

KIC 010136549

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 010136549-01 | OBS | 1929.01 | 9.693118 | 132.816688 | 143.1 | 5.746 | 31.9 | 35.1 | 1.47 | 5683 | 1.99 | 253.43 |
| 010136549-02 | OBS | 1929.02 | 3.292789 | 133.002004 | 74.0 | 4.885 | 28.2 | 30.0 | 1.47 | 5683 | 1.51 | 1069.20 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|------------|
| 010136549-01 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |
| 010136549-02 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |

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

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

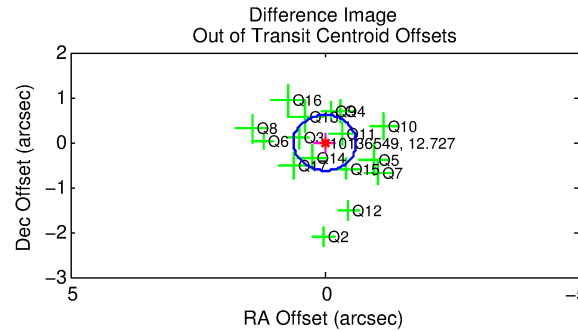
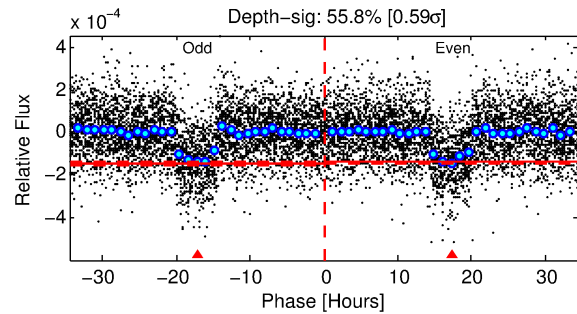
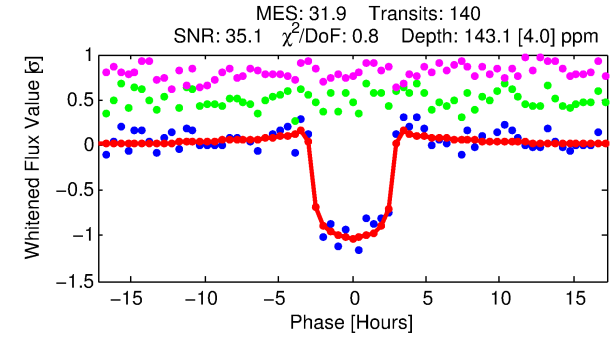
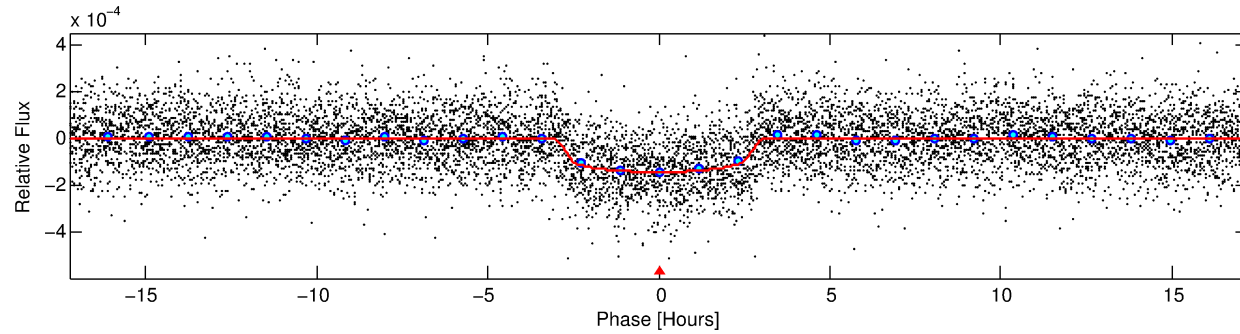
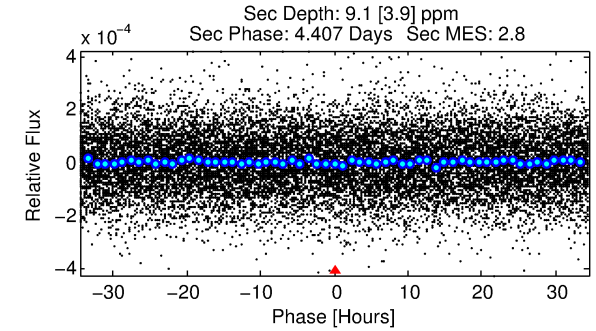
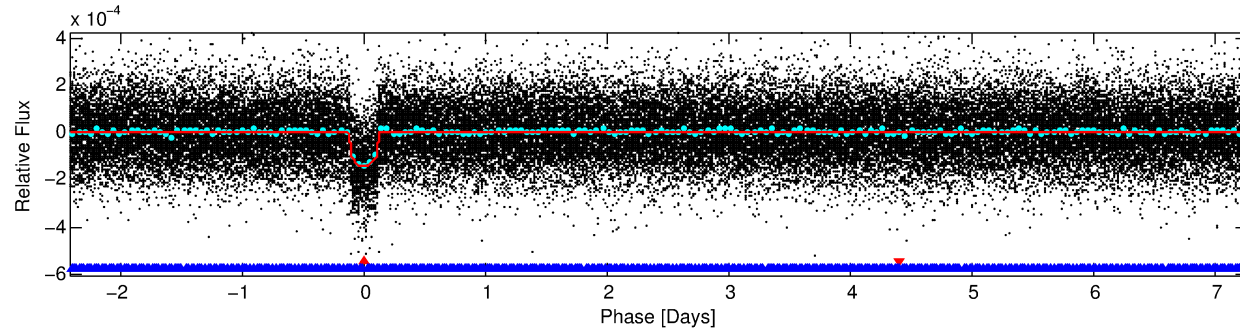
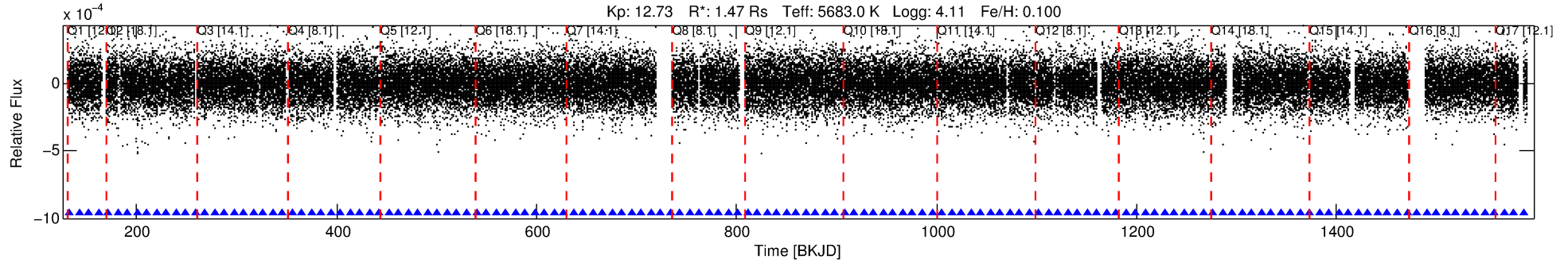
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 010136549-01

No Significant Match Found

DV One-Page Summary

KIC: 10136549 Candidate: 1 of 2 Period: 9.693 d
KOI: K01929.01 Name: Kepler-337c Corr: 0.985



DV Fit Results:

Period = 9.69312 [0.00003] d
Epoch = 132.8167 [0.0025] BKJD
Rp/R* = 0.0124 [0.0019]
a/R* = 7.51 [4.96]
b = 0.83 [0.25]
Seff = 253.43 [87.95]
Teq = 1017 [88] K
Rp = 1.99 [0.55] Re
a = 0.0894 [0.0193] AU
Ag = 10.05 [6.24] [1.45σ]
Teffp = 2801 [370] K [4.69σ]

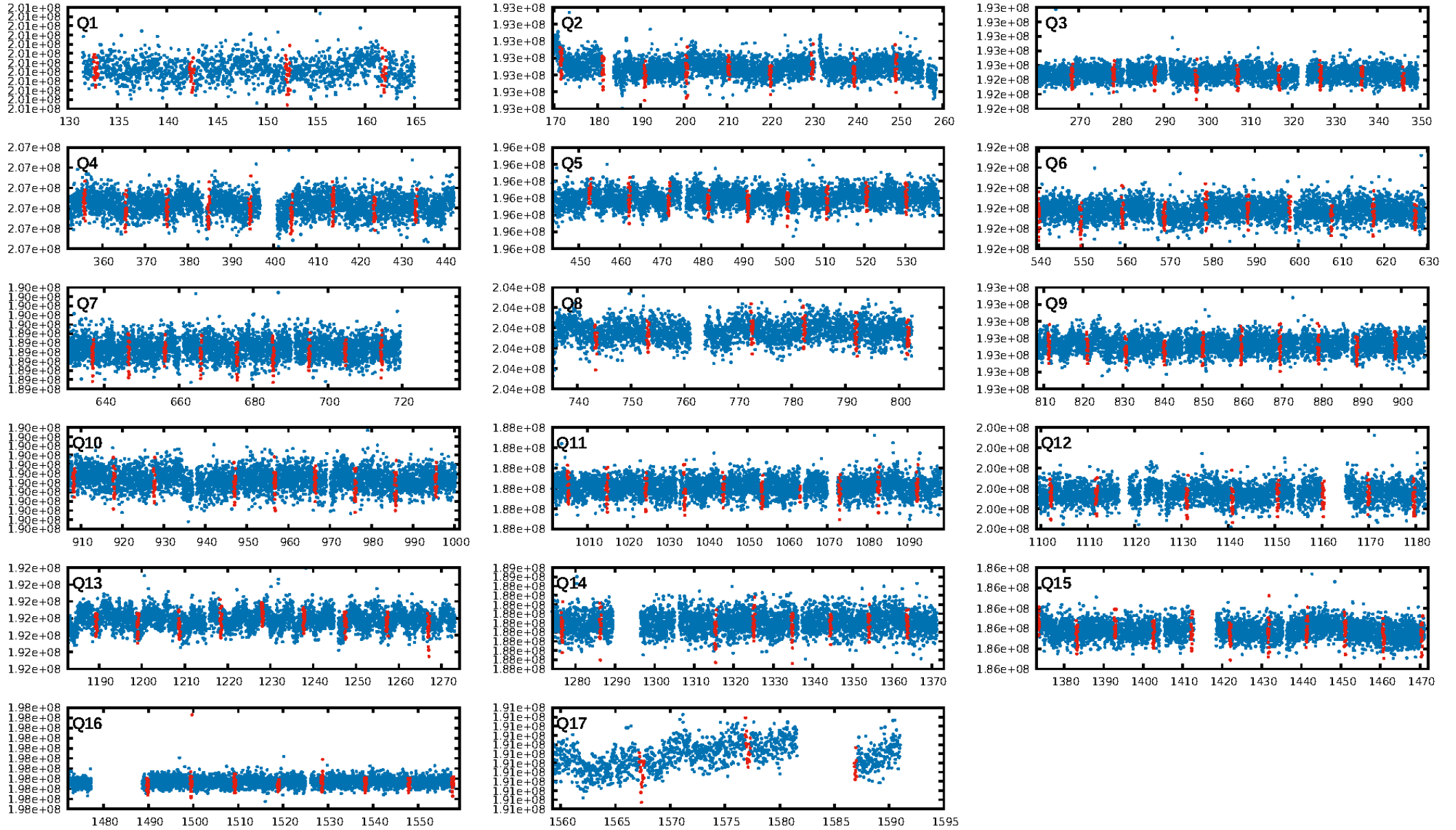
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [20.37σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 99.9%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 1.32e-202
RollingBand-fgt: 1.00 [133/133]
GhostDiagnostic-chr: 5.168
Centroid-sig: 17.8%
Centroid-so: 0.671 arcsec [2.01σ]
OotOffset-rm: 0.013 arcsec [0.06σ]
KicOffset-rm: 0.079 arcsec [0.35σ]
OotOffset-st: 4/4/4/4 [16]
KicOffset-st: 4/4/4/4 [16]
DiffImageQuality-fgm: 1.00 [16/16]
DiffImageOverlap-fno: 1.00 [17/17]

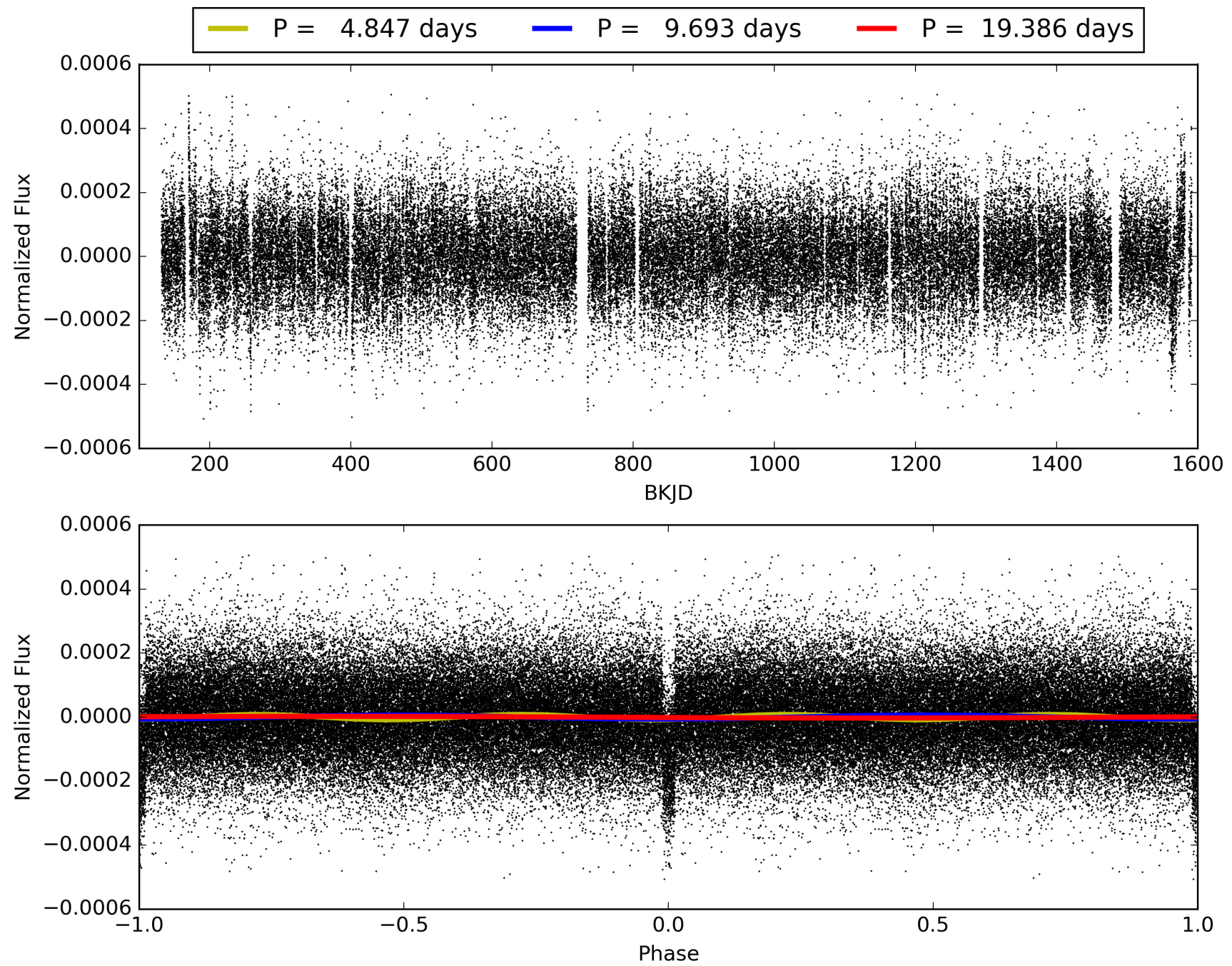
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 02:42:40 Z

