

# KIC 005609753

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|-----|-----------------------------|-----------------|------------------------|------------------------|
| 005609753-01 | OBS      | No   | 345.000927    | 426.784631   | 910.9       | 4.728            | 23.3 | 5.7 | 0.62                        | 5203            | 1.88                   | 0.38                   |
| 005609753-02 | OBS      | No   | 549.928834    | 301.082157   | 803.5       | 3.726            | 15.6 | 6.8 | 0.62                        | 5203            | 1.96                   | 0.20                   |
| 005609753-03 | OBS      | No   | 275.988514    | 329.847221   | 992.9       | 20.421           | 16.0 | 6.1 | 0.62                        | 5203            | 1.94                   | 0.51                   |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 005609753-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_SKYE—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS |
| 005609753-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS                                 |
| 005609753-03 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS                  |

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

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

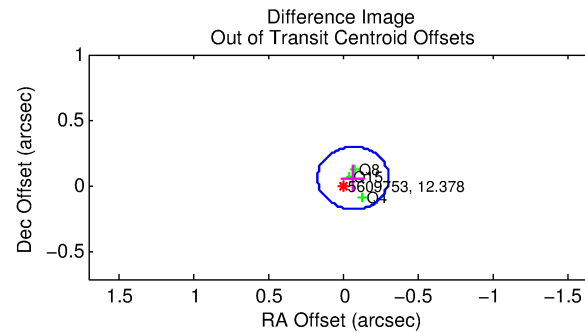
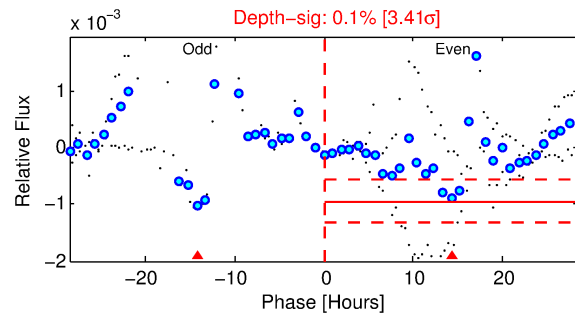
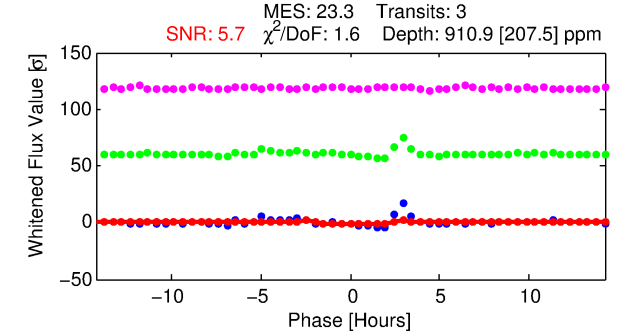
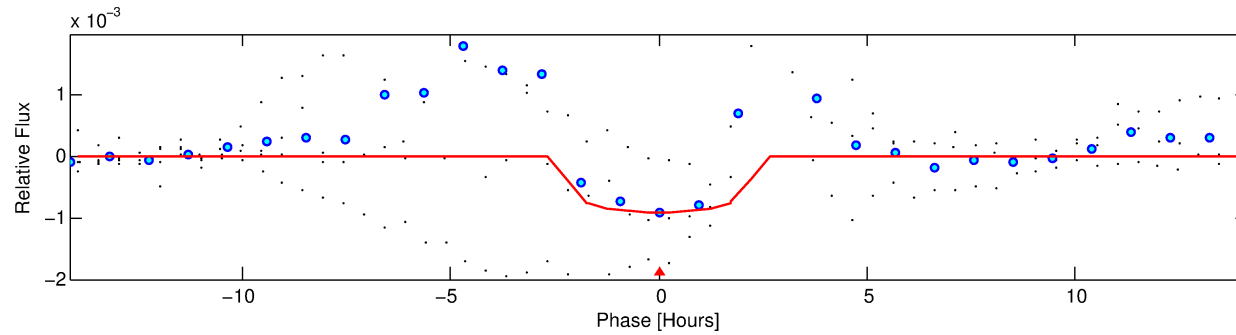
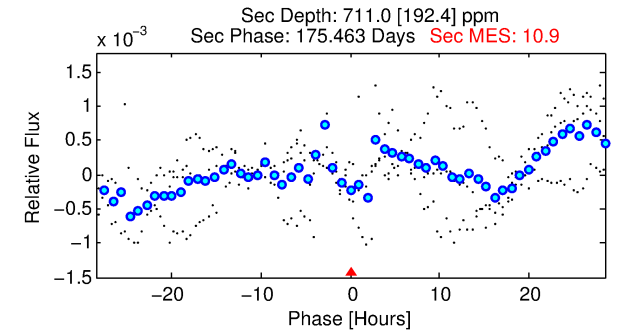
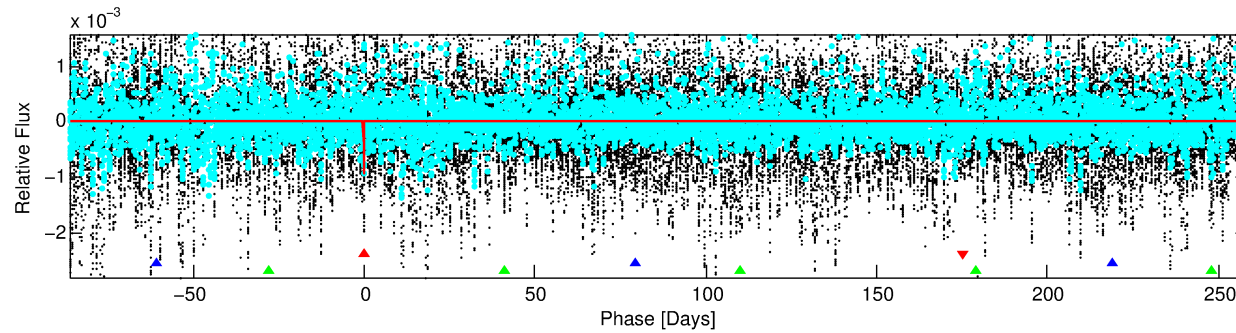
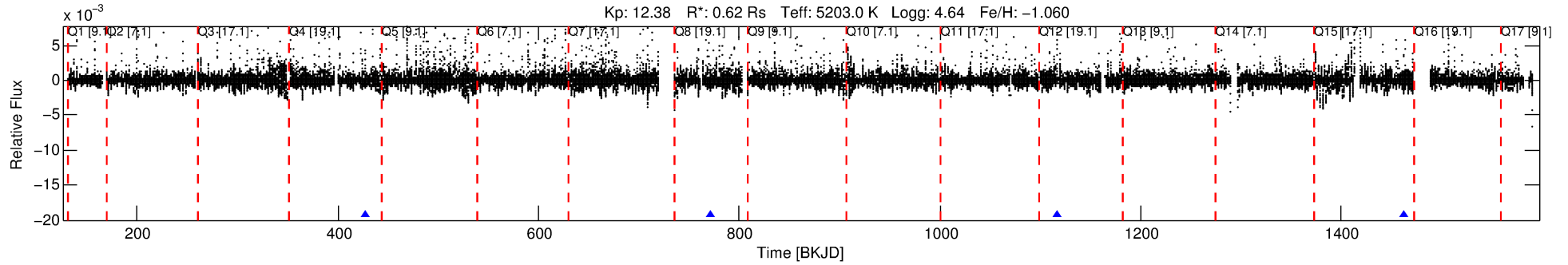
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 005609753-01

No Significant Match Found

# DV One-Page Summary

KIC: 5609753 Candidate: 1 of 3 Period: 345.001 d



## DV Fit Results:

Period = 345.00093 [0.00244] d  
Epoch = 426.7846 [0.0053] BKJD  
Rp/R\* = 0.0278 [0.1053]  
a/R\* = 540.18 [9072.66]  
b = 0.34 [43.53]  
Seff = 0.38 [0.06]  
Teq = 200 [8] K  
Rp = 1.88 [7.12] Re  
a = 0.8182 [0.0566] AU  
Ag = 74085.93 [561664.17] [0.13 $\sigma$ ]  
Teffp = 5097 [9660] K [0.51 $\sigma$ ]

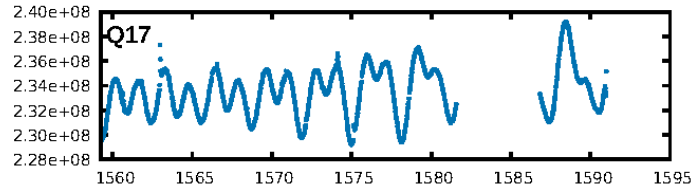
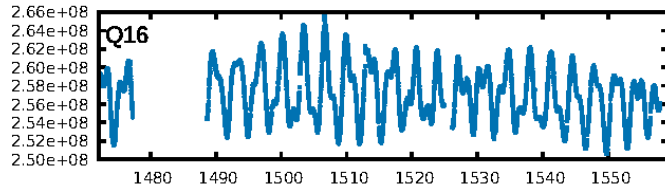
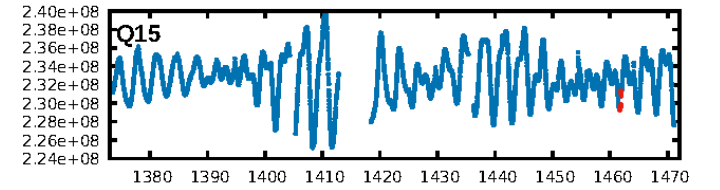
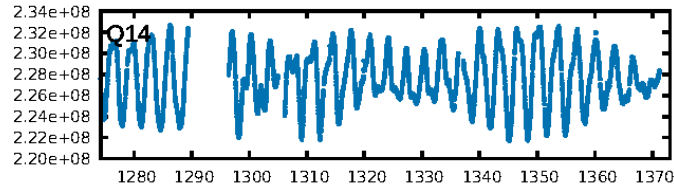
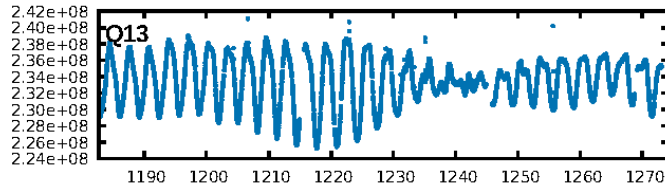
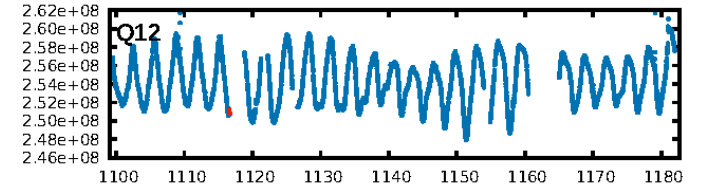
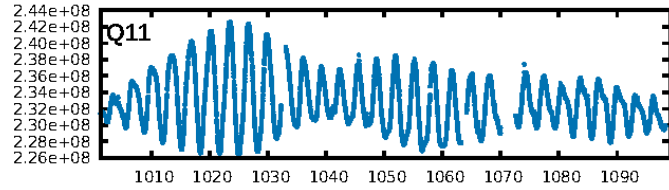
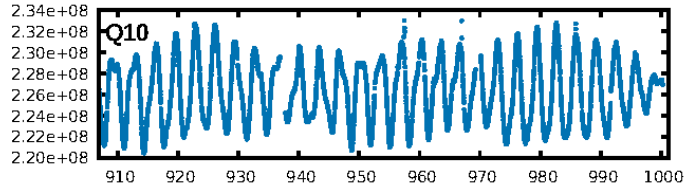
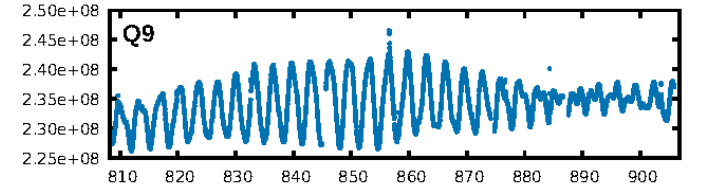
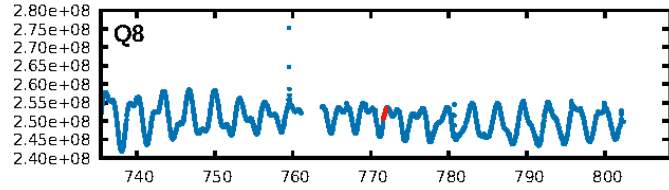
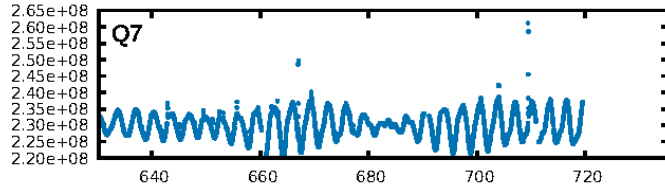
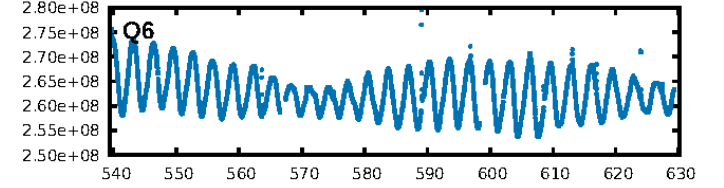
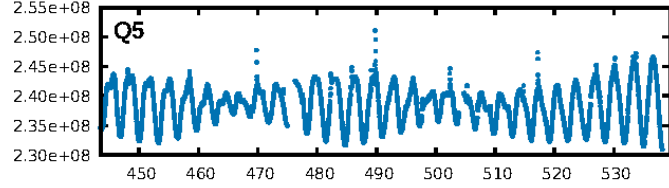
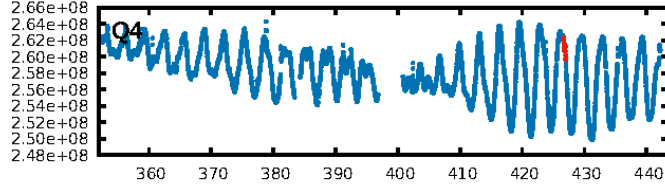
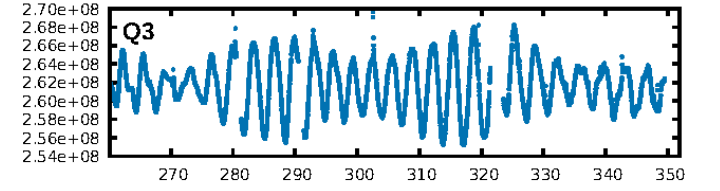
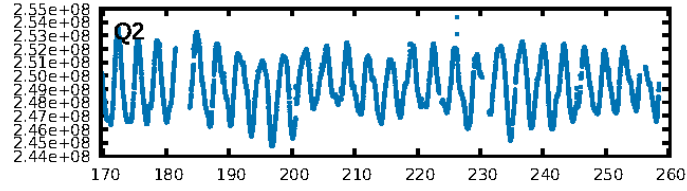
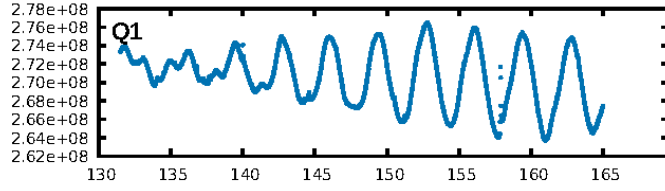
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [79.02 $\sigma$ ]  
LongPeriod-sig: 100.0% [817.08 $\sigma$ ]  
ModelChiSquare2-sig: 8.9%  
ModelChiSquareGof-sig: 40.8%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 6.675  
Centroid-sig: 3.9%  
Centroid-so: 0.507 arcsec [1.54 $\sigma$ ]  
OotOffset-rm: 0.095 arcsec [1.20 $\sigma$ ]  
OotOffset-st: 0/1/2/0 [3]  
KicOffset-rm: 0.507 arcsec [5.68 $\sigma$ ]  
KicOffset-st: 0/1/2/0 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [3/3]

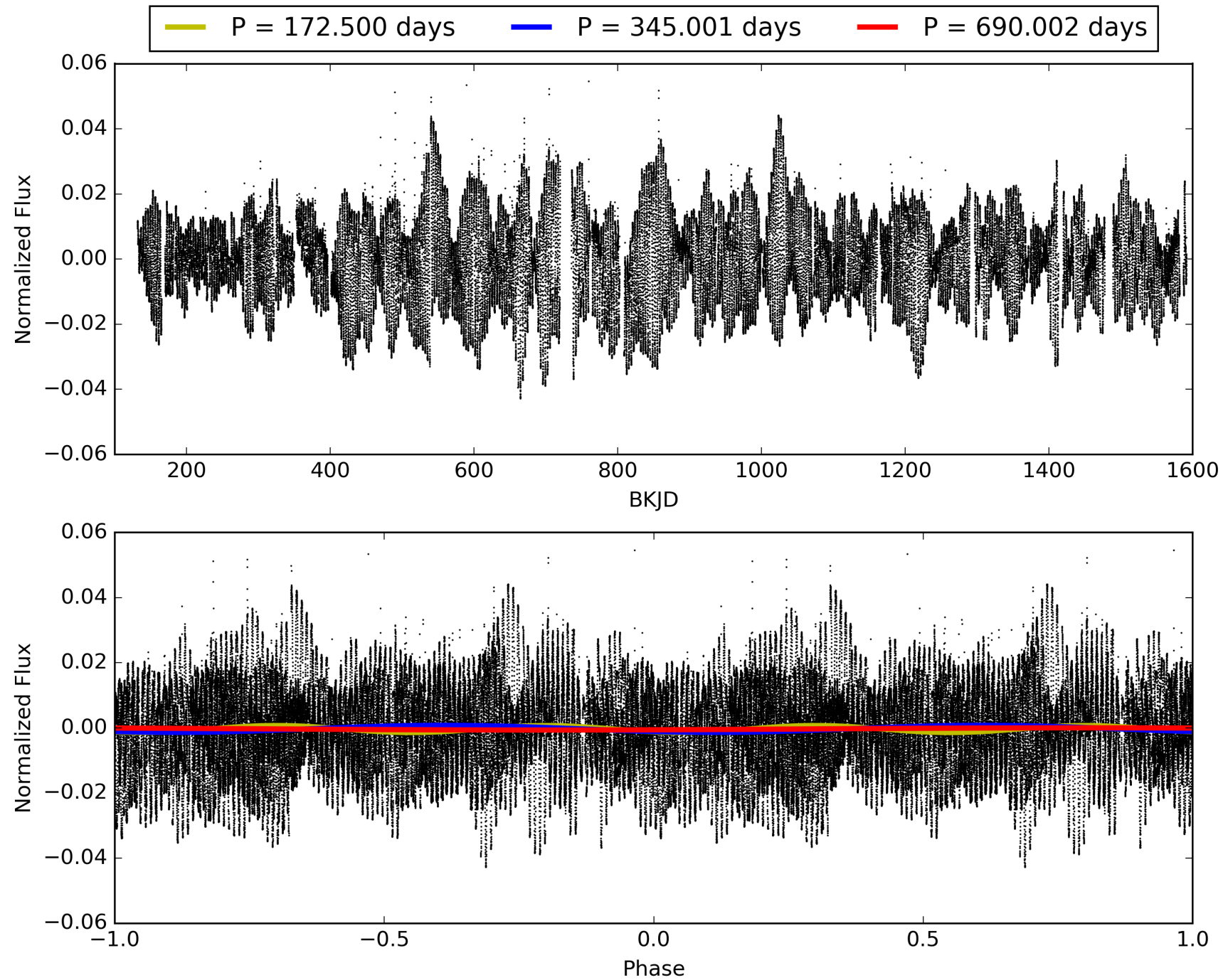
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 00:26:35 Z

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

# TCE 005609753-01, PDC Light Curves

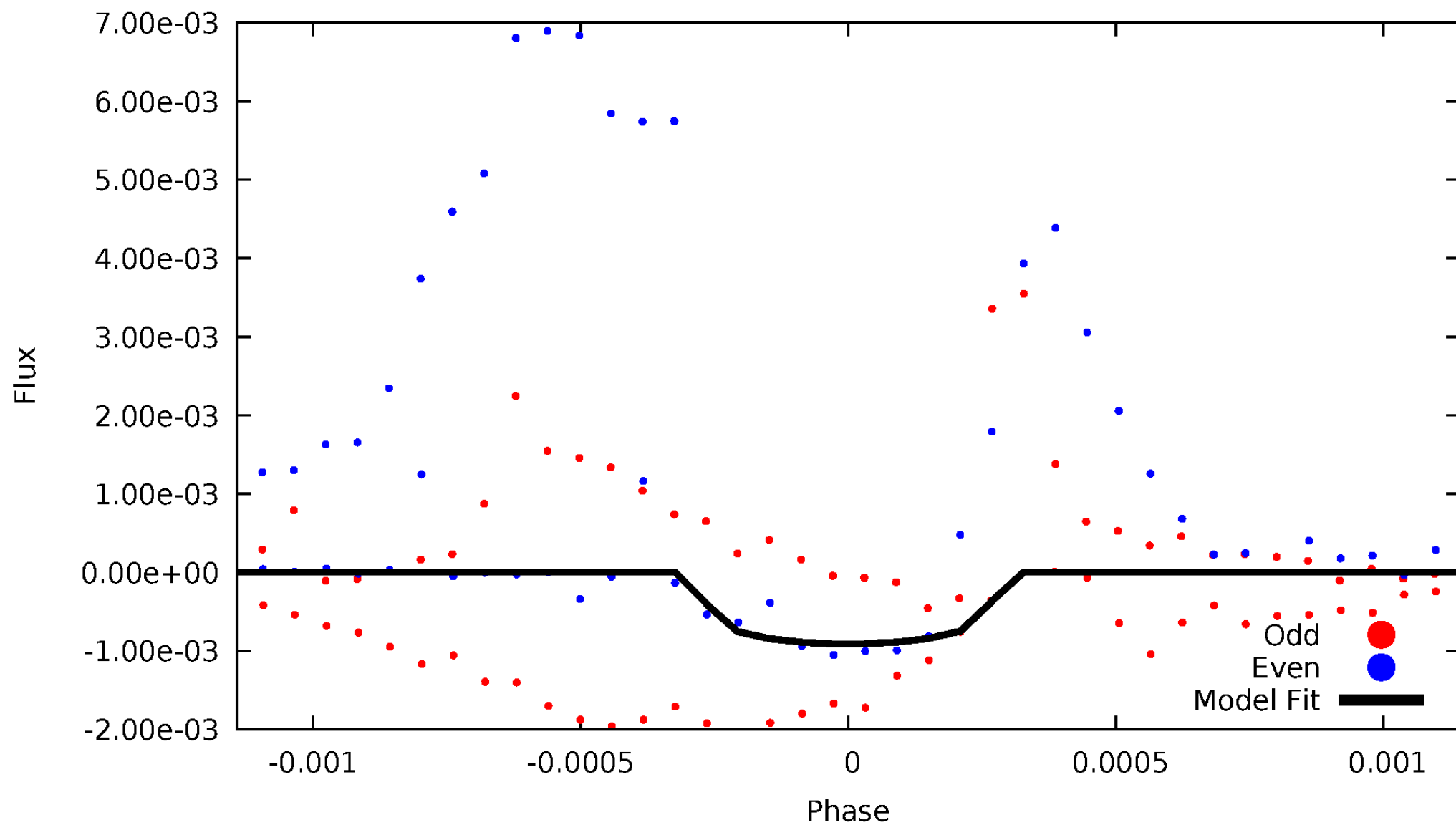


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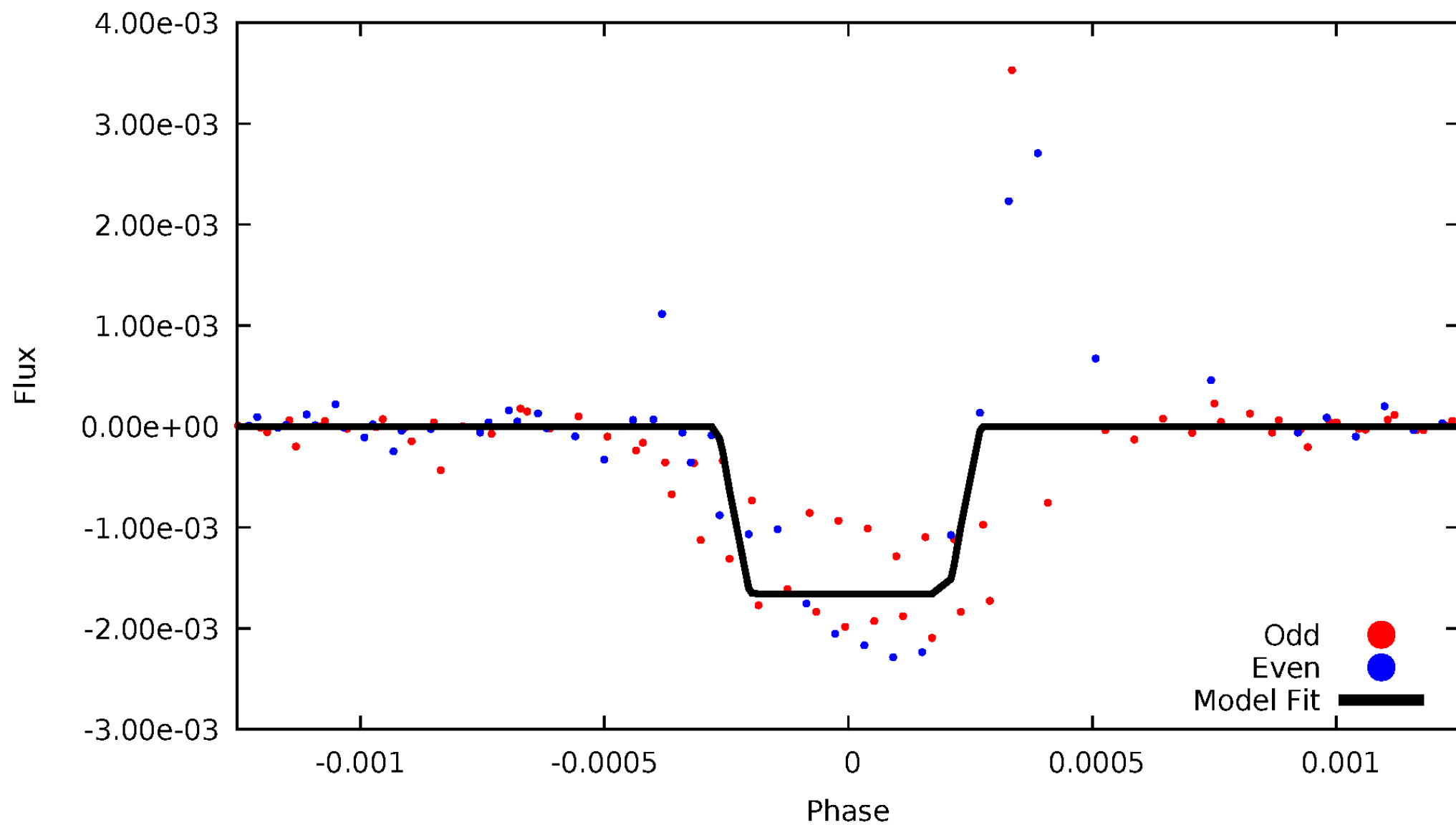
# DV Odd/Even

