

Data analysis pipeline for SN survey

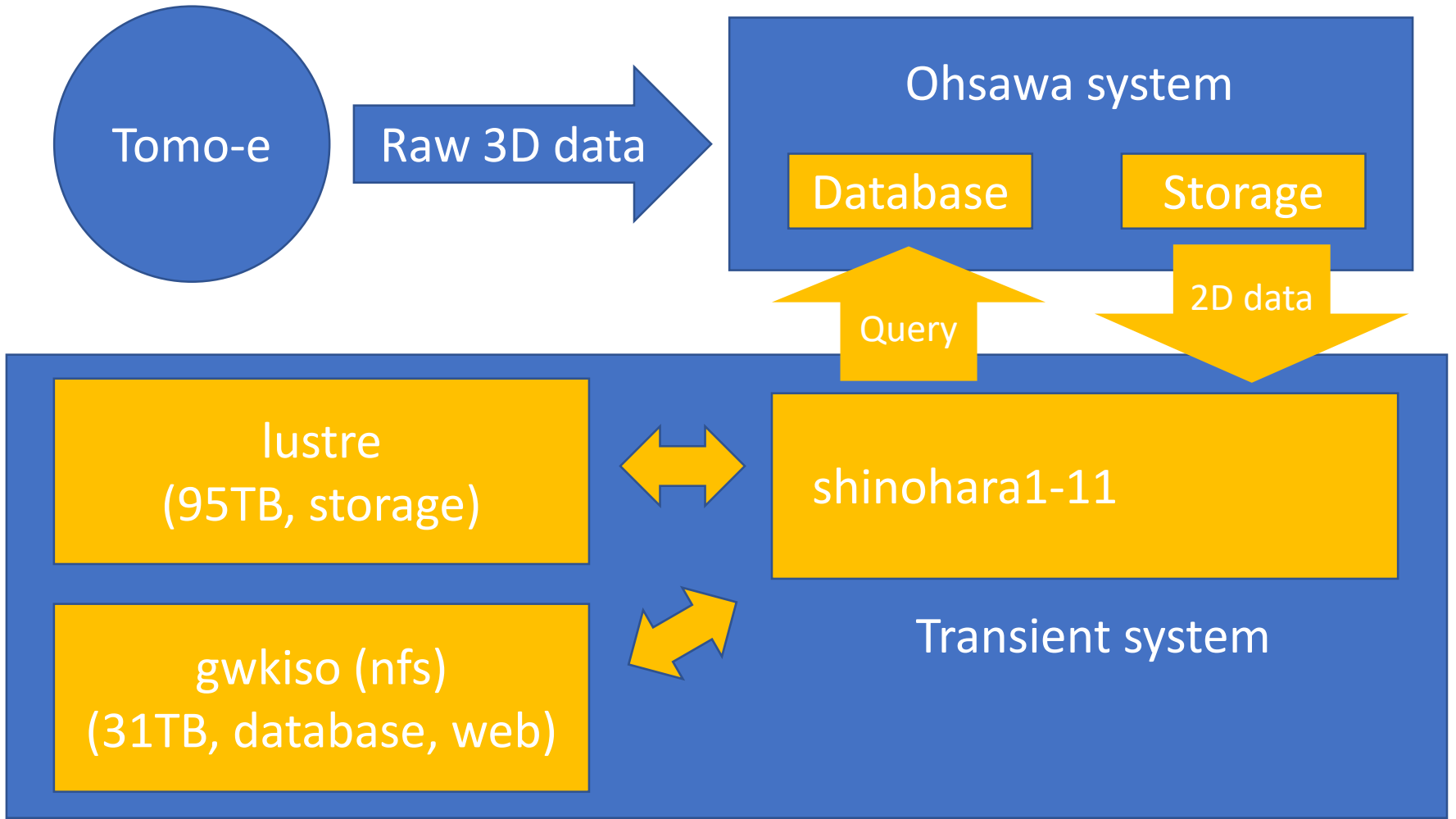
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9th Jul 2019