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

TCE 010136549-01, PDC Light Curves

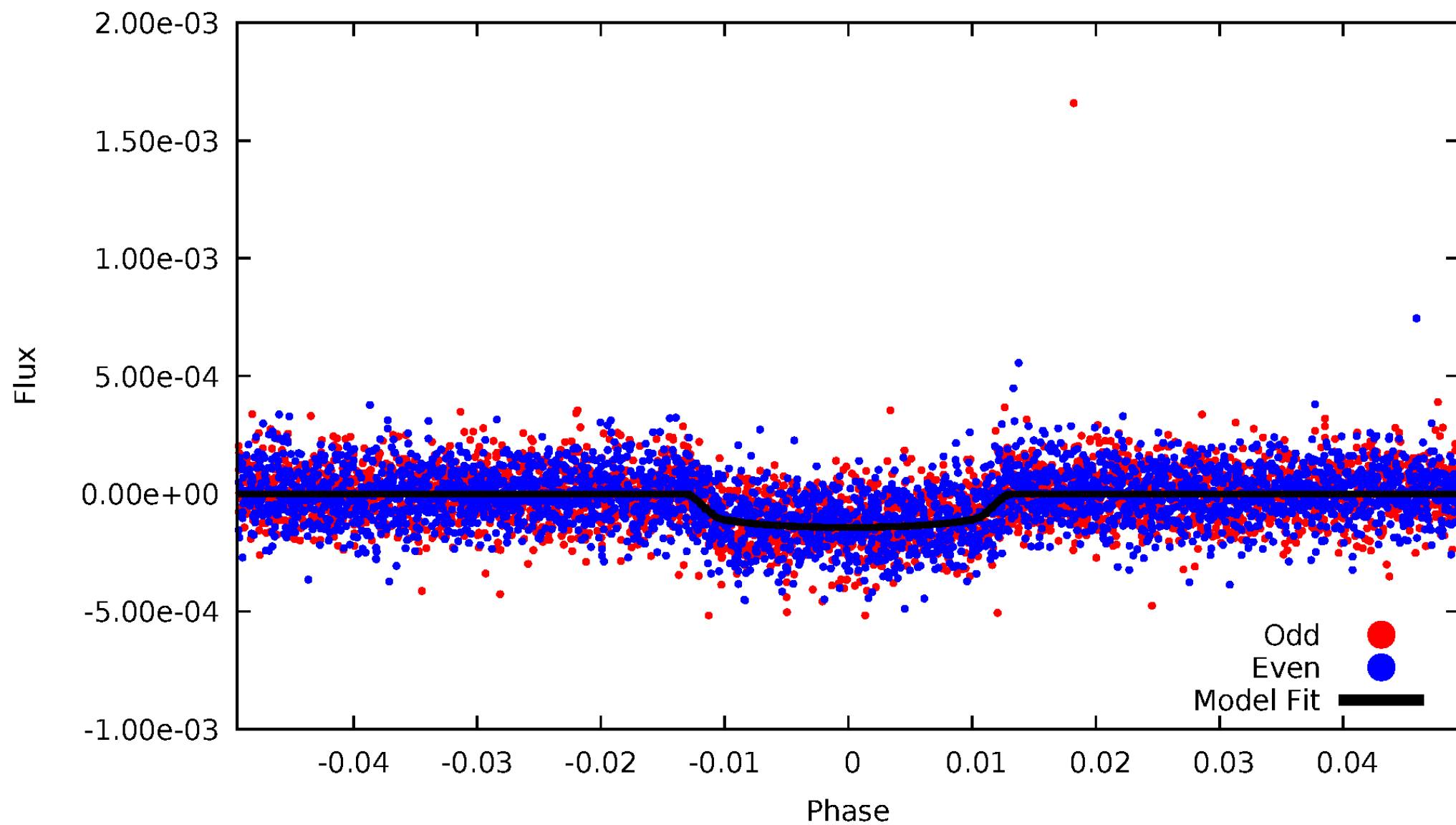


TCE 010136549-01



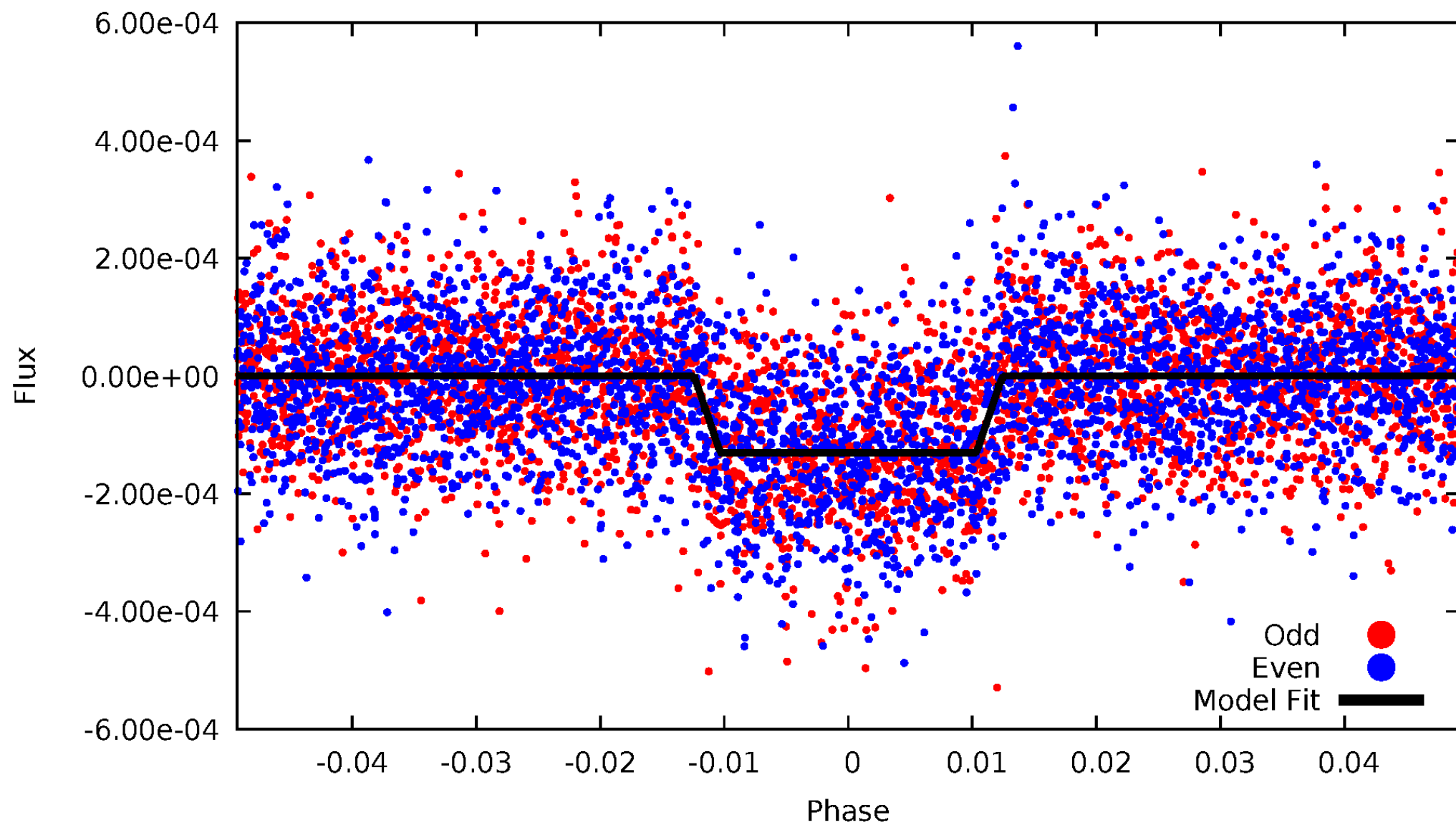
DV Odd/Even

TCE 010136549-01



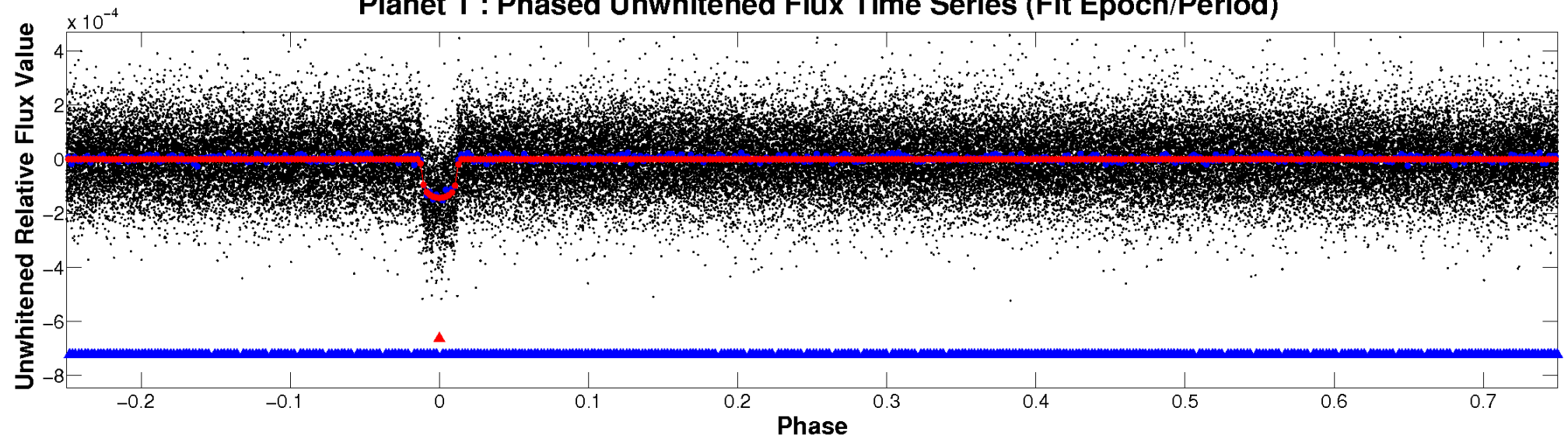
ALT Odd/Even

TCE 010136549-01

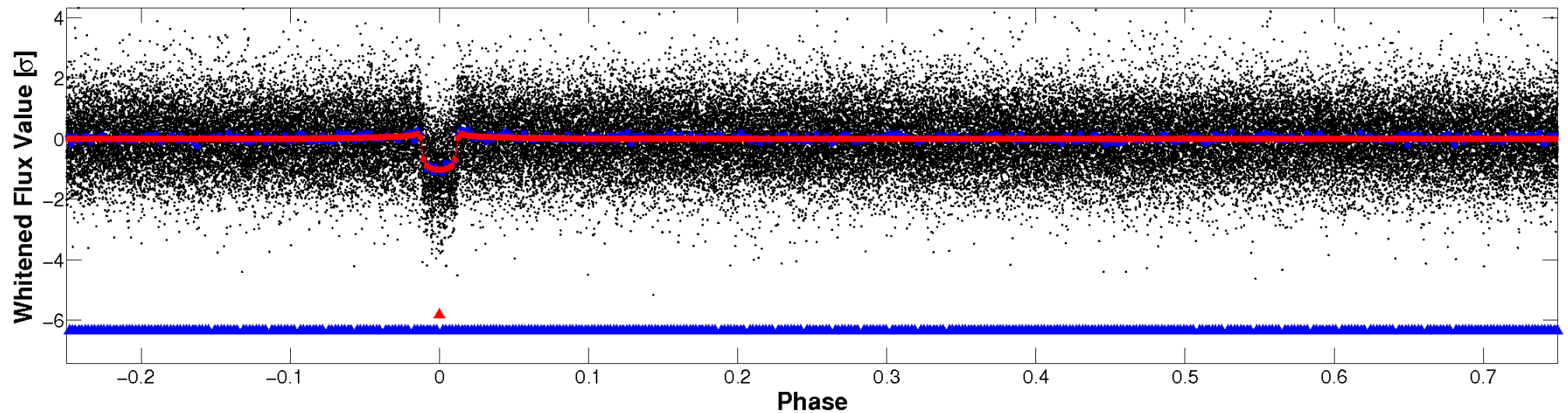


Non-Whitened Vs. Whitened Light Curve

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

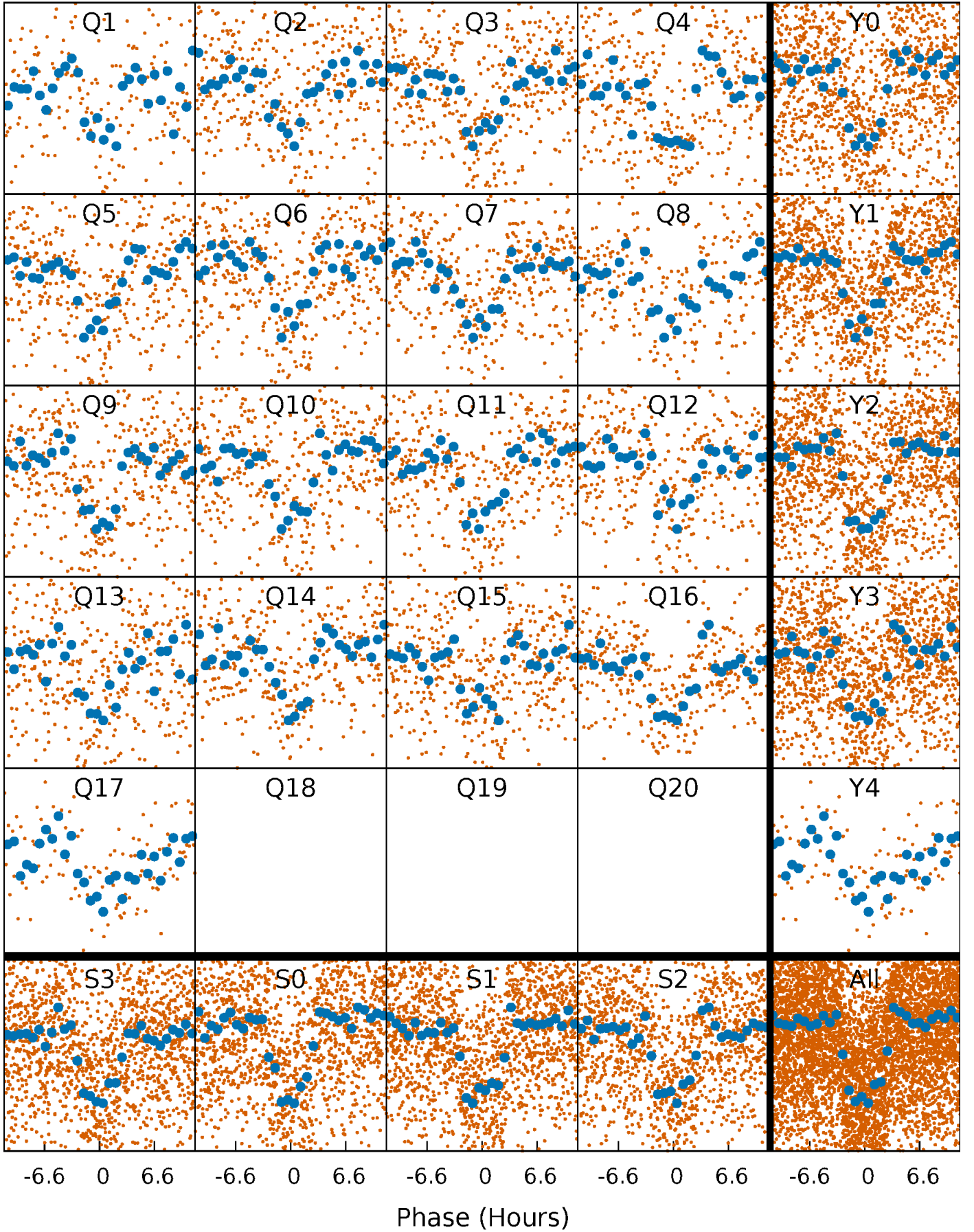


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



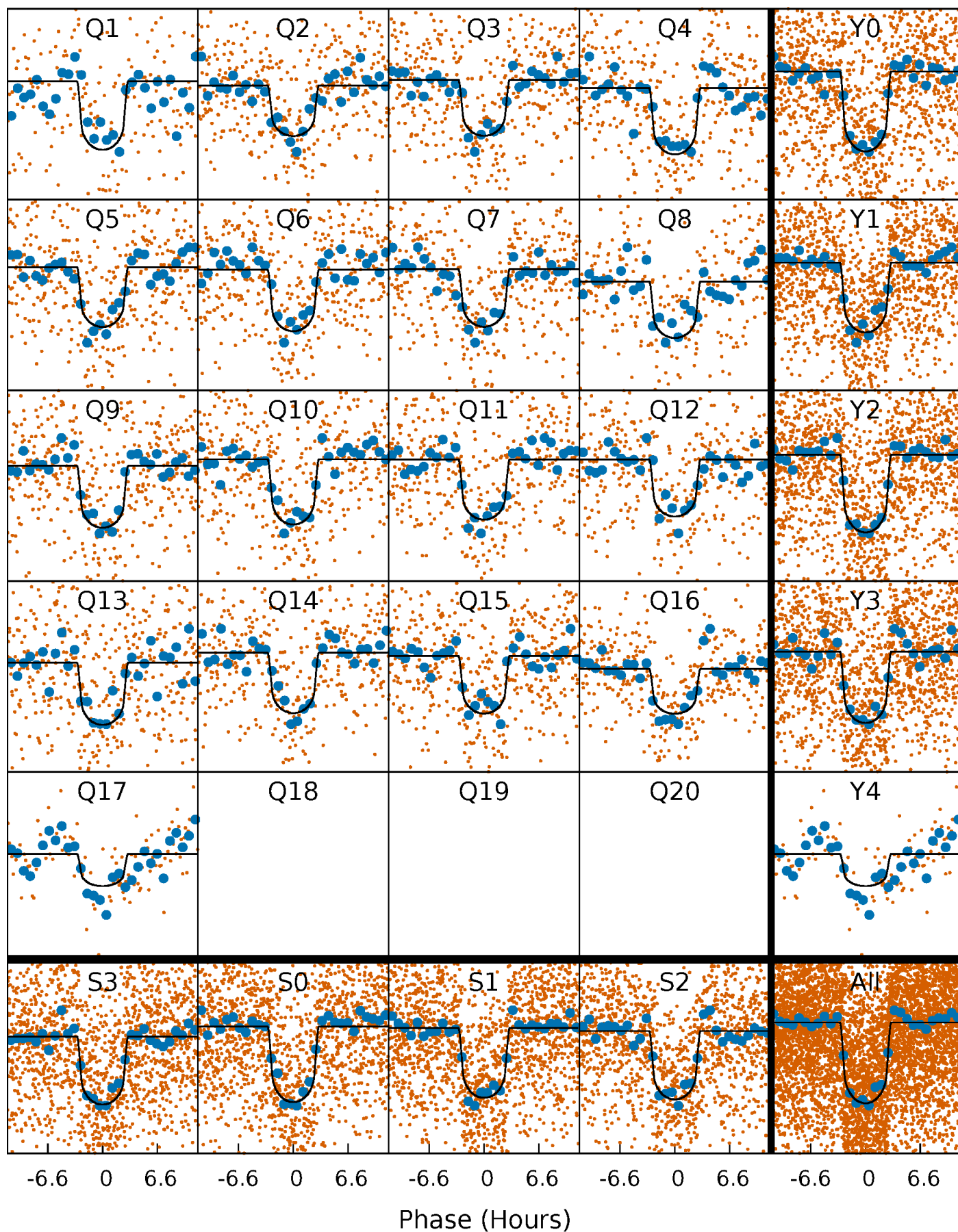
PDC Quarter-Phased Transit Curves

TCE 010136549-01 P= 9.693118 Days $T_0=132.816688$ (BKJD)



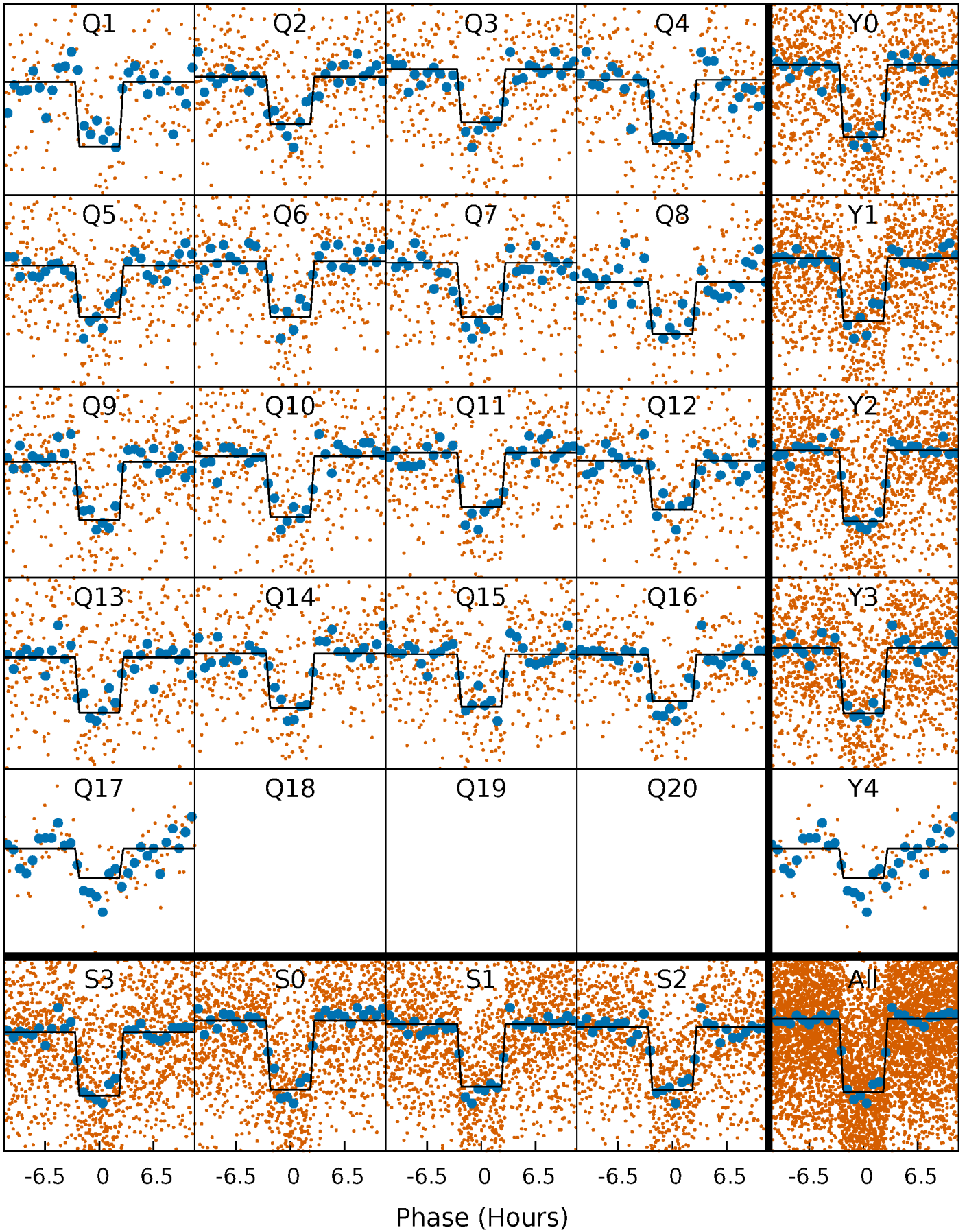
DV Quarter-Phased Transit Curves

TCE 010136549-01 P= 9.693118 Days $T_0=132.816688$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

