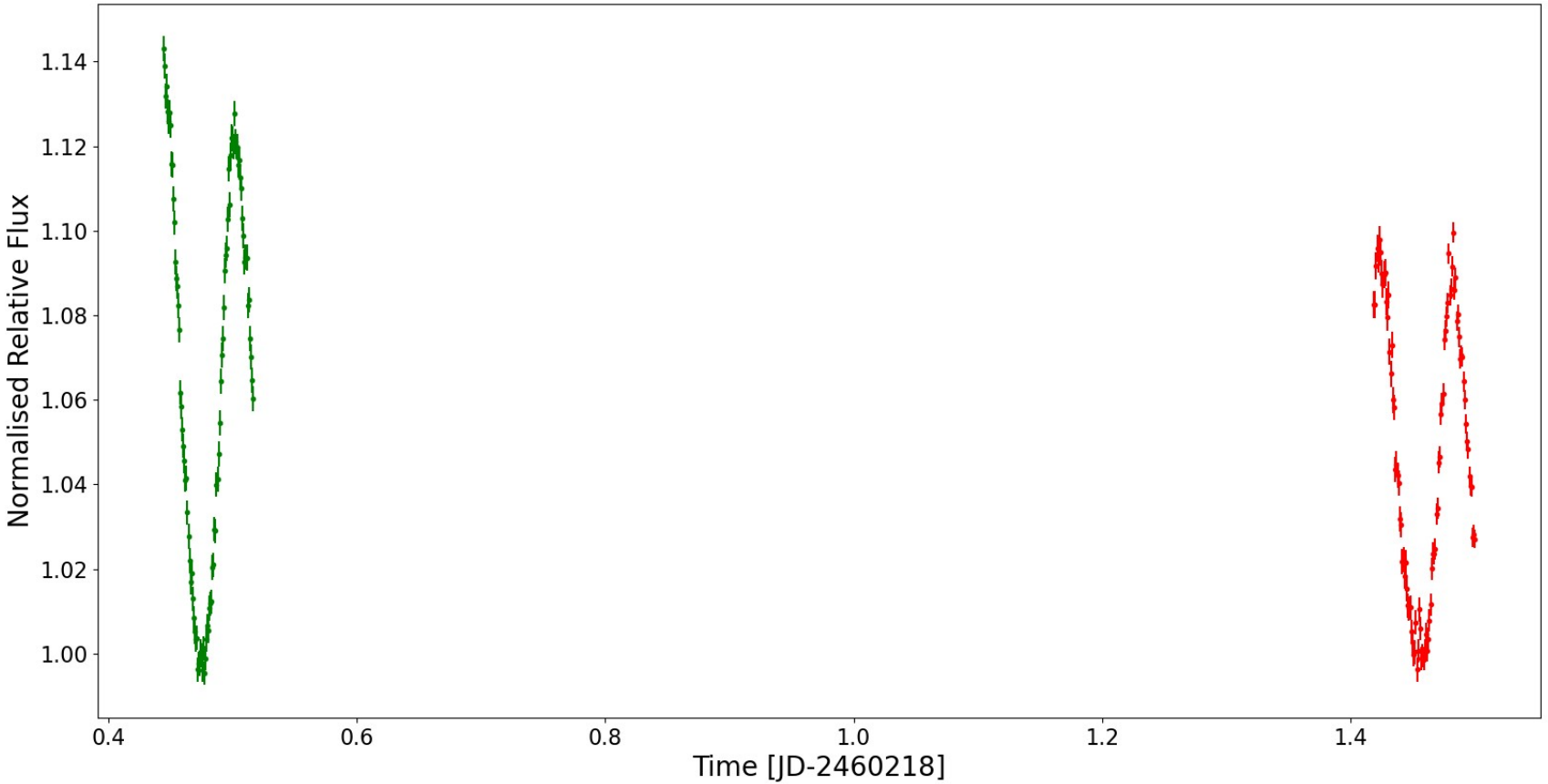
The variable star data were taken on two different nights, so when we plot them together in one figure, they don't look very good...