木曾シュミットシンポジウム

Structure



Database

- gwkiso -

- raw: list 2D images
- process: manage processes in shinohara
- analysis_stack: basic info of 2D images
- source_stack: sources in orig images
- source_sub: sources in diff images
- variable: good sources in diff images (unique for ra,dec)
- transient: good variables (≥ 2 detection)
- forced_phot: forced photometry of Transients
- tag: tags after visual inspection
- tns_forced_phot: forced photometry of TNS objs

External catalog

- ps_bright: PS1 bright (<19) objs
- gaia_dr2: Gaia bright (<16) objs
- glade: GLADE catalog
- tns: TNS catalog

pipeline.py

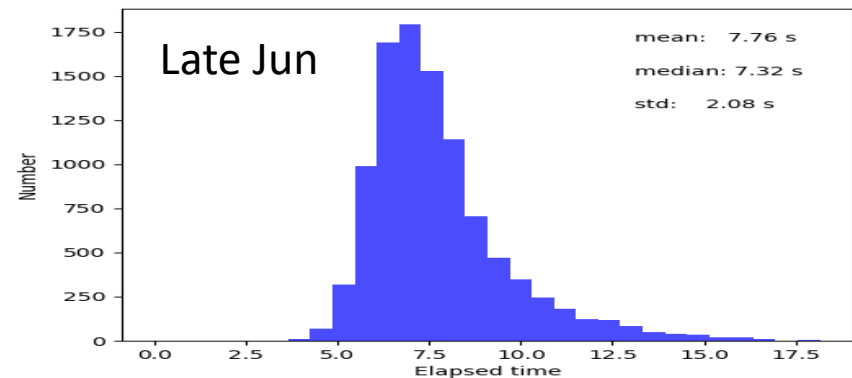
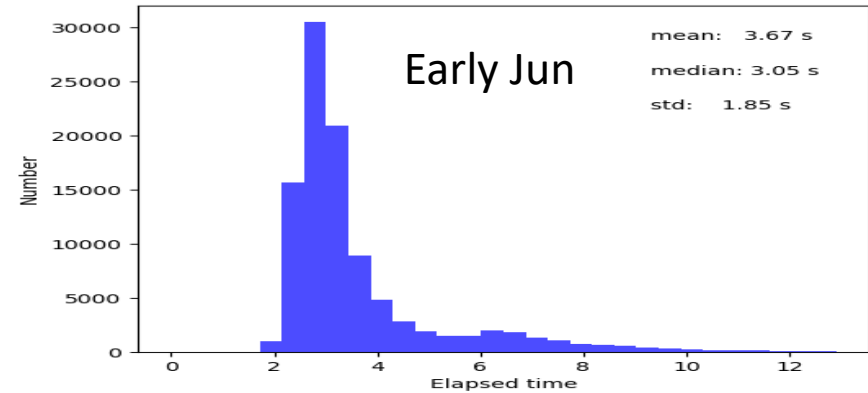
- managing all processes -

- Download MP and TNS information everyday
 - Check Ohsawa DB and rsync data from Ohsawa Storage on **each** node
 - Register images to shinohara DB
 - Submit following processes
 - measure.py (made by Morokuma-san)
 - imsub.py (made by Tanaka-san)
 - limmag.py
 - forcedPhot.py
- For GW follow-up,
- coadd 2D images
 - cutoff.py (made by Shikauchi-san)

measure.py

-measure 2D images-

- Determine zeromag for each image matching with PS1 r-band catalog
- Run sextractor for each image
- Register sources in 2D images to source_stack
- Register information (fwhr zeromag, number of sources, rough limmag) of images to analysis_stack

