

KIC 005640085

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})
005640085-01	OBS	0448.01	10.139600	137.892101	1121.3	2.695	51.1	54.6	0.50	3893	1.81	9.43
005640085-02	OBS	0448.02	43.573898	151.244765	1817.3	6.479	31.8	37.7	0.50	3893	4.08	1.35

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005640085-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
005640085-02	OBS	FP	0.00	0	1	0	0	DEEP_V_SHAPED

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

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

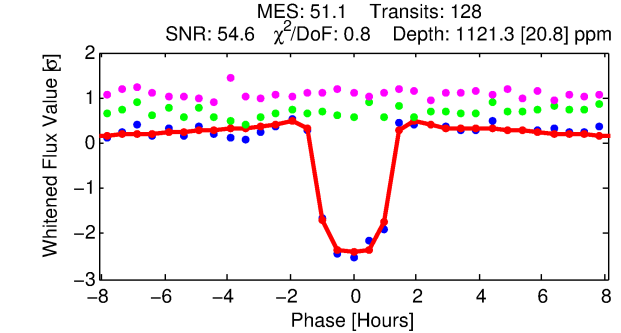
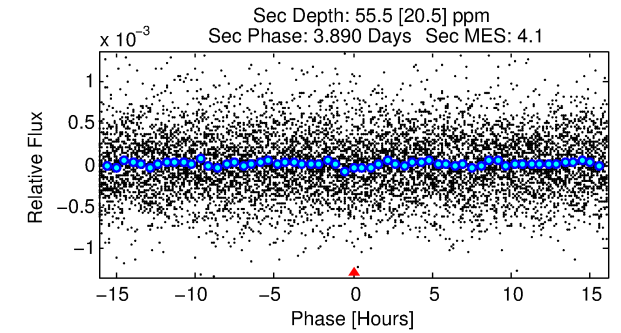
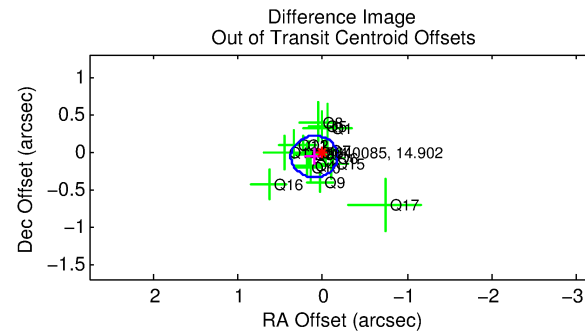
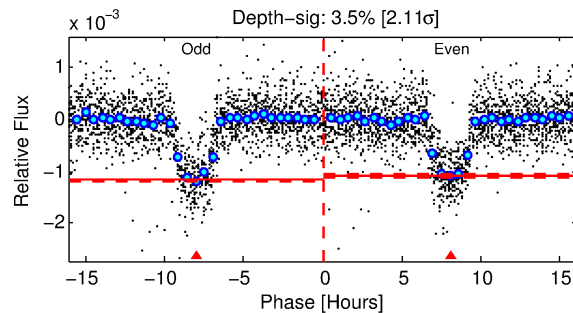
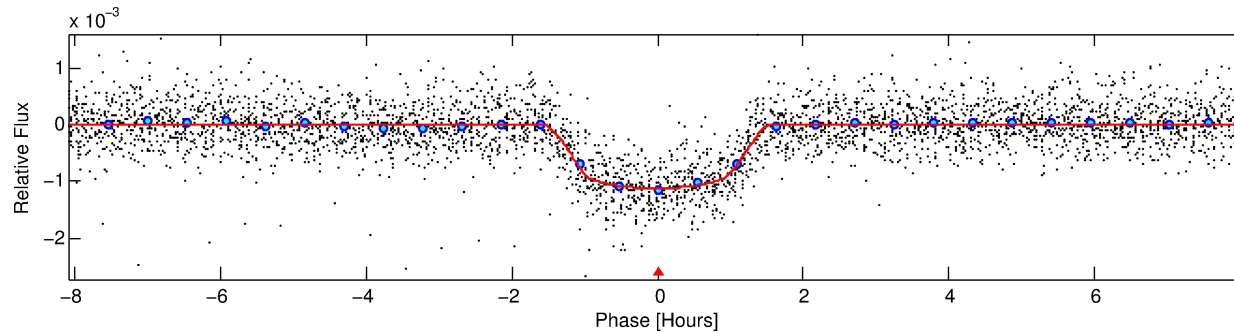
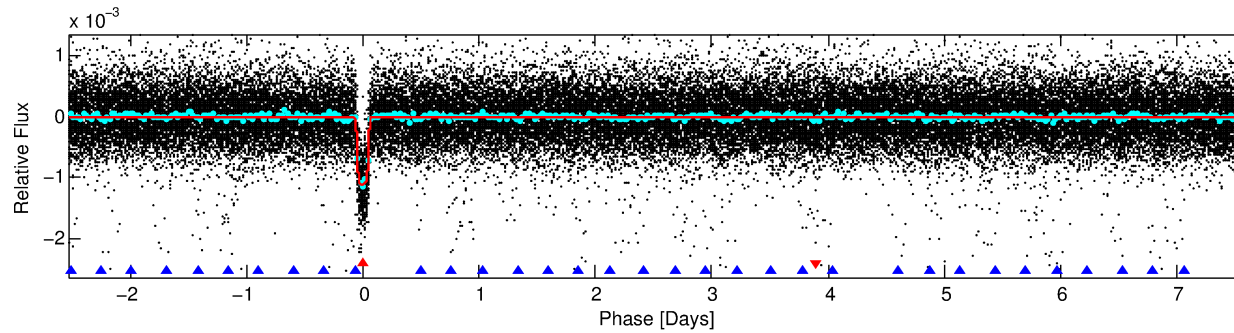
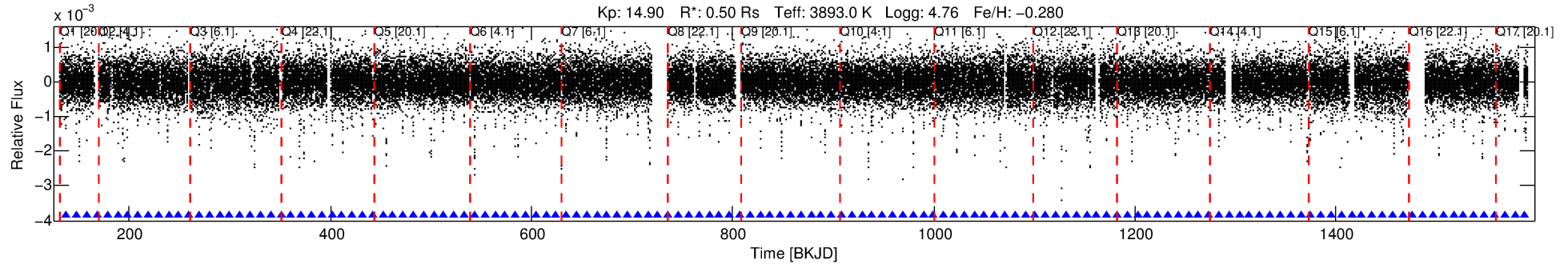
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 005640085-01

No Significant Match Found

DV One-Page Summary

KIC: 5640085 Candidate: 1 of 2 Period: 10.140 d
KOI: K00448.01 Name: Kepler-159b Corr: 0.992



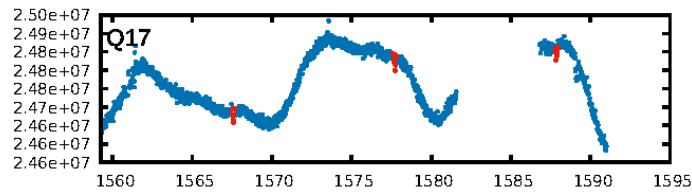
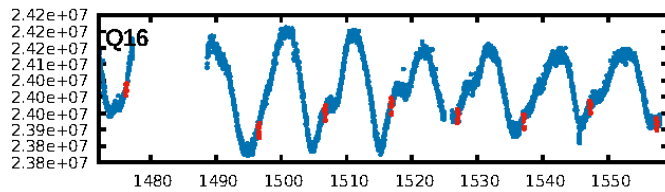
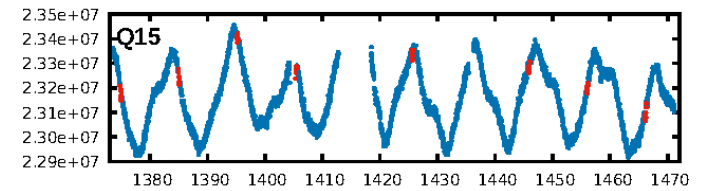
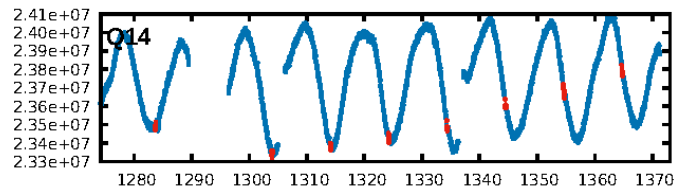
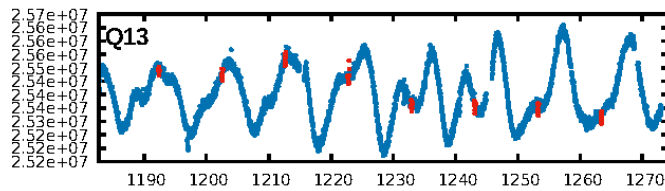
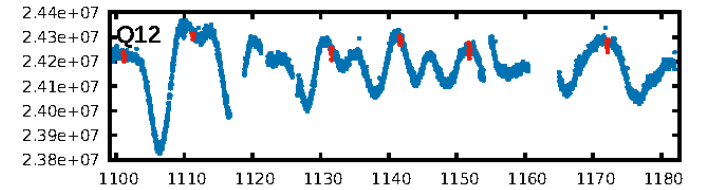
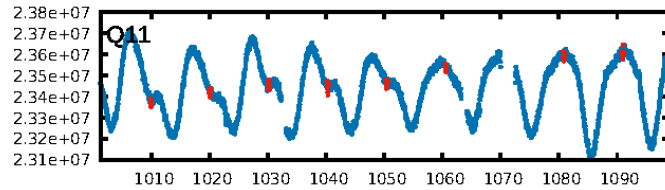
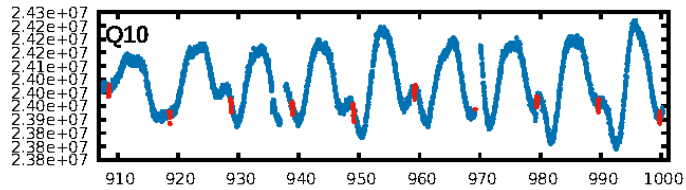
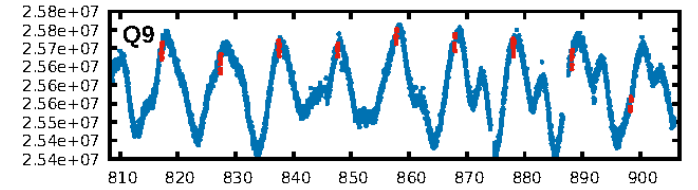
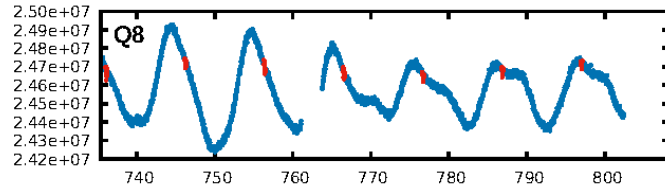
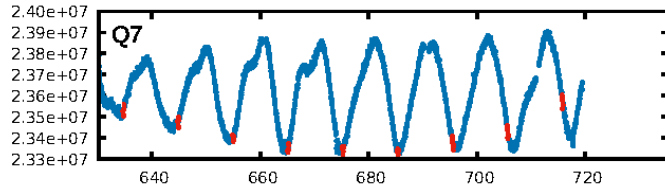
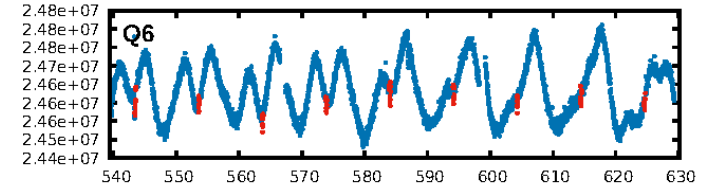
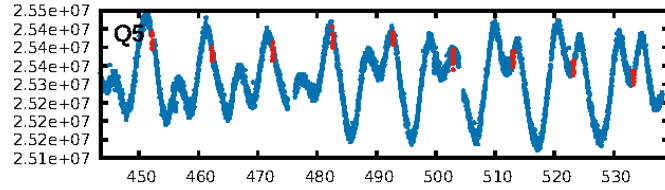
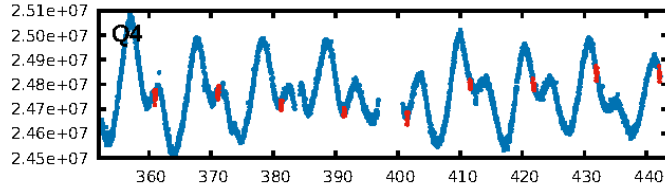
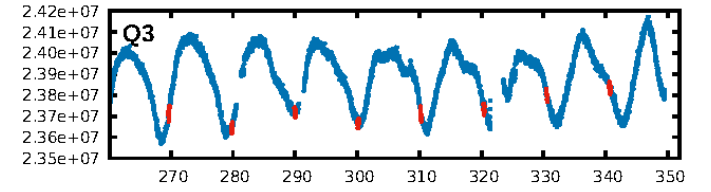
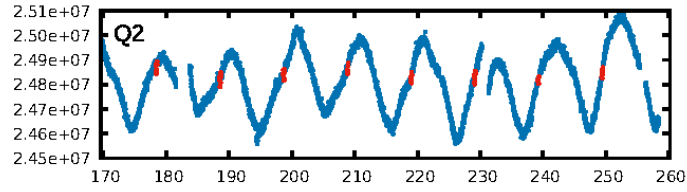
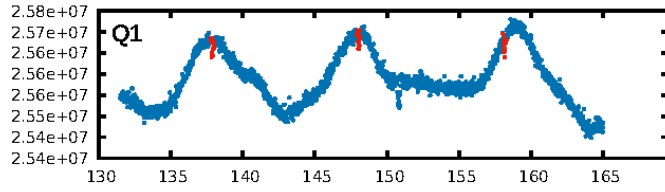
DV Fit Results:

Period = 10.13960 [0.00001] d
Epoch = 137.8921 [0.0009] BKJD
Rp/R* = 0.0332 [0.0035]
a/R* = 20.77 [10.22]
b = 0.74 [0.30]
Seff = 9.43 [1.13]
Teq = 447 [13] K
Rp = 1.81 [0.24] Re
a = 0.0739 [0.0046] AU
Ag = 50.84 [21.96] [2.27 σ]
Teffp = 1845 [200] K [6.99 σ]

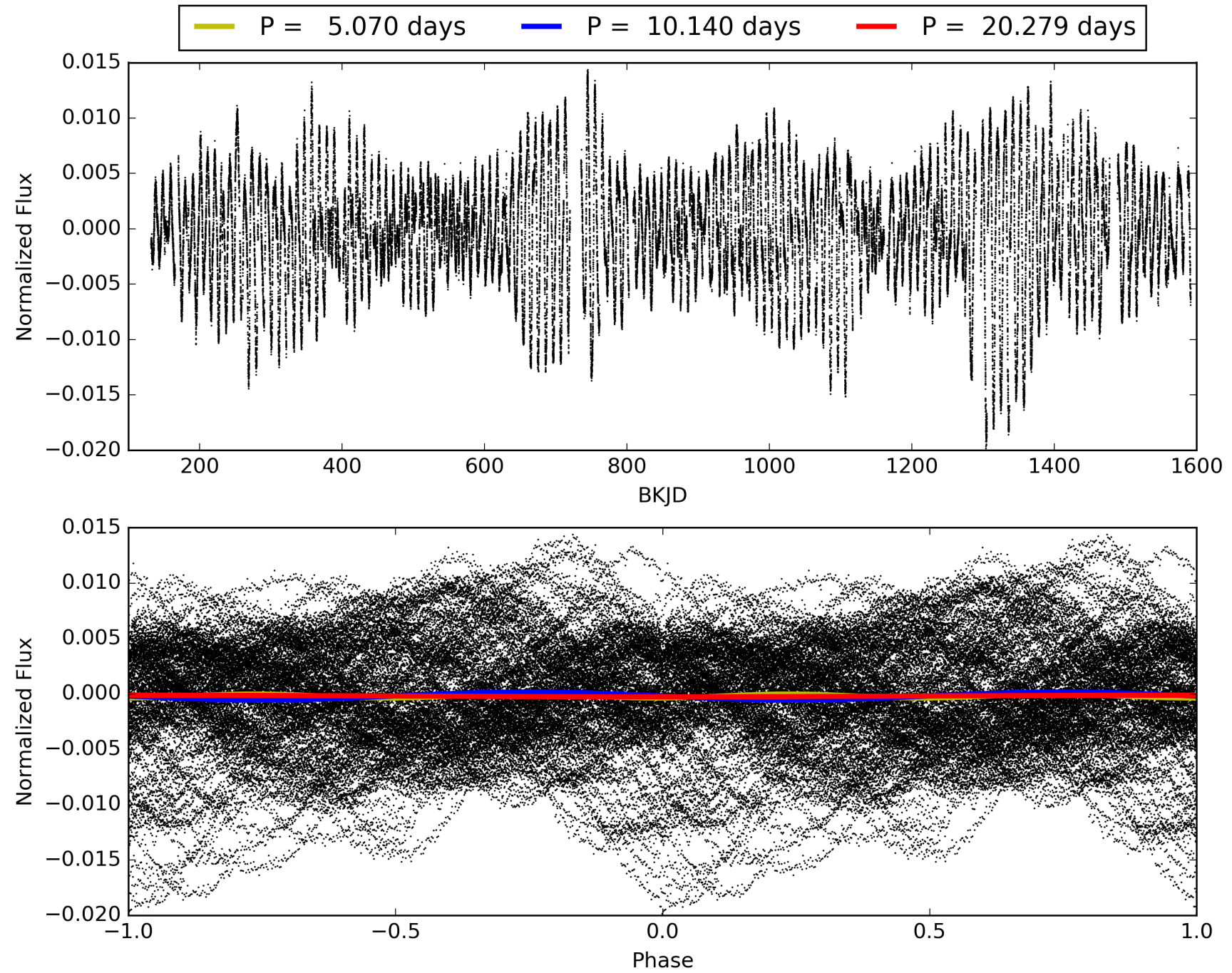
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [114.34 σ]
ModelChiSquare2-sig: 99.5%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 0.00e+00
RollingBand-fgt: 1.00 [122/122]
GhostDiagnostic-chr: 2.06
Centroid-sig: 3.5%
Centroid-so: 0.567 arcsec [2.74 σ]
OotOffset-rm: 0.116 arcsec [1.25 σ]
KicOffset-rm: 0.207 arcsec [2.10 σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 1.00 [17/17]
DiffImageOverlap-fno: 1.00 [17/17]

