

# The Transient Name Server

in light of the MMA realm

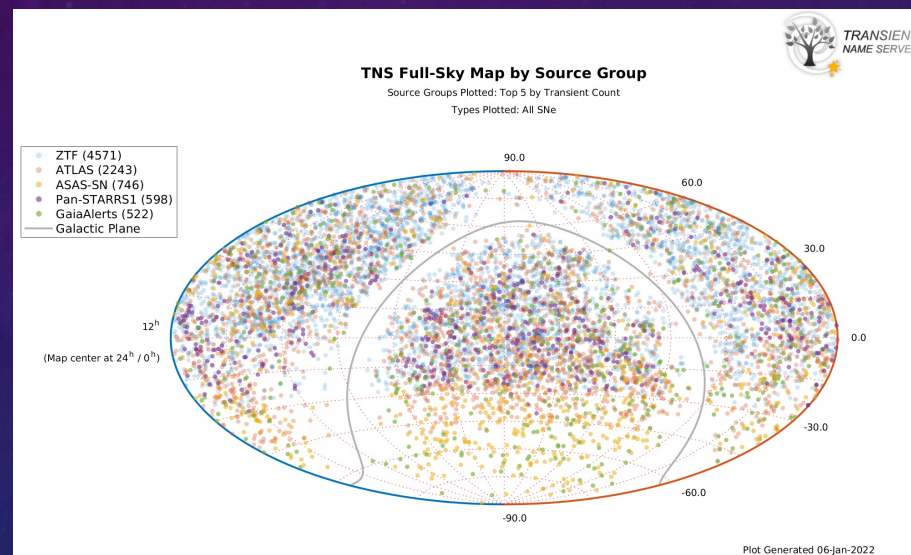
[Overview for the Paris MMA workshop - Jan 2022]

Ofer Yaron

- Name server
- Fully searchable
- Citable (ADS indexed)

## Reports

- “Manual” [forms]  
(including amateurs)
- Automatic [bots]  
(most surveys)
- Brokers



The Official IAU transient reporting mechanism

The team: Avishay Gal-Yam (PI, chair of IAU SN WG),  
Avner Sass, Eran Ofek, Nikola Knezevic

Alerts on

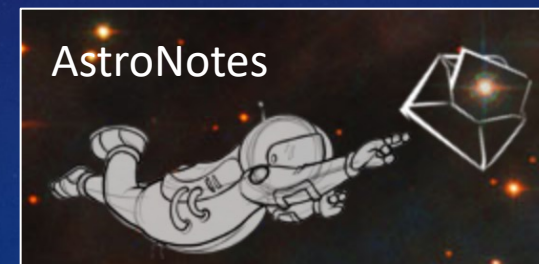
Transients (AT)

Classifications (SN...)

FRBs

(GRBs, GW events ...)

AstroNotes



Weizmann Institute for Science

[www.wis-tns.org](http://www.wis-tns.org)





# The Transient Name Server - overview

- In operation since Jan 1<sup>st</sup>, 2016. The official IAU mechanism for reporting new astronomical (extra galactic) transients and specifically for official name designation. (Set up by the IAU in order to provide a modern, automatic mechanism to archive and distribute alerts about transients, replacing the manual CBAT system.)
- [As of Jan 2022] holds: ~90k reported transient candidates (“ATs”),  
>9k (10%) classified SNe (in addition the full catalog of all pre-2016 SNe),  
>1k registered users, >120 groups
- The basic TNS object is an Astronomical Transient (AT) with a unique identifier of the form AT YYYYx (x=A..Z, aa..zz, aaa..zzz,...). The prefix “AT” can be later changed to indicate a classification (e.g., “SN”) but the unique identifier is always kept.
- Most reports are submitted automatically by “bots” of the major surveys & brokers (PS1, ZTF, Gaia, ATLAS...), but it is also possible to submit reports interactively using forms. Discovery reports are called *AT-reps* whereas classification reports (supported by a spectrum, for the “normal” transients) are called *Class-reps*.
- The system naturally handles multiple reports on the same event (e.g., discoveries of the same object by different surveys) and keeps a (fully searchable) record of “internal names” that are associated with each AT-rep.
- The system supports a service for short astronomical announcements (*AstroNotes*) which is a superior version of the ATEL system (e.g., searchable; hyperlinked to the specific objects).





# The Transient Name Server - overview

- All reports and AstroNotes are indexed by the **ADS** and are citable.
- Currently all alerts/notifications from the TNS (discoveries/classifications/AstroNotes) are distributed via emails to the registered users, according to their defined preferences. (Additional staging/alerting mechanisms (e.g. Kafka streams) may be added.)
- Some data can be reported as **proprietary** for a certain period of time; e.g. securing a name designation without official release of the details yet, or not exposing a classification spectrum.
- Groups, Bots and memberships are all **self-managed** (by the users/group-owners), thus enabling flexible handling of access permissions, controlling the discovery credits etc.
- The system resides on the **AWS cloud**, increasing its high-availability capacity and scalability.
- On Mar 2020 the **Fast Radio Bursts (FRB)** community joined the TNS.
  - An additional subsystem was tailored for handling the specific requirements of FRBs – including a separate naming engine (FRB YYYYMMDDx), a separate report form (for the specific FRB properties), and enabling specification of area localizations (***“area transients”***).
- Adaptations for the **Gamma-Ray Bursts (GRB)** community are now in design phase.  
(Requiring a separate GRB naming engine, and several additional challenges, e.g. the editing of many properties after the initial report...)



# Two major requirements/guidelines of the TNS



- To provide quick (low-latency) and robust processing of the incoming reports, and in strict order of arrival.
  - No downtime is allowed (downtimes are kept on the level of a few hours per year).
  - A high-availability and scalable system configuration is provided.
- The TNS is **dynamic** - constantly adapted to meet the needs of the community and its working protocols, as well as the inclusion of new communities and system components.

e.g. with the emergence of “brokers”,  
the need to split the “Source group” to the

- Reporting group

and the

- Discovery data source group.

## Modifications to the treatment of the Discovery (Source) Group

2019-12-01 - Dr. Ofer Yaron (WIS)

In order to adapt the TNS for both the present and future needs, and in particular to the activity of transient brokers as significant sources that report discoveries of transients that are observed and publicly released by the observing surveys/facilities, we have deployed today - Dec 1st, 2019 - the adjustments to the handling of the “discovery group/s”, by introducing instead two distinct group identifications: the Reporting group and the Discovery Data Source group.

The changes affect the AT Report JSON/TSV formats (and clearly the AT Report Form), the search page, the object page, the discovery certificate and the statistics pages.

