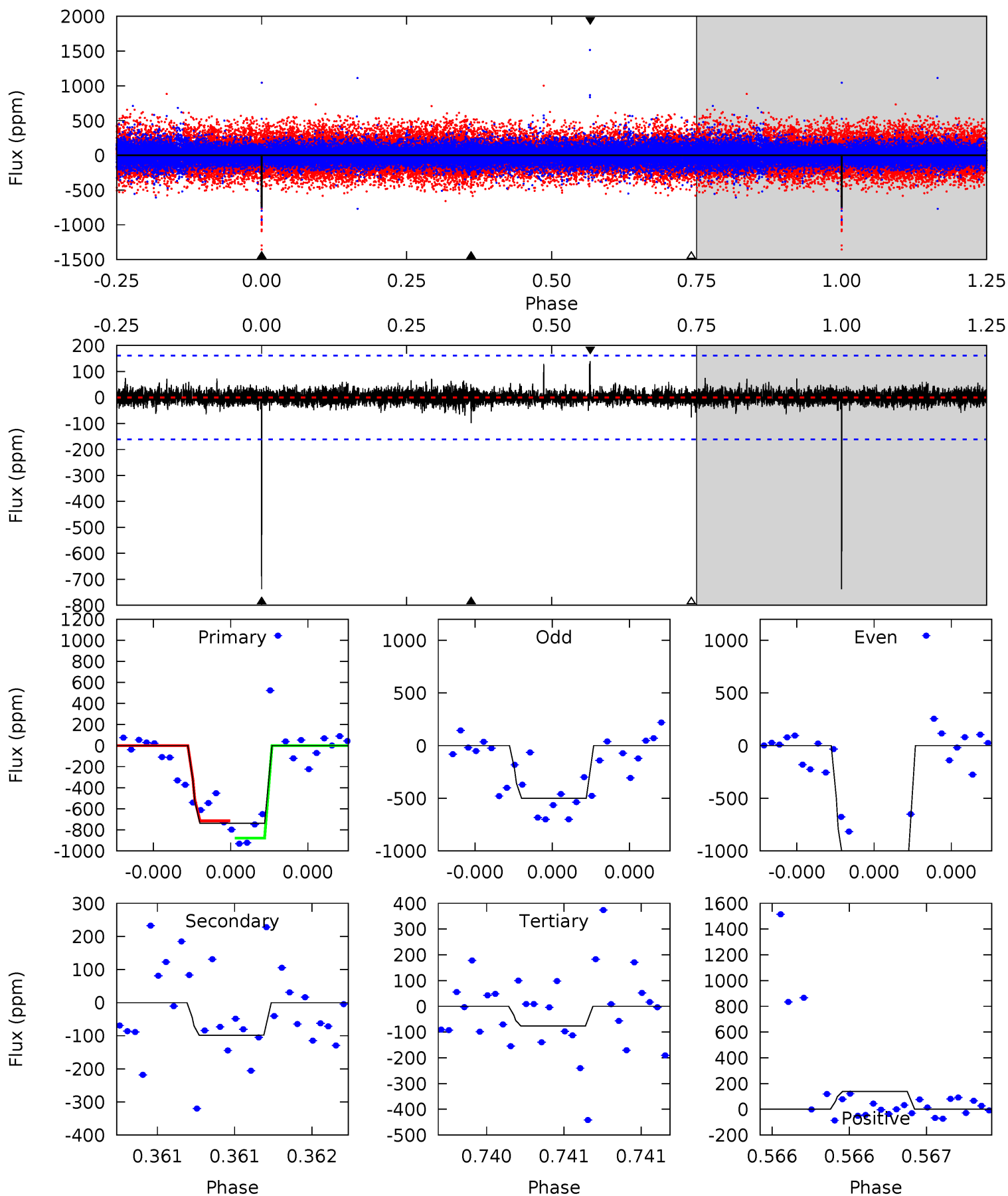
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.33	11.7	11.4	27.6	5.59	3.51	2.86	-6.09	-22.3	0.32	-15.9	1.63	0.97	0.70	0.12



# Alt Model-Shift Uniqueness Test

004457475-01, P = 585.012823 Days, E = 205.732902 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
25.7	3.43	2.66	4.86	5.62	3.55	0.52	23.1	20.9	0.77	-1.43	10.5	1.20	0.16	2.71



### Stellar Parameters For KIC 004457475

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5300^{+159}_{-143}$	$4.470^{+0.112}_{-0.182}$	$-0.160^{+0.300}_{-0.300}$	$0.849^{+0.160}_{-0.120}$	$0.776^{+0.115}_{-0.057}$	$1.786^{+0.932}_{-0.762}$
	+3%/-3%	+3%/-4%	+188%/-188%	+19%/-14%	+15%/-7%	+52%/-43%
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 004457475-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-861 \pm 73$	$4.73^{+4.31}_{-2.99}$	$271^{+16}_{-13}$	$4272^{+2416}_{-833}$	$34221^{+215172}_{-25069}$
Alt.	$-98 \pm 29$	$4.88^{+4.84}_{-3.28}$	$272^{+16}_{-14}$	$2967^{+1278}_{-495}$	$3570^{+29296}_{-2712}$

$T_{max}$  = 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  $A_{obs} \gg 1.0$

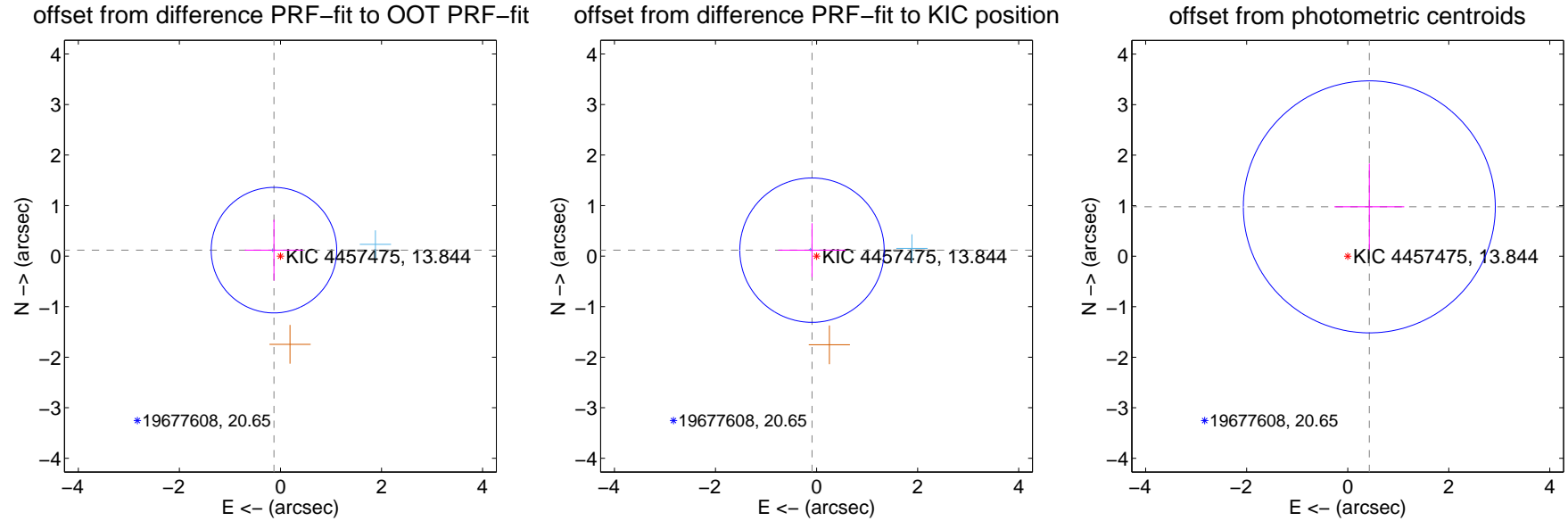
## DV Centroid Data

Supplemental centroid analysis for 004457475-01. Kepler magnitude: 13.84. Transit SNR 5.90

There are 2 quarters with good PRF difference image offsets

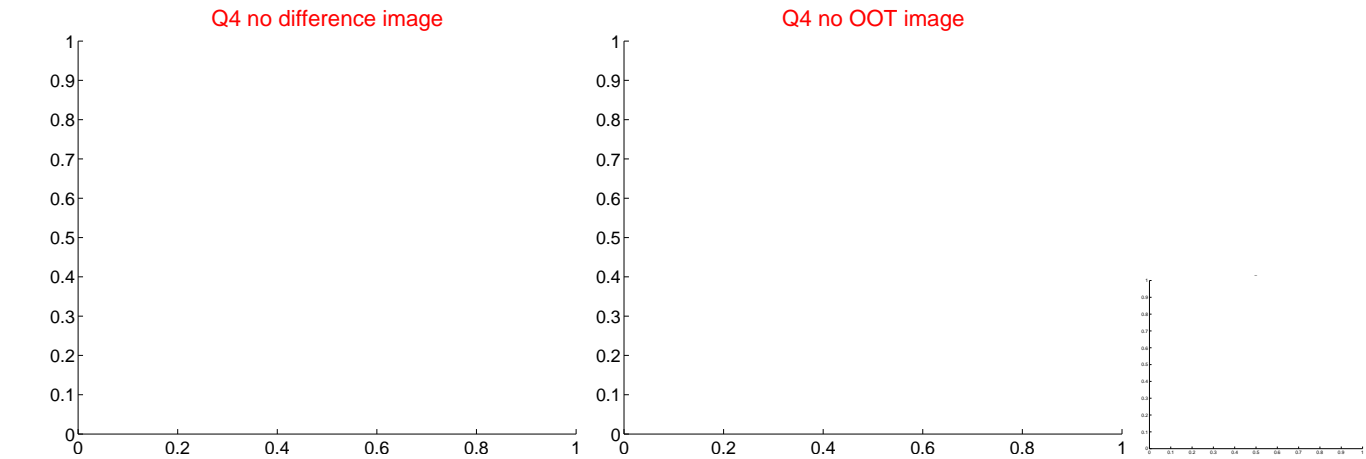
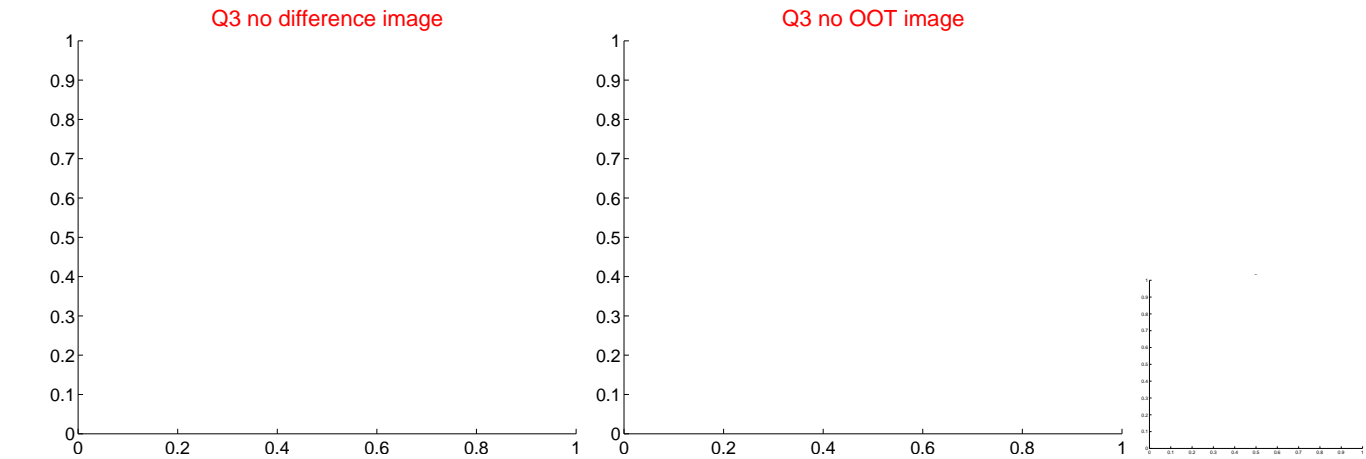
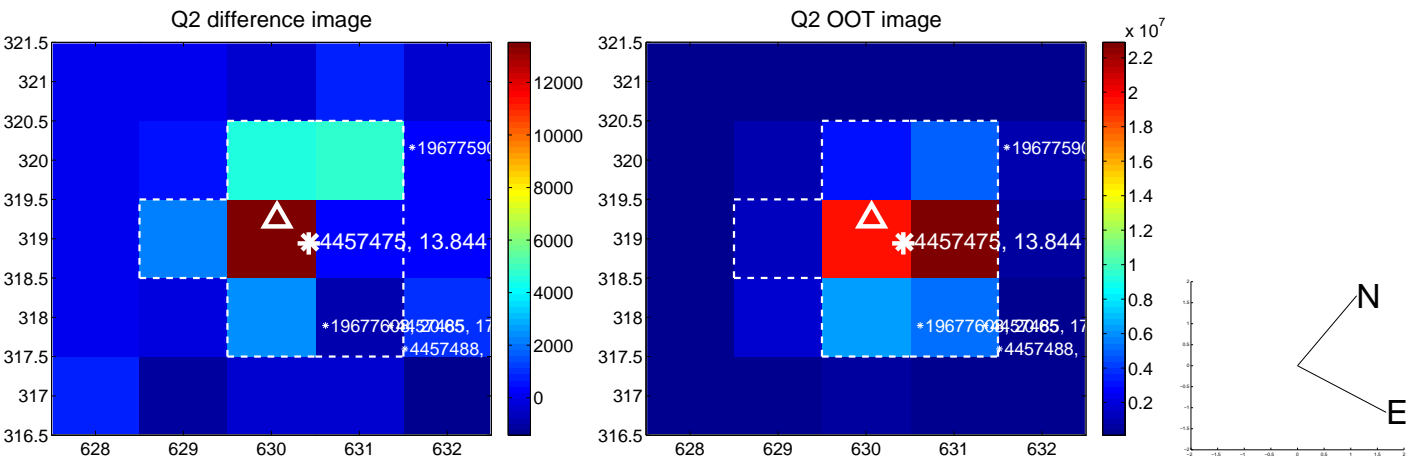
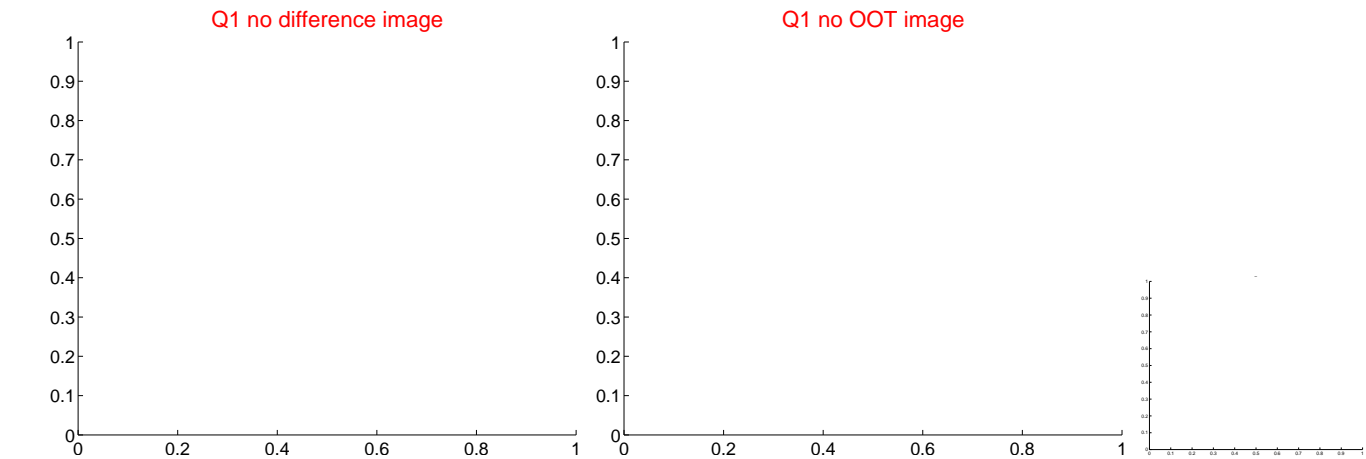
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.175 \pm 0.414$	0.42	$0.129 \pm 0.576$	$0.118 \pm 0.602$
PRF-fit source offset from KIC position	$0.149 \pm 0.476$	0.31	$0.091 \pm 0.667$	$0.118 \pm 0.531$
photometric centroid source offset	$1.07 \pm 0.83$	1.28	$-0.43 \pm 0.69$	$0.98 \pm 0.86$

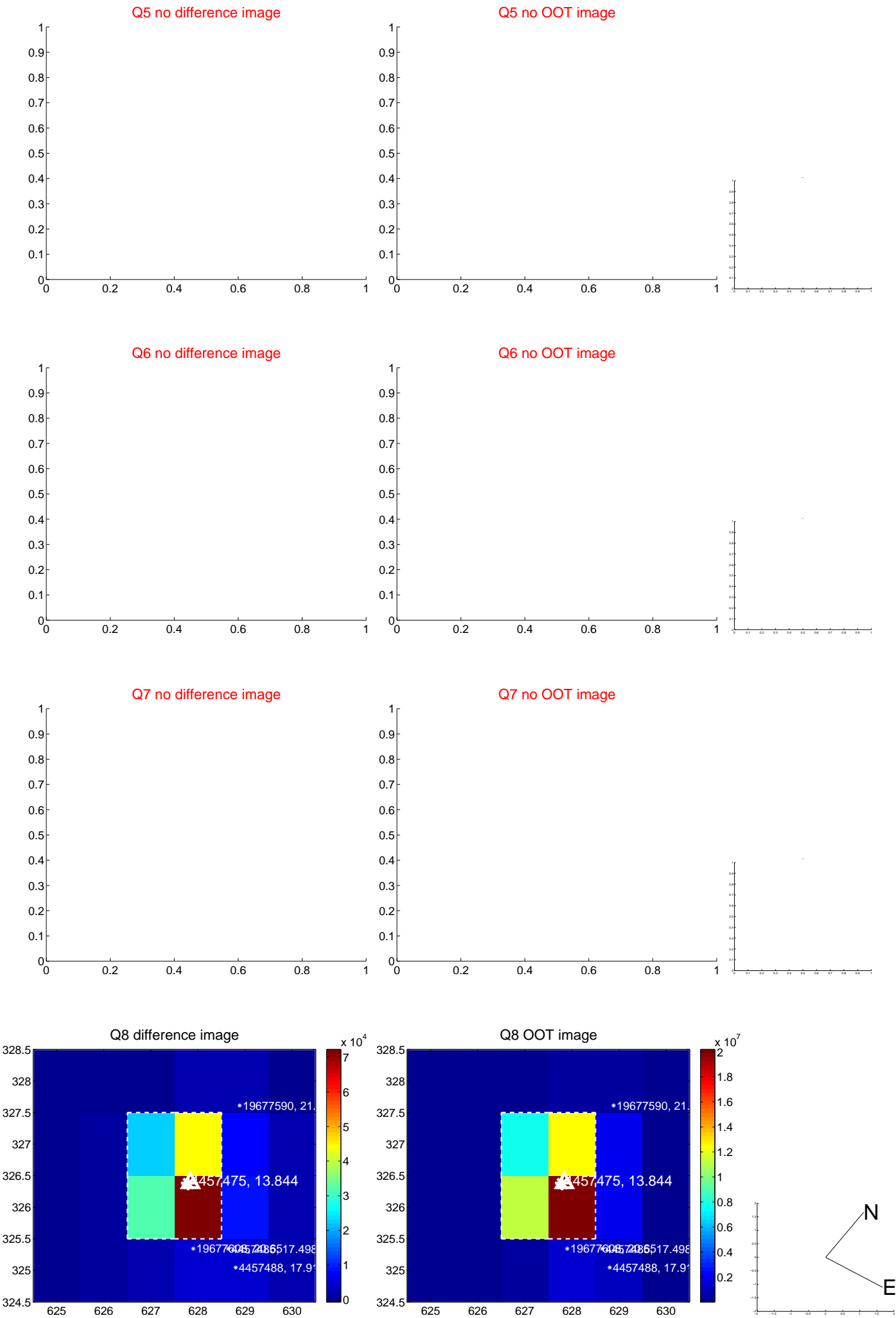


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

Q13 no difference image



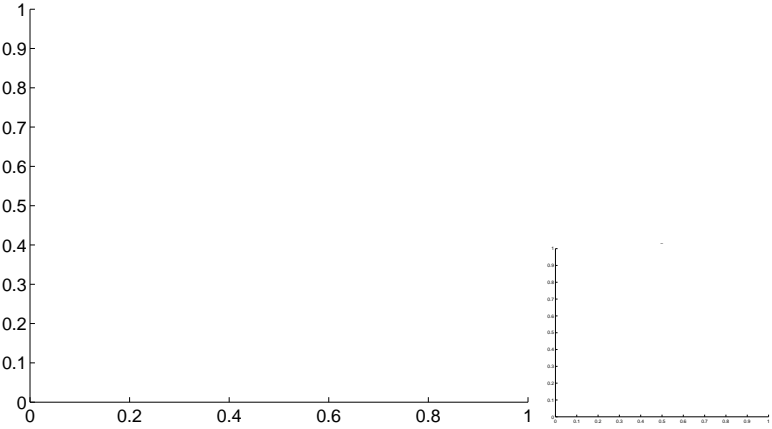
Q13 no OOT image



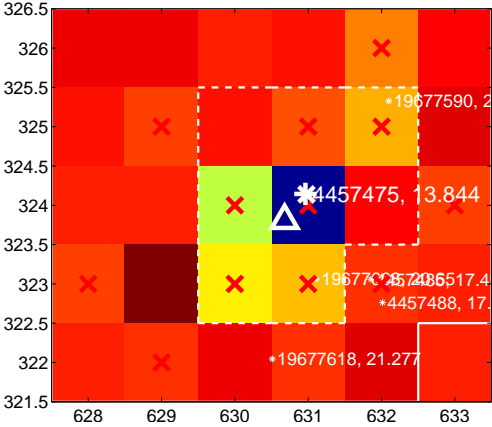
Q14 no difference image



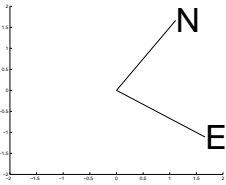
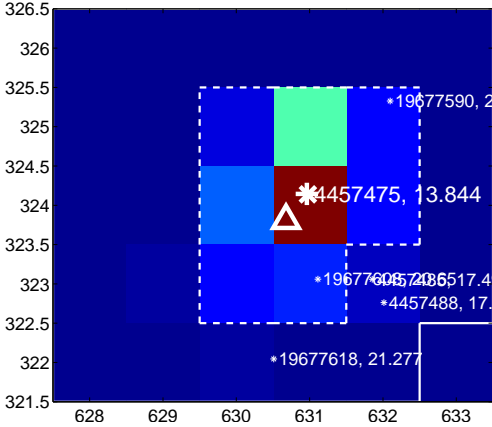
Q14 no OOT image