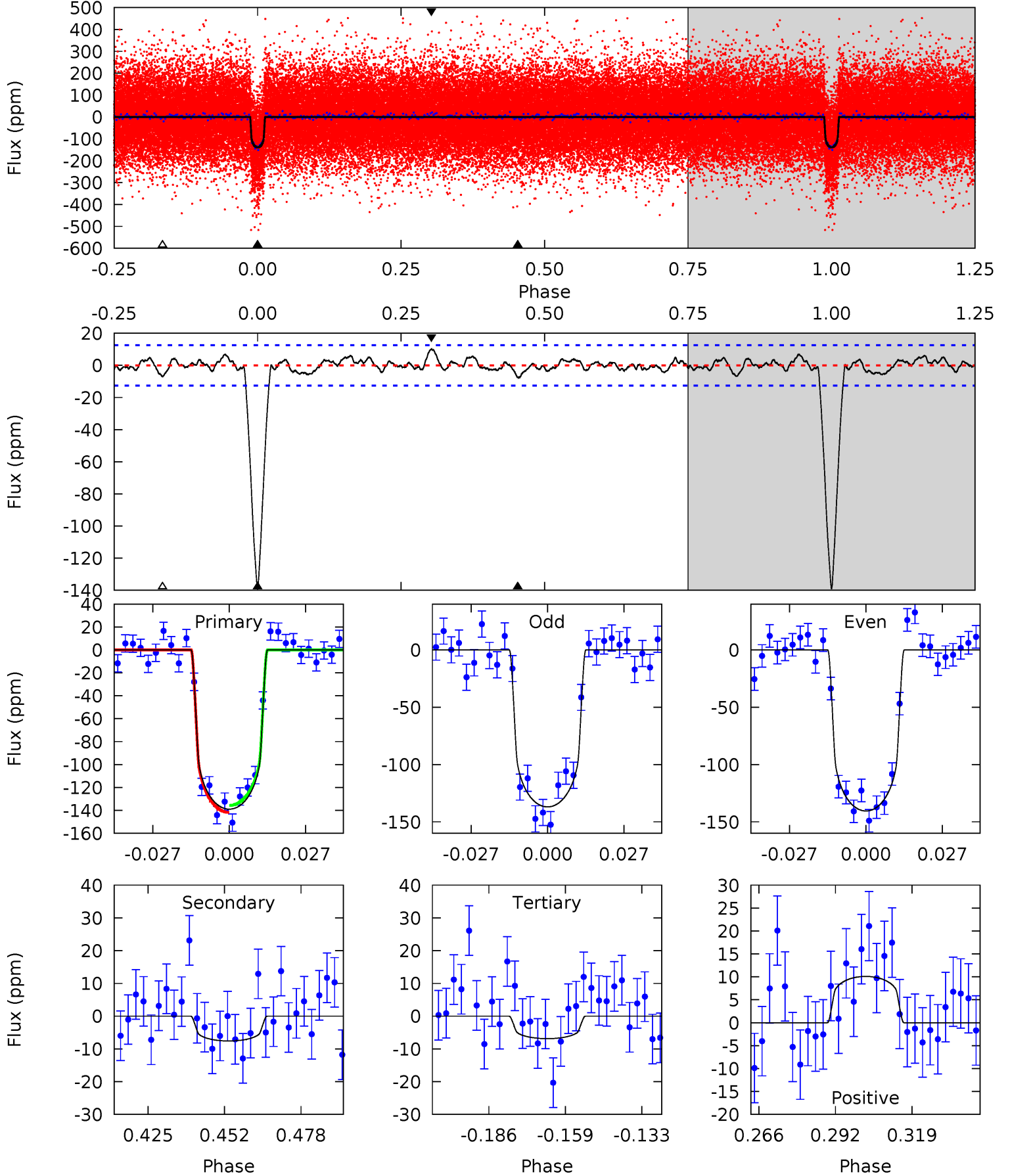
TCE 010136549-01 P= 9.693127 Days $T_0=132.816358$ (BKJD)



DV Model-Shift Uniqueness Test

010136549-01, P = 9.693118 Days, E = 123.123570 Days

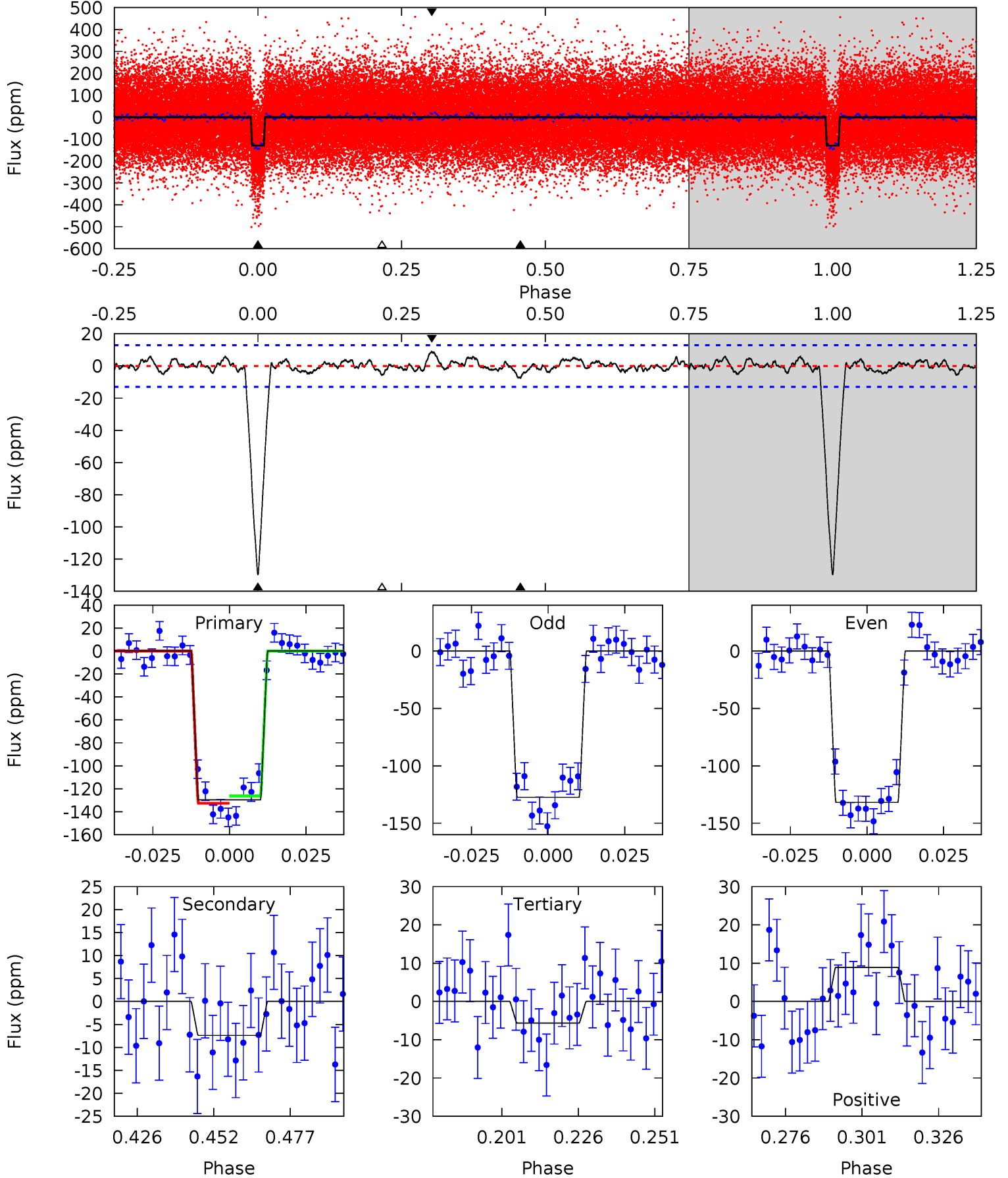
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 53.3 | 2.91 | 2.63 | 3.87 | 4.84 | 2.22 | 1.10 | 50.6 | 49.4 | 0.28 | -0.96 | 0.69 | 0.99 | 0.07 | 1.17 |



Alt Model-Shift Uniqueness Test

010136549-01, P = 9.693127 Days, E = 123.123231 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 48.6 | 2.77 | 2.12 | 3.35 | 4.85 | 2.24 | 0.97 | 46.5 | 45.3 | 0.65 | -0.58 | 0.82 | 0.97 | 0.06 | 1.18 |



Stellar Parameters For KIC 010136549

| | $T_{\text{eff}} (K)$ | $\log(g)$ | $[\text{Fe}/\text{H}]$ | $R (R_{\odot})$ | $M (M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|---------------------------|---------------------------|---------------------------|---|
| | 5683^{+115}_{-104} | $4.108^{+0.195}_{-0.090}$ | $0.100^{+0.150}_{-0.150}$ | $1.472^{+0.229}_{-0.344}$ | $1.014^{+0.093}_{-0.084}$ | $0.448^{+0.458}_{-0.141}$ |
| | +2%/-2% | +5%/-2% | +150%/-150% | +16%/-23% | +9%/-8% | +102%/-32% |
| Source | SPE59 | SPE59 | SPE59 | DSEP | | |

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

Secondary Eclipse Parameters for KIC 010136549-01 / KOI 1929.01

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$ | A_{obs} |
|---------|-------------|------------------------|----------------------|----------------------|---------------------------|
| DV | -8 ± 3 | $1.92^{+0.40}_{-0.37}$ | 1412^{+64}_{-94} | 3246^{+243}_{-241} | $8.986^{+6.505}_{-3.712}$ |
| Alt. | -7 ± 3 | $1.77^{+0.35}_{-0.32}$ | 1408^{+69}_{-88} | 3294^{+253}_{-260} | $9.946^{+7.072}_{-4.267}$ |

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 $A_{\text{obs}} \gg 1.0$

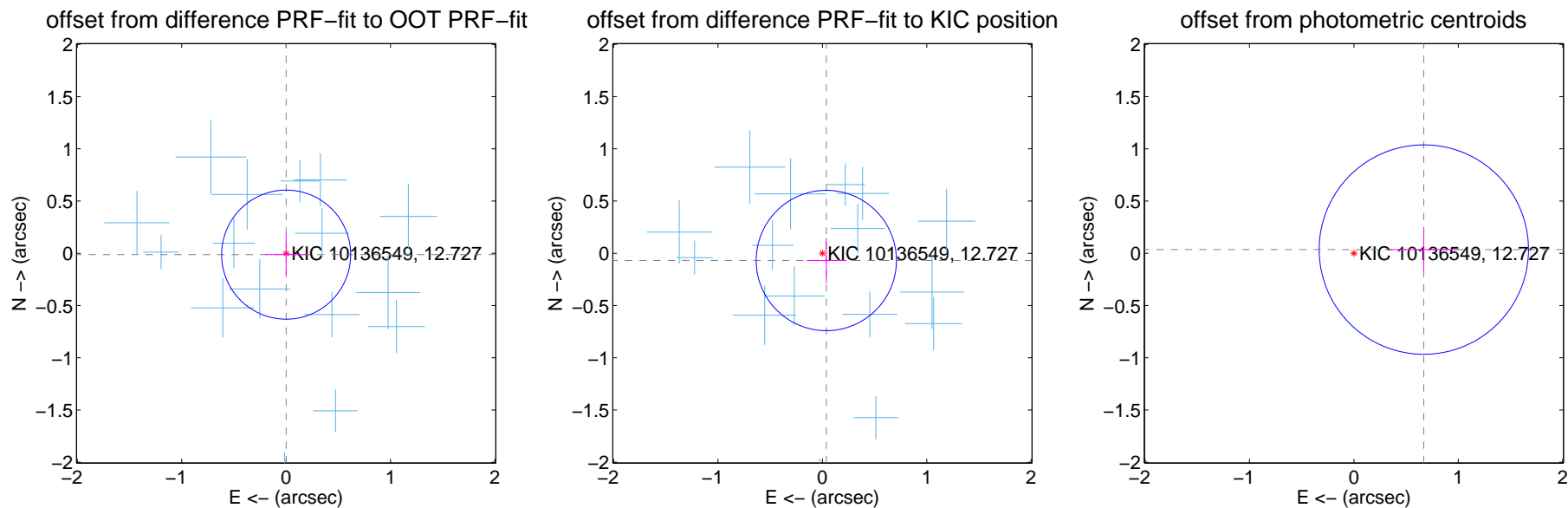
DV Centroid Data

Supplemental centroid analysis for 010136549-01. Kepler magnitude: 12.73. Transit SNR 35.12

There are 16 quarters with good PRF difference image offsets

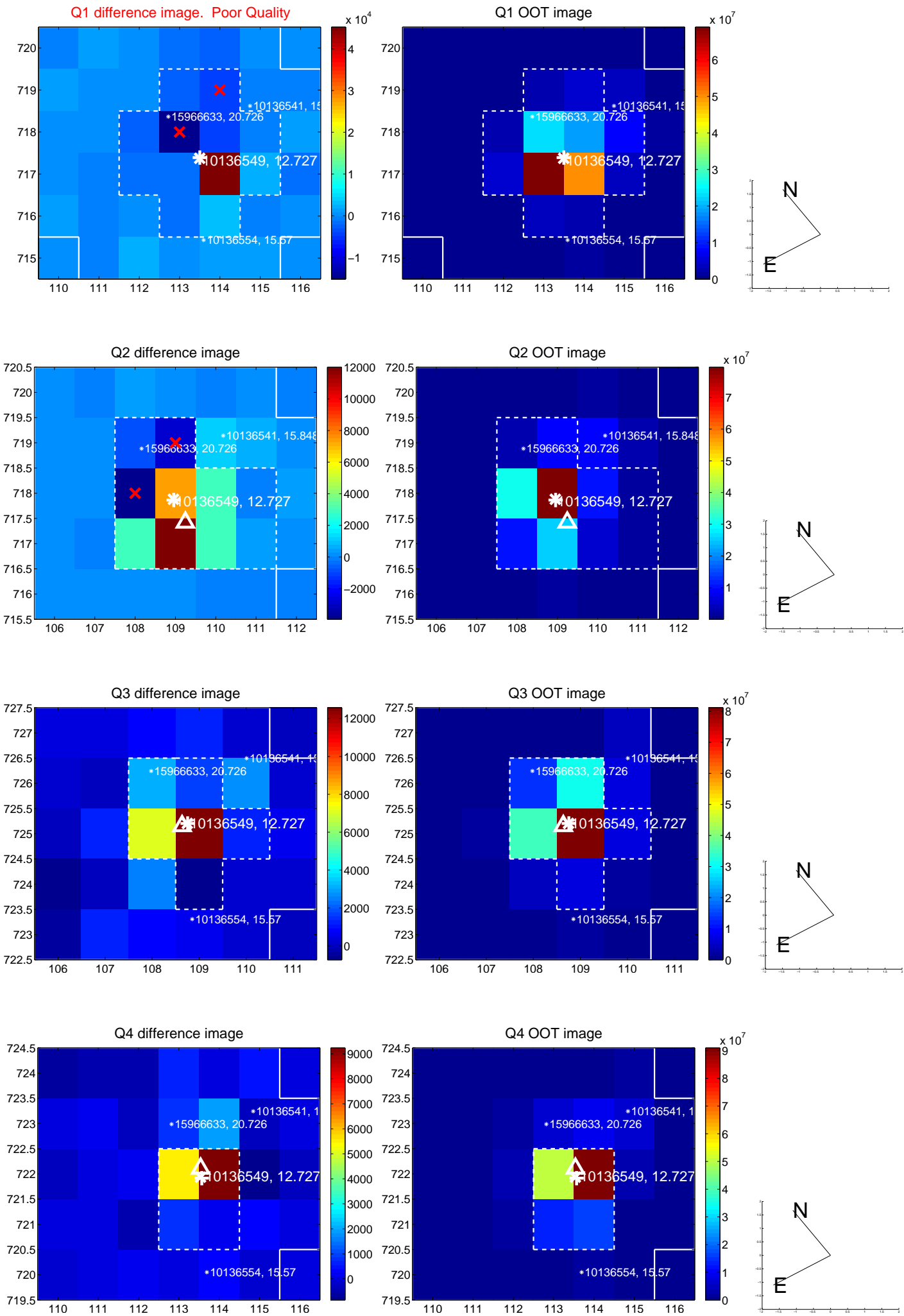
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT | 0.013 ± 0.206 | 0.06 | -0.001 ± 0.200 | -0.013 ± 0.205 |
| PRF-fit source offset from KIC position | 0.079 ± 0.224 | 0.35 | -0.038 ± 0.187 | -0.069 ± 0.215 |
| photometric centroid source offset | 0.67 ± 0.33 | 2.01 | -0.67 ± 0.33 | 0.04 ± 0.21 |