## AstroNote 2019-136

AstroNotes My Draft AstroNotes Add an AstroNote My Templates Stats ADS Test Notifications Test Edit AstroNote View Edit Devel

### Bookmark

2019-11-24 11:28:24 Type: Announcement-Tool/Utility Bibcode: 2019TNSAN.136....1Y

Modifications to the TNS treatment of the “Discovery Group” - to be deployed on Dec 2nd, 2019.

Authors: Ofer Yaron, Avishay Gal-Yam, Avner Sass (Weizmann)

Keywords: [Surveys](#), [Transient](#), [Astronomical Databases](#)

Abstract: In order to adapt the TNS for both the present and future needs, and in particular to the activity of transient brokers as significant sources that report discoveries of transients that are observed and publicly released by the observing surveys/facilities, we will deploy next week - on Monday, Dec 2nd, 2019 - small adjustments to the handling of the “discovery group/s”, by introducing instead two distinct group identifications: the Reporting group and the Discovery Data Source group. Bot owners should apply these changes in the scripts for the Bulk AT Reports, whether via JSON or TSV submissions, as described below.





UV/visible/IR surveys



Real-time  
transient  
Alerts  
since 2016

Radio surveys



Joined 2020

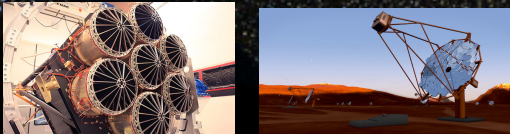
Discussion initiated

Gravitational Wave Detectors



Potential

High energy surveys (X/ $\gamma$ )



All  
data



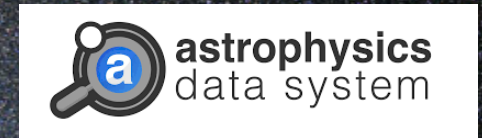
Robotic follow-up facilities



Major follow-up  
collaborations



NASA data system



Data queries

Data contributions

Global  
Astrophysics  
Community



Pan-Starrs (Hawaii)



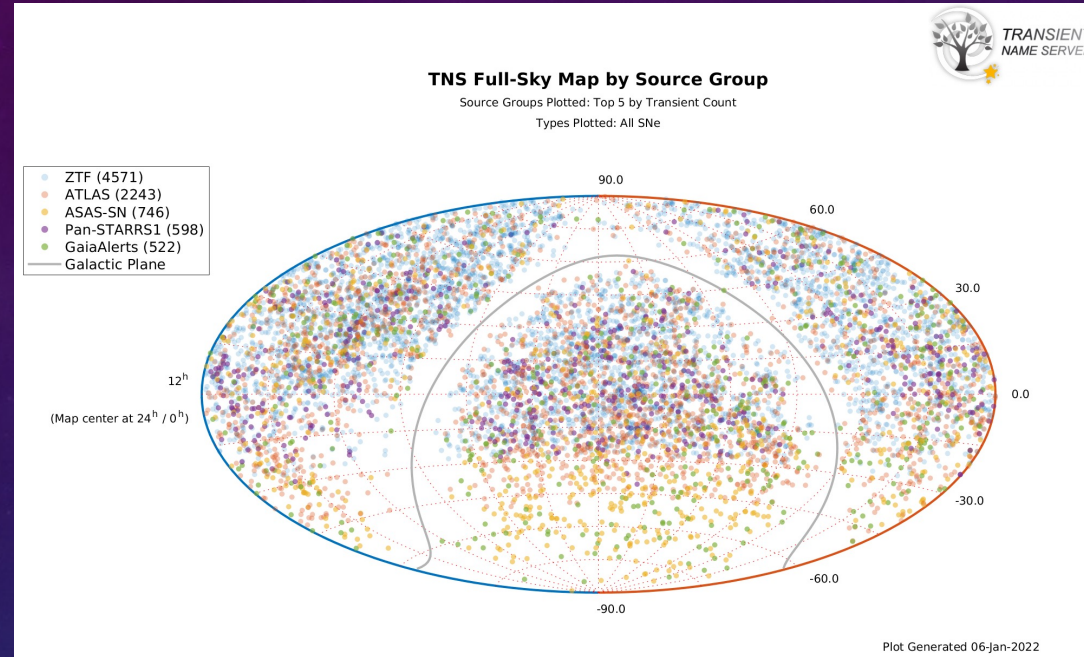
ZTF, iPTF (Palomar, CA)



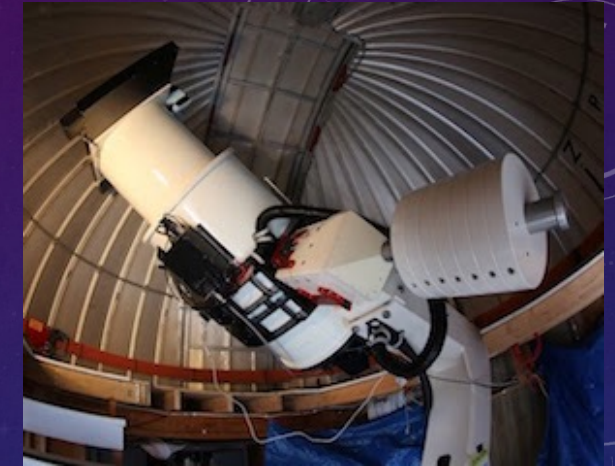
CHIME-FRB (Canada)



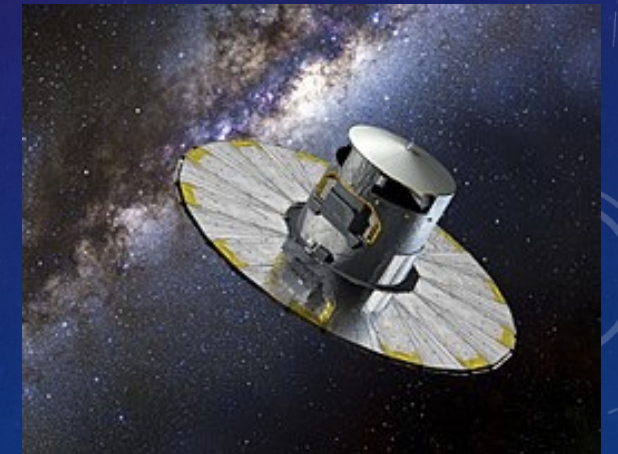
## Some of the major surveys reporting to the TNS



ATLAS (Hawaii)



Gaia (Space)



Soon...

- GRBs
- LIGO-Virgo-KAGRA ?