TCE 005609753-01



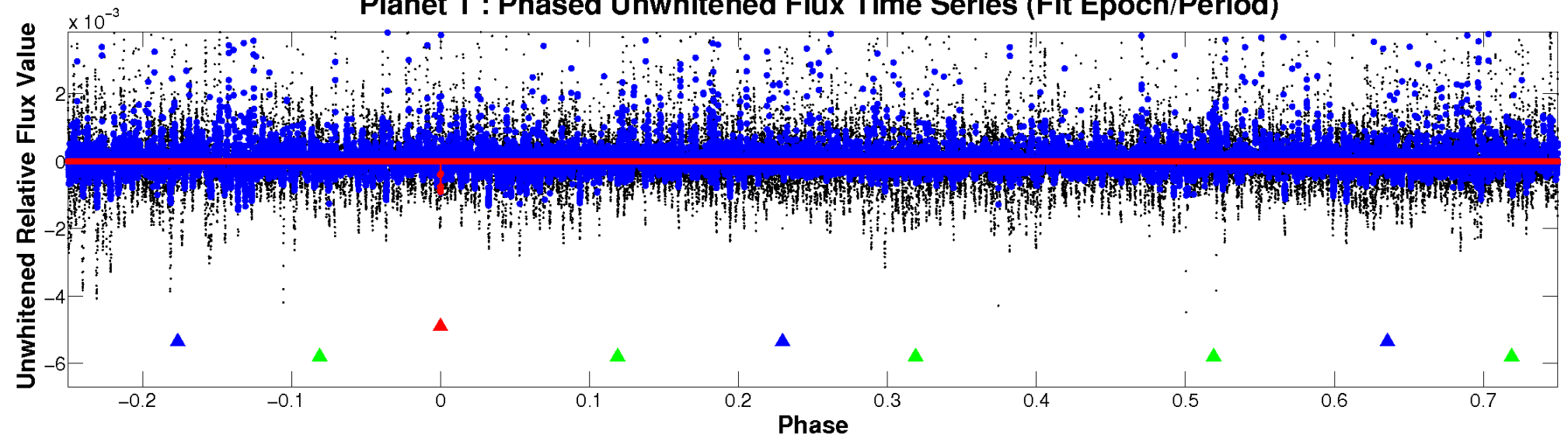
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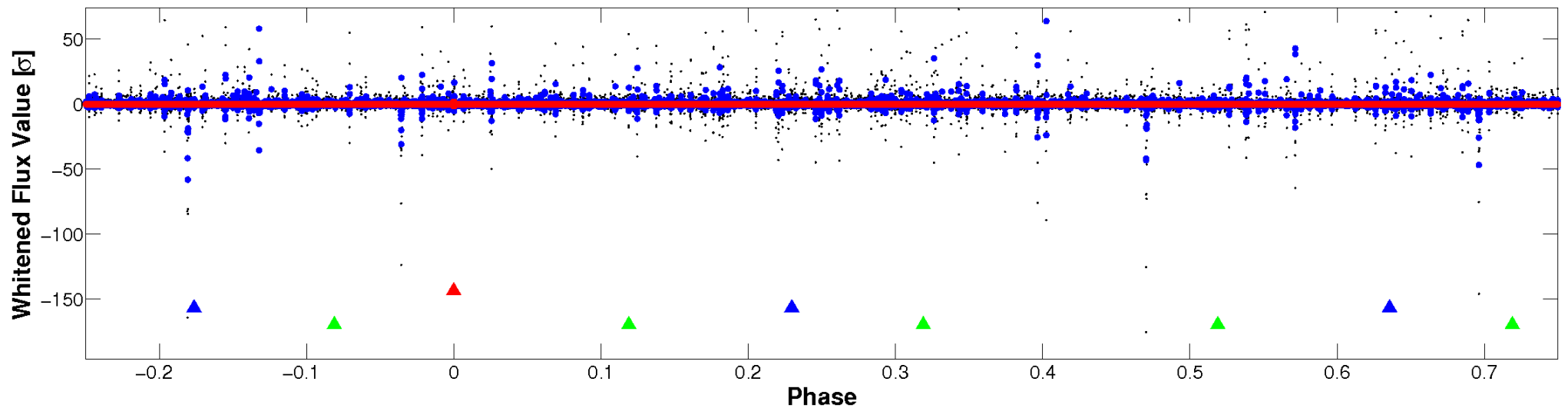


# Non-Whitened Vs. Whitened Light Curve

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

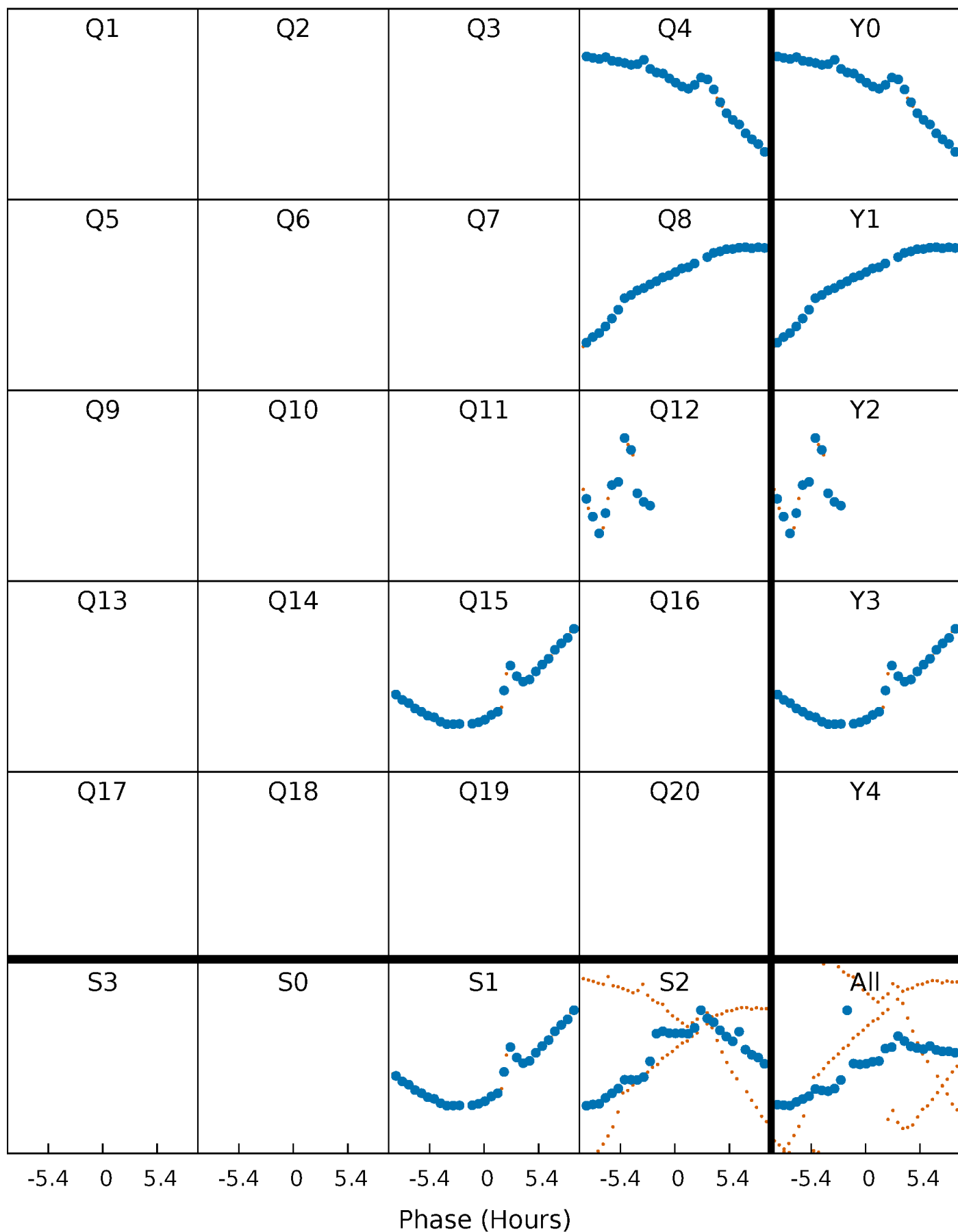


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

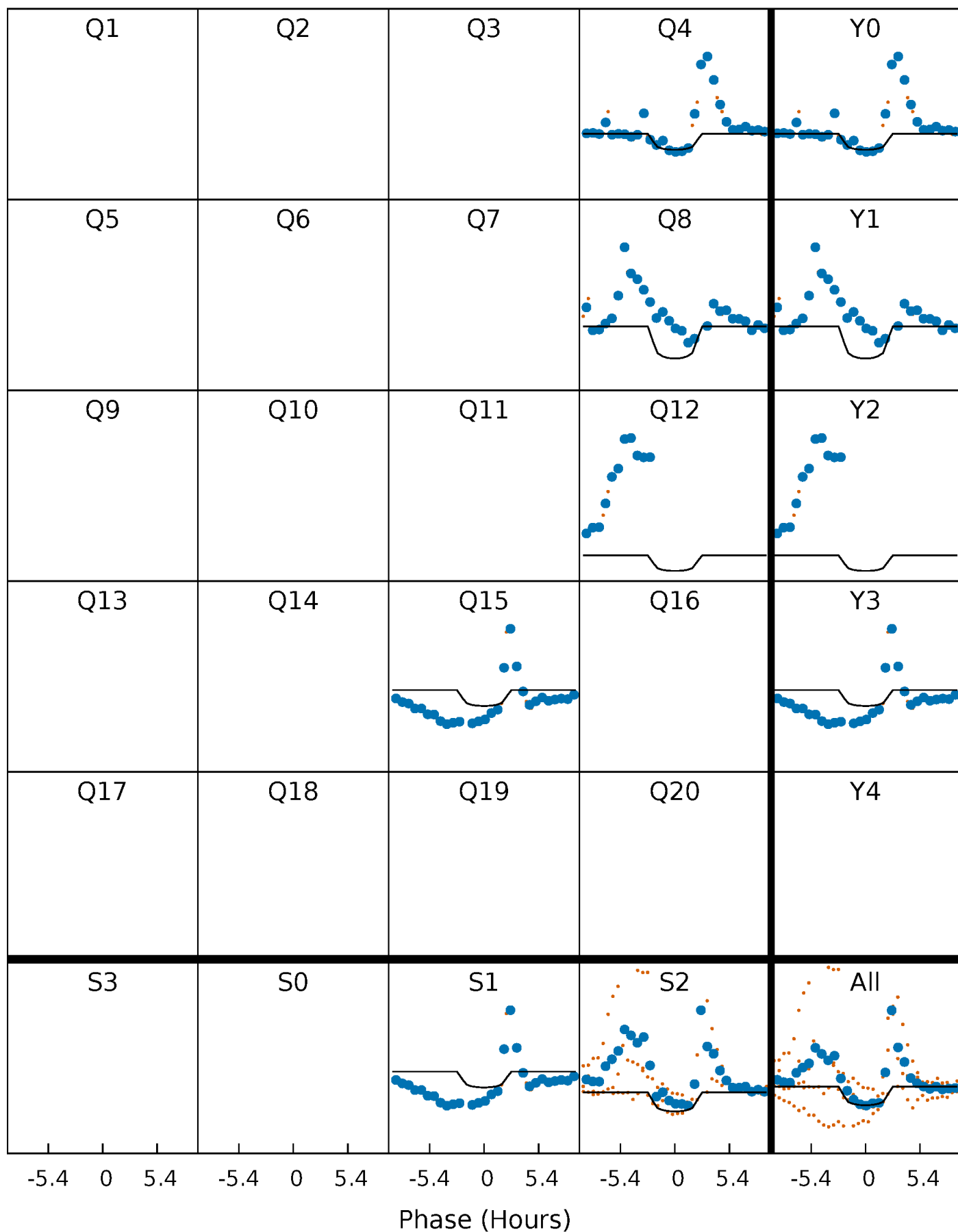
TCE 005609753-01 P=345.000927 Days  $T_0=426.784631$  (BKJD)





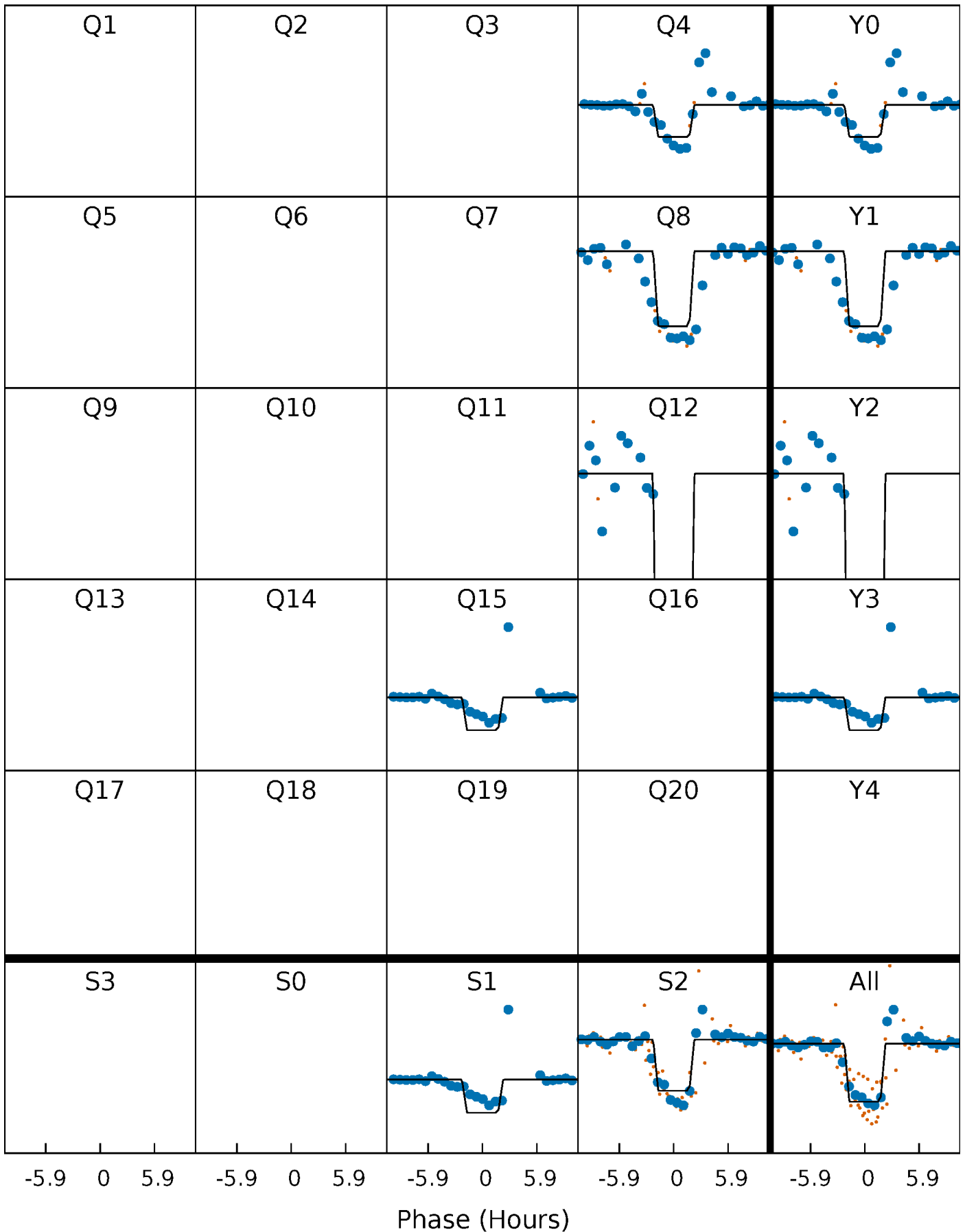
# DV Quarter-Phased Transit Curves

TCE 005609753-01 P=345.000927 Days  $T_0=426.784631$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

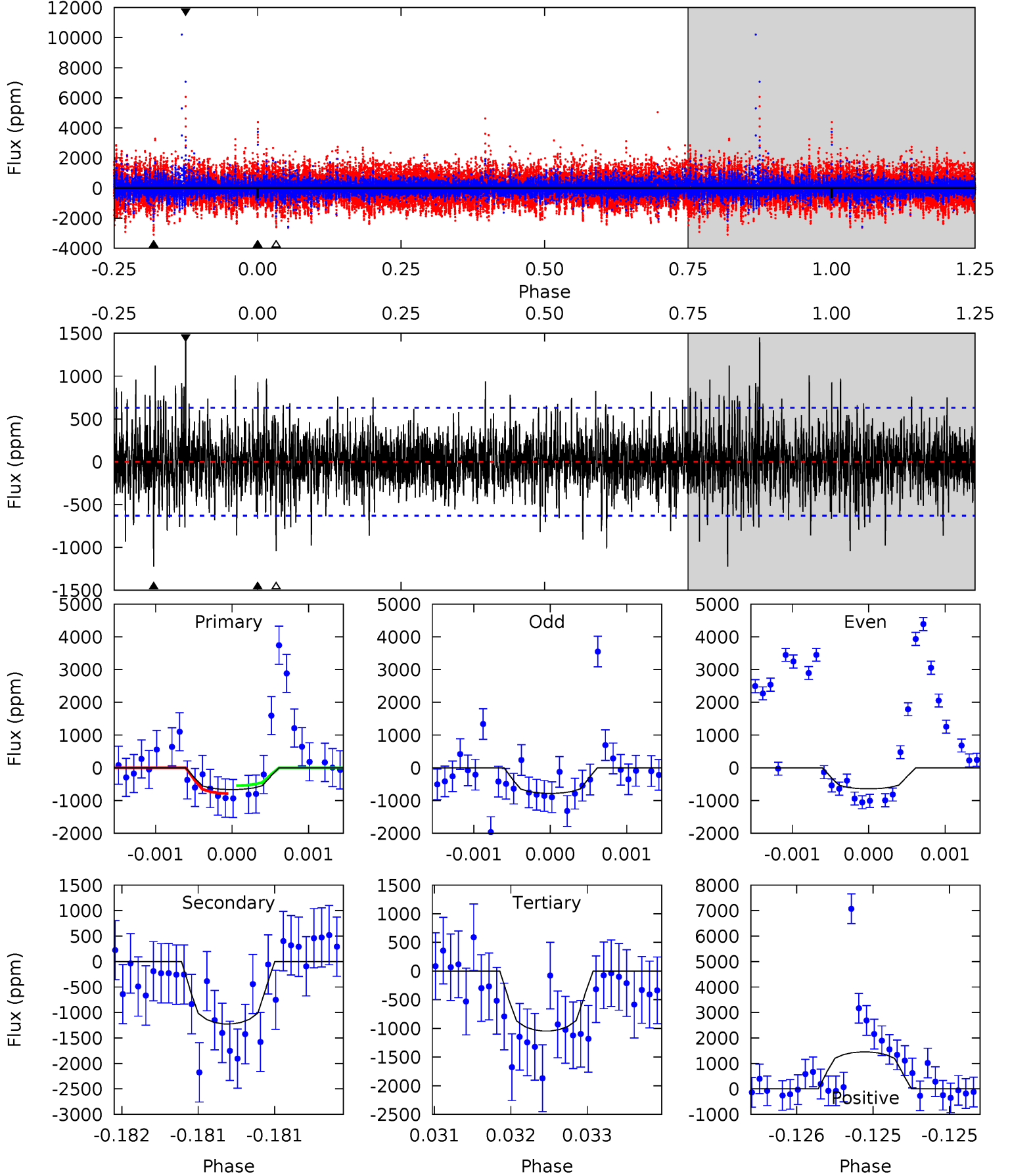
TCE 005609753-01 P=344.993416 Days  $T_0=426.784240$  (BKJD)



# DV Model-Shift Uniqueness Test

005609753-01, P = 345.000927 Days, E = 81.783704 Days

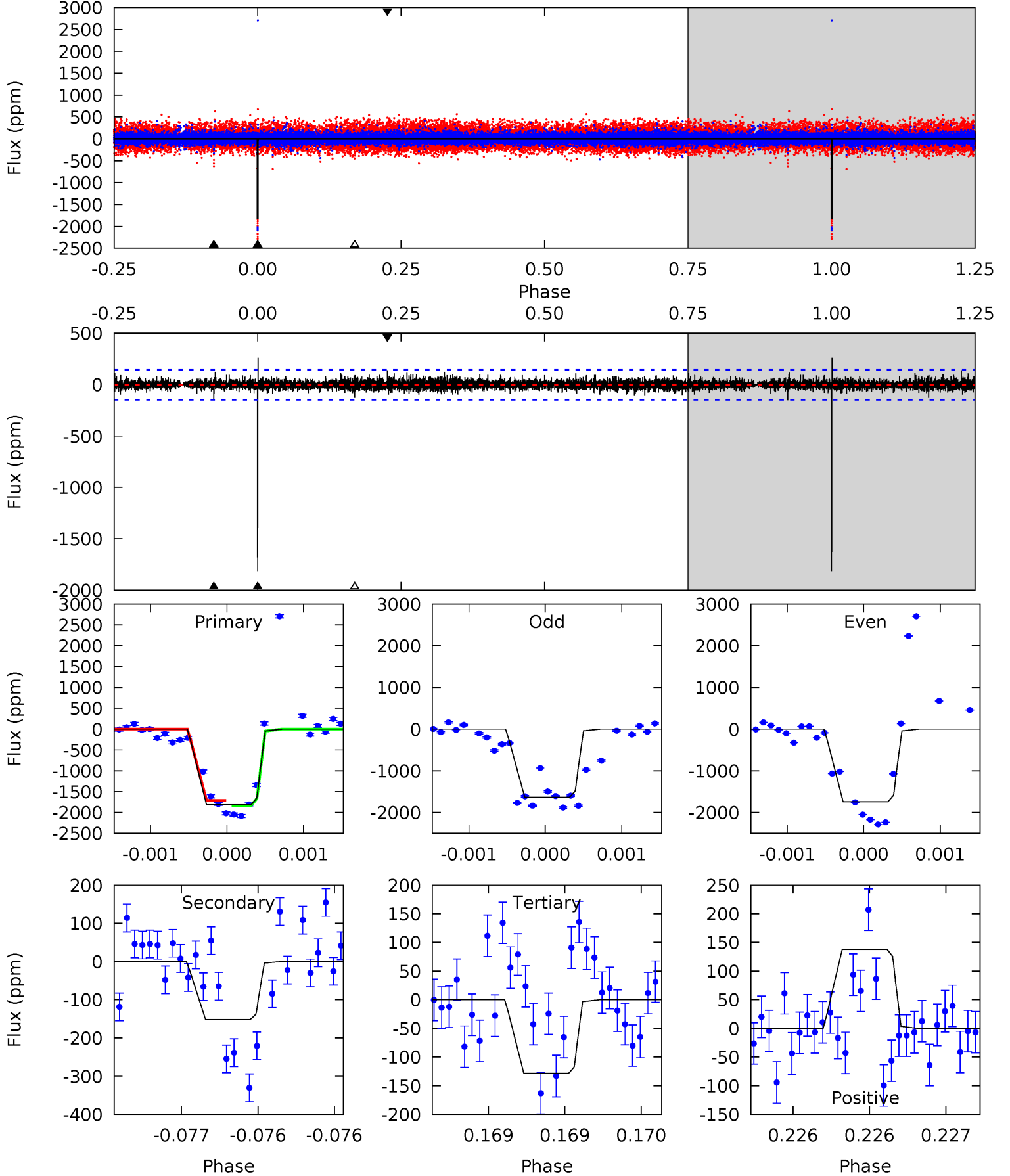
| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 5.87 | 10.8 | 9.23 | 12.8 | 5.56            | 3.46            | 2.14             | -3.35   | -6.94   | 1.59    | -2.00   | 0.49    | 1.07 | 0.54  | 1.07 |



# Alt Model-Shift Uniqueness Test

005609753-01, P = 344.993416 Days, E = 81.790824 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 68.9 | 5.75 | 4.88 | 5.24 | 5.56            | 3.46            | 0.96             | 64.0    | 63.6    | 0.87    | 0.51    | 2.15    | 0.90 | 0.13  | 2.18 |



### Stellar Parameters For KIC 005609753

|        | $T_{\text{eff}} (K)$ | $\log(g)$                 | $[\text{Fe}/\text{H}]$     | $R (R_{\odot})$           | $M (M_{\odot})$           | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $5203^{+156}_{-141}$ | $4.641^{+0.060}_{-0.040}$ | $-1.060^{+0.350}_{-0.300}$ | $0.620^{+0.048}_{-0.043}$ | $0.614^{+0.058}_{-0.022}$ | $3.624^{+0.889}_{-0.549}$                 |
|        | +3%/-3%              | +1%/-1%                   | +33%/-28%                  | +8%/-7%                   | +9%/-4%                   | +25%/-15%                                 |
| 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 005609753-01 / KOI

| Detrend | Depth (ppm)     | $R_p (R_{\oplus})$     | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$  | $A_{\text{obs}}$           |
|---------|-----------------|------------------------|----------------------|-----------------------|----------------------------|
| DV      | $-1224 \pm 113$ | $5.65^{+5.69}_{-4.00}$ | $279^{+10}_{-9}$     | $3768^{+2330}_{-770}$ | $14356^{+144860}_{-10720}$ |
| Alt.    | $-151 \pm 26$   | $5.96^{+5.50}_{-4.14}$ | $279^{+9}_{-10}$     | $2710^{+1184}_{-411}$ | $1572^{+15858}_{-1168}$    |

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

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

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

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

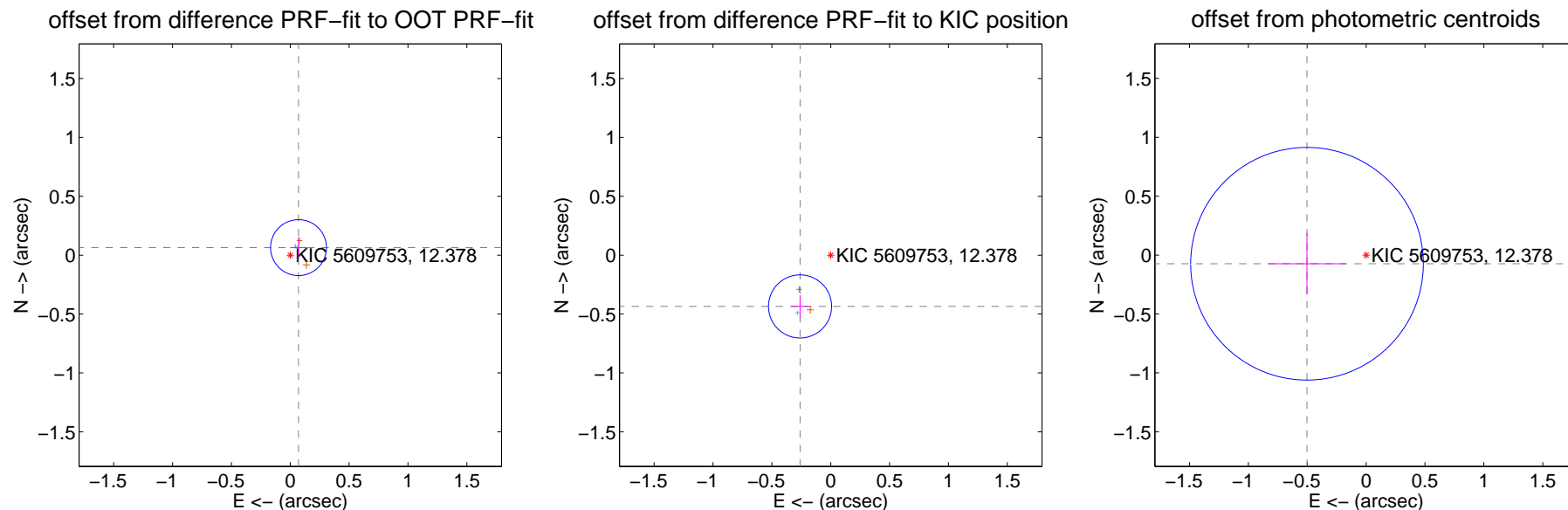
## DV Centroid Data

Supplemental centroid analysis for 005609753-01. Kepler magnitude: 12.38. Transit SNR 5.66