TCE 005640085-01, PDC Light Curves

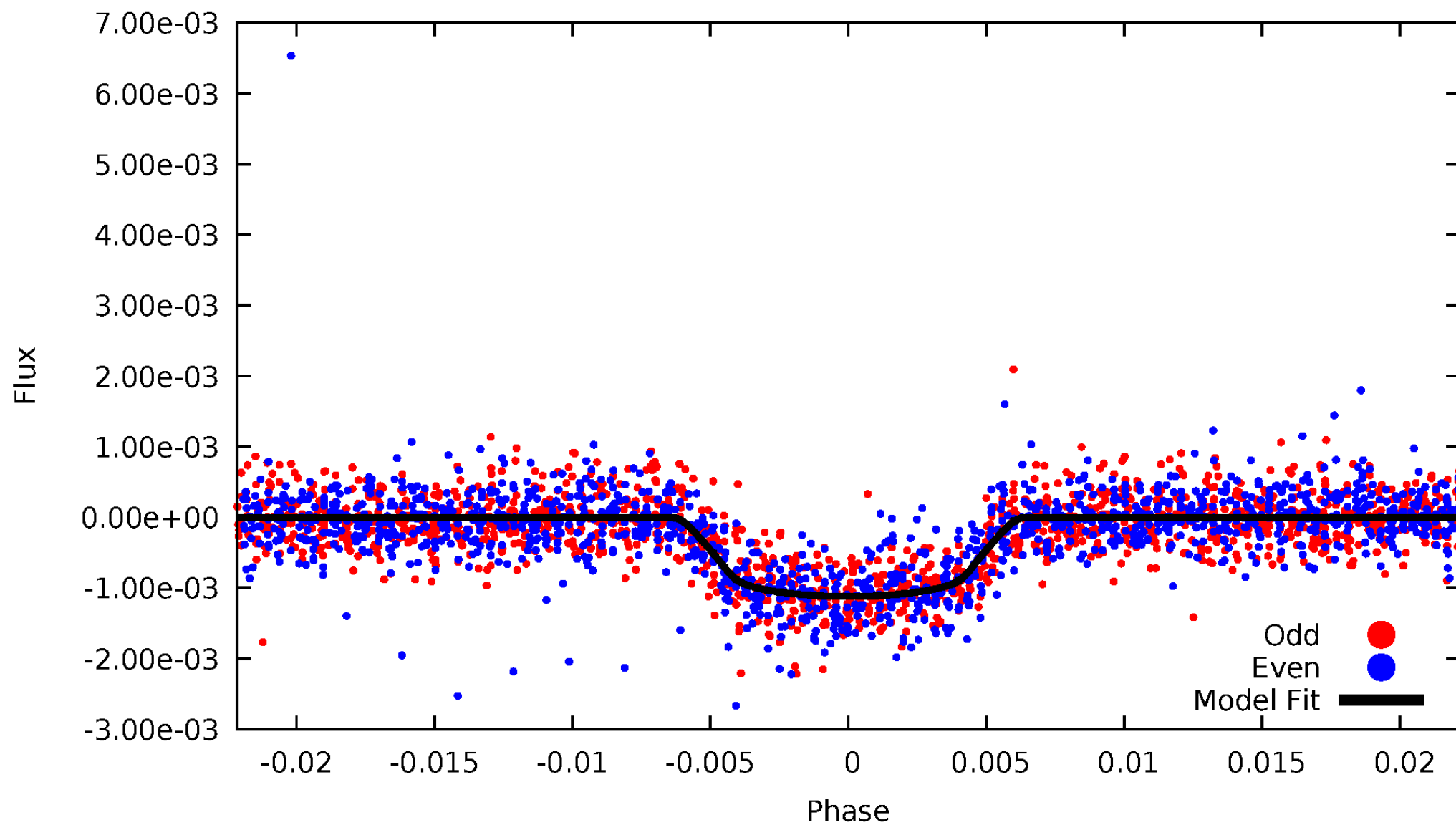


TCE 005640085-01



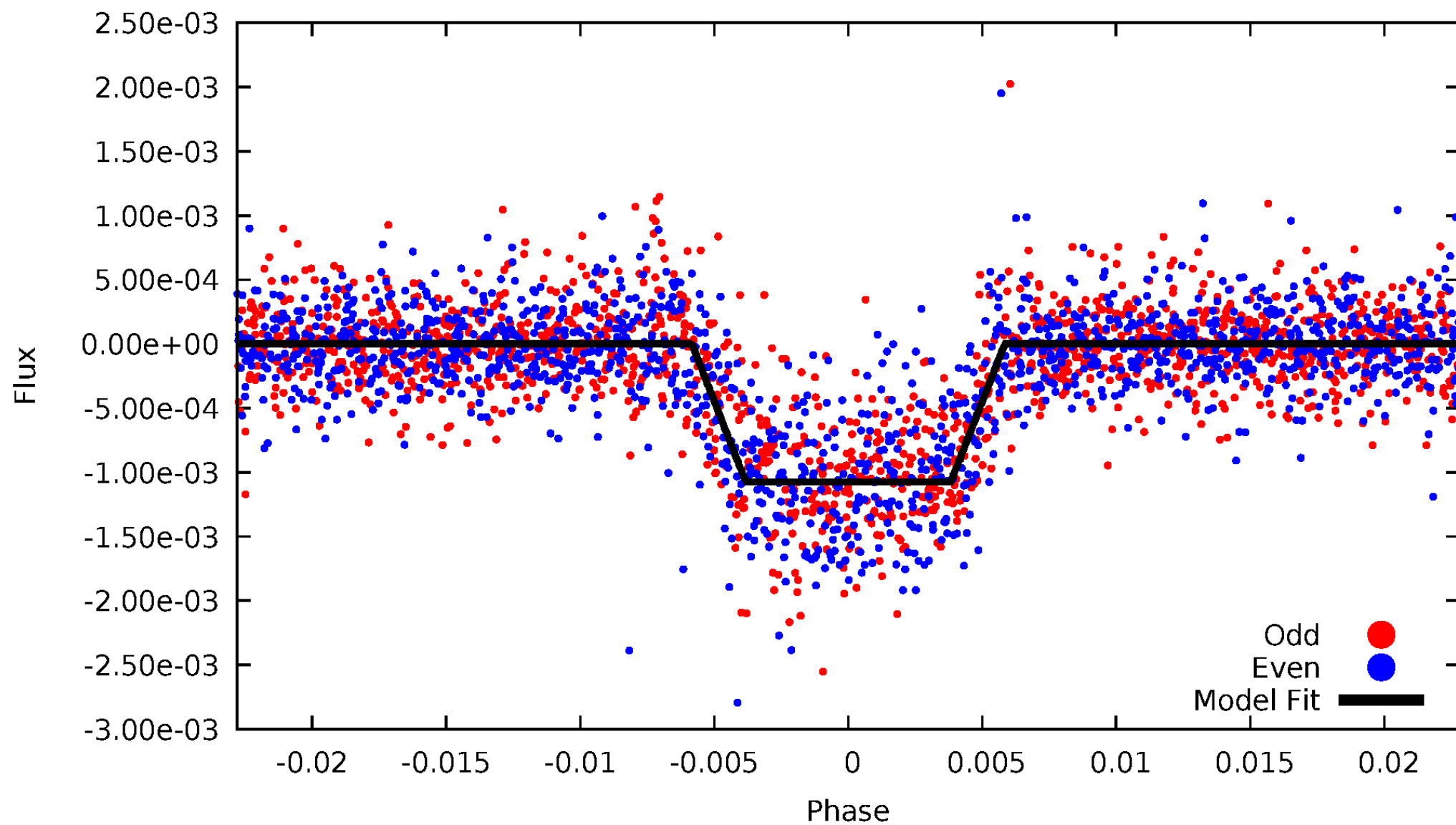
DV Odd/Even

TCE 005640085-01



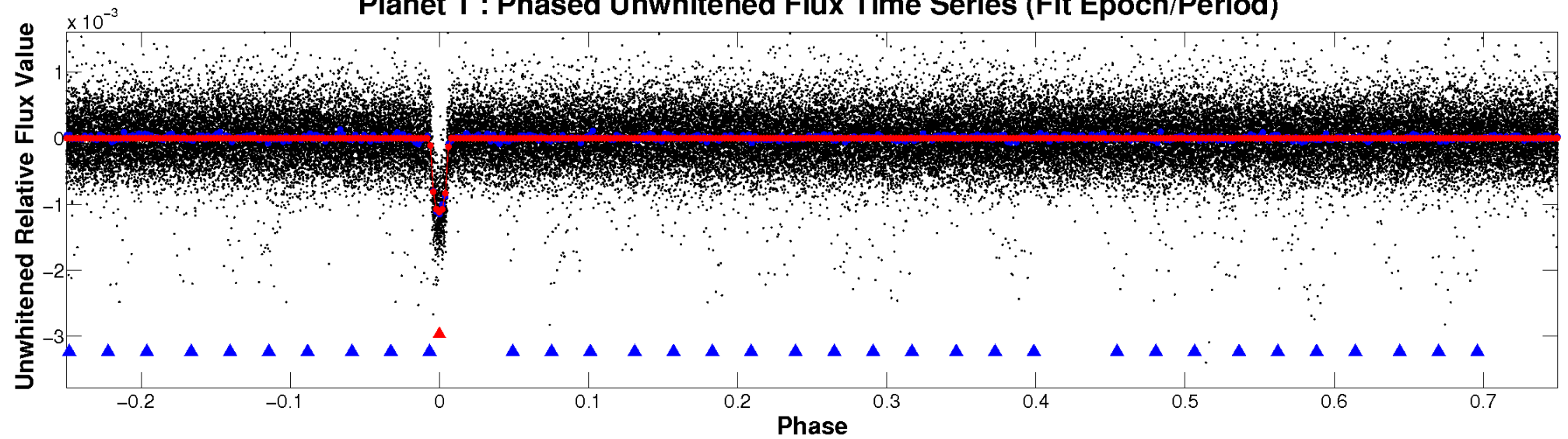
ALT Odd/Even

TCE 005640085-01

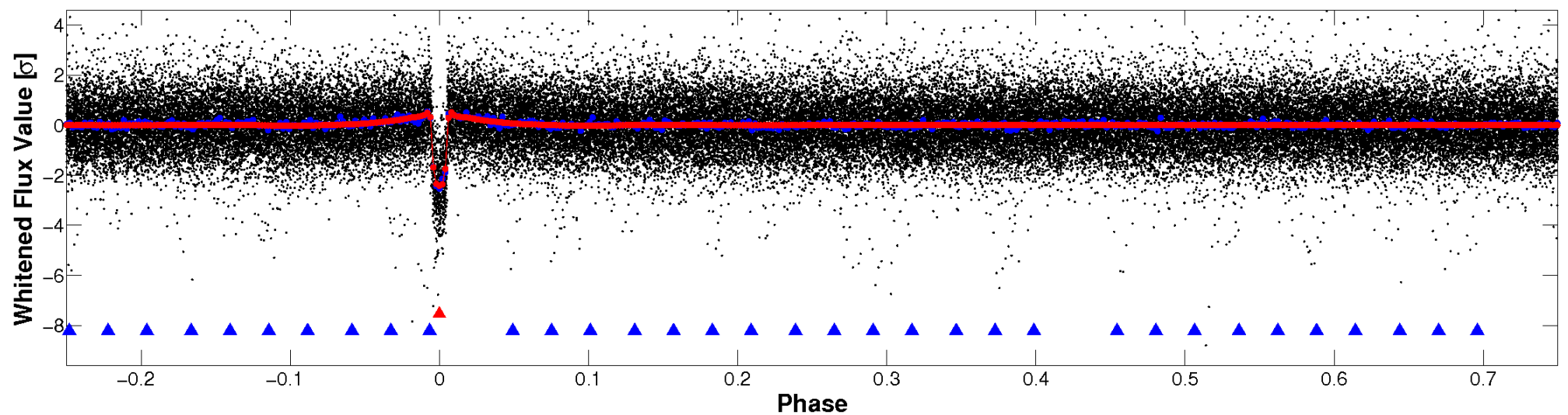


Non-Whitened Vs. Whitened Light Curve

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

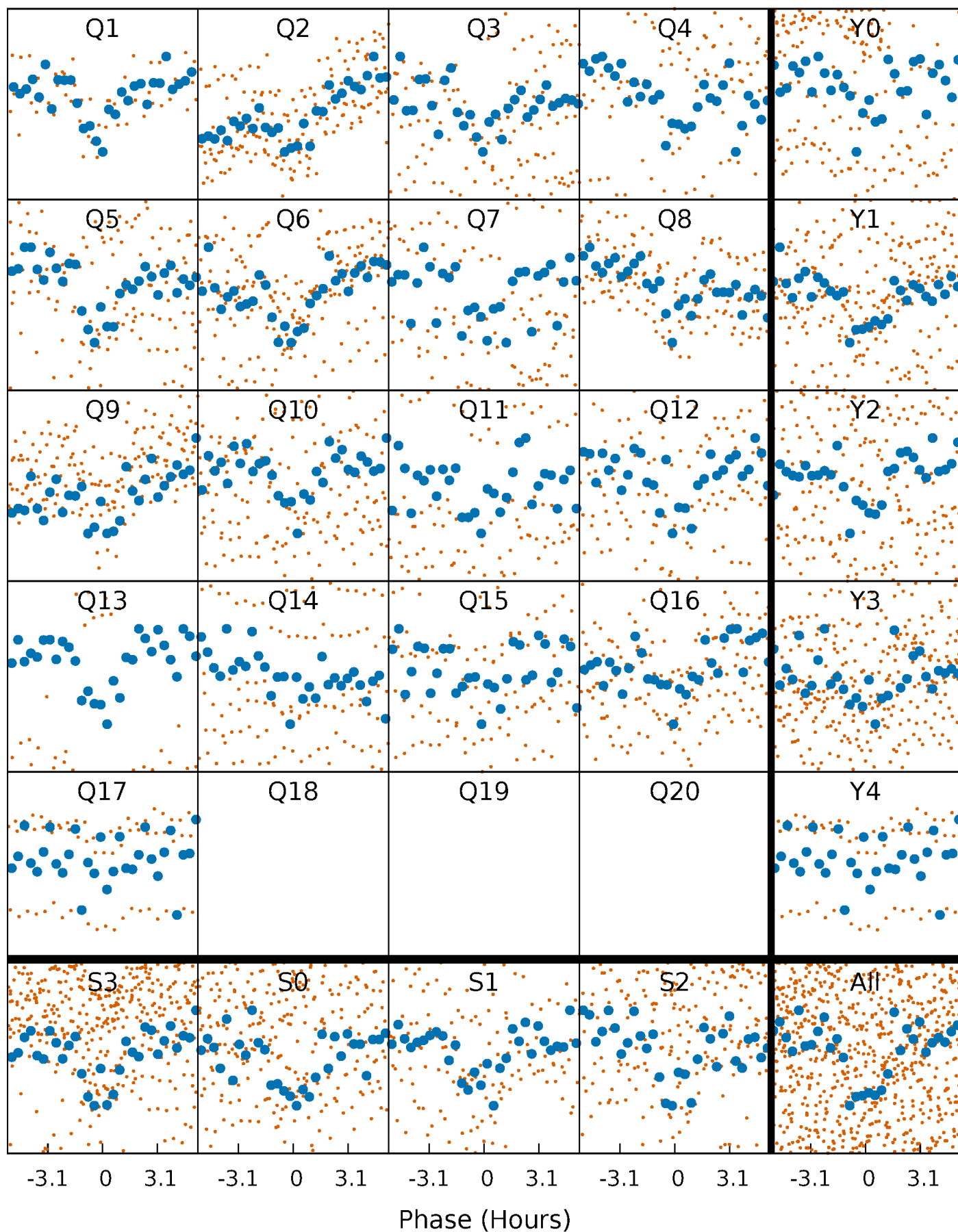


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



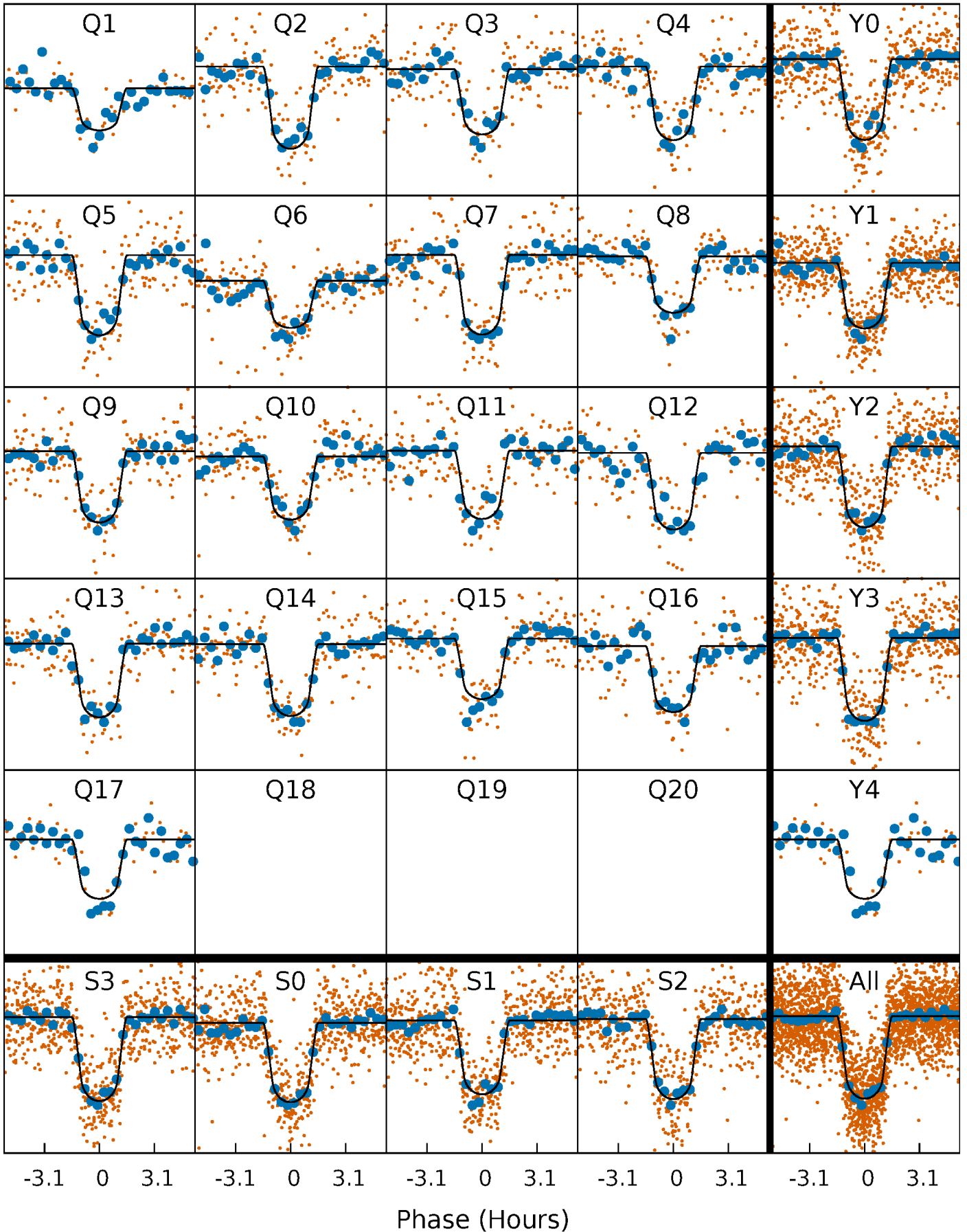
PDC Quarter-Phased Transit Curves

TCE 005640085-01 P= 10.139600 Days $T_0=137.892101$ (BKJD)