# TNS Statistics (as of 2022-01-10)

<b>ALL transients</b> reported since Jan 1, 2016	88495		<b>PUBLIC classified SNe by type</b>	
<b>PUBLIC transients</b> reported since Jan 1, 2016	88413		SN Ia	6208
<b>PUBLIC transients</b> for the top 5 reporting groups			SN II	1412
	Pan-STARRS1	26791	SN IIn	282
	GaiaAlerts	14205	SN Ia-91T-like	248
	ZTF	12941	SN Ic	211
	ALeRCE	12712	SN IIP	182
	ATLAS	10352	SN Ib	165
<b>PUBLIC transients</b> for the top 5 data source groups			SN Iib	139
	Pan-STARRS1	28307	SLSN-I	109
	ZTF	28064	SN Ic-BL	93
	GaiaAlerts	14205	SN Ia-91bg-like	79
	ATLAS	10352	SN Ia-pec	55
	iPTF	1636	SN Ib/c	49
			SLSN-II	44
<b>PUBLIC classified SNe</b> reported since Jan 1, 2016	9465		SN Ibn	40
<b>PUBLIC classified SNe</b> for the top 5 reporting groups			SN I	37
	ZTF	2699	SN	28
	ATLAS	2275	SN Iax[02cx-like]	27
	ALeRCE	1622	SN Ia-CSM	13
	ASAS-SN	754	SN Ib-pec	10
	GaiaAlerts	528	SN II-pec	10
<b>PUBLIC classified SNe</b> for the top 5 data source groups			SN Ib-Ca-rich	9
	ZTF	4583	SN IIn-pec	5
	ATLAS	2275	SN Icn	3
	ASAS-SN	753	SN IIL	3
	Pan-STARRS1	603	SN Ic-pec	2
	GaiaAlerts	528	SN Ia-SC	2
<b>ALL spectra</b> reported to the TNS	11606			
<b>PUBLIC spectra</b> reported to the TNS	11307			
<b>PUBLIC classifications</b> for the top 5 contributing groups				
	ZTF	4477		
	ePESSTO+	990		
	ePESSTO	723		
	SCAT	679		
	PESSTO	277		

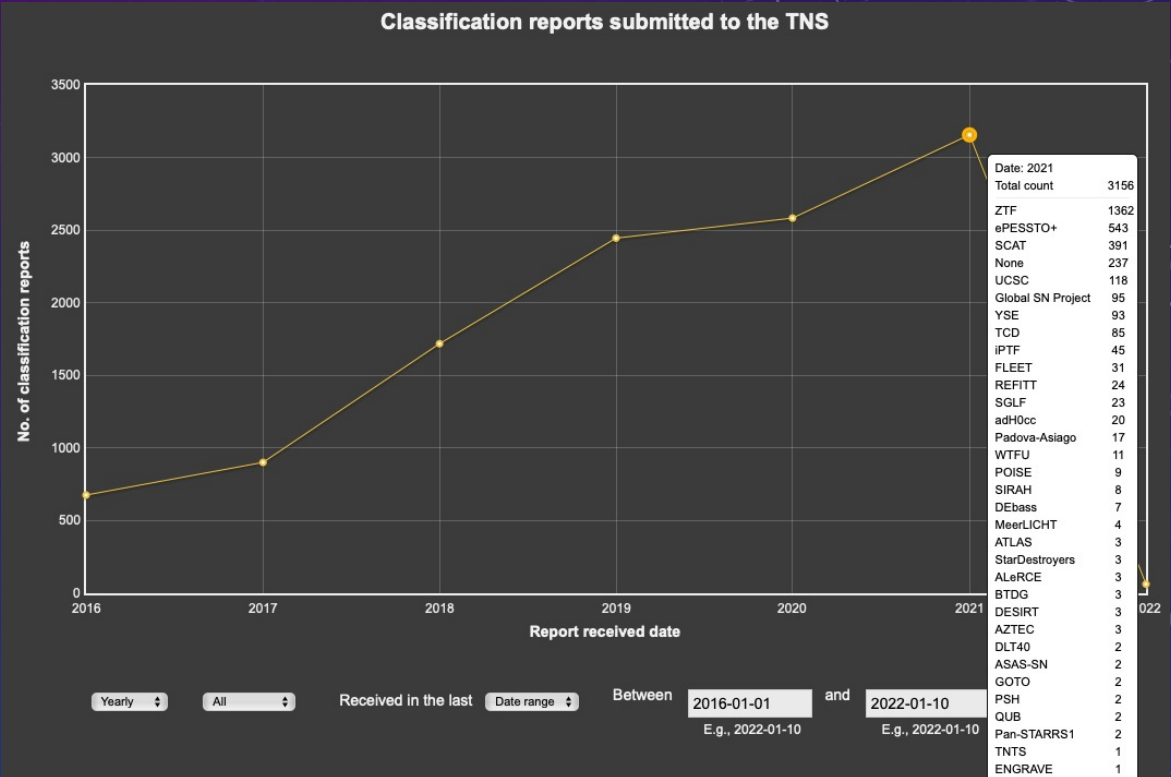
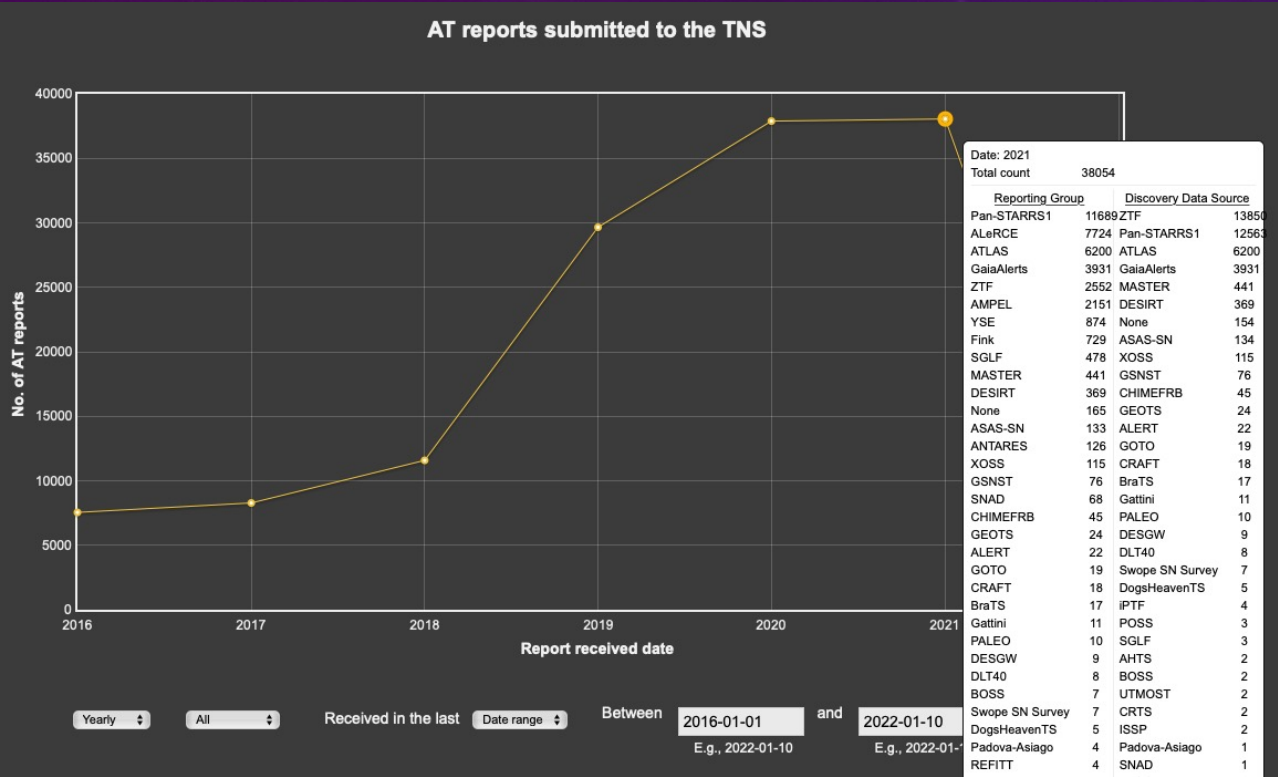