Ephemeris

$$T_{obs} = T_0 + E * P$$

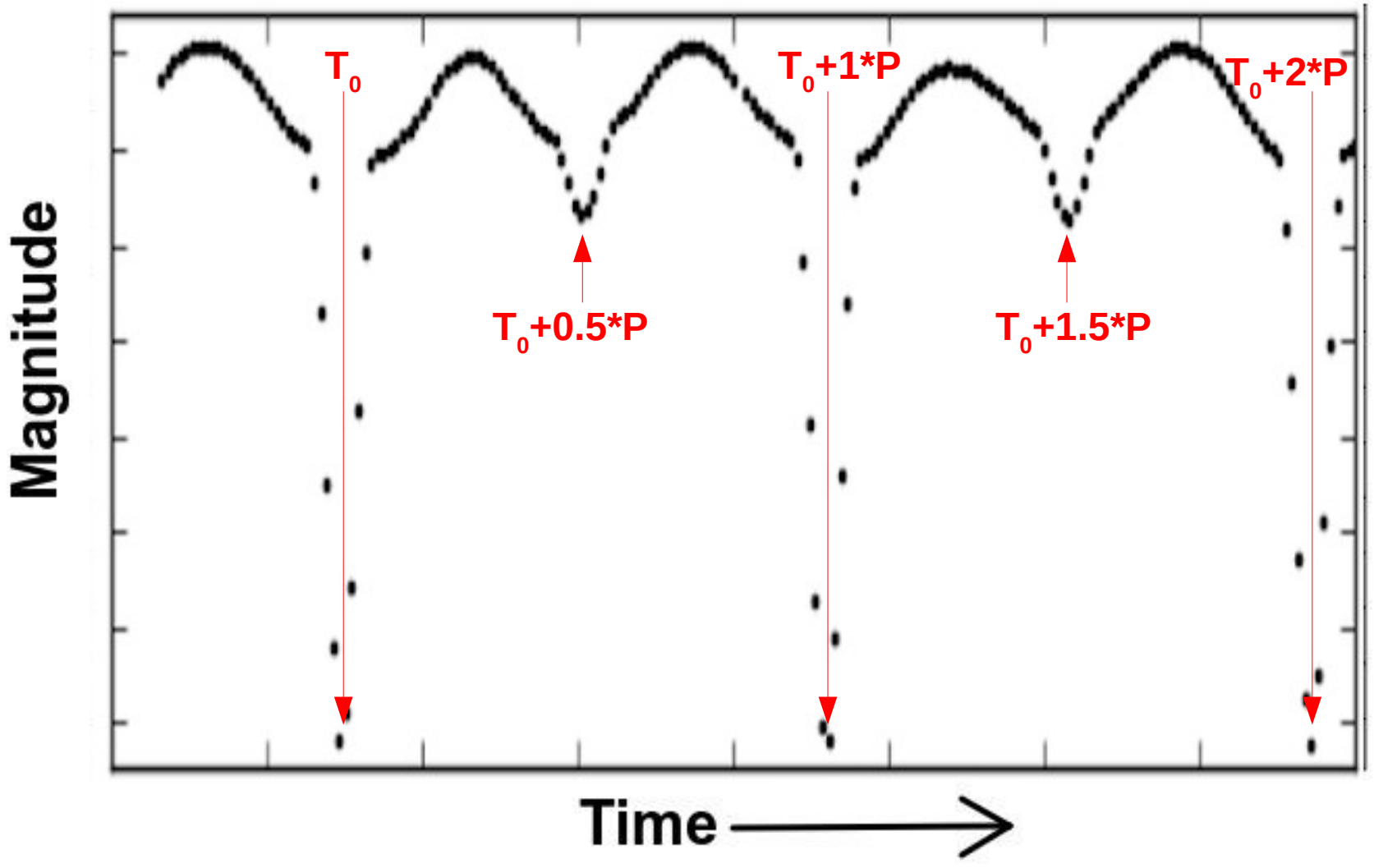
- T_{obs} = the timestamp of each data point, usually in some JD format (JD, MJD, HJD, BMJD…)
- T_0 = a reference time, e.g. the first observed time of mid-eclipse
  the first observed pulsation maximum
- E = the cycle number (just that, a number)
- P = the variability period (pulsation period, orbital period etc)