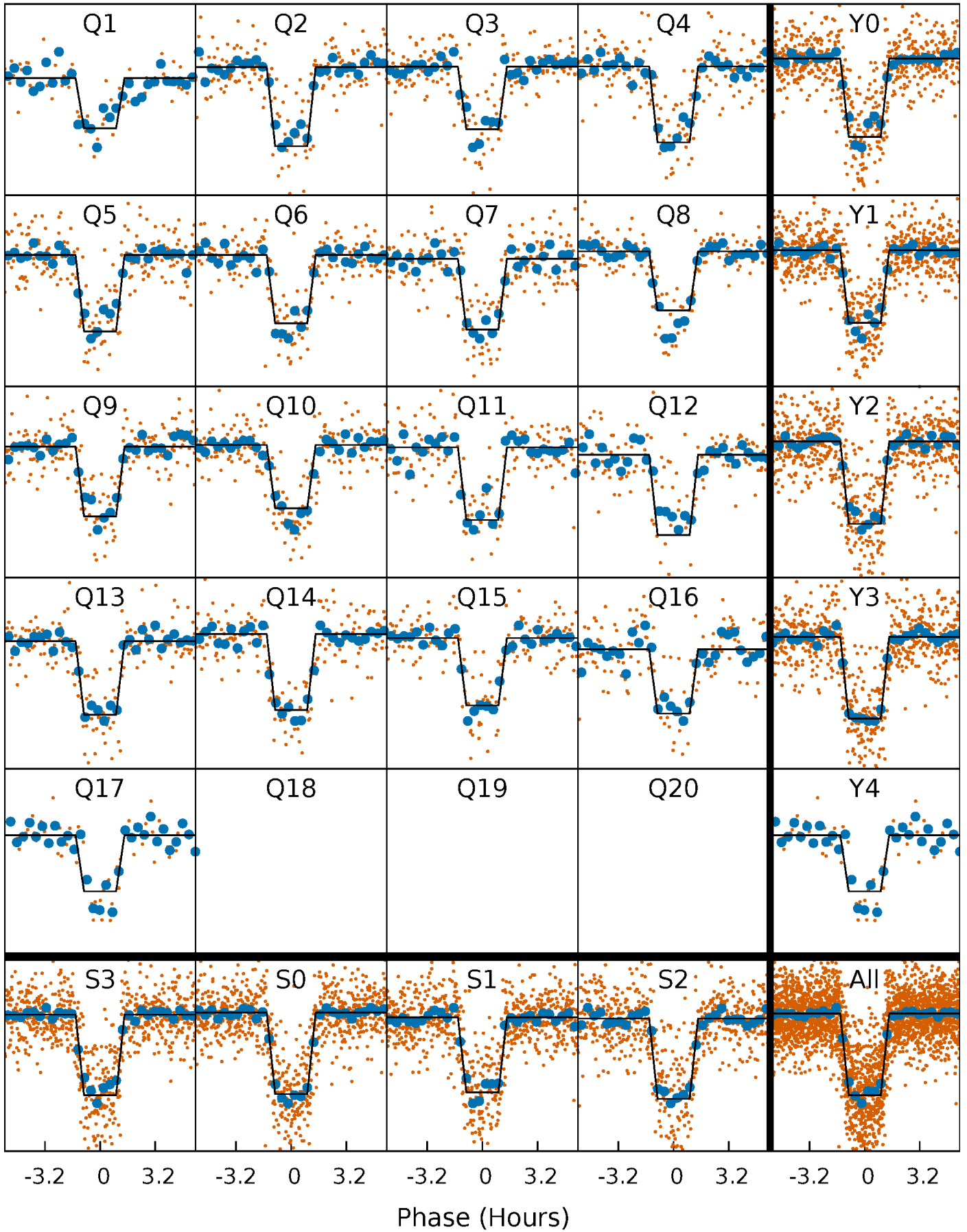
DV Quarter-Phased Transit Curves

TCE 005640085-01 P= 10.139600 Days $T_0=137.892101$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

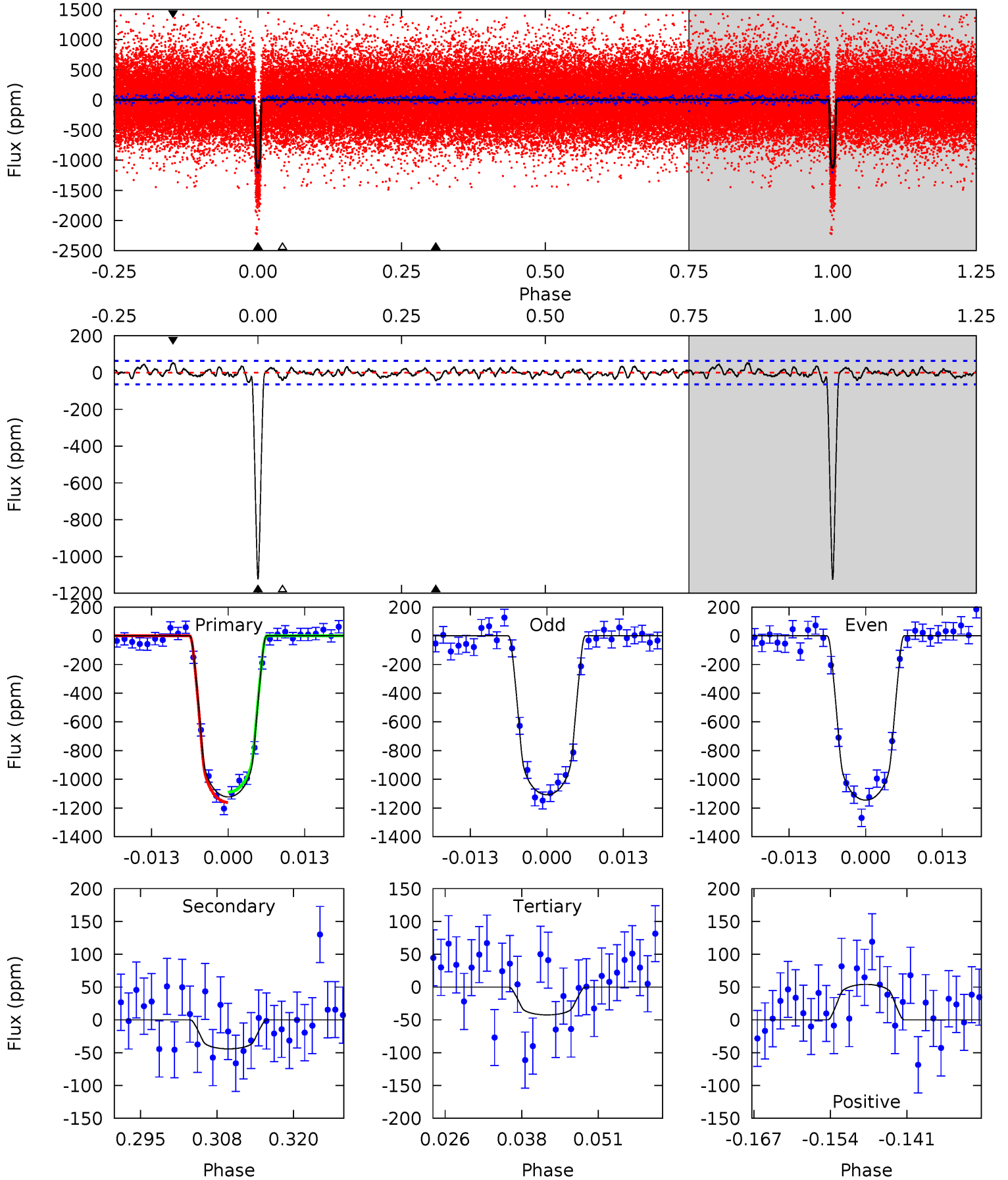
TCE 005640085-01 P= 10.139581 Days $T_0=137.893493$ (BKJD)



DV Model-Shift Uniqueness Test

005640085-01, $P = 10.139600$ Days, $E = 127.752501$ Days

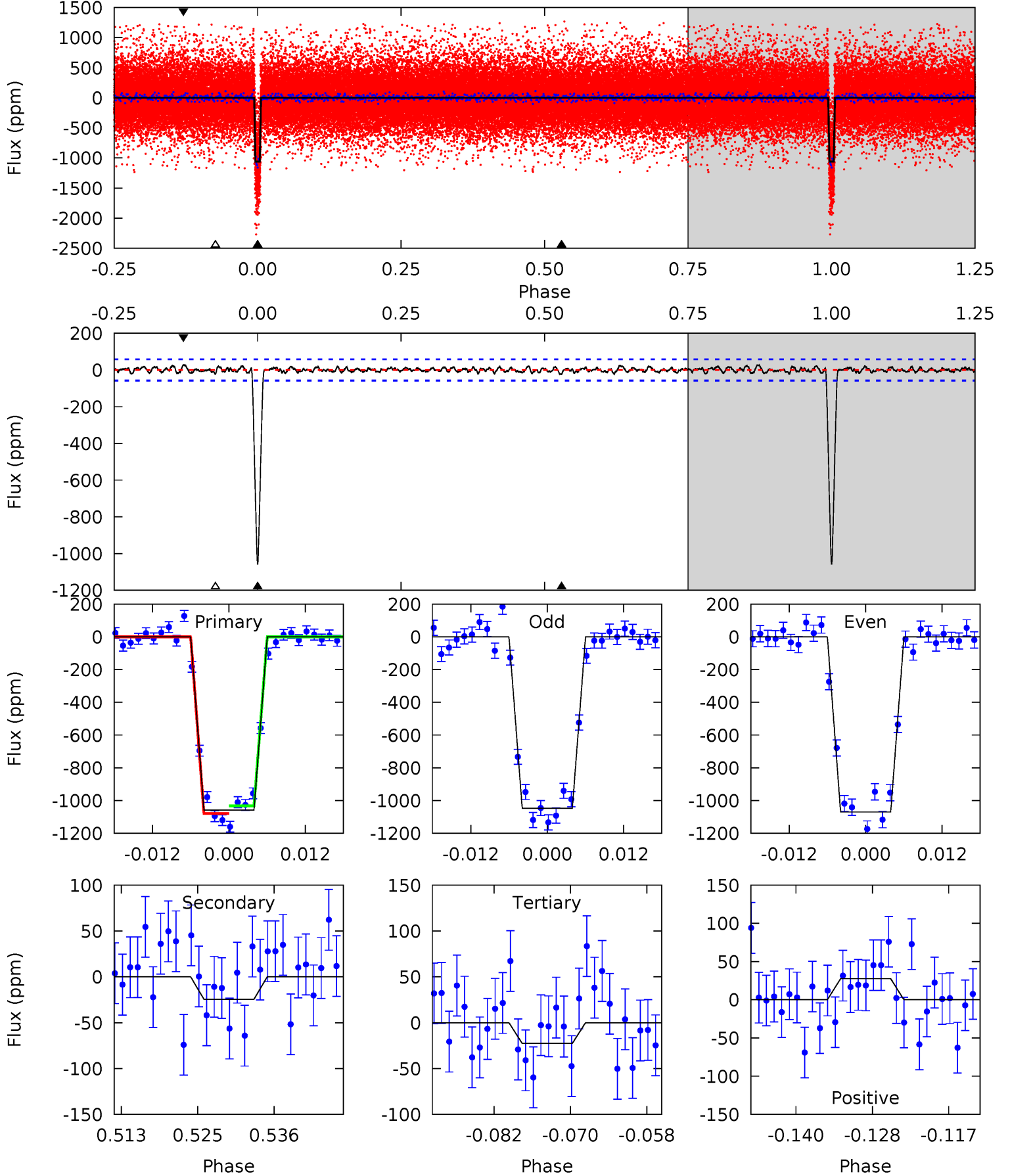
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
87.5	3.44	3.31	4.21	4.98	2.49	1.26	84.2	83.3	0.14	-0.77	1.47	1.00	0.05	2.80



Alt Model-Shift Uniqueness Test

005640085-01, P = 10.139581 Days, E = 127.753912 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
91.4	2.11	1.95	2.38	5.00	2.52	0.80	89.4	89.0	0.16	-0.27	0.99	0.99	0.03	2.01



Stellar Parameters For KIC 005640085

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	3893^{+78}_{-85}	$4.758^{+0.040}_{-0.036}$	$-0.280^{+0.150}_{-0.150}$	$0.500^{+0.037}_{-0.041}$	$0.521^{+0.034}_{-0.041}$	$5.887^{+1.143}_{-0.877}$
	+2%/-2%	+1%/-1%	+54%/-54%	+7%/-8%	+7%/-8%	+19%/-15%
Source	SPE5	SPE5	SPE5	DSEP		

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

Secondary Eclipse Parameters for KIC 005640085-01 / KOI 0448.01

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-44 ± 13	$1.81^{+0.21}_{-0.20}$	623^{+17}_{-16}	2447^{+114}_{-117}	40^{+16}_{-13}
Alt.	-24 ± 12	$1.77^{+0.23}_{-0.20}$	624^{+17}_{-15}	2296^{+136}_{-187}	24^{+14}_{-13}

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 $T_{\text{obs}} \gg T_{\text{max}}$ AND $A_{\text{obs}} \gg 1.0$

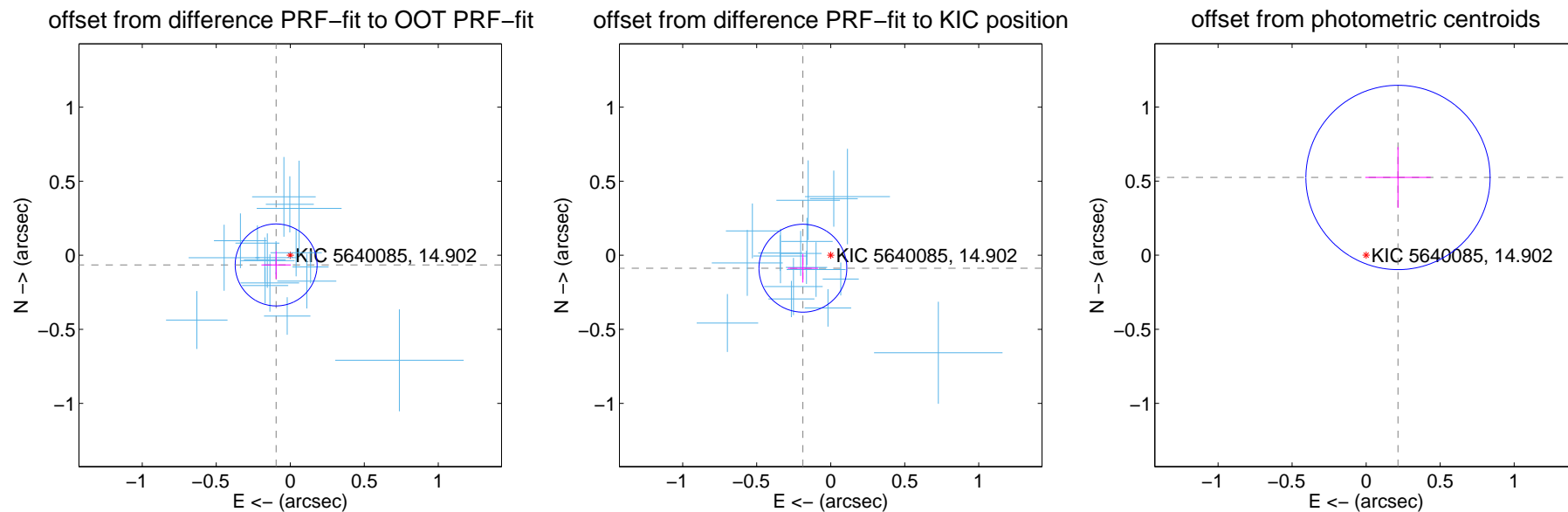
DV Centroid Data

Supplemental centroid analysis for 005640085-01. Kepler magnitude: 14.90. Transit SNR 54.59

There are 17 quarters with good PRF difference image offsets

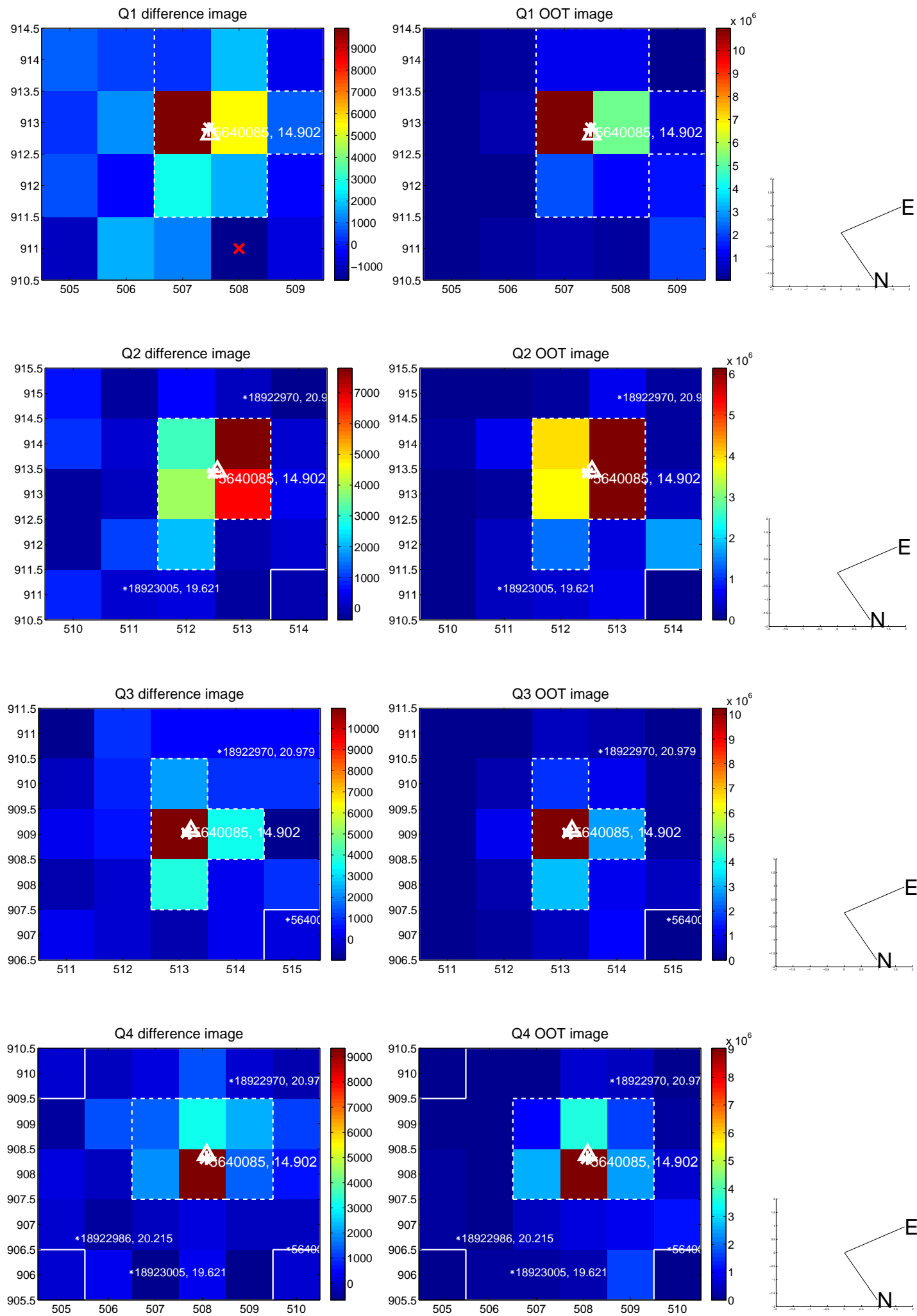
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.116 ± 0.092	1.25	0.095 ± 0.099	-0.065 ± 0.094
PRF-fit source offset from KIC position	0.207 ± 0.099	2.10	0.188 ± 0.102	-0.087 ± 0.096
photometric centroid source offset	0.57 ± 0.21	2.74	-0.22 ± 0.22	0.52 ± 0.21