Q15 difference image. Poor Quality



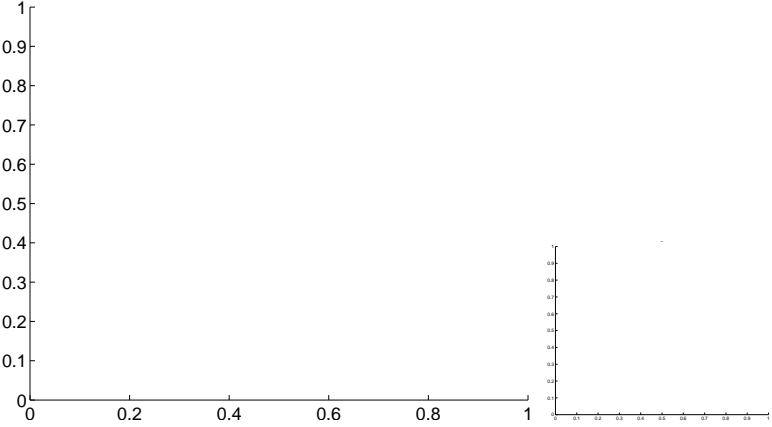
Q15 OOT image



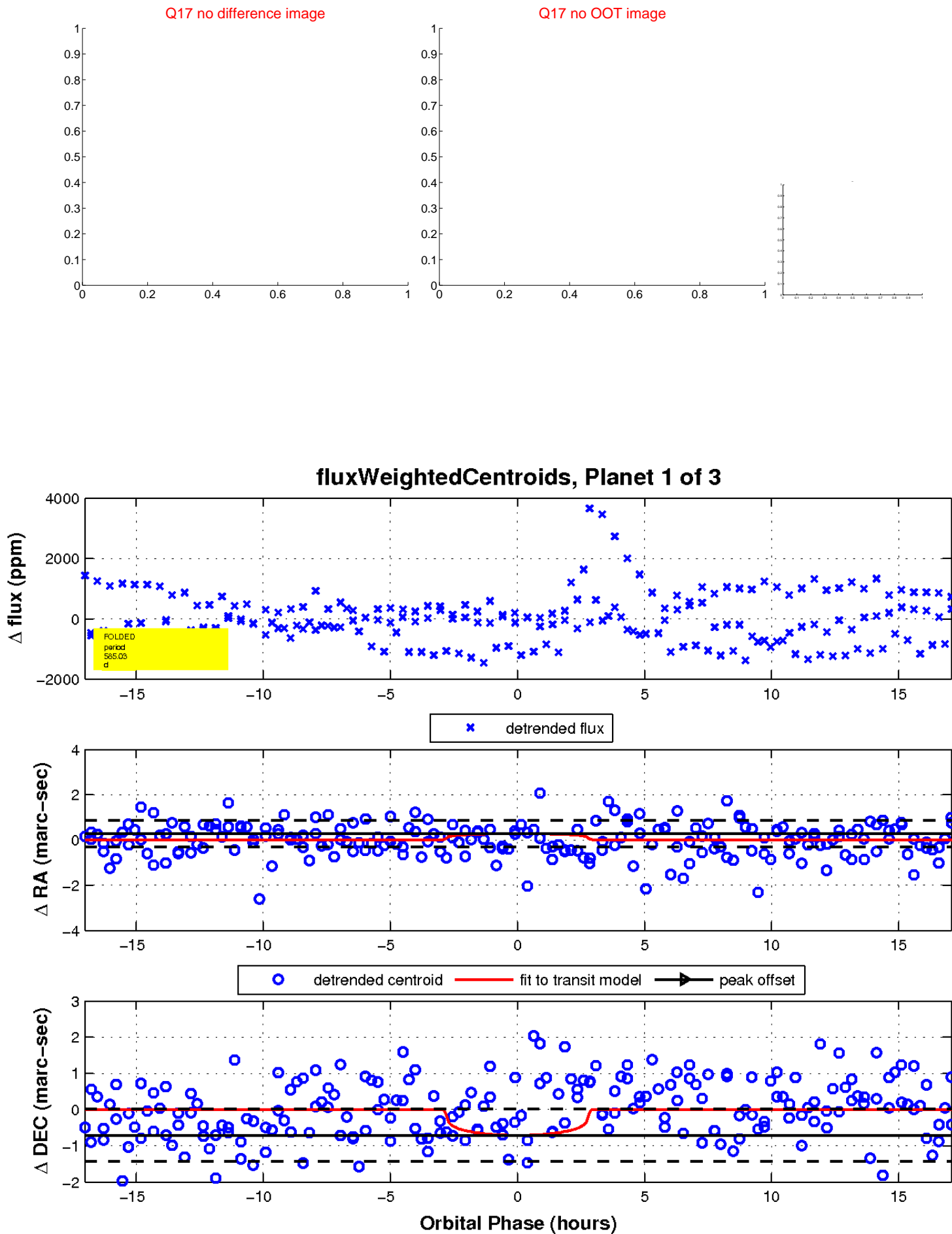
Q16 no difference image



Q16 no OOT image

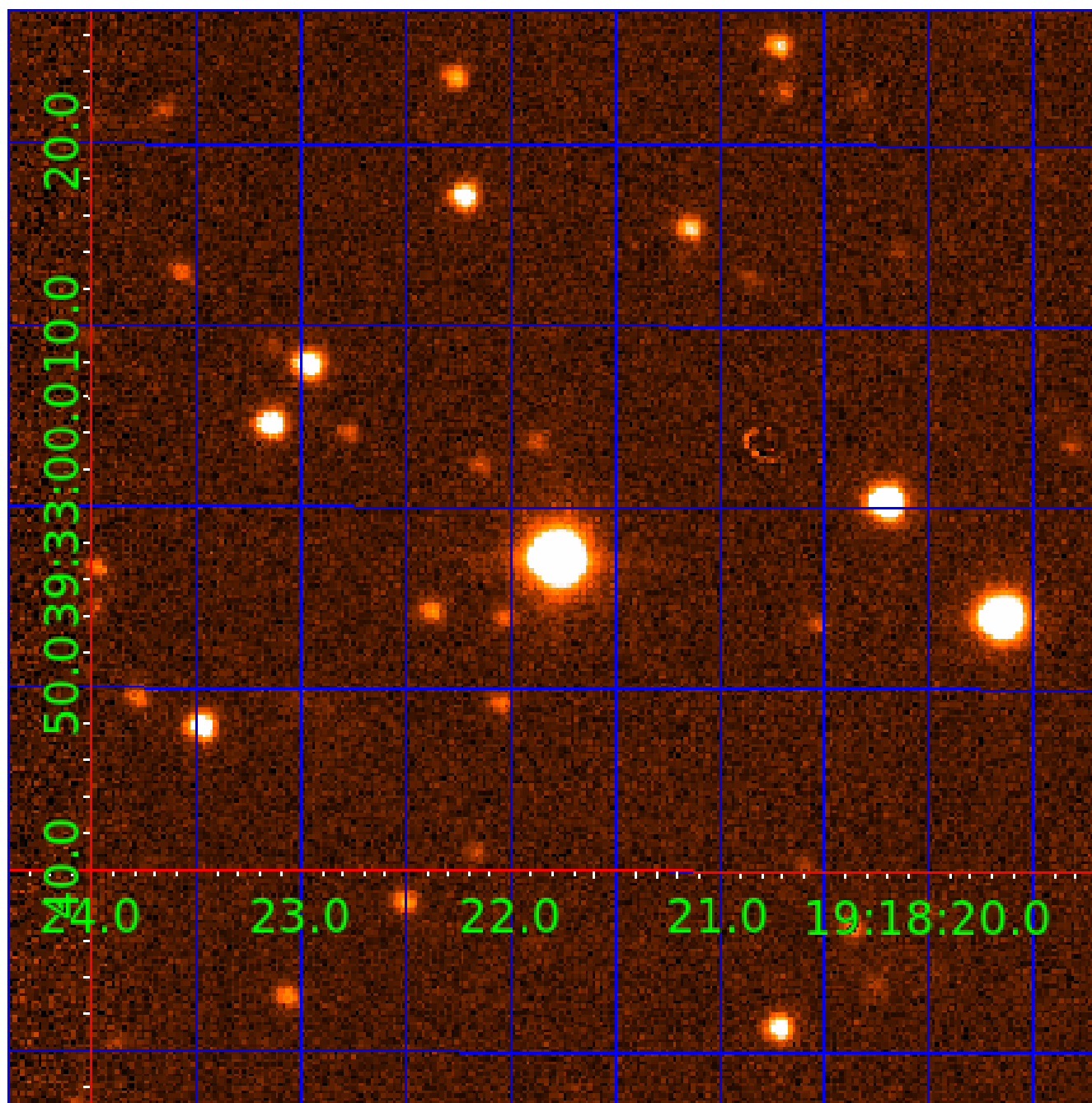


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 004457475

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004457475-01	OBS	No	585.028762	205.733576	697.8	5.735	12.3	5.9	0.85	5300	2.21	0.32
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## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004457475-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004457475-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004457475-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—CENT_FEW_DIFFS

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

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

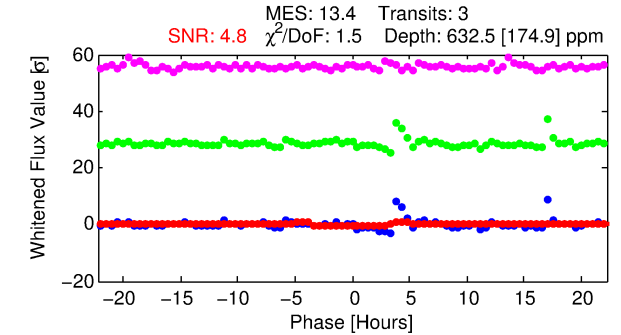
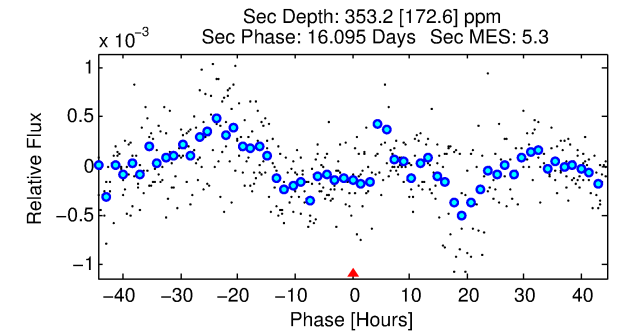
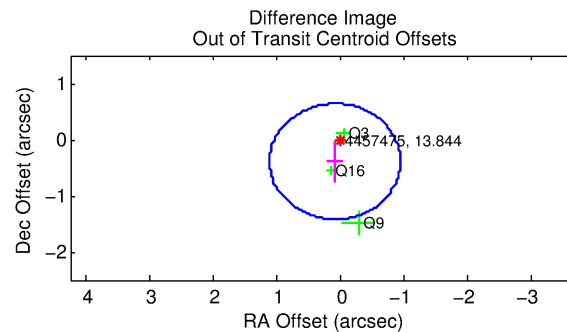
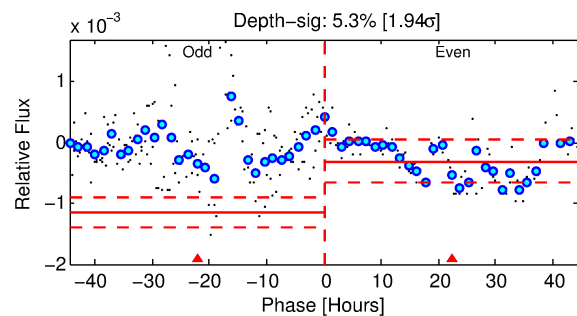
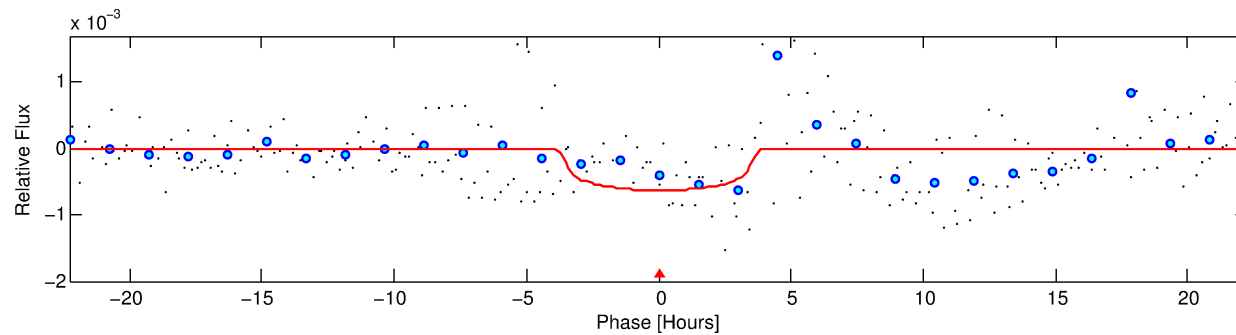
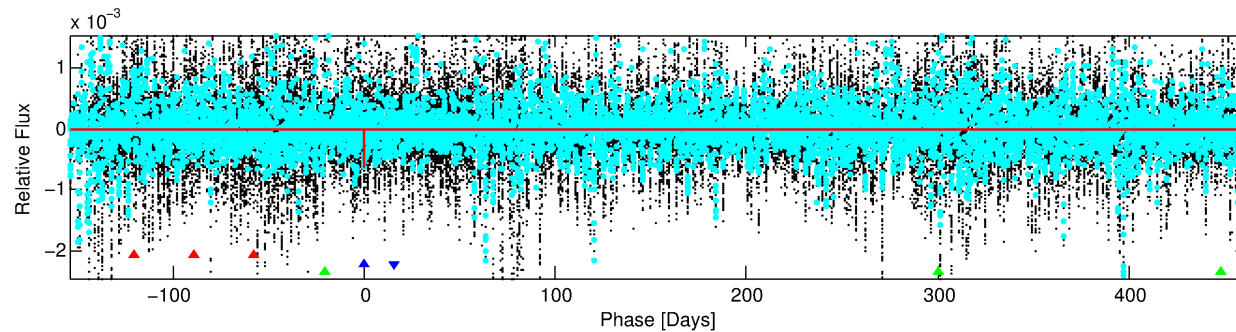
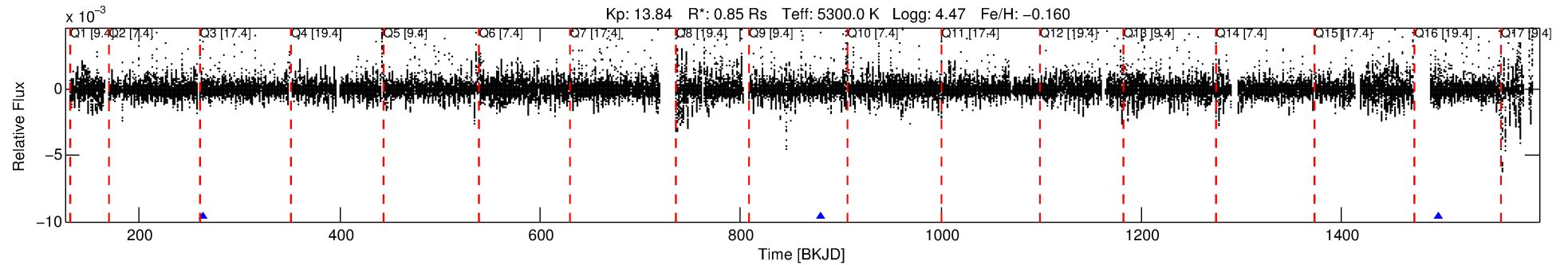
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004457475-02

No Significant Match Found

# DV One-Page Summary

KIC: 4457475 Candidate: 2 of 3 Period: 616.289 d



## DV Fit Results:

Period = 616.28899 [0.00925] d  
Epoch = 263.7309 [0.0130] BKJD  
Rp/R\* = 0.0242 [0.0249]  
a/R\* = 504.88 [1977.17]  
b = 0.64 [3.60]  
Seff = 0.30 [0.10]  
Teq = 189 [16] K  
Rp = 2.24 [2.34] Re  
a = 1.3026 [0.2447] AU  
Ag = 65854.30 [141002.06] [0.47 $\sigma$ ]  
Teffp = 4675 [2481] K [1.81 $\sigma$ ]