# TNS Reports Yearly Timeline (2022-01-10)

Discovery reports

Classification reports





# “Brokers” activity

An example of AT reports for ZTF/Pan-STARRS discoveries reported by various groups (as of 2022-01-04)



All AT Reports

name	count(*) ▾ 1
ZTF	25414
ALeRCE	13289
AMPEL	2152
SGLF	1668
Fink	866
ANTARES	126
SNAD	65
None	20
ZUDS	11
ULL-ASTRO-MASTER	10
REFITT	10
SIRAH	4
ePESSTO+	3
HOLISMOKES	1
IMSNG	1
Global SN Project	1

ATs classified as SNe

name	count(*) ▾ 1
ZTF	8852
ALeRCE	1819
AMPEL	685
Fink	564
SGLF	172
ANTARES	8
REFITT	7
SIRAH	4
ePESSTO+	2
ULL-ASTRO-MASTER	2
None	2
Global SN Project	1
HOLISMOKES	1



All AT Reports

name	count(*) ▾ 1
Pan-STARRS1	40425
YSE	2352
None	3

ATs classified as SNe

name	count(*) ▾ 1
Pan-STARRS1	5264
YSE	433





# TNS NewsFeed + Help Page

- Important updates/revisions are presented on the NewsFeed
- Use the help page, where also sample codes and examples are provided...

## TNS Newsfeed

Here we will notify about new features, modifications, open issues, and any general news and remarks...

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**Daily staging of all TNS public objects as CSV text files**

2021-03-15 - Dr. Ofer Yaron (WIS)

We are glad to announce a new feature we have deployed, to enable easier and quicker mass download of information about TNS public objects.

Staging the CSV files will fulfil requests by TNS users, as well as encourage performing time-consuming operations locally by users, reducing the load on t

For example, if you need to cross-match entire catalogs or long object lists, we request that this would be done locally, against the csv (or a locally manage  
Calling the APIs for a limited number of objects is clearly fine, but we ask that our users apply appropriate caution and sensibility when using the TNS reso

Every day after UT midnight, two CSV files are created and are accessible for download under: [https://www.wis-tns.org/system/files/tns\\_public\\_objects/](https://www.wis-tns.org/system/files/tns_public_objects/)

1. **tns\_public\_objects.csv.zip** - holds the entire catalog of TNS public objects (AT/SN/FRB/... ~70,000 currently). This file is overwritten daily.  
The date and time when the list of objects was created is specified in the first line; e.g. "2021-03-15 00:00:00"
2. **tns\_public\_objects\_YYYYMMDD.csv.zip** - holds only those entries (objects) that were either added or modified during the specified day.  
So, e.g. during Mar 15, 2021 it is possible to download this latest CSV for the previous day: `tns_public_objects_20210314.csv.zip`  
The first line in the CSV will contain the exact duration covering the entries in the file; e.g. for the above example: "2021-03-14 00:00:00 - 23:59:59"

The separate daily files remain in place for 1 month backwards.

## TNS - Getting started

- General
- Registration, reporting methods
- Email notifications (*Immediate/Daily digests*)
- ADS indexing
- Report forms (*Discovery/Classification*)
- APIs
  - Bulk reports
  - Change prop. period
  - Search/Get Objects
- Groups, proprietary period
- Discoverer/Classifier
- Search page
- Statistics page
- LIGO GW Events
- Quick query links
- Daily CSV staging
- AstroNotes
- Funding and Support





# APIs, Bulk downloads

- A Sandbox environment exists for experimentation with the APIs (both for submission and retrieval of info)

All API development must be performed against the sandbox!!!

<https://sandbox.wis-tns.org>

<https://sandbox.wis-tns.org/api>

- APIs are in place for:
  - the submission of Discovery (AT) and Classification reports.
  - Searching of objects (by coords, names – IAU/internal)
  - Retrieving object details
- CSV/TSV downloads are available from the Search page (also in a scriptable way)

e.g. [https://www.wis-tns.org/search?&&classified\\_sne=1&date\\_start%5Bdate%5D=2021-01-01&format=csv&num\\_page=100&page=0](https://www.wis-tns.org/search?&&classified_sne=1&date_start%5Bdate%5D=2021-01-01&format=csv&num_page=100&page=0) ←[0..N]

- A CSV of all public objects (as well as daily “delta” lists) are available for download, in order to allow for easy local managing of the TNS data and to perform “heavy” operations locally (such as cross-matching entire catalogs or long object lists)

[https://www.wis-tns.org/system/files/tns\\_public\\_objects/tns\\_public\\_objects.csv.zip](https://www.wis-tns.org/system/files/tns_public_objects/tns_public_objects.csv.zip)

Or using curl (with User-Agent and api\_key) for a daily csv:

```
curl -X POST -H 'user-agent: tns_marker{"tns_id":YOUR_BOT_ID,"type": "bot", "name": "YOUR_BOT_NAME"}
```