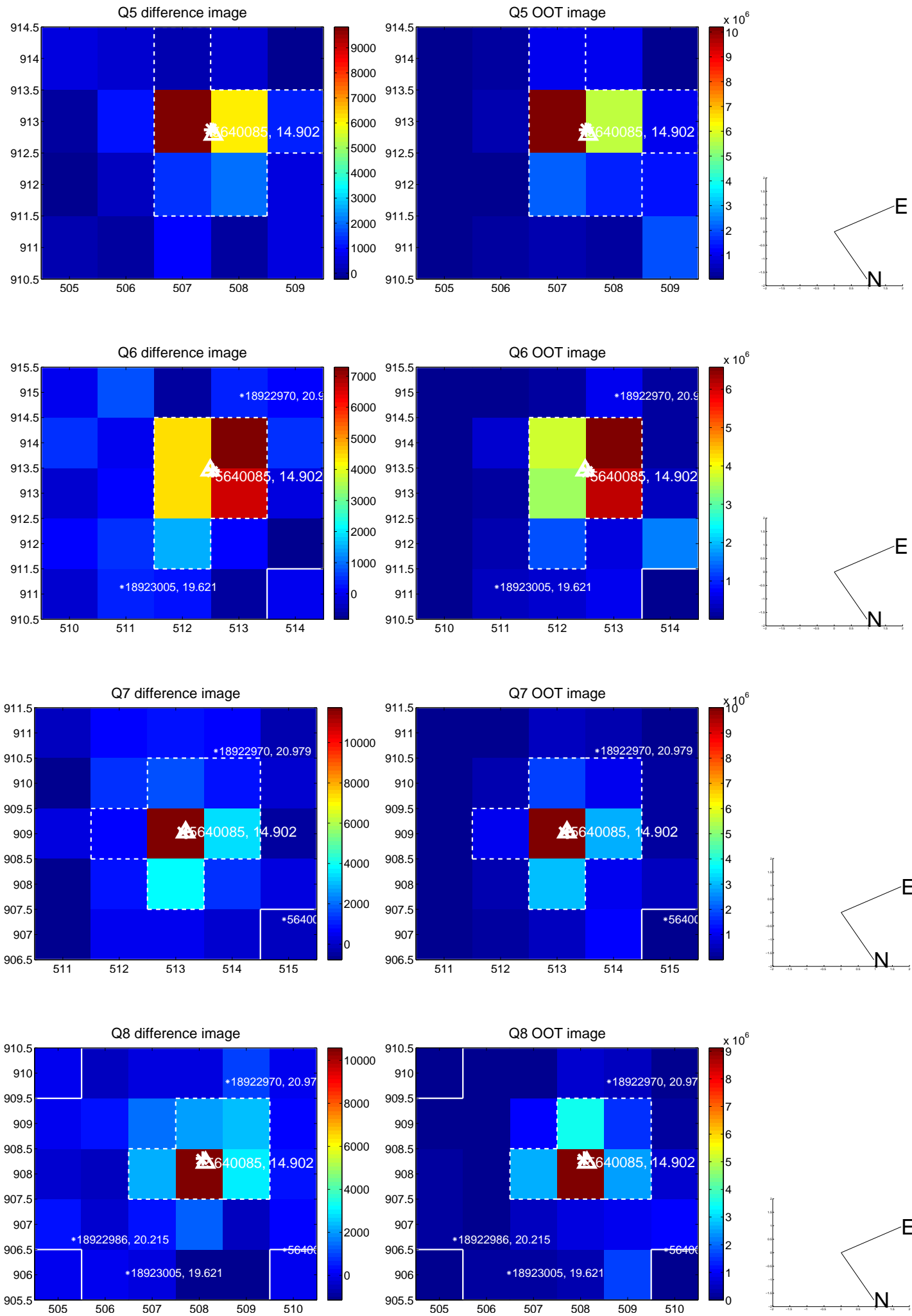


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

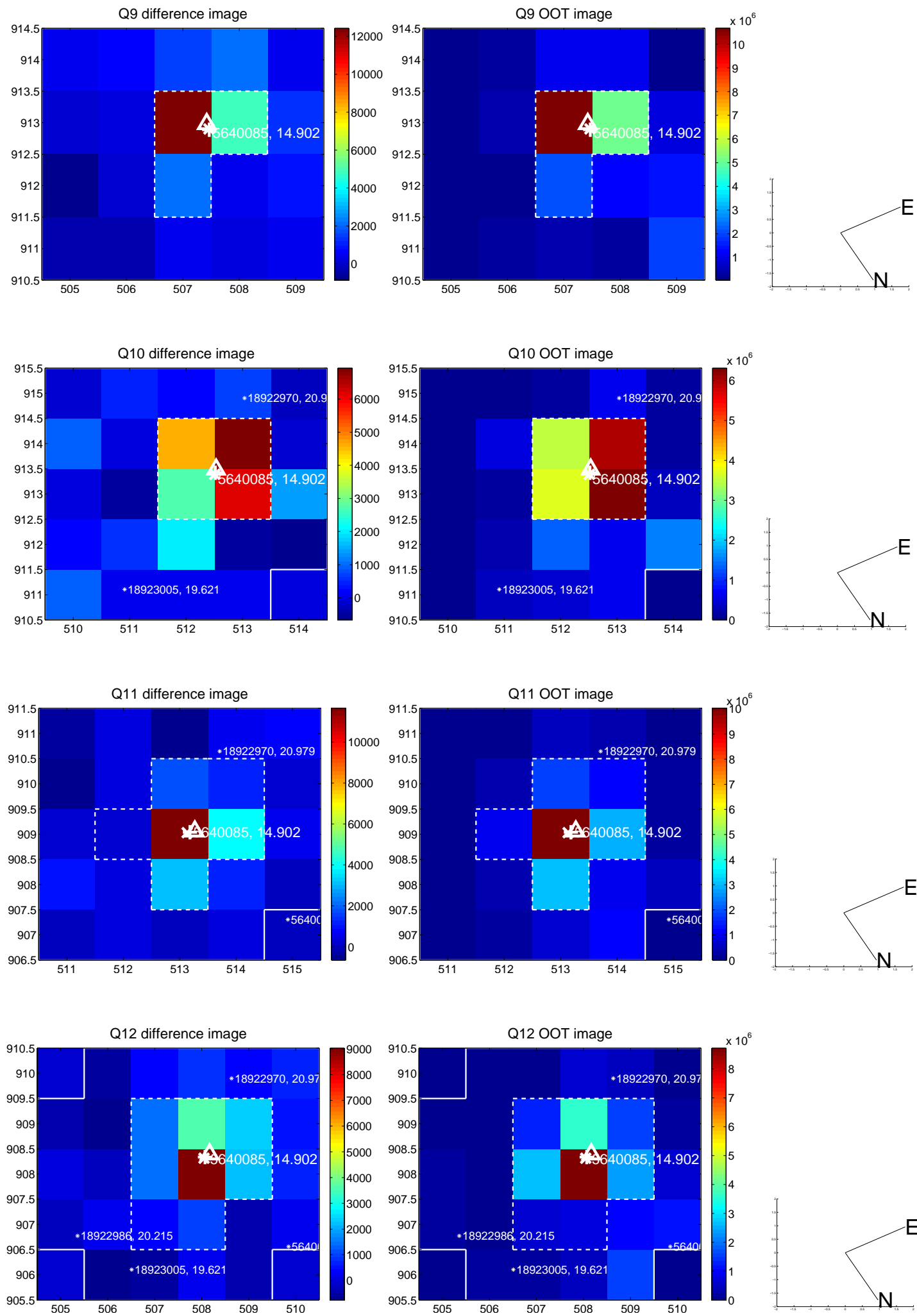
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



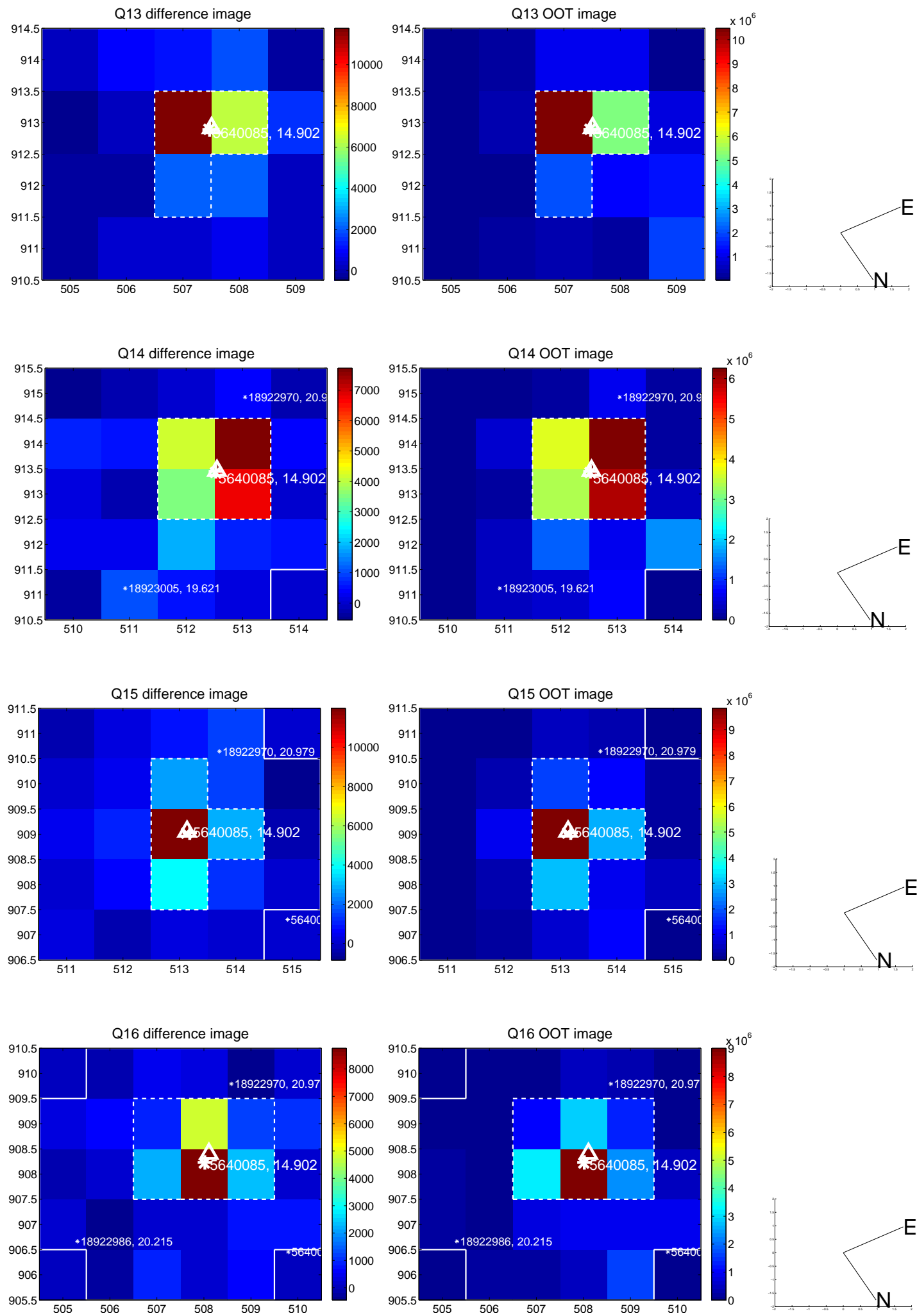
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



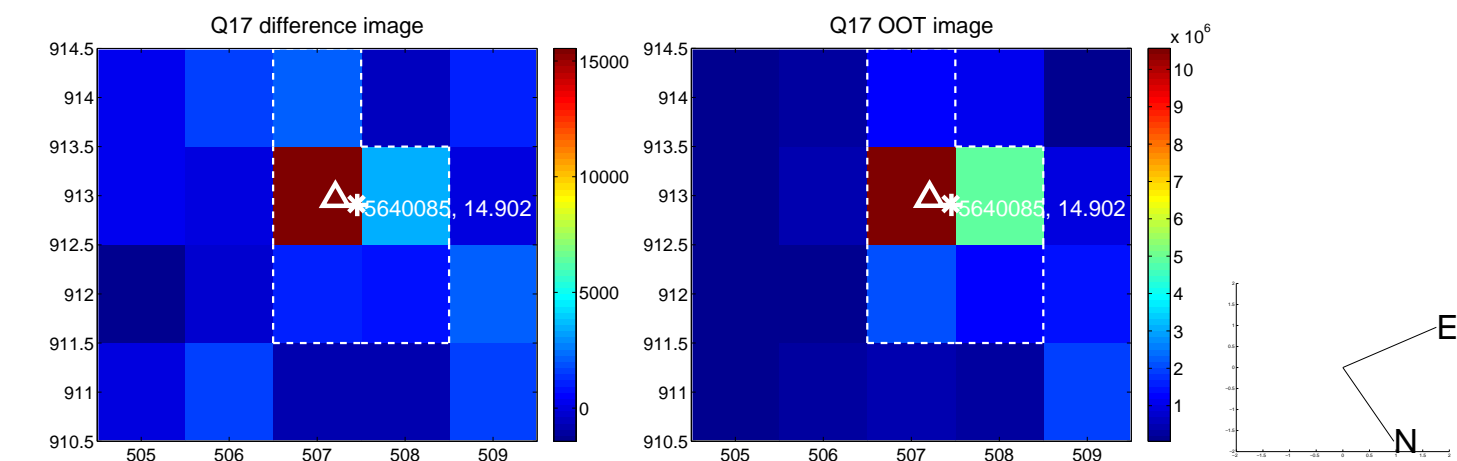
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



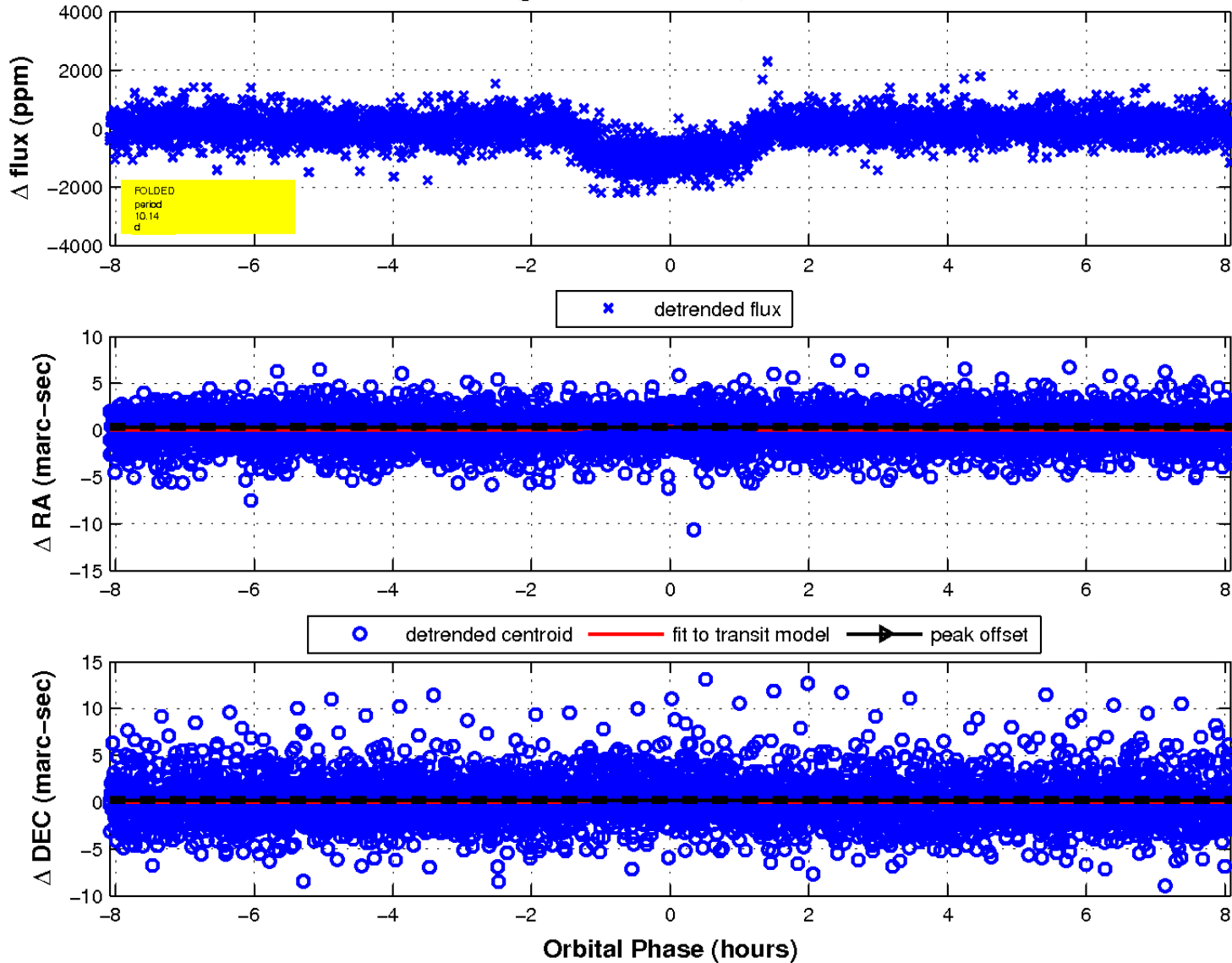
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

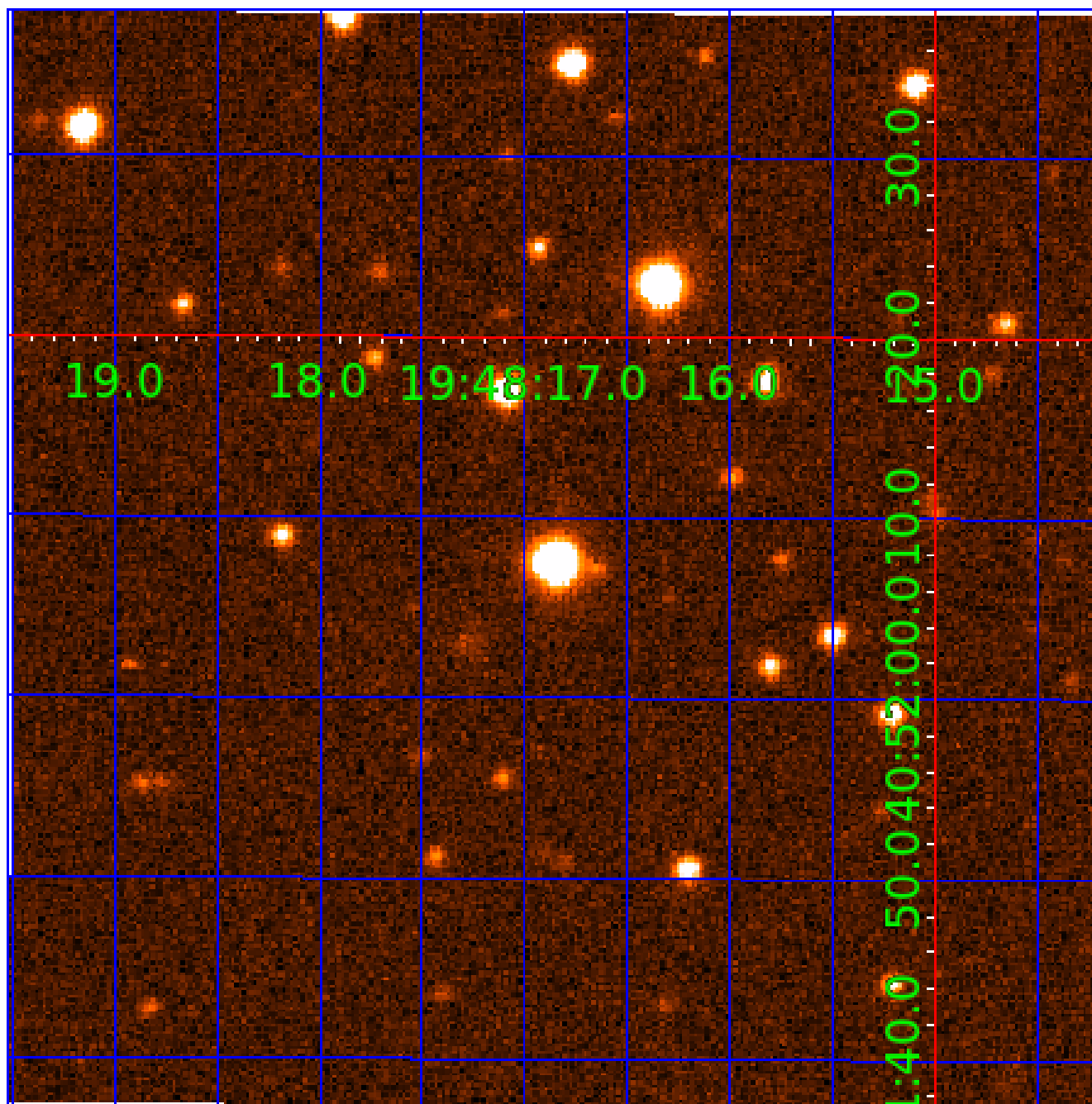


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination



KIC 005640085

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})
005640085-01	OBS	0448.01	10.139600	137.892101	1121.3	2.695	51.1	54.6	0.50	3893	1.81	9.43
005640085-02	OBS	0448.02	43.573898	151.244765	1817.3	6.479	31.8	37.7	0.50	3893	4.08	1.35

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005640085-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
005640085-02	OBS	FP	0.00	0	1	0	0	DEEP_V_SHAPED