There are 1 quarters with good PRF difference image offsets

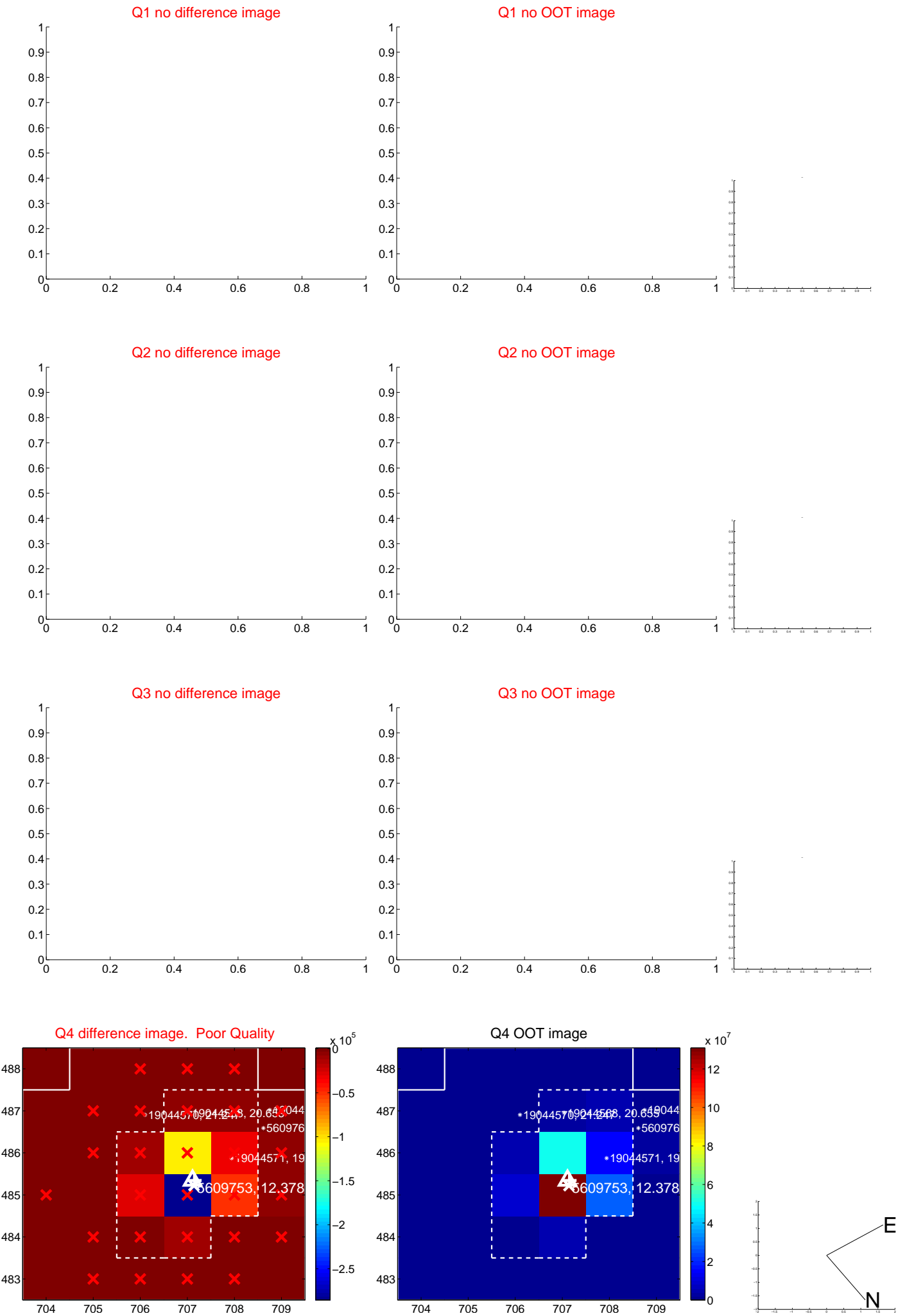
The direct PRF centroid is offset from the target star catalog position by about 0.65 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec       |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT          | $0.095 \pm 0.079$  | 1.20                | $-0.070 \pm 0.072$ | $0.064 \pm 0.087$  |
| PRF-fit source offset from KIC position | $0.507 \pm 0.089$  | 5.68                | $0.261 \pm 0.074$  | $-0.435 \pm 0.094$ |
| photometric centroid source offset      | $0.51 \pm 0.33$    | 1.54                | $0.50 \pm 0.33$    | $-0.07 \pm 0.26$   |

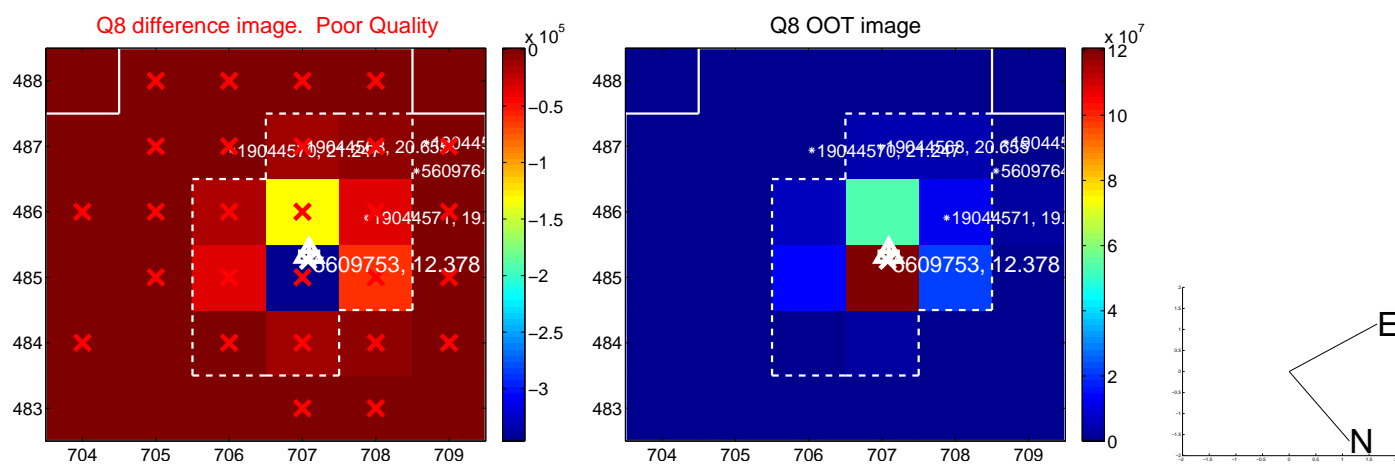


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

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

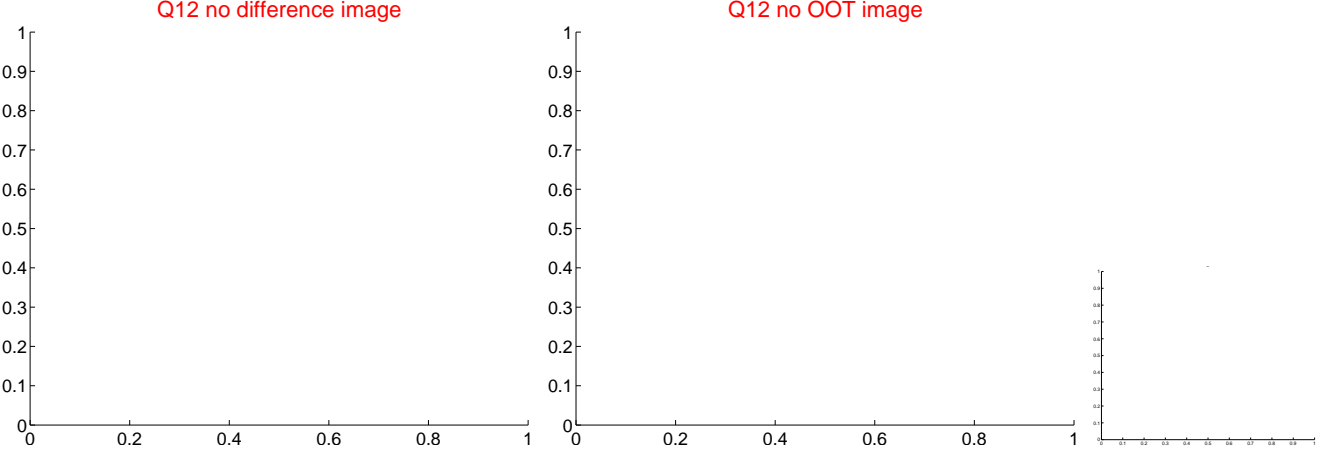
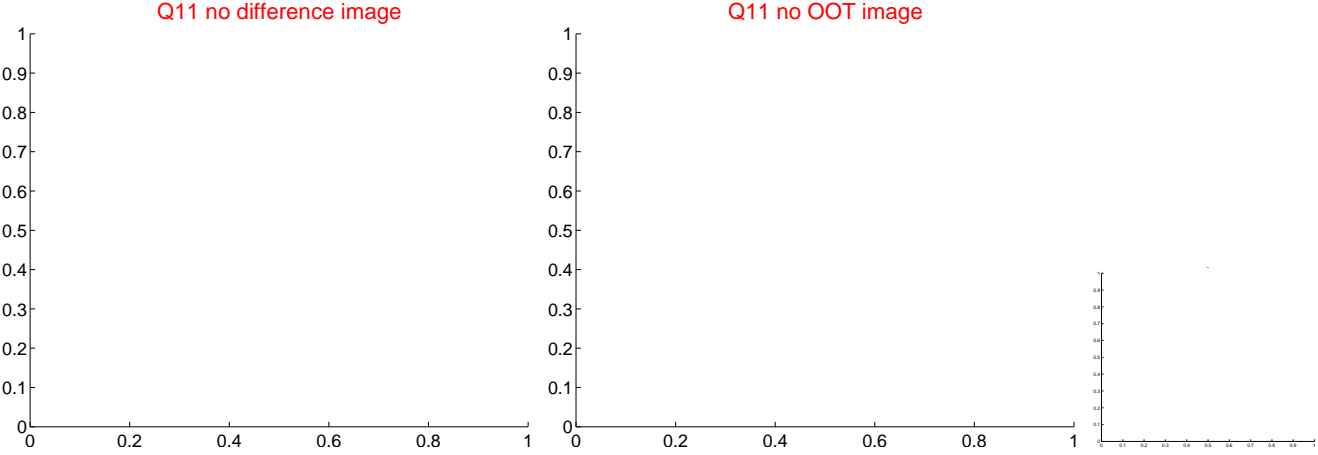
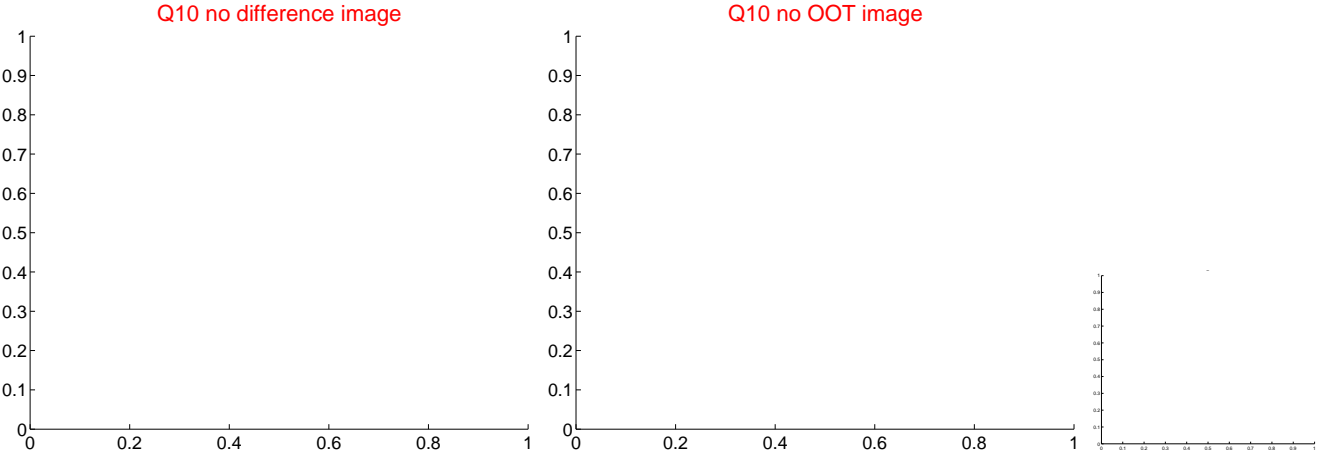


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white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

Q13 no difference image



Q13 no OOT image



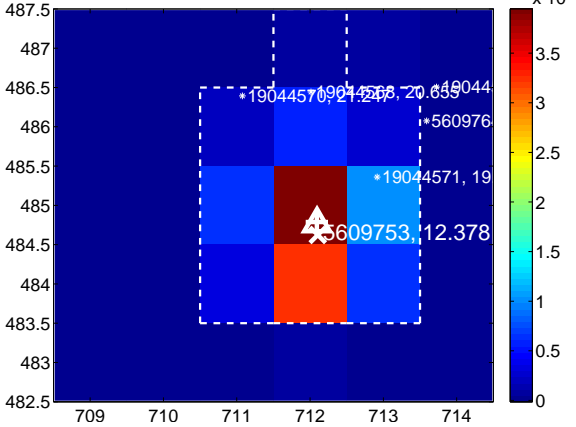
Q14 no difference image



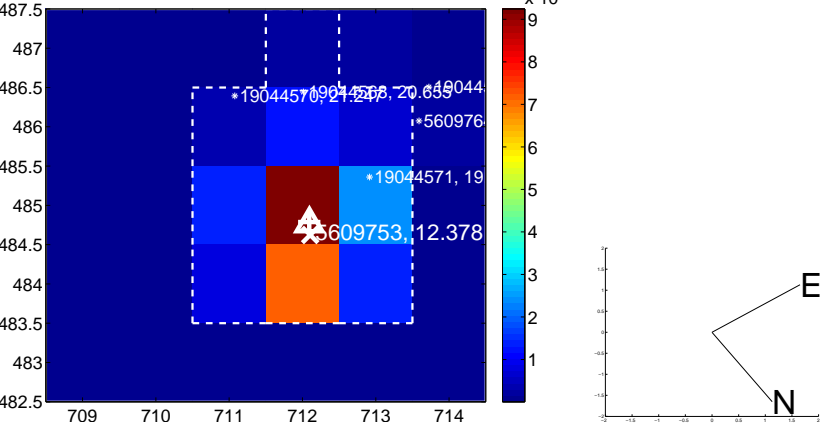
Q14 no OOT image



Q15 difference image



Q15 OOT image



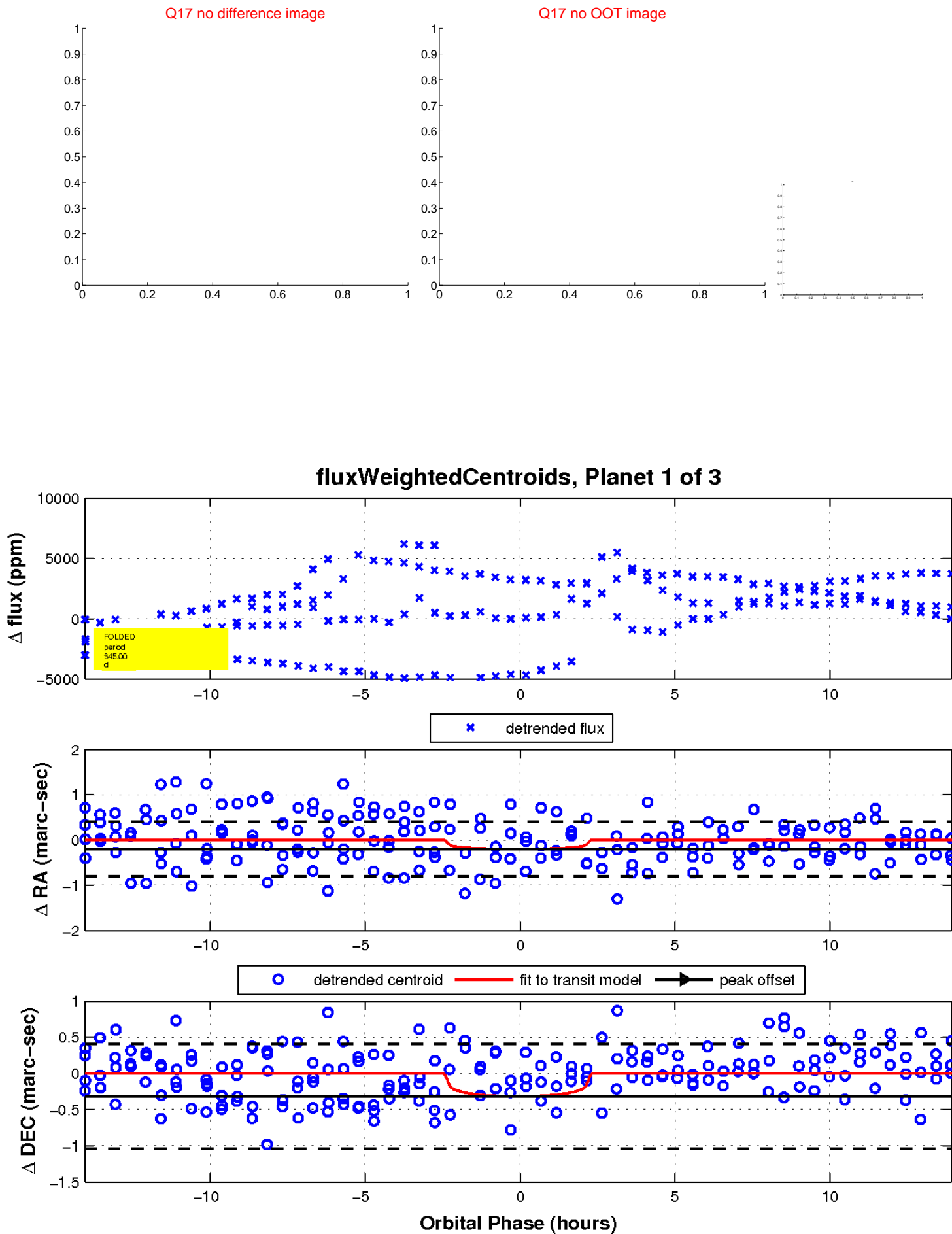
Q16 no difference image



Q16 no OOT image

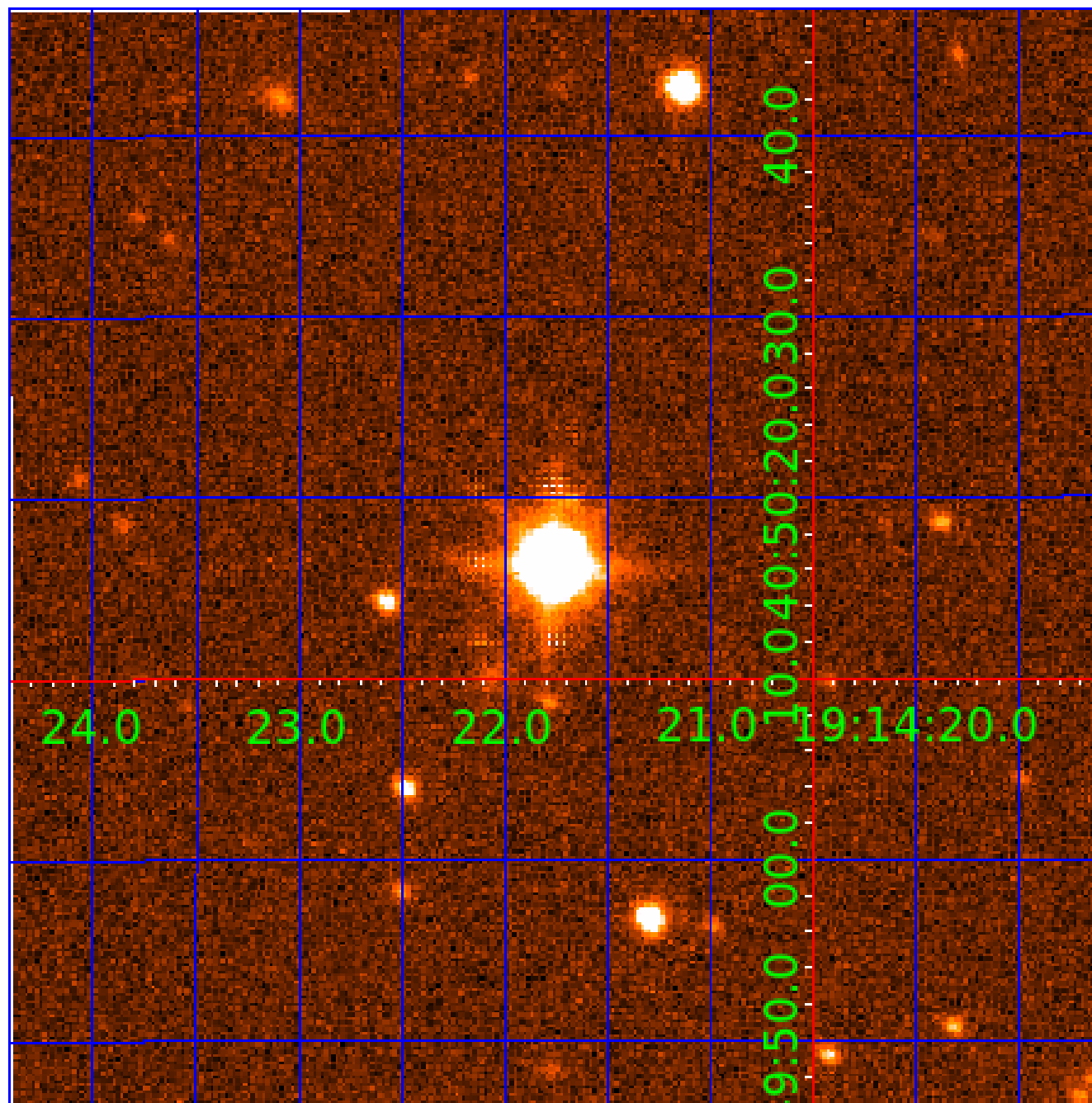


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UKIRT Image

Declination



# KIC 005609753

## Q1-17 DR25 TCE Parameters

| TCE          | Run Type | KOI? | Period (Days) | Epoch (BKJD) | Depth (ppm) | Duration (Hours) | MES  | SNR | $R_{\star}$ ( $R_{\odot}$ ) | $T_{\star}$ (K) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|-----|-----------------------------|-----------------|------------------------|------------------------|
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## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 005609753-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_SKYE—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS |
| 005609753-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS                                 |
| 005609753-03 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS                  |

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

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

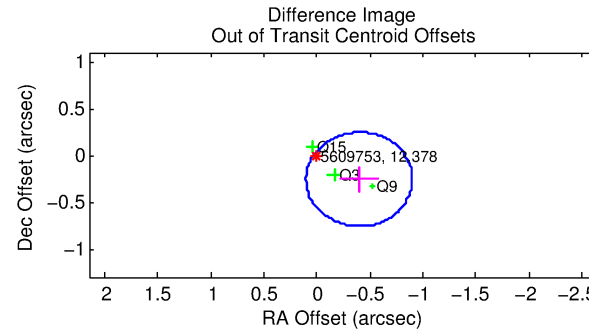
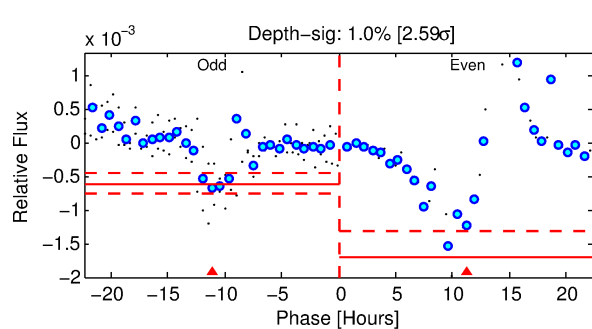
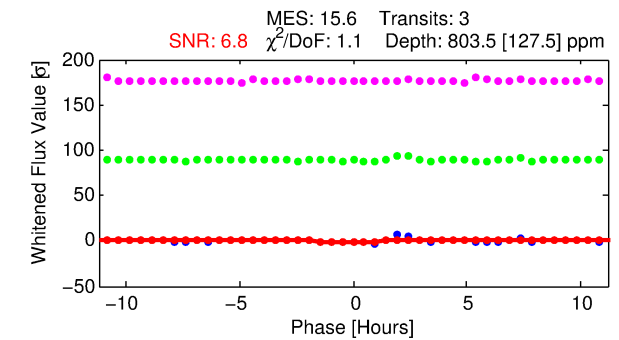
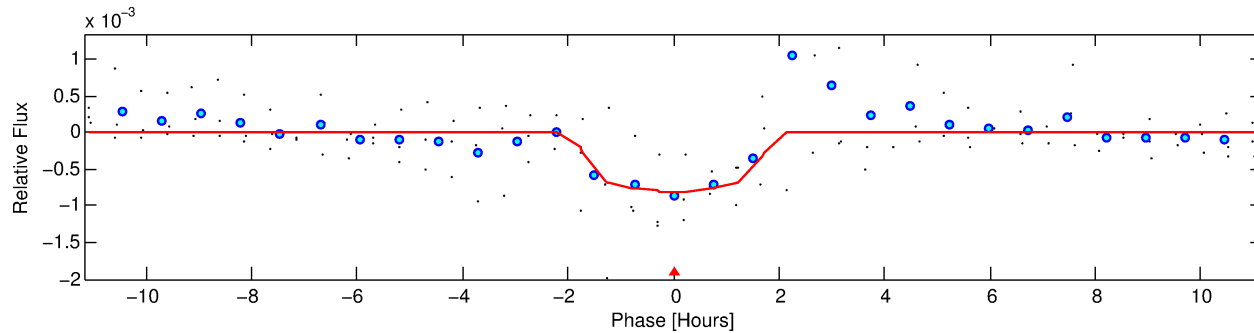
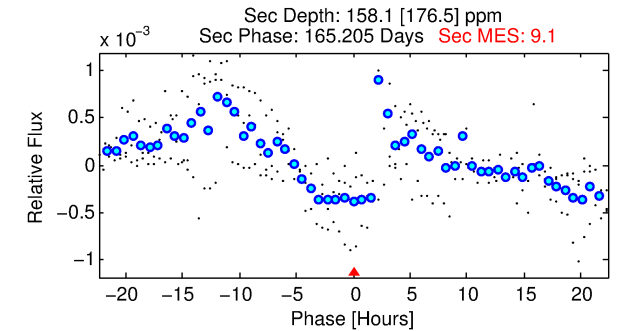
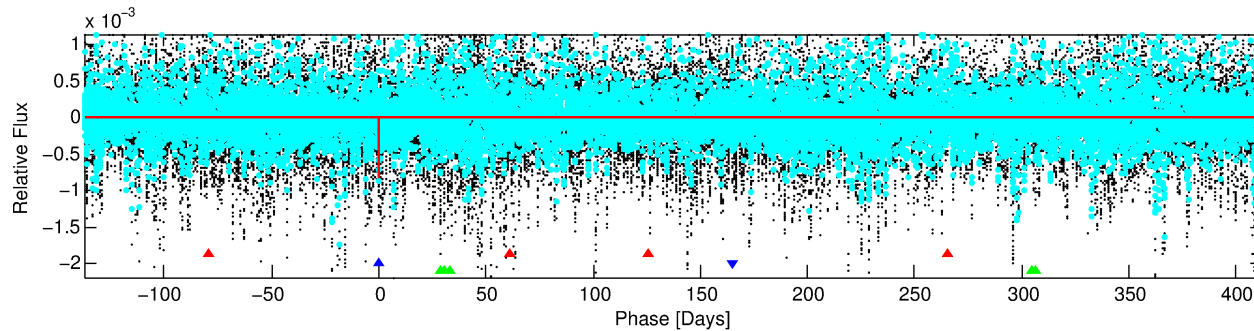
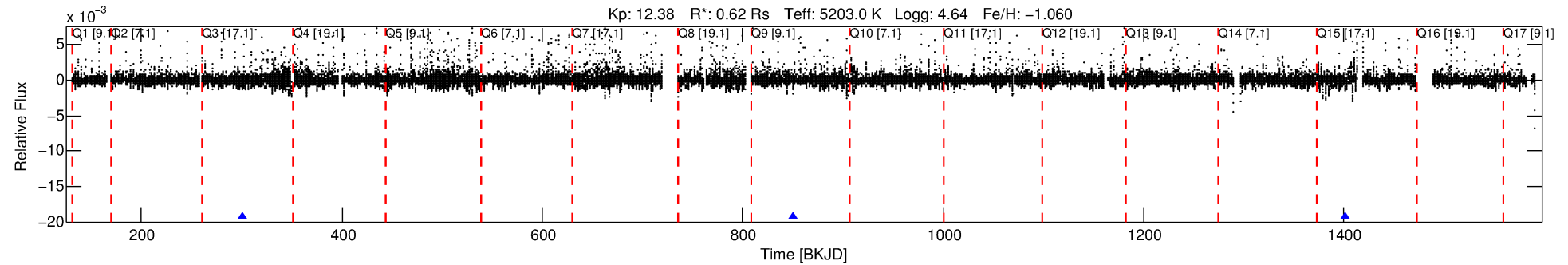
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005609753-02