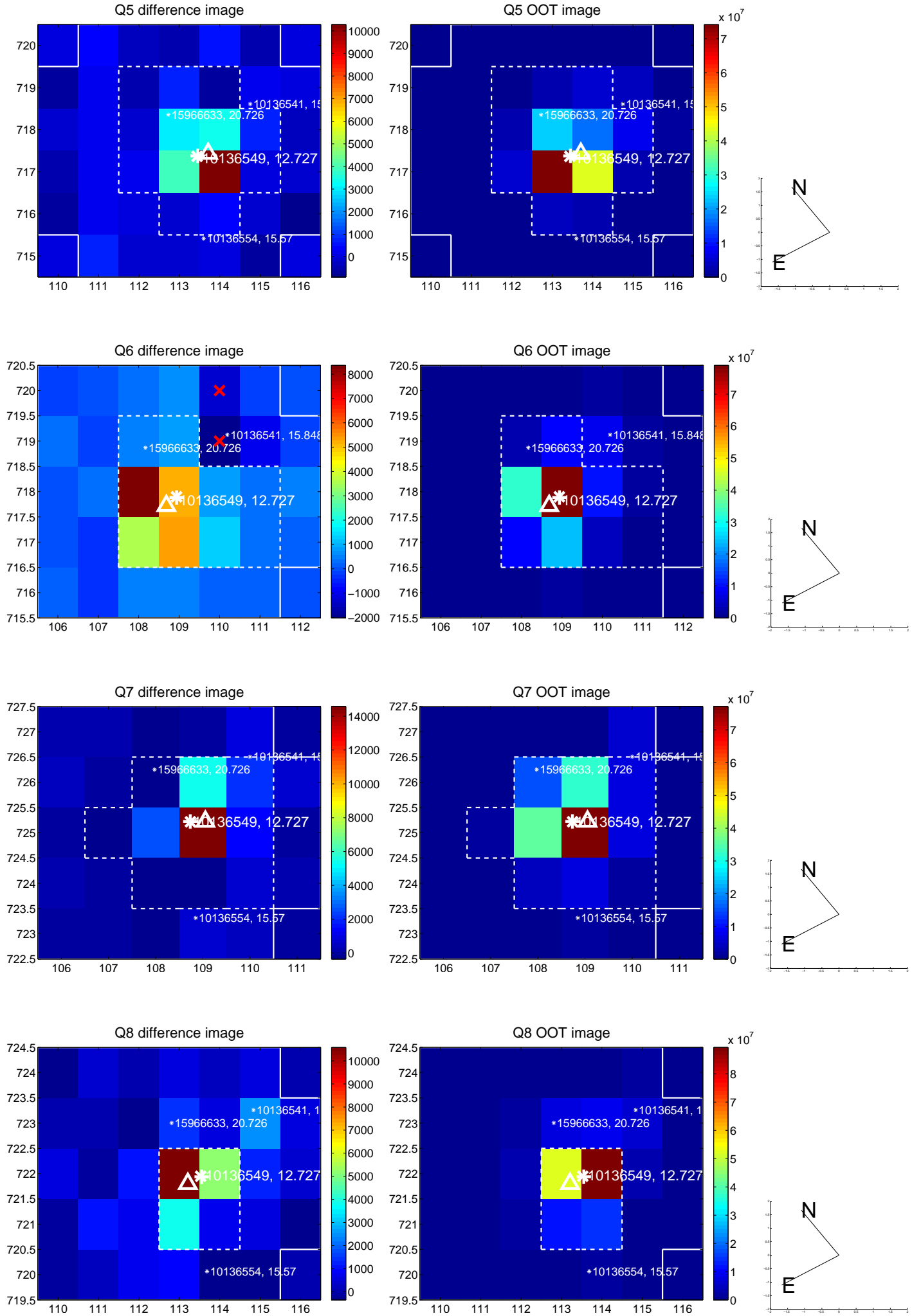


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

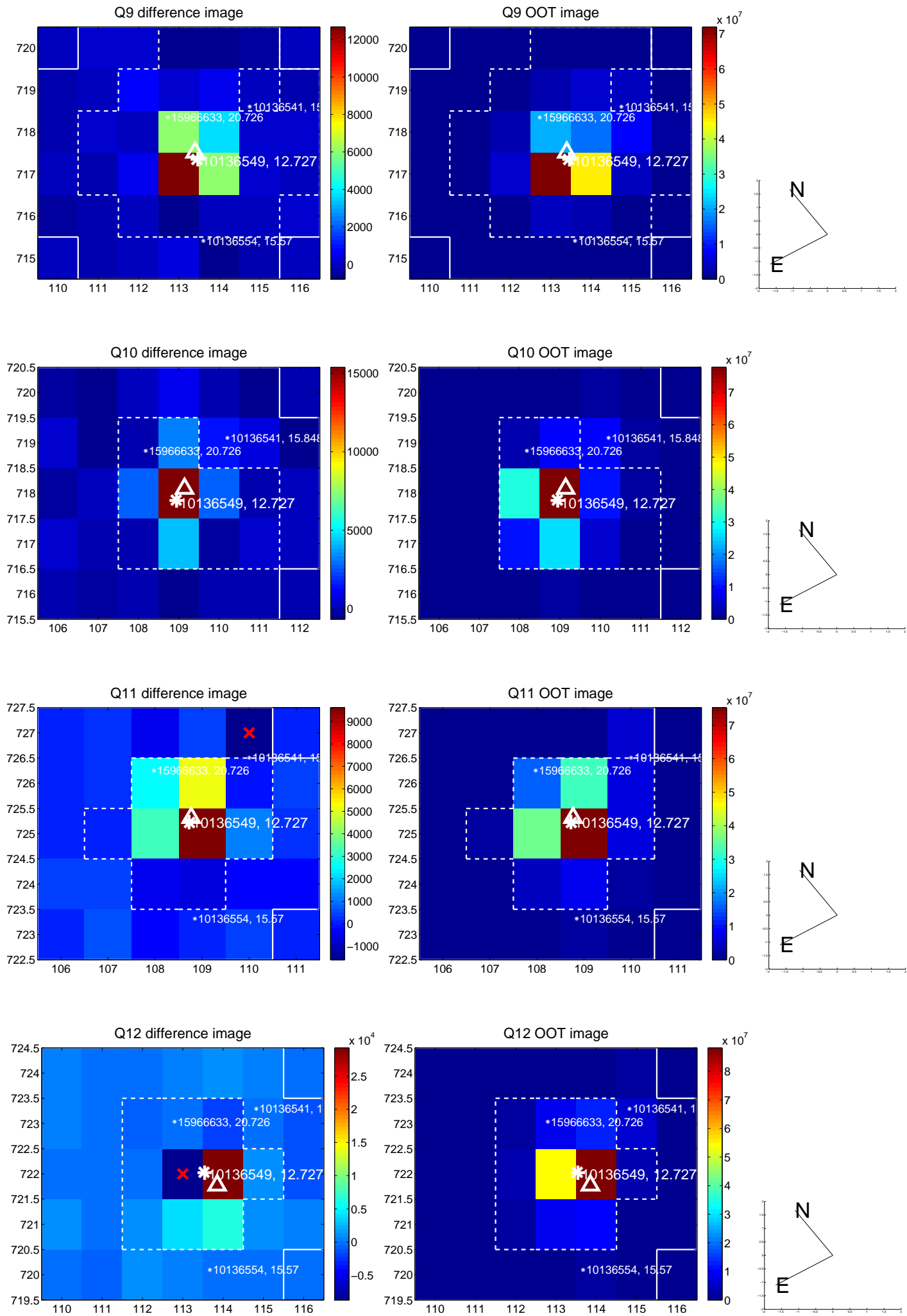
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



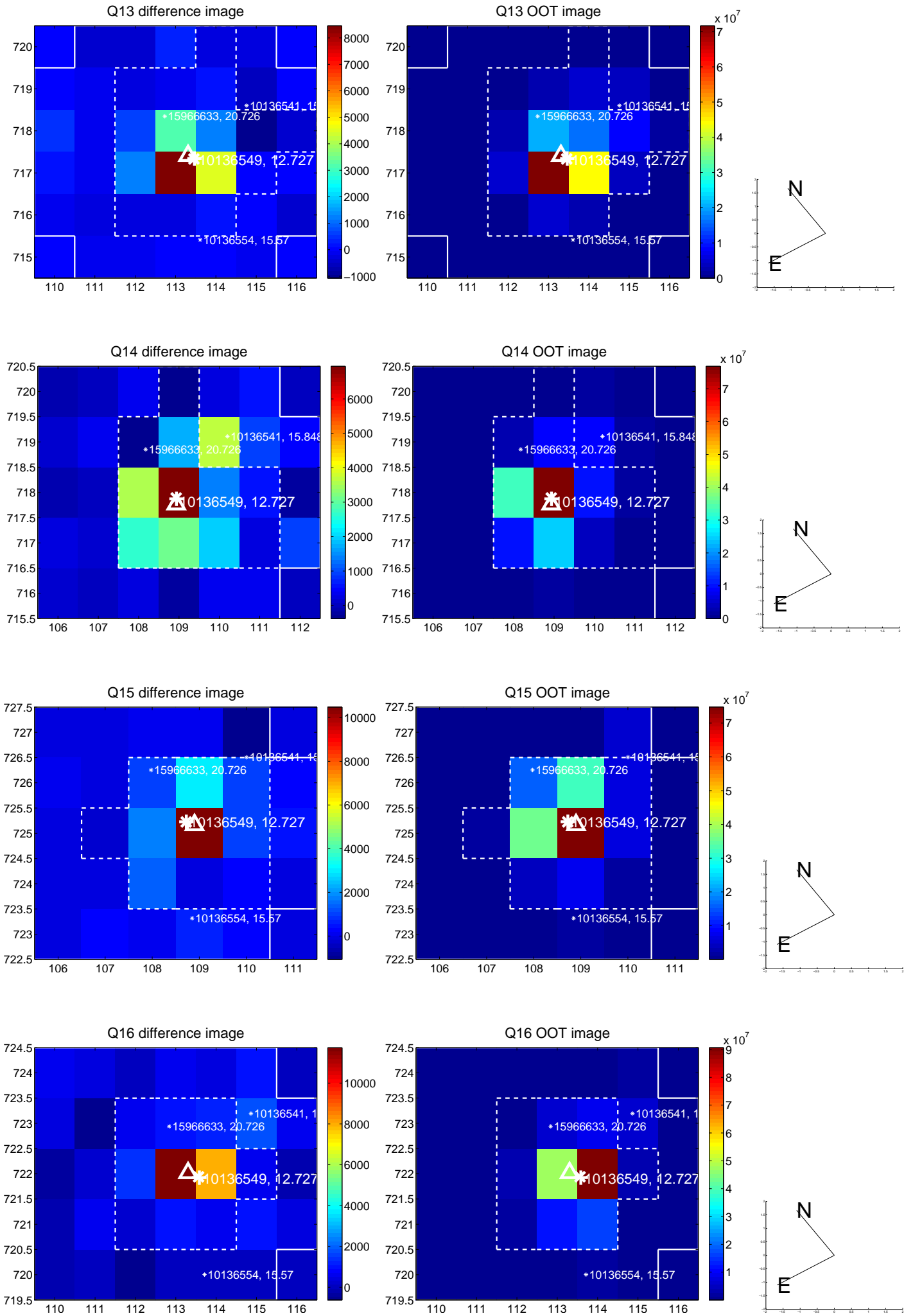
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



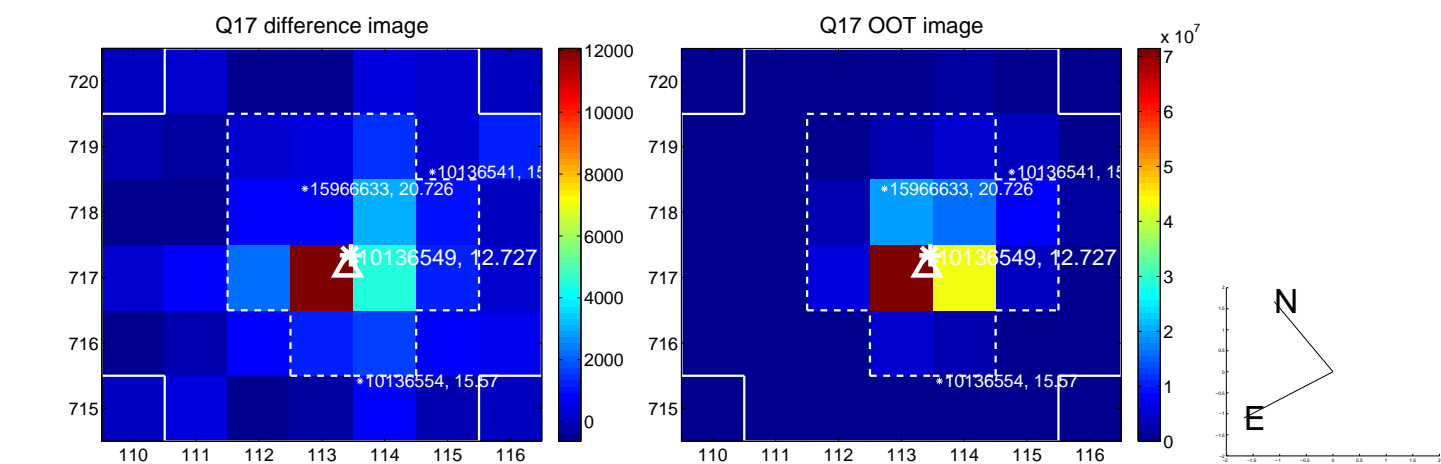
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



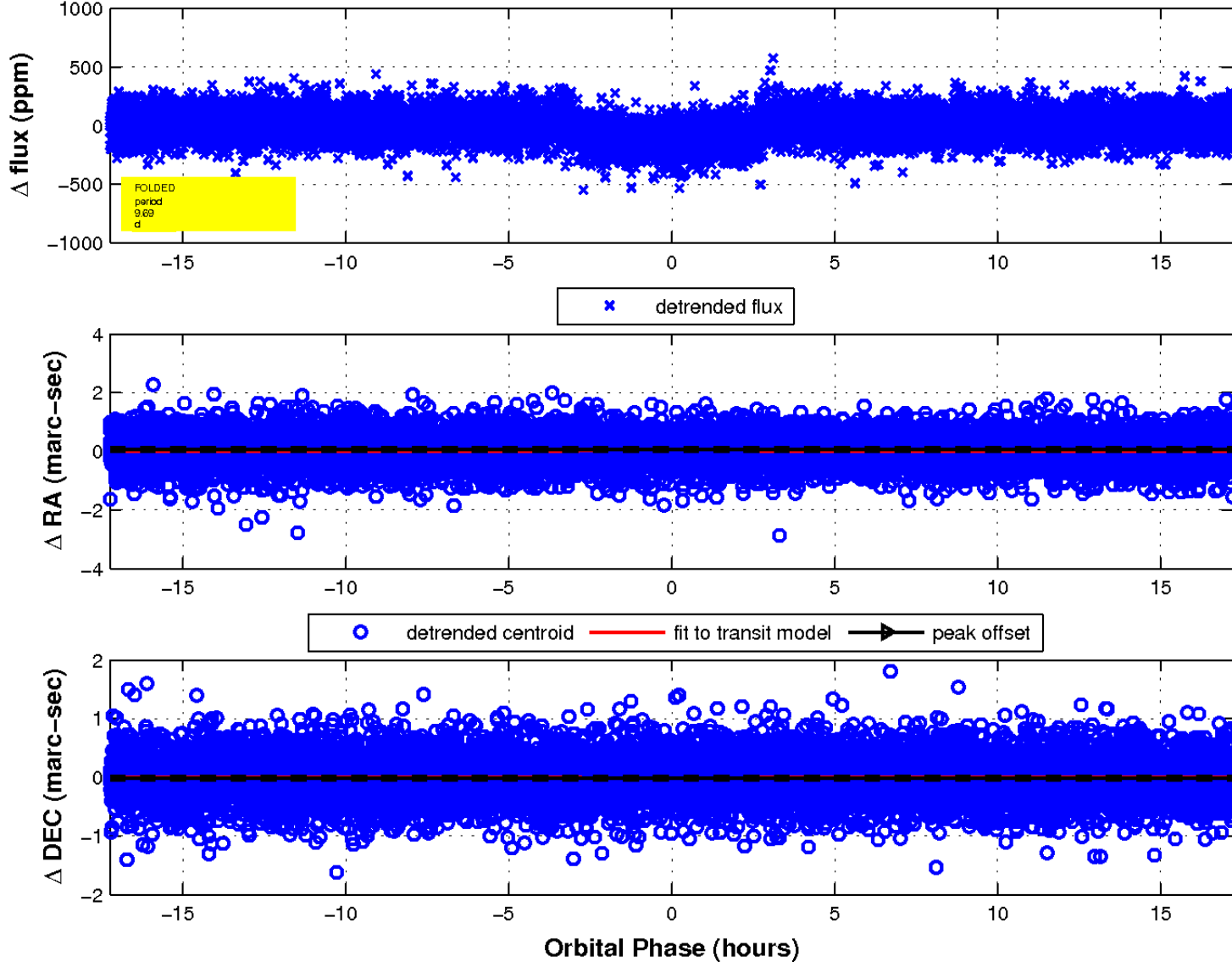
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



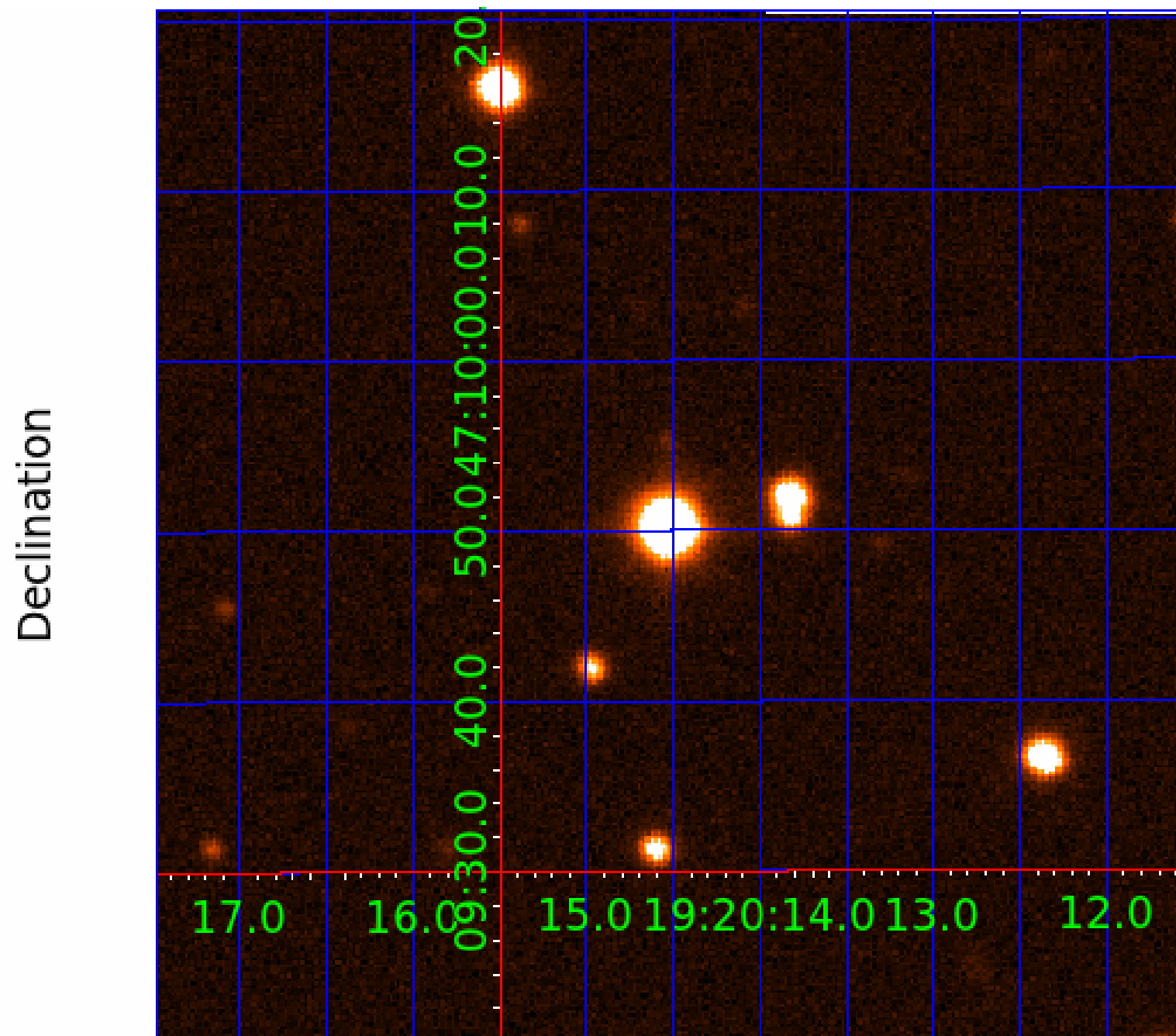
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



fluxWeightedCentroids, Planet 1 of 2



UKIRT Image



KIC 010136549

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 010136549-01 | OBS | 1929.01 | 9.693118 | 132.816688 | 143.1 | 5.746 | 31.9 | 35.1 | 1.47 | 5683 | 1.99 | 253.43 |
| 010136549-02 | OBS | 1929.02 | 3.292789 | 133.002004 | 74.0 | 4.885 | 28.2 | 30.0 | 1.47 | 5683 | 1.51 | 1069.20 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|------------|
| 010136549-01 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |
| 010136549-02 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |

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

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

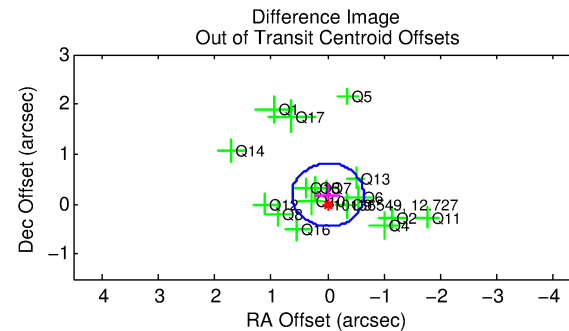
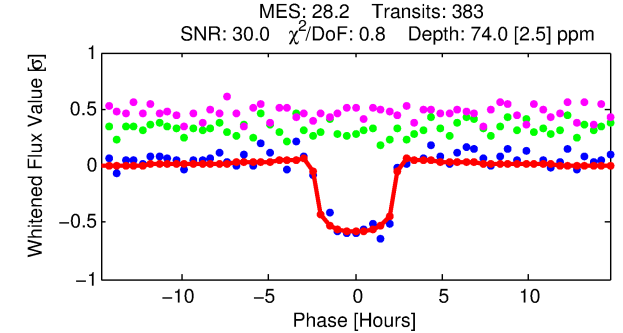
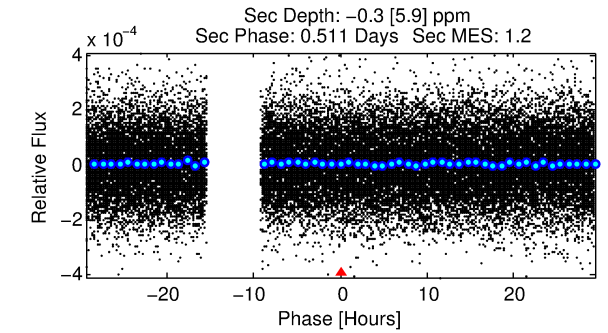
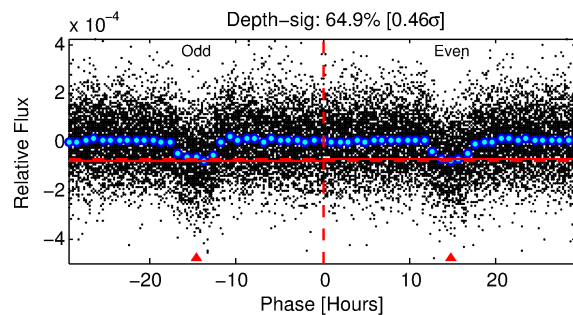
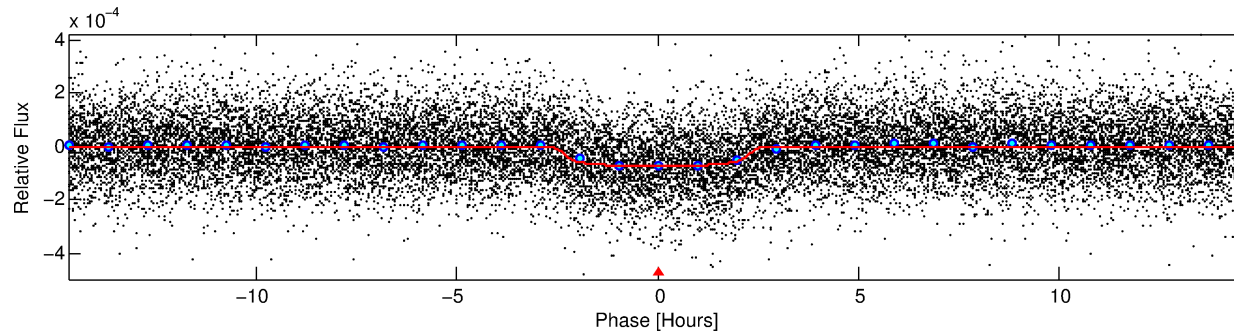
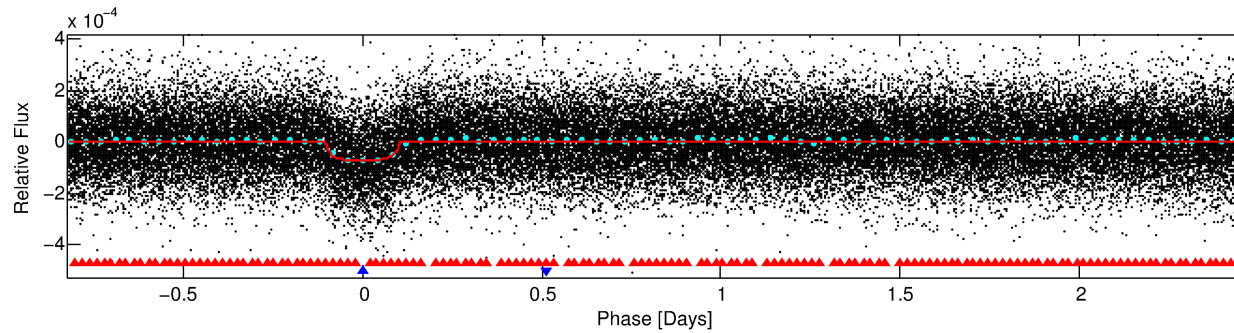
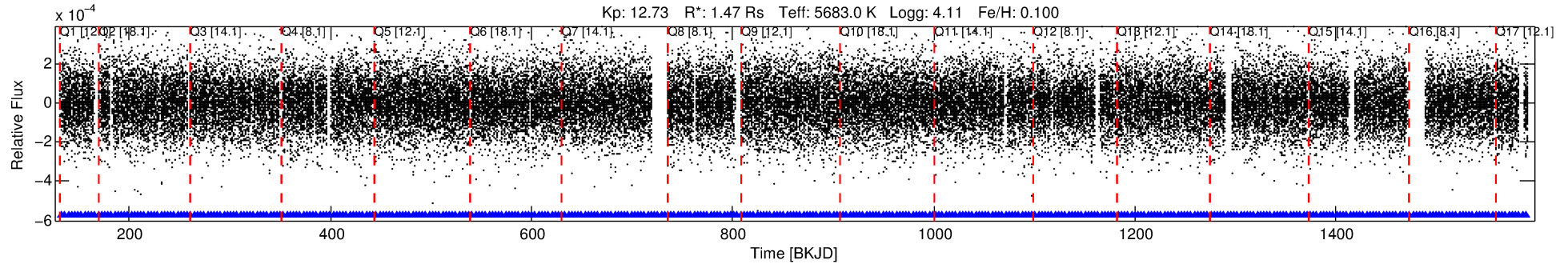
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 010136549-02

No Significant Match Found

DV One-Page Summary

KIC: 10136549 Candidate: 2 of 2 Period: 3.293 d
KOI: K01929.02 Name: Kepler-337b Corr: 0.986



DV Fit Results:

Period = 3.29279 [0.00001] d
Epoch = 133.0020 [0.0020] BKJD
Rp/R* = 0.0094 [0.0014]
a/R* = 2.53 [1.52]
b = 0.90 [0.15]
Seff = 1069.20 [371.04]
Teq = 1458 [127] K
Rp = 1.51 [0.42] Re
a = 0.0435 [0.0094] AU
Ag = N/A
Teffp = N/A

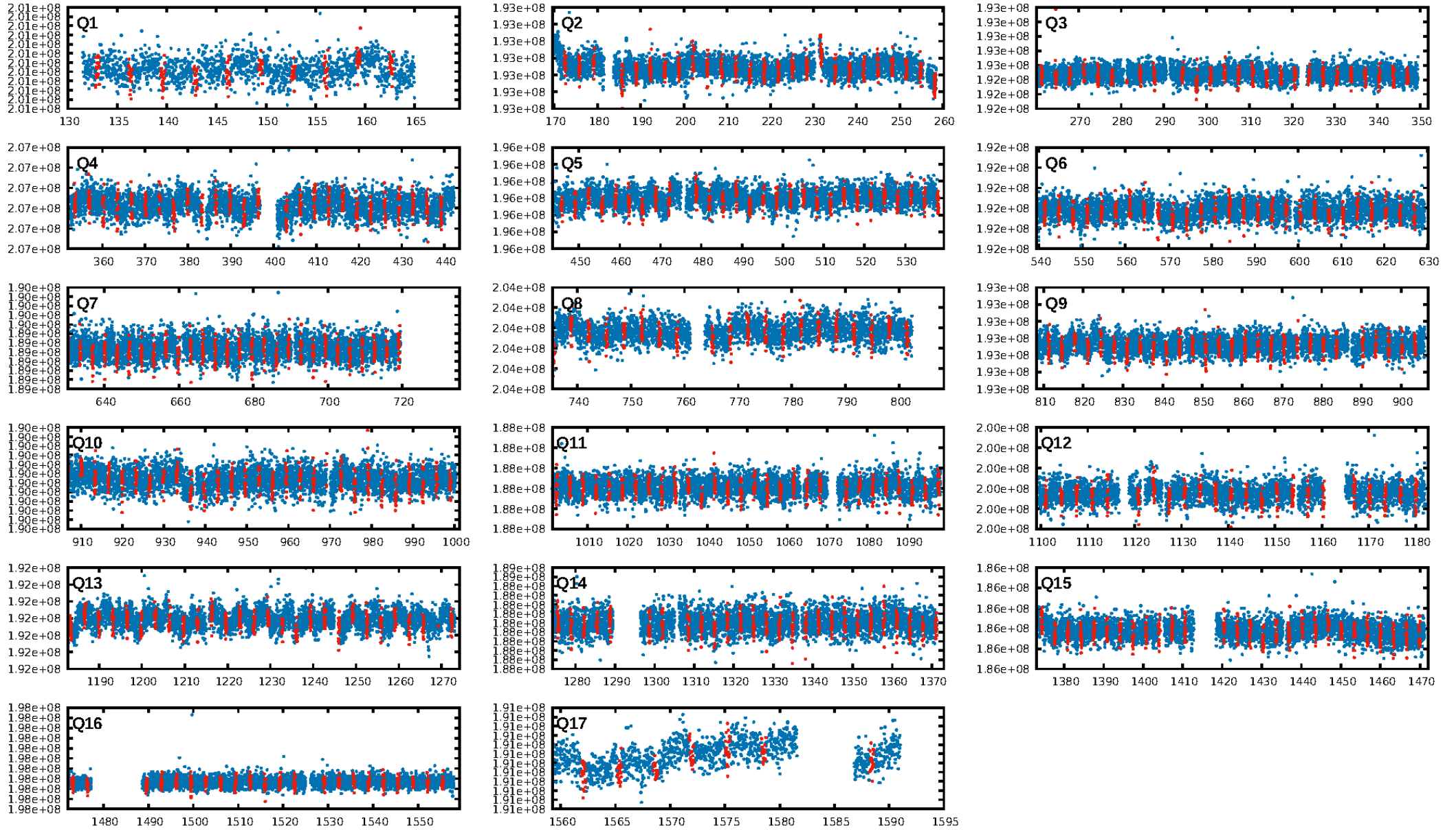
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [20.37 σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 3.11e-159
RollingBand-fgt: 1.00 [367/367]
GhostDiagnostic-chr: 5.047
Centroid-sig: 12.2%
Centroid-so: 0.206 arcsec [0.62 σ]
OotOffset-rm: 0.184 arcsec [0.87 σ]
KicOffset-rm: 0.169 arcsec [0.84 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]

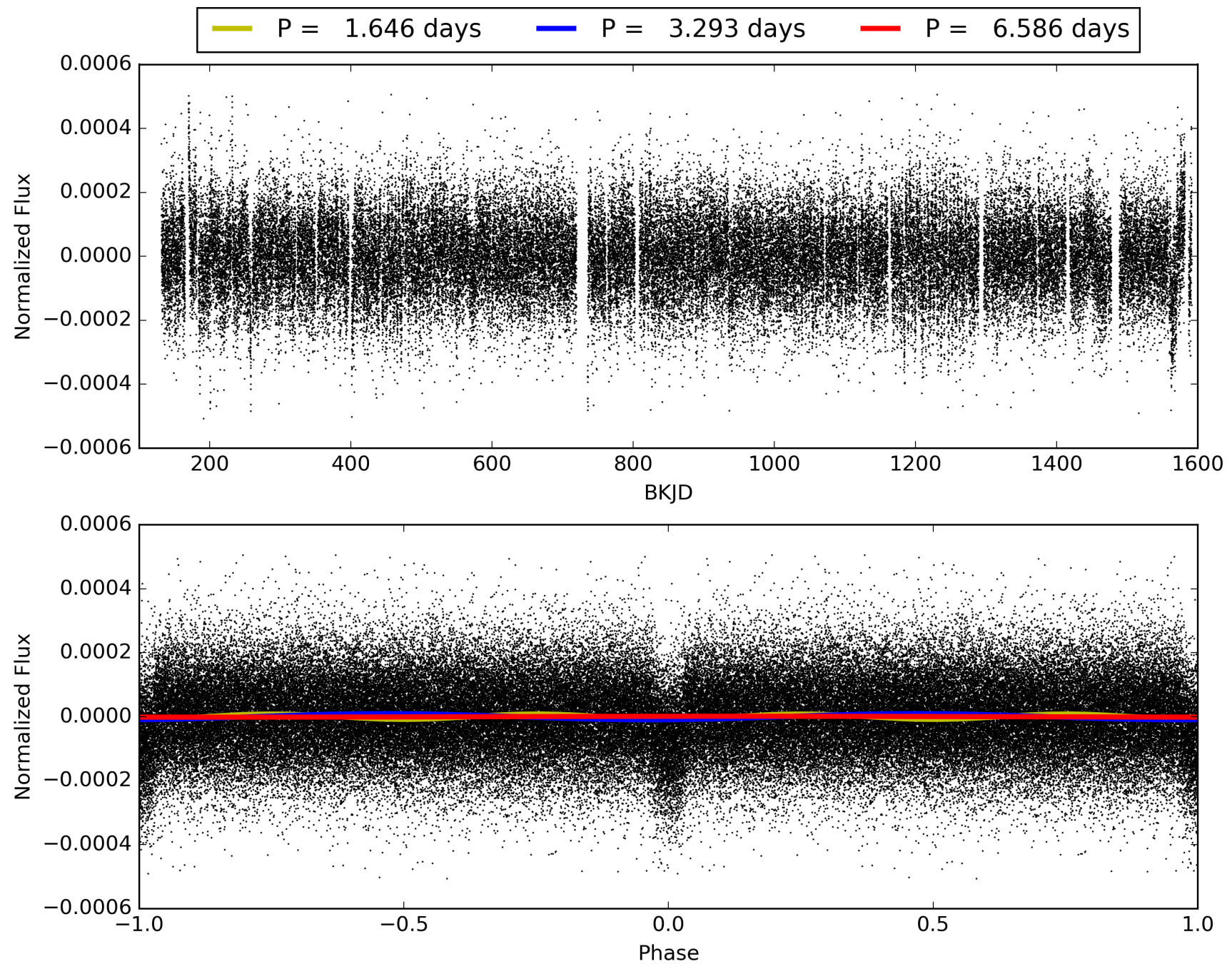
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 02:42:47 Z