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

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

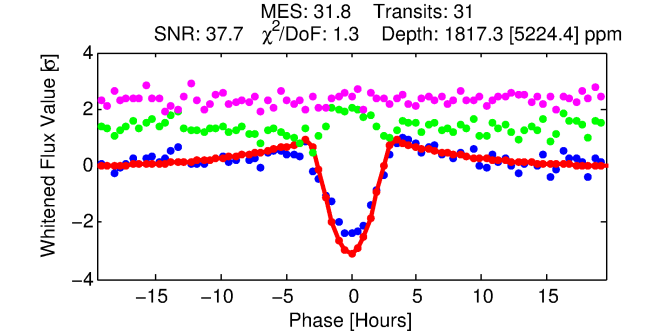
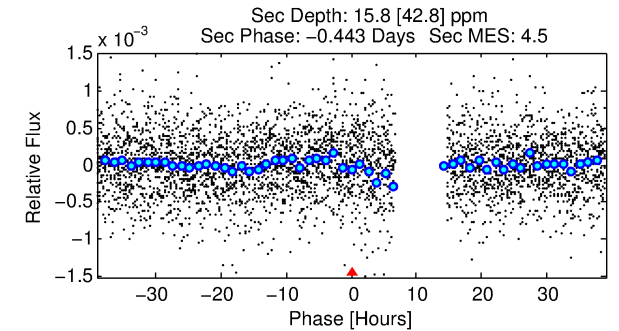
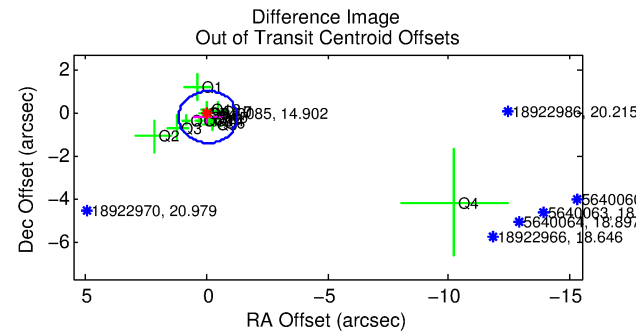
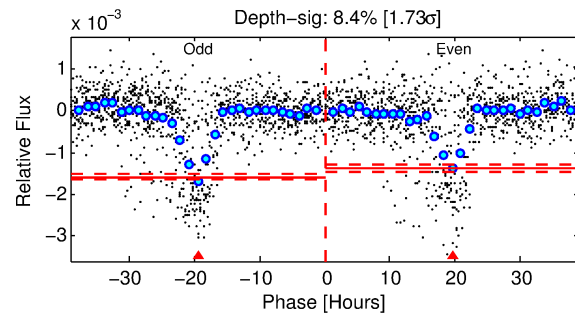
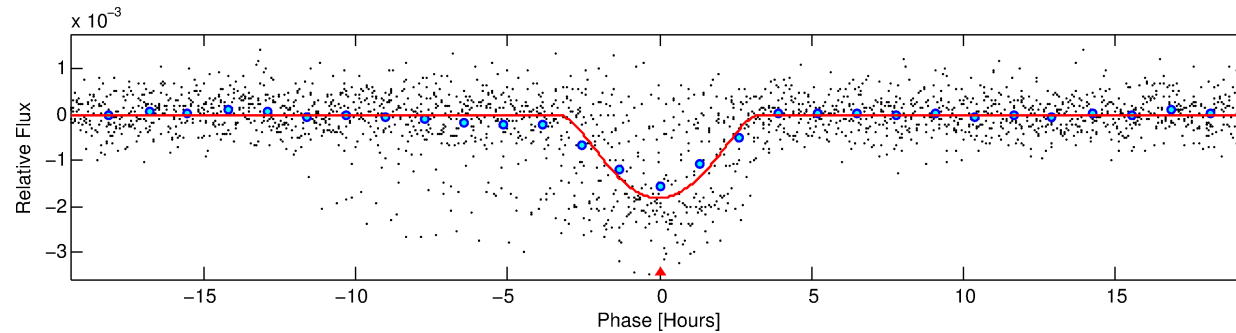
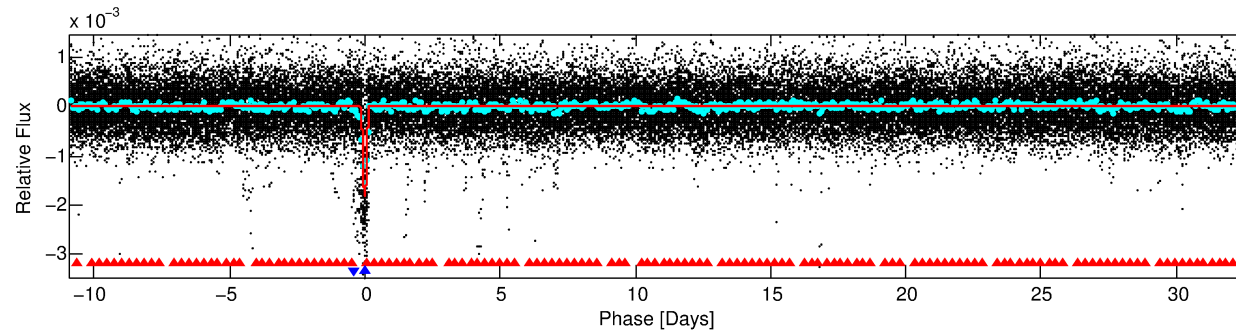
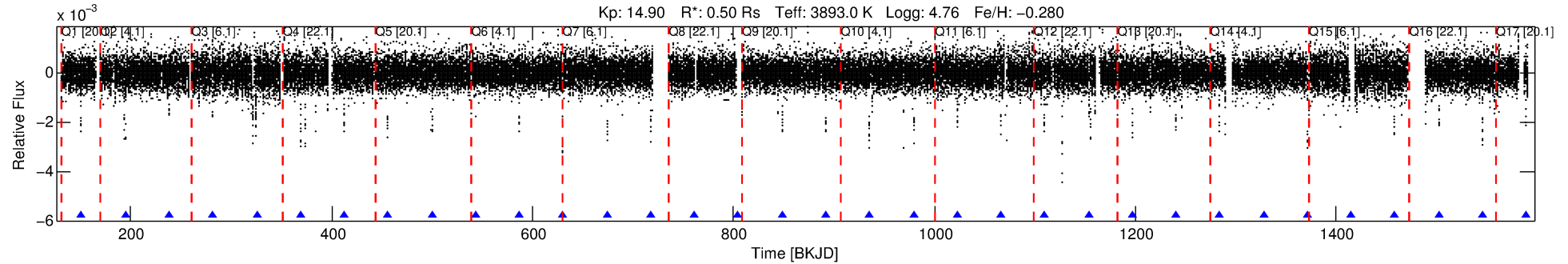
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 005640085-02

No Significant Match Found

DV One-Page Summary

KIC: 5640085 Candidate: 2 of 2 Period: 43.574 d
KOI: K00448 Name: Kepler-159 Corr: No Ephemeris Match



DV Fit Results:

Period = 43.57390 [0.00020] d
Epoch = 151.2448 [0.0038] BKJD
Rp/R* = 0.0748 [0.0713]
a/R* = 20.27 [4.15]
b = 1.00 [0.04]
Seff = 1.35 [0.16]
Teff = 275 [8] K
Rp = 4.08 [3.91] Re
a = 0.1952 [0.0122] AU
Ag = 19.94 [66.00] [0.29 σ]
Teffp = 898 [743] K [0.84 σ]

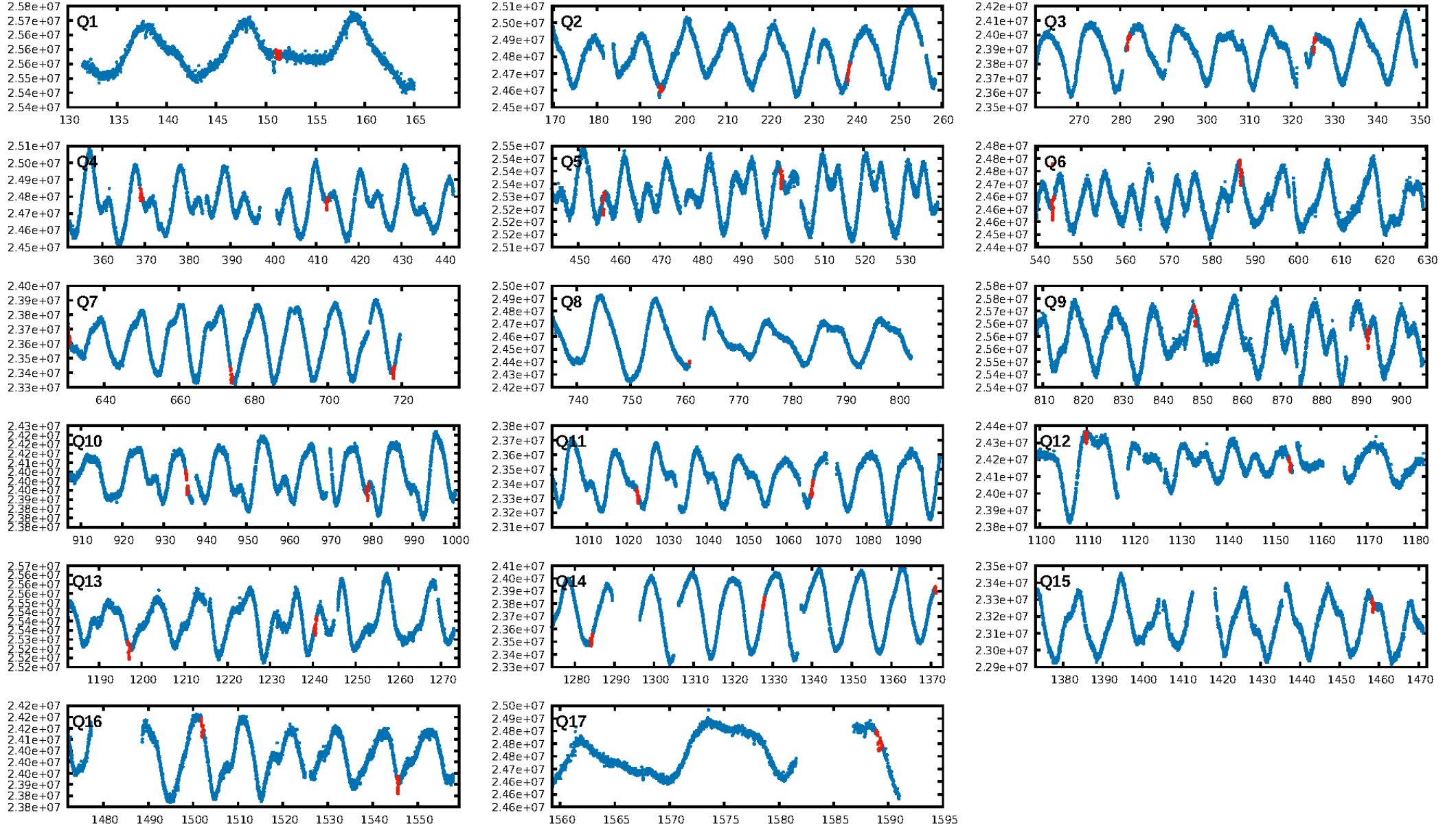
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [114.34 σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 0.0%
ModelChiSquareGof-sig: 2.4%
Bootstrap-pfa: 8.85e-135
RollingBand-fgt: 1.00 [29/29]
GhostDiagnostic-chr: 3.802
Centroid-sig: 0.0%
Centroid-so: 0.017 arcsec [0.07 σ]
OotOffset-rm: 0.189 arcsec [0.47 σ]
KicOffset-rm: 0.174 arcsec [0.74 σ]
OotOffset-st: 4/4/3/5 [16]
KicOffset-st: 4/4/3/5 [16]
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DiffImageOverlap-fno: 1.00 [16/16]

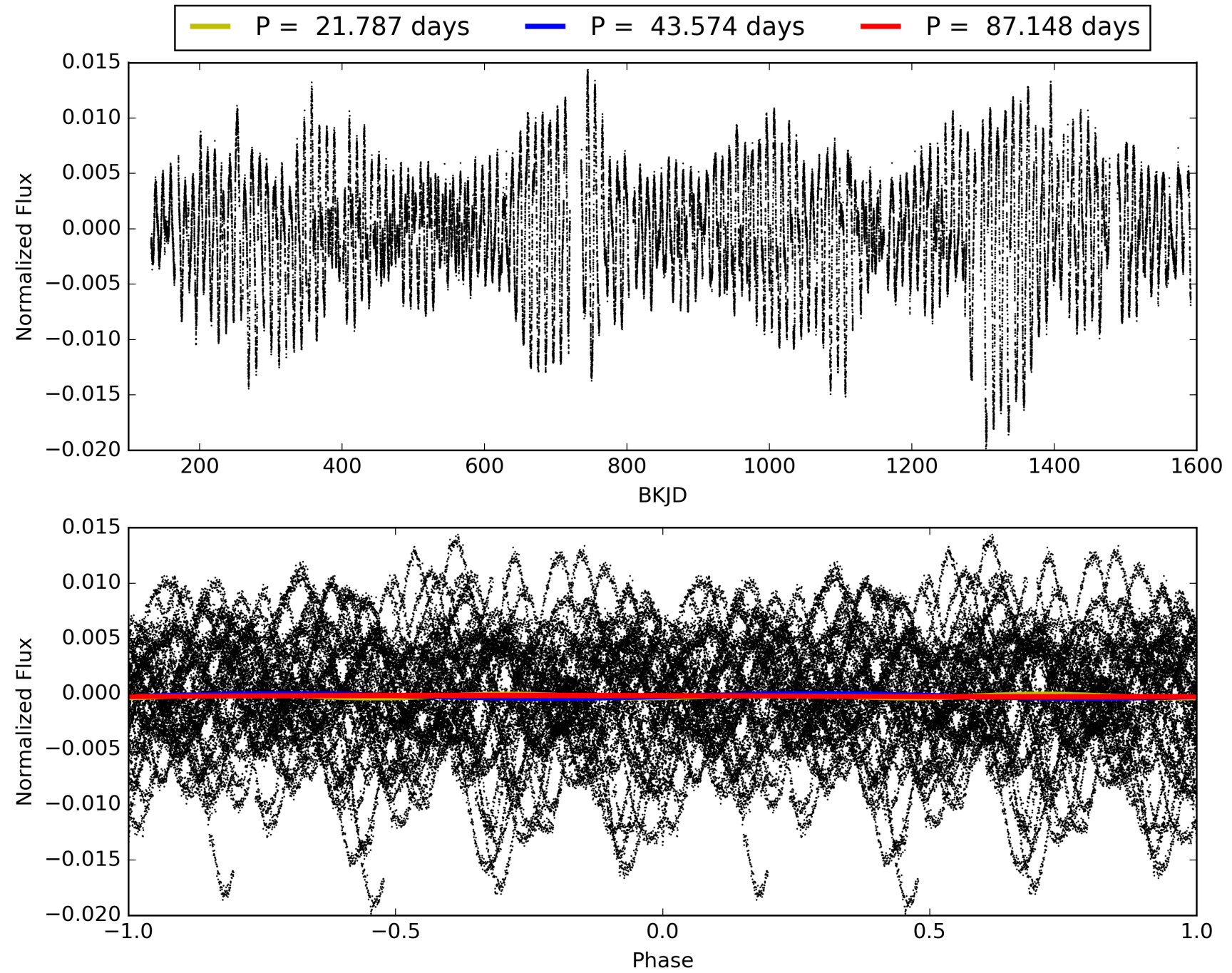
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 19:20:20 Z