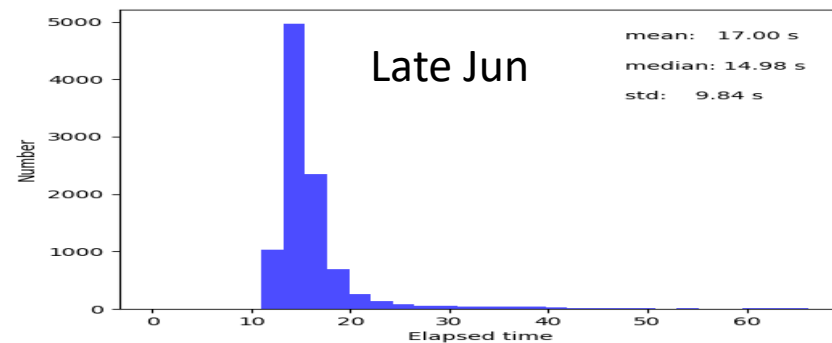
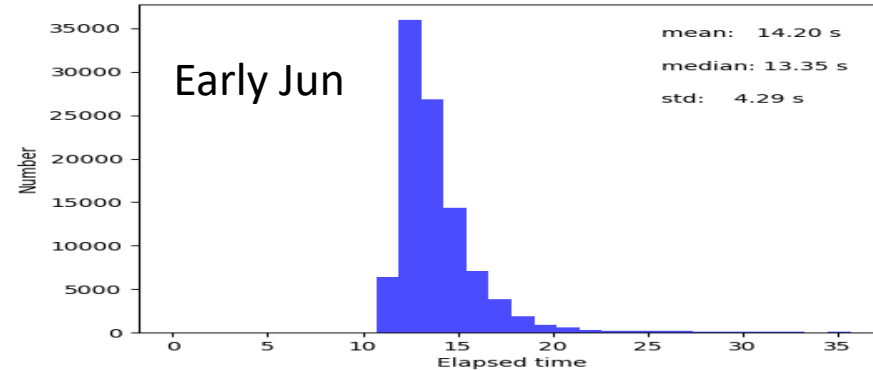


3.7 - 7.8 s/chip

imsub.py

-image subtraction-

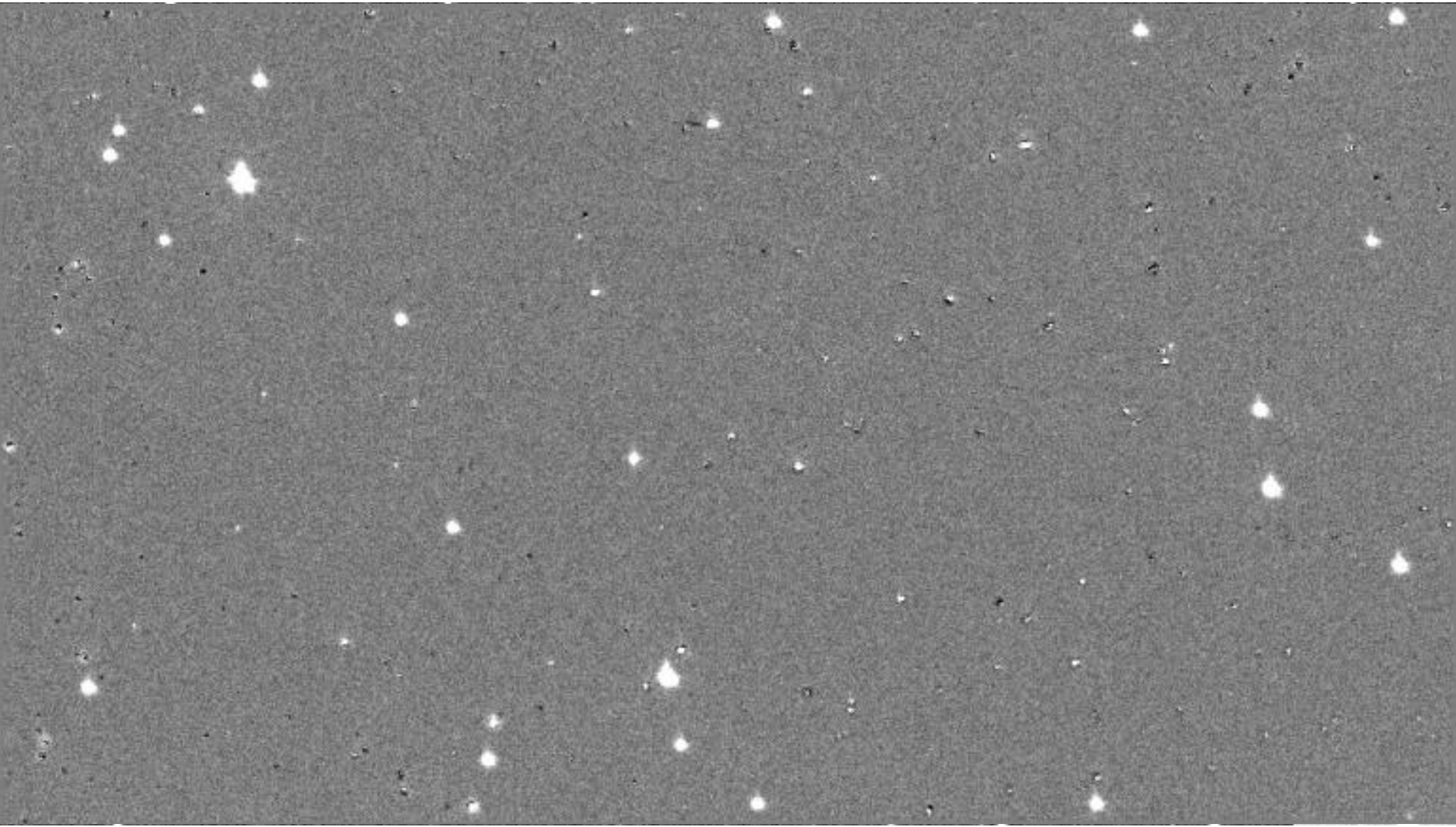
- Subtract Tomo-e images from PS1 r-band reference images
- Run sextractor for difference images
- Exclude known MPs from sources and remove bogus sources with parameter cuts and CNN (-> Hamasaki-kun's talk)
- Register sources to variable (≥ 1 detection)
- Register variables to transient (≥ 2 detection at the same position)