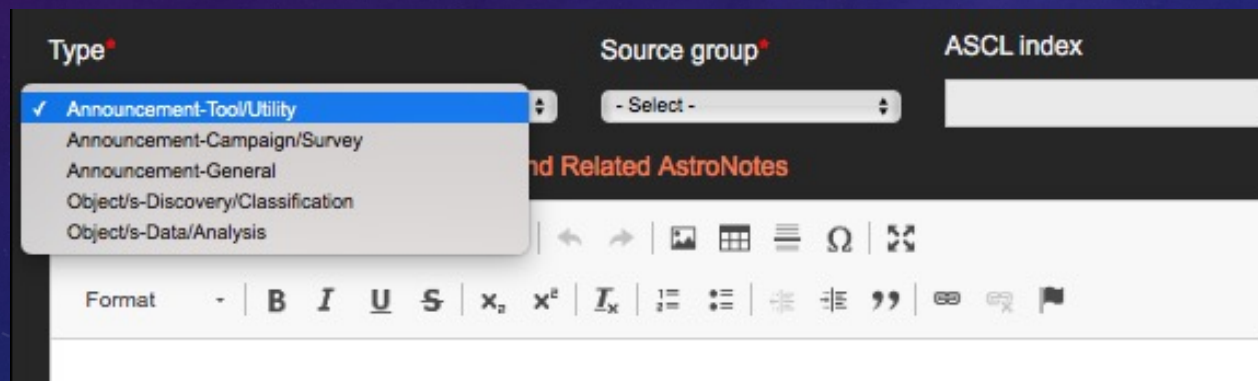
```
-d 'api_key=YOUR_API_KEY' https://www.wis-tns.org/system/files/tns_public_objects/tns_public_objects_20220112.csv.zip > tns_public_objects_20220112.csv.zip
```





# AstroNotes!!!

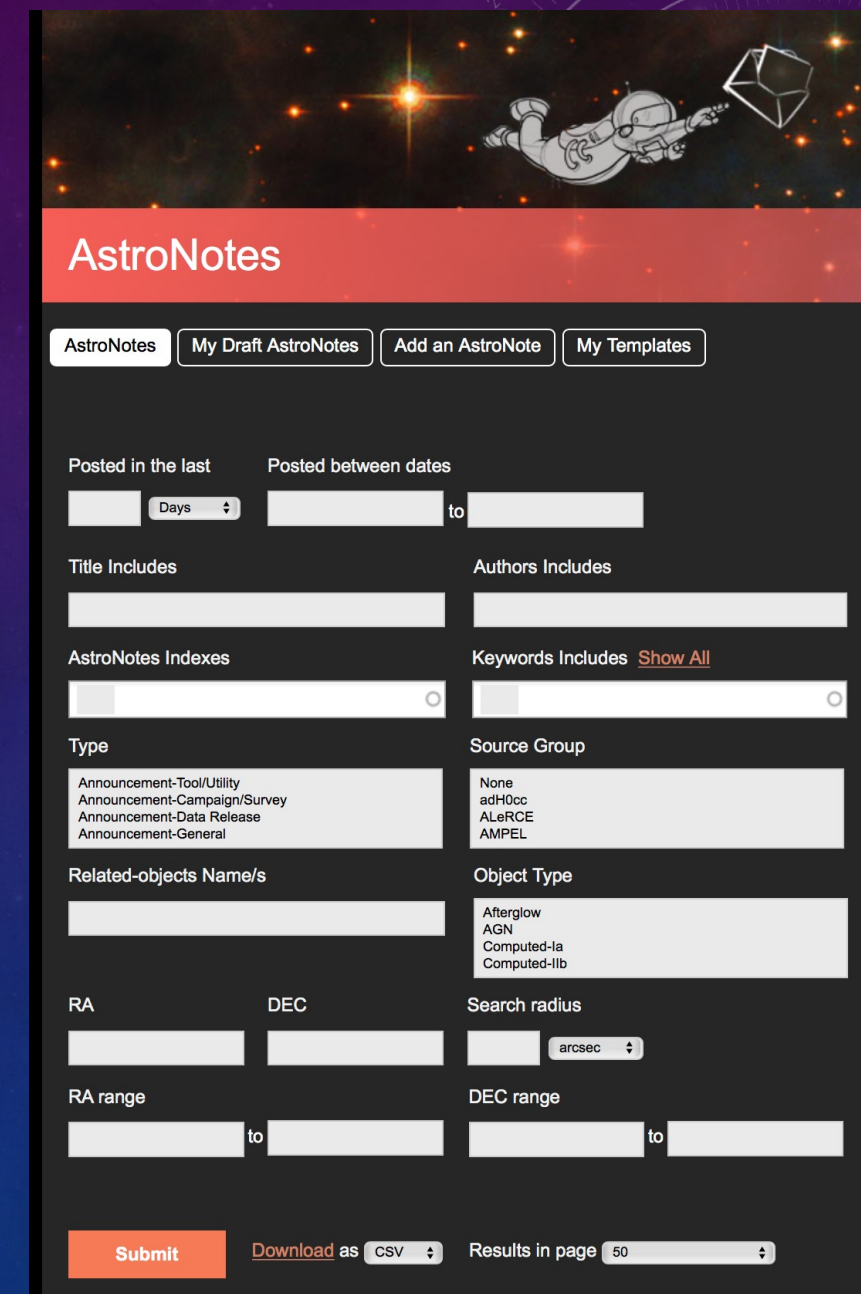
- A sub-system within the TNS (so no need to register to an additional service for creating and receiving these notifications).
- Enabling the distribution of notifications in a very flexible (yet accurate) way, **directly coupled** to the related objects, **searchable and citable**.
- Can create either an object-related (discovery, classification, analysis) or an “announcement” notification, **without any restrictions, limitations or penalties...**



The screenshot shows the 'Type' dropdown menu open, with the following options:

- ✓ Announcement-Tool/Utility
- Announcement-Campaign/Survey
- Announcement-General
- Object/s-Discovery/Classification
- Object/s-Data/Analysis

Other visible fields include 'Source group' (set to '- Select -') and 'ASCL index'.