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

TCE 005640085-02, PDC Light Curves

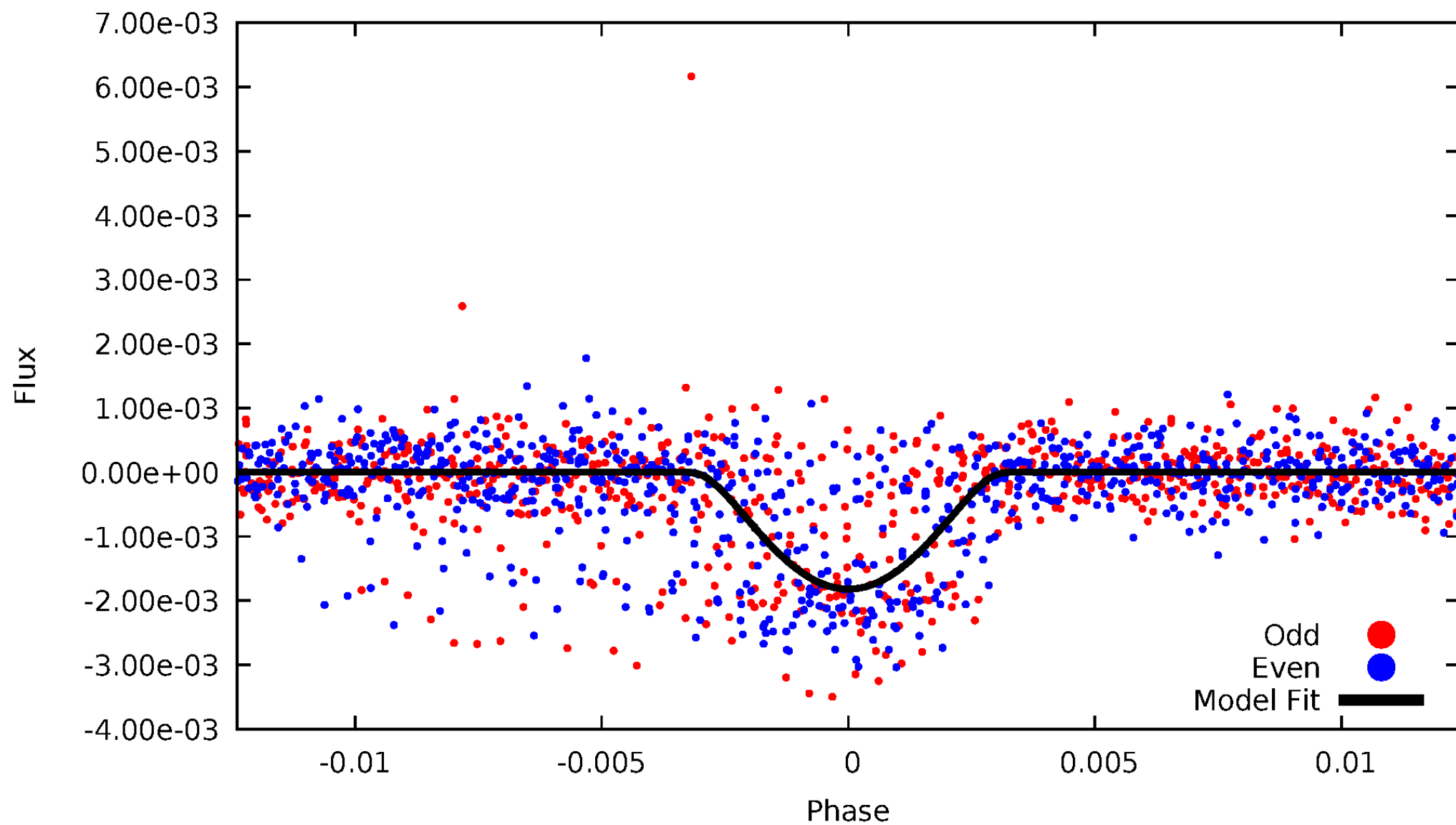


TCE 005640085-02



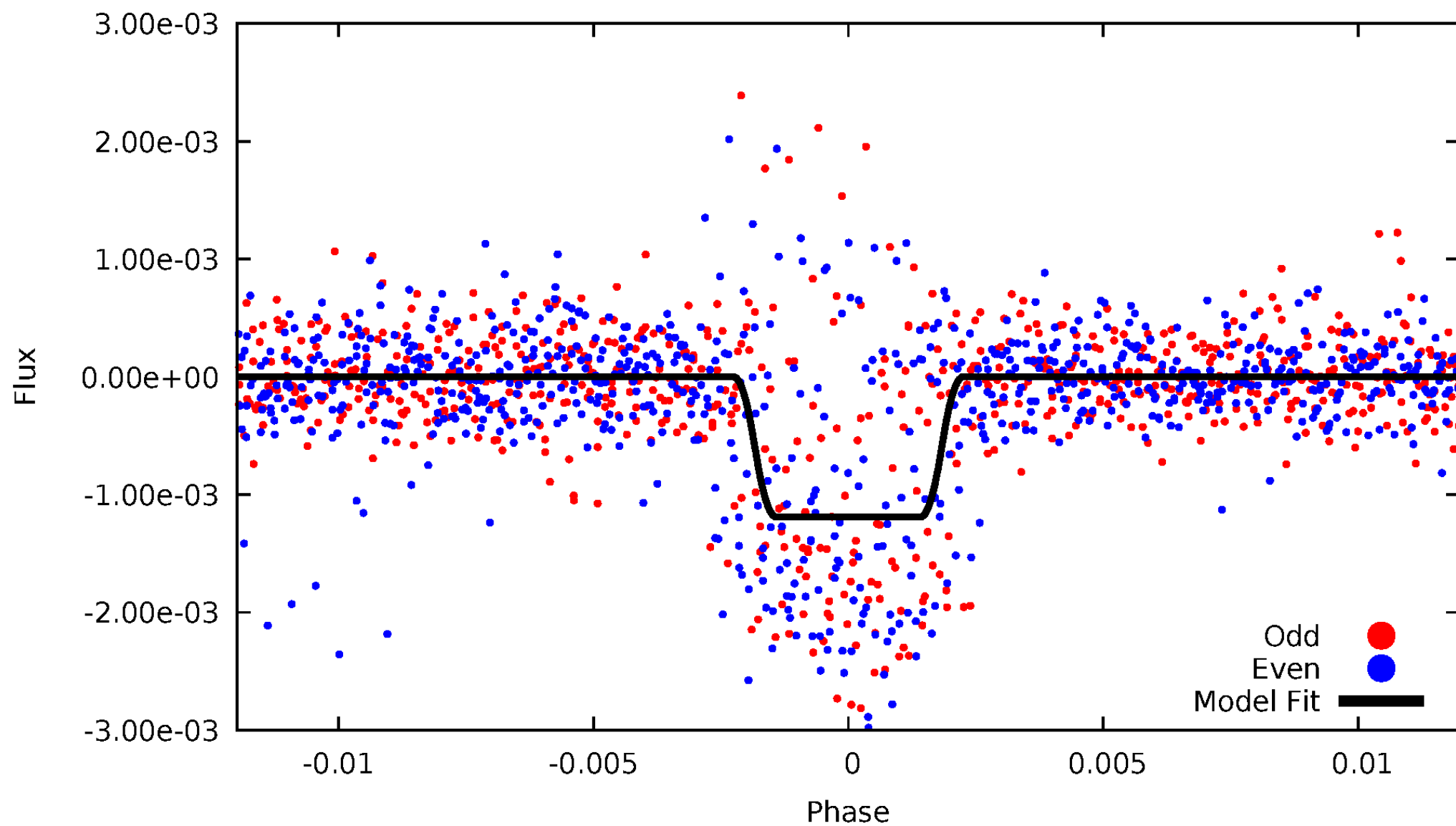
DV Odd/Even

TCE 005640085-02



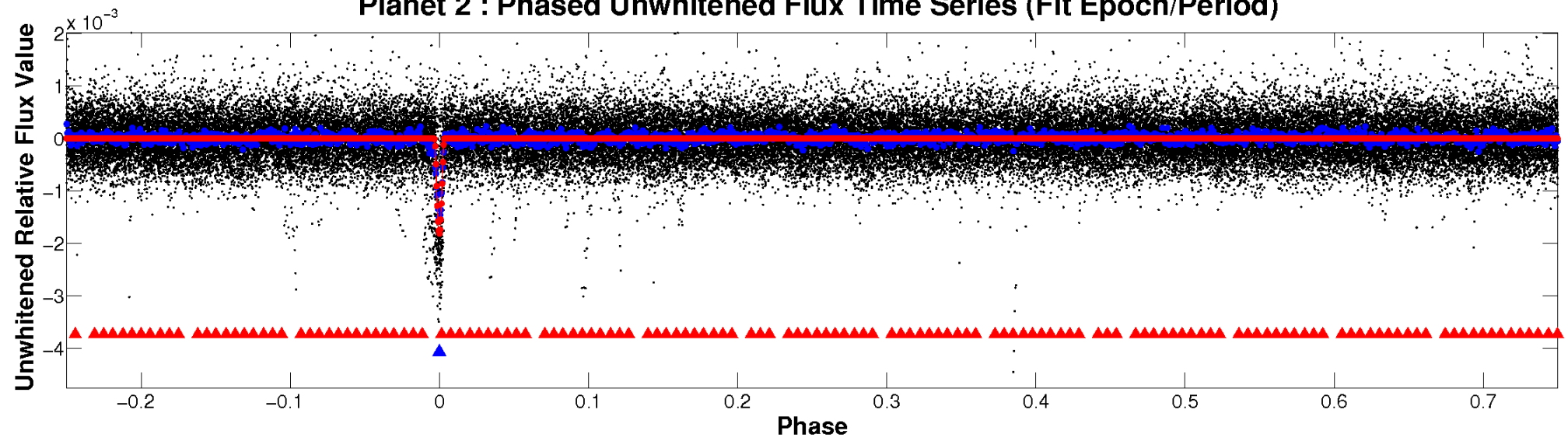
ALT Odd/Even

TCE 005640085-02

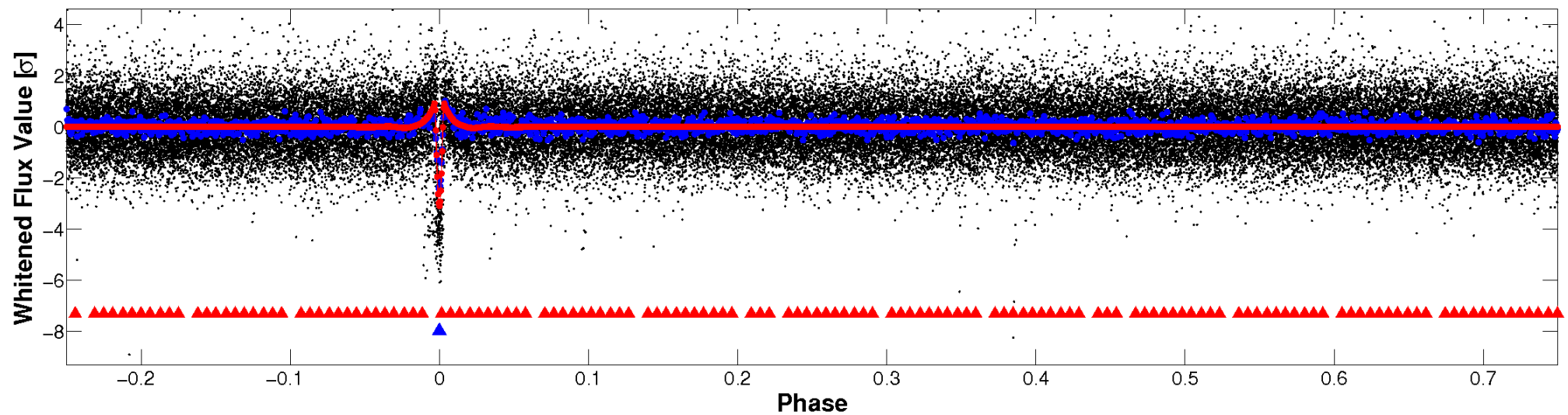


Non-Whitened Vs. Whitened Light Curve

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

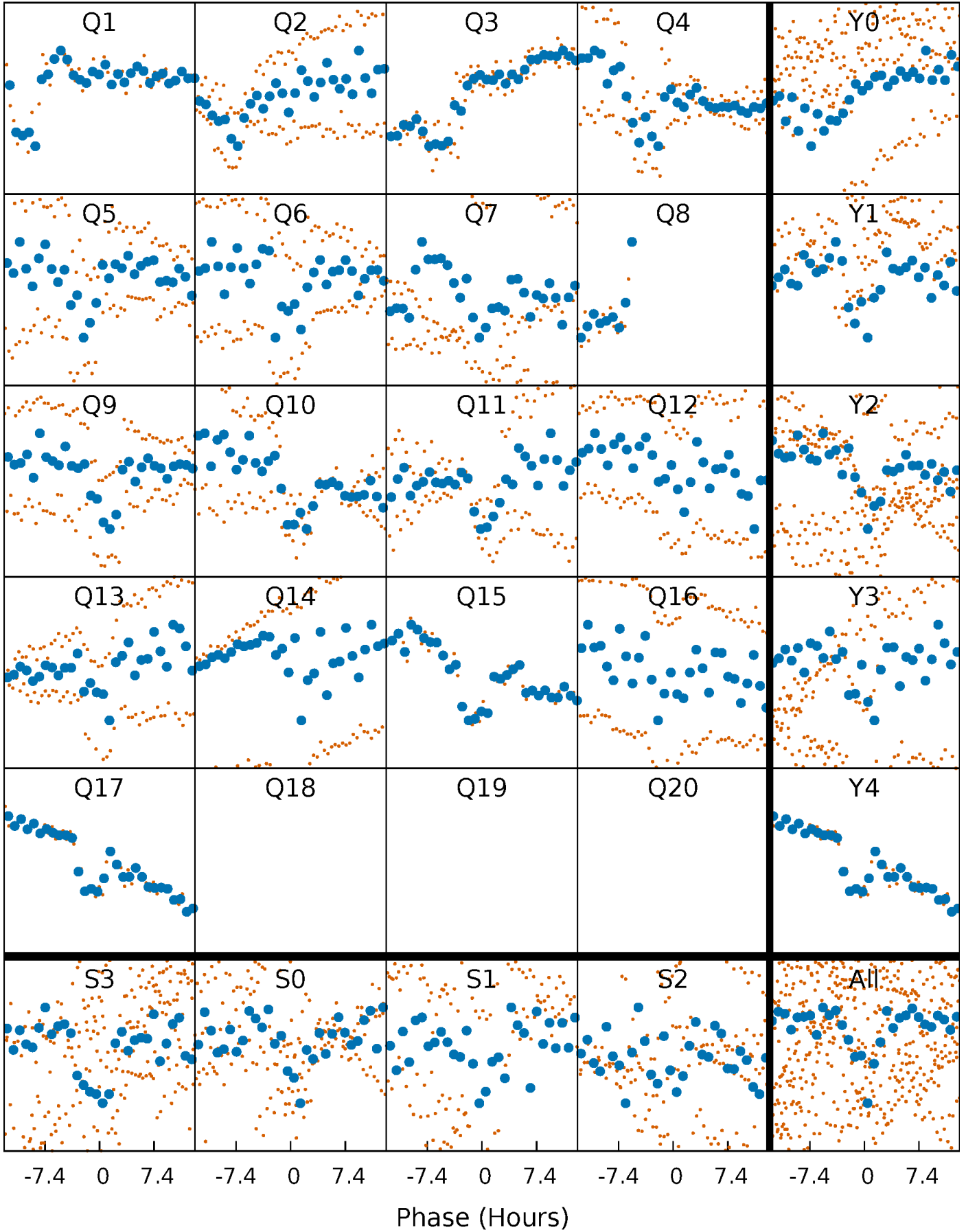


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



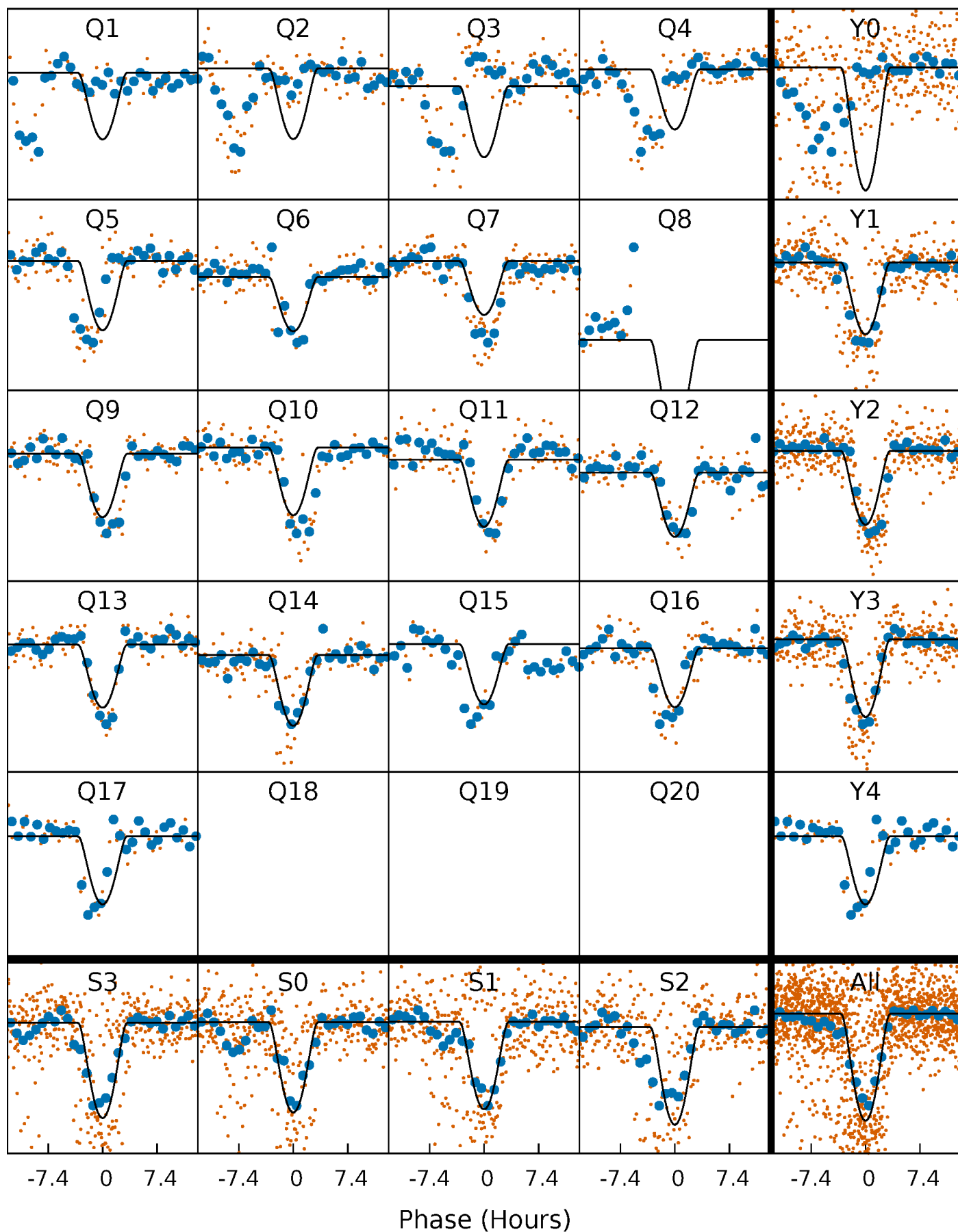
PDC Quarter-Phased Transit Curves

TCE 005640085-02 P= 43.573898 Days $T_0=151.244765$ (BKJD)



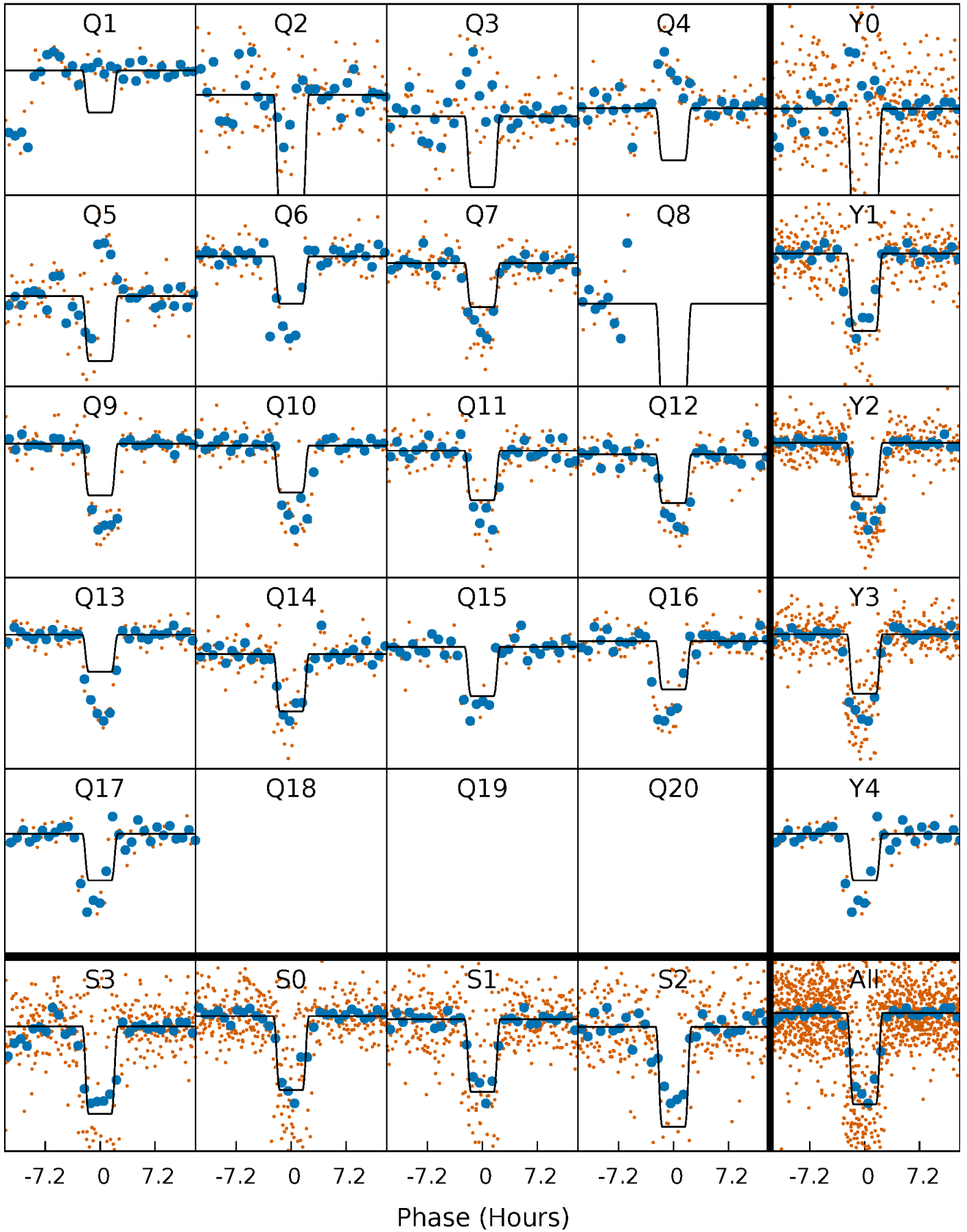
DV Quarter-Phased Transit Curves

TCE 005640085-02 $P = 43.573898$ Days $T_0 = 151.244765$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

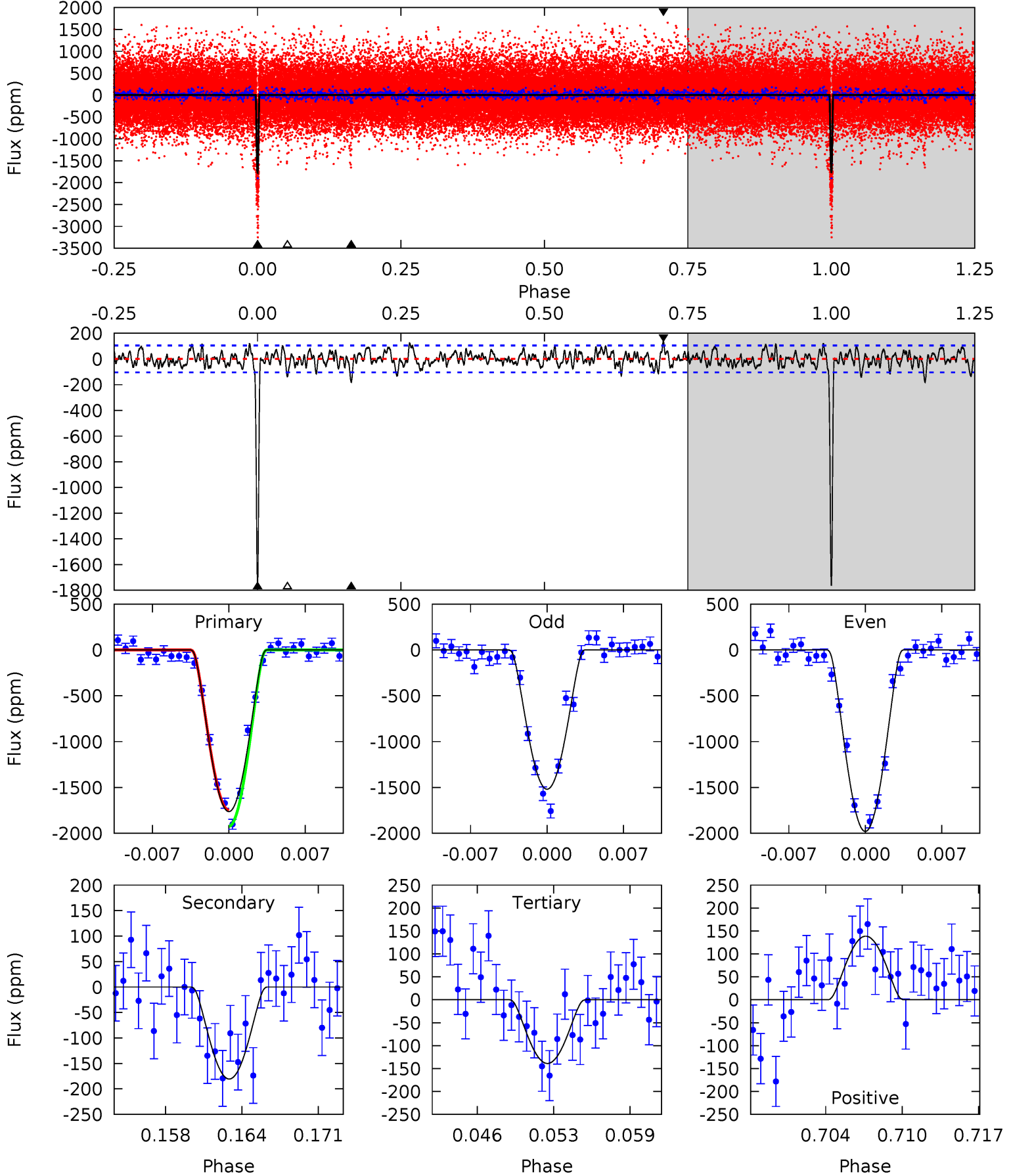
TCE 005640085-02 P= 43.572717 Days $T_0=151.277950$ (BKJD)