No Significant Match Found

# DV One-Page Summary

KIC: 5609753 Candidate: 2 of 3 Period: 549.929 d



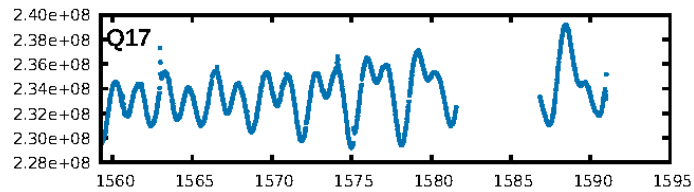
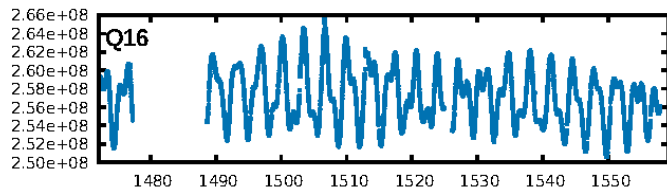
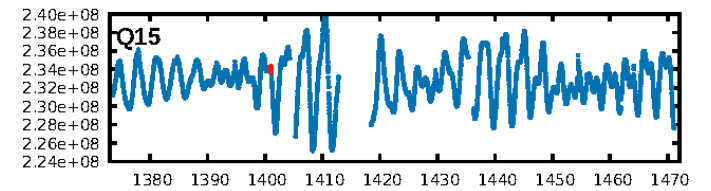
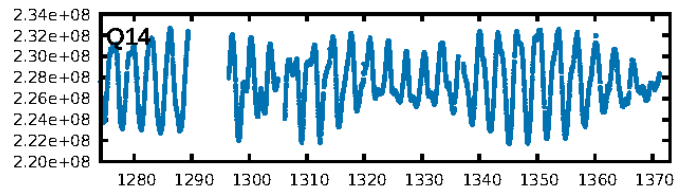
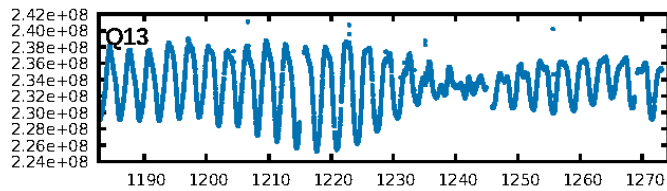
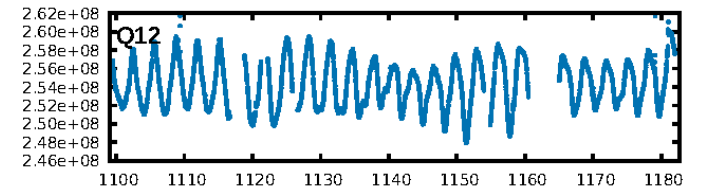
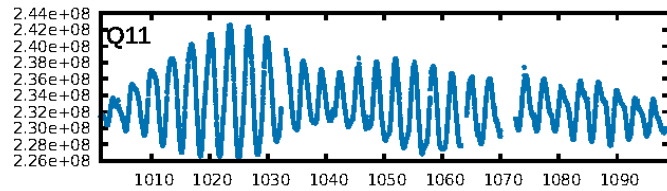
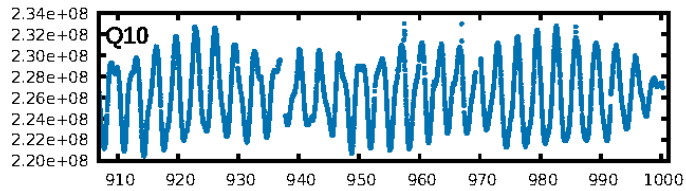
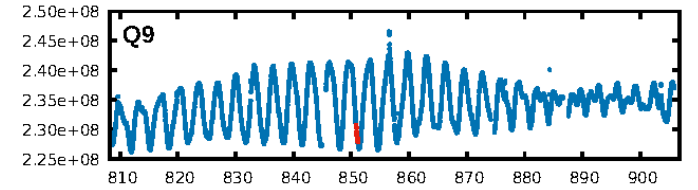
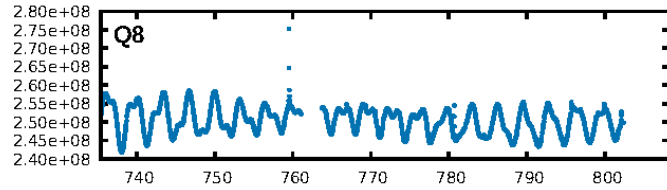
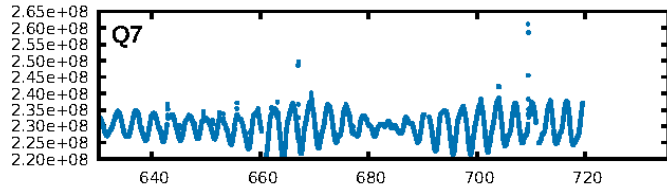
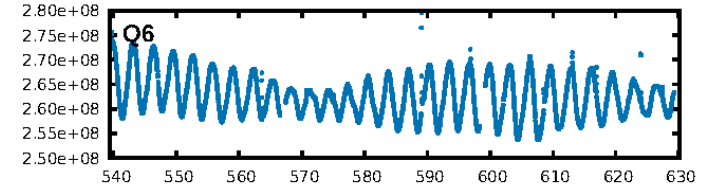
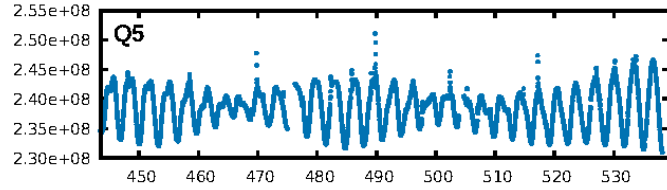
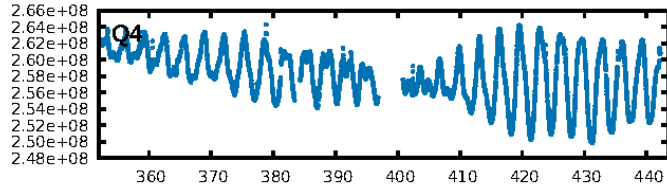
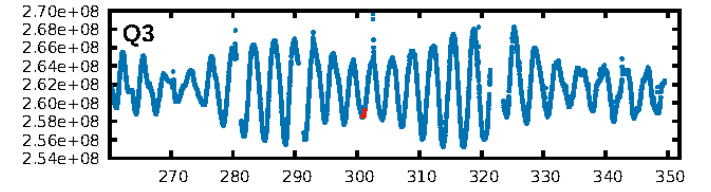
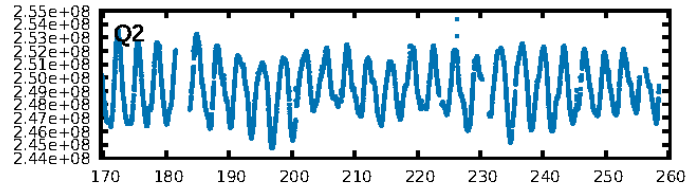
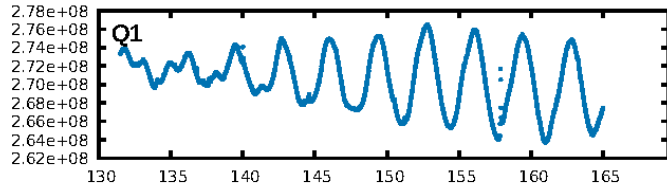
## DV Fit Results:

Period = 549.92883 [0.00403] d  
Epoch = 301.0822 [0.0061] BKJD  
Rp/R\* = 0.0289 [0.0903]  
a/R\* = 724.73 [10115.18]  
b = 0.80 [6.28]  
Seff = 0.20 [0.03]  
Teq = 171 [7] K  
Rp = 1.96 [6.11] Re  
a = 1.1164 [0.0772] AU  
Ag = 28319.51 [179652.71] [0.16σ]  
Teffp = 3431 [5441] K [0.60σ]

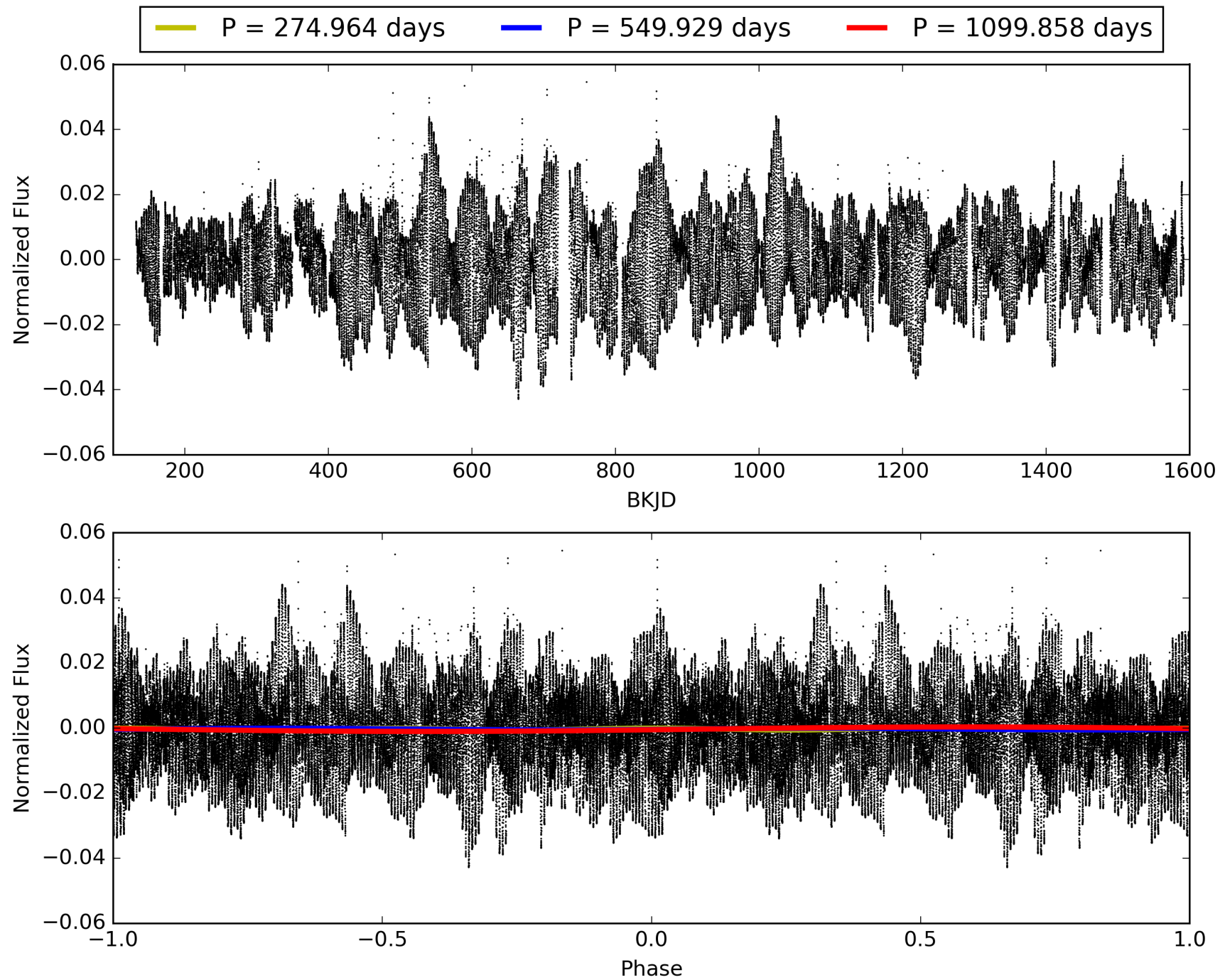
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [817.08σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 29.4%  
ModelChiSquareGof-sig: 60.7%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
**GhostDiagnostic-chr: 0.5838**  
Centroid-sig: 56.6%  
Centroid-so: 0.715 arcsec [1.93σ]  
OotOffset-rm: 0.474 arcsec [2.83σ]  
**KicOffset-rm: 0.733 arcsec [7.03σ]**  
OotOffset-st: 0/2/0/1 [3]  
KicOffset-st: 0/2/0/1 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