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

TCE 010136549-02, PDC Light Curves

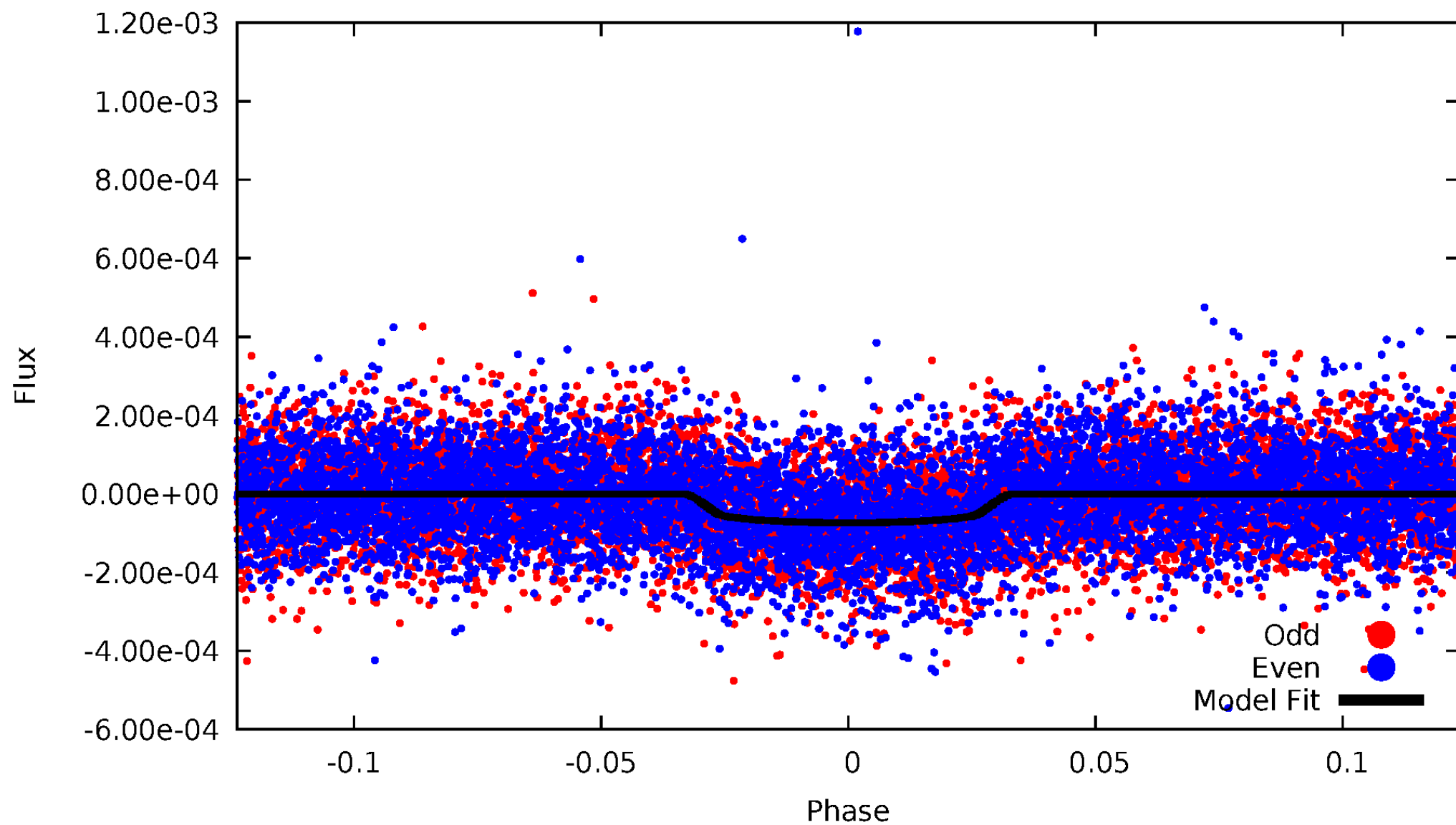


TCE 010136549-02



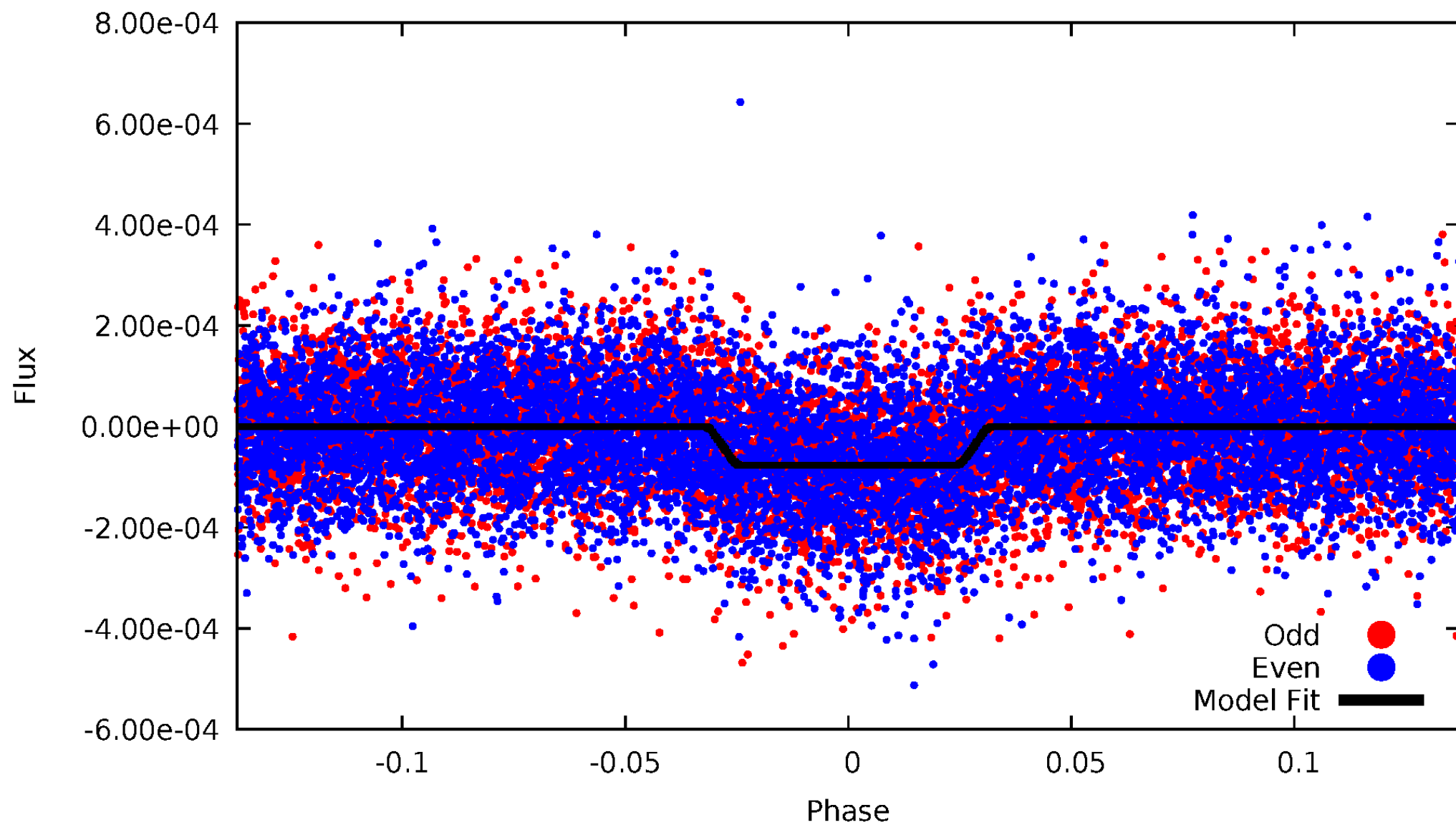
DV Odd/Even

TCE 010136549-02



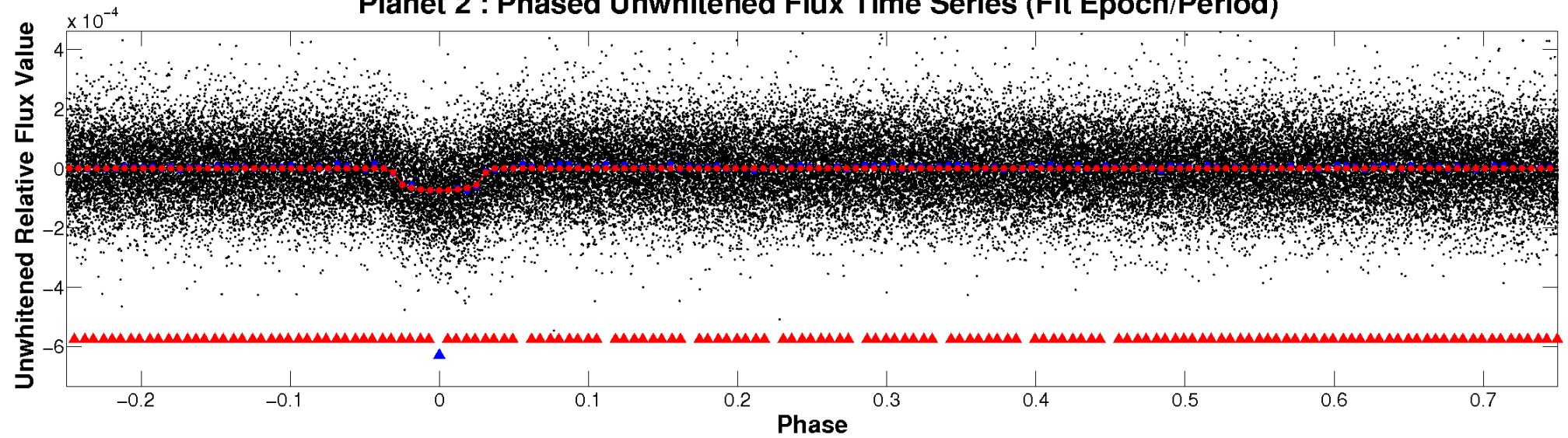
ALT Odd/Even

TCE 010136549-02

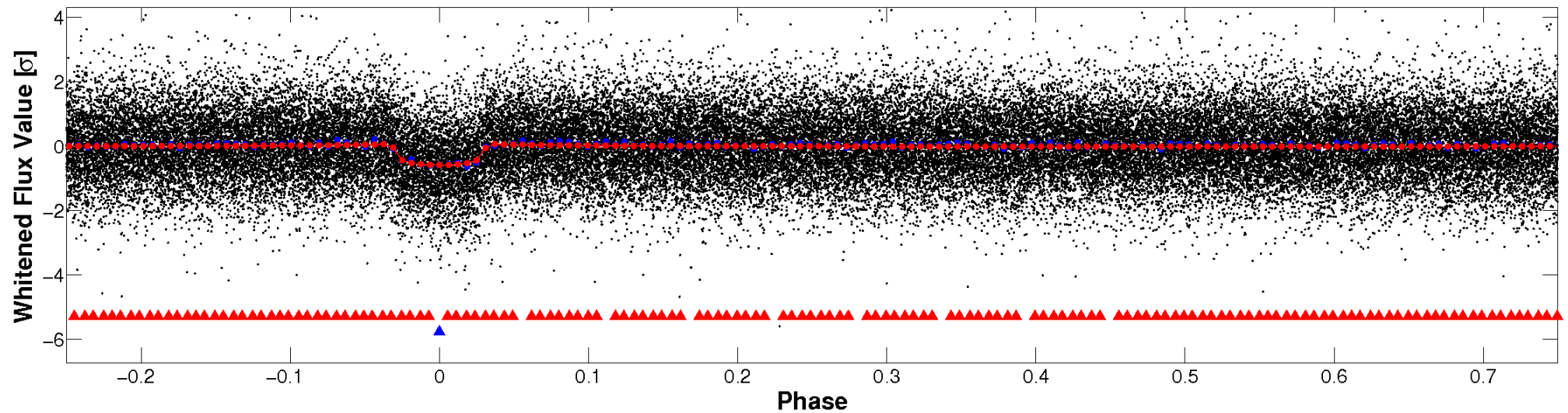


Non-Whitened Vs. Whitened Light Curve

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

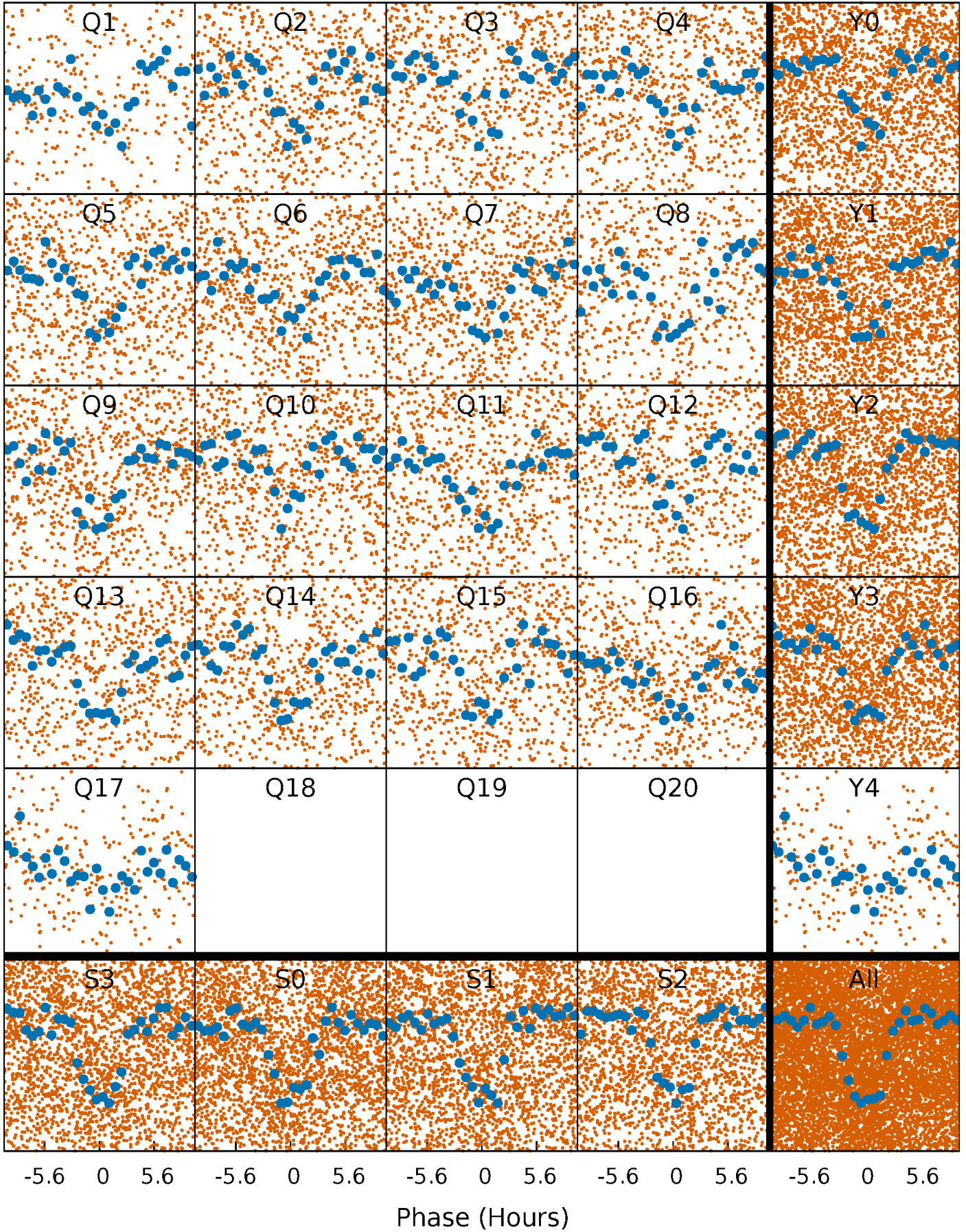


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



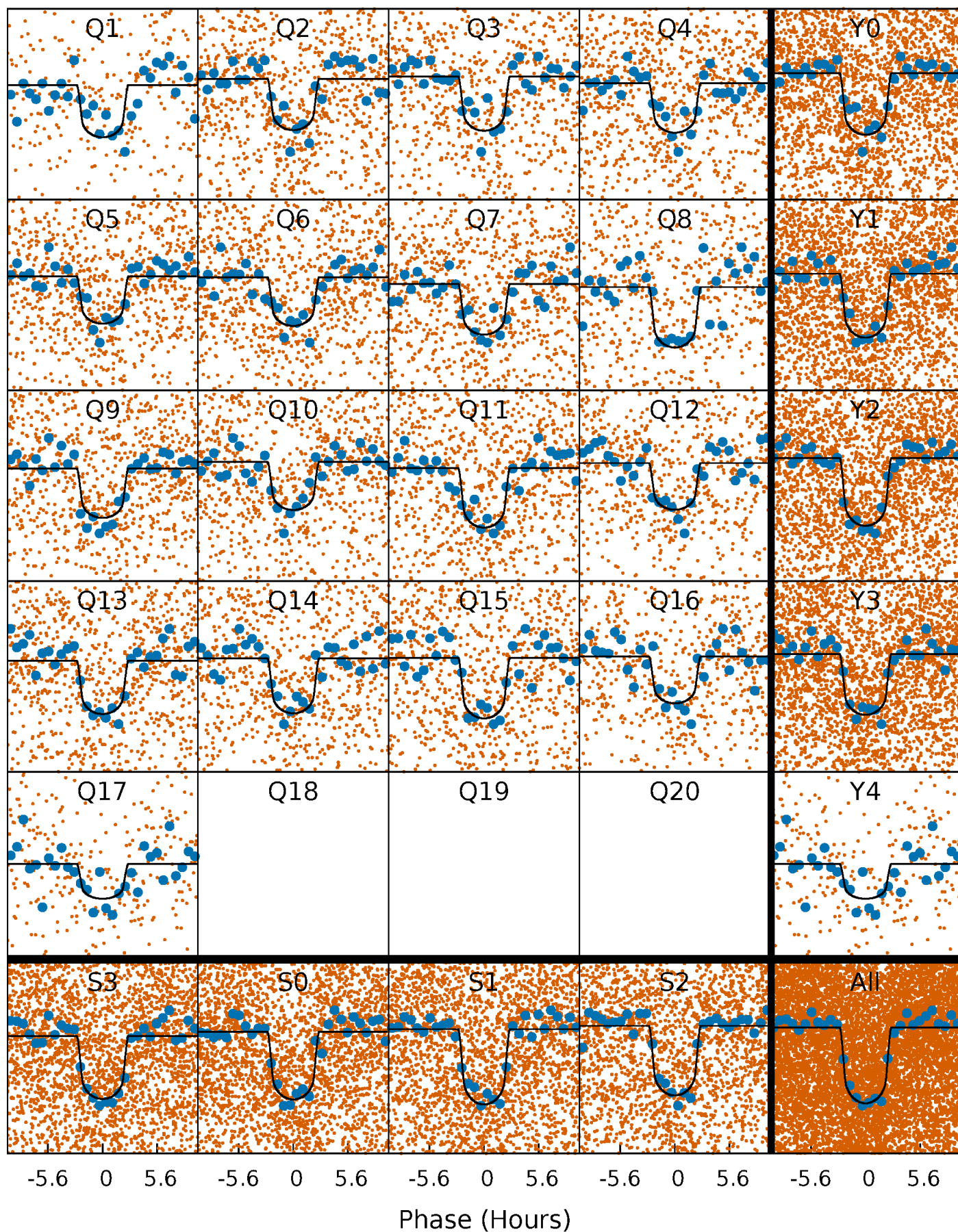
PDC Quarter-Phased Transit Curves

TCE 010136549-02 P= 3.292789 Days $T_0=133.002004$ (BKJD)



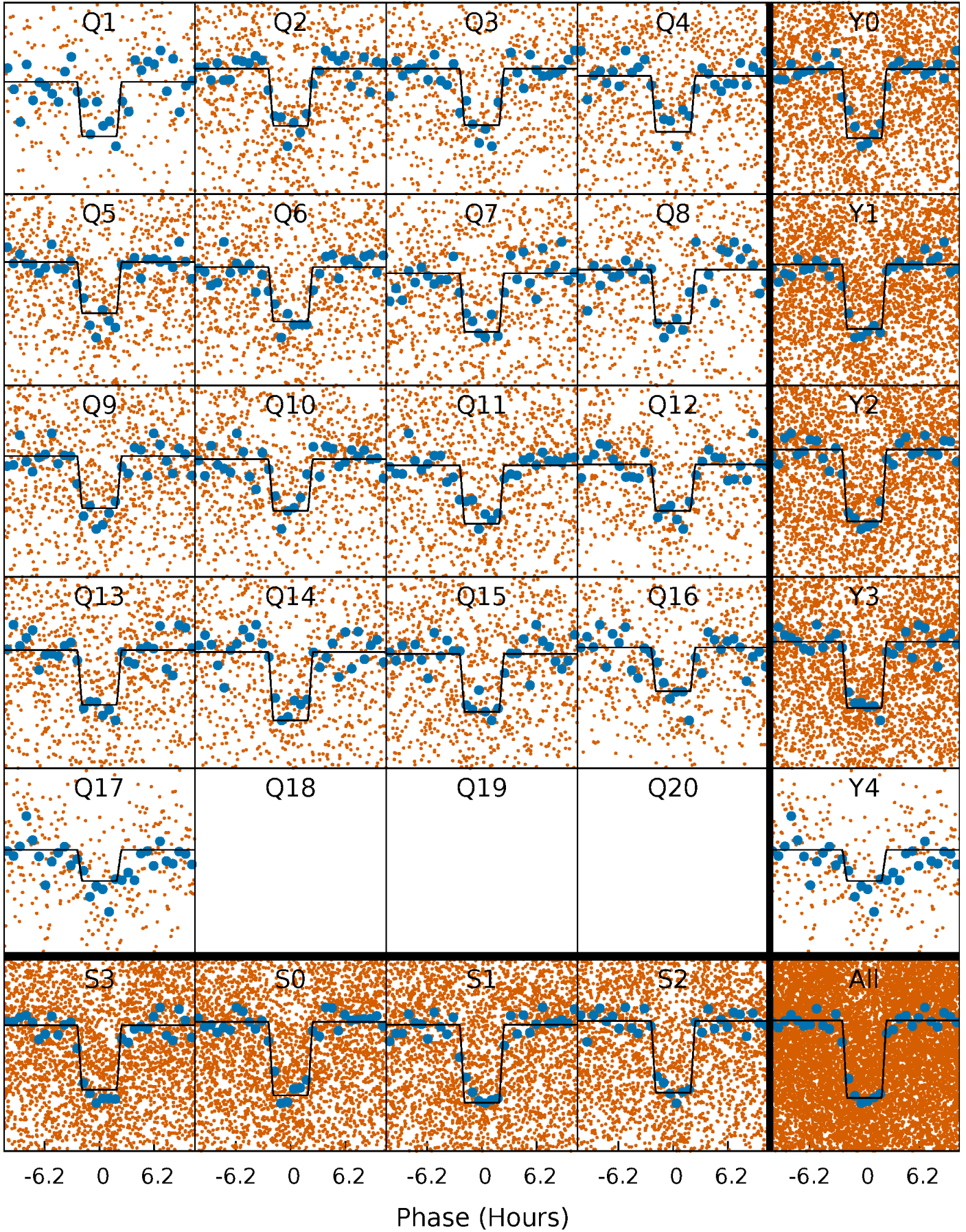
DV Quarter-Phased Transit Curves

TCE 010136549-02 P= 3.292789 Days $T_0=133.002004$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