The screenshot shows the AstroNotes interface with the following sections:

- AstroNotes** header with navigation buttons: AstroNotes, My Draft AstroNotes, Add an AstroNote, My Templates.
- Posted in the last**: Input field with a 'Days' dropdown.
- Posted between dates**: Input fields for 'to' and 'from'.
- Title Includes**: Input field.
- Authors Includes**: Input field.
- AstroNotes Indexes**: Input field with a search icon.
- Keywords Includes**: Input field with a 'Show All' link.
- Type**: Dropdown menu with options: Announcement-Tool/Utility, Announcement-Campaign/Survey, Announcement-Data Release, Announcement-General.
- Source Group**: Dropdown menu with options: None, adH0cc, ALeRCE, AMPEL.
- Related-objects Name/s**: Input field.
- Object Type**: Input field with options: Afterglow, AGN, Computed-Ia, Computed-Ilb.
- RA**: Input field.
- DEC**: Input field.
- Search radius**: Input field with a unit dropdown (set to 'arcsec').
- RA range**: Input fields for 'to' and 'from'.
- DEC range**: Input fields for 'to' and 'from'.
- Submit** button.
- Download as**: Dropdown menu (set to 'CSV').
- Results in page**: Input field (set to '50').



# AstroNotes!!!

- A “sub-system” within the TNS.
- Enabling the distribution of notifications in a very flexible way, directly coupled to the related objects, searchable and citable.
- Easy managing and use of **Templates**, for quicker writing of a new AstroNote.
- Easy sharing of **Drafts** with the colleagues; allowing definition of several editors to continue editing the draft until submission.

**AstroNotes**

AstroNotes My Draft AstroNotes Add an AstroNote My Templates

Save as draft

Use template

ATLAS20XXX (AT2020YYY): discovery of a candidate supernova in NGC XXXX (XX Mpc) [ ATLAS ]

Template Instructions

This is a template for announcing ATLAS discoveries for use by QUB and collaborating team.

You need to change

- Title : put in the ATLAS, AT names and the host galaxy and distance
- The first paragraph does not need adjusted
- Adjust all the parameters of the object in the 2nd paragraph - name, discovery time, mag, last non-detection, host galaxy, absolute mag etc.
- For foreground reddening :  $A_0 \sim (A_r + A_i)/2$  and  $A_c \sim (A_g + A_r)/2$
- Author order : the discoverer should write and submit the AstroNote. Put yourself first and leave the rest as they are
- Adjust the Abstract appropriately, as above. This is what gets sent out in an email shot.
- For now you can use the Generate ATel button on the ATLAS object page to generate some of these numbers. ***But double and triple check*** they are correct - sometimes the automated cross-matching in Sherlock does not pick up the right object
- You can then select the object from the TNS database - no need to paste in details. The object, by definition will have been registered on the TNS and will be found.

Additional AstroNote editors

Title

ATLAS20XXX (AT2020YYY): discovery of a candidate supernova in NGC XXXX (XX Mpc)

Authors

K. W. Smith, S. Srivastav, O. McBrien, S. J. Smartt, J. Gillanders, P. Clark, M. Fulton, D. O'Neill, D. R. Y



# AstroNotes!!!

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- Easy managing and use of Templates, for quicker writing of a new AstroNote.
- Easy sharing of Drafts with the colleagues; allowing definition of several editors to continue editing the draft until submission.
- Many **Search options**, including by object names, types and coords.

**AstroNotes**

AstroNotes My Draft AstroNotes Add an AstroNote My Templates

Posted in the last  Days  Posted between dates  to

Title Includes  Authors Includes

AstroNotes Indexes  Keywords Includes  [Show All](#)

Type  Source Group

Announcement-Tool/Utility  
Announcement-Campaign/Survey  
Announcement-Data Release  
Announcement-General