# TCE 005609753-02, PDC Light Curves



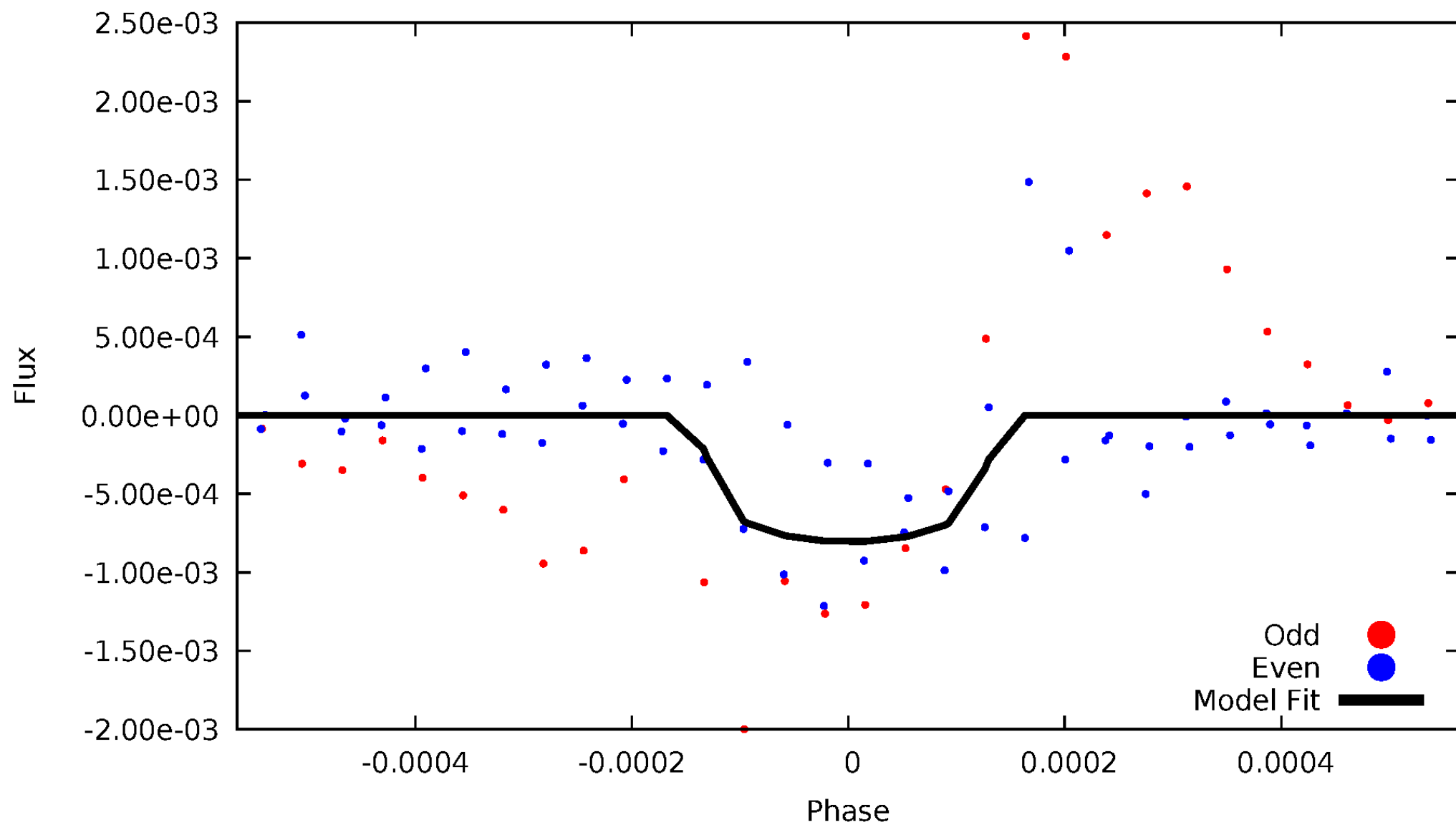
TCE 005609753-02





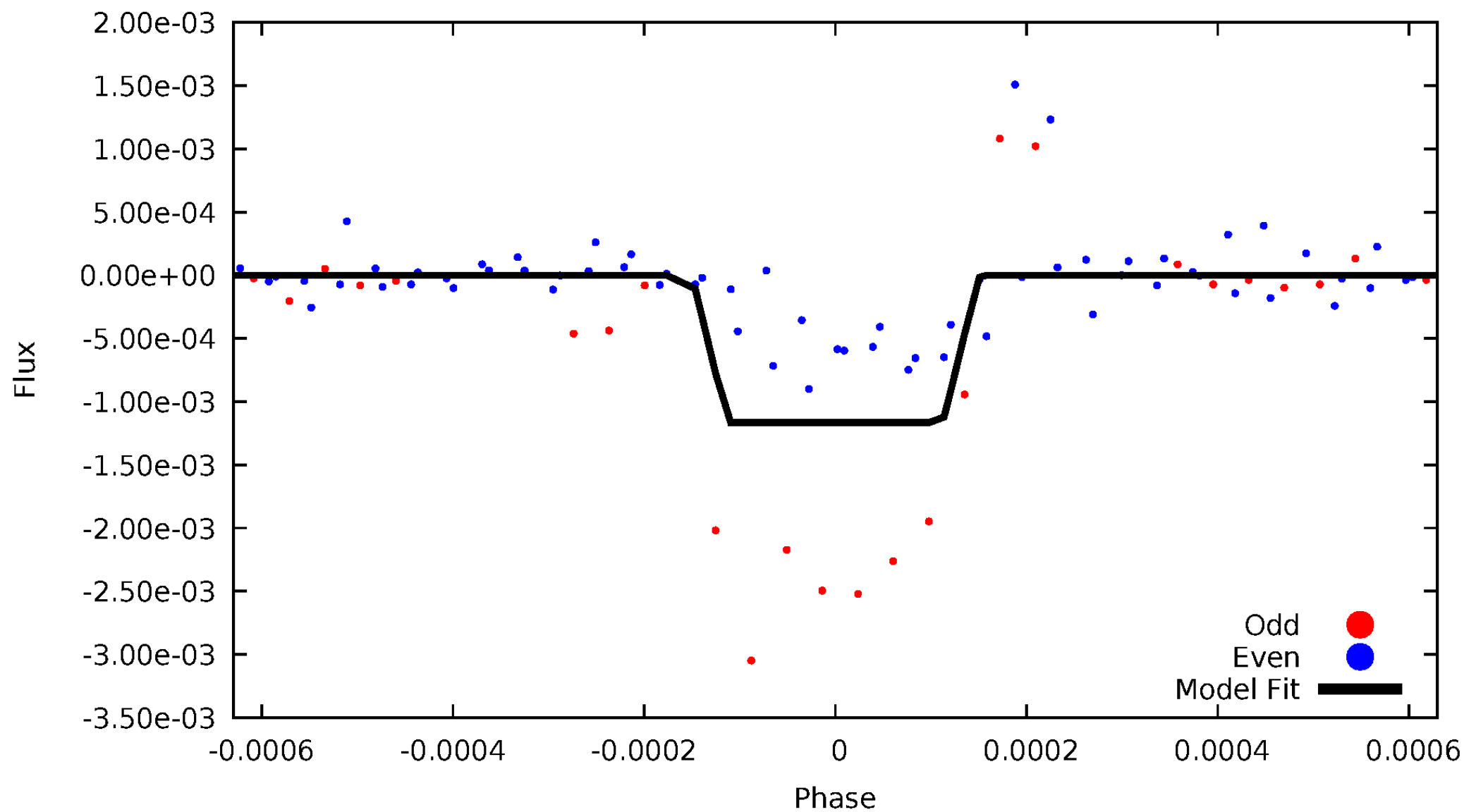
# DV Odd/Even

TCE 005609753-02



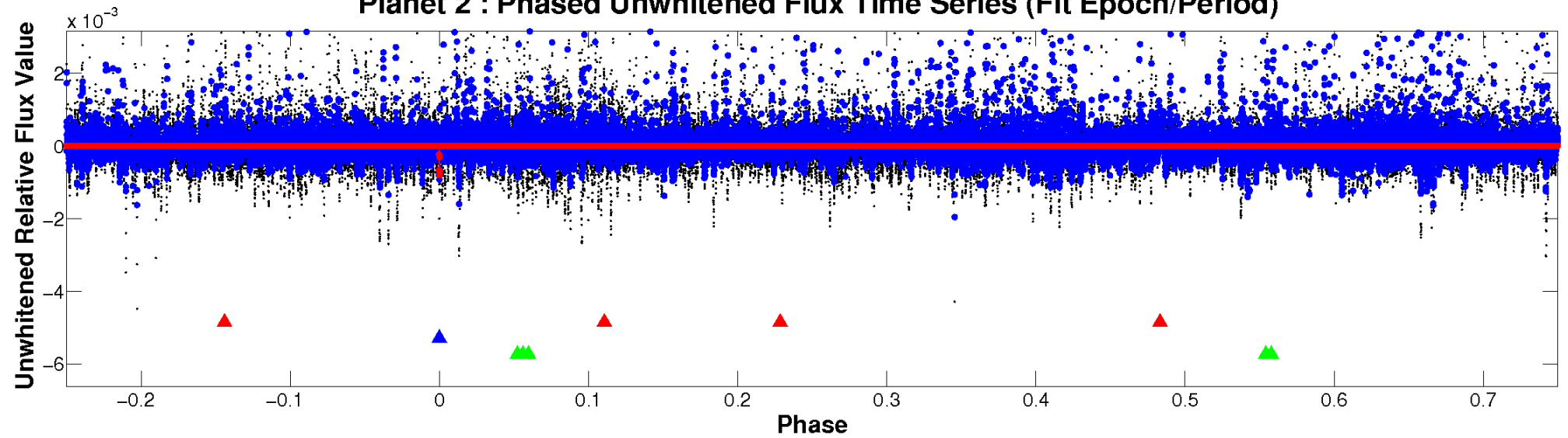
# ALT Odd/Even

TCE 005609753-02

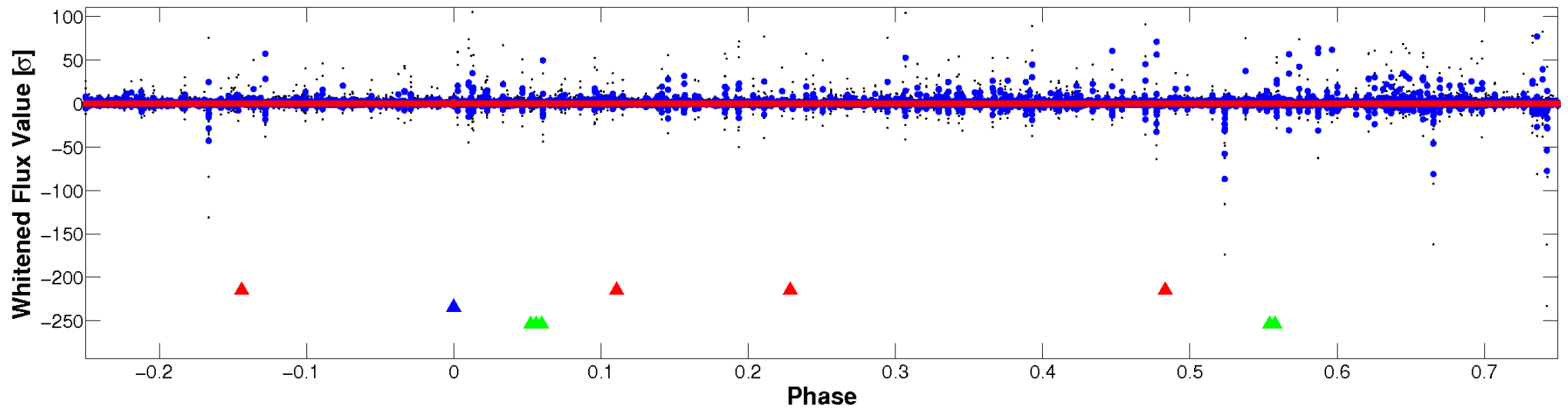


# Non-Whitened Vs. Whitened Light Curve

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

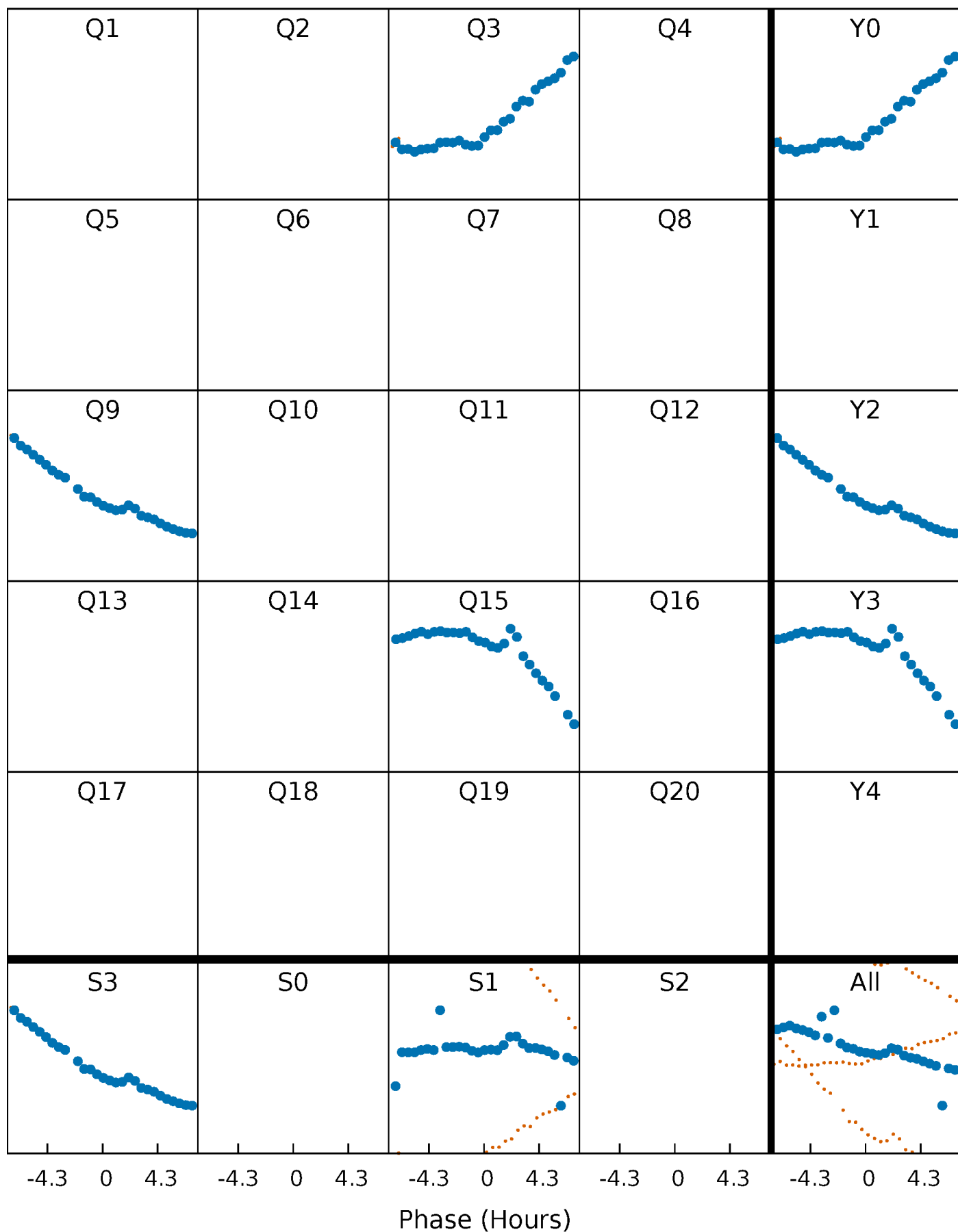


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



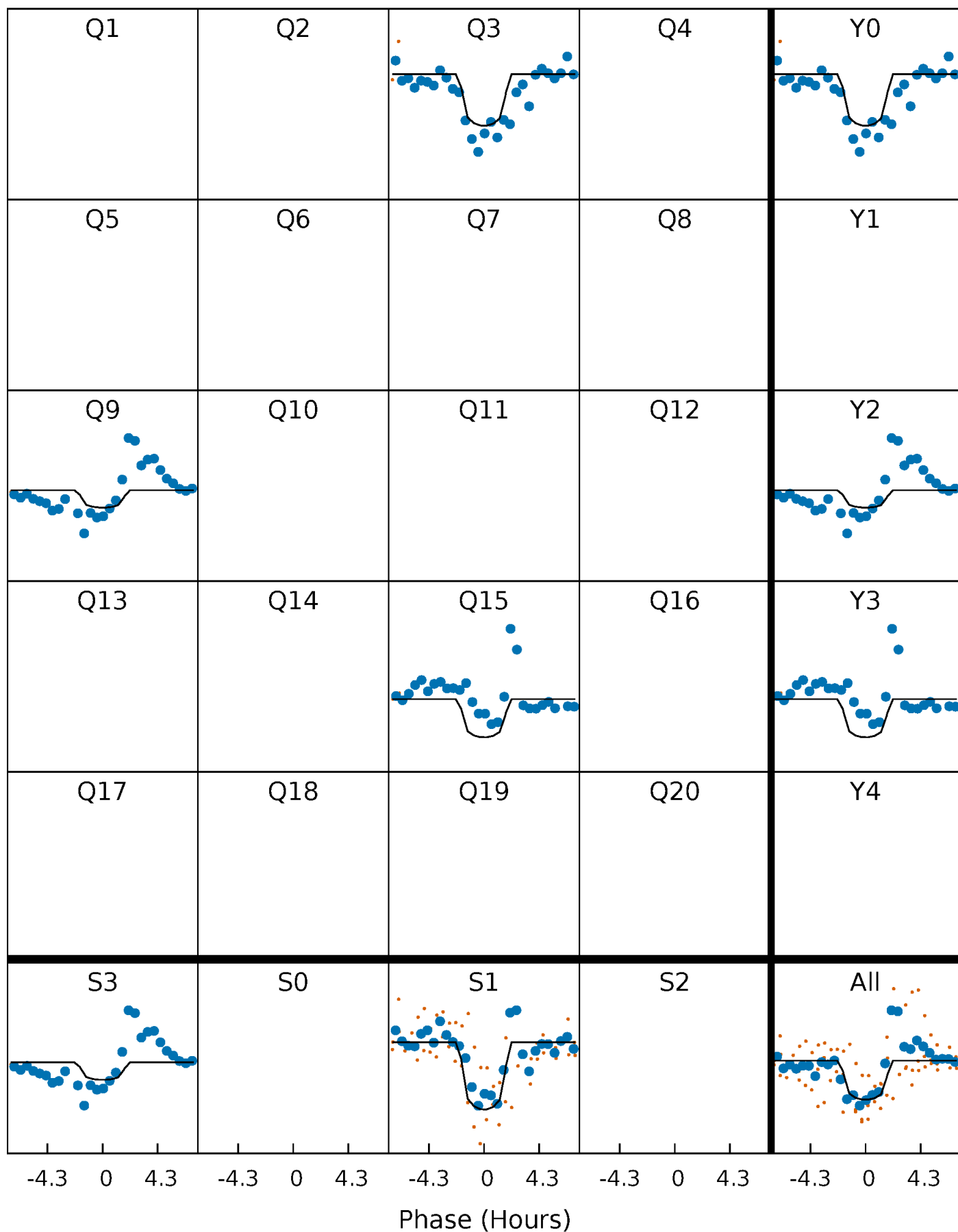
# PDC Quarter-Phased Transit Curves

TCE 005609753-02 P=549.928834 Days  $T_0=301.082157$  (BKJD)



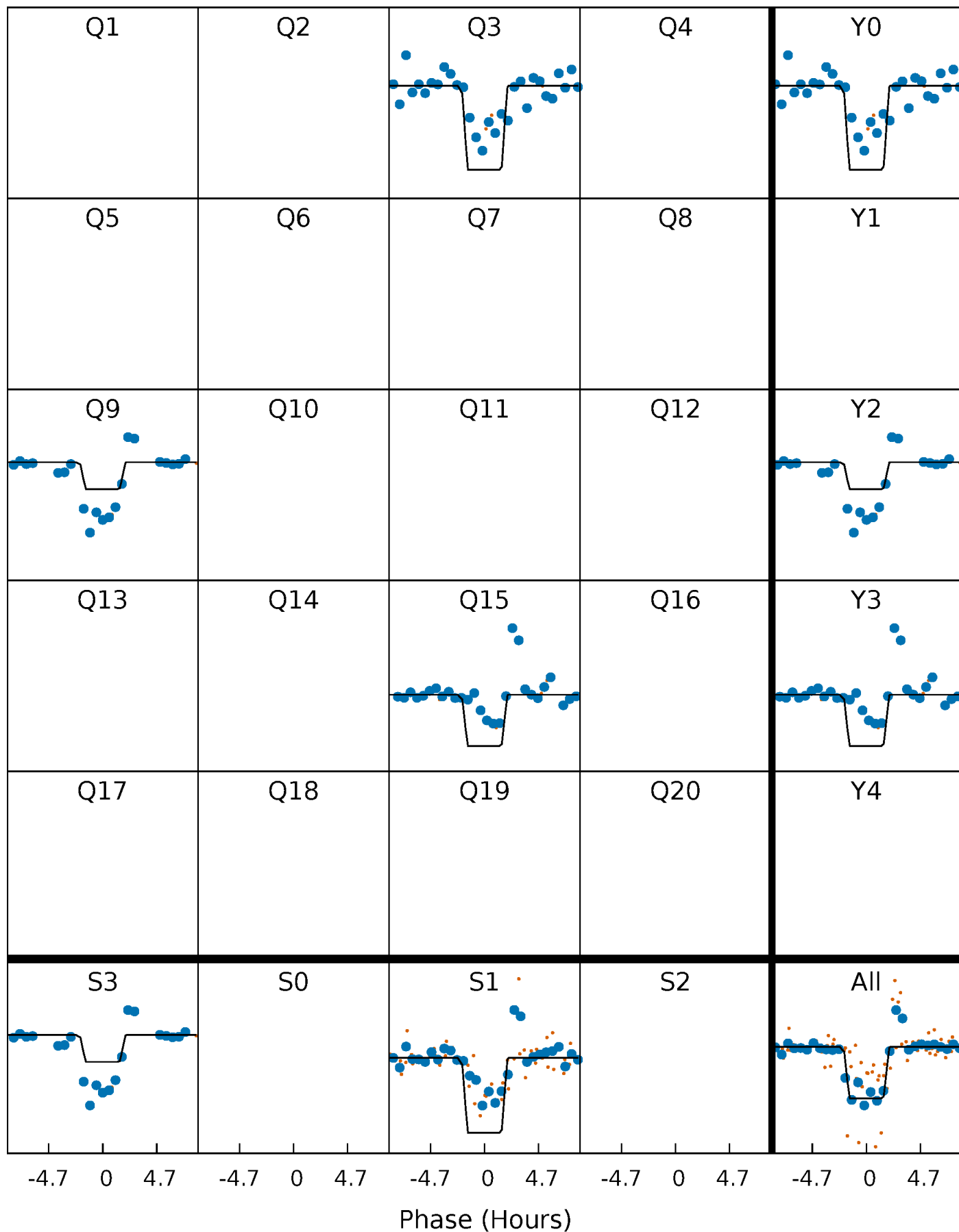
# DV Quarter-Phased Transit Curves

TCE 005609753-02     $P=549.928834$  Days     $T_0=301.082157$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

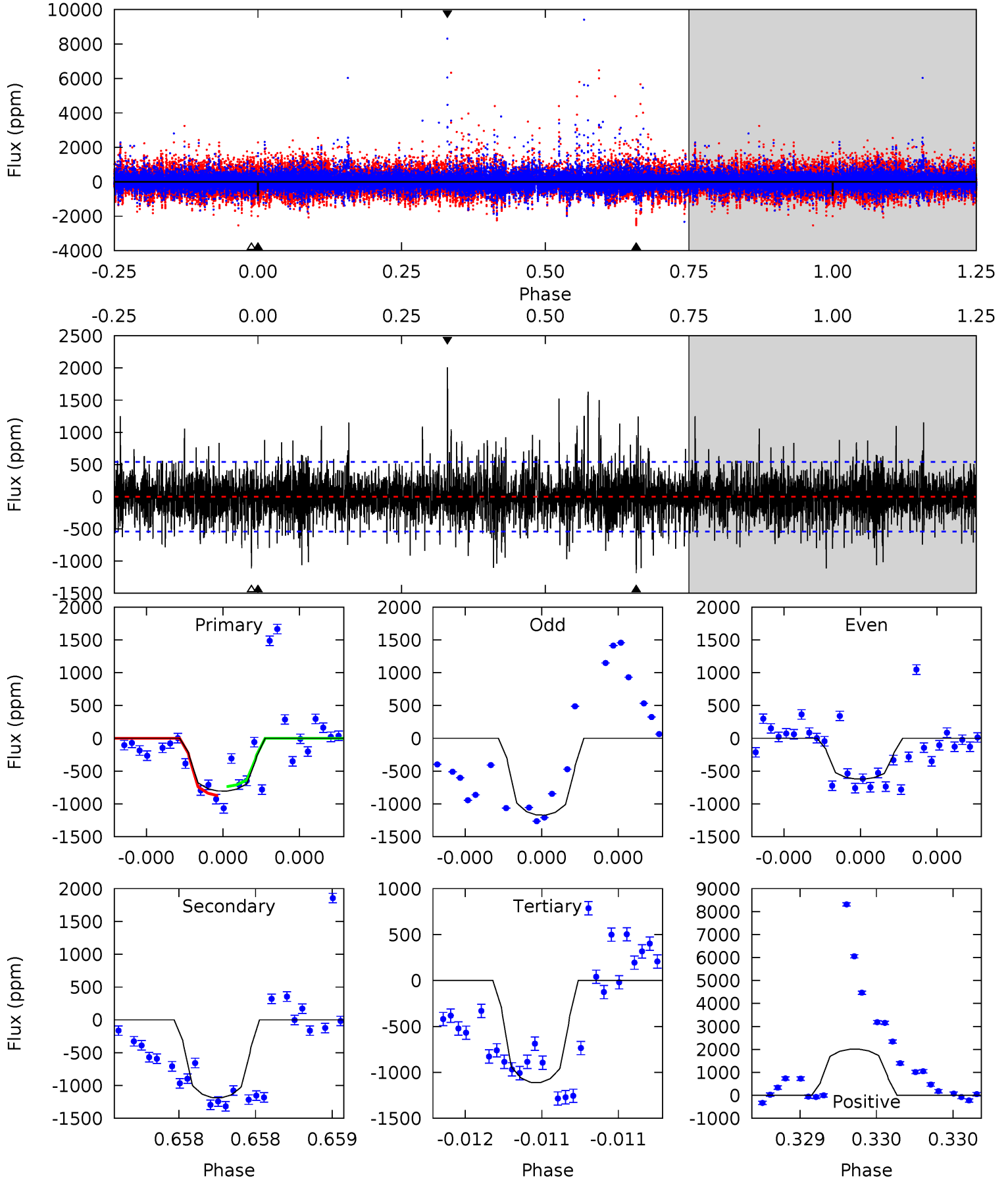
TCE 005609753-02 P=549.921589 Days  $T_0=301.085021$  (BKJD)



# DV Model-Shift Uniqueness Test

005609753-02, P = 549.928834 Days, E = 301.082157 Days

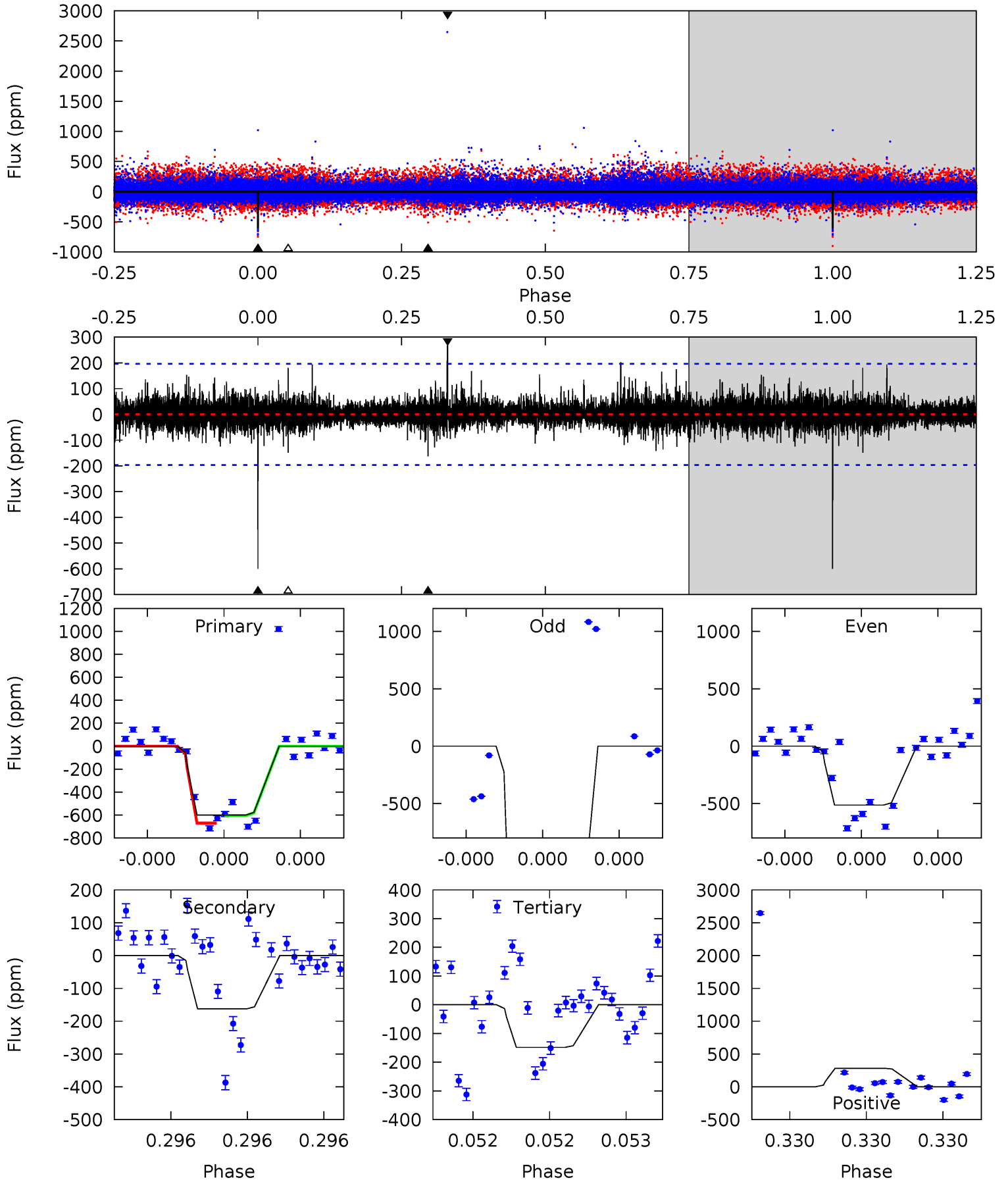
| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 8.43 | 12.4 | 11.7 | 21.0 | 5.66            | 3.62            | 2.62             | -3.22   | -12.6   | 0.79    | -8.61   | 0.91    | 0.79 | 0.63  | 0.73 |



# Alt Model-Shift Uniqueness Test

005609753-02, P = 549.921589 Days, E = 301.085021 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 |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|-----|
| 17.3 | 4.69 | 4.28 | 8.15 | 5.67            | 3.62            | 0.82             | 13.0    | 9.15    | 0.41    | -3.47   | 28.5    | 1.92 | 0.32  | 0   |





### Stellar Parameters For KIC 005609753

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M(M_{\odot})$            | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $5203^{+156}_{-141}$ | $4.641^{+0.060}_{-0.040}$ | $-1.060^{+0.350}_{-0.300}$ | $0.620^{+0.048}_{-0.043}$ | $0.614^{+0.058}_{-0.022}$ | $3.624^{+0.889}_{-0.549}$                     |
|        | +3%/-3%              | +1%/-1%                   | +33%/-28%                  | +8%/-7%                   | +9%/-4%                   | +25%/-15%                                     |
| 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 005609753-02 / KOI

| Detrend | Depth (ppm)    | $R_p$ ( $R_{\oplus}$ ) | $T_{max}$ (K)   | $T_{obs}$ (K)         | $A_{obs}$                  |
|---------|----------------|------------------------|-----------------|-----------------------|----------------------------|
| DV      | $-1187 \pm 95$ | $5.07^{+4.67}_{-3.57}$ | $238^{+9}_{-8}$ | $3861^{+2528}_{-730}$ | $32271^{+315175}_{-23603}$ |
| Alt.    | $-162 \pm 35$  | $4.91^{+5.03}_{-3.33}$ | $238^{+8}_{-8}$ | $2874^{+1194}_{-484}$ | $4700^{+40577}_{-3594}$    |

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

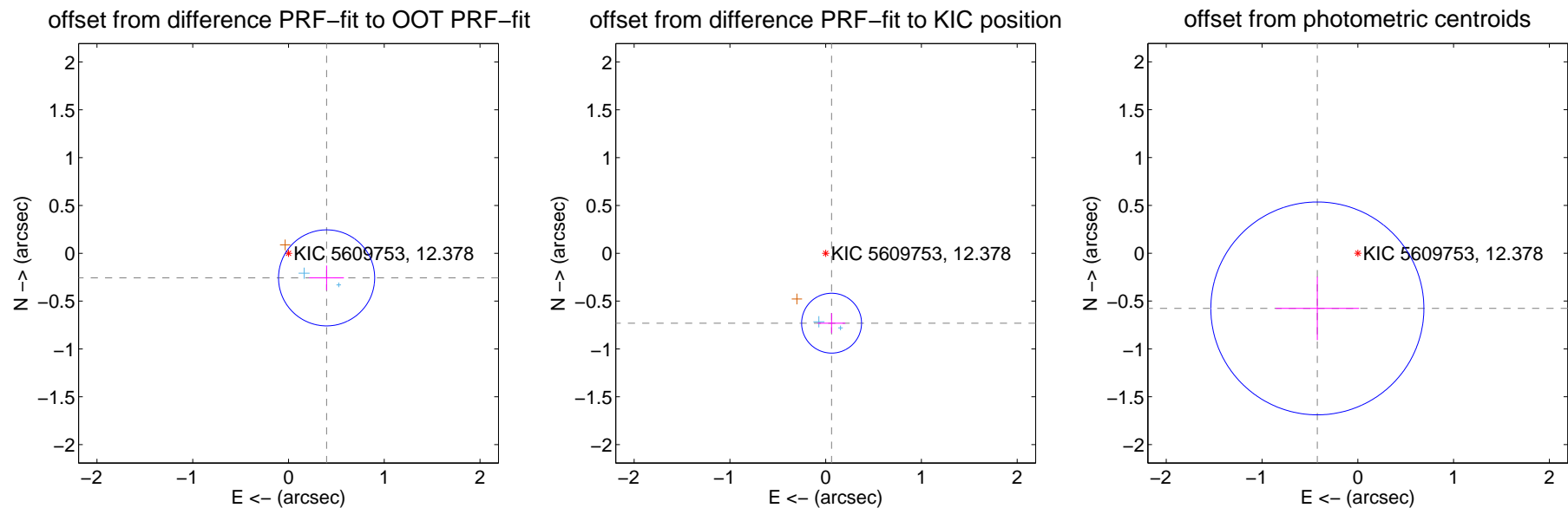
## DV Centroid Data

Supplemental centroid analysis for 005609753-02. Kepler magnitude: 12.38. Transit SNR 6.78

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.62 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec       |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT          | $0.474 \pm 0.167$  | 2.83                | $-0.398 \pm 0.181$ | $-0.257 \pm 0.129$ |
| PRF-fit source offset from KIC position | $0.733 \pm 0.104$  | 7.03                | $-0.062 \pm 0.144$ | $-0.731 \pm 0.104$ |
| photometric centroid source offset      | $0.71 \pm 0.37$    | 1.93                | $0.42 \pm 0.43$    | $-0.58 \pm 0.33$   |



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



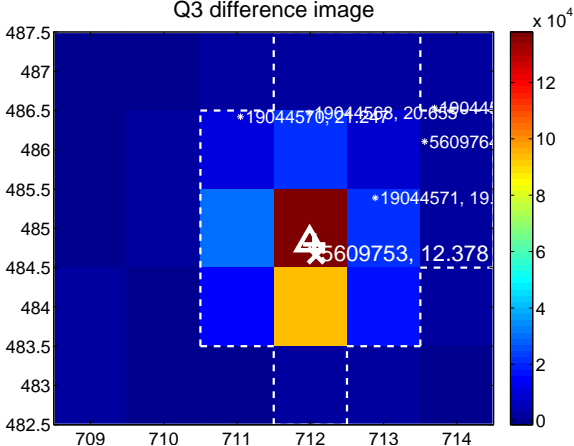
Q2 no difference image



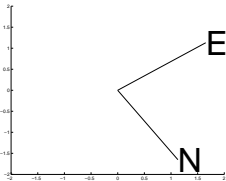
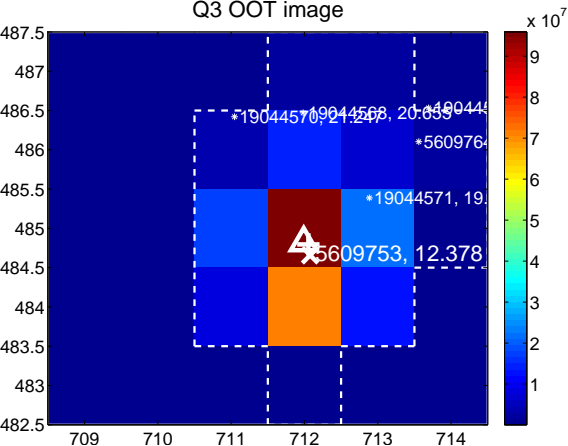
Q2 no OOT image



Q3 difference image



Q3 OOT image



Q4 no difference image



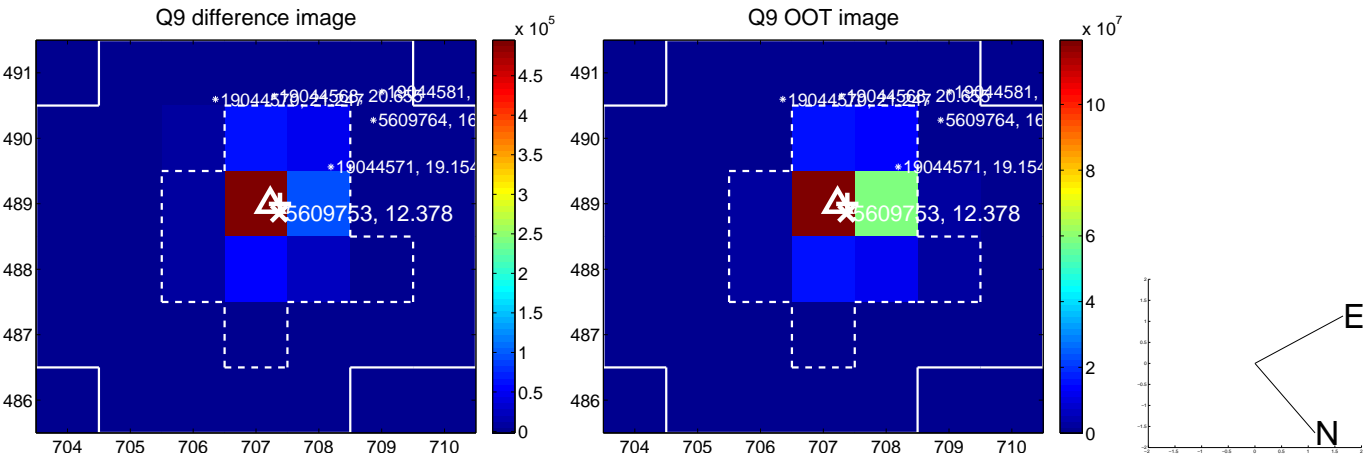
Q4 no OOT image



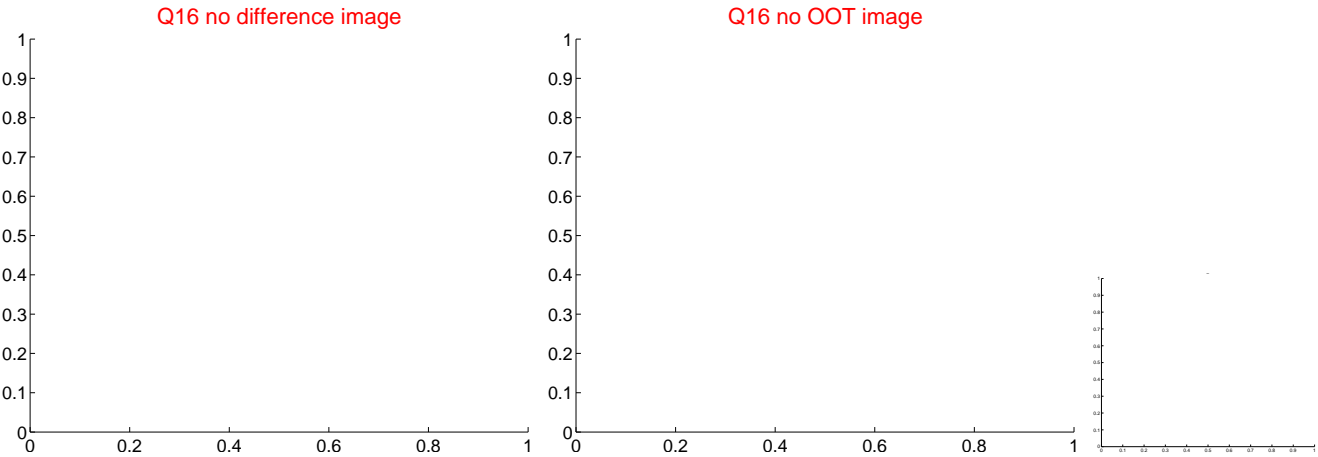
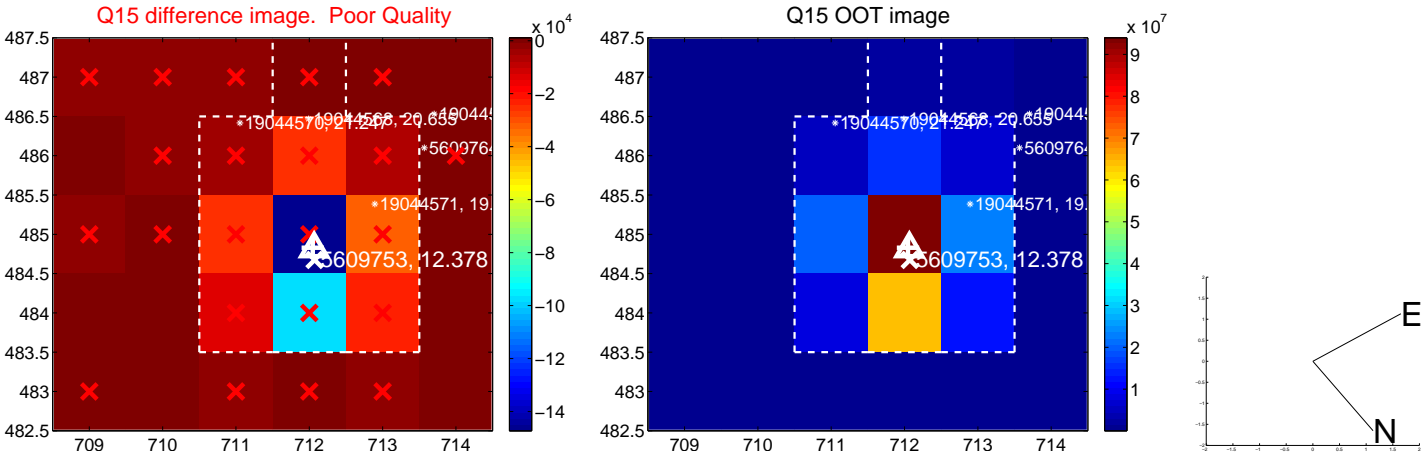
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