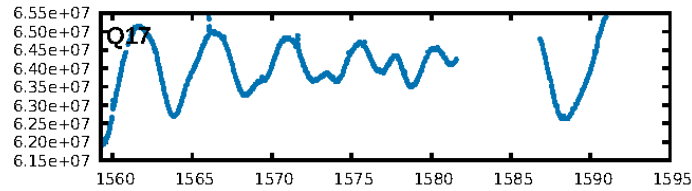
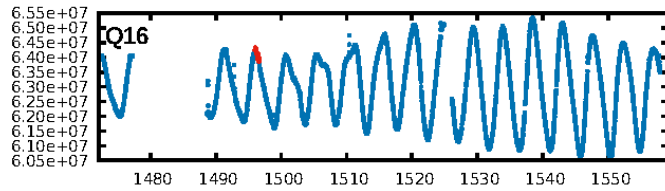
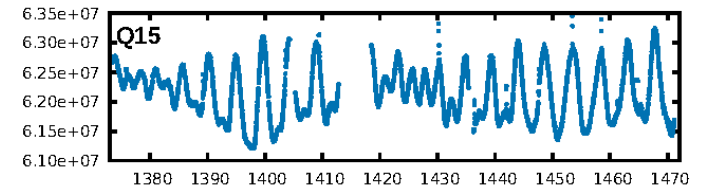
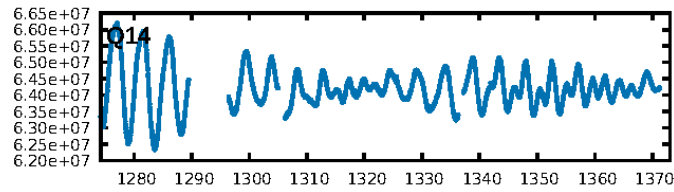
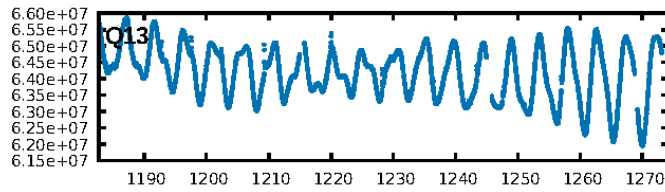
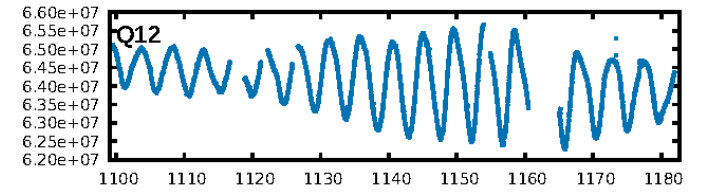
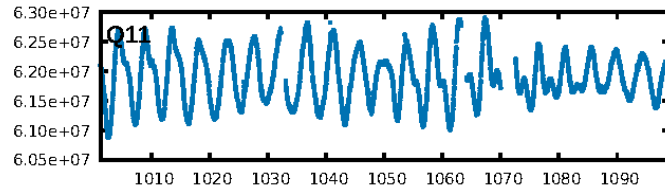
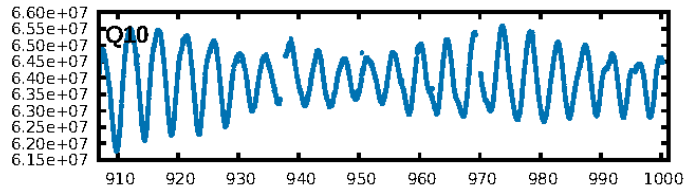
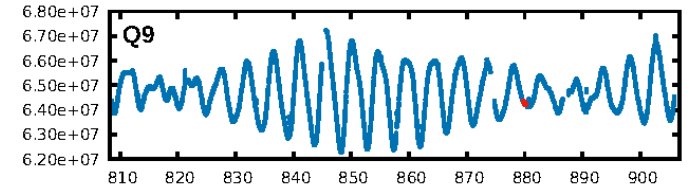
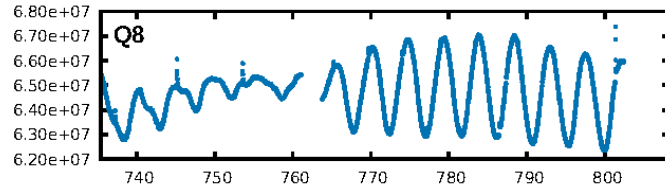
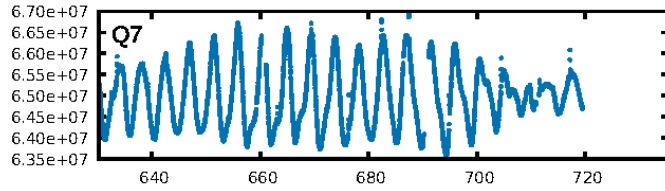
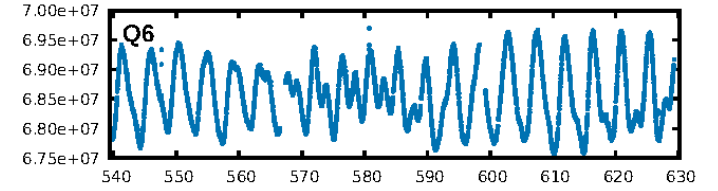
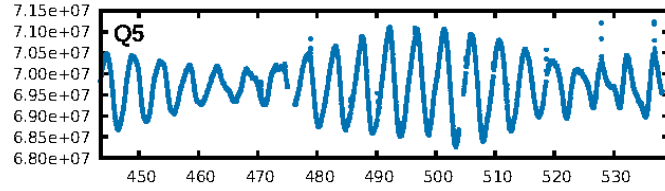
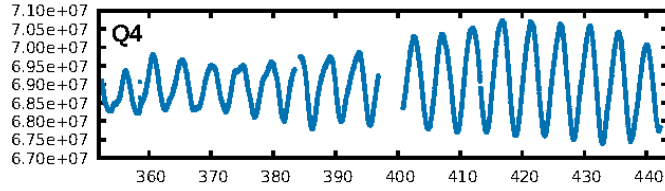
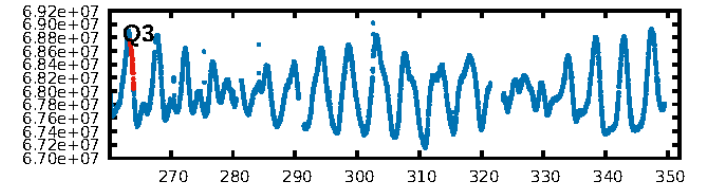
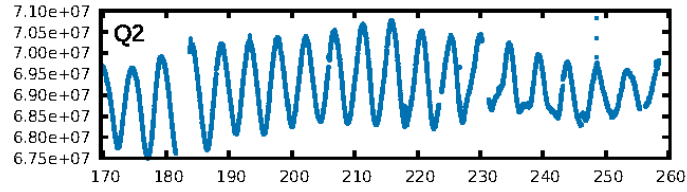
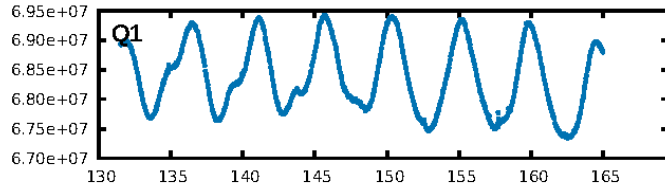
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [79.98 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 5.5%  
ModelChiSquareGof-sig: 24.1%  
**Bootstrap-pfa: 3.12e-10**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.311  
**Centroid-sig: 0.1%**  
Centroid-so: 1.742 arcsec [1.98 $\sigma$ ]  
OotOffset-rm: 0.400 arcsec [1.17 $\sigma$ ]  
OotOffset-st: 0/1/1/1 [3]  
KicOffset-rm: 0.431 arcsec [1.21 $\sigma$ ]  
KicOffset-st: 0/1/1/1 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [3/3]

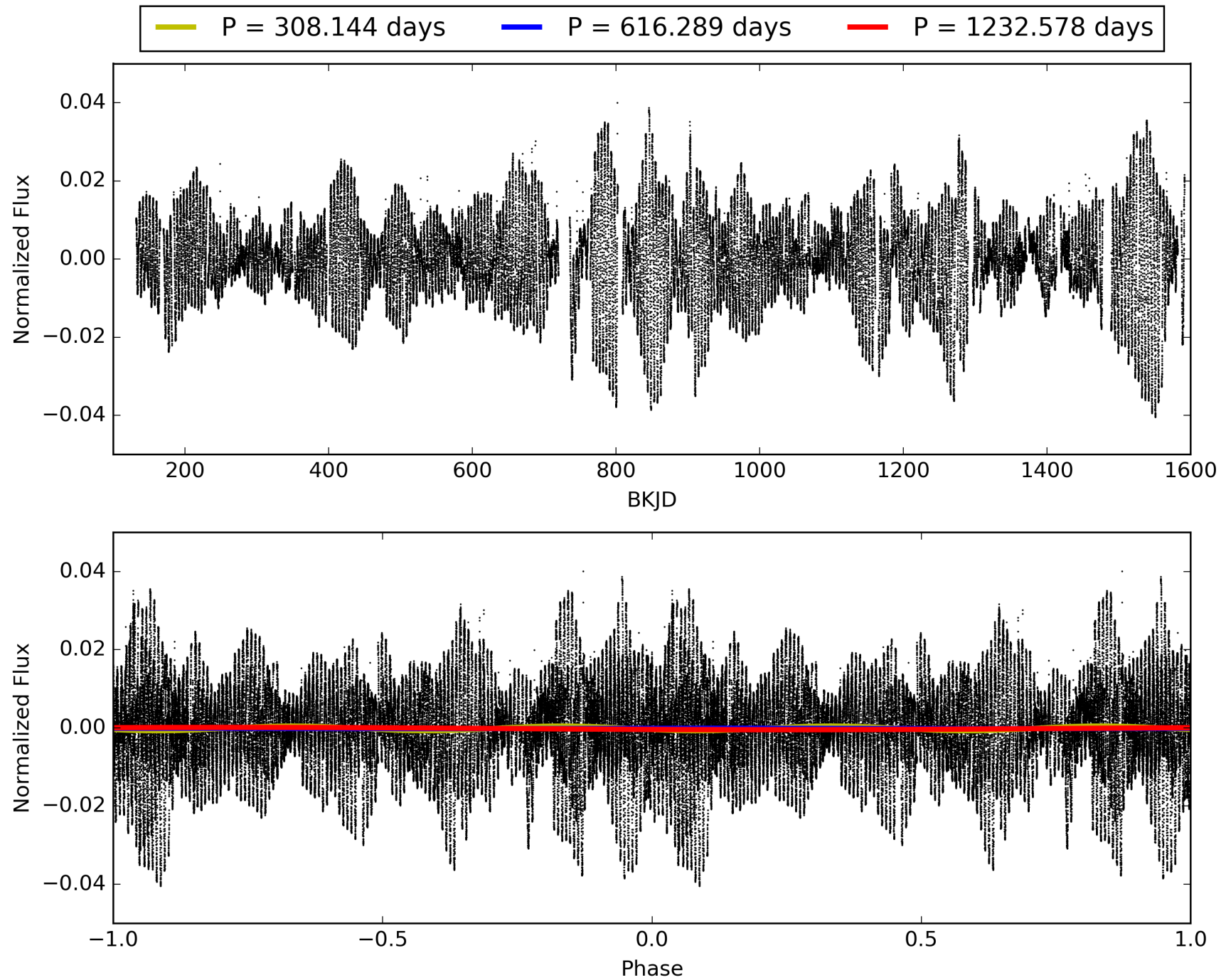
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 15:43:33 Z