Phase-folding data

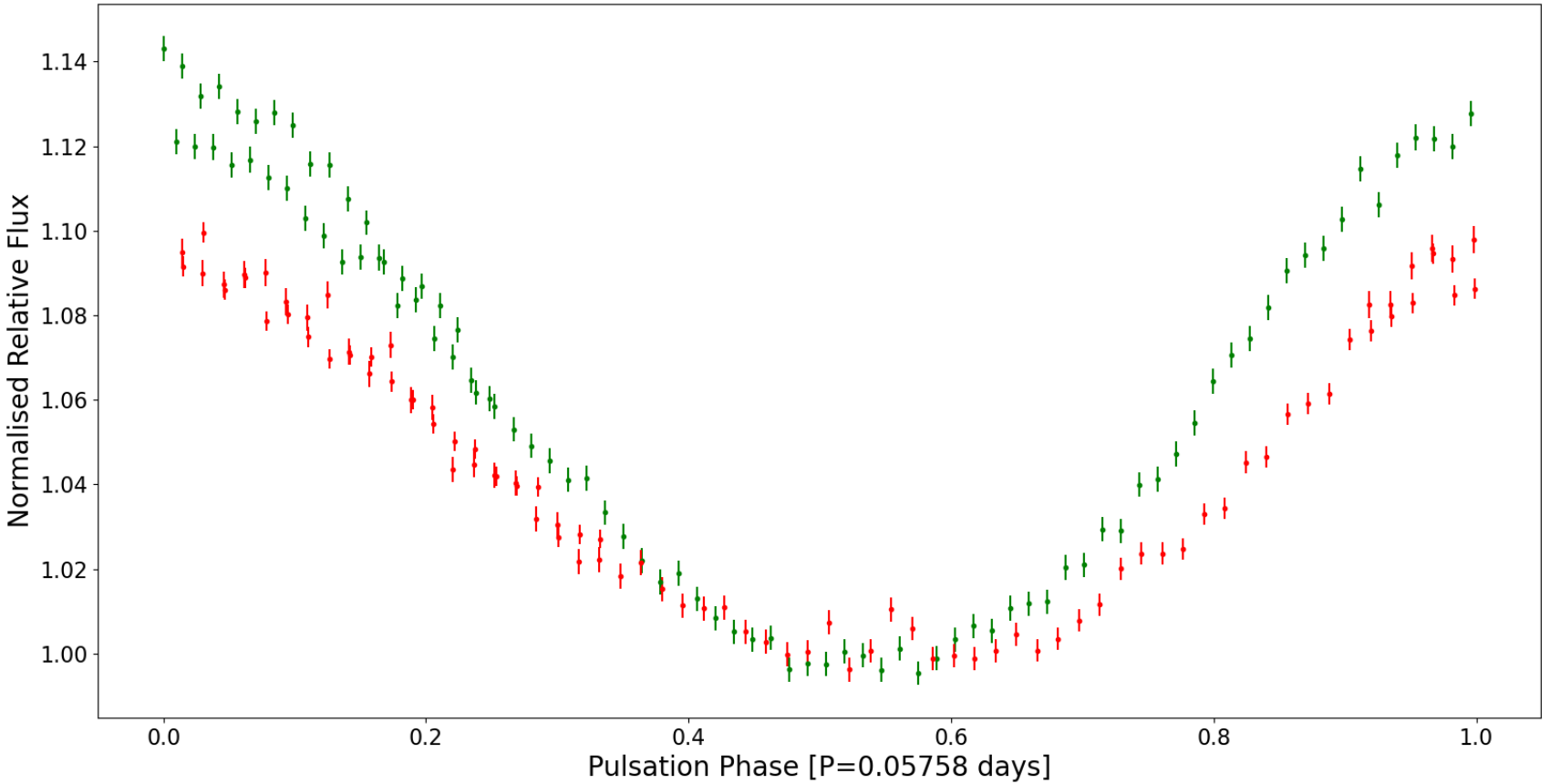
$$E = \frac{T_{obs} - T_0}{P}$$

- Calculating E allows us to see how many full periods have passed between T_0 and T_{obs} (the integer part of the resulting E)
- It also allows us to calculate on what *phase* (= percentage of one full cycle) our observations were taken (the decimal part)
- Example results for E:

E = 1.14	Cycle: 1	Phase: 0.14
E = 58.14	Cycle: 58	Phase: 0.14
E = 1786.14	Cycle: 1786	Phase: 0.14


Magnitude
T0
T0+1*P
T0+2*P
T0+0.5*P
T0+1.5*P
Time

Pulsation Period: 0.0575814 days



Getting the magnitude

$$mag_T = \frac{-\ln\left(\sum_i 2.512^{-mag_{C_i}}\right)}{\ln(2.512)} - 2.5\log(rel\_flux\_T)$$

Where mag_{Ci} is the catalogue magnitude of the i-th comparison star (i=2, 3, 4…)

rel_flux_T you can get directly from your full Table of measurements and it is defined as:

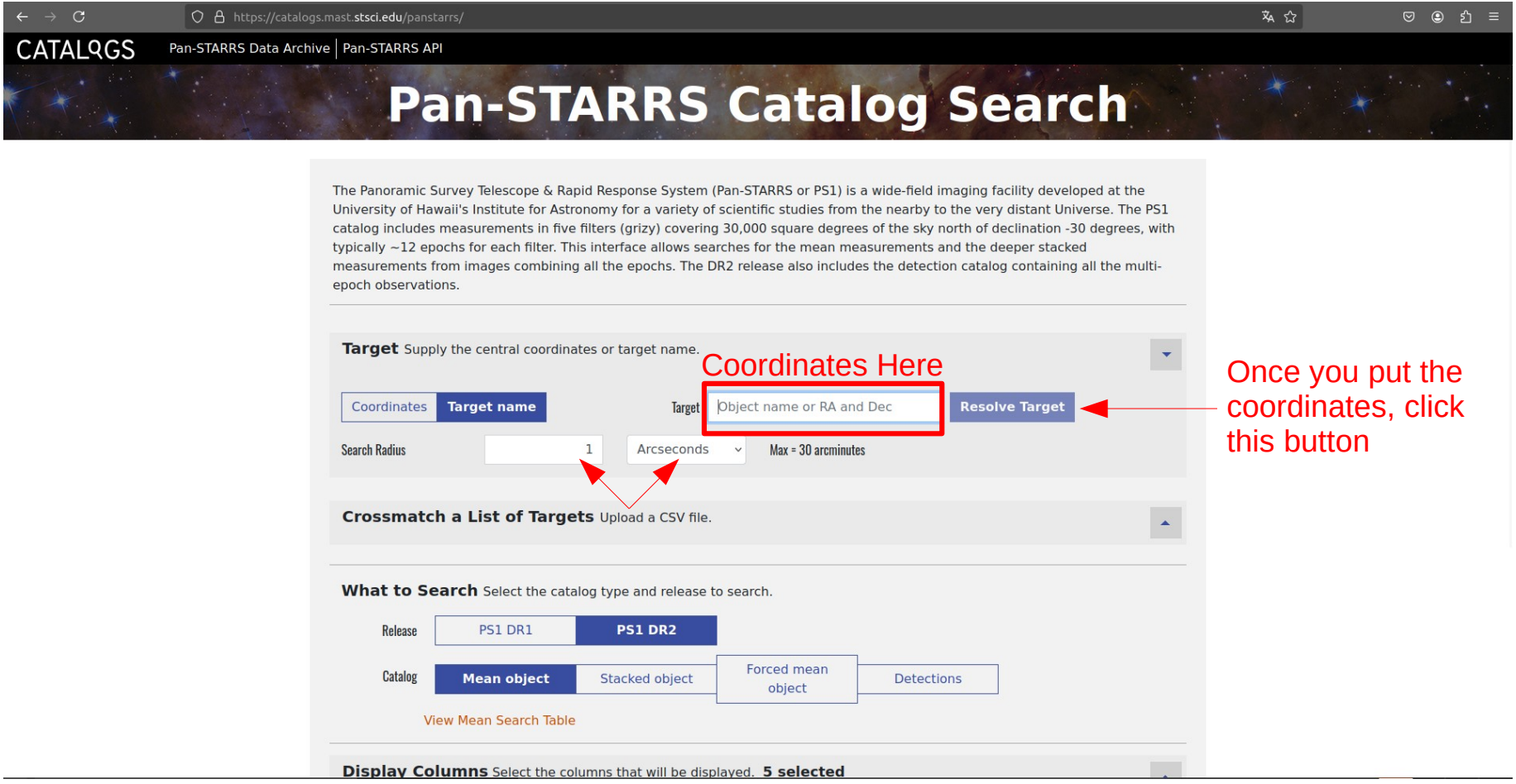
$$rel\_flux\_T = \frac{Source - Sky\_T1}{\sum_i Souce - Sky\_C_i}$$