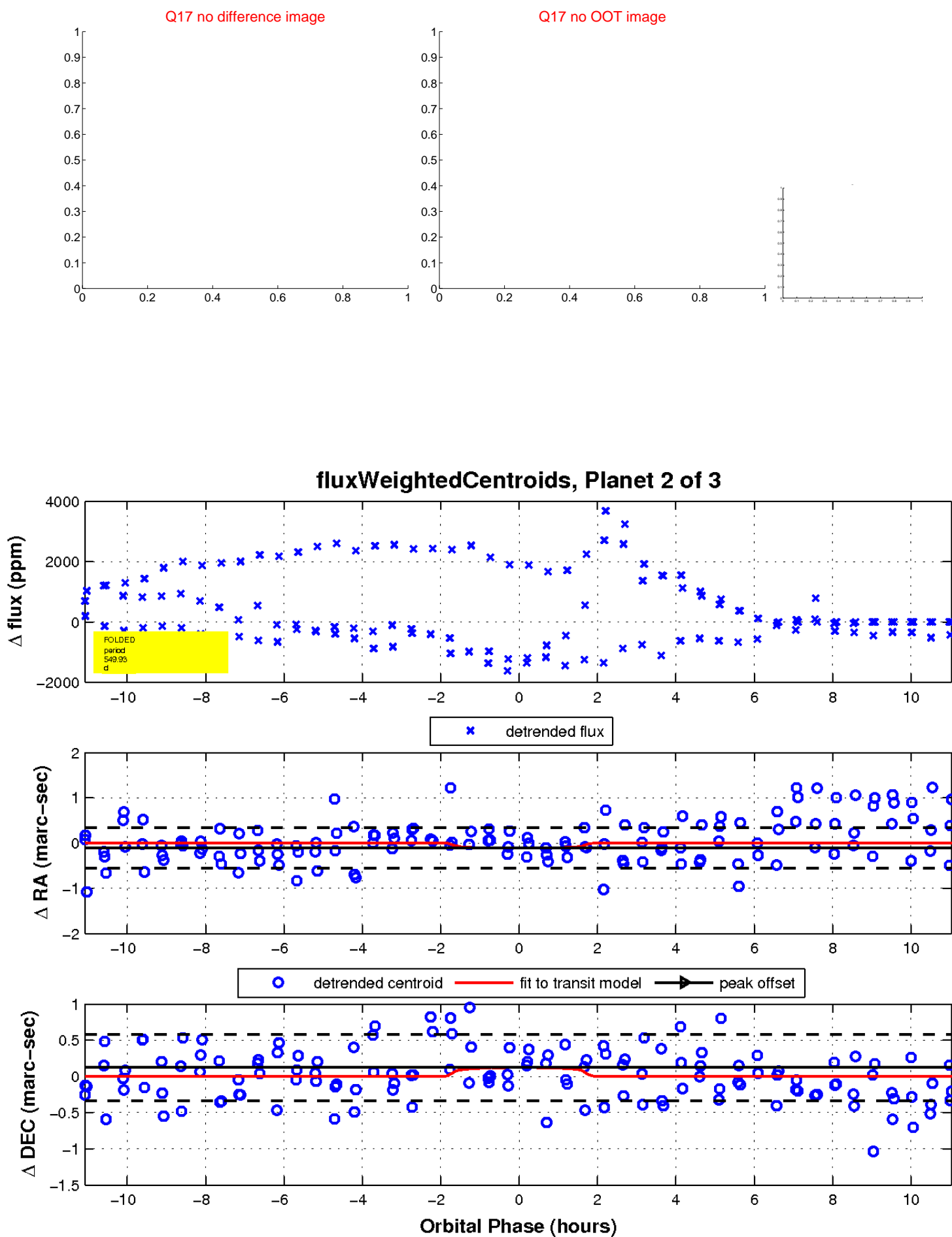
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

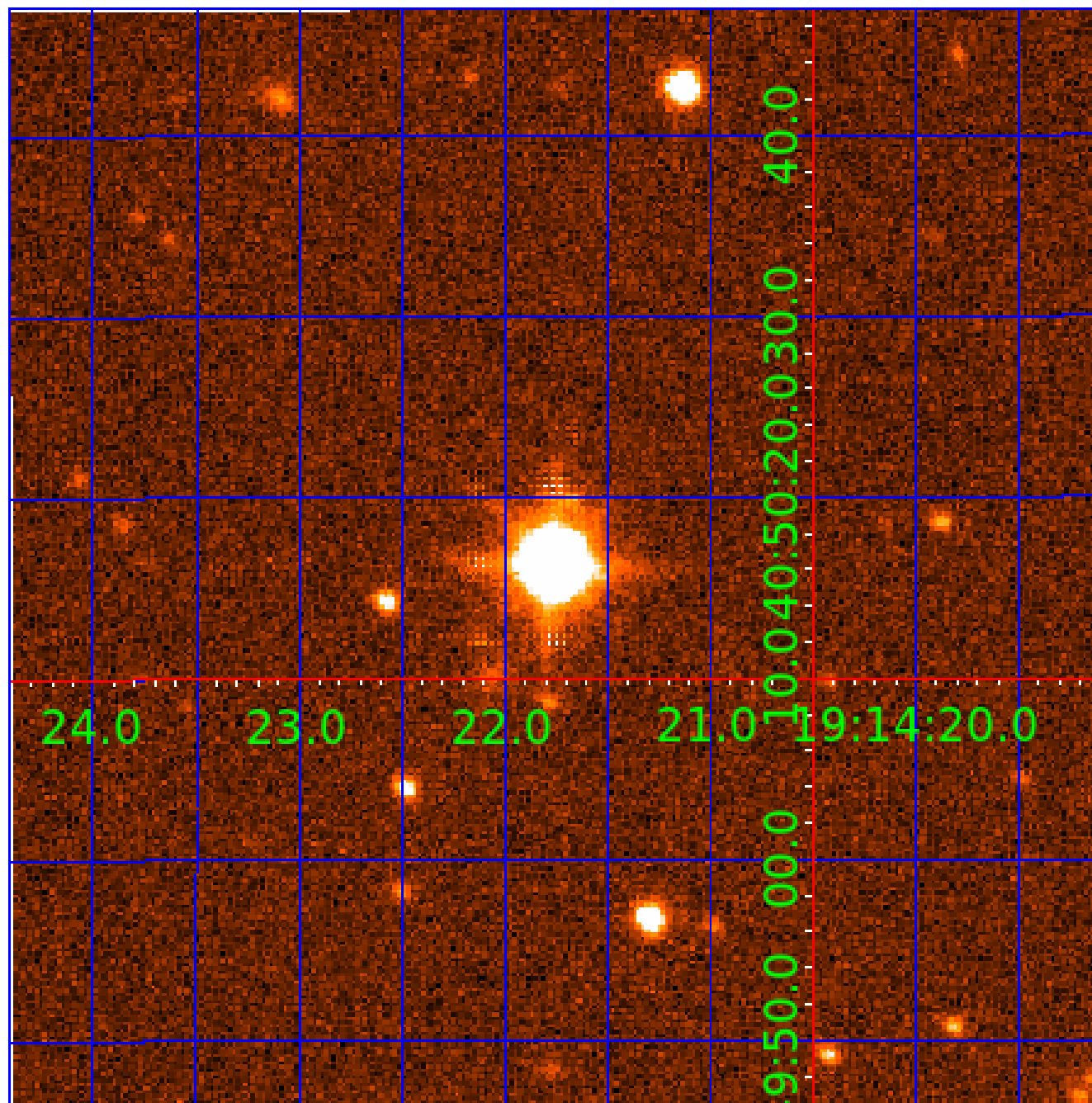


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 005609753

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|-----|-----------------------------|-----------------|------------------------|------------------------|
| 005609753-01 | OBS      | No   | 345.000927    | 426.784631   | 910.9       | 4.728            | 23.3 | 5.7 | 0.62                        | 5203            | 1.88                   | 0.38                   |
| 005609753-02 | OBS      | No   | 549.928834    | 301.082157   | 803.5       | 3.726            | 15.6 | 6.8 | 0.62                        | 5203            | 1.96                   | 0.20                   |
| 005609753-03 | OBS      | No   | 275.988514    | 329.847221   | 992.9       | 20.421           | 16.0 | 6.1 | 0.62                        | 5203            | 1.94                   | 0.51                   |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 005609753-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_SKYE—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS |
| 005609753-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS                                 |
| 005609753-03 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS                  |

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

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

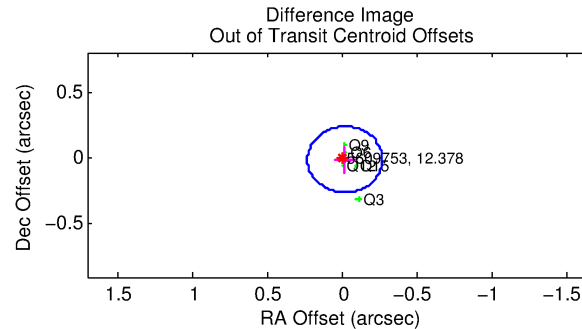
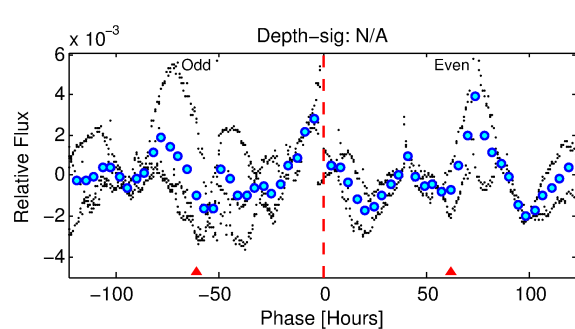
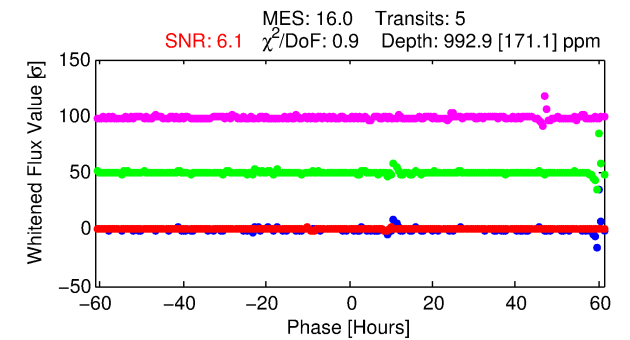
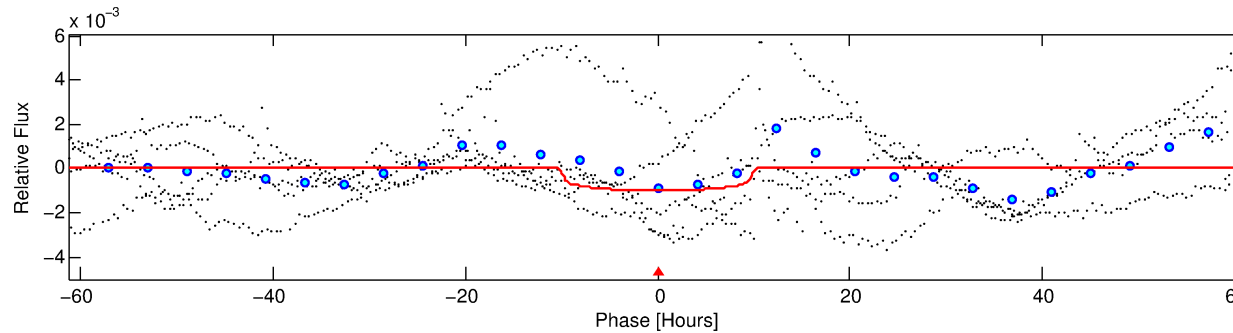
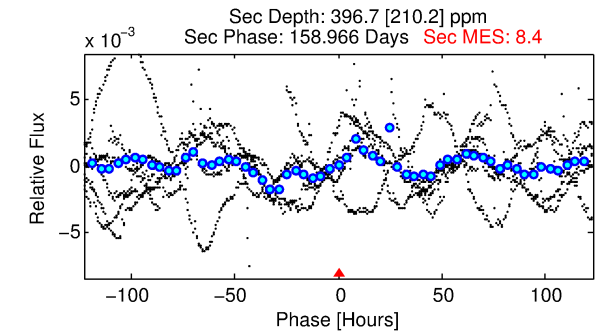
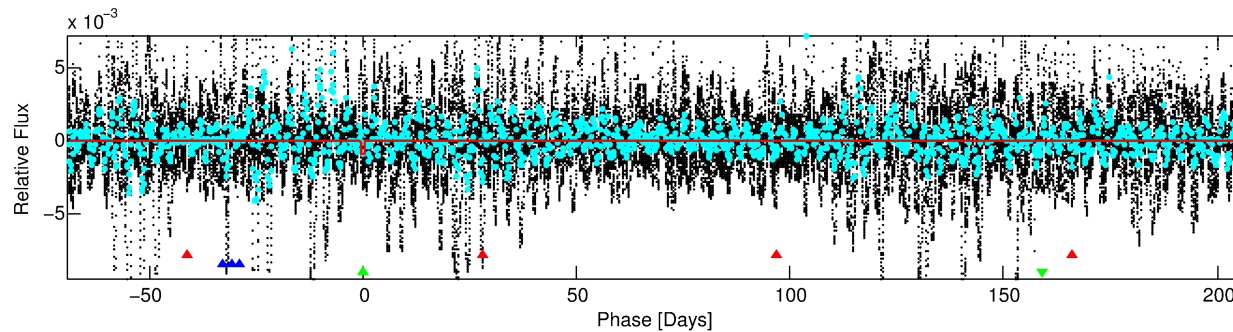
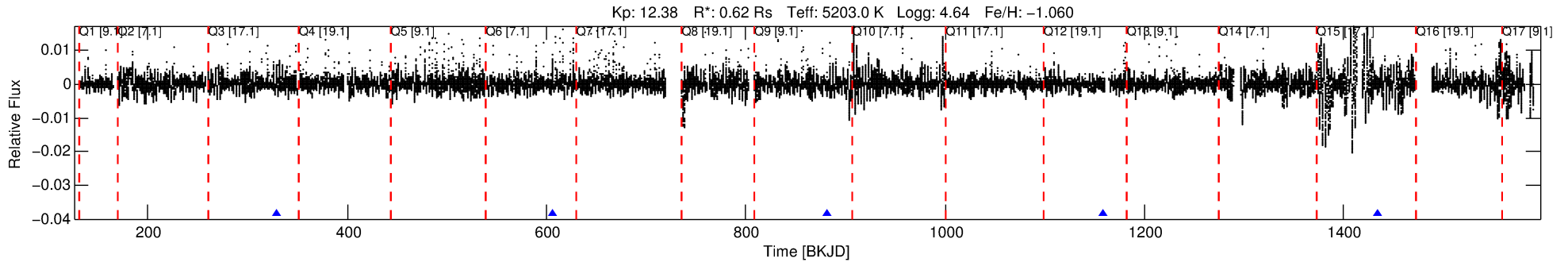
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 005609753-03

No Significant Match Found

# DV One-Page Summary

KIC: 5609753 Candidate: 3 of 3 Period: 275.989 d



## DV Fit Results:

Period = 275.98851 [0.00219] d  
Epoch = 329.8472 [0.0058] BKJD  
Rp/R\* = 0.0287 [0.0040]  
a/R\* = 103.57 [38.69]  
b = 0.23 [1.56]  
Seff = 0.51 [0.08]  
Teq = 215 [9] K  
Rp = 1.94 [0.31] Re  
a = 0.7050 [0.0488] AU  
Ag = 28700.08 [17444.09] [1.65σ]  
**Teffp = 4332 [661] K [6.23σ]**

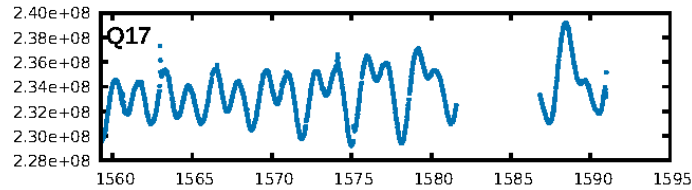
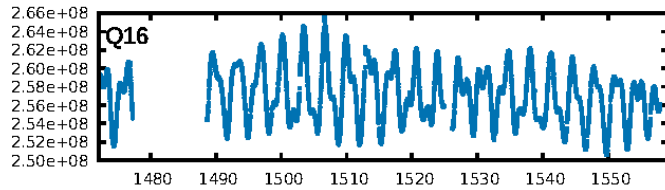
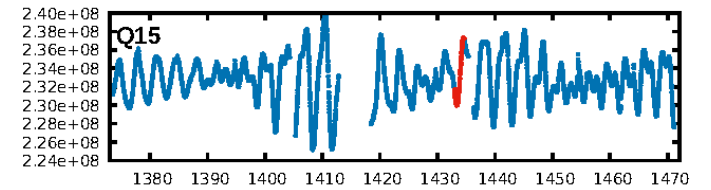
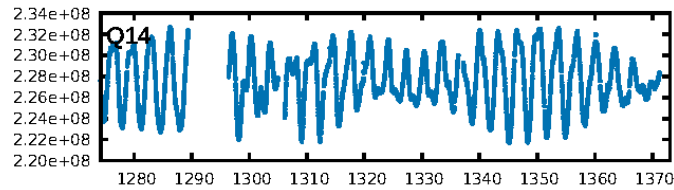
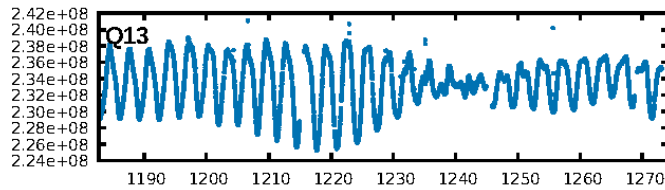
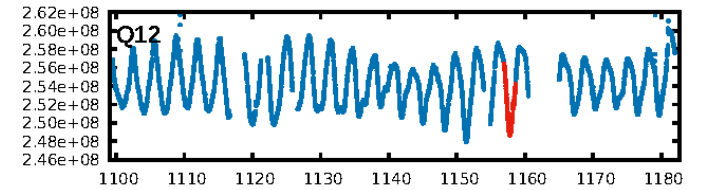
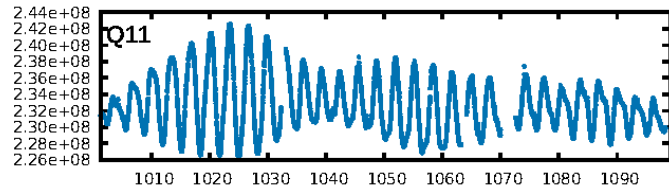
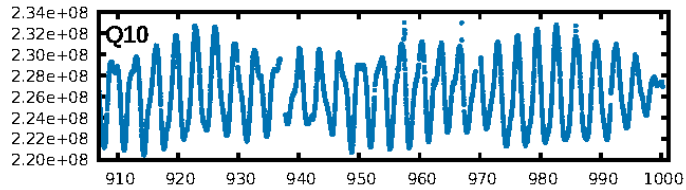
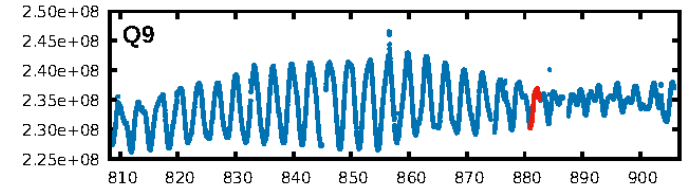
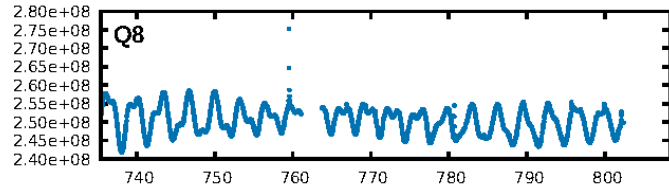
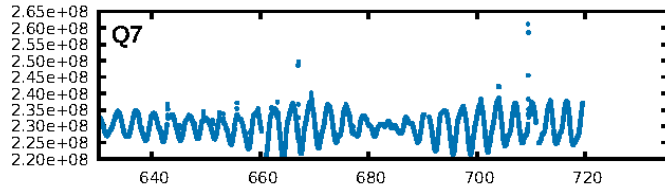
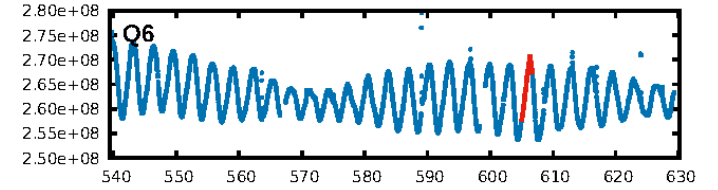
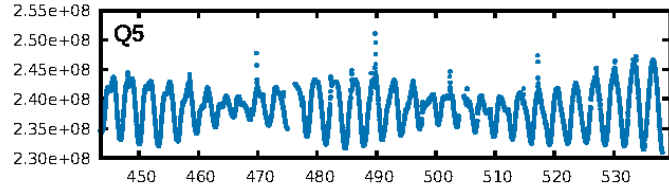
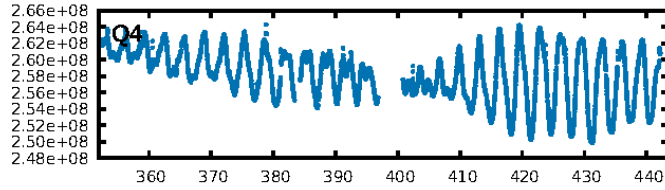
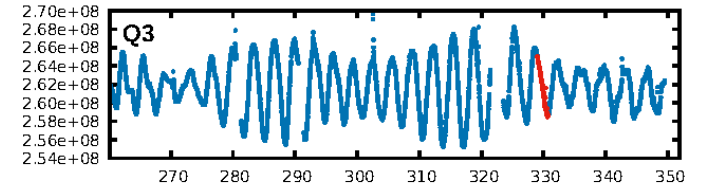
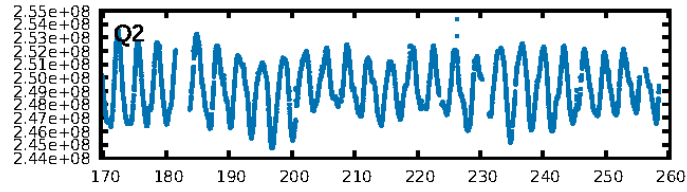
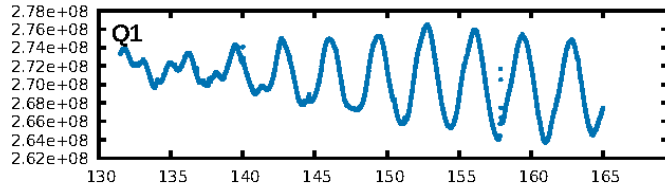
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [79.02σ]  
ModelChiSquare2-sig: 83.7%  
ModelChiSquareGof-sig: 99.9%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 3.132  
Centroid-sig: 50.5%  
Centroid-so: 0.643 arcsec [2.47σ]  
OotOffset-rm: 0.024 arcsec [0.29σ]  
OotOffset-st: 1/2/1/1 [5]  
KicOffset-rm: **0.569 arcsec [6.74σ]**  
KicOffset-st: 1/2/1/1 [5]  
DiffImageQuality-fgm: 0.60 [3/5]  
DiffImageOverlap-fno: 1.00 [5/5]

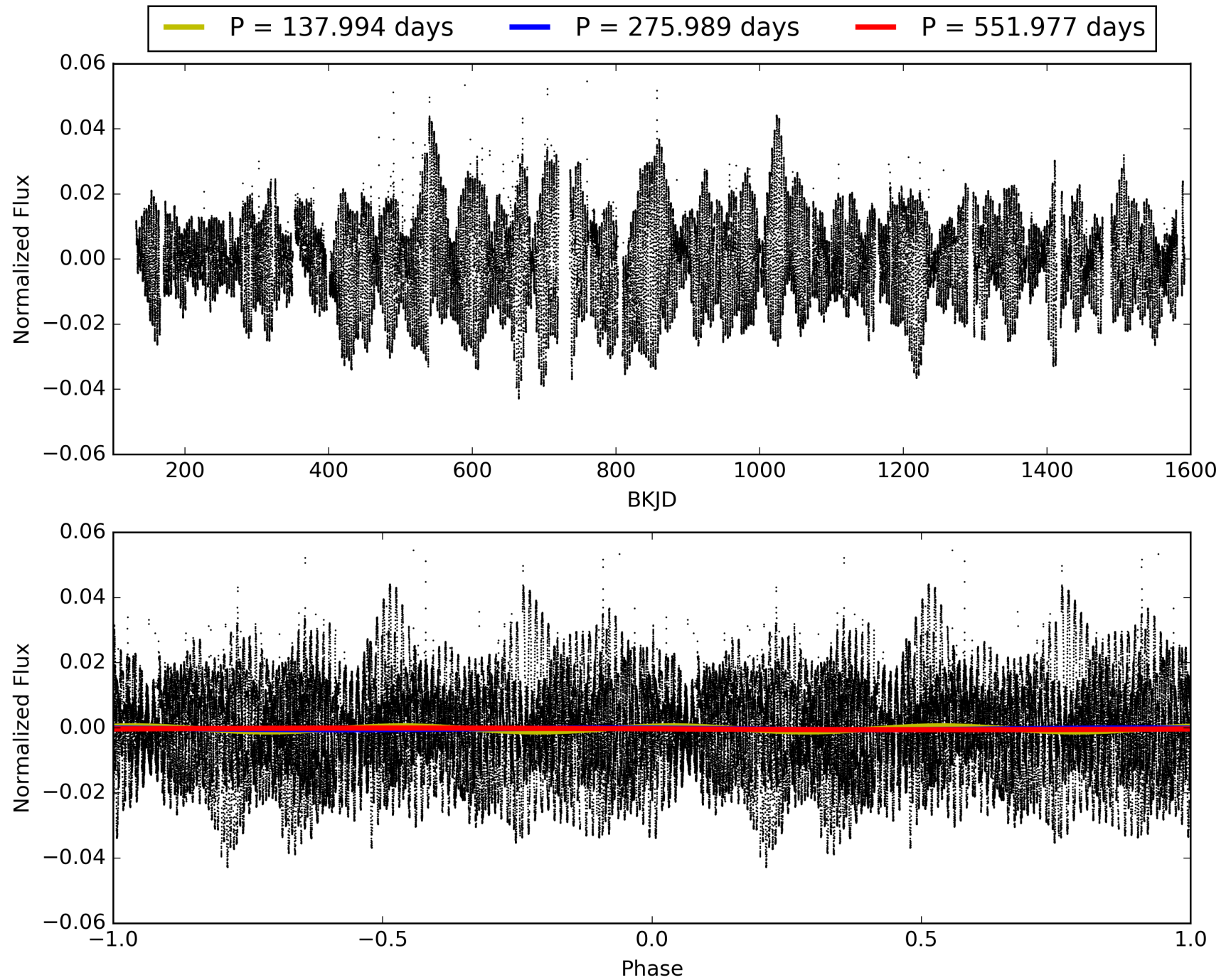
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 00:27:02 Z

