Transient and Variable Classification Alerts for ELAsTiCC

Rob Knop, LBNL & the ELAsTiCC Team

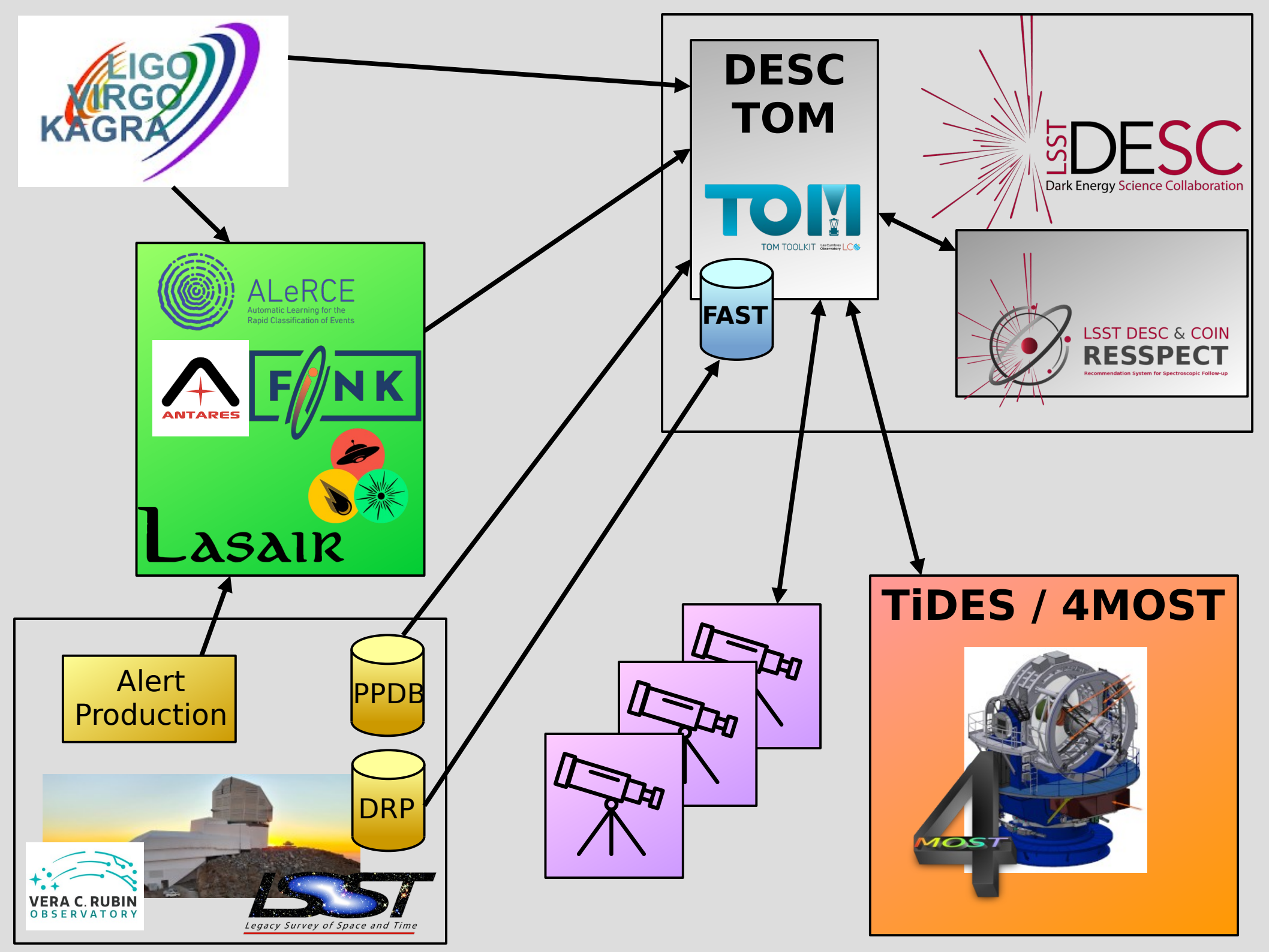
The Transient and Variable Universe 2023