DV Model-Shift Uniqueness Test

005640085-02, P = 43.573898 Days, E = 107.670867 Days

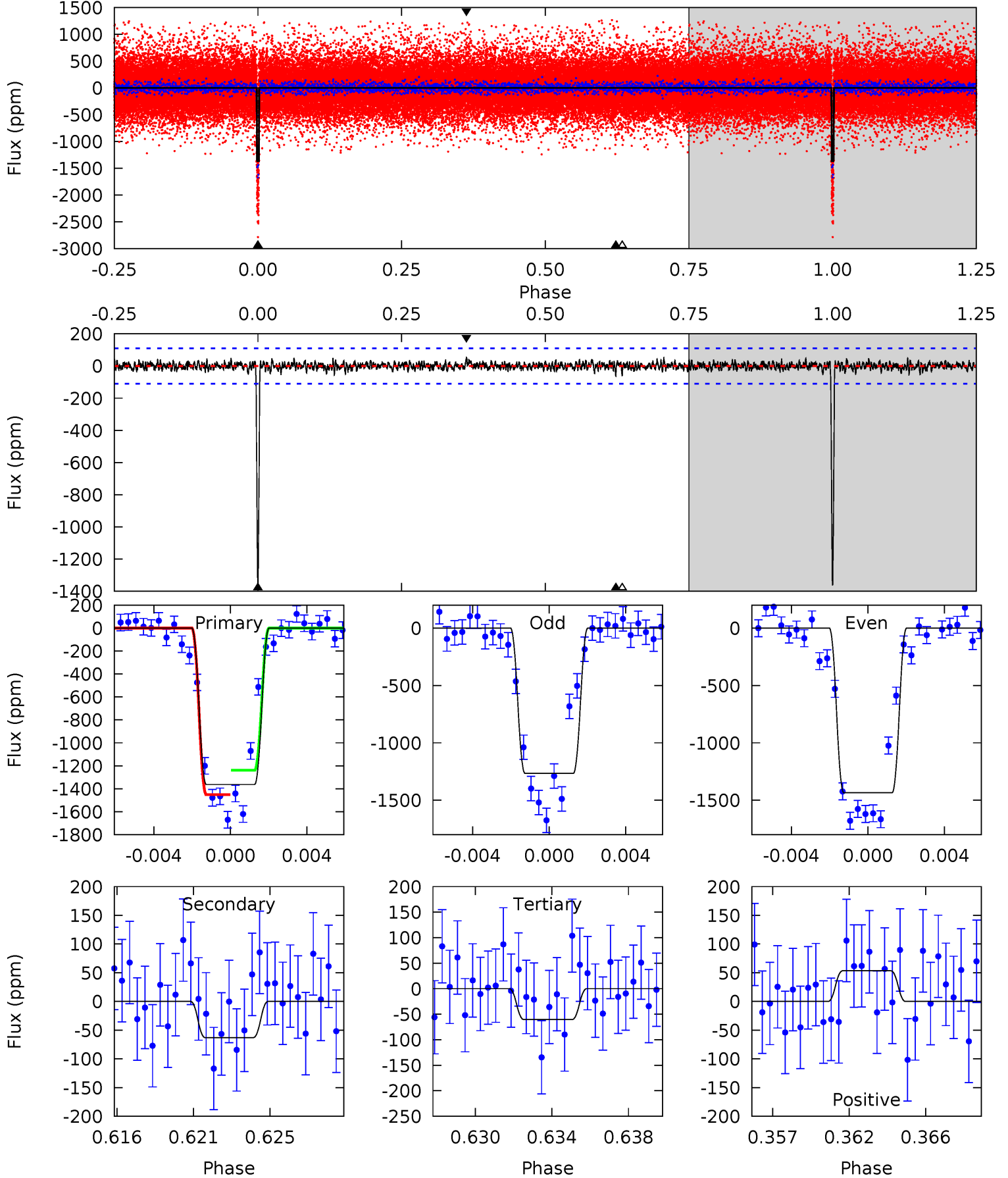
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
86.1	8.81	6.78	6.76	5.11	2.72	2.18	79.3	79.3	2.03	2.04	11.1	1.03	0.07	4.22



Alt Model-Shift Uniqueness Test

005640085-02, $P = 43.572717$ Days, $E = 107.705233$ Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
64.4	2.97	2.85	2.52	5.18	2.84	0.74	61.5	61.8	0.12	0.45	3.97	0.75	0.04	4.98



Stellar Parameters For KIC 005640085

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	$M(M_{\odot})$	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	3893^{+78}_{-85}	$4.758^{+0.040}_{-0.036}$	$-0.280^{+0.150}_{-0.150}$	$0.500^{+0.037}_{-0.041}$	$0.521^{+0.034}_{-0.041}$	$5.887^{+1.143}_{-0.877}$
	+2%/-2%	+1%/-1%	+54%/-54%	+7%/-8%	+7%/-8%	+19%/-15%
Source	SPE5	SPE5	SPE5	DSEP		

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

Secondary Eclipse Parameters for KIC 005640085-02 / KOI 0448.02

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-181 ± 20	$4.73^{+3.28}_{-3.25}$	384^{+10}_{-10}	2327^{+774}_{-272}	175^{+1529}_{-117}
Alt.	-63 ± 21	$3.71^{+3.22}_{-2.44}$	384^{+9}_{-11}	2159^{+656}_{-260}	90^{+762}_{-64}

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 $T_{\text{obs}} \gg T_{\text{max}}$ AND $A_{\text{obs}} \gg 1.0$

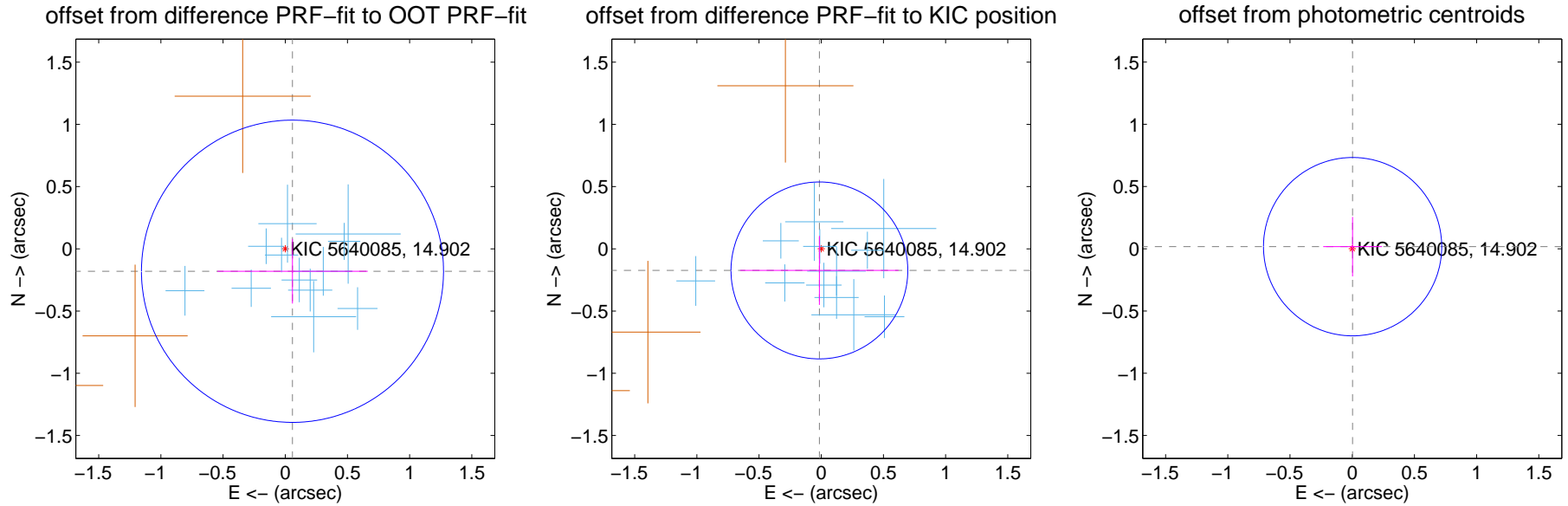
DV Centroid Data

Supplemental centroid analysis for 005640085-02. Kepler magnitude: 14.90. Transit SNR 37.74

There are 12 quarters with good PRF difference image offsets

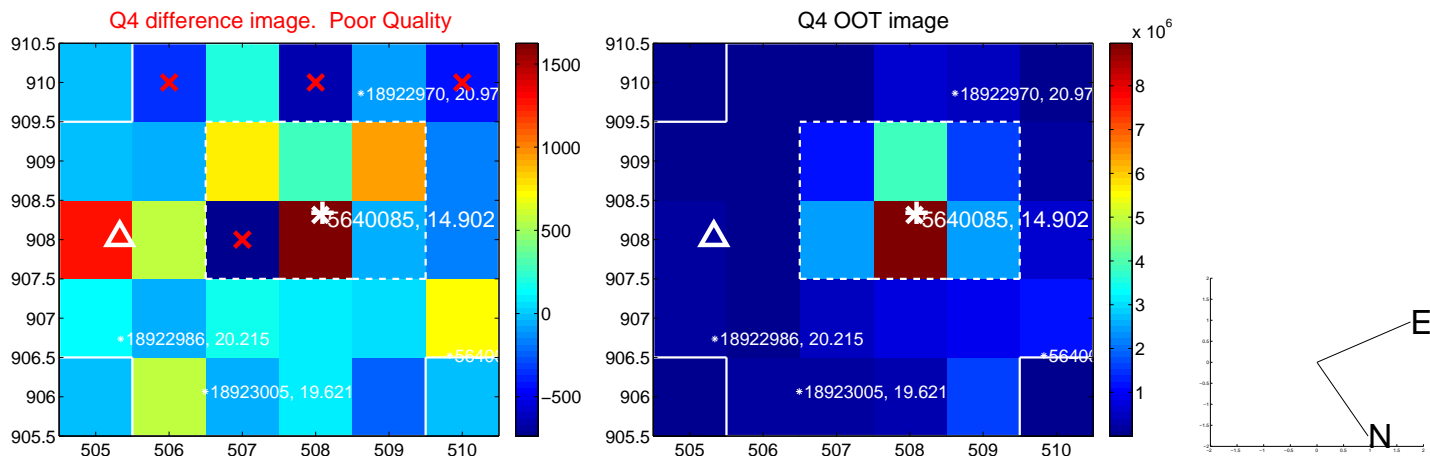
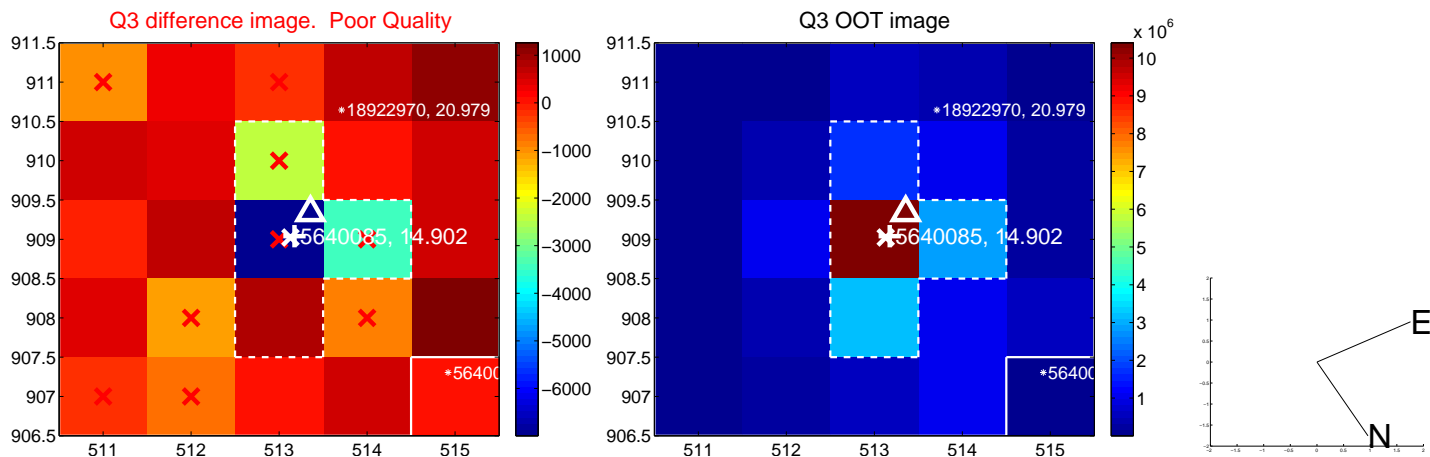
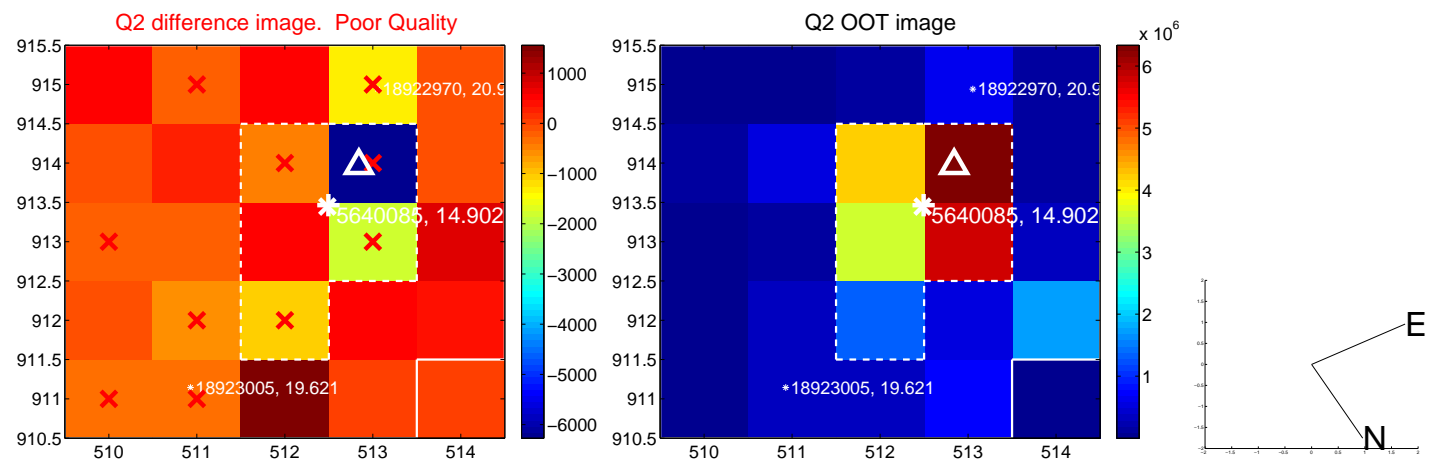
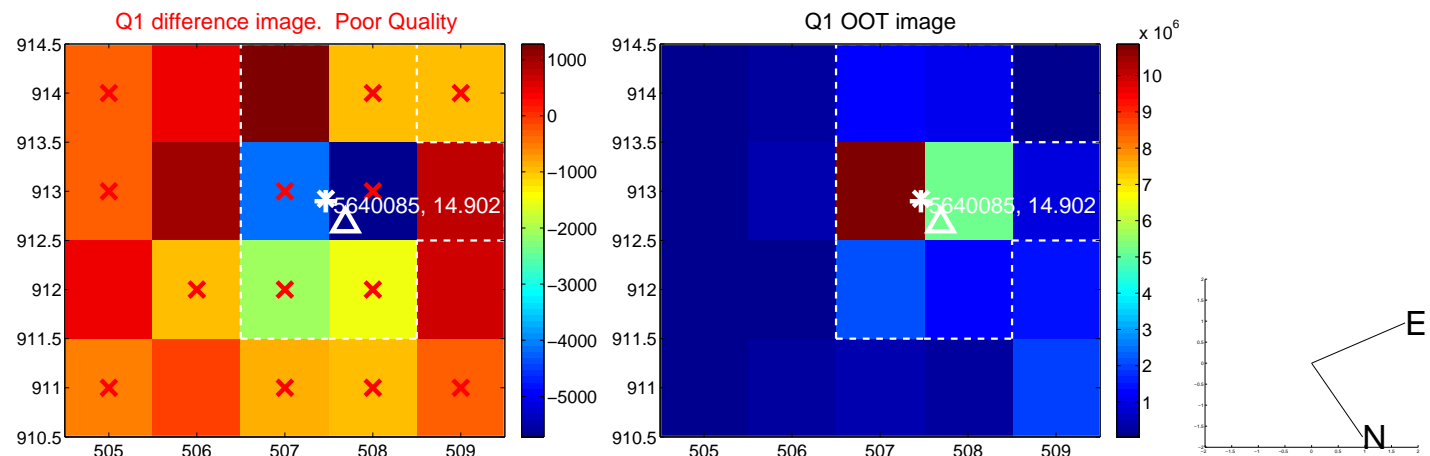
The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.189 ± 0.405	0.47	-0.058 ± 0.605	-0.180 ± 0.259
PRF-fit source offset from KIC position	0.174 ± 0.237	0.74	0.015 ± 0.636	-0.174 ± 0.277
photometric centroid source offset	0.02 ± 0.24	0.07	-0.00 ± 0.24	0.02 ± 0.24