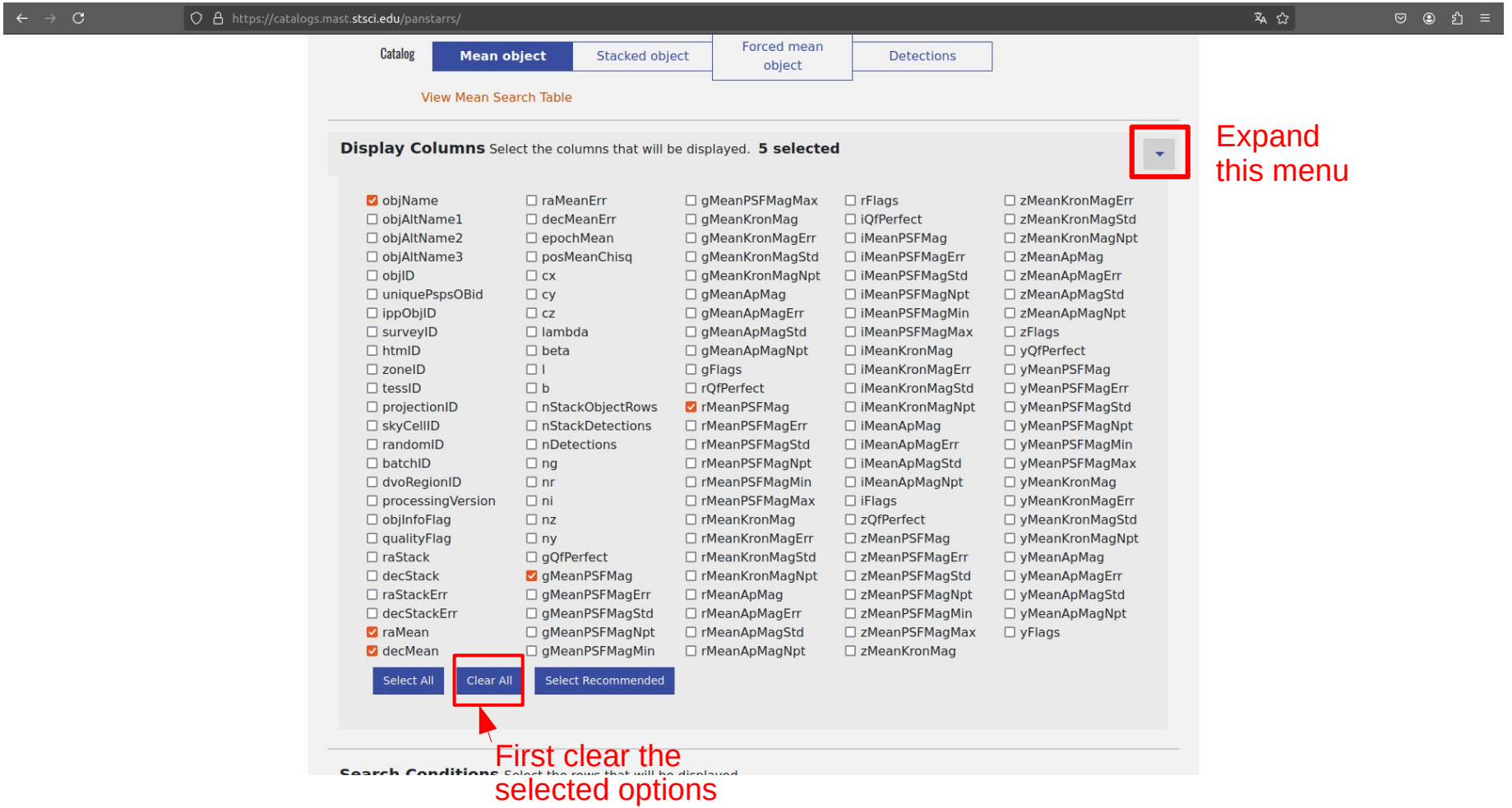
Getting the magnitude error

$$Mag\_Err_T = 2.5 * \log\left(1 + \sqrt{\frac{Source\_Error\_T1^2}{Source - Sky\_T1^2} + \frac{\sum_i Source\_Err\_C_i^2}{\left(\sum_i Source - Sky\_C_i\right)^2}}\right)$$

All the different variables that enter in the Equation above,
you can get directly from the AstroImageJ Measurements Table!

https://catalogs.mast.stsci.edu/panstarrs/




https://catalogs.mast.stsci.edu/panstarrs/
Catalog
Mean object
Stacked object
Forced mean object
Detections
View Mean Search Table
Display Columns Select the columns that will be displayed. 5 selected
objName
objAltName1
objAltName2
objAltName3
objID
uniquePspsOBid
ippObjID
surveyID
htmID
zoneID
tessID
projectionID
skyCellID
randomID
batchID
dvoRegionID
processingVersion
objInfoFlag
qualityFlag
raStack
decStack
raStackErr
decStackErr
raMean
decMean
raMeanErr
decMeanErr
epochMean
posMeanChisq
cx
cy
cz
lambda
beta
l
b
nStackObjectRows
nStackDetections
nDetections
ng
nr
ni
nz
ny
gQfPerfect
gMeanPSFMag
gMeanPSFMagErr
gMeanPSFMagStd
gMeanPSFMagNpt
gMeanPSFMagMin
gMeanPSFMagMax
gMeanKronMag