None  
adH0cc  
ALeRCE  
AMPEL

Related-objects Name/s  Object Type

Afterglow  
AGN  
Computed-Ia  
Computed-Ilb

RA  DEC  Search radius

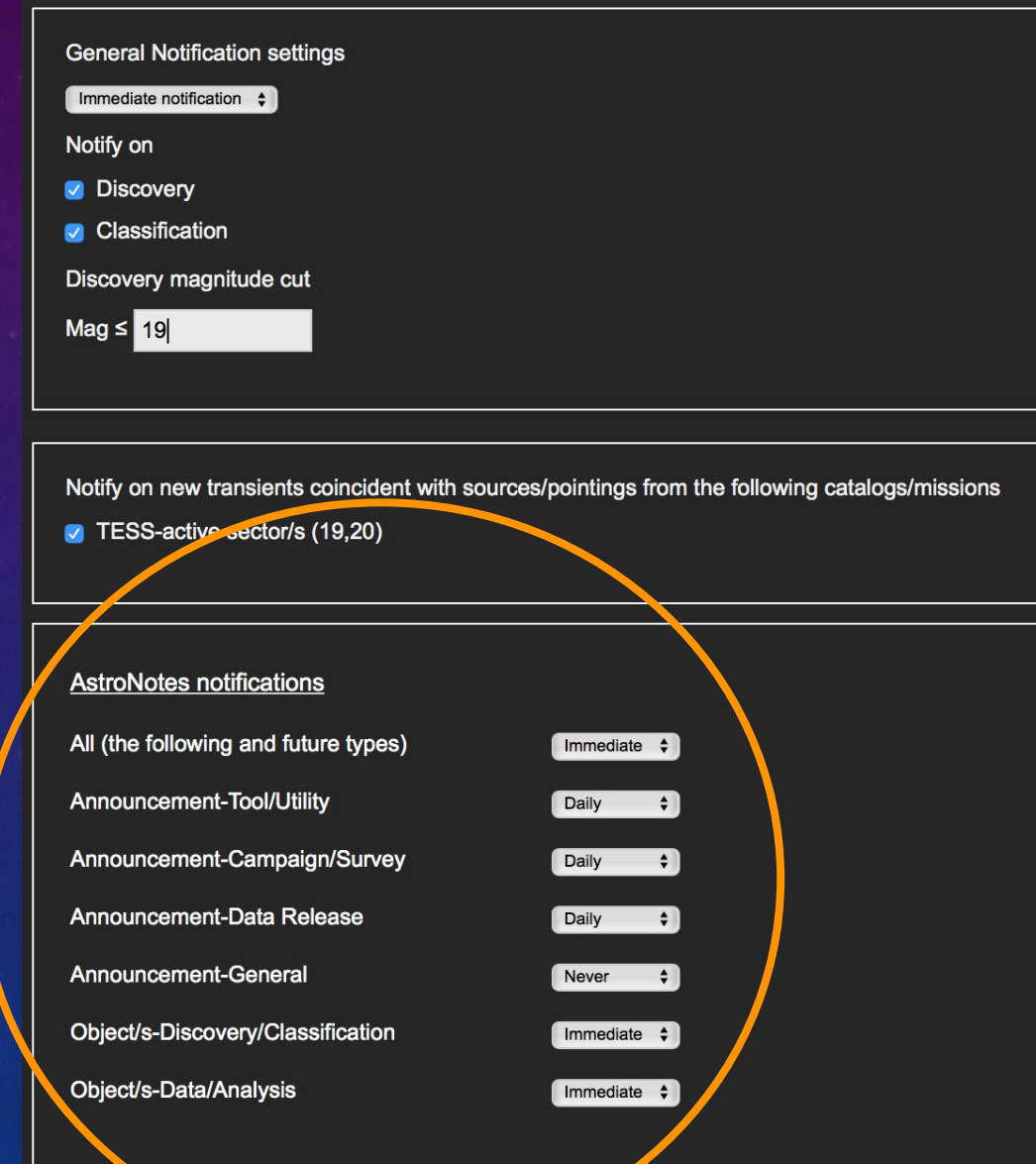
RA range  to  DEC range  to

[Download as](#)  Results in page  50



# AstroNotes!!!

- A “sub-system” within the TNS.
- Enabling the distribution of notifications in a very flexible way, directly coupled to the related objects, searchable and citable.
- Easy managing and use of Templates, for quicker writing of a new AstroNote.
- Easy sharing of Drafts with the colleagues; allowing definition of several editors to continue editing the draft until submission.
- Many Search options, including by object names, types and coords.
- Possible to define on your **My Account** page which types of notifications you wish to receive, and in which manner.



General Notification settings

Immediate notification ▾

Notify on

☒ Discovery

☒ Classification

Discovery magnitude cut

Mag ≤ 19

Notify on new transients coincident with sources/pointings from the following catalogs/missions

☒ TESS-active sector/s (19,20)

AstroNotes notifications

All (the following and future types)	Immediate ▾
Announcement-Tool/Utility	Daily ▾
Announcement-Campaign/Survey	Daily ▾
Announcement-Data Release	Daily ▾
Announcement-General	Never ▾
Object/s-Discovery/Classification	Immediate ▾
Object/s-Data/Analysis	Immediate ▾



# AstroNotes!!!

## A query for ZTF AstroNotes:

- Major surveys and groups of the Transients community have already moved to using solely AstroNotes – ATLAS, Pan-Starrs, PESSTO, ZTF...

Clicking on an object name overlays its basic details, with a link directly to the object page

Showing results 1 to 9 out of 9

AstroNote 2020-8

Type: [Object/s-Data/Analysis](#)

Released: 2020-01-08 22:08:33

Early ZTF and UVOT Observations of ZTF20aaelulu, a Supernova Candidate in M100

A. Y. Q. Ho (Caltech), S. Schulze (Weizmann), D. Perley (LJMU), J. Sollerman (OKC), Y. Yang (Weizmann), O. Yaron (Wei...

Source Group: [ZTF](#)

Keywords: [Transient](#), [Supernova](#), [Time-domain](#), [Photometry](#)

Related Objects: [2020oi](#) [\[ZTF20aaelulu\]](#)

We report early photometry of ZTF20aaelulu (AT2020oi) from the Zwicky Transient Facility (ZTF; ATel #11266) and Swift/UVOT. ZTF20aaelulu is a rapidly rising transient coincident with M100 (z=0.0052...

J2000 12 22 925 +15 49 25.53

FoV: 2.38'

AstroNote 2019-131

Type: [Object/s-Data/Analysis](#)

Released: 2019-11-14 23:22:21

ZTF early discovery and rapid follow-up of the infant SN AT2019ust (ZTF19acryurj)

Rachel Bruch, Steve Schulze, Ofer Yaron, Yi Yang (WIS), Mattia Bulla (OKC, Nordita) and Avishay Gal-Yam (WIS) on beha...

Source Group: [ZTF](#)

Keywords: [Supernova](#), [Transient](#)

Related Objects: [2019ust](#)

J2000 00 54 18 +31 40 12.53

FoV: 2.38'

AstroNote 2019-124

Type: [Announcement-Campaign/Survey](#)

Released: 2019-11-05 20:41:27

Public reports of transients from the Zwicky Transient Facility volume limit

K. De (Cal), C. Fremling, ... wal (Caltech),

Source Gr See object 2019ubr

Keywords: [Supernova](#), [Transient](#), [Time-domain](#), [Photometry](#)

Related Objects: [2019ubs](#), [2019ubr](#), [2019tyf](#), [2019tkn](#)

Related Notes: [2019-112](#)

We announce the beginning of public reports to the Transient Name Sever (TNS) of transients saved as a part of the volume

J2000 06 25 12 +64 44 38.53

FoV: 2.38'

Recent Released Tools

AstroNote 2020-1

Released: 2020-01-01

Views Count: 49

A bash shell utility to query and download classified SNe from TNS

S. R. Kulkarni

AstroNote 2019-136

Released: 2019-11-24

Views Count: 93

Modifications to the TNS treatment of the "Discovery Group" - to be deployed on Dec 2nd, 2019.

Ofer Yaron, Avishay Gal-Yam, Avner Sass (Weizmann)