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

# TCE 004457475-02, PDC Light Curves



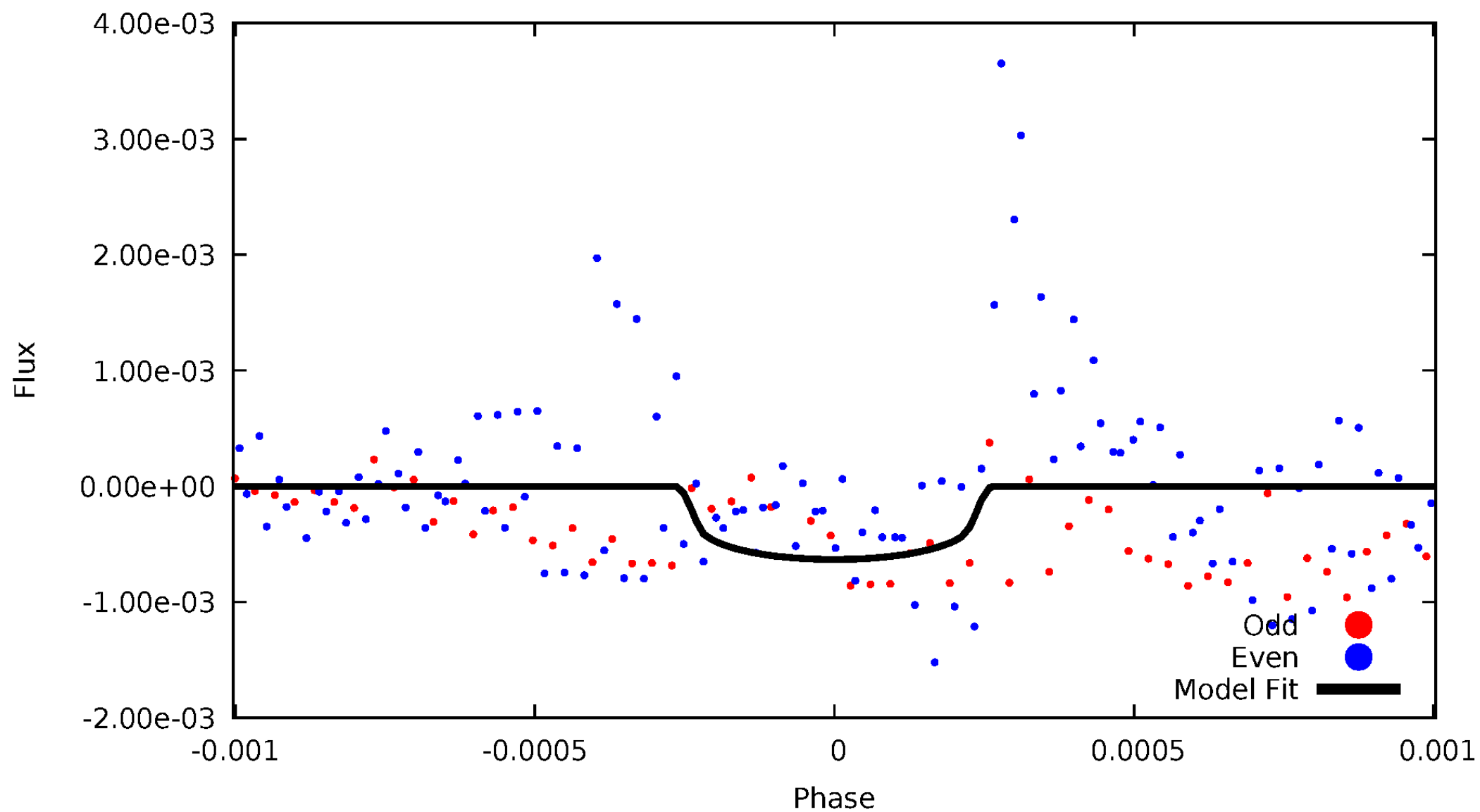
TCE 004457475-02





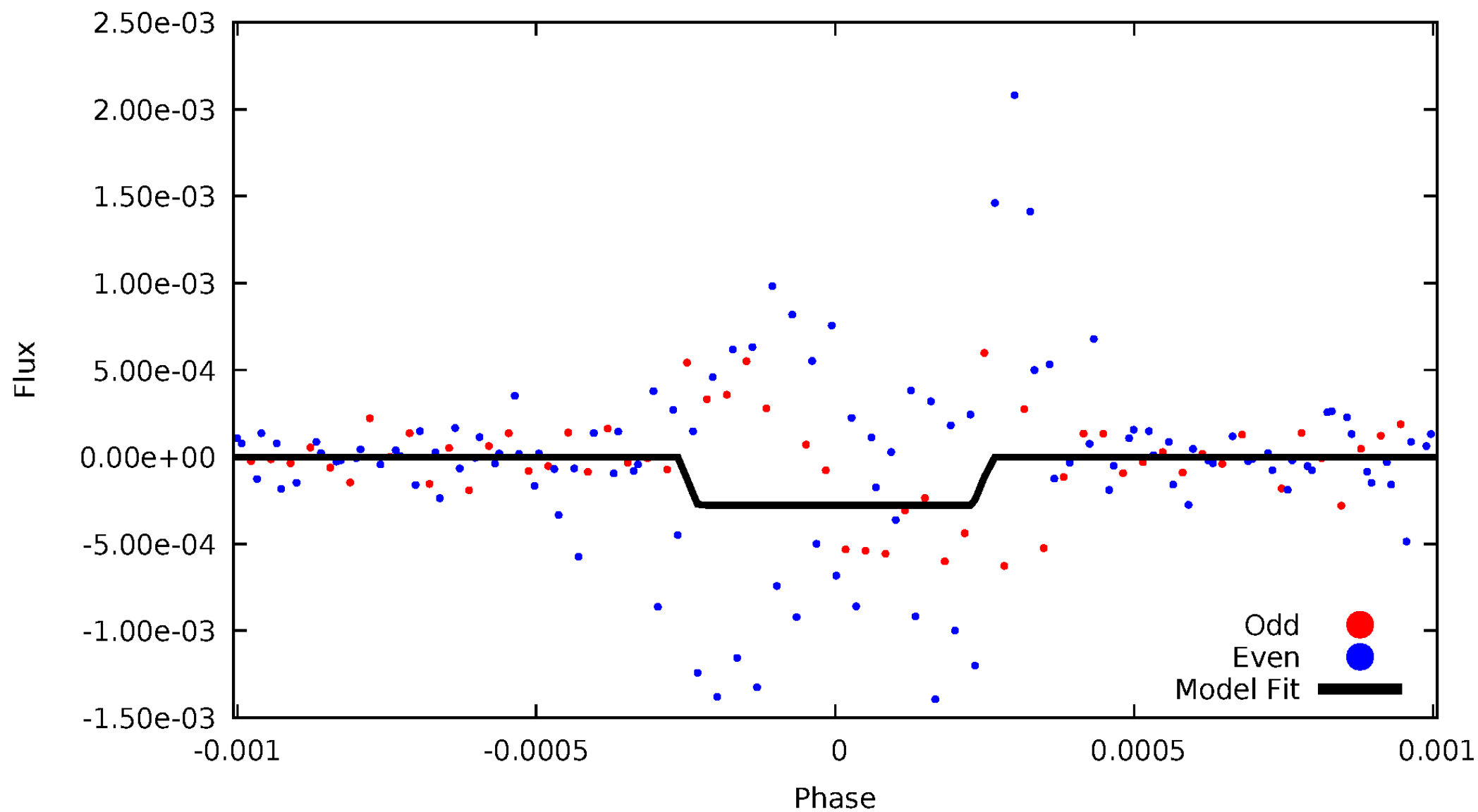
# DV Odd/Even

TCE 004457475-02



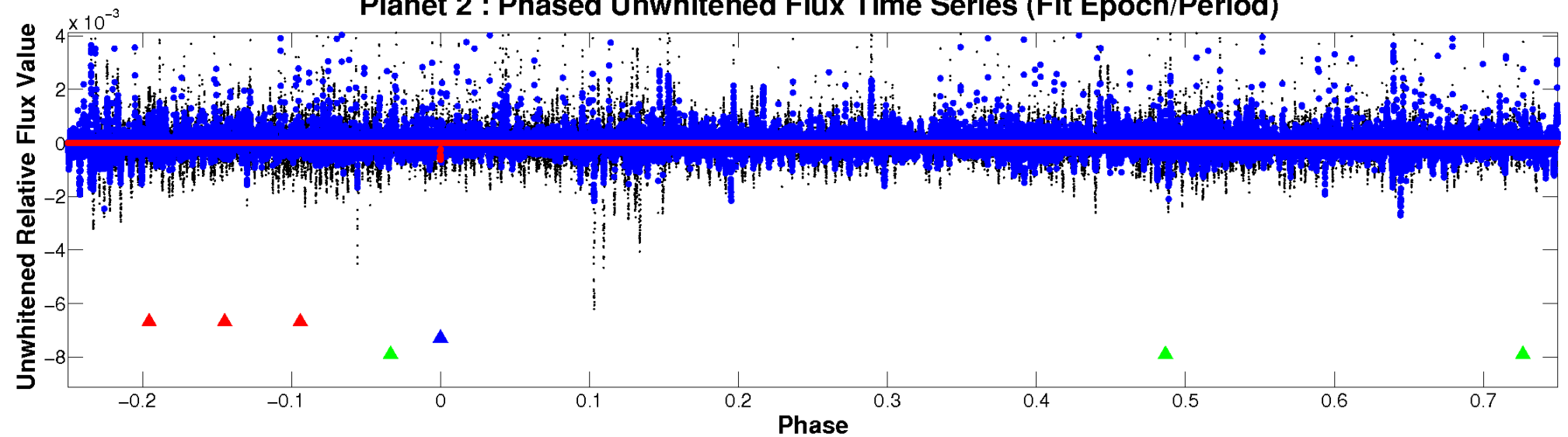
# ALT Odd/Even

TCE 004457475-02

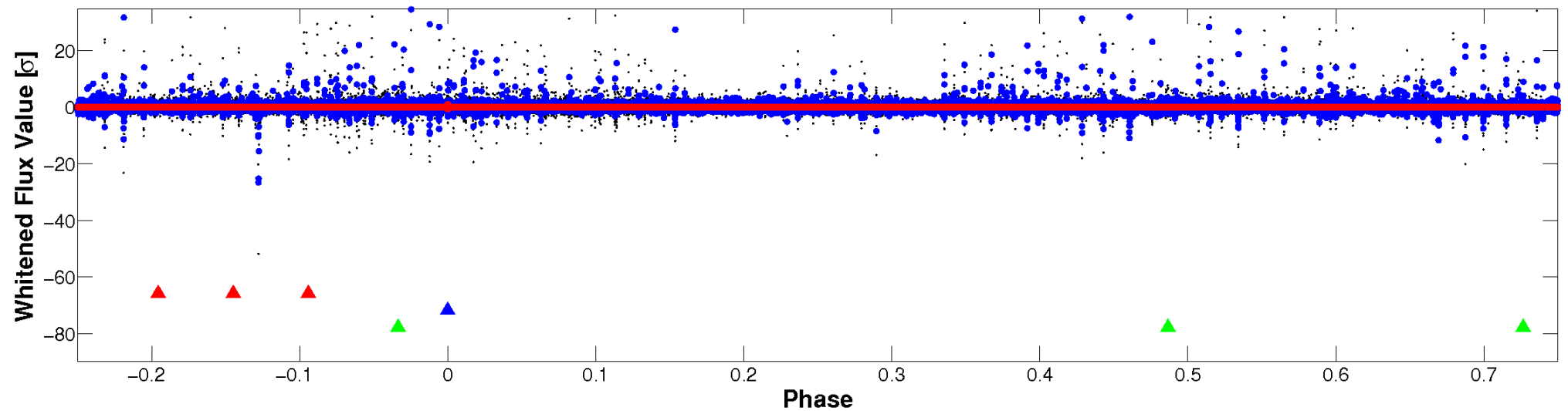


# Non-Whitened Vs. Whitened Light Curve

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

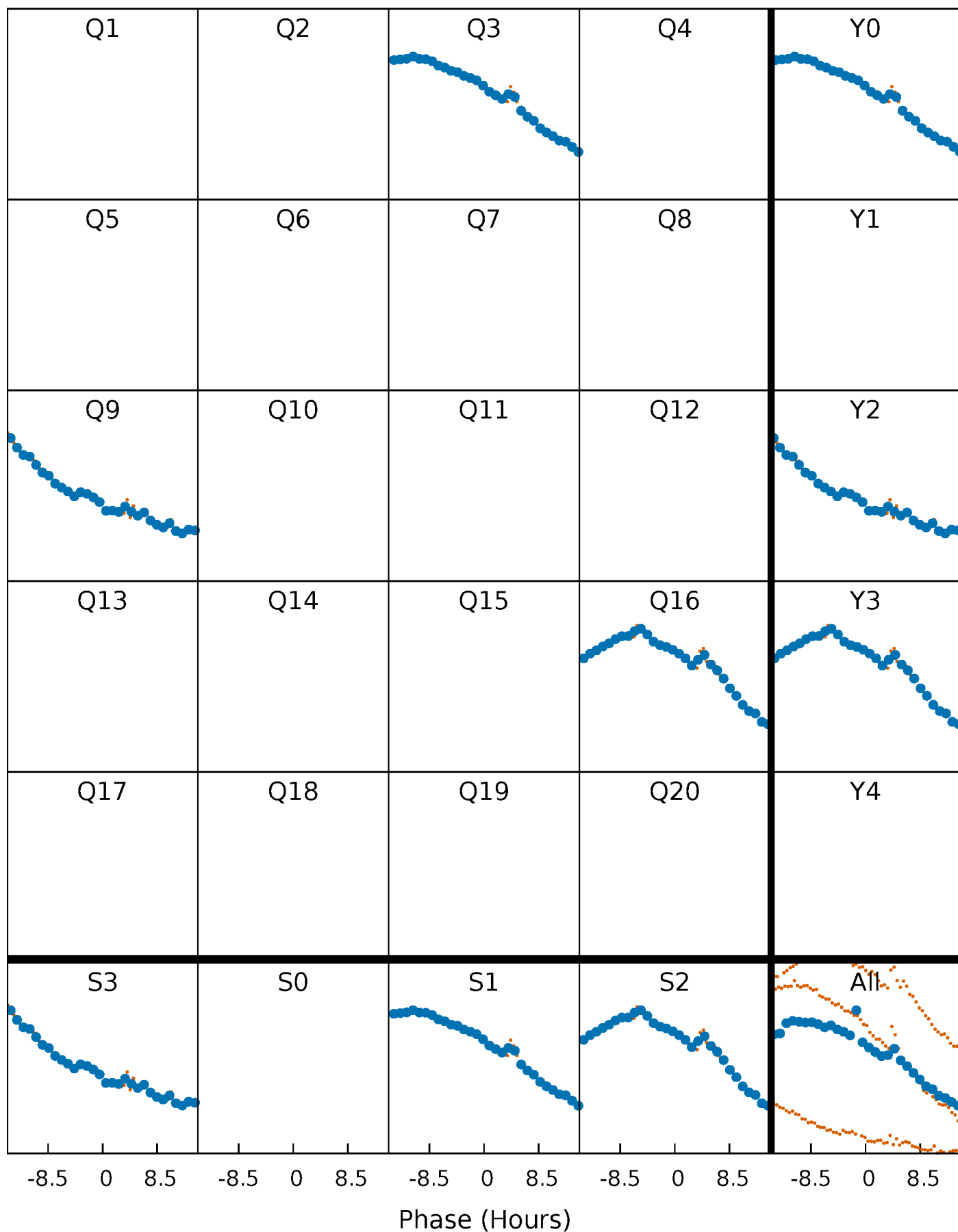


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

TCE 004457475-02 P=616.288985 Days  $T_0=263.730944$  (BKJD)



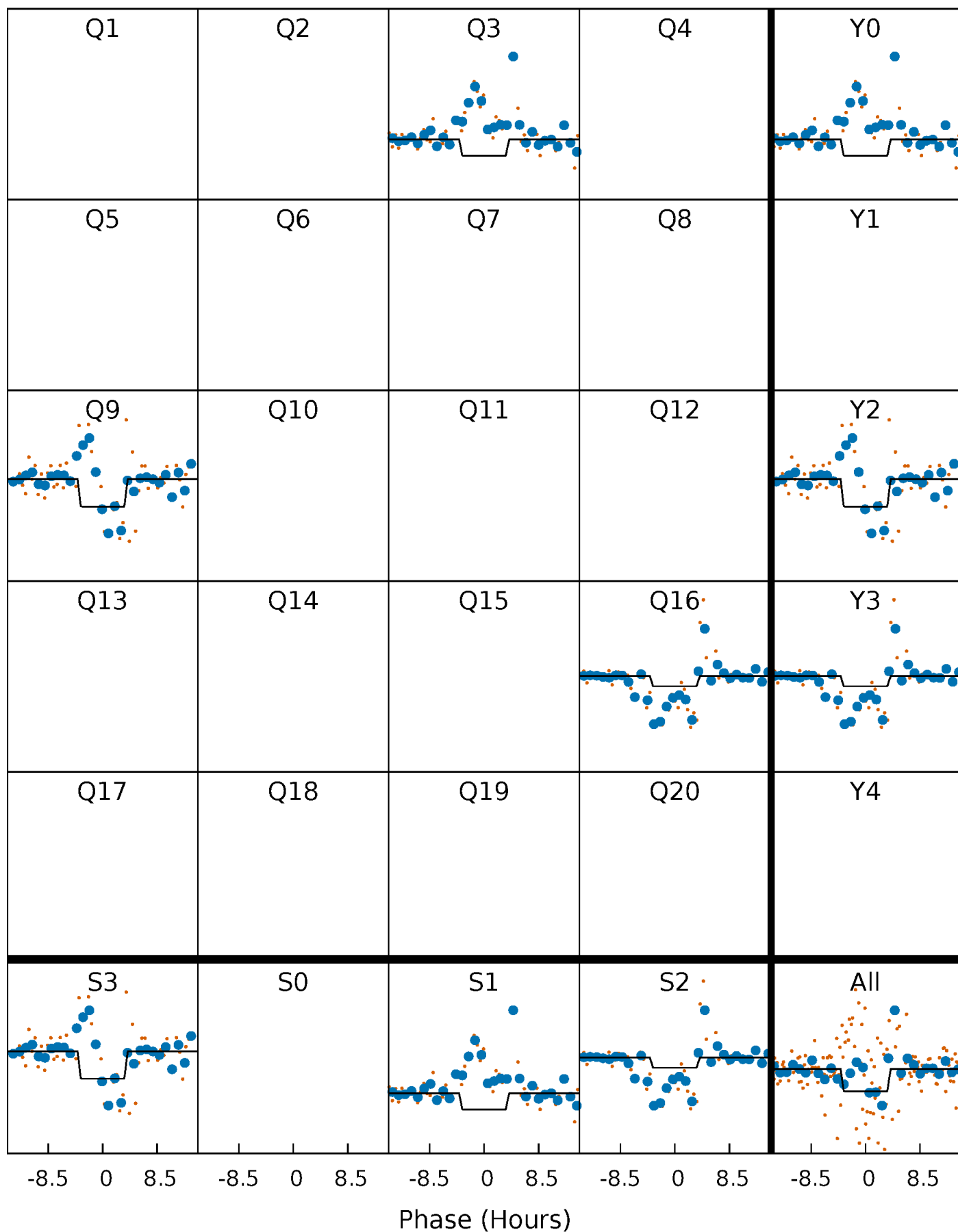
# DV Quarter-Phased Transit Curves

TCE 004457475-02     $P=616.288985$  Days     $T_0=263.730944$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

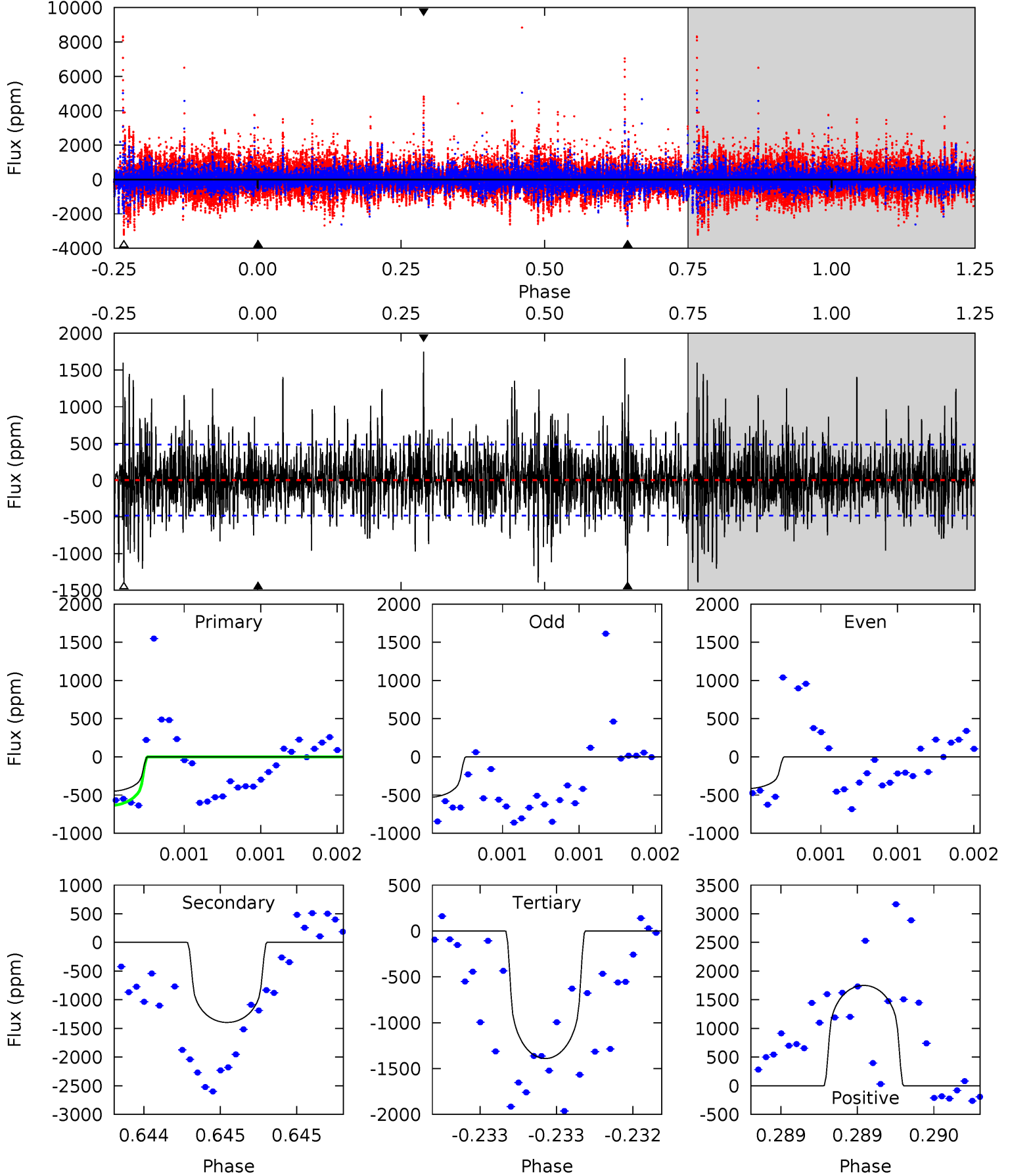
TCE 004457475-02 P=616.282981 Days  $T_0=263.742893$  (BKJD)



# DV Model-Shift Uniqueness Test

004457475-02, P = 616.288985 Days, E = 263.730944 Days

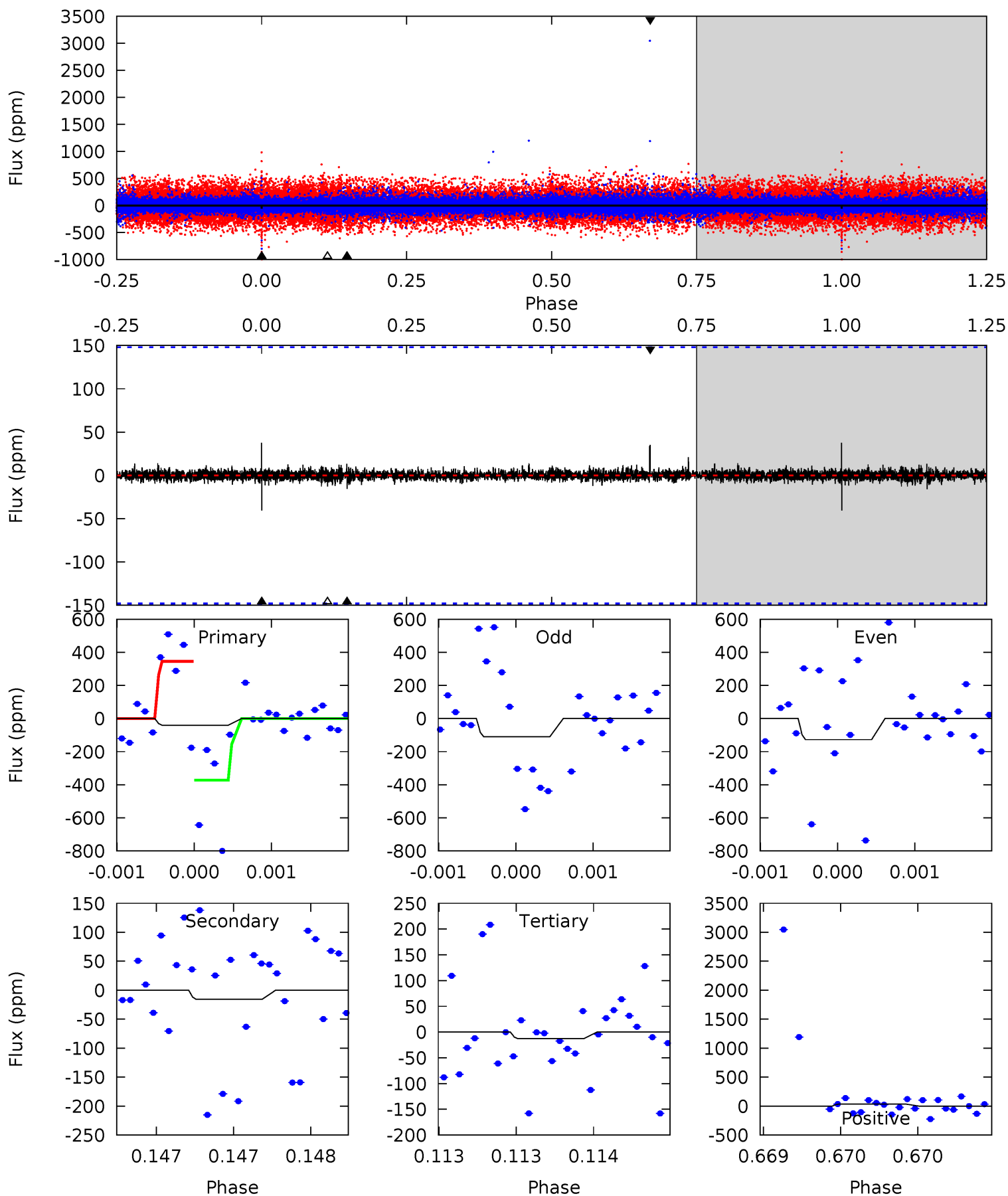
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.23	16.1	16.0	20.2	5.57	3.48	3.66	-10.8	-14.9	0.06	-4.09	0.51	0.86	0.56	2.23



# Alt Model-Shift Uniqueness Test

004457475-02, P = 616.282981 Days, E = 263.742893 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
1.52	0.59	0.48	1.32	5.57	3.47	0.11	1.05	0.21	0.11	-0.73	0.34	2.15	0.48	0.53





### Stellar Parameters For KIC 004457475

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5300^{+159}_{-143}$	$4.470^{+0.112}_{-0.182}$	$-0.160^{+0.300}_{-0.300}$	$0.849^{+0.160}_{-0.120}$	$0.776^{+0.115}_{-0.057}$	$1.786^{+0.932}_{-0.762}$
	+3%/-3%	+3%/-4%	+188%/-188%	+19%/-14%	+15%/-7%	+52%/-43%
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 004457475-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1396 \pm 87$	$2.77^{+2.22}_{-1.75}$	$267^{+16}_{-15}$	$5904^{+4792}_{-1340}$	$170646^{+1082999}_{-117026}$
Alt.	$-16 \pm 27$	$2.35^{+2.15}_{-1.54}$	$268^{+16}_{-15}$	$2716^{+1144}_{-5312}$	$1947^{+19534}_{-3336}$

$T_{max}$  = 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

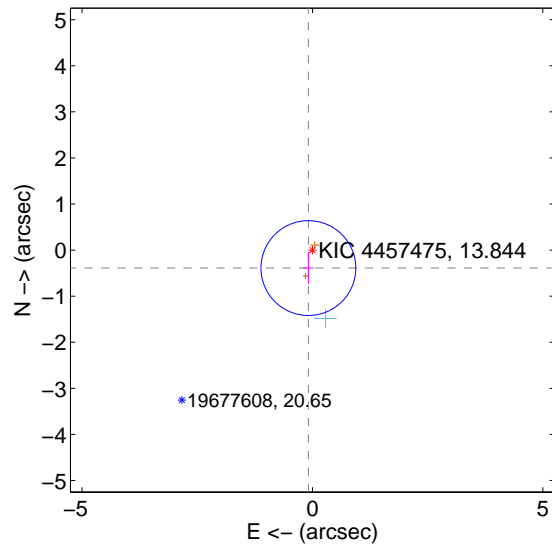
Supplemental centroid analysis for 004457475-02. Kepler magnitude: 13.84. Transit SNR 4.79

There are 1 quarters with good PRF difference image offsets

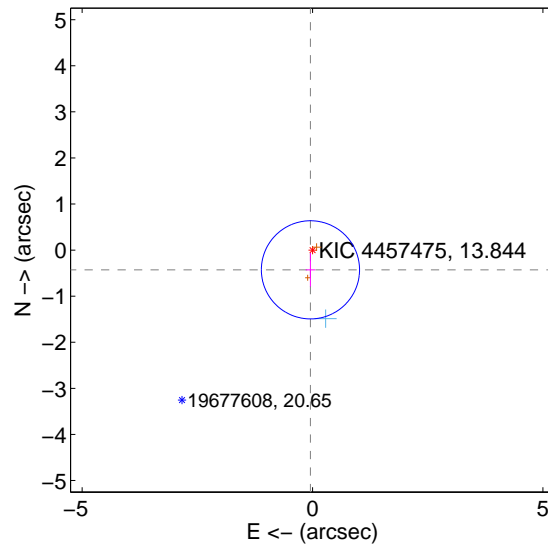
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.400 \pm 0.343$	1.17	$0.088 \pm 0.117$	$-0.390 \pm 0.351$
PRF-fit source offset from KIC position	$0.431 \pm 0.355$	1.21	$0.045 \pm 0.103$	$-0.428 \pm 0.363$
photometric centroid source offset	$1.74 \pm 0.88$	1.98	$0.69 \pm 0.87$	$-1.60 \pm 0.88$

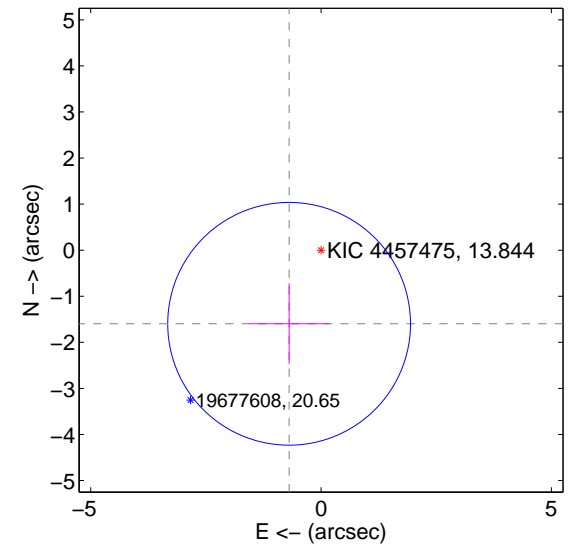
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