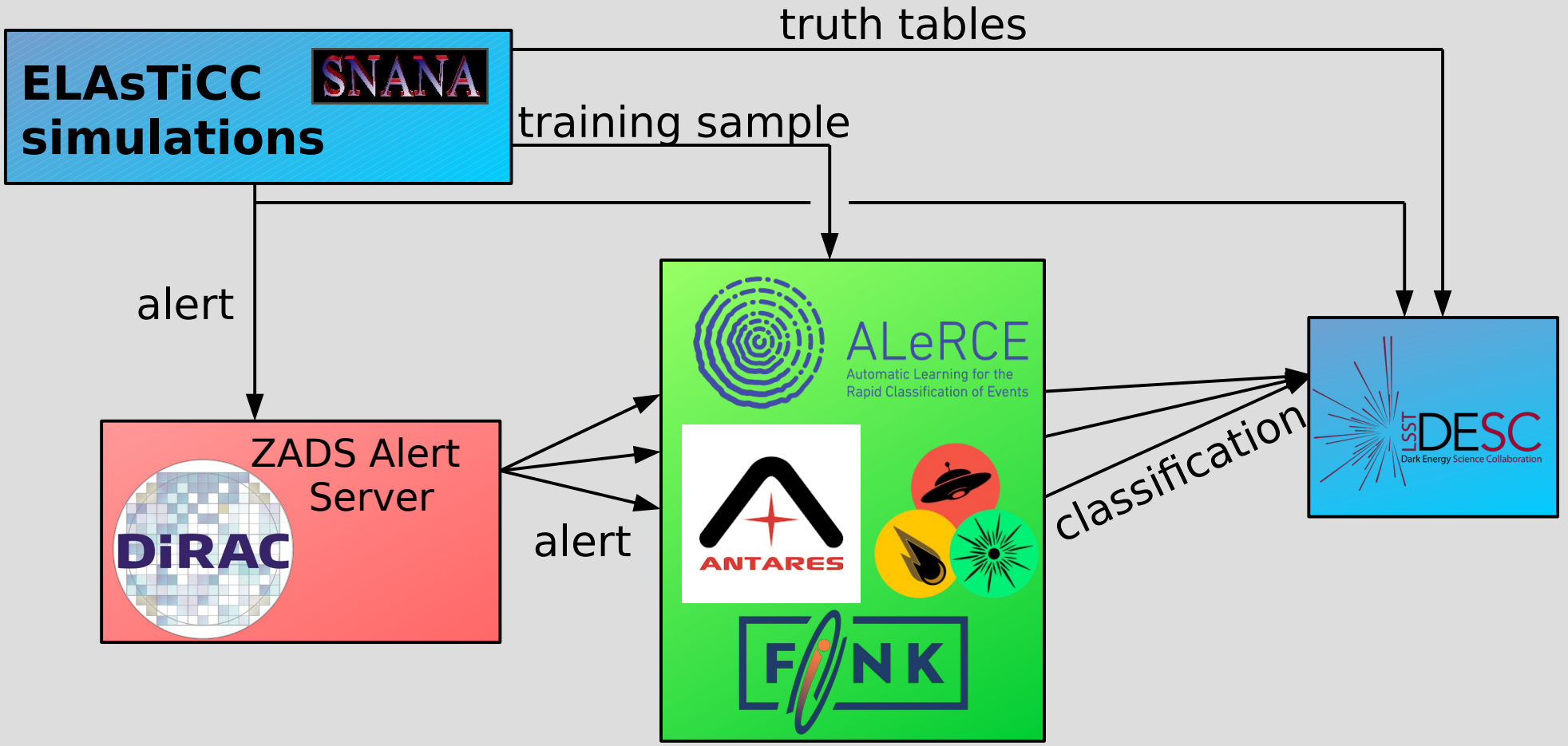
2023-06-20

https://portal.nersc.gov/cfs/lsst/DESC_TD_PUBLIC/ELASTICC/

https://desc-tom.lbl.gov

https://desc-tom-2.lbl.gov (temporary)


LIGO
VIRGO
KAGRA
DESC
TOM
TOM
TOM TOOLKIT
FAST
LSST DESC
Dark Energy Science Collaboration
ALeRCE
Automatic Learning for the
Rapid Classification of Events
ANTARES
FINK
Lasair
LSST DESC & COIN
RESSPECT
Recommendation System for Spectroscopic Follow-up
Alert
Production
PPDB
DRP
VERA C. RUBIN
OBSERVATORY
LSST
Legacy Survey of Space and Time
TiDES / 4MOST
4MOST


truth tables
ELAsTiCC simulations
SNANA
training sample
alert
ZADS Alert Server
DiRAC
alert
ALeRCE
Automatic Learning for the Rapid Classification of Events
ANTARES
FINK
classification
LSST DESC
Dark Energy Science Collaboration

elasticc.v0_9_1.alert.avsc

Outgoing alerts (ingested by brokers):

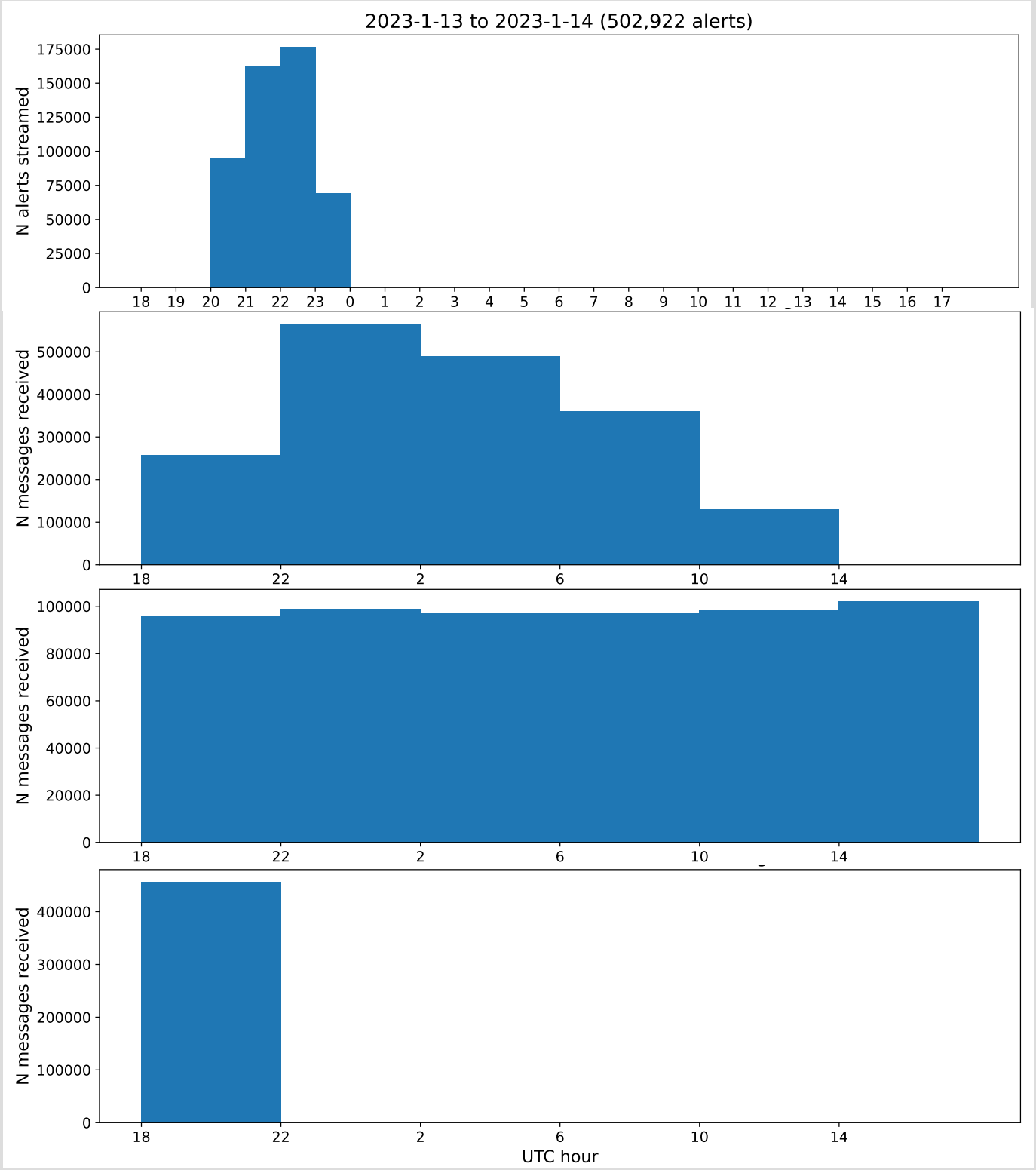
- One alert for each detection (S/N>5).
- Includes all previous detections and all previous forced photometry*.
- May include photo-z information on one or two possible host galaxies.