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

# TCE 005609753-03, PDC Light Curves

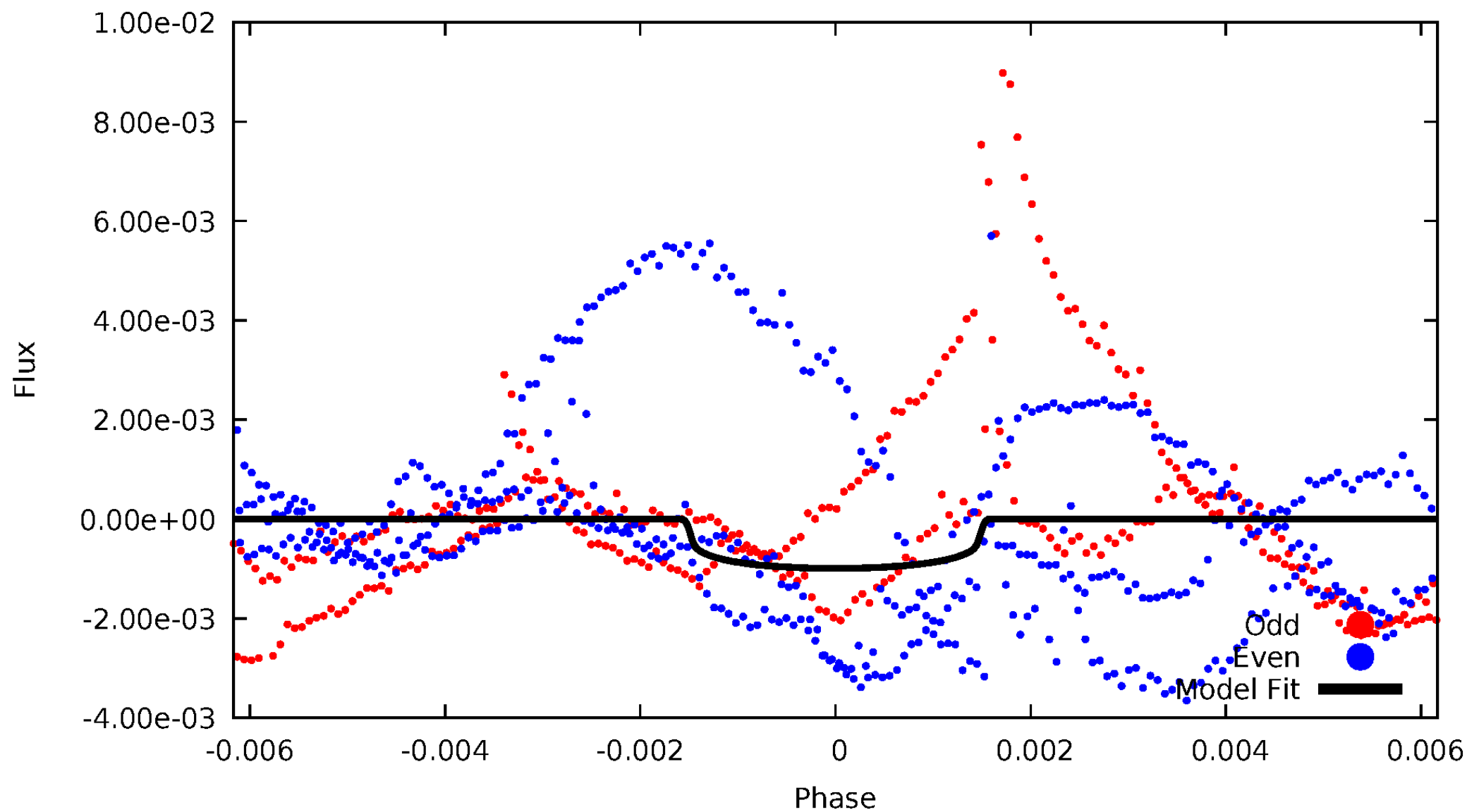


TCE 005609753-03



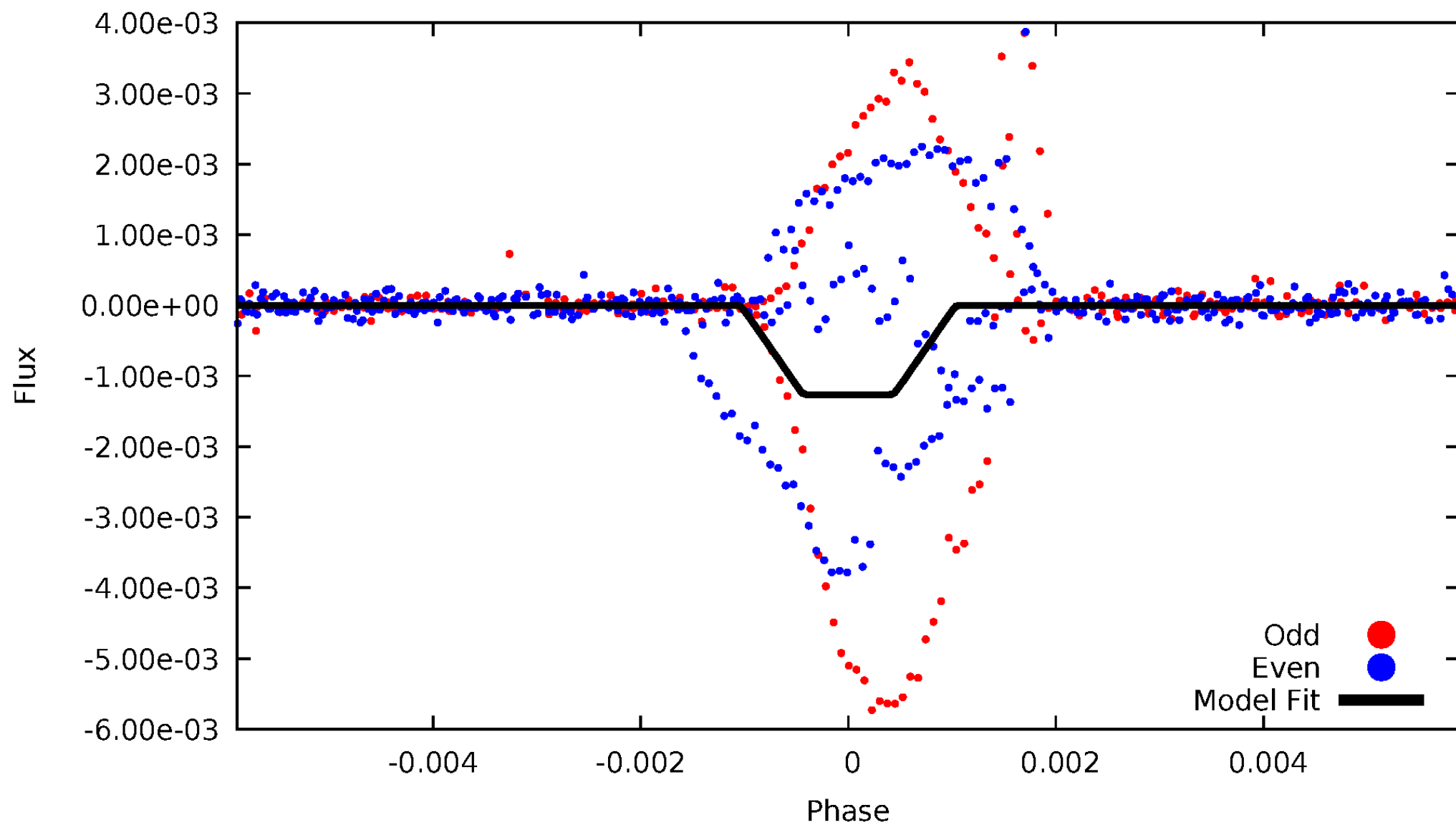
# DV Odd/Even

TCE 005609753-03



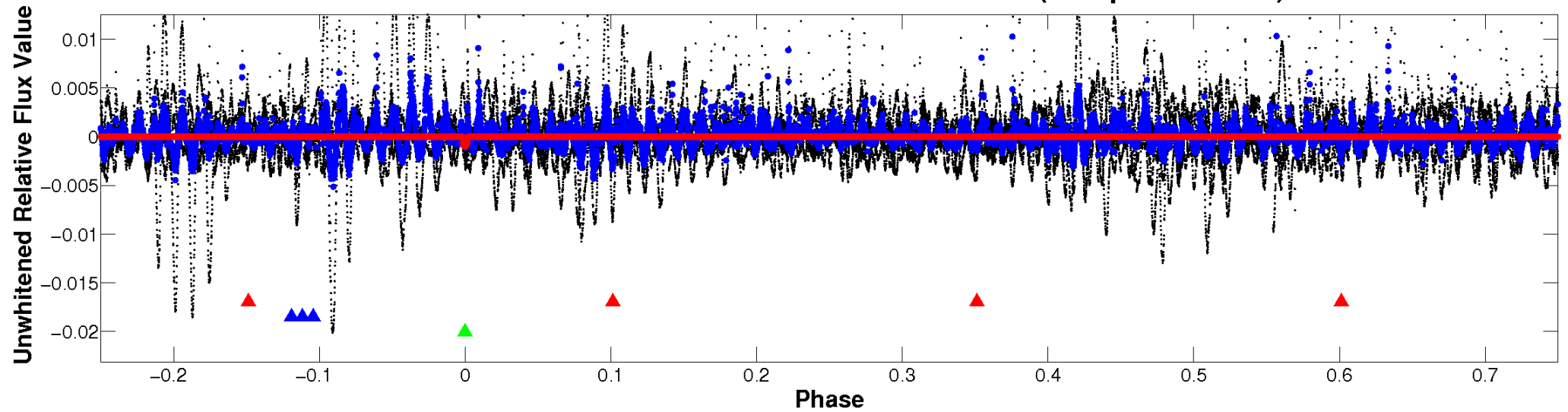
# ALT Odd/Even

TCE 005609753-03

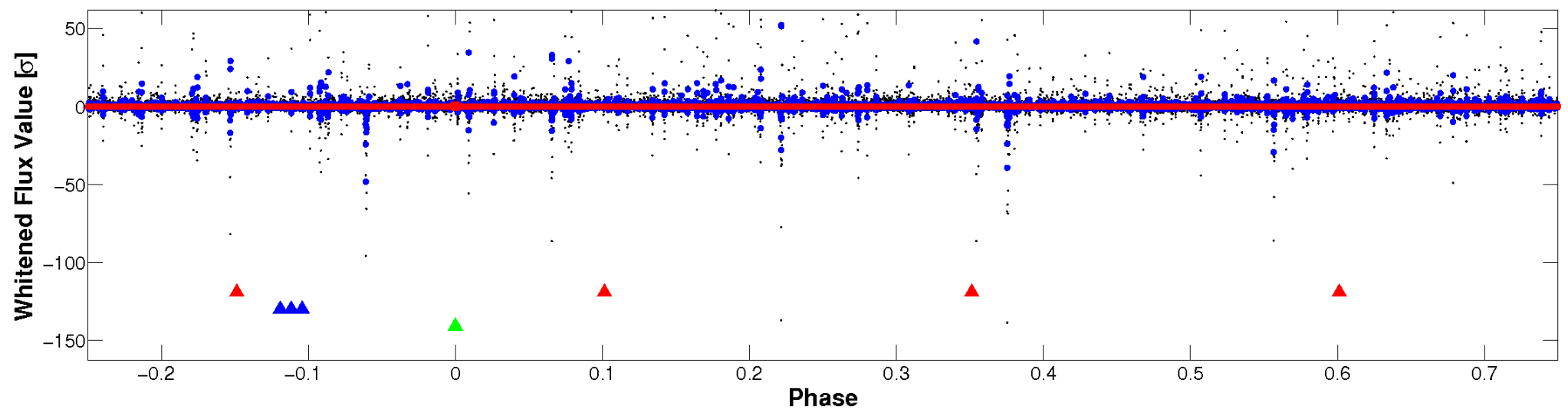


# Non-Whitened Vs. Whitened Light Curve

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



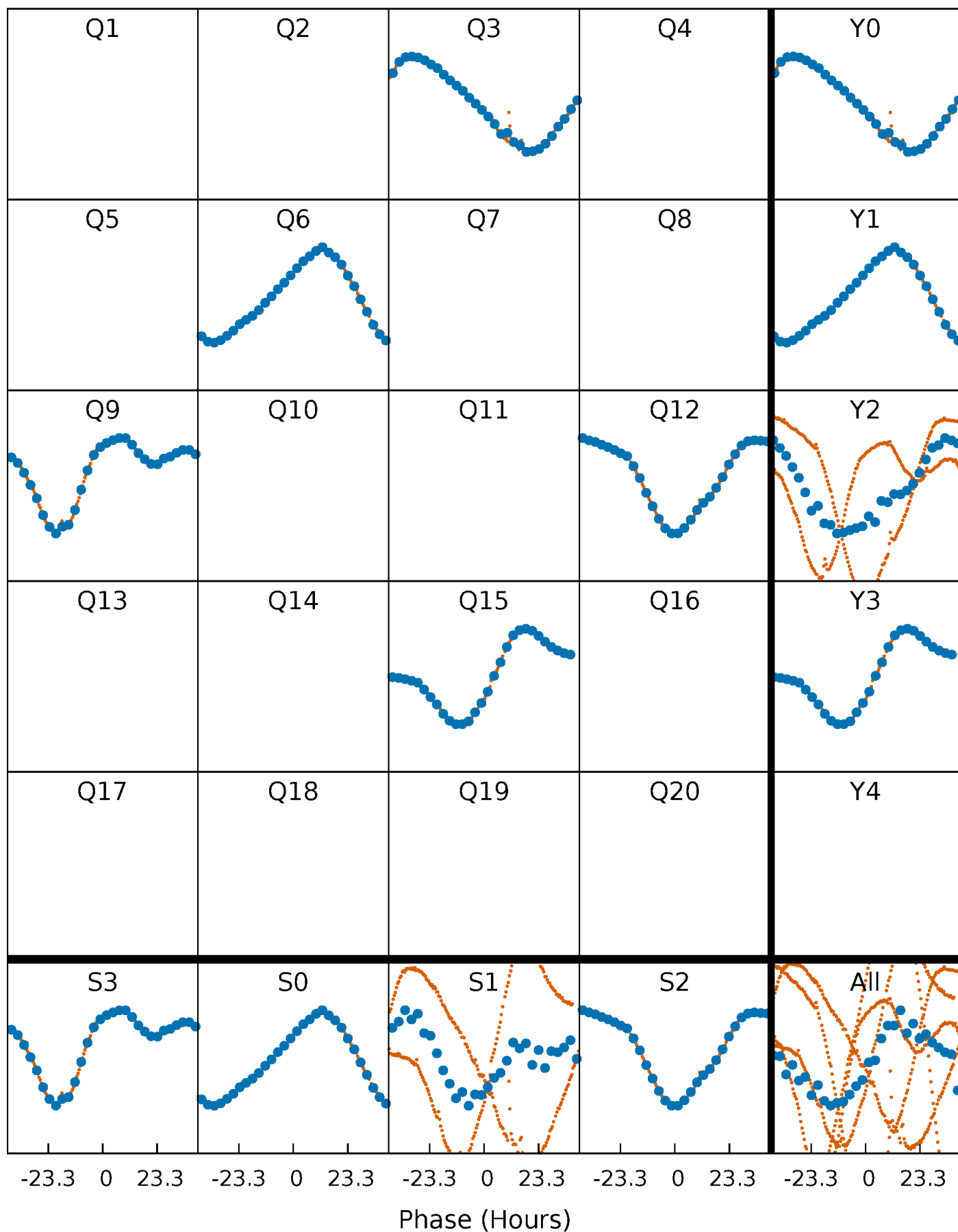
**Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

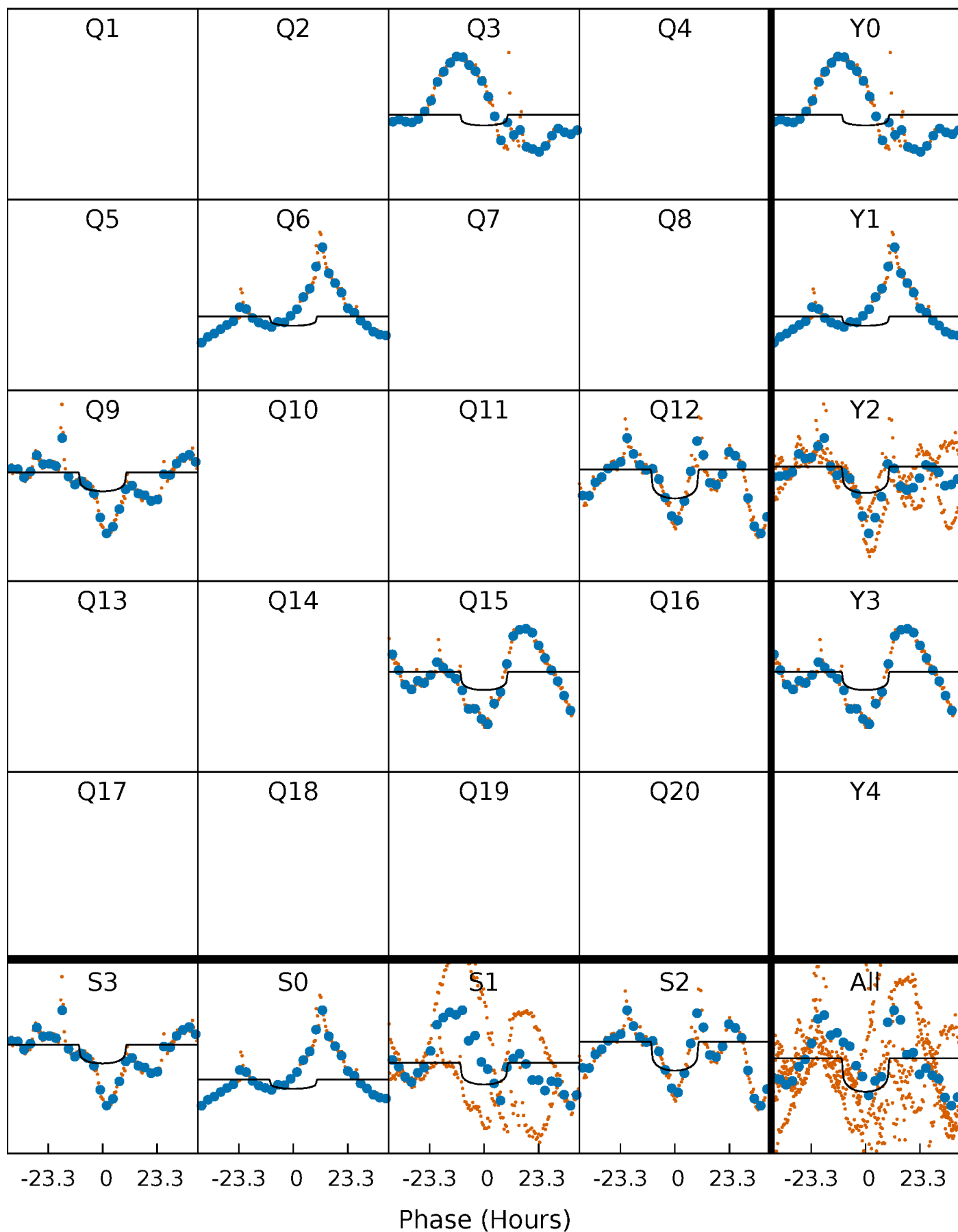
TCE 005609753-03     $P=275.988514$  Days     $T_0=329.847221$  (BKJD)





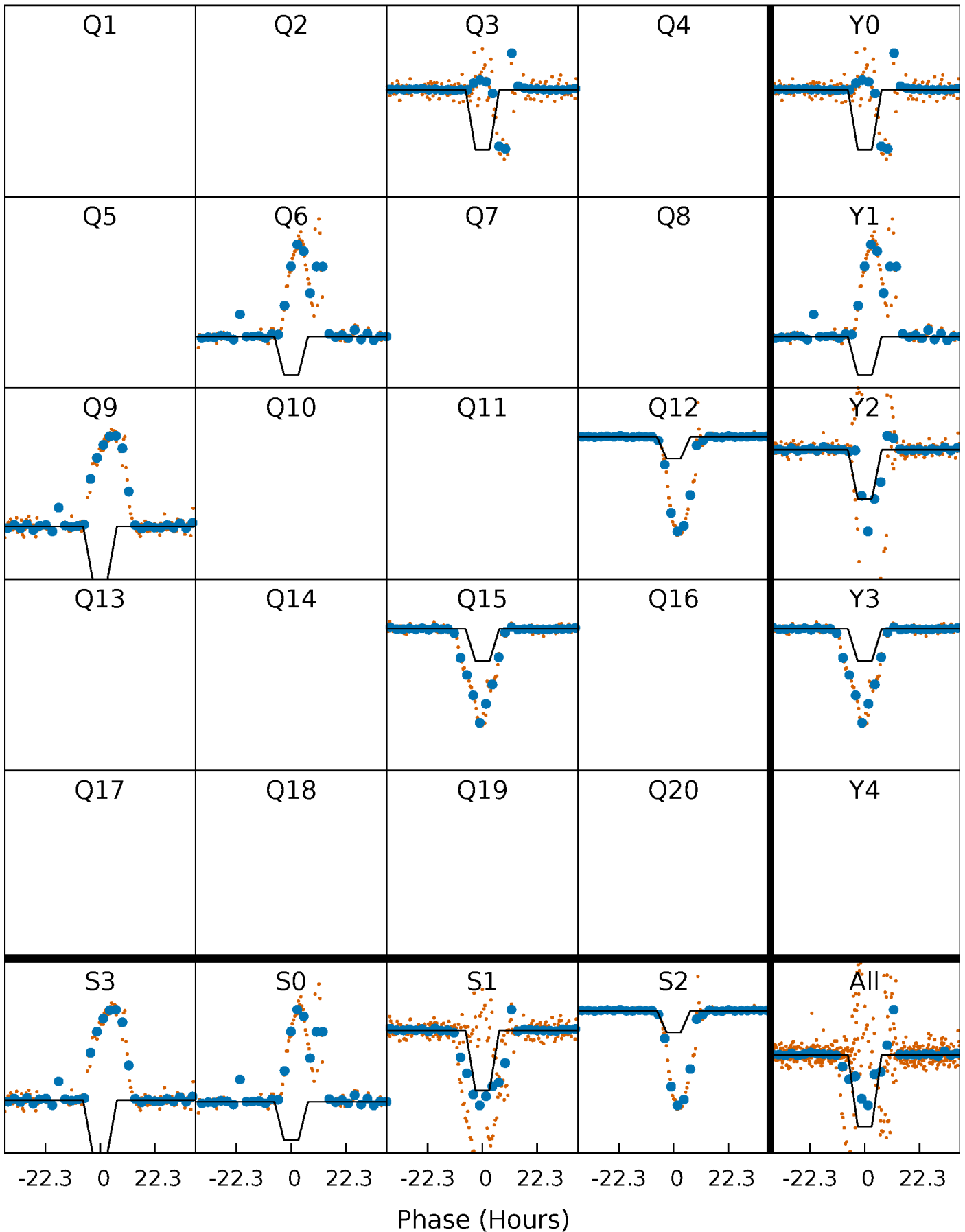
# DV Quarter-Phased Transit Curves

TCE 005609753-03 P=275.988514 Days  $T_0=329.847221$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

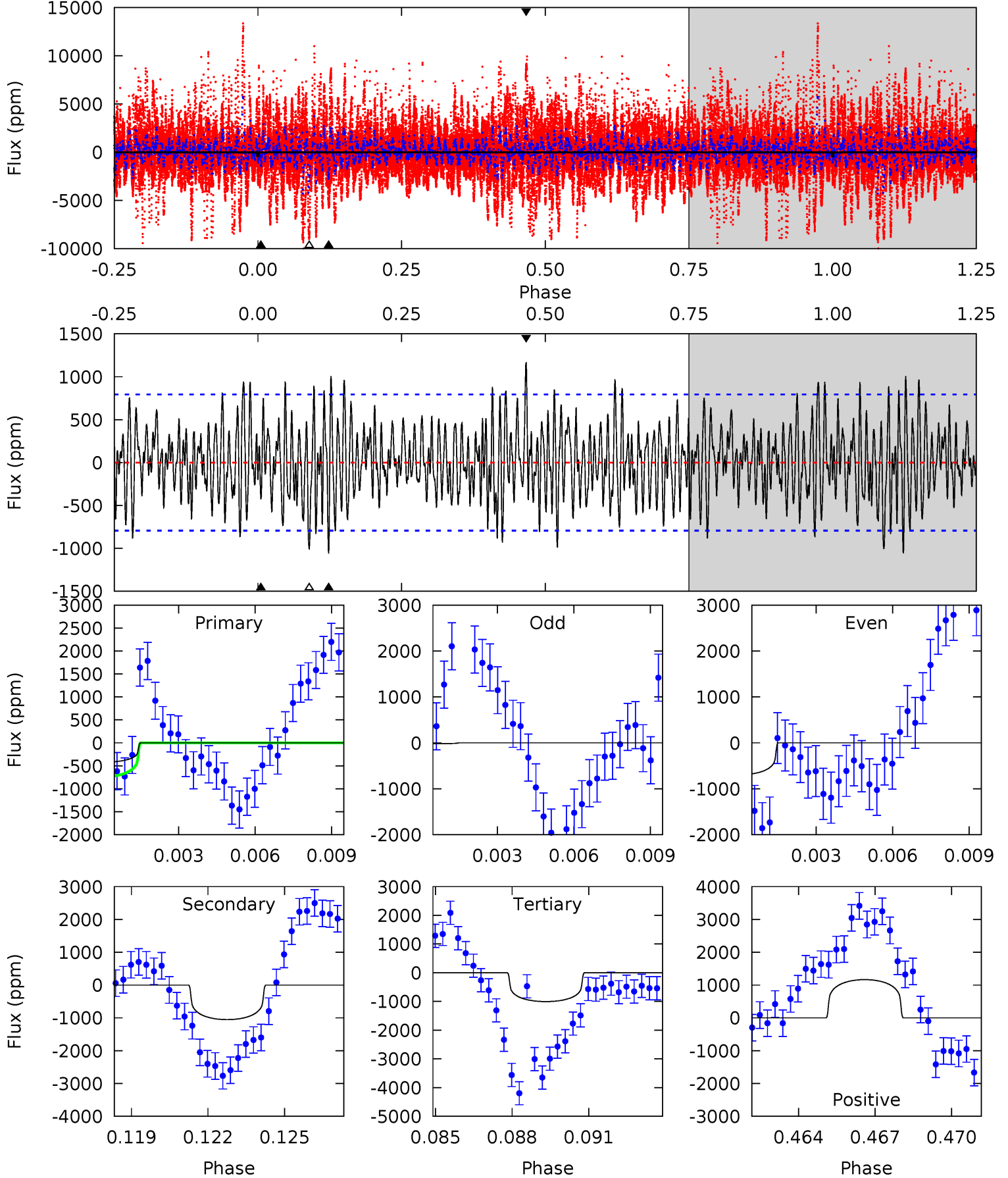
TCE 005609753-03     $P=276.002906$  Days     $T_0=329.837833$  (BKJD)