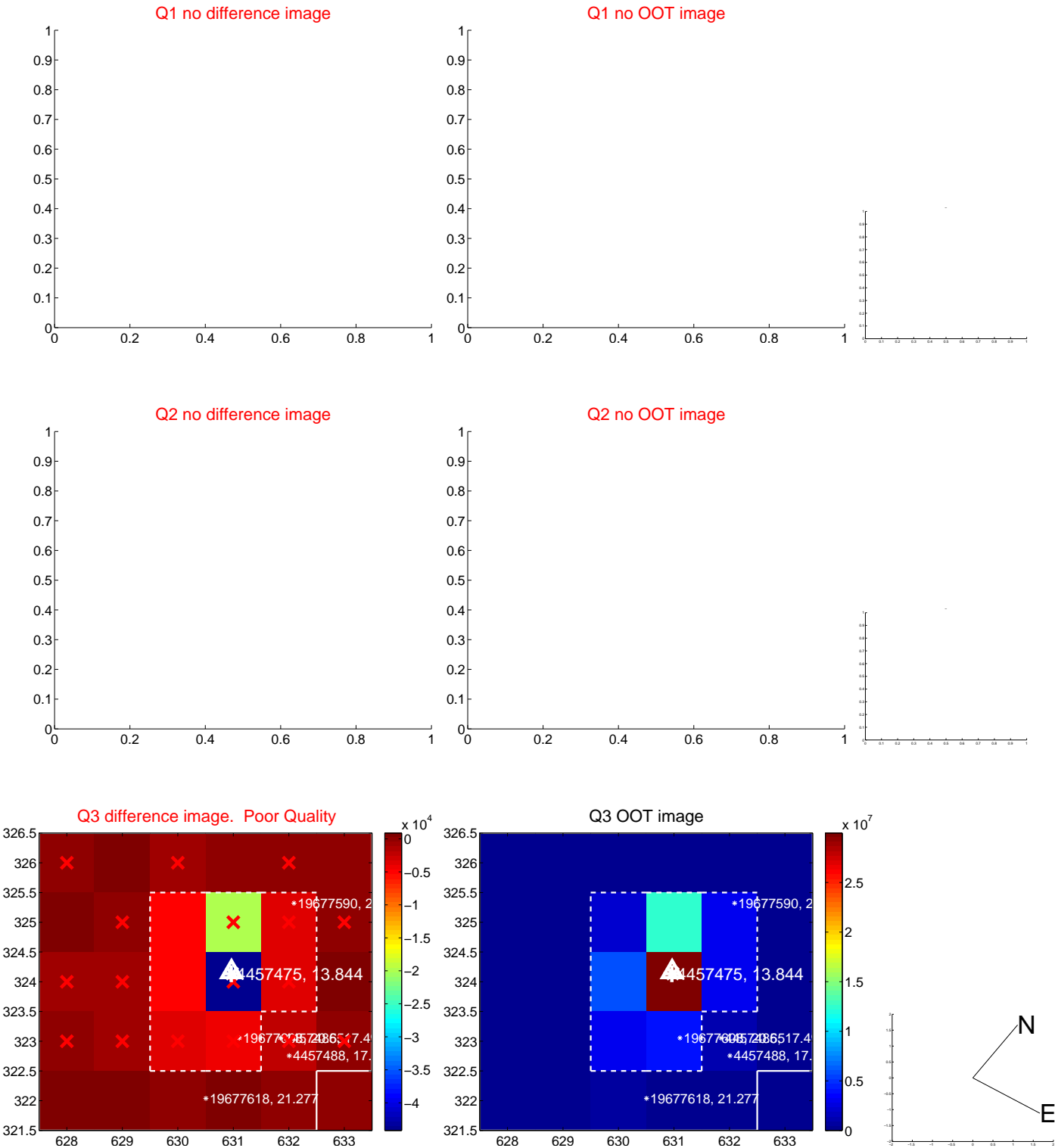


offset from photometric centroids



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.

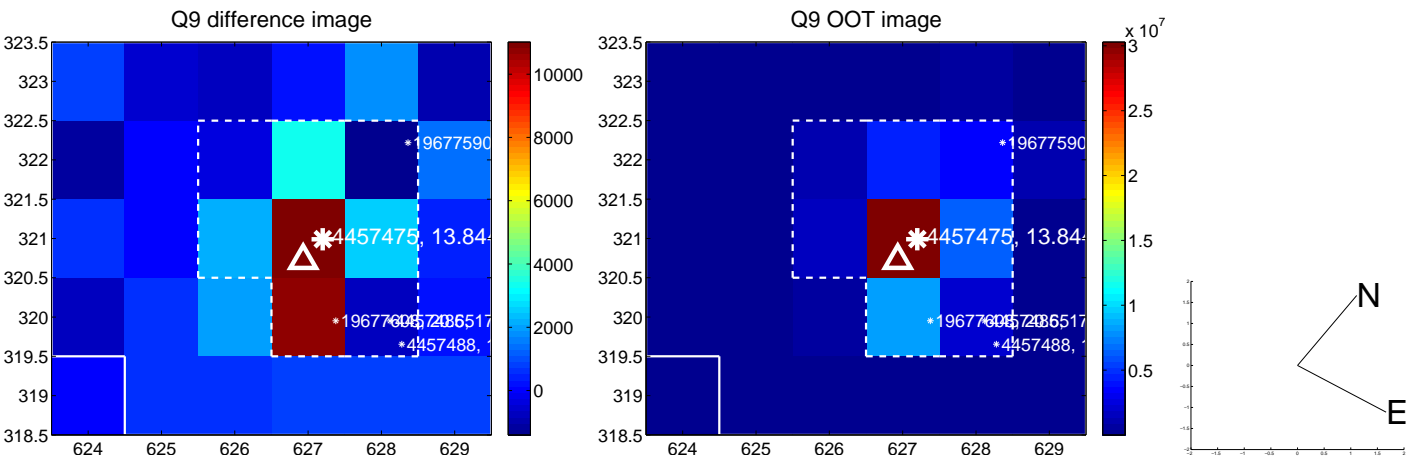
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



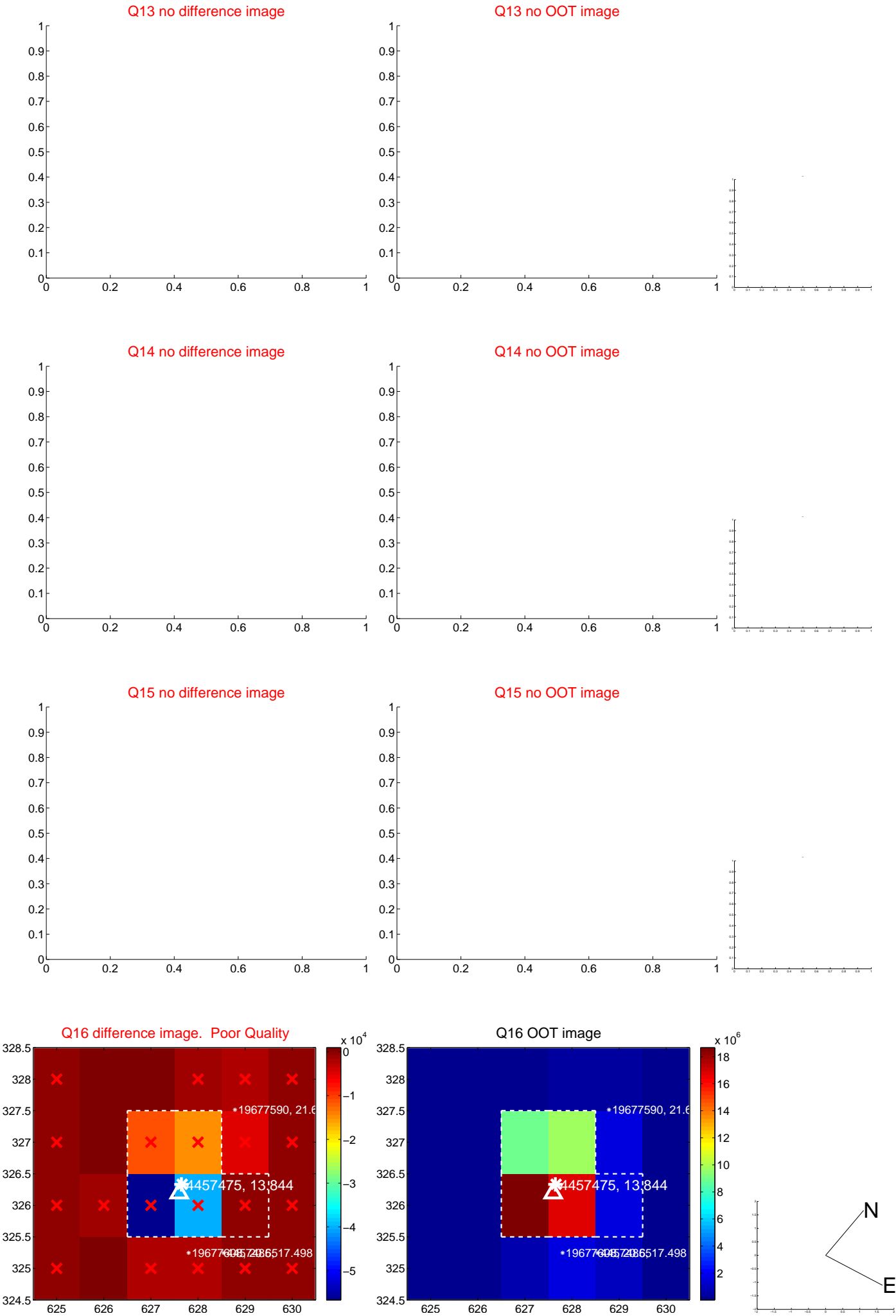
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



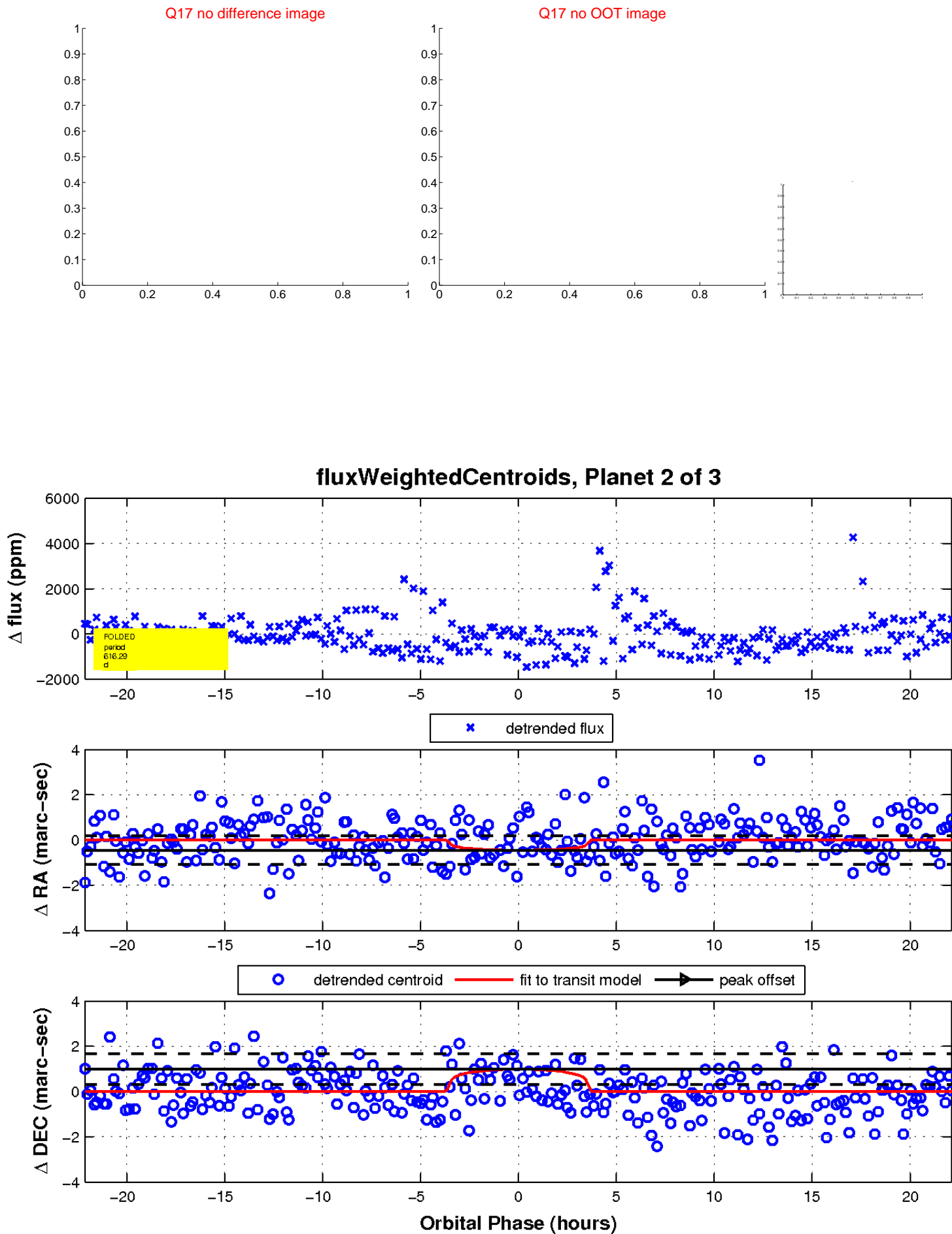
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

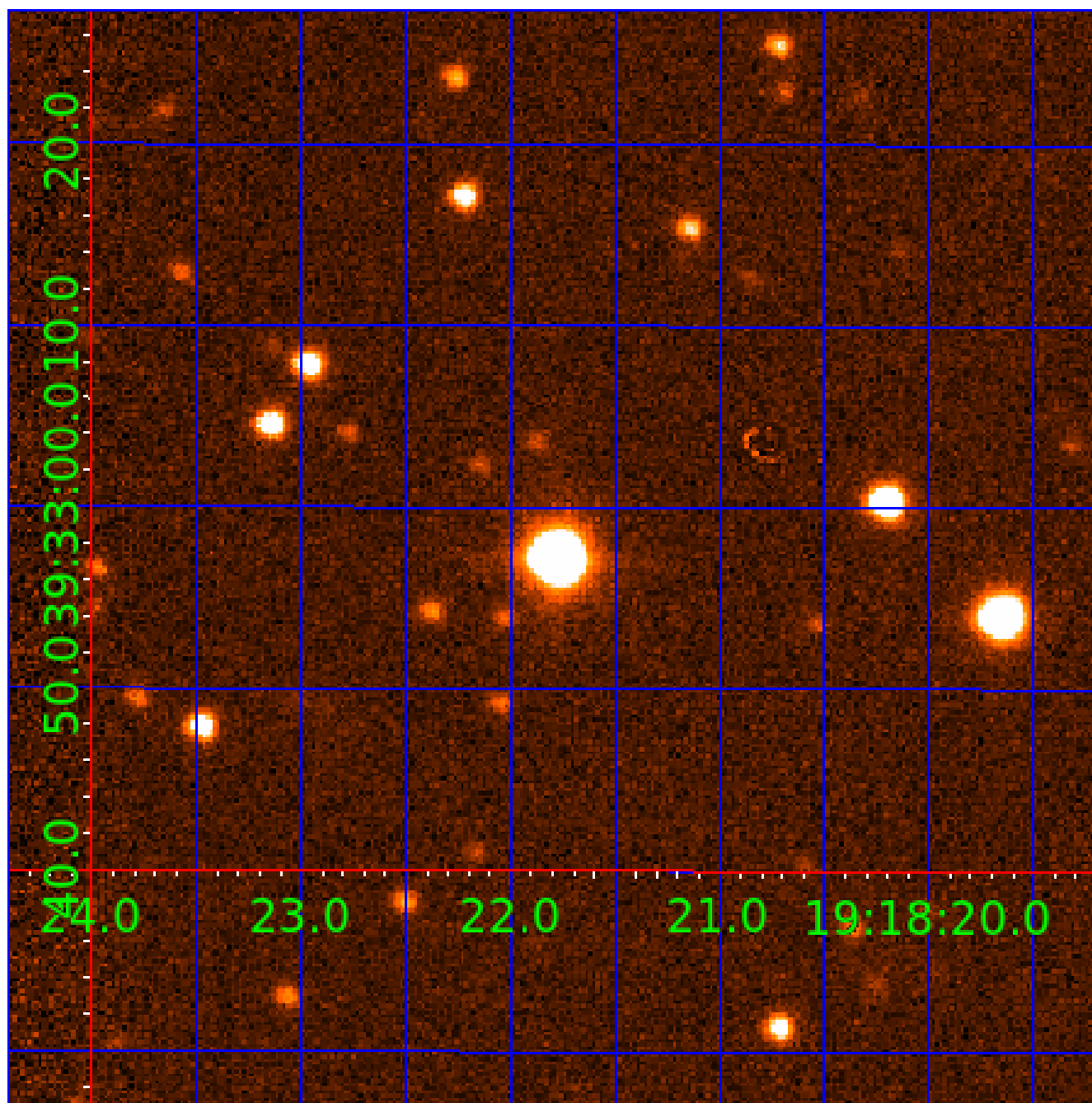


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 004457475

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004457475-01	OBS	No	585.028762	205.733576	697.8	5.735	12.3	5.9	0.85	5300	2.21	0.32
004457475-02	OBS	No	616.288985	263.730944	632.5	7.422	13.4	4.8	0.85	5300	2.24	0.30
004457475-03	OBS	No	468.415281	243.090661	962.4	3.245	13.4	8.6	0.85	5300	2.72	0.43

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004457475-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004457475-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004457475-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—CENT_FEW_DIFFS

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

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

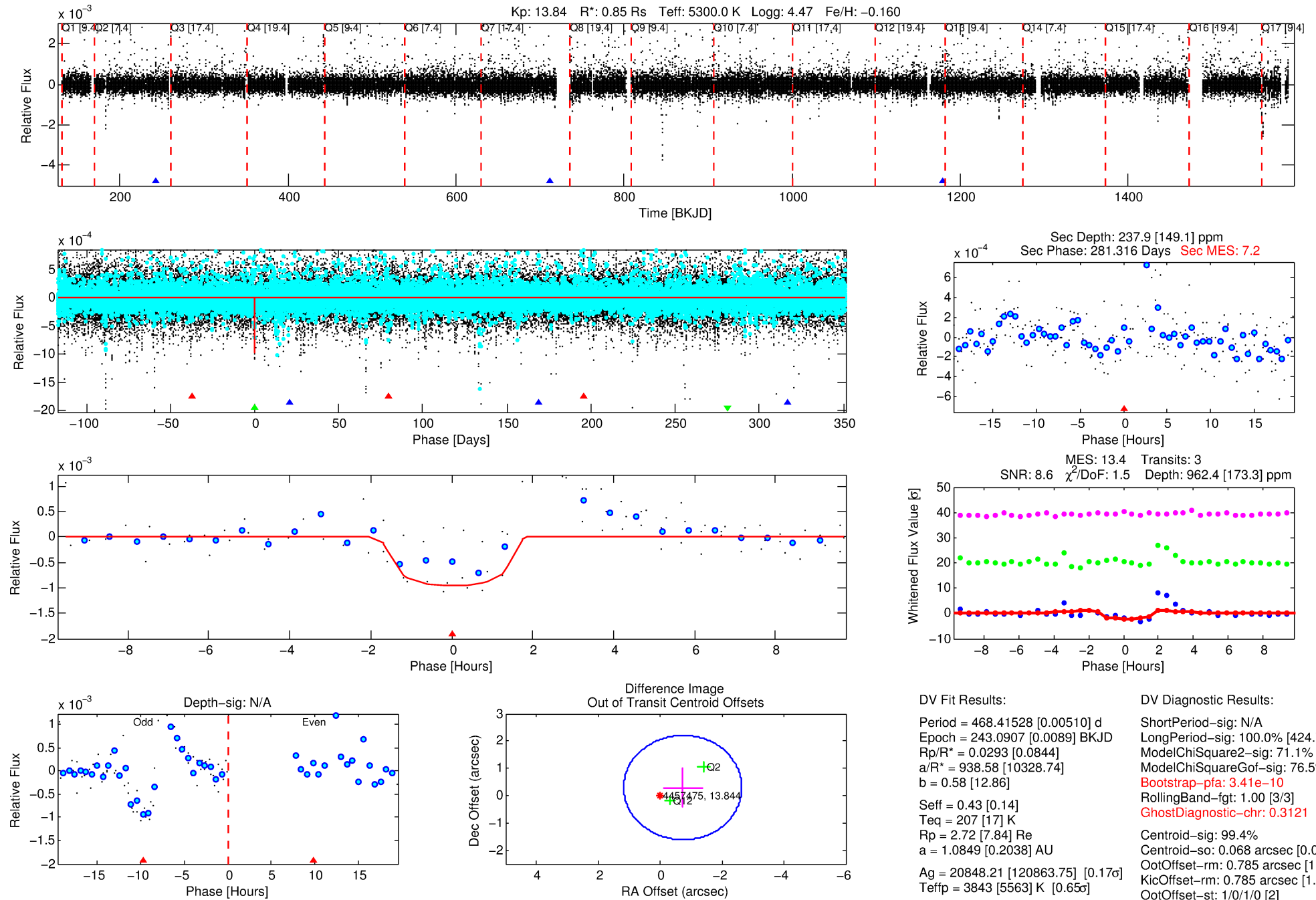
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004457475-03