elasticc.v0_9_1.brokerClassification.avsc

Incoming alerts (produced by brokers):

- DiaSourceId
- Classifier identification
- Array of object class & probability

Alert schema: https://github.com/LSSTDESC/elasticc/tree/elasticc2/alert_schema



Alerts Sent

(One day in the last week of ELAsTiCC)

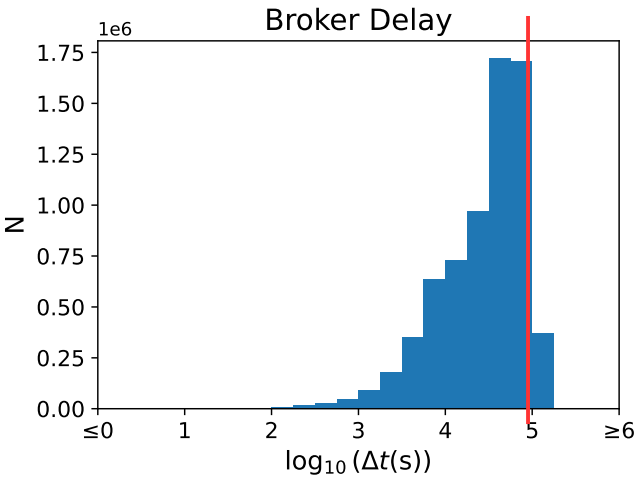
Received — ALeRCE

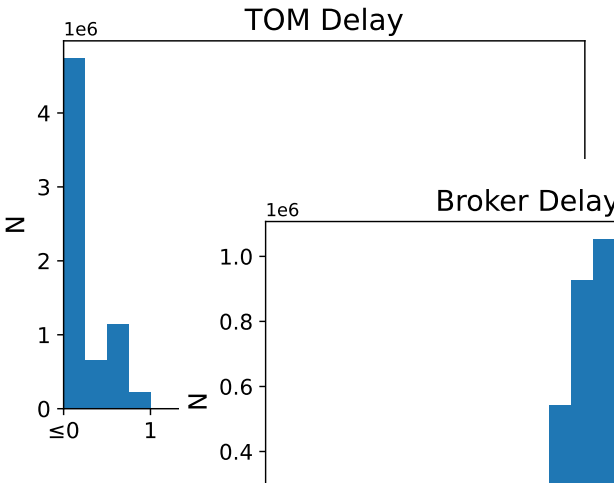
Received — ANTARES

Received — Fink

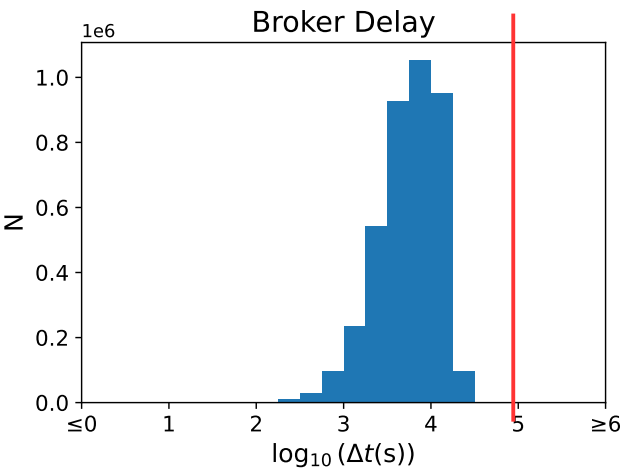
Turnaround time — first week of ELAsTiCC