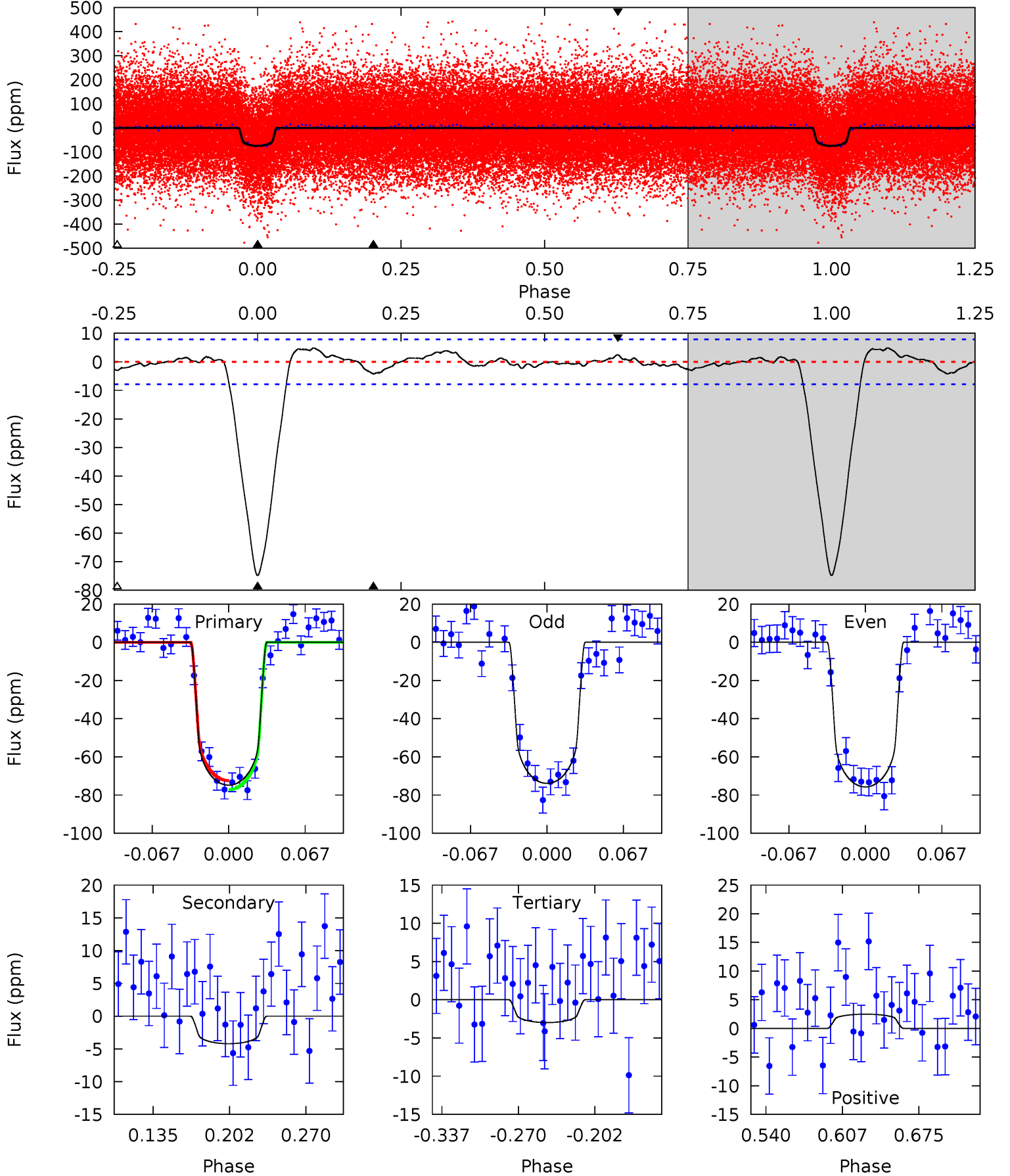
TCE 010136549-02 P= 3.292748 Days $T_0=133.011886$ (BKJD)



DV Model-Shift Uniqueness Test

010136549-02, P = 3.292789 Days, E = 129.709215 Days

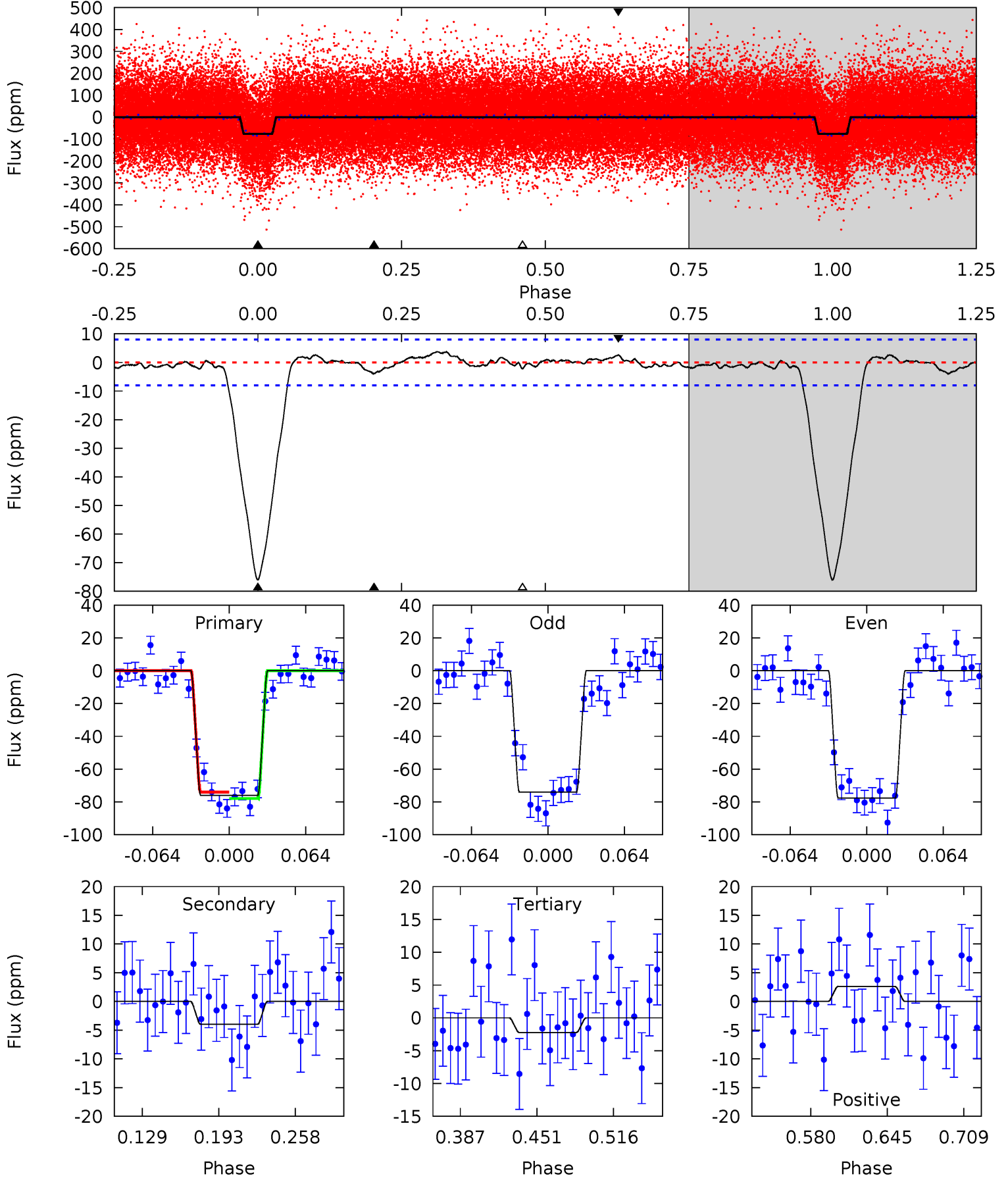
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 44.3 | 2.49 | 1.77 | 1.47 | 4.65 | 1.83 | 1.03 | 42.5 | 42.8 | 0.73 | 1.02 | 0.55 | 1.08 | 0.06 | 1.42 |



Alt Model-Shift Uniqueness Test

010136549-02, P = 3.292748 Days, E = 129.719138 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 44.2 | 2.31 | 1.30 | 1.51 | 4.66 | 1.85 | 0.81 | 42.9 | 42.7 | 1.01 | 0.80 | 1.06 | 1.06 | 0.05 | 1.13 |



Stellar Parameters For KIC 010136549

| | $T_{\text{eff}} (K)$ | $\log(g)$ | $[\text{Fe}/\text{H}]$ | $R (R_{\odot})$ | $M (M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|---------------------------|---------------------------|---------------------------|---|
| | 5683^{+115}_{-104} | $4.108^{+0.195}_{-0.090}$ | $0.100^{+0.150}_{-0.150}$ | $1.472^{+0.229}_{-0.344}$ | $1.014^{+0.093}_{-0.084}$ | $0.448^{+0.458}_{-0.141}$ |
| | +2%/-2% | +5%/-2% | +150%/-150% | +16%/-23% | +9%/-8% | +102%/-32% |
| Source | SPE59 | SPE59 | SPE59 | DSEP | | |

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

Secondary Eclipse Parameters for KIC 010136549-02 / KOI 1929.02

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$ | A_{obs} |
|---------|-------------|------------------------|----------------------|----------------------|---------------------------|
| DV | -4 ± 2 | $1.48^{+0.27}_{-0.29}$ | 2022^{+101}_{-125} | 3162^{+265}_{-319} | $2.016^{+1.497}_{-0.949}$ |
| Alt. | -4 ± 2 | $1.39^{+0.27}_{-0.29}$ | 2029^{+101}_{-122} | 3166^{+330}_{-347} | $2.077^{+1.602}_{-1.048}$ |

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 $A_{\text{obs}} \gg 1.0$

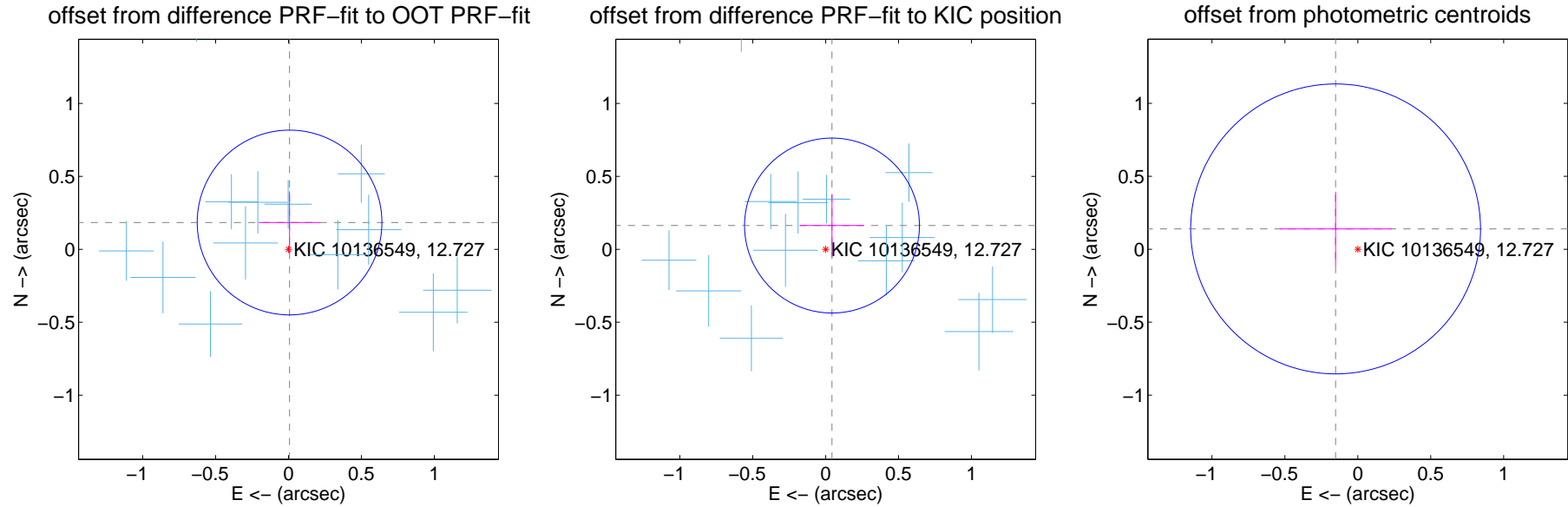
DV Centroid Data

Supplemental centroid analysis for 010136549-02. Kepler magnitude: 12.73. Transit SNR 30.03

There are 17 quarters with good PRF difference image offsets

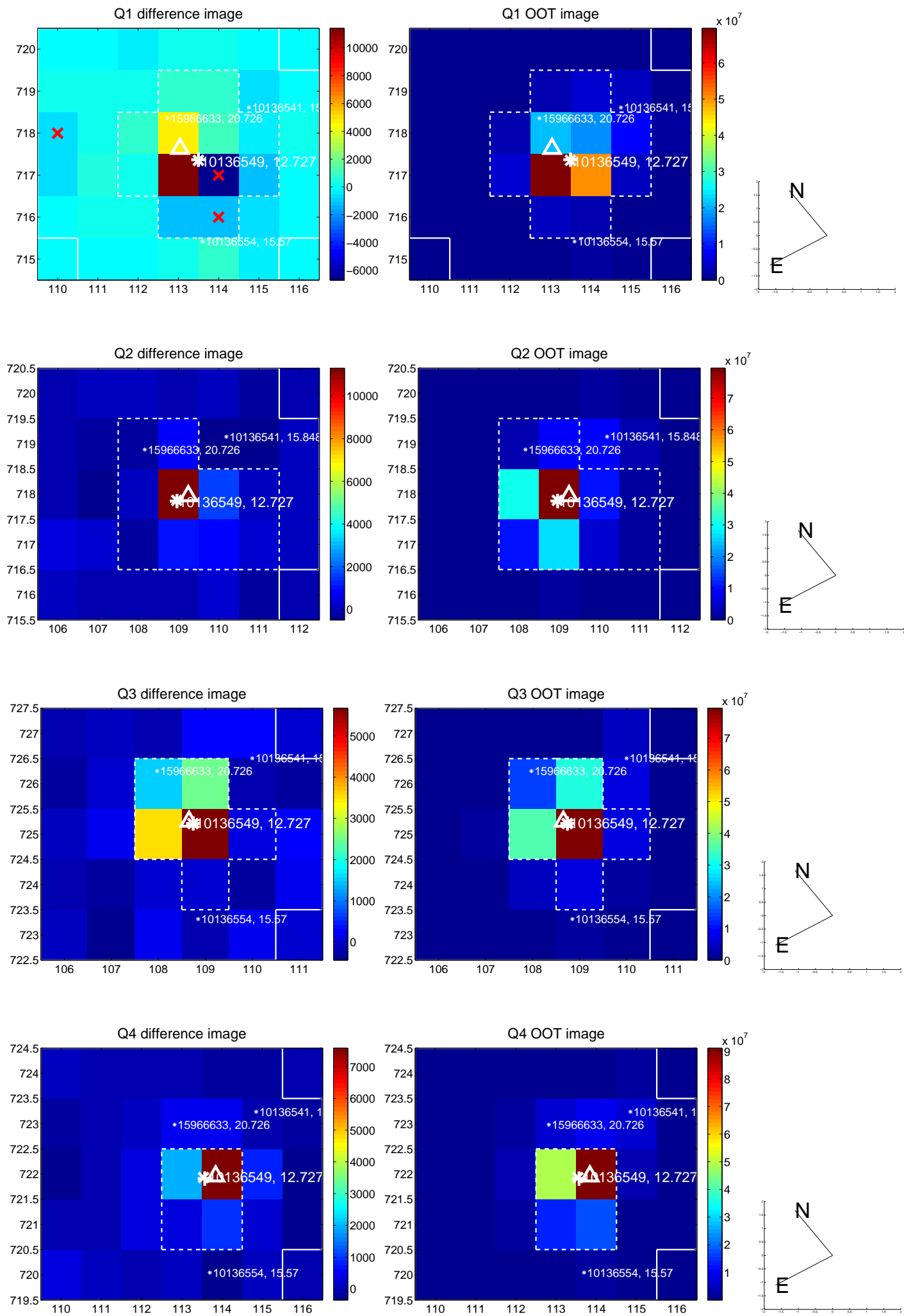
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|-------------------|
| PRF-fit source offset from OOT | 0.184 ± 0.211 | 0.87 | -0.007 ± 0.212 | 0.184 ± 0.214 |
| PRF-fit source offset from KIC position | 0.169 ± 0.200 | 0.84 | -0.043 ± 0.220 | 0.163 ± 0.216 |
| photometric centroid source offset | 0.21 ± 0.33 | 0.62 | 0.15 ± 0.38 | 0.14 ± 0.25 |