No Significant Match Found

# DV One-Page Summary

KIC: 4457475 Candidate: 3 of 3 Period: 468.415 d



## DV Fit Results:

Period = 468.41528 [0.00510] d  
Epoch = 243.0907 [0.0089] BKJD  
Rp/R\* = 0.0293 [0.0844]  
a/R\* = 938.58 [10328.74]  
b = 0.58 [12.86]  
Seff = 0.43 [0.14]  
Teq = 207 [17] K  
Rp = 2.72 [7.84] Re  
a = 1.0849 [0.2038] AU  
Ag = 20848.21 [120863.75] [0.17σ]  
Teffp = 3843 [5563] K [0.65σ]

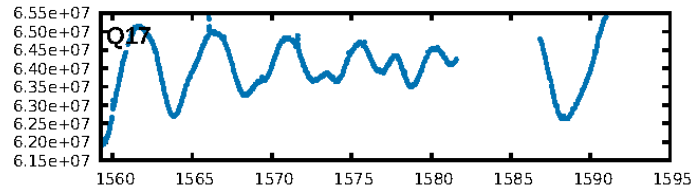
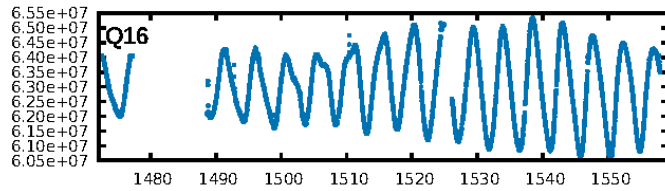
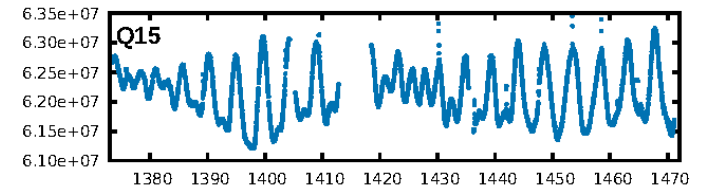
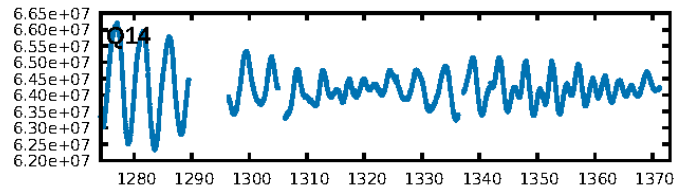
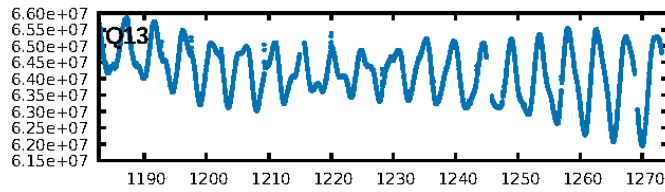
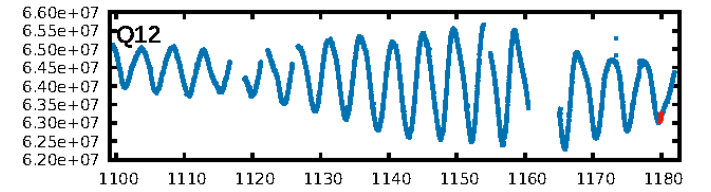
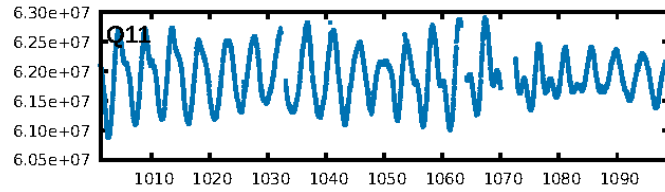
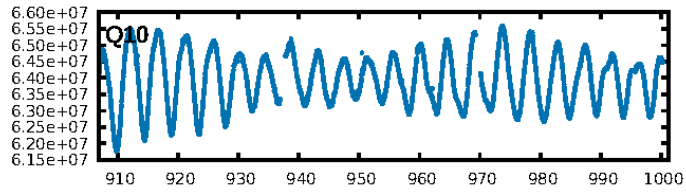
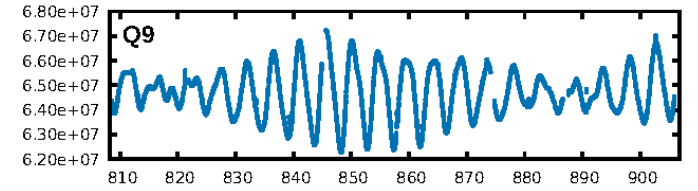
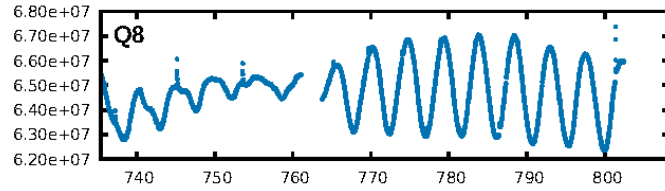
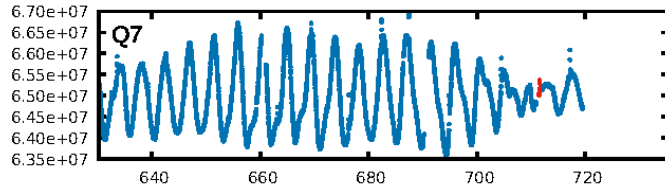
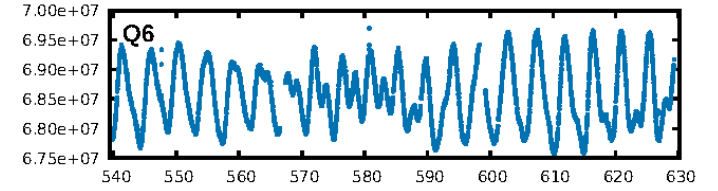
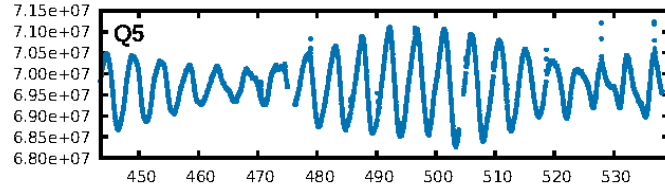
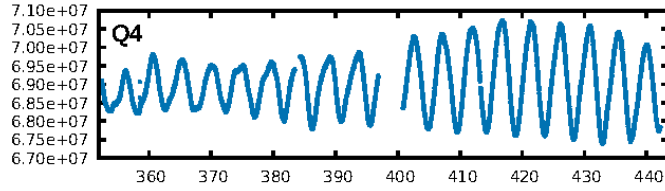
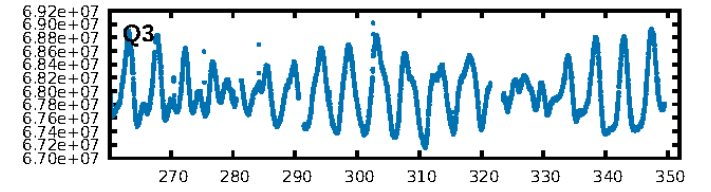
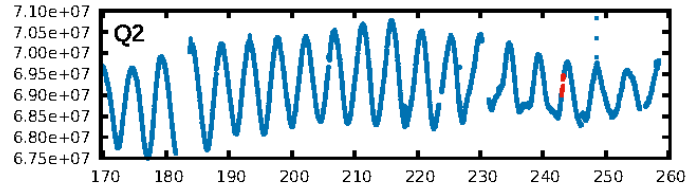
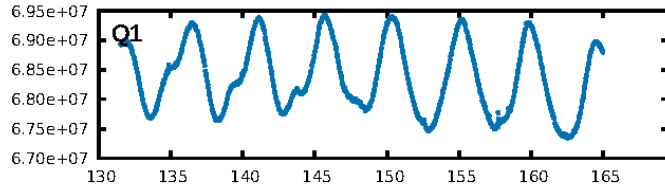
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [424.70σ]  
ModelChiSquare2-sig: 71.1%  
ModelChiSquareGof-sig: 76.5%  
**Bootstrap-pfa: 3.41e-10**  
RollingBand-fgt: 1.00 [3/3]  
**GhostDiagnostic-chr: 0.3121**  
Centroid-sig: 99.4%  
Centroid-so: 0.068 arcsec [0.09σ]  
OotOffset-rm: 0.785 arcsec [1.23σ]  
OotOffset-st: 1/0/1/0 [2]  
KicOffset-rm: 0.785 arcsec [1.36σ]  
KicOffset-st: 1/0/1/0 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 1.00 [2/2]

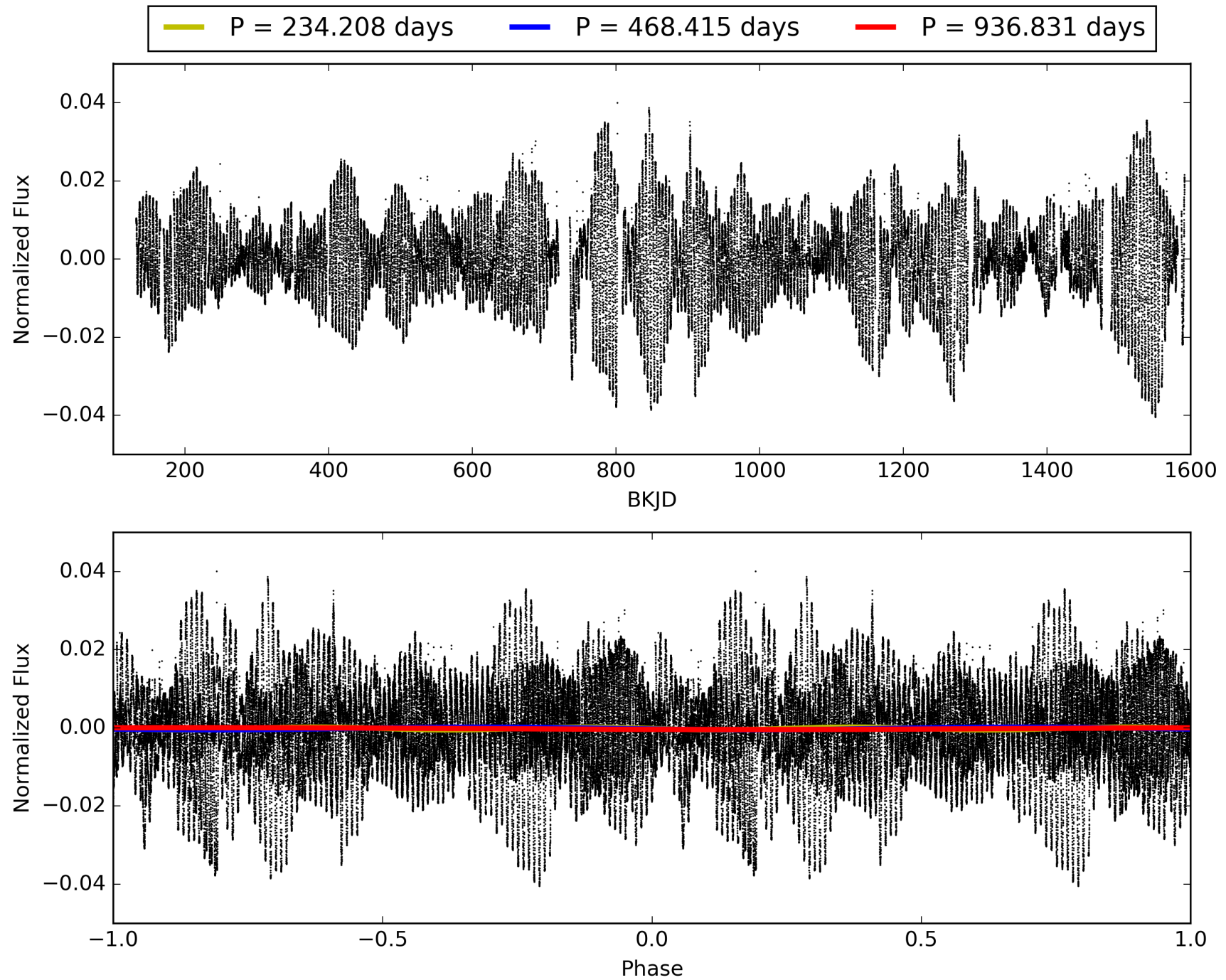
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 15:43:53 Z