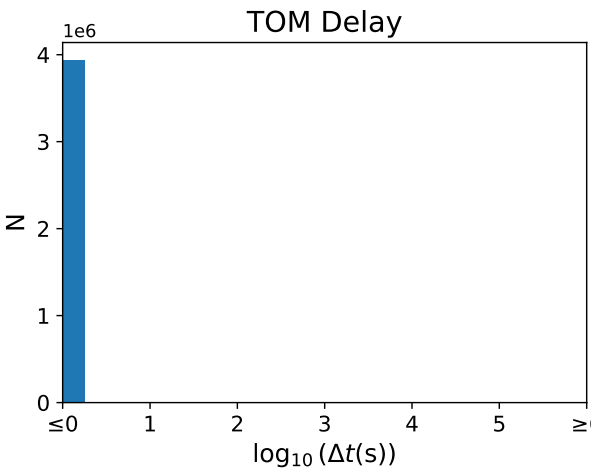
ALeRCE



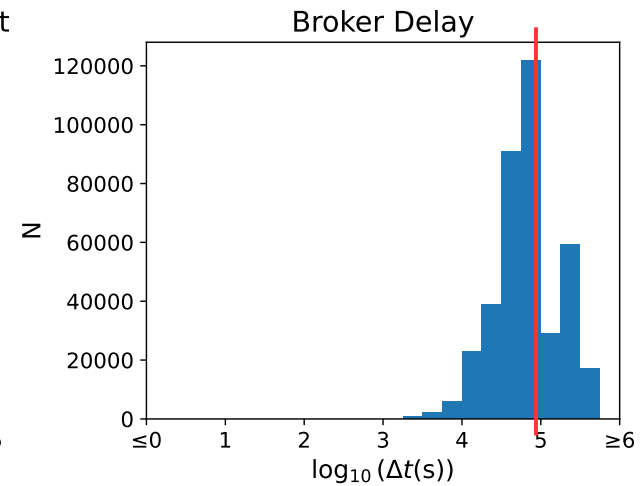


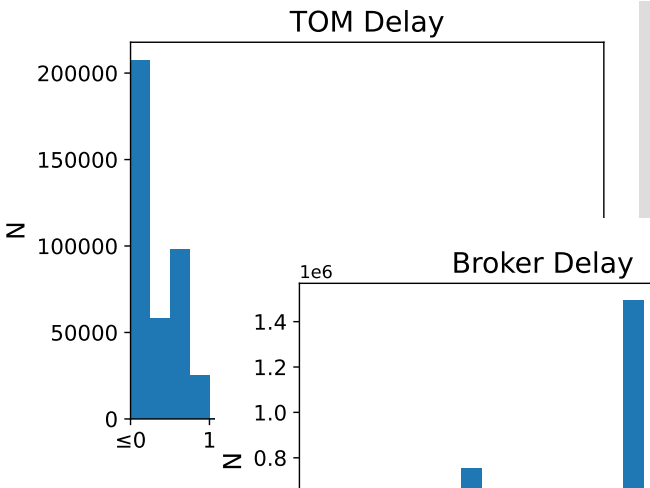
AMPEL



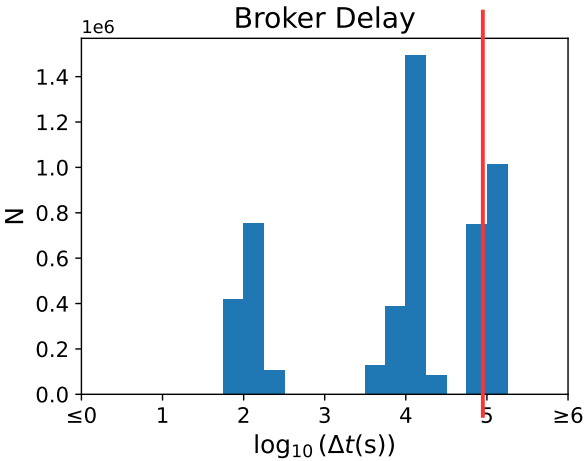


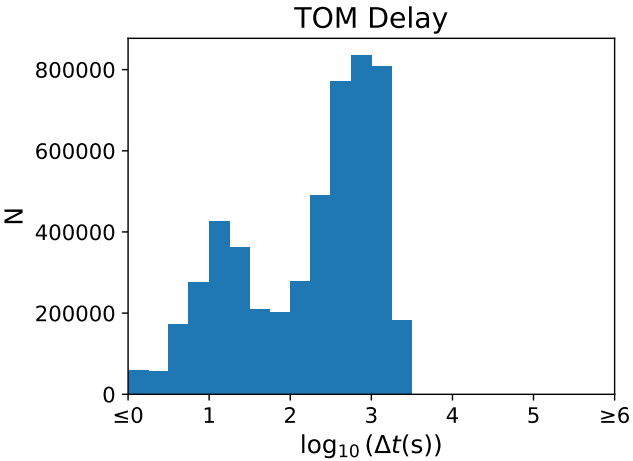
ANTARES

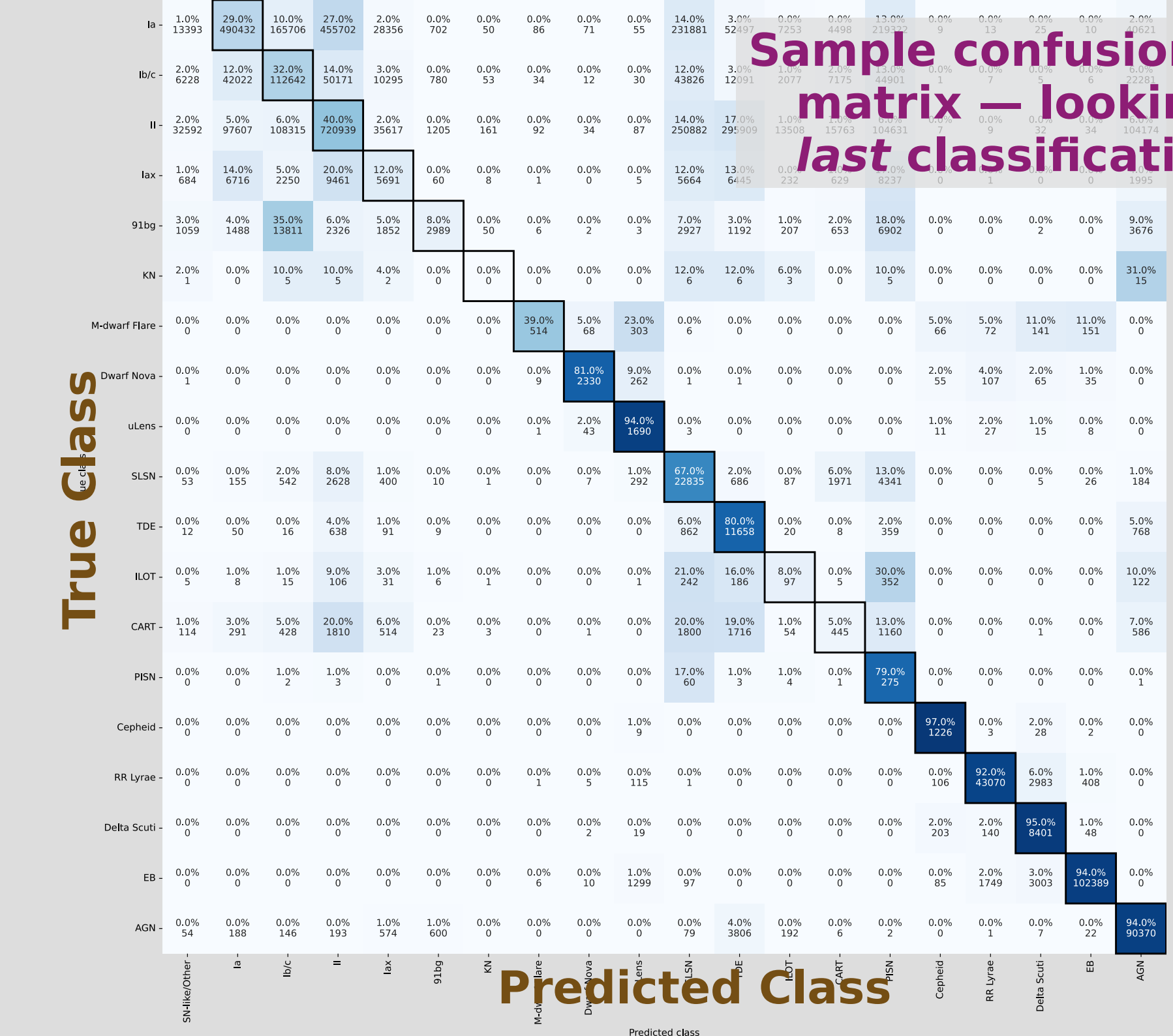


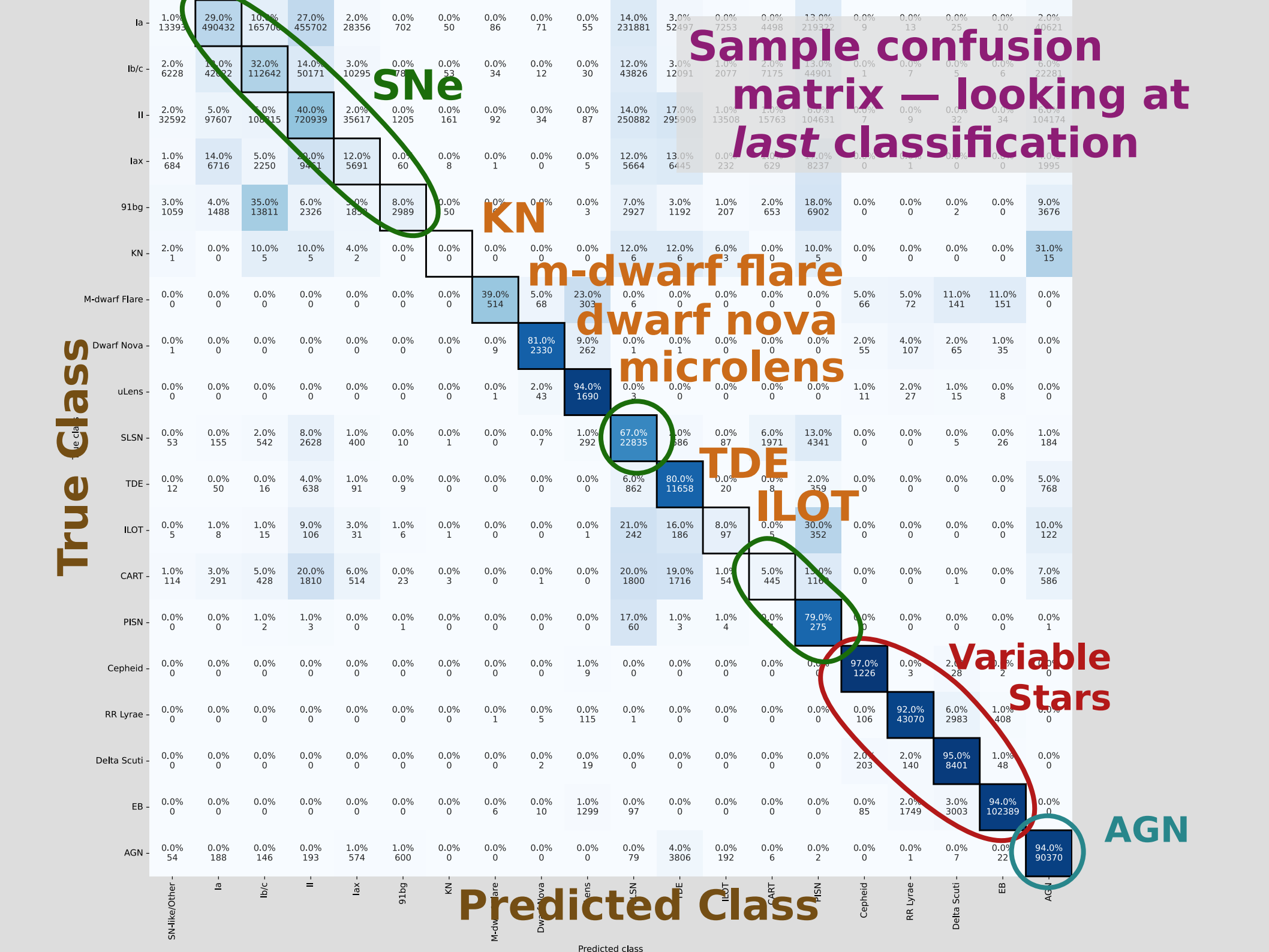