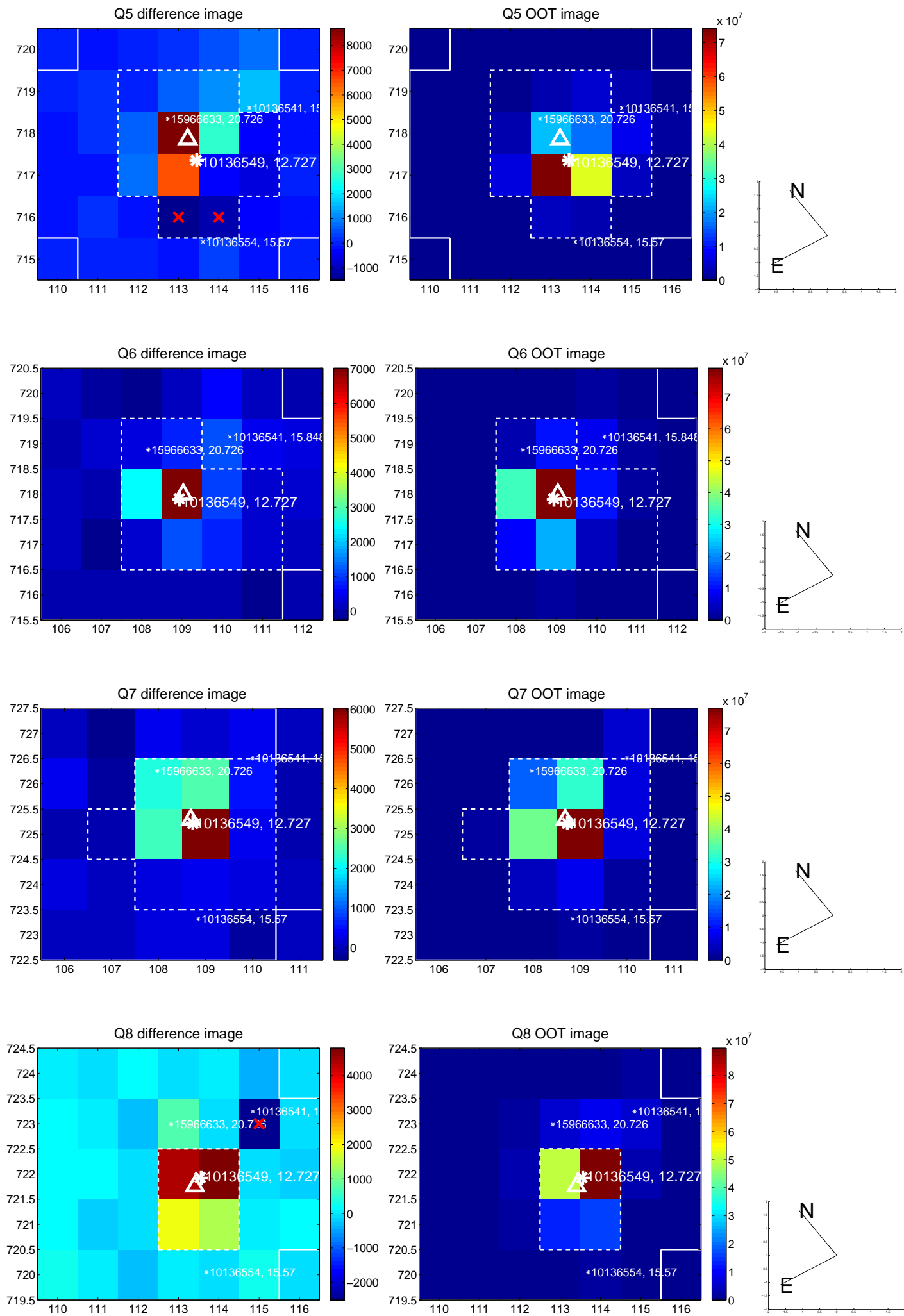


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

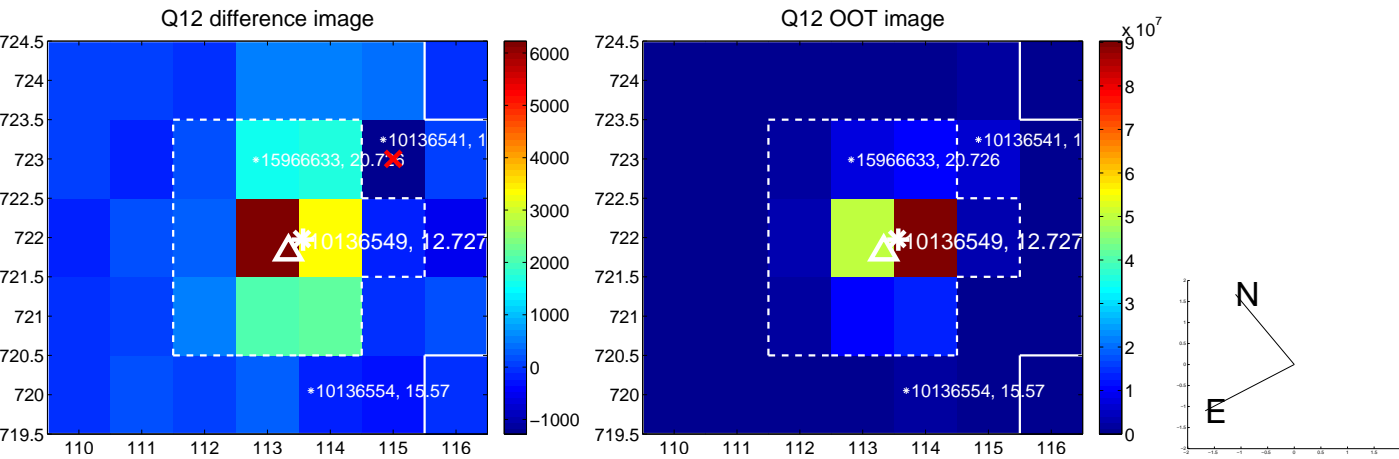
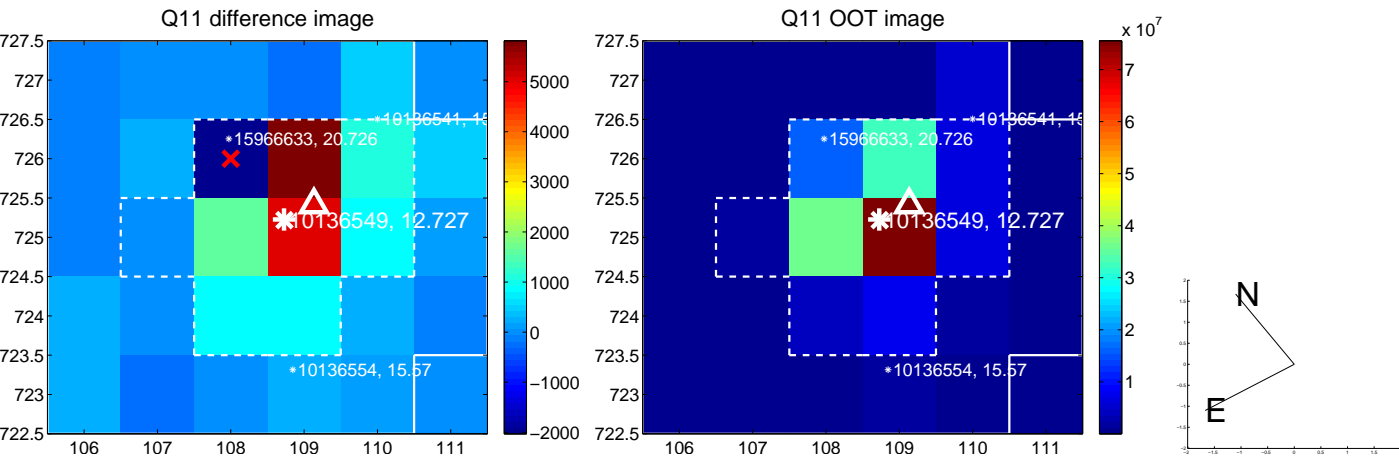
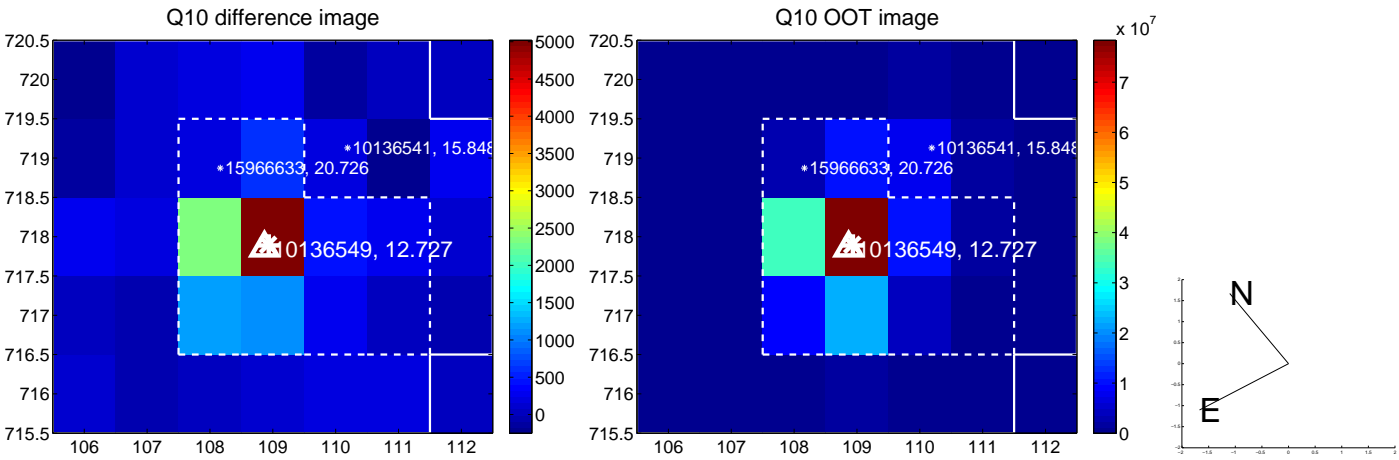
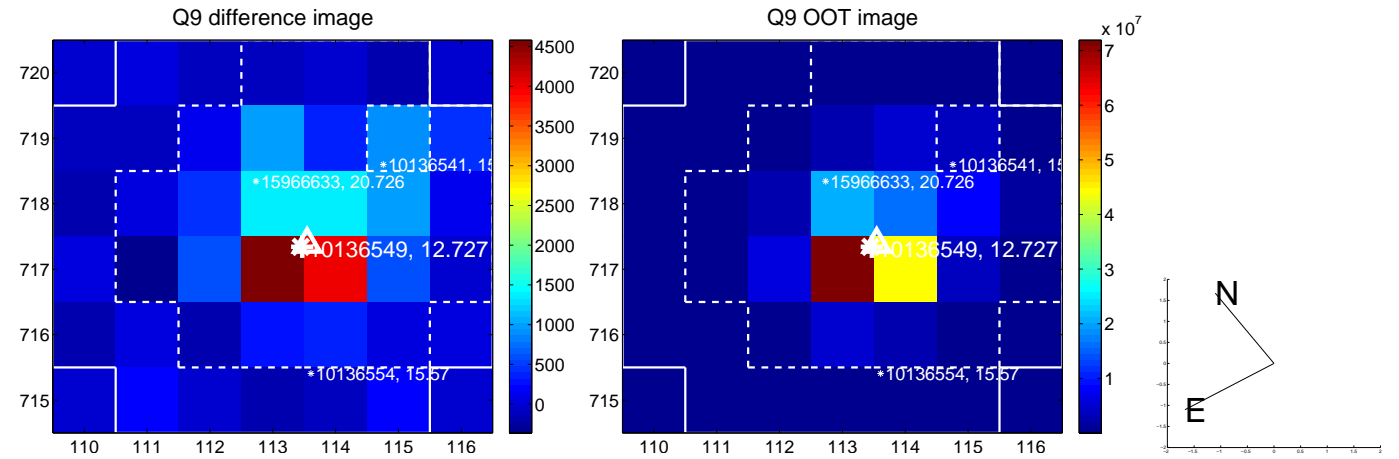
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



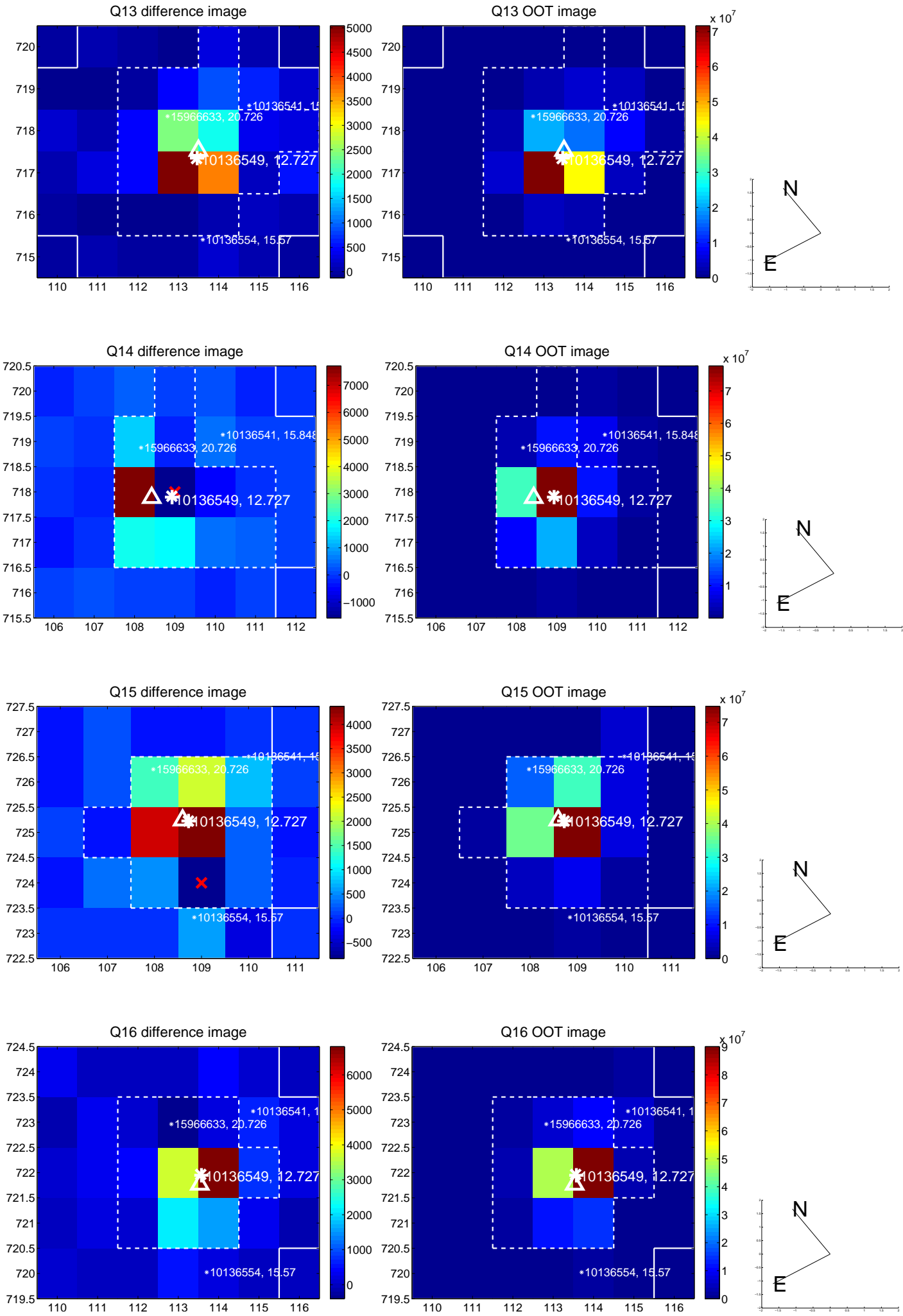
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



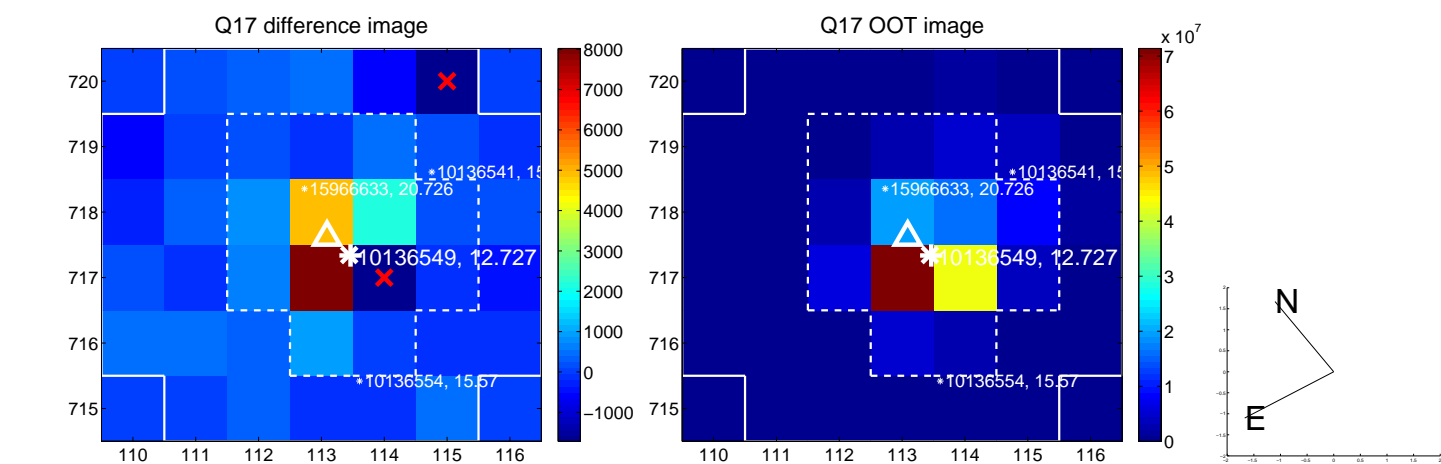
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



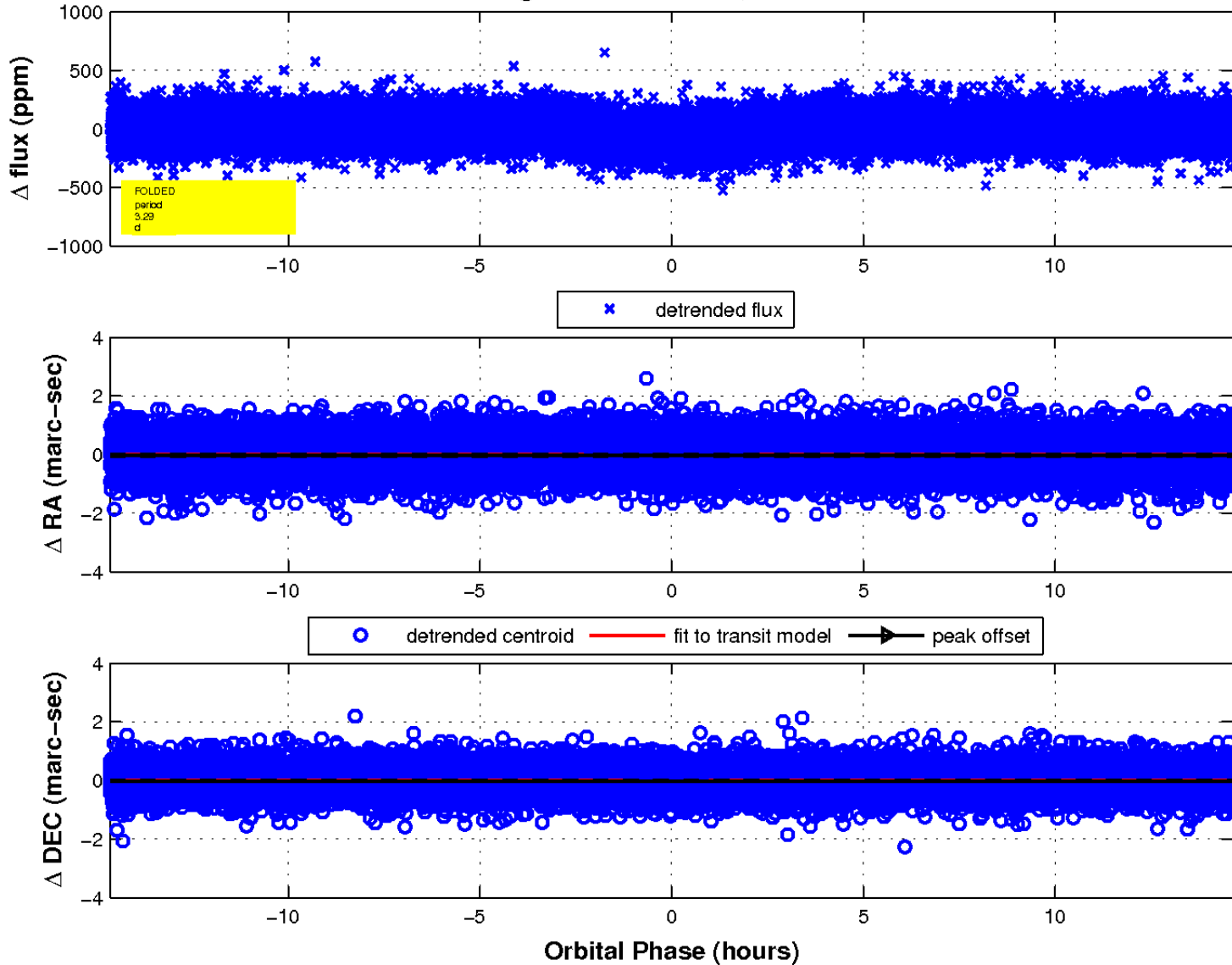
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