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

# TCE 004457475-03, PDC Light Curves

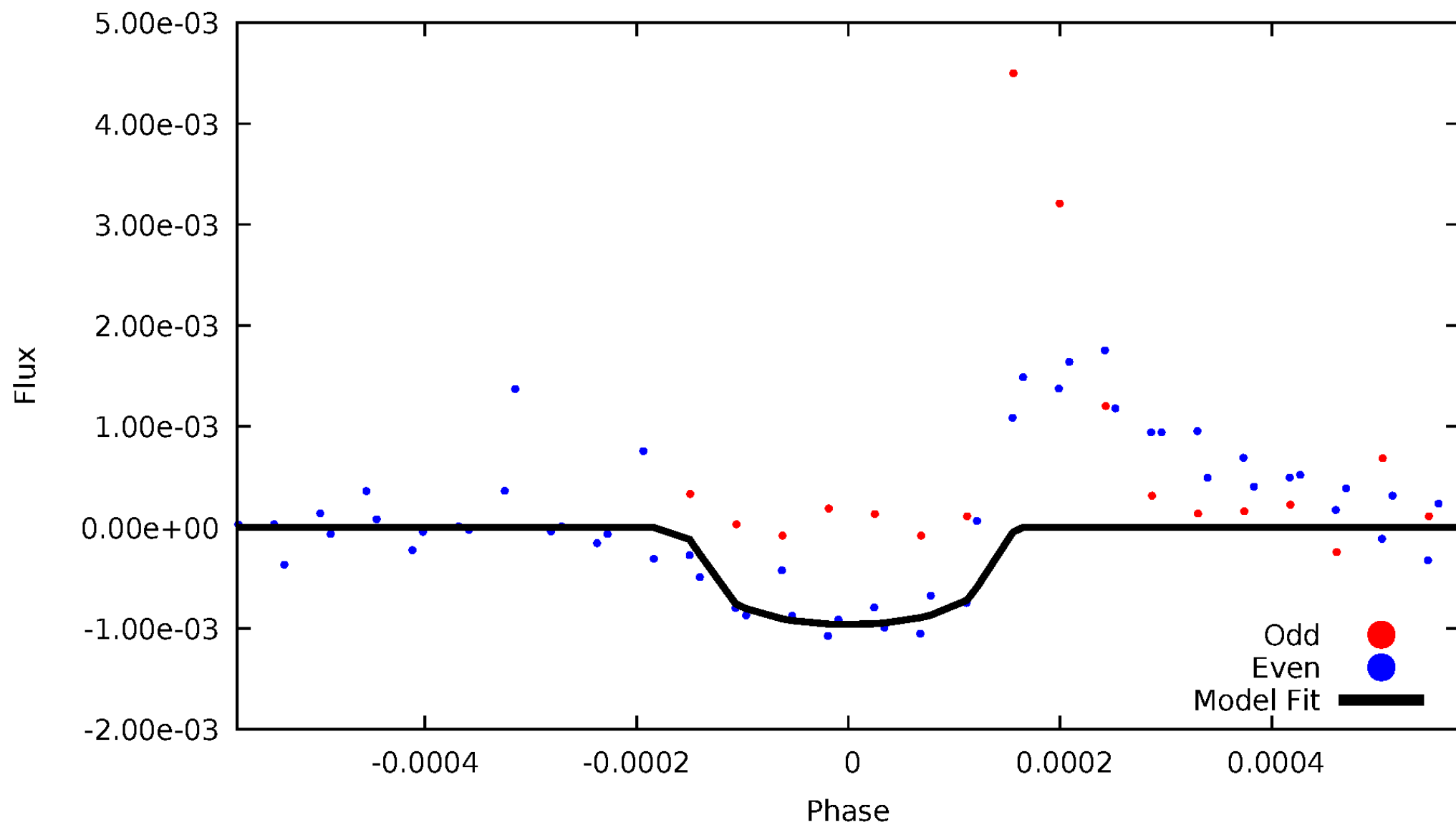


TCE 004457475-03



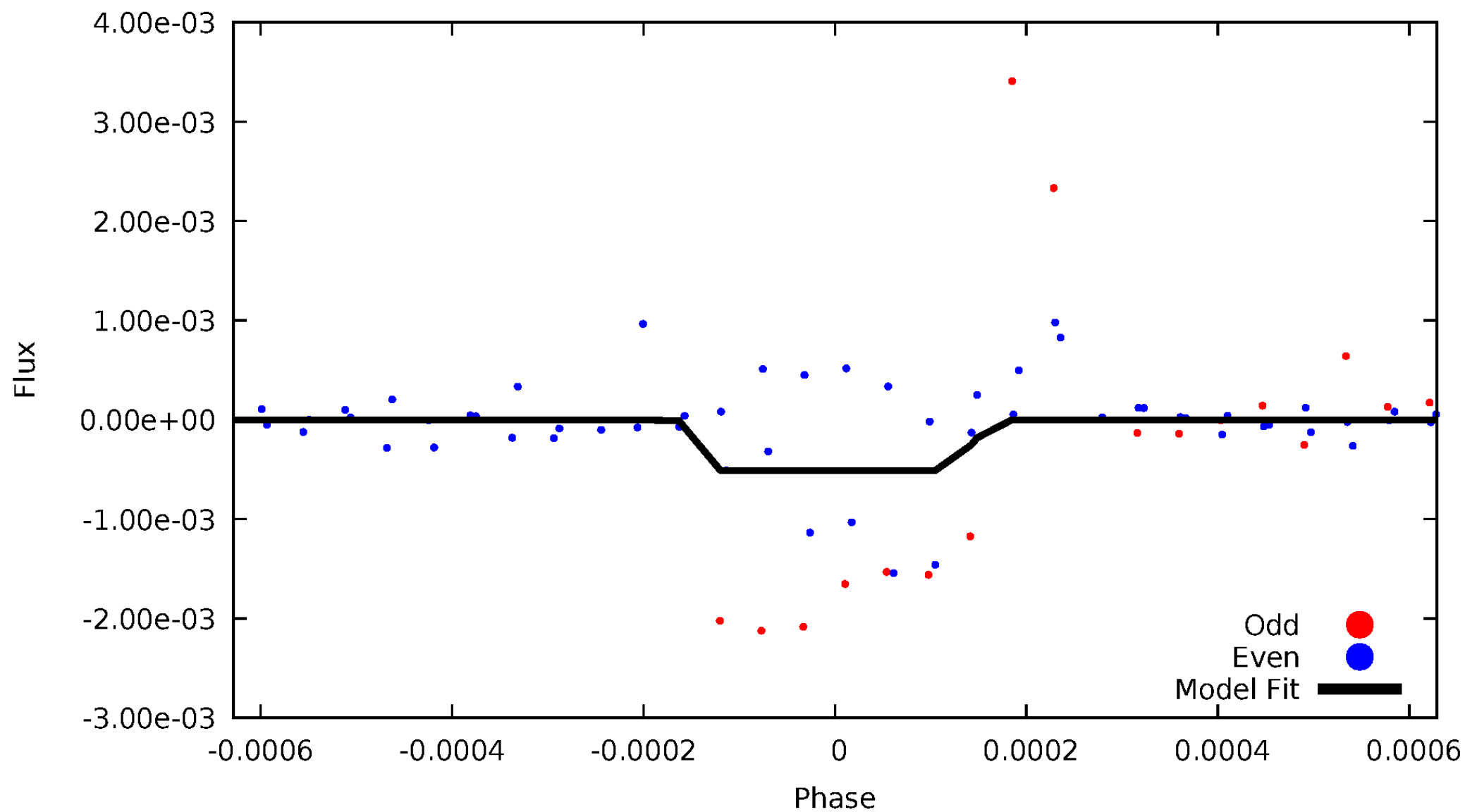
# DV Odd/Even

TCE 004457475-03



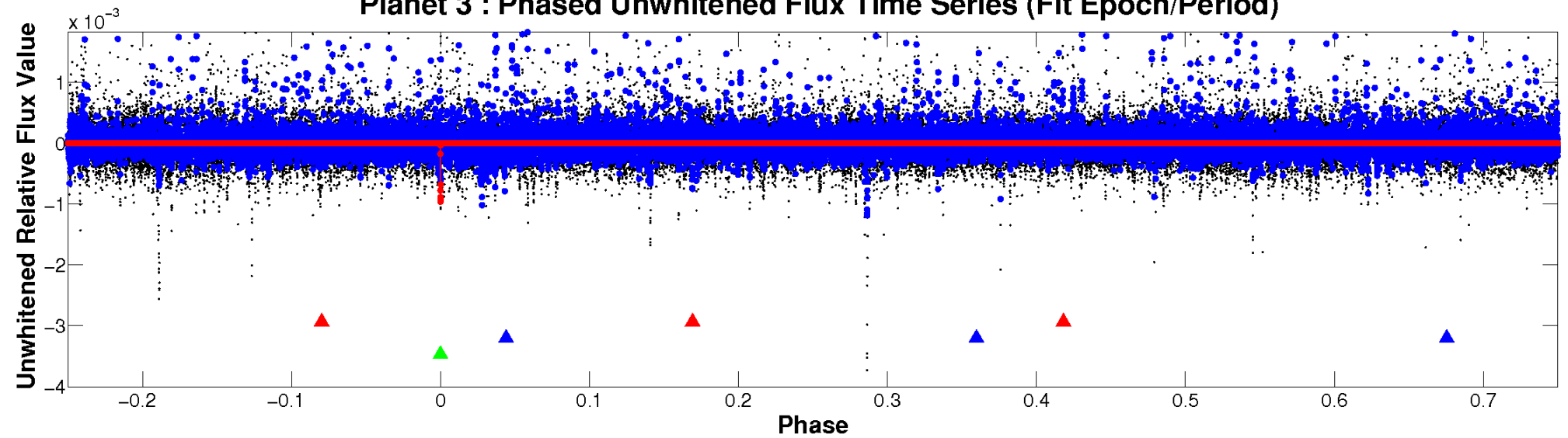
# ALT Odd/Even

TCE 004457475-03

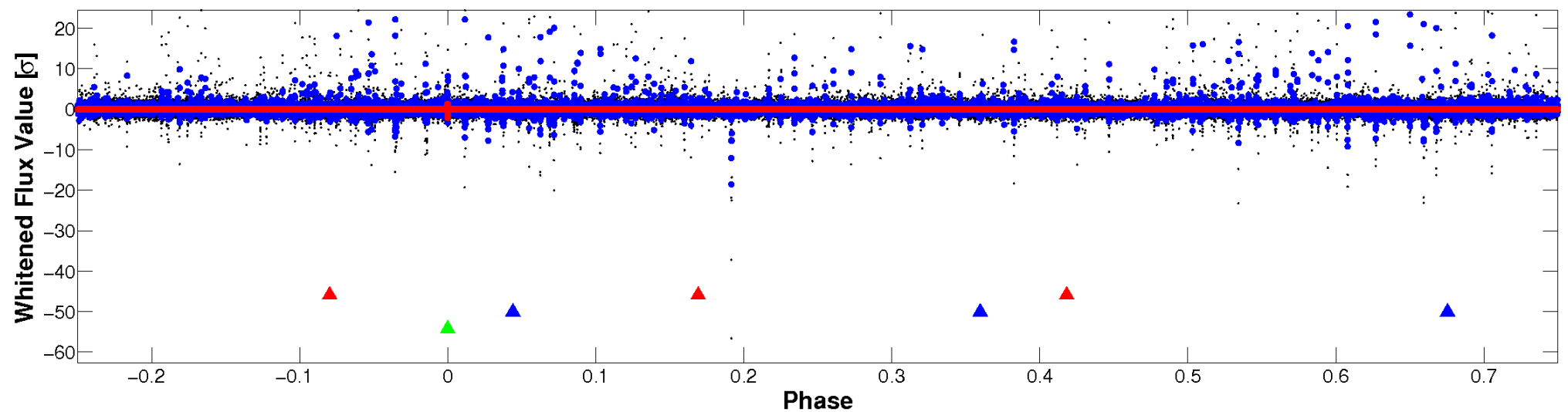


# Non-Whitened Vs. Whitened Light Curve

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

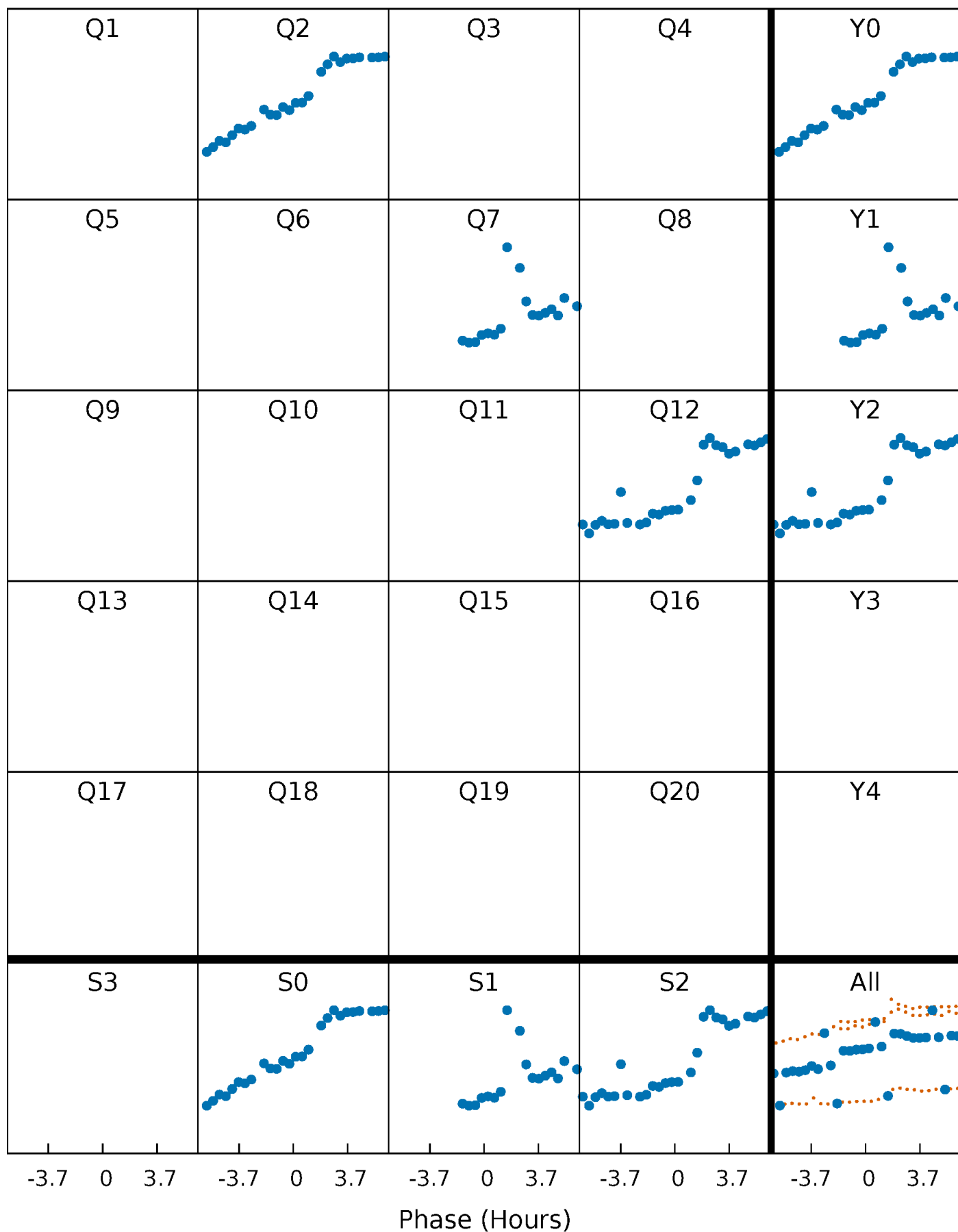


**Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

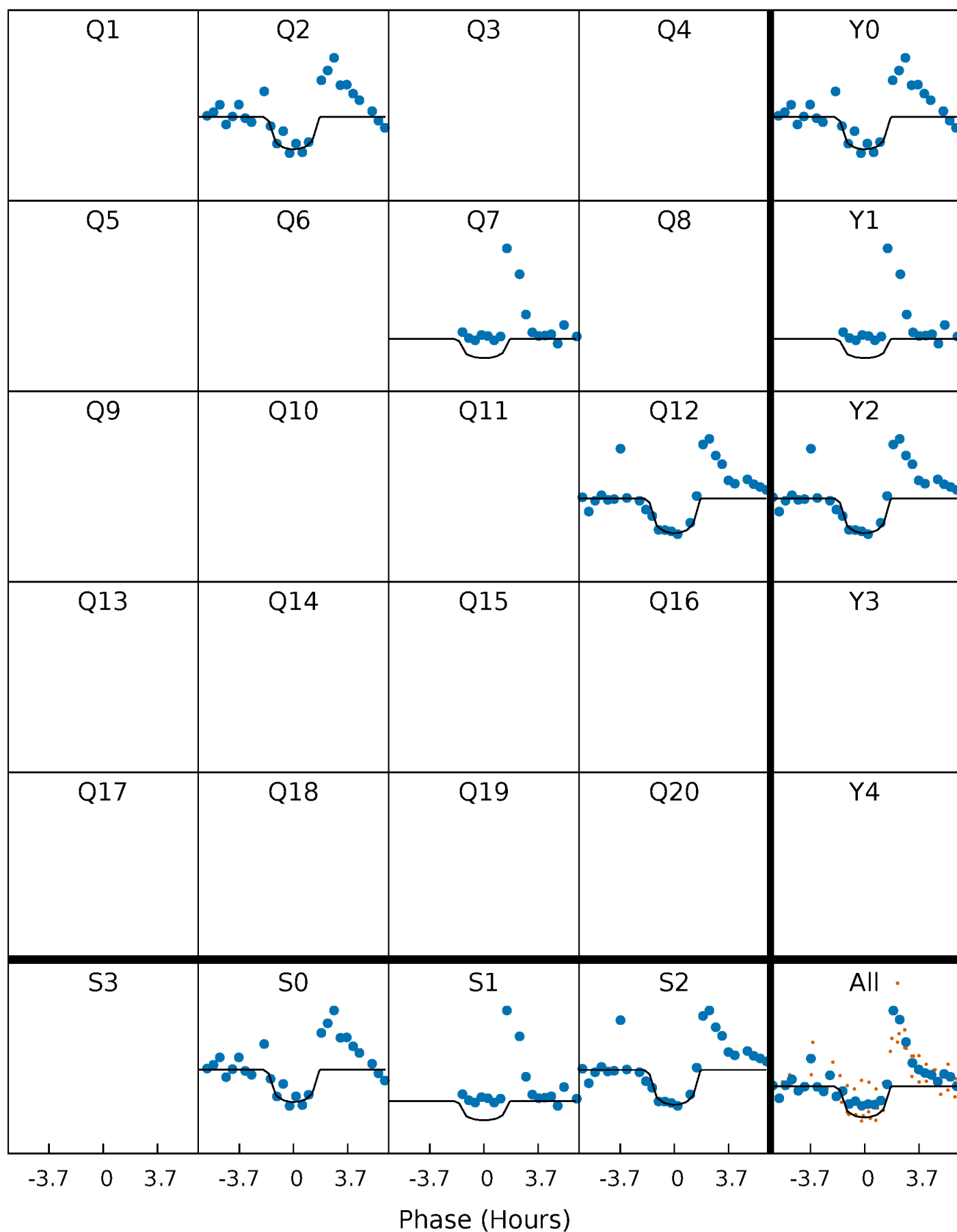
TCE 004457475-03 P=468.415281 Days  $T_0=243.090661$  (BKJD)





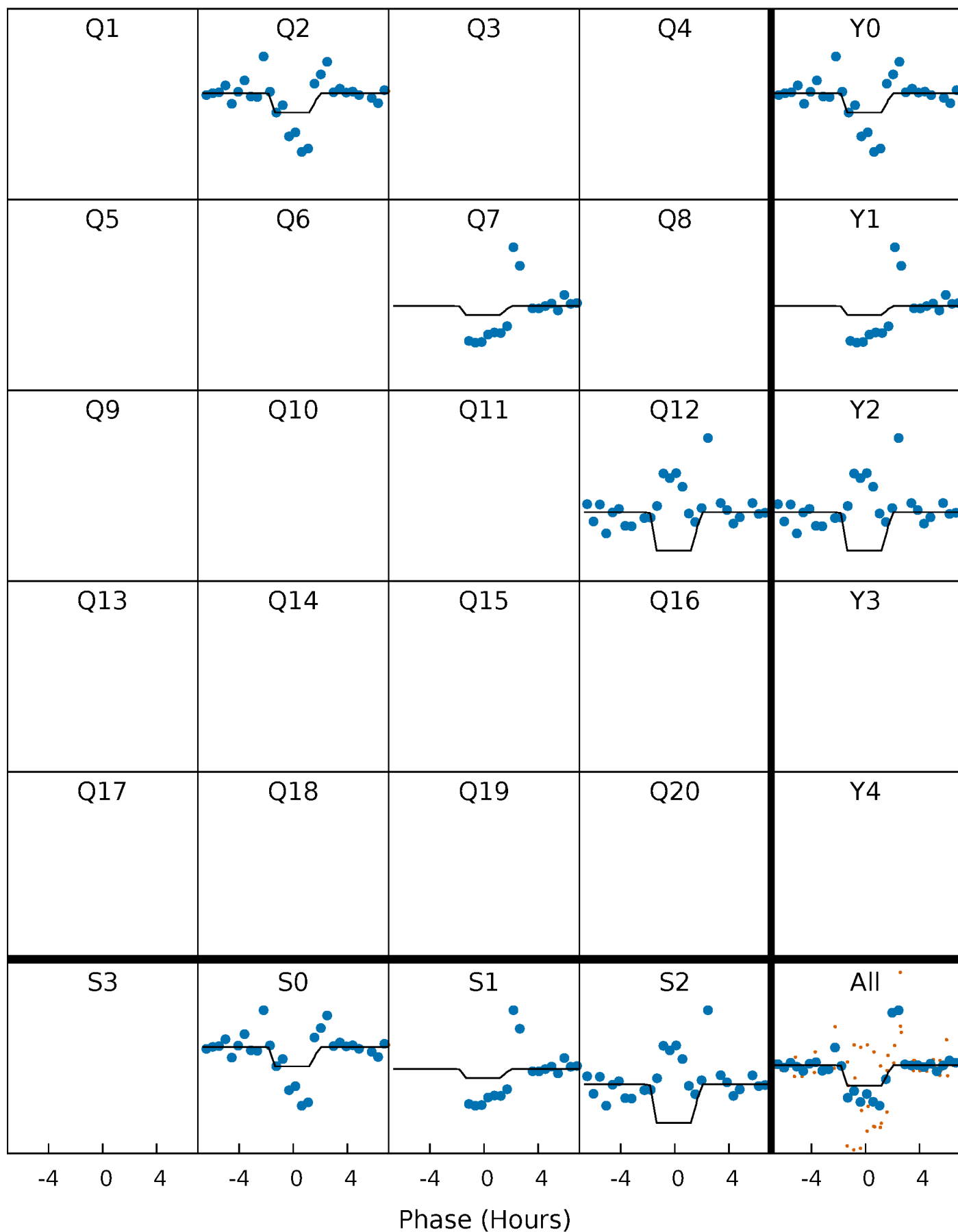
# DV Quarter-Phased Transit Curves

TCE 004457475-03     $P=468.415281$  Days     $T_0=243.090661$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

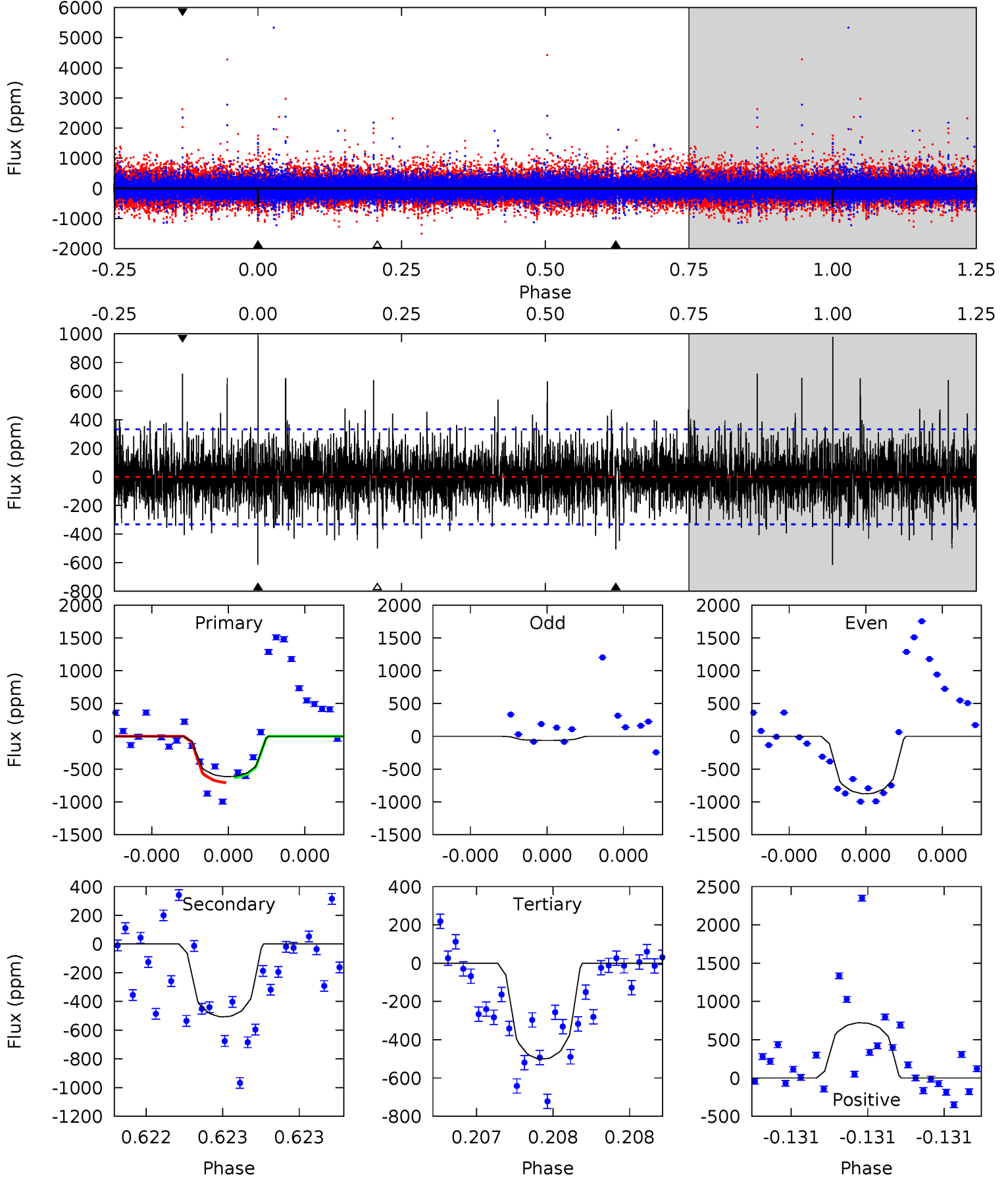
TCE 004457475-03     $P=468.398496$  Days     $T_0=243.093946$  (BKJD)