14.2 - 17.0 s/chip

imsub.py

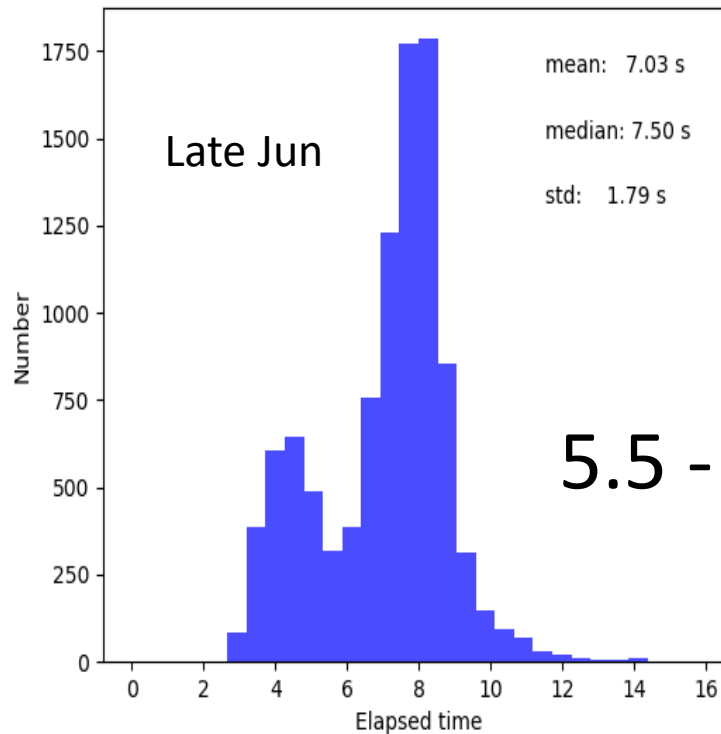
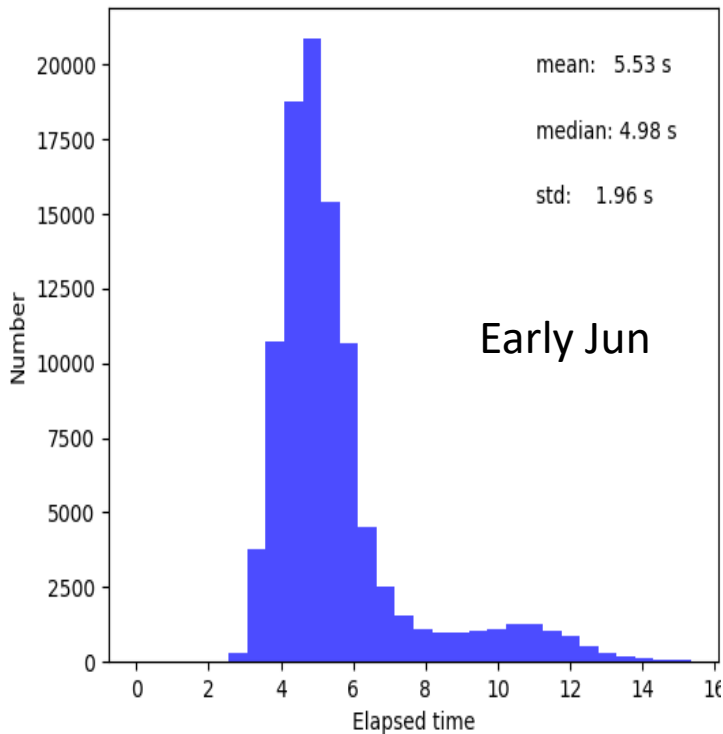
-image subtraction-