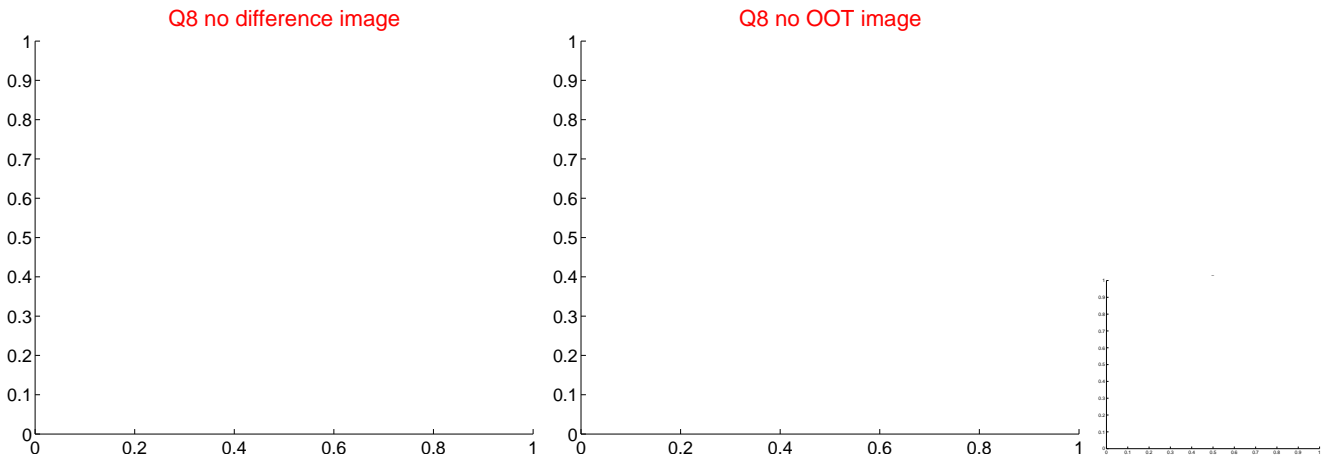
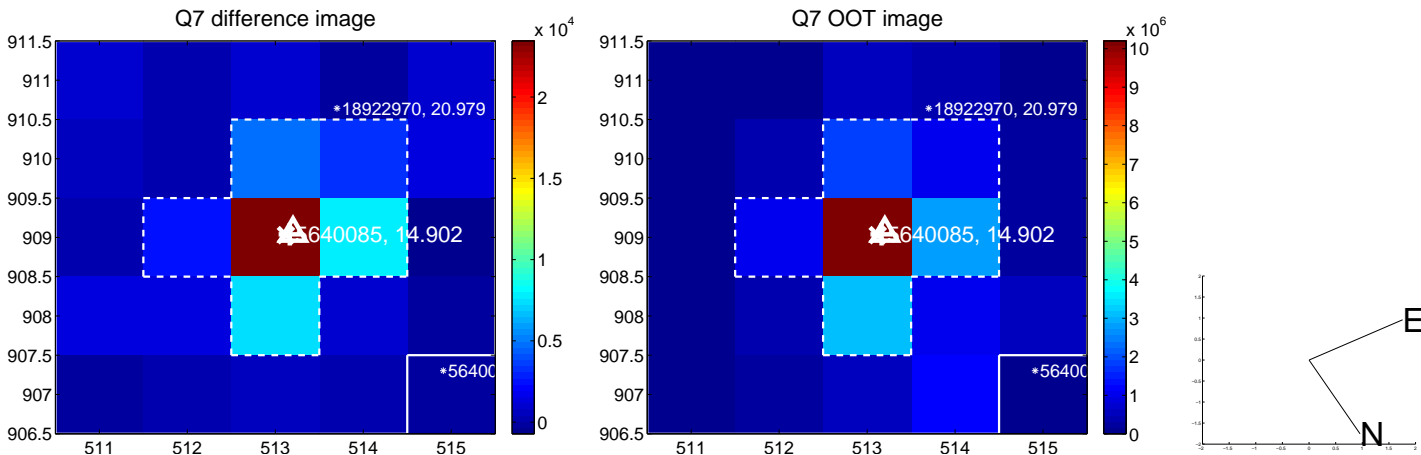
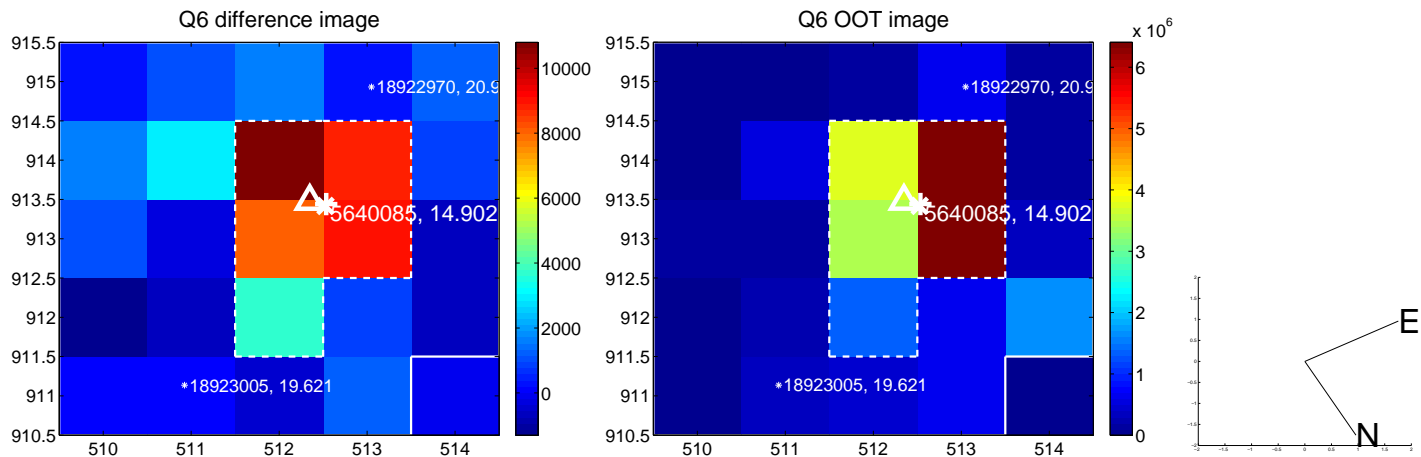
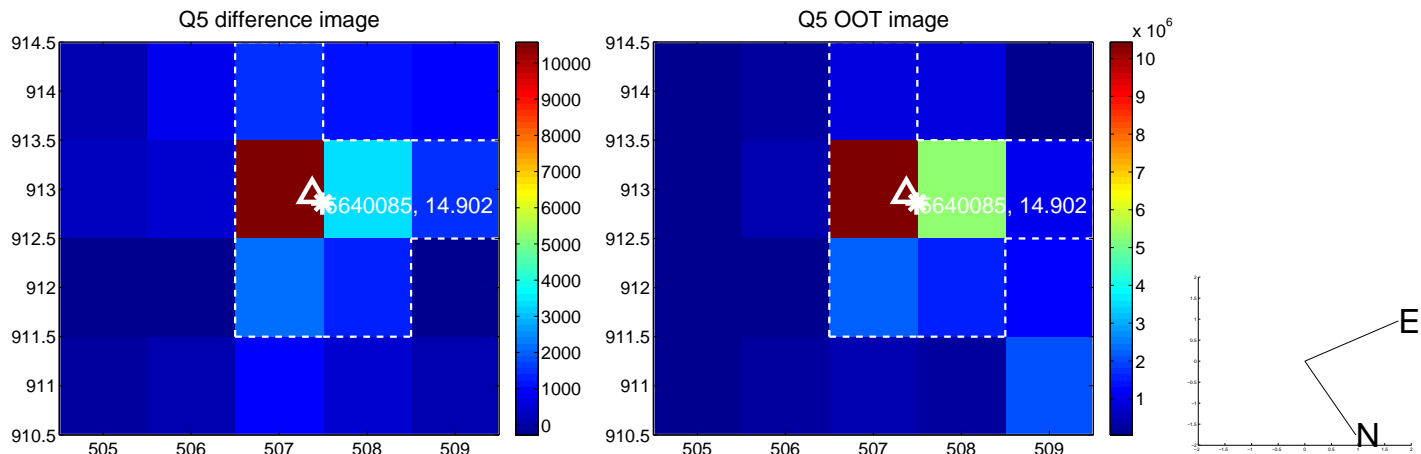


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

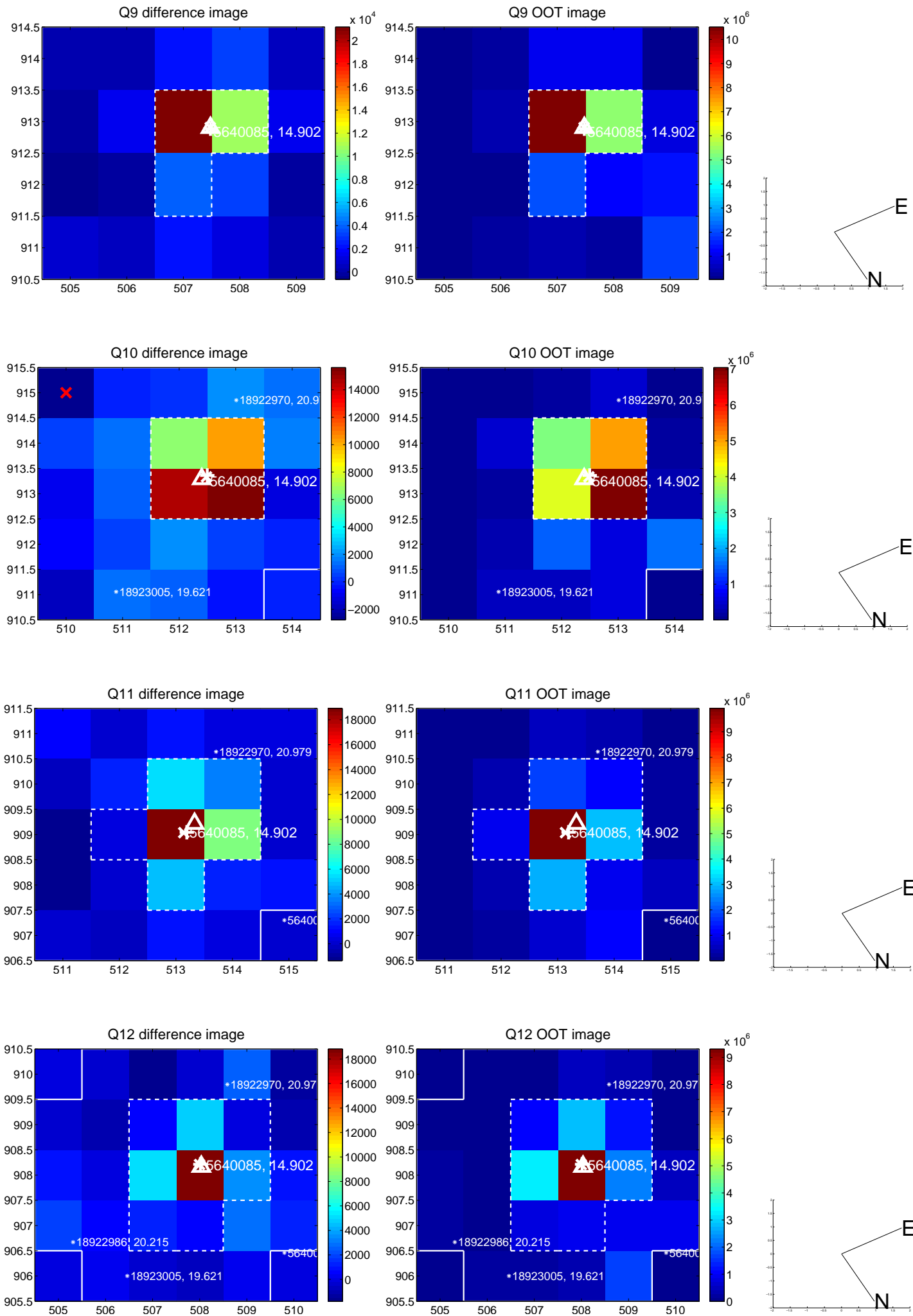
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



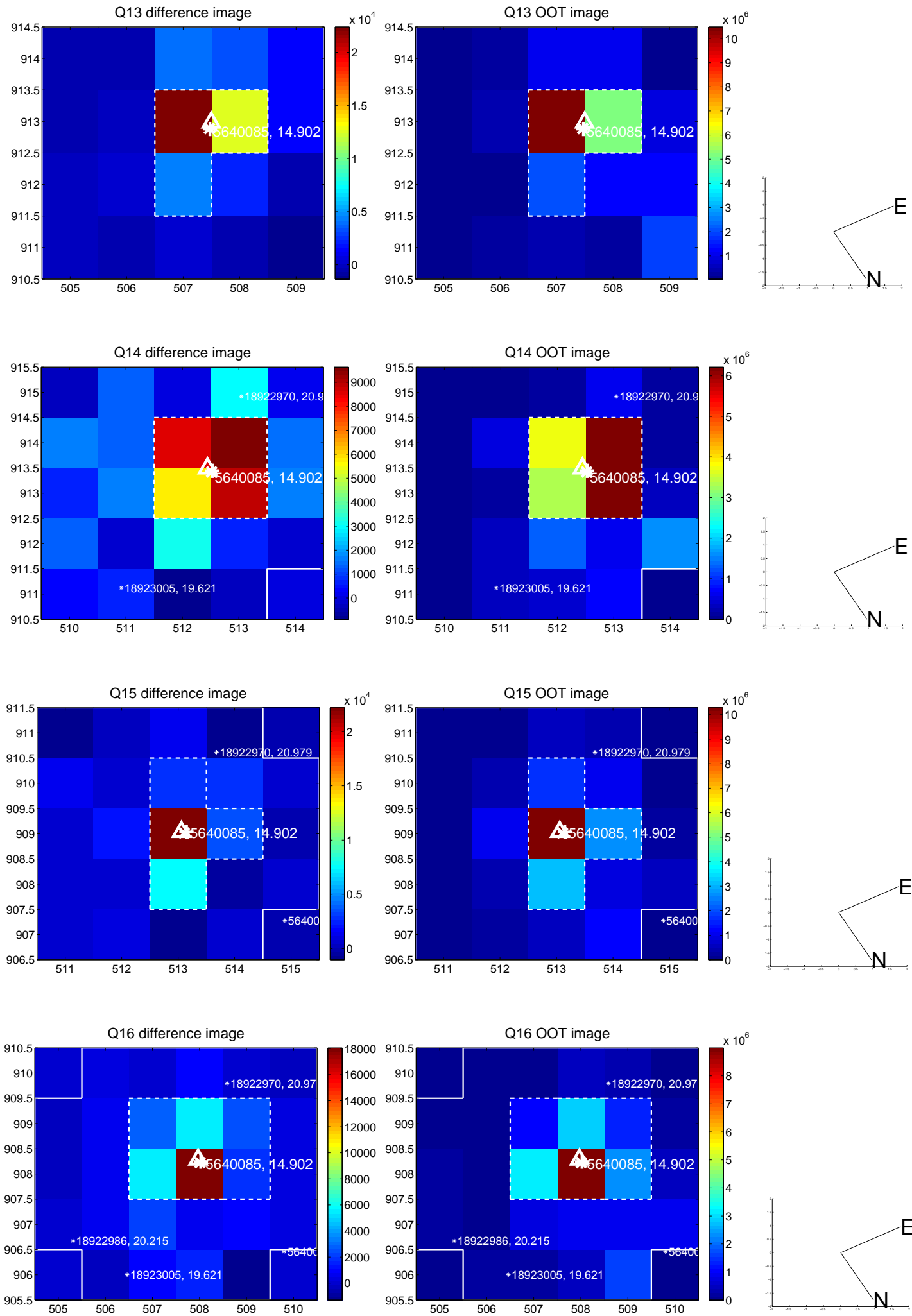
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



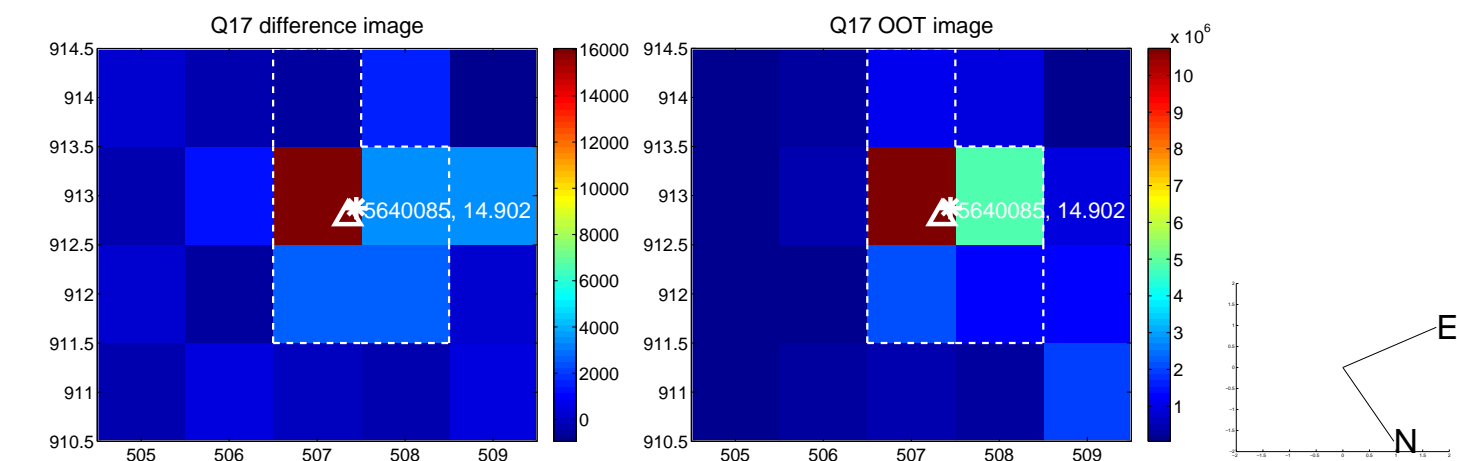
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



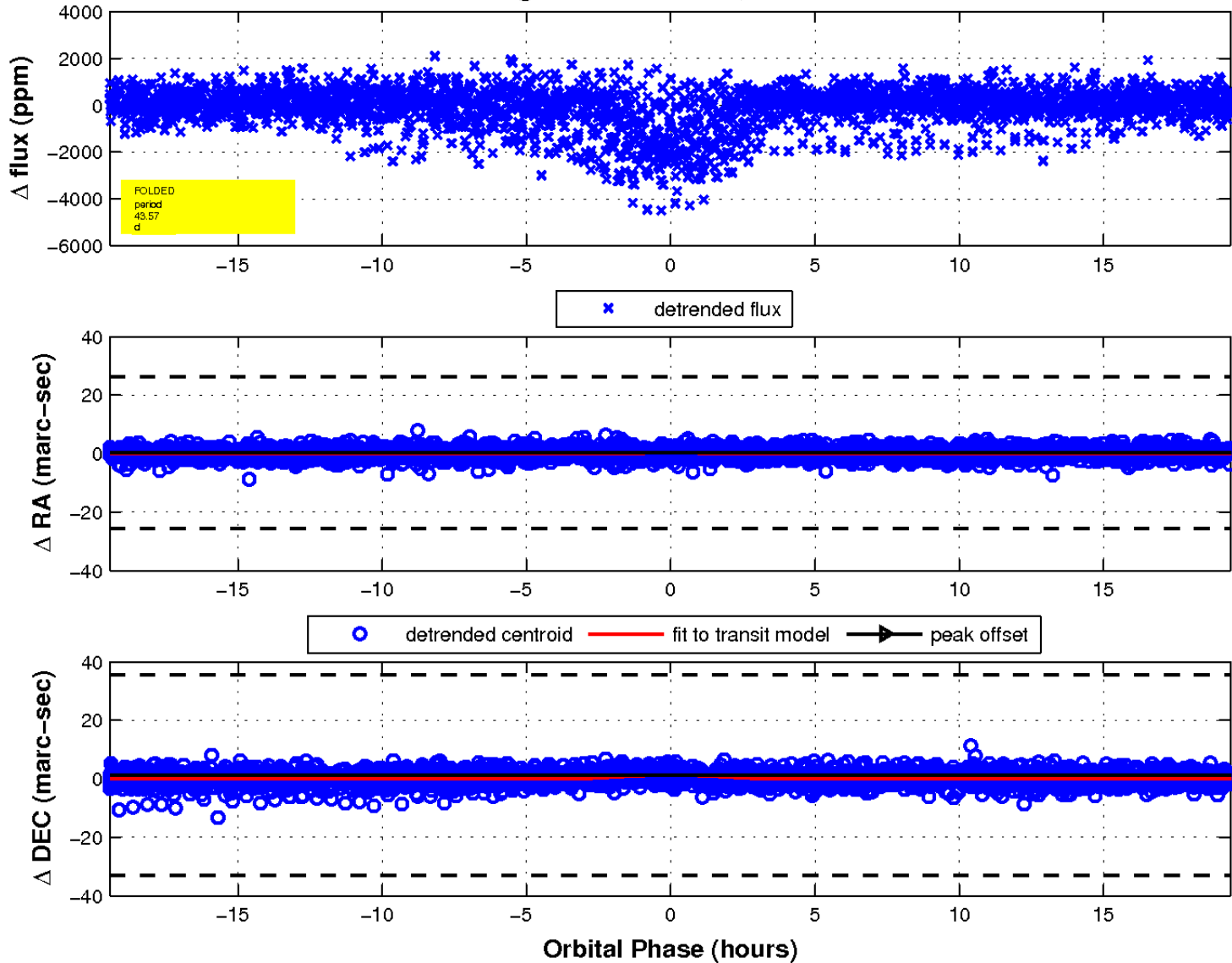
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