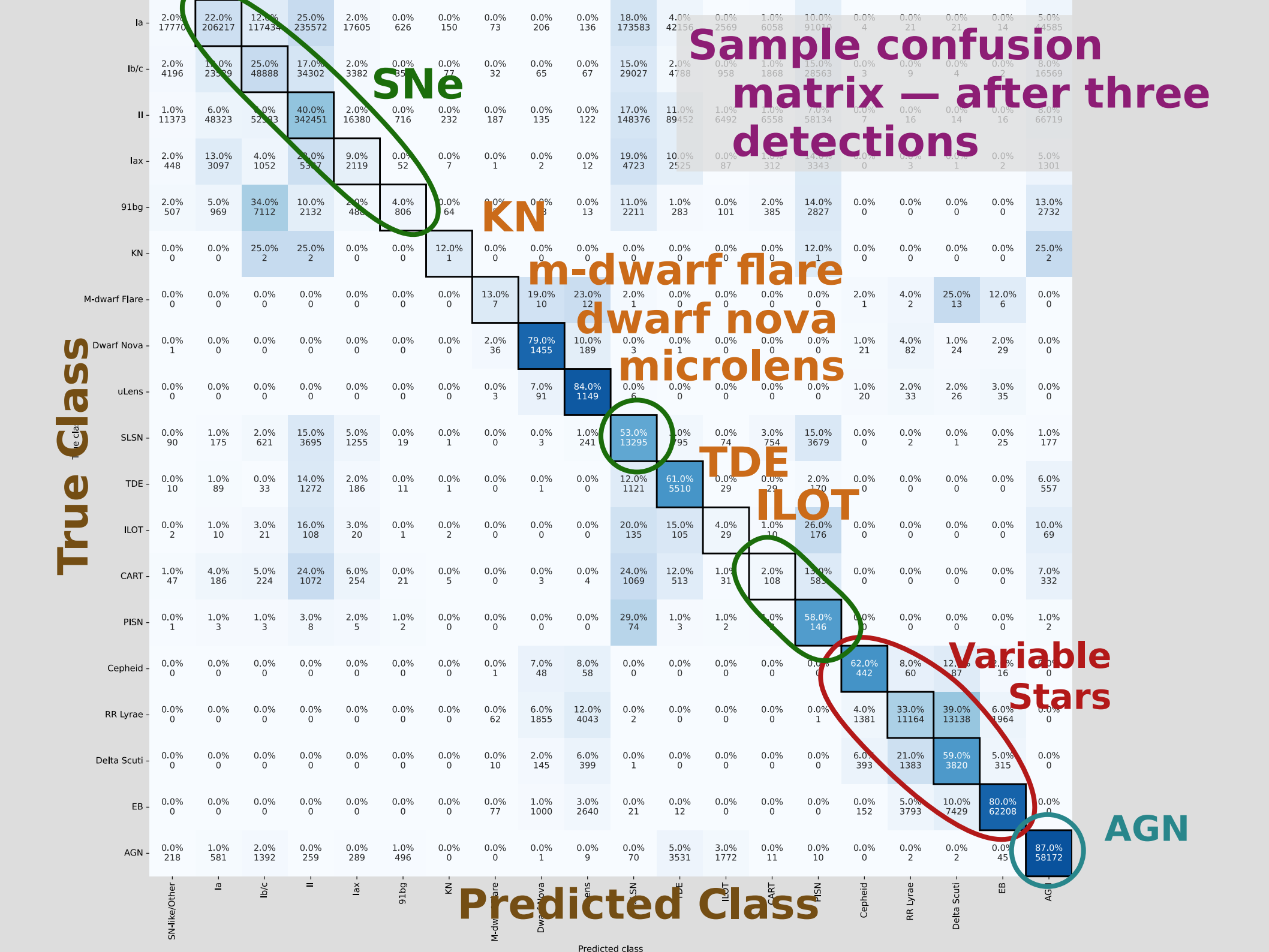
Fink



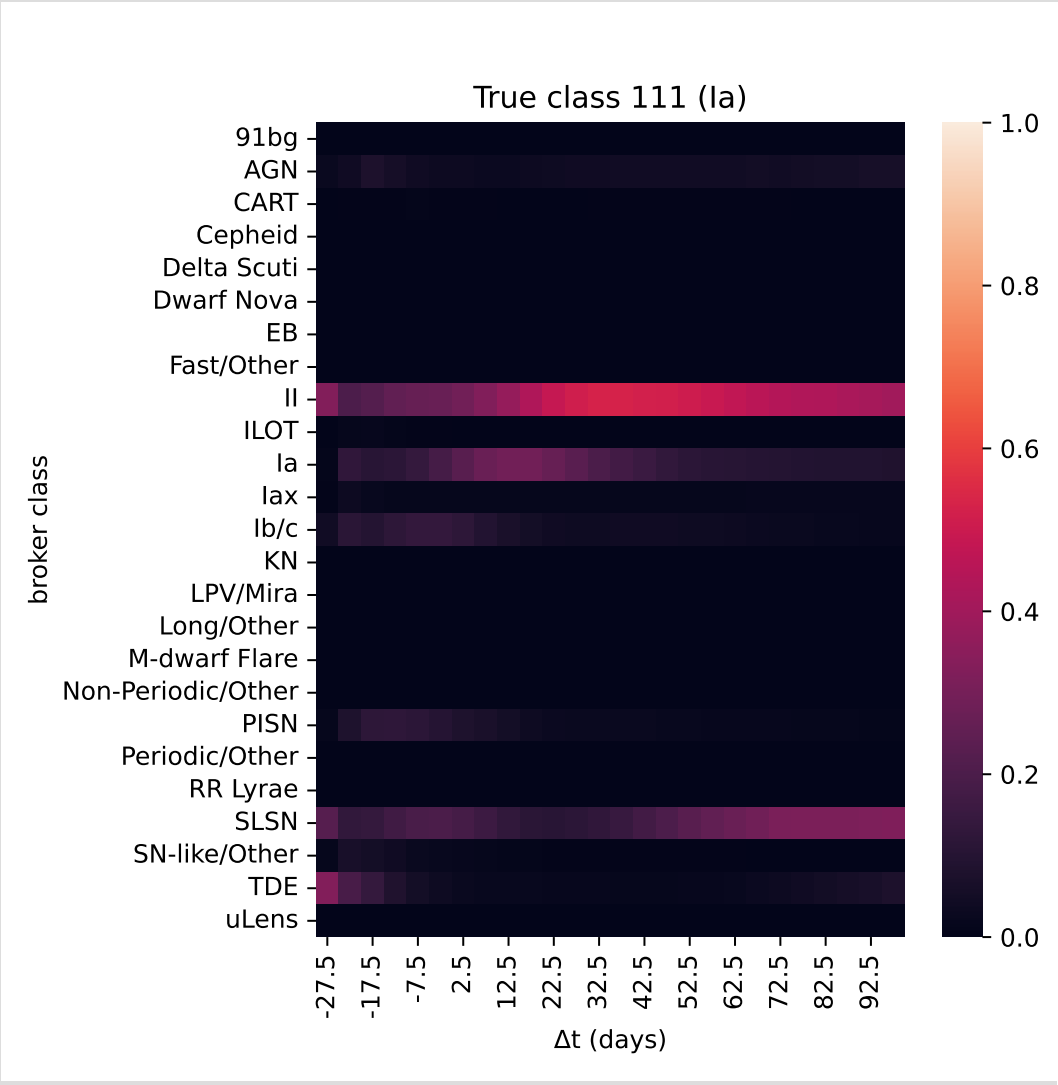


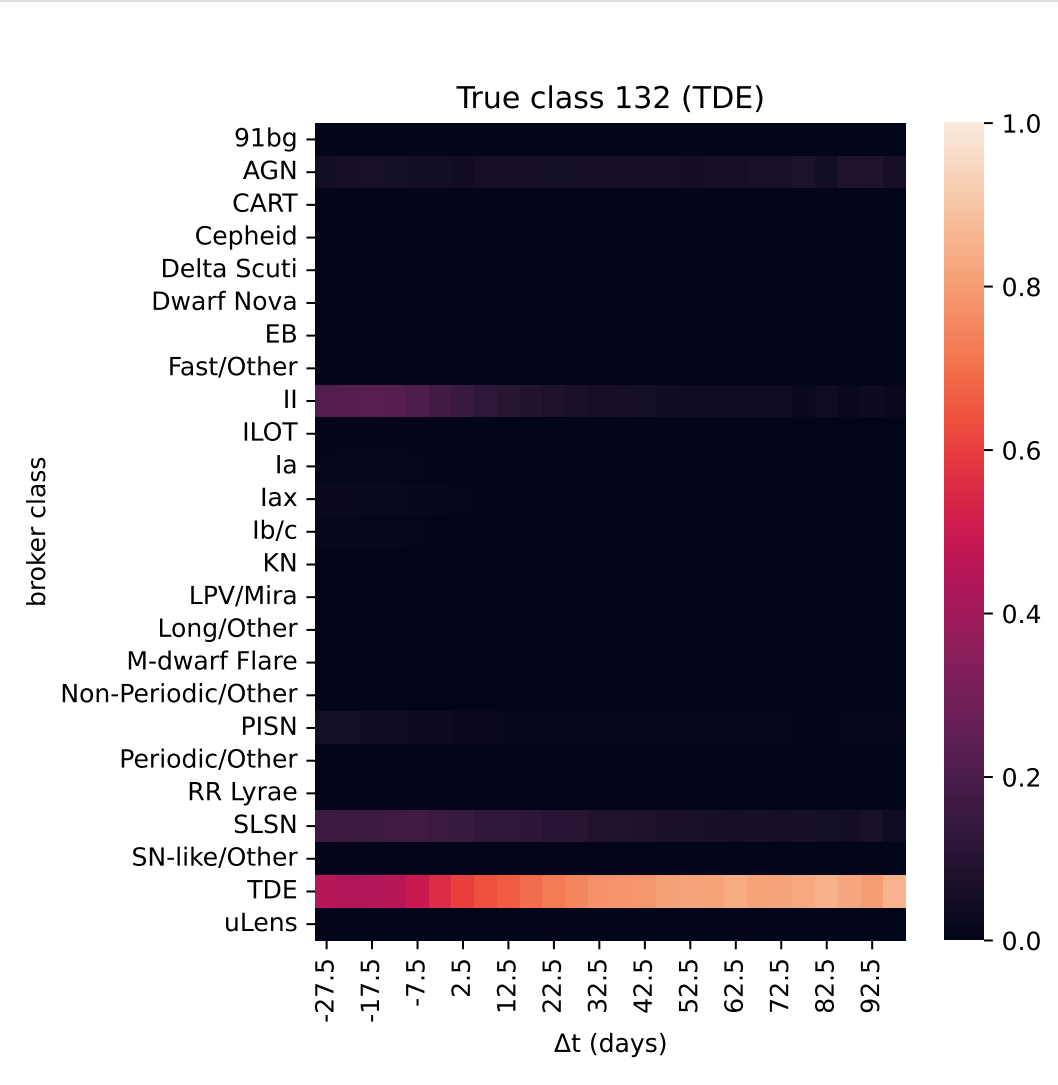

Sample confusion matrix — looking at *last* classification
True Class
Predicted Class
Predicted class
Ia
Ib/c
II
Iax
91bg
KN
M-dwarf Flare
Dwarf Nova
uLens
SLSN
TDE
ILOT
CART
PISN
Cepheid
RR Lyrae
Delta Scuti
EB
AGN
SN-like/Other


Sample confusion matrix — looking at *last* classification
SNe
KN
m-dwarf flare
dwarf nova
microlens
TDE
ILOT
Variable Stars
AGN
True Class
Predicted Class
SN-like/Other
Ia
Ib/c
II
Iax
91bg
KN
M-dwarf Flare
Dwarf Nova
uLens
SLSN
TDE
ILOT
CART
PISN
Cepheid
RR Lyrae
Delta Scuti
EB
AGN
Predicted class


Sample confusion matrix — after three detections
SNe
KN
m-dwarf flare
dwarf nova
microlens
TDE
ILOT
Variable Stars
AGN
True Class
Predicted Class
Predicted class
Ia
Ib/c
II
Iax
91bg
KN
M-dwarf Flare
Dwarf Nova
uLens
SLSN
TDE
ILOT
CART
PISN
Cepheid
RR Lyrae
Delta Scuti
EB
AGN
SN-like/Other