limmag.py

-set limiting magnitude-

- Measure sky noise with random apertures
- Register S/N=5 magnitude for images before and after image subtraction to analysis_stack

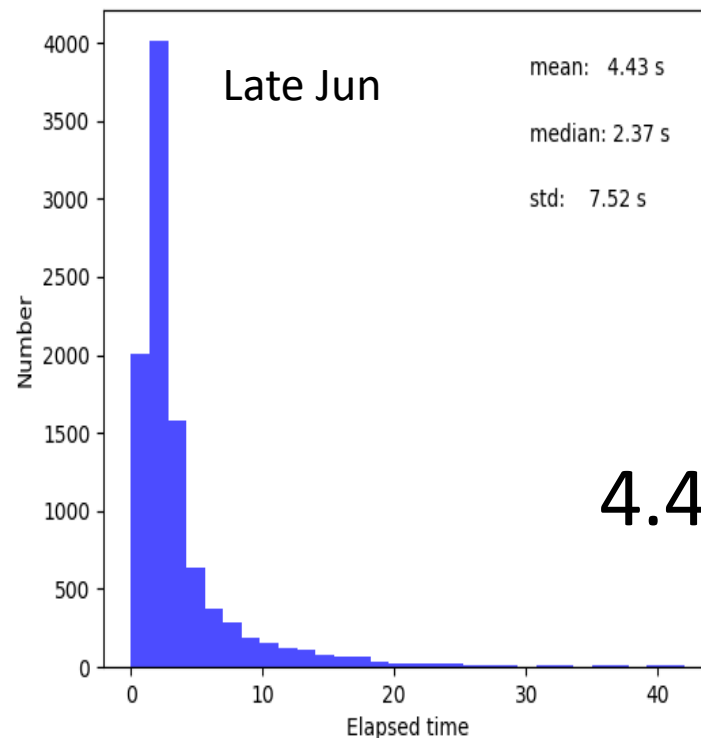
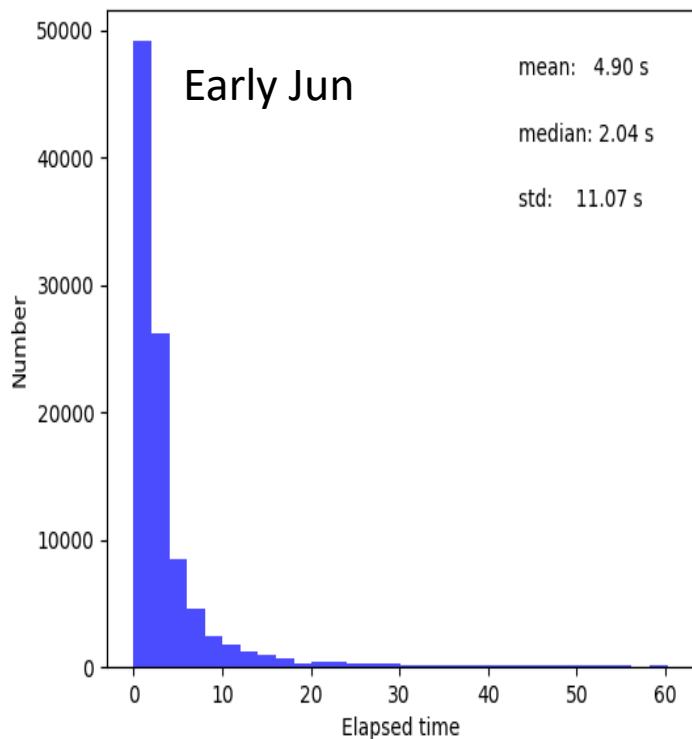


