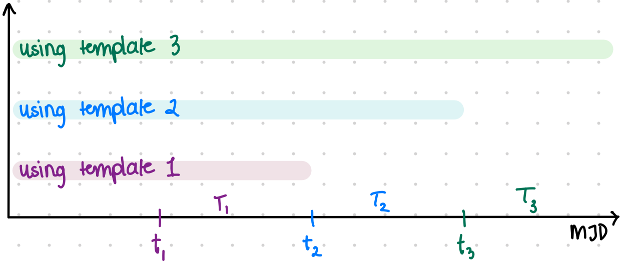
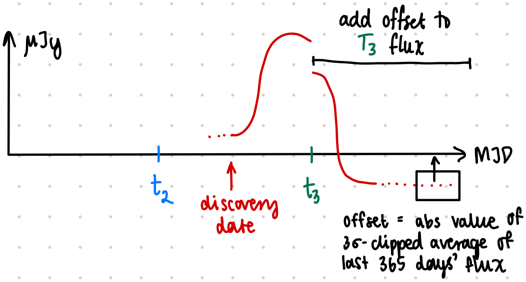
Template Change Correction



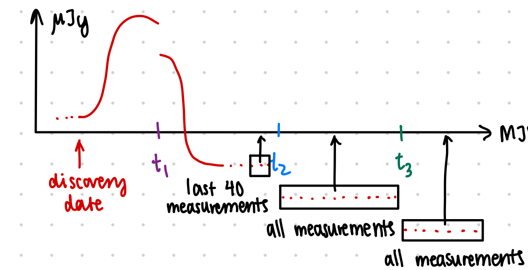
"Baseline indices/flux": non-SN flux (flux well before discovery date and after end of SN)

t_3 < discovery date: no adjustment needed since all SN flux occurs after template changes

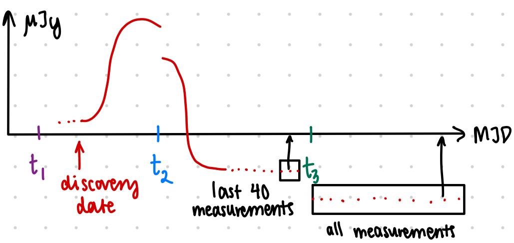
t_2 < discovery date < t_3: take last year of T_3, get offset of flux from 0 by taking 3σ-clipped average, add offset to all flux in T_3



t_1 < discovery date < t_2: ① take last 40 measurements of T_2, get offset, and add to all T_2 flux; ② take all measurements in T_3, get offset, and add to all T_3 flux



discovery date < t_1: ① take last 40 measurements of T_1, get offset, and add to all T_1 flux; ② take all measurements in T_2, get offset, and add to all T_2 flux; ③ take all measurements in T_3, get offset, and add to all T_3 flux



How to take the 3σ-clipped average: call function calcaverage_sigmacutloop() on the light curve pdastrostatsclass() object

```
def calcaverage_sigmacutloop(self,datacol, noisecol=None,
                             indices=None, sigmacutFlag=False,
                             maskcol=None, maskval=None,
                             removeNaNs = True,
                             Nsigma=3.0,Nitmax=10,verbose=0,
                             percentile_cut_firstiteration=None,
                             median_firstiteration=True):
```

→ datacol = 'uJy' (column we want averaged)
→ noisecol = 'duJy' (noise column of flux is the uncertainties)
→ indices = list of indices of measurements we want averaged
→ Nsigma = 3 (since we want 3σ-clipped)

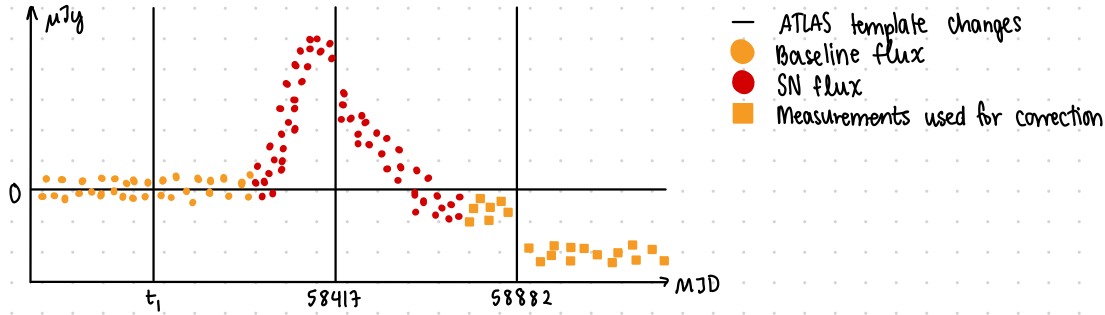
Example:

```
lc = pdastrostatsclass()
# load lc file and populate df ...
ix = # indices of all measurements in T3 ...
lc.calcaverage_sigmacutloop('uJy',
noisecol='duJy', Nsigma=3, indices=ix)
```

The End Goal

Note: we don't know t_1 yet — you can probably just use a dummy MJD for testing purposes until we get the real one from John Tonry. But $t_2 = 58417$ and $t_3 = 58882$.

Plot 1: Which template regions may have been affected by the SN flux? Which measurements will we average to get the region offset from 0?



Since not every case will have baseline flux in each region, and correction may not always be possible, we can think about printing a warning if the SN discovery date is within X days of a succeeding template change.

In any case, we recommend the above regions for correction to the user, specify the offsets calculated for each region, and ask the user if they want to proceed or input their own offsets.

Example output:

Template region 1: None – 58417 MJD ← T_1

Template region 2: 58417 – 58882 MJD ← T_2
Measurements used for correction: 58872 – 58882 MJD ← last 40 measurements of T_2
Calculated offset: 50 µJy

Template region 3: 58882 – None MJD ← T_3
Measurements used for correction: 58882 – None MJD ← all measurements in T_3
Calculated offset: 90 µJy

Proceed with template change correction using calculated regions and offsets? (y/n)