# DV Model-Shift Uniqueness Test

005609753-03, P = 275.988514 Days, E = 53.858707 Days

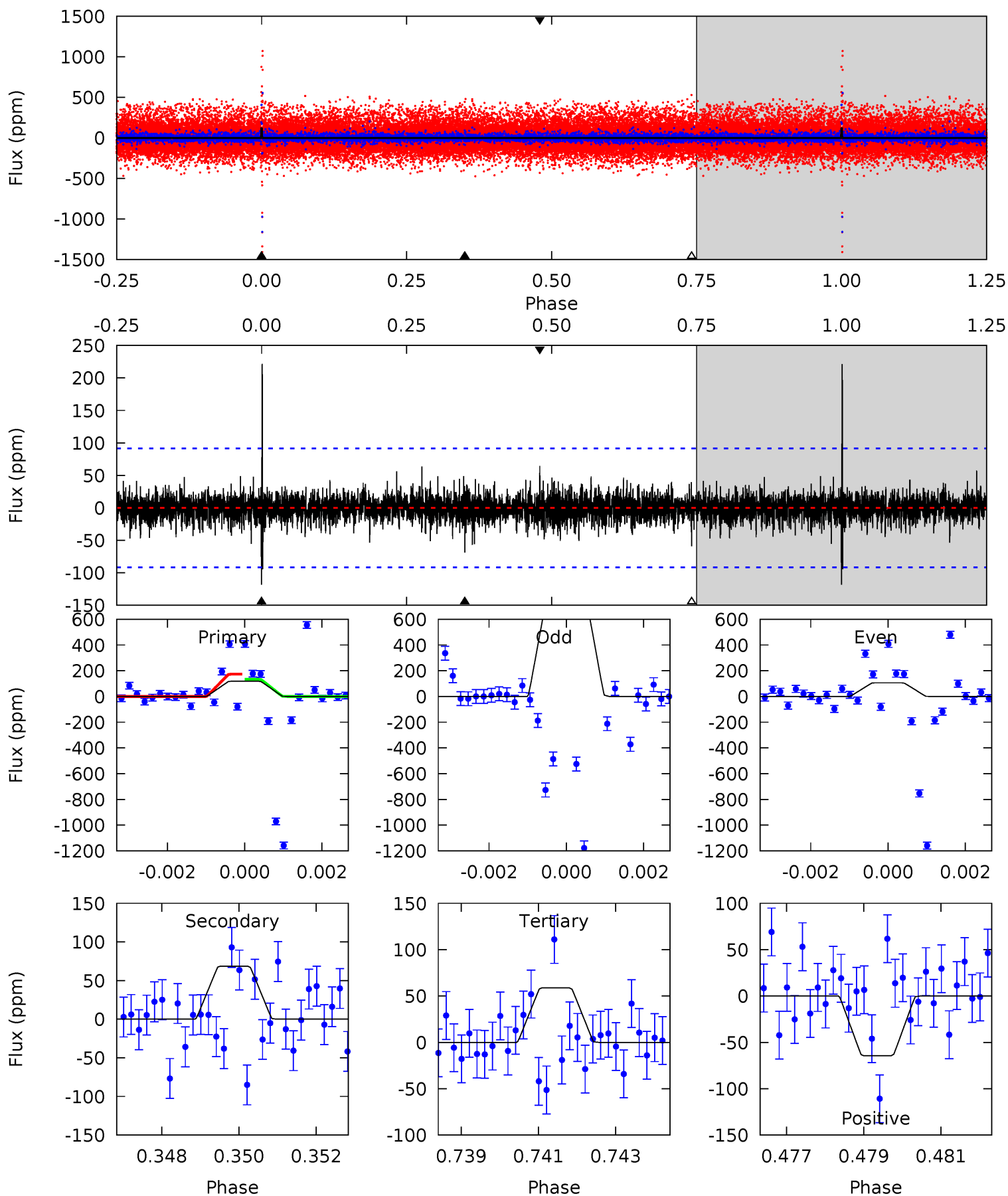
| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 2.79 | 6.96 | 6.64 | 7.70 | 5.24            | 2.95            | 2.39             | -3.86   | -4.91   | 0.32    | -0.74   | 2.22    | 0.45 | 0.53  | 2.14 |



# Alt Model-Shift Uniqueness Test

005609753-03, P = 276.002906 Days, E = 53.834927 Days

| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM   | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|-------|-------|-----|
| 6.86 | 3.99 | 3.42 | 3.74 | 5.32            | 3.07            | 0.78             | 3.44    | 3.11    | 0.57    | 0.24    | 28.8    | -5.25 | 0.65  | 0   |



### Stellar Parameters For KIC 005609753

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M(M_{\odot})$            | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $5203^{+156}_{-141}$ | $4.641^{+0.060}_{-0.040}$ | $-1.060^{+0.350}_{-0.300}$ | $0.620^{+0.048}_{-0.043}$ | $0.614^{+0.058}_{-0.022}$ | $3.624^{+0.889}_{-0.549}$                     |
|        | +3%/-3%              | +1%/-1%                   | +33%/-28%                  | +8%/-7%                   | +9%/-4%                   | +25%/-15%                                     |
| 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 005609753-03 / KOI

| Detrend | Depth (ppm)     | $R_p$ ( $R_{\oplus}$ ) | $T_{max}$ (K)     | $T_{obs}$ (K)        | $A_{obs}$                 |
|---------|-----------------|------------------------|-------------------|----------------------|---------------------------|
| DV      | $-1053 \pm 151$ | $1.95^{+0.28}_{-0.28}$ | $300^{+10}_{-10}$ | $5491^{+489}_{-390}$ | $77143^{+32162}_{-20211}$ |
| Alt.    | $-69 \pm 17$    | $2.41^{+0.28}_{-0.29}$ | $300^{+10}_{-11}$ | $3113^{+162}_{-157}$ | $3278^{+1275}_{-948}$     |

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

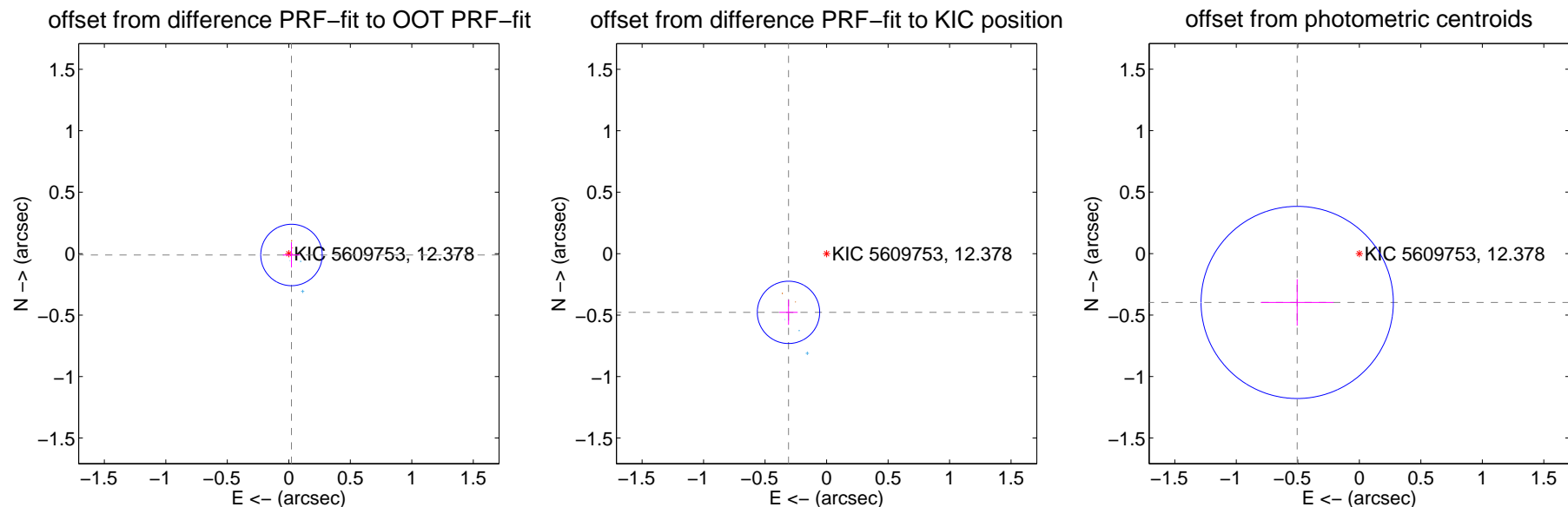
## DV Centroid Data

Supplemental centroid analysis for 005609753-03. Kepler magnitude: 12.38. Transit SNR 6.11

There are 3 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.65 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec       |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT          | $0.024 \pm 0.083$  | 0.29                | $-0.022 \pm 0.070$ | $-0.011 \pm 0.102$ |
| PRF-fit source offset from KIC position | $0.569 \pm 0.084$  | 6.74                | $0.310 \pm 0.075$  | $-0.478 \pm 0.102$ |
| photometric centroid source offset      | $0.64 \pm 0.26$    | 2.47                | $0.50 \pm 0.30$    | $-0.40 \pm 0.19$   |



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



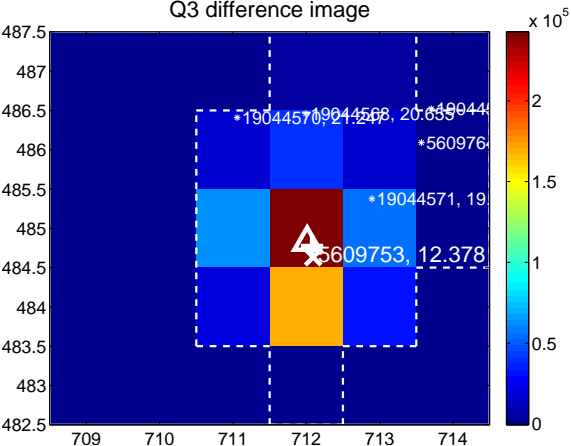
Q2 no difference image



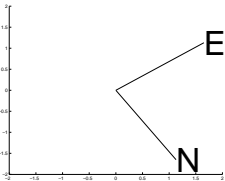
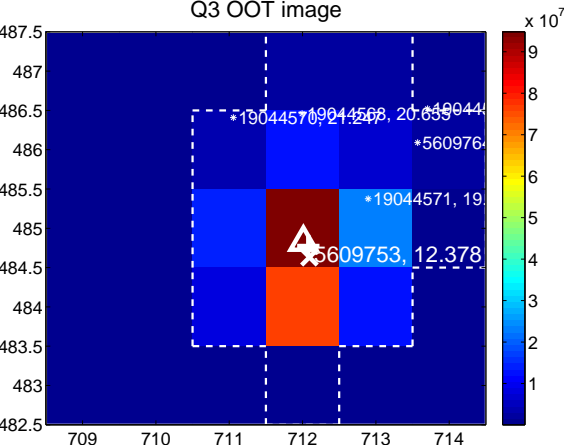
Q2 no OOT image



Q3 difference image



Q3 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.

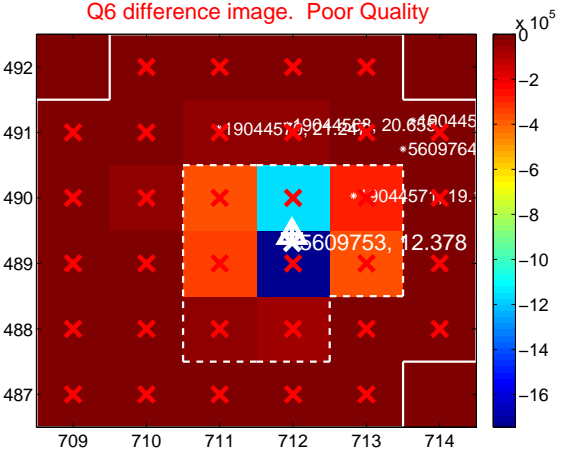
Q5 no difference image



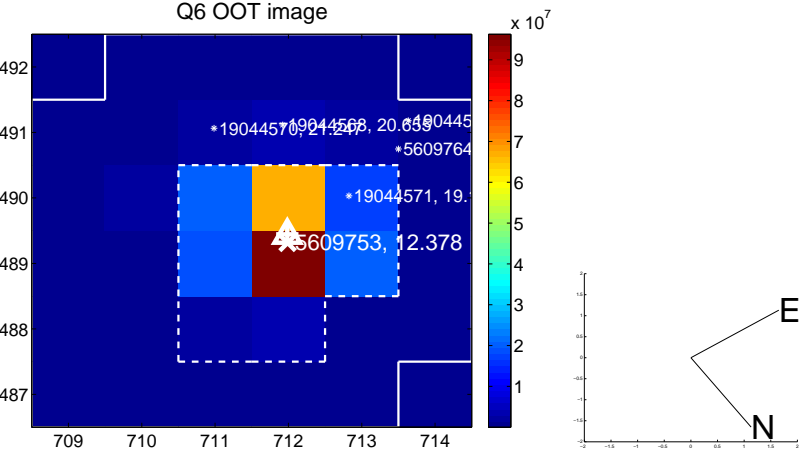
Q5 no OOT image



Q6 difference image. Poor Quality



Q6 OOT image



Q7 no difference image



Q7 no OOT image



Q8 no difference image

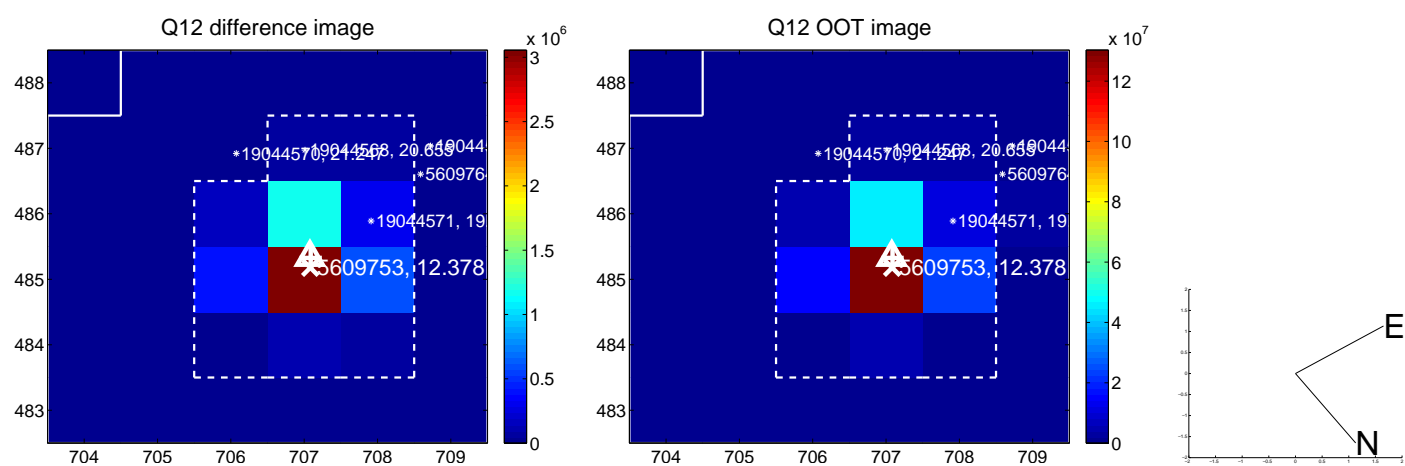
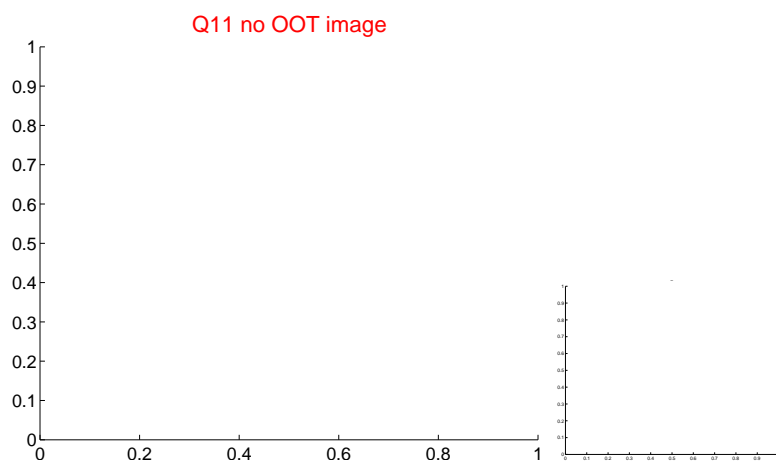
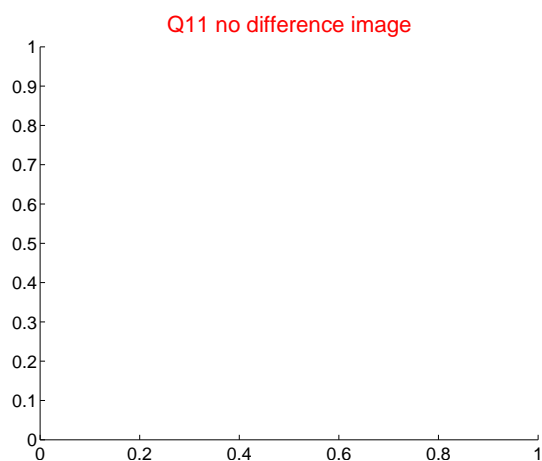
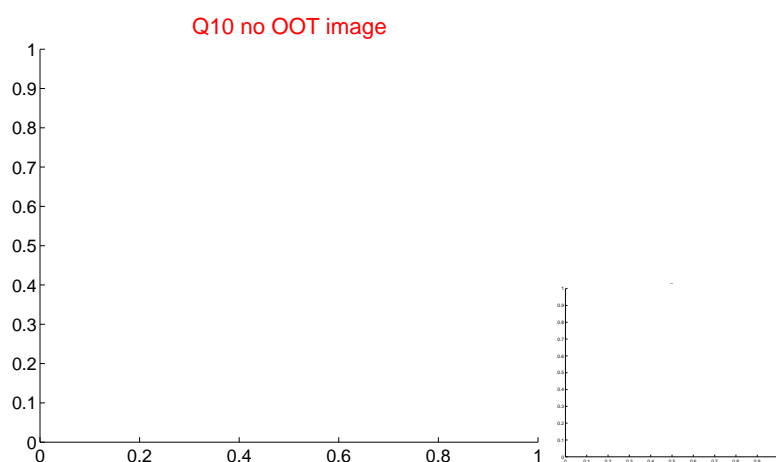
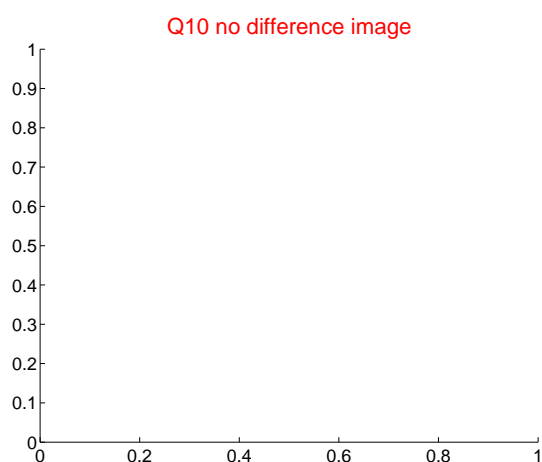
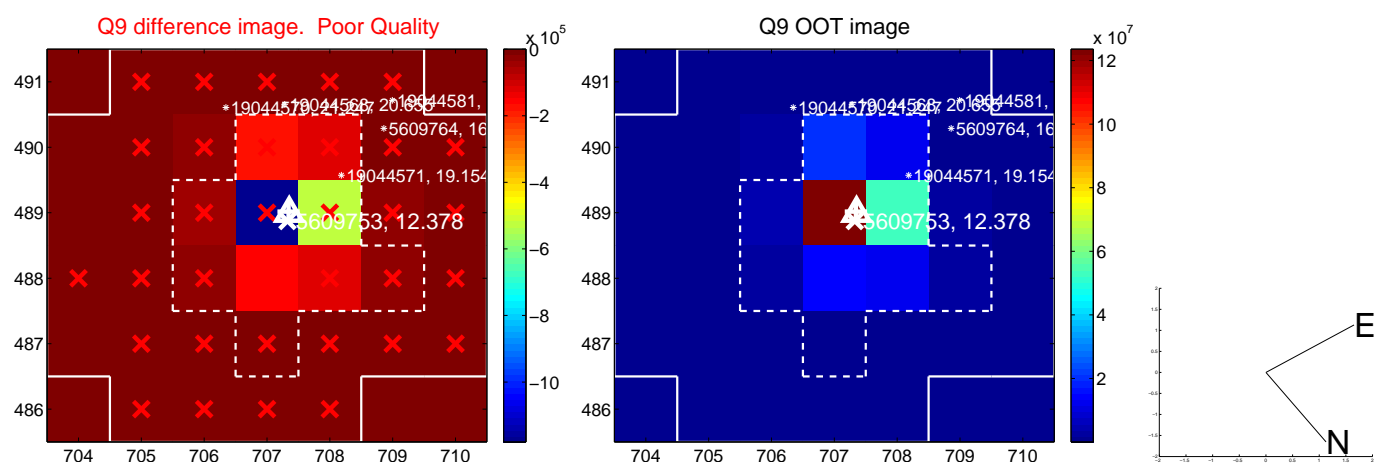


Q8 no OOT image





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.

Q13 no difference image



Q13 no OOT image



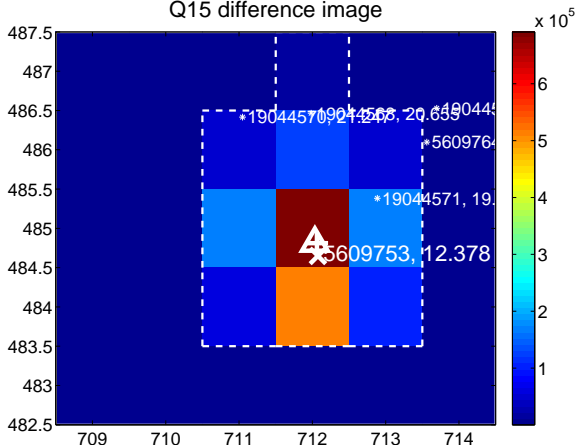
Q14 no difference image



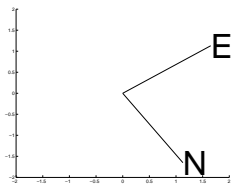
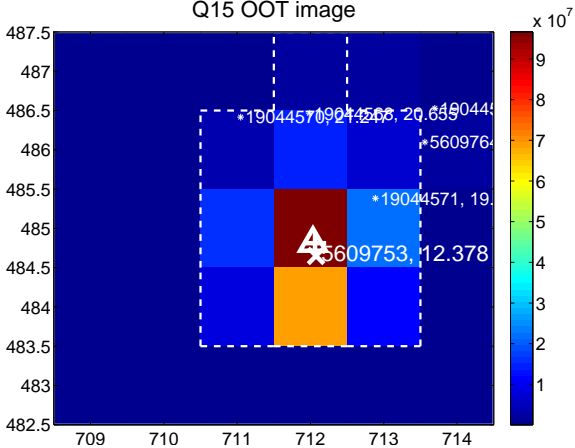
Q14 no OOT image



Q15 difference image



Q15 OOT image



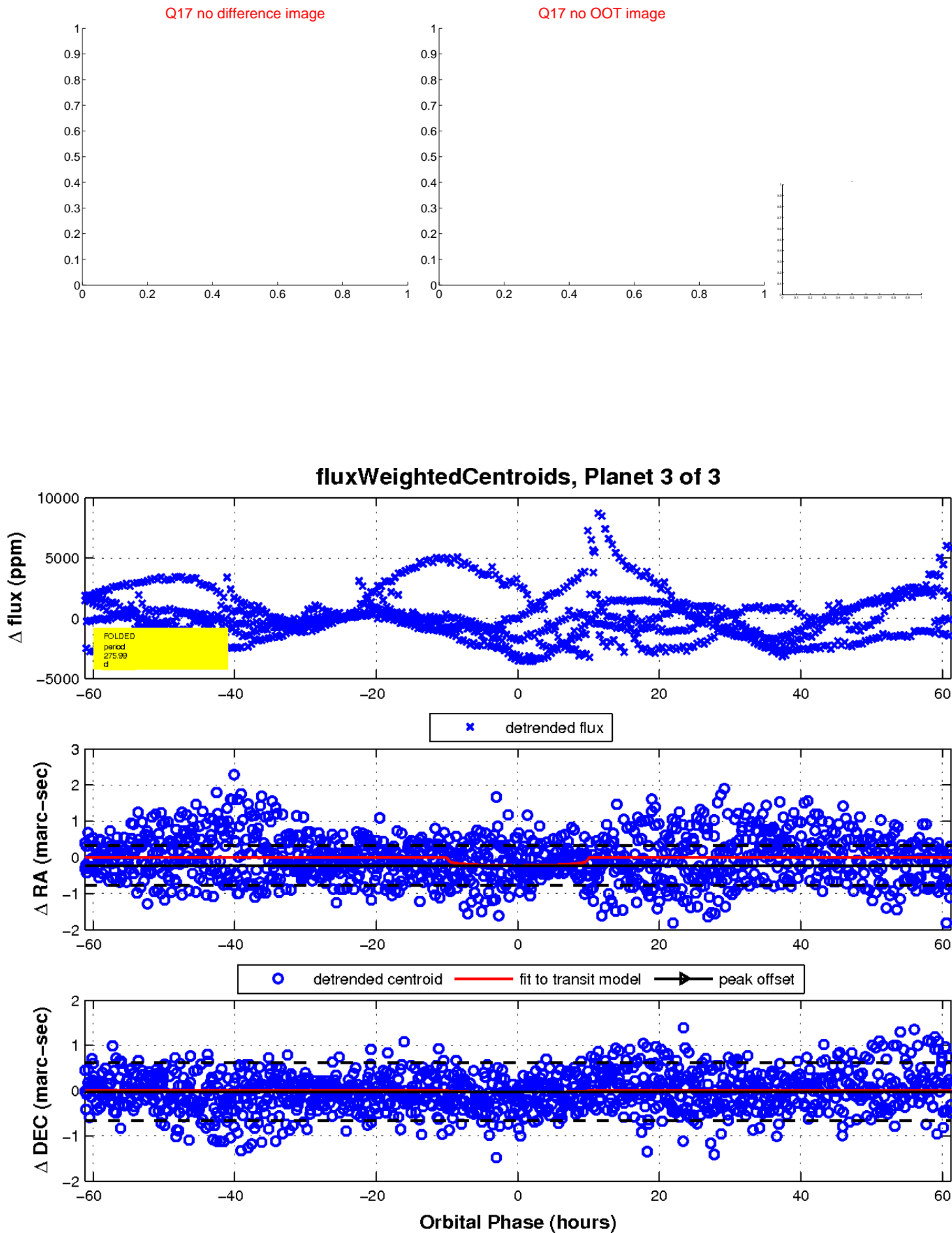
Q16 no difference image



Q16 no OOT image



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



UKIRT Image

Declination