gMeanKronMagErr
gMeanKronMagStd
gMeanKronMagNpt
gMeanApMag
gMeanApMagErr
gMeanApMagStd
gMeanApMagNpt
gFlags
rQfPerfect
rMeanPSFMag
rMeanPSFMagErr
rMeanPSFMagStd
rMeanPSFMagNpt
rMeanPSFMagMin
rMeanPSFMagMax
rMeanKronMag
rMeanKronMagErr
rMeanKronMagStd
rMeanKronMagNpt
rMeanApMag
rMeanApMagErr
rMeanApMagStd
rMeanApMagNpt
rFlags
iQfPerfect
iMeanPSFMag
iMeanPSFMagErr
iMeanPSFMagStd
iMeanPSFMagNpt
iMeanPSFMagMin
iMeanPSFMagMax
iMeanKronMag
iMeanKronMagErr
iMeanKronMagStd
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zMeanPSFMagErr
zMeanPSFMagStd
zMeanPSFMagNpt
zMeanPSFMagMin
zMeanPSFMagMax
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zMeanKronMagErr
zMeanKronMagStd
zMeanKronMagNpt
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zMeanApMagErr
zMeanApMagStd
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yMeanPSFMagErr
yMeanPSFMagStd
yMeanPSFMagNpt
yMeanPSFMagMin
yMeanPSFMagMax
yMeanKronMag
yMeanKronMagErr
yMeanKronMagStd
yMeanKronMagNpt
yMeanApMag
yMeanApMagErr
yMeanApMagStd
yMeanApMagNpt
yFlags
Select All
Clear All
Select Recommended
Expand this menu
First clear the selected options