5.5 - 7.0 s/chip

forcedPhot.py

-forced photometry and cutout images-
images-

- Perform forced photometry and cutout images for transients



4.4 - 4.9s/chip

For GW follow-up observations,

- Coadd 2D images with swarp

cutoff.py

-cutout images and upload J-GEM
server-

- Cutout coadded images and upload to J-GEM Image server and Planner (-> Shikauchi-san's talk)

Web page -listing candidates-

transientId (variableId) project (rawId)	Name	Ra, Dec Date (magnitude)	Ref	New	Sub	SDSS DR15 Ref	PS1 gri 3- color Ref	paramcand cnncand	mark	
1042575 (2687126) Supernova Survey (3795557)	201906aftgi show	302.88535 , 51.39598 20190620 (Unfiltered = 16.8)						2		<input type="checkbox"/> Rapid <input type="checkbox"/> Young? <input type="checkbox"/> SN? <input type="checkbox"/> AGN? <input type="checkbox"/> Variable? <input type="checkbox"/> MP? <input type="checkbox"/> NEO? <input type="checkbox"/> Unclear <input type="checkbox"/> Bogus <input type="checkbox"/> Checked <input type="checkbox"/> Bogus <input checked="" type="checkbox"/> Checked
1042522 (3260788) Supernova Survey (3795488)	201906affc show	314.04664 , 51.10085 20190620 (Unfiltered = 15.3)						2		<input type="checkbox"/> Rapid <input type="checkbox"/> Young? <input type="checkbox"/> SN? <input type="checkbox"/> AGN? <input type="checkbox"/> Variable? <input type="checkbox"/> MP? <input type="checkbox"/> NEO? <input type="checkbox"/> Unclear <input type="checkbox"/> Bogus <input type="checkbox"/> Checked <input type="checkbox"/> Bogus <input checked="" type="checkbox"/> Checked
1042480 (3415123) Supernova Survey (3795375)	201906aftdz show	314.75248 , 50.19026 20190620 (Unfiltered = 13.8)						2		<input type="checkbox"/> Rapid <input type="checkbox"/> Young? <input type="checkbox"/> SN? <input type="checkbox"/> AGN? <input type="checkbox"/> Variable? <input type="checkbox"/> MP? <input type="checkbox"/> NEO? <input type="checkbox"/> Unclear <input type="checkbox"/> Bogus <input type="checkbox"/> Checked <input type="checkbox"/> Bogus <input checked="" type="checkbox"/> Checked
1042194 (3328190) Supernova Survey (3794691)	201906afswq show	350.88377 , 52.78718 20190620 (Unfiltered = 13.6)						2		<input type="checkbox"/> Rapid <input type="checkbox"/> Young? <input type="checkbox"/> SN? <input type="checkbox"/> AGN? <input type="checkbox"/> Variable? <input type="checkbox"/> MP? <input type="checkbox"/> NEO? <input type="checkbox"/> Unclear <input type="checkbox"/> Bogus <input type="checkbox"/> Checked <input type="checkbox"/> Bogus <input checked="" type="checkbox"/> Checked
1041908 (3321500)	201906afsoy	340.08418 , 33.29270						2		<input type="checkbox"/> Rapid <input type="checkbox"/> Young?