# DV Model-Shift Uniqueness Test

004457475-03, P = 468.415281 Days, E = 243.090661 Days

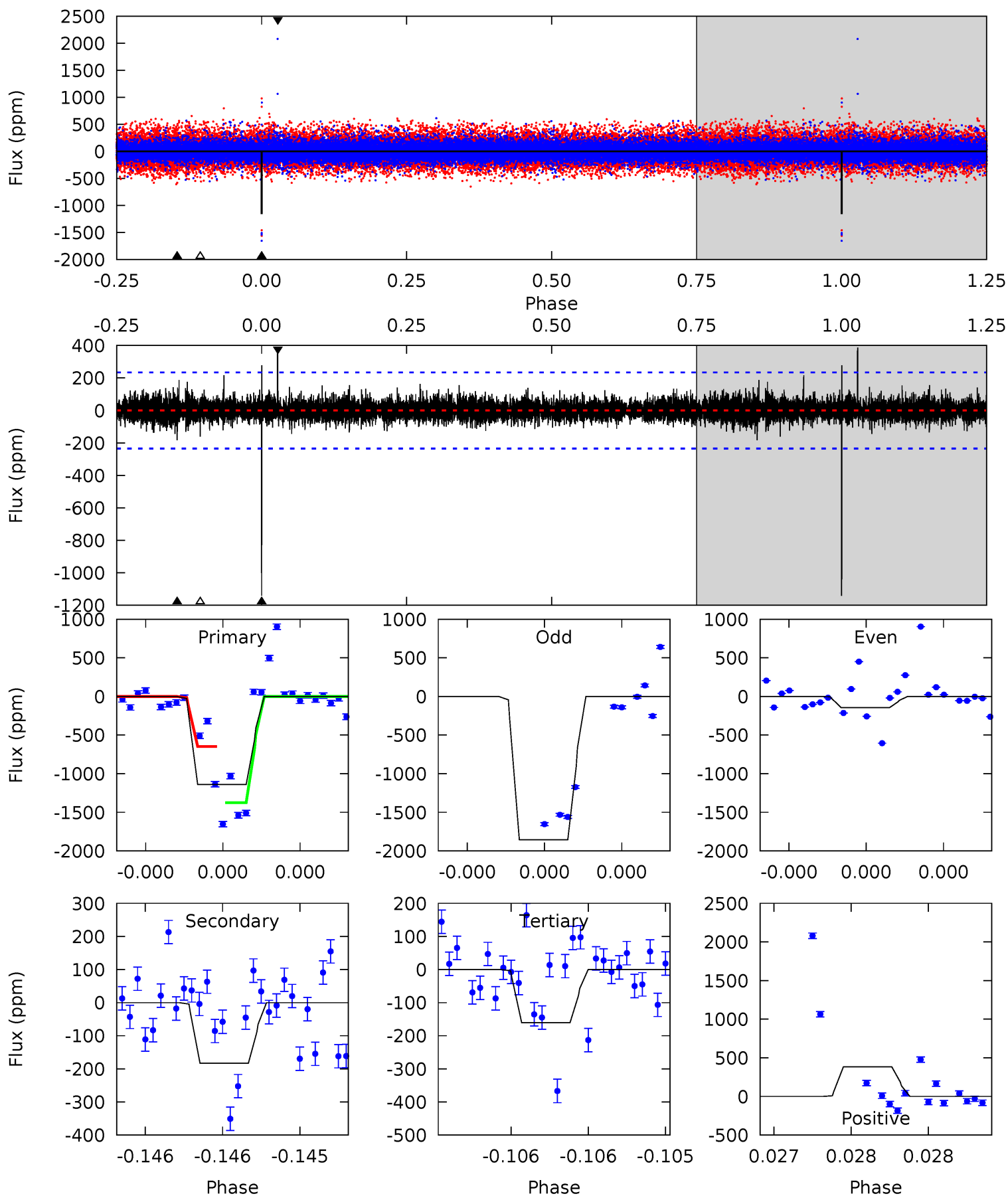
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.5	8.63	8.52	12.3	5.65	3.60	1.98	1.94	-1.81	0.11	-3.64	4.67	0.64	0.61	0.63



# Alt Model-Shift Uniqueness Test

004457475-03, P = 468.398496 Days, E = 243.093946 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
27.4	4.39	3.85	9.22	5.64	3.58	0.81	23.6	18.2	0.54	-4.83	24.4	0.88	0.25	8.34



### Stellar Parameters For KIC 004457475

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5300^{+159}_{-143}$	$4.470^{+0.112}_{-0.182}$	$-0.160^{+0.300}_{-0.300}$	$0.849^{+0.160}_{-0.120}$	$0.776^{+0.115}_{-0.057}$	$1.786^{+0.932}_{-0.762}$
	+3%/-3%	+3%/-4%	+188%/-188%	+19%/-14%	+15%/-7%	+52%/-43%
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 004457475-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-508 \pm 59$	$6.96^{+5.69}_{-4.86}$	$292^{+17}_{-15}$	$3431^{+1896}_{-558}$	$7016^{+74232}_{-4980}$
Alt.	$-183 \pm 42$	$6.60^{+5.67}_{-4.79}$	$291^{+18}_{-13}$	$3011^{+1462}_{-476}$	$2677^{+29159}_{-1903}$

$T_{max}$  = 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

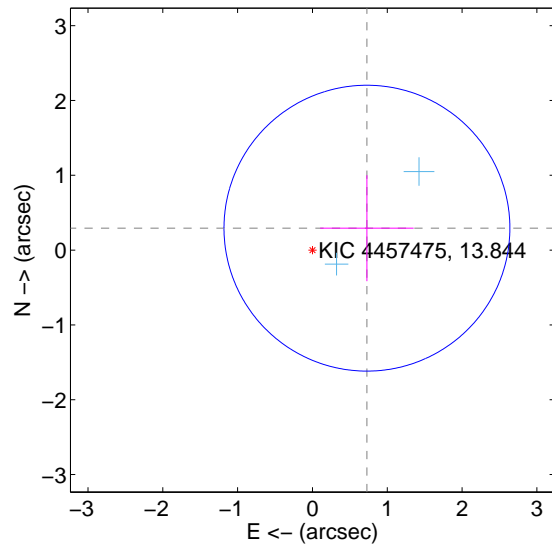
Supplemental centroid analysis for 004457475-03. Kepler magnitude: 13.84. Transit SNR 8.65

There are 2 quarters with good PRF difference image offsets

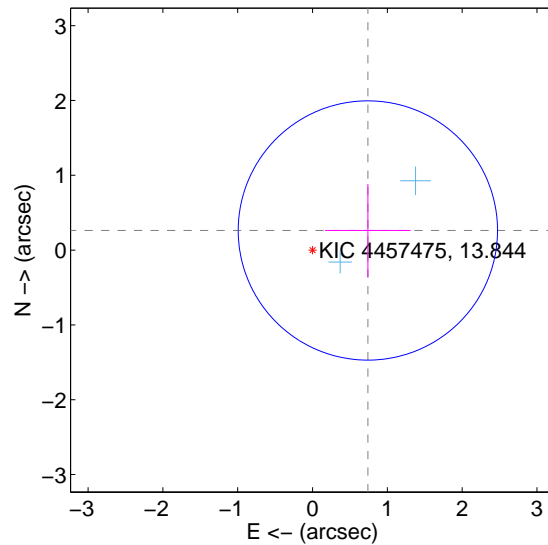
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.785 \pm 0.637$	1.23	$-0.729 \pm 0.625$	$0.293 \pm 0.708$
PRF-fit source offset from KIC position	$0.785 \pm 0.578$	1.36	$-0.740 \pm 0.572$	$0.262 \pm 0.622$
photometric centroid source offset	$0.07 \pm 0.72$	0.09	$0.01 \pm 0.71$	$-0.07 \pm 0.72$

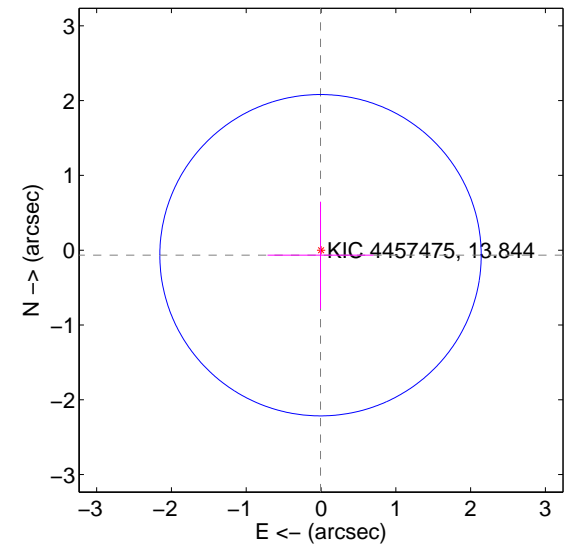
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids



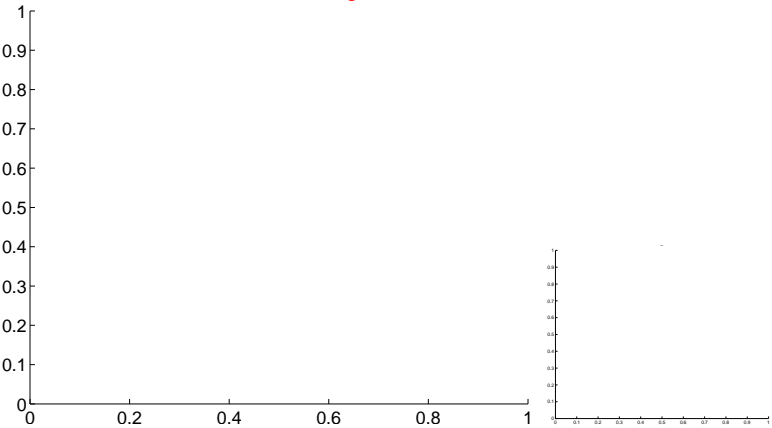
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

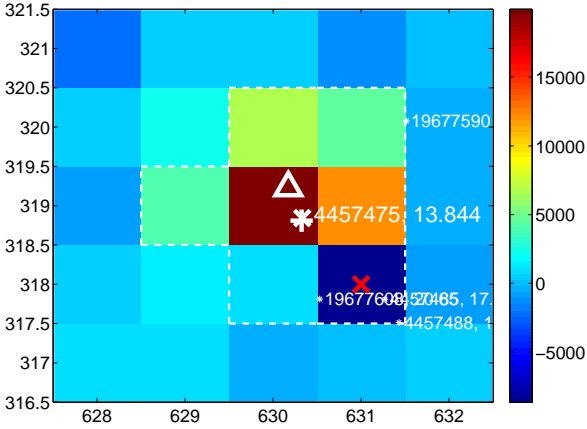
Q1 no difference image



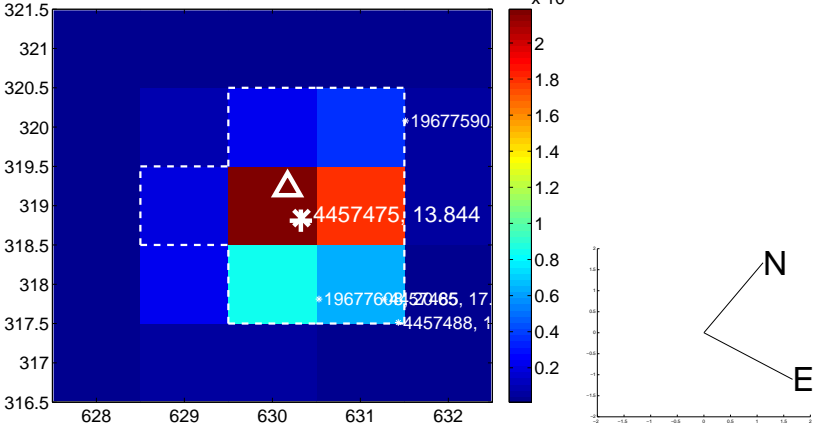
Q1 no OOT image



Q2 difference image



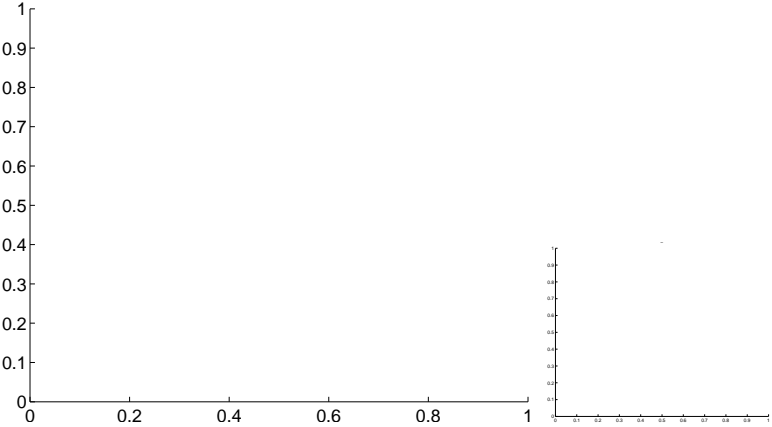
Q2 OOT image



Q3 no difference image



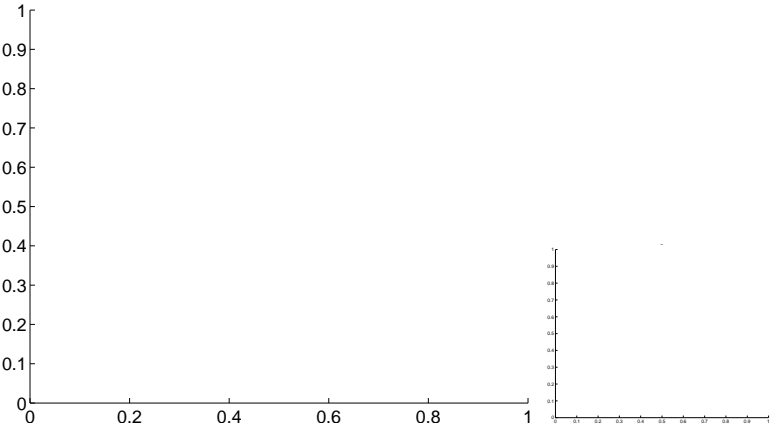
Q3 no OOT image



Q4 no difference image



Q4 no OOT image

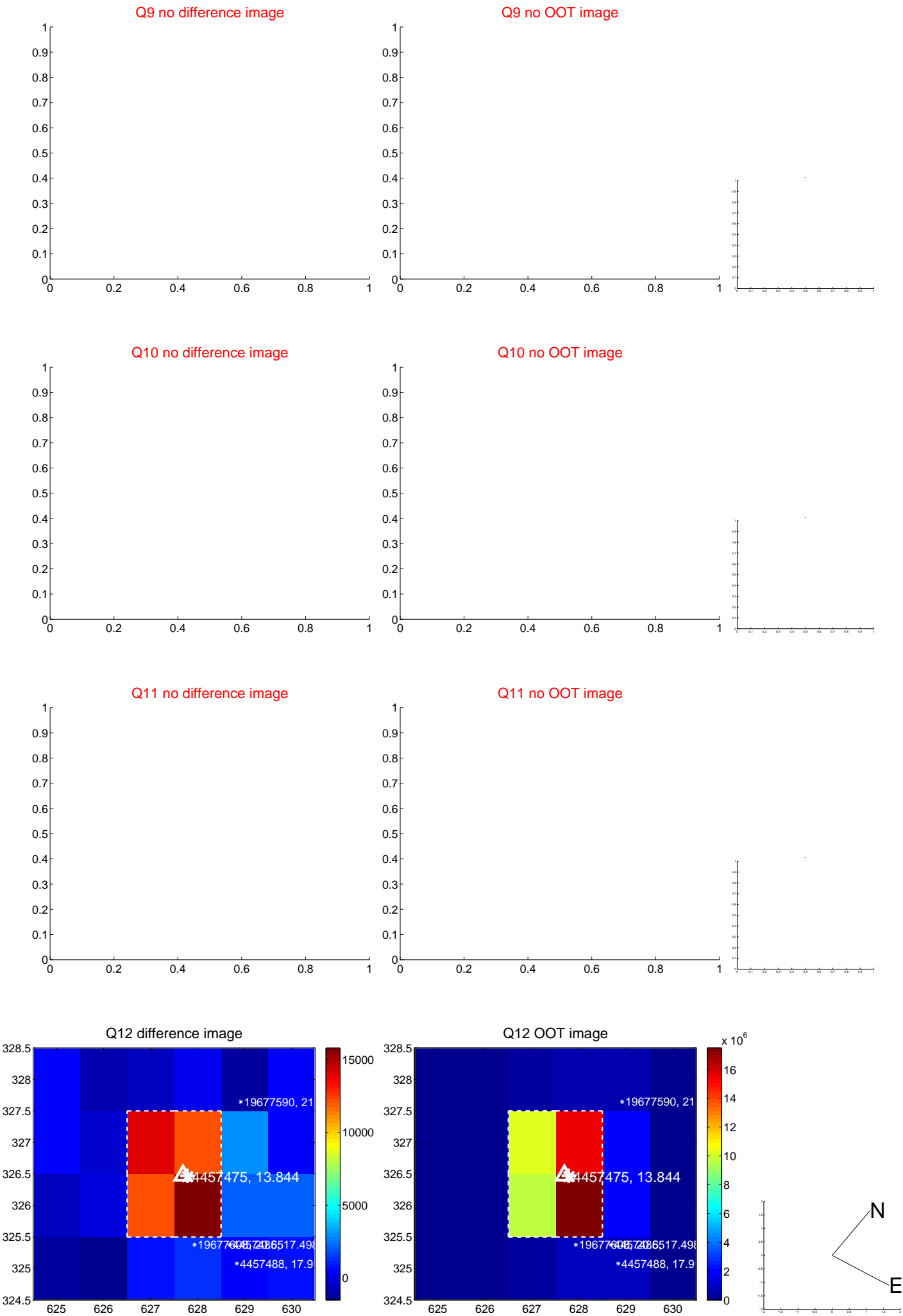


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





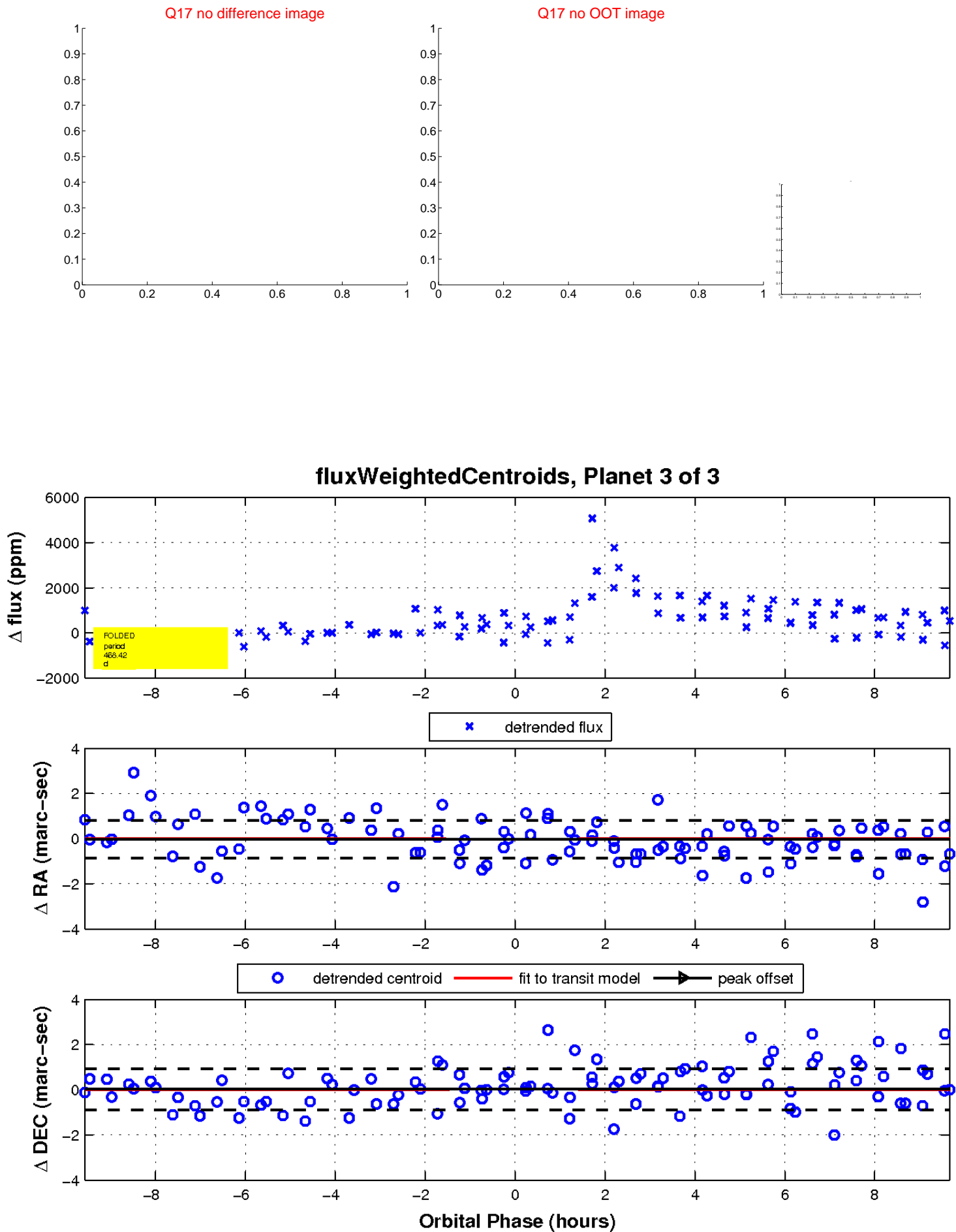
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