Classification as a function of time relative to lightcurve peak





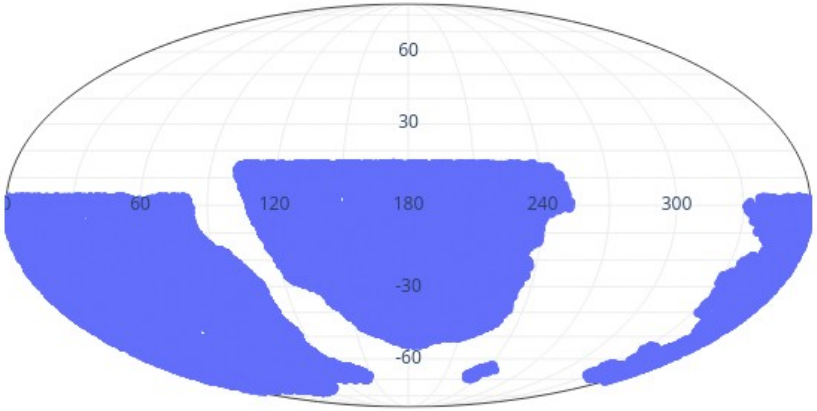
Lots more at `https://desc-tom.lbl.gov`

Targets classified by brokers listening to the ELAsTiCC2 “plumbing test stream”

TOM Toolkit Home ELAsTiCC ELAsTiCC2 Targets Alerts Observations Data Users Rob Knop (rknop) Logout

598944 Targets | Create Targets | Update Broker Data | Export Filtered Targets

Target Distribution (sidereal)



« 1 2 3 4 5 6 7 8 9 10 11 12 … »

Add/Remove from grouping | Add | Move | Remove

	Name	Type	Observations	Saved Data
☐	ELAsTiCC2 150451504	Sidereal	0	0

Target Type

Name
Name

Key
Key

Value
Value

Cone Search
Cone Search
RA, Dec, Search Radius (degrees)

Target Grouping

Cone Search (Target)
Cone Search (Tar
Target Name, Search Radius (degrees)

TOM Photometry view of a (simulated) z=0.16 SN Ia

TOM Toolkit Home ELAsTiCC ELAsTiCC2 Targets Alerts Observations Data Users Rob Knop (rknop) Logout

ELAsTiCC2 150467992

There are 0 observations with unknown status.

Update Target Delete Target

Names	ELAsTiCC2 150467992
Target Type	SIDEREAL
Right Ascension	79.0253 05:16:06.075
Declination	-4.1546 -04:09:16.72
Epoch	2000.0000

Recent Photometry

Timestamp	Magnitude
No recent photometry.	

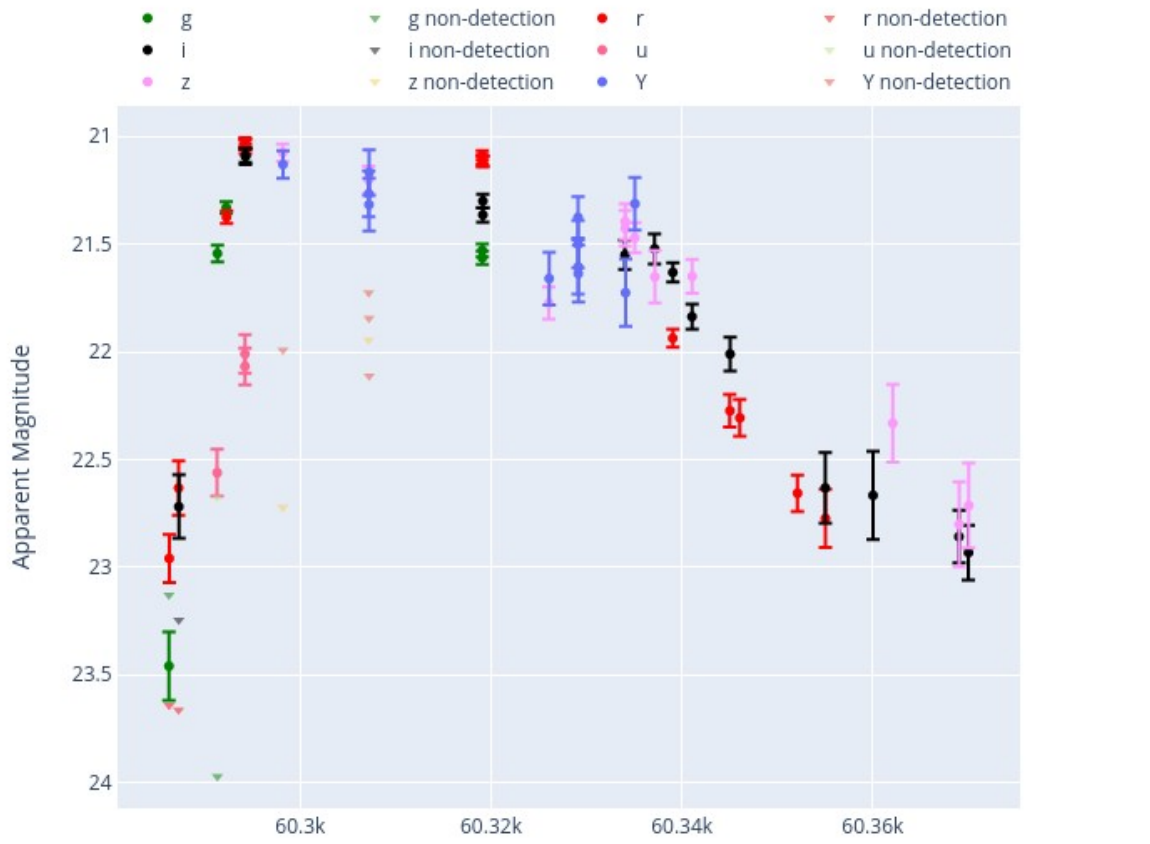
Publish Data for ELAsTiCC2 150467992:

Not Configured

Observe Observations Manage Data Manage Groups Photometry Spectroscopy

Photometry

Check for new data



ELAsTiCC2

Streaming to brokers near you, July 2023

Next Steps

- Hook up to LSST prompt products database (PPDB) to pull photometry of objects we learn from brokers (simulated, sort of, in ELAsTiCC2).
- Process broker classifications to produce followup priority lists (for both hot transients and host galaxies). (RESSPECT workshop pre-DESC meeting, July 2023.)
- Define telescope communication (API/observation request) for follow-up (using TOM facilities et al.).
- Define telescope communication to pull information about what has been observed (and where available, data).
- Evolve from the current DESC TOM database structure to the DESC-FAST database.