Web page -candidate information-

201904aaski

Transient ID: 703988 Variable_id: 2633389

Number of detections: 9 (paramcand)



Tags Click a tag for removal

Insert tags

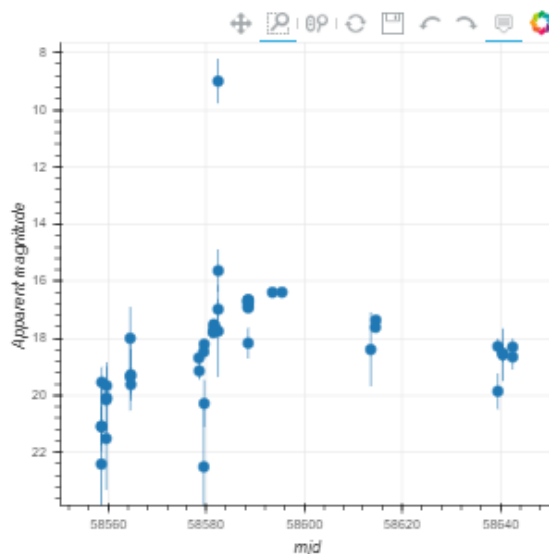
Ra, Dec (Decimal)	Ra, Dec	SDSS Phot-z	SDSS Spec-z	Detector ID	x,y
169.45091, 13.72832	11:17:48.22, +13:43:42.0	0.028 ± 0.0094	0.02478	322	0.00, 0.00 0.00, 0.00

Relavant links [SDSS Archive](#) [PS1](#) [TNS](#) [MPCChecker](#) [Visibility \(local site: 137.6283 35.7942 1130 +9\)](#)

fits files [Ref](#) [Su](#)

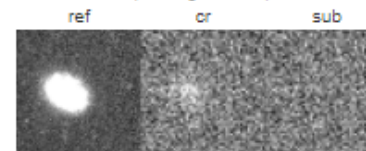
SN 2019cxx

Light Curves

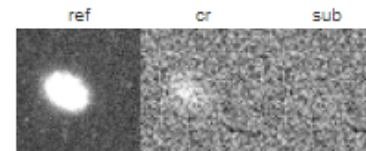


Images

2019-03-16 58558.6204 (1268342, single)
22.41 ± 2.82 (limmag = 17.76)



2019-03-16 58558.6212 (1268145, single)
21.08 ± 0.67 (limmag = 18.19)



2019-03-16 58558.7049 (1293267, single)
19.54 ± 0.52 (limmag = 18.32)



Comments

No comments posted yet.

Elapsed time

- `measure.py` : 3.7-7.8 s/chip
- `imsub.py` : 14.2-17.0 s/chip
- `limmag.py` : 5.5-7.0 s/chip
- `forcedPhot.py` : 4.4-4.9 s/chip

} 28.3 - 36.2 s/chip
=> 2400 - 3040 s/exp
=> 170 - 217 cores to
complete in 14s

shinohara1-3 : 96 cores

IPMU nodes (shinohara4-11) : 160 cores

The data analysis should finish in time.

Remaining issue

- Include external, e.g., X-ray, radio, etc, catalogs
- List transients matched with TNS candidates
- Alerts without visual inspection (-> Hamasaki-kun's talk)
- Disk usage of lustre ~ 100% -> compress 2D data (daily-stack, monthly-stack, 3x3 binning?)