AstroNote 2019-60

Released: 2019-08-01

Views Count: 96

Revising the astrometric accuracy values on the TNS and merging of objects

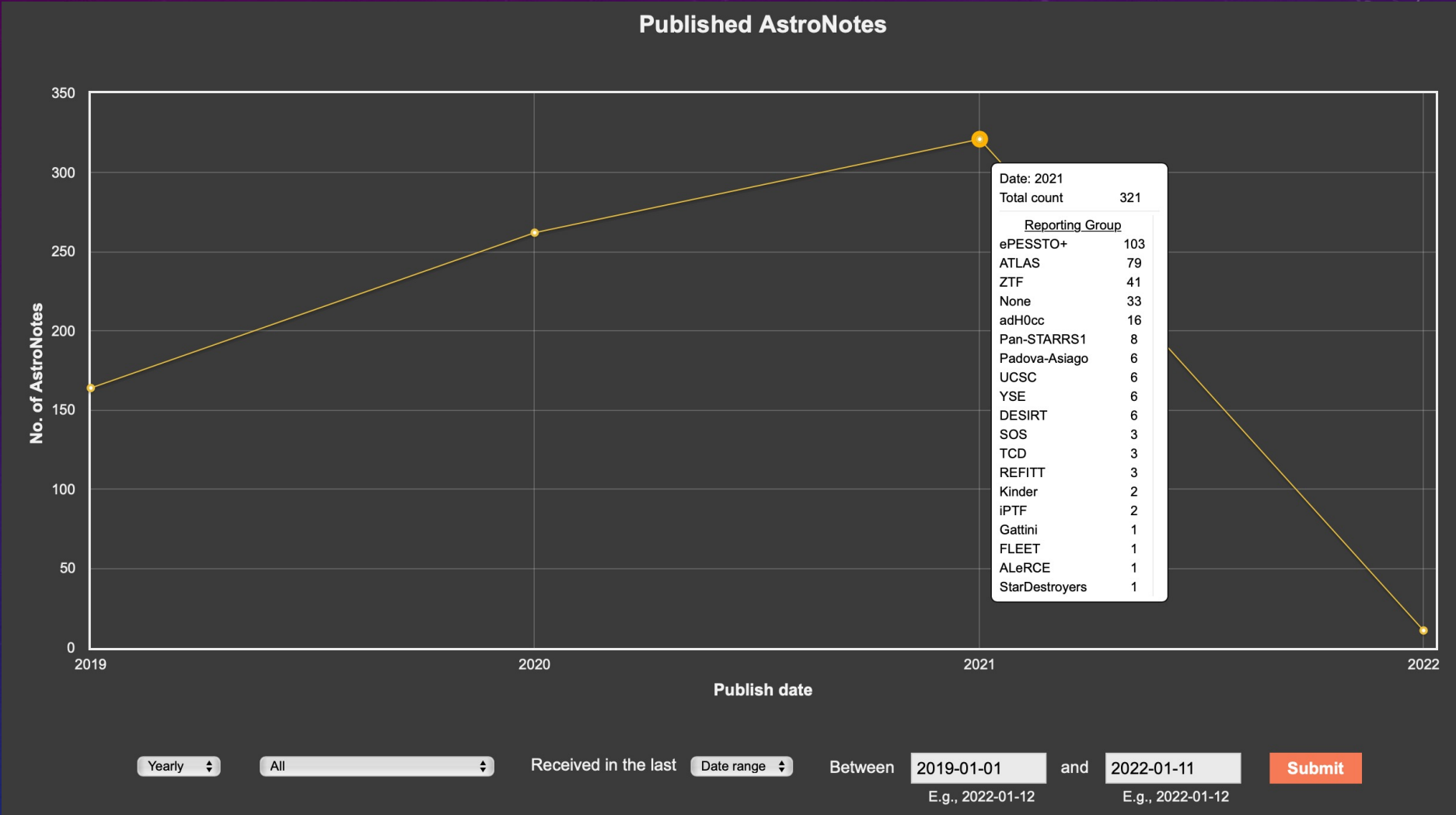
Ofer Yaron (Weizmann)

Ofer Yaron, Weizmann Institute for Science

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# AstroNotes - Stats



Monotonic increase, currently dominated by ePESSTO+, ATLAS and ZTF



# Area Transients - The new guys in town (well, already since 2020-03)... FRBs

- Main coordination with **CHIME** and representatives of the FRB community
- A separate engine for designation of names: (FRB)YYYYMMDDabc, coexisting next to the AT/SN names
- FRB-Catalog fully ingested to the TNS

Photometry

**Burst Properties**

Topocentric Datetime*	Peak Flux*	Flux-Err	Limiting Flux	Units*	Filter*	Instrument*
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
SNR*	Fluence	Fluence-Err	Units	Exp-time (sec)	Observer	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
Burst Width	Burst Width-Err	Units	Burst BandWidth	Burst BandWidth-Err	Units	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
Scattering time	Scattering Time-Err	Units	DM Struct	DM Struct-Err	Units	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
RM	RM-Err	Units	Lin. Polarization Frac.	Lin. Pol.-Err	Circ. Polarization Frac.	Circ. Pol.-Err
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Ref. (Central) Freq.*	Units*	Instrument Bandwidth*	Units*	No. Freq. Channels*	Sampling Time*	Units*
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

**FRB Report Form**

AT Report Form **Classification Report Form** **FRB Report Form**

RA*	Error	Err units	DEC*	Error	Err units
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Reporting Group\*  Discovery Data Source\*  Internal name  AT type

Reporter/s (Authors list)\*

Discovery Datetime / JD (UT)\*  Barycentric Datetime / JD (UT)  End prop. period  Associate with group/s

Redshift  Host name  Host redshift

Repeater of Primary Burst  Public Webpage

Region - Ellipse  Semi-major/minor axes Units

Region - Polygon  Region - filename

DM\*  DM-Err  Units\*  Gal. DM Limit  Gal. DM Model



# Fast Radio Bursts

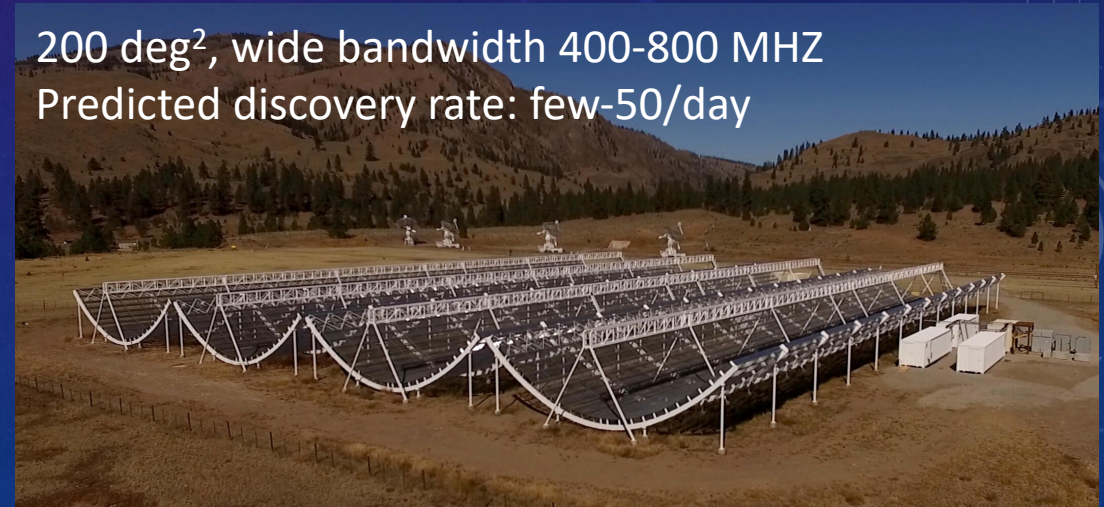
- Repeaters are distinct objects on the TNS, allowing flexible associations of multiple bursts with the **Primary Burst**.

## CHIME/FRB Discovery of Eight New Repeating Fast Radio Burst Sources

THE CHIME/FRB COLLABORATION, B. C. ANDERSEN,<sup>1,2</sup> K. BANDURA,<sup>3,4</sup> M. BHARDWAJ,<sup>1,2</sup> P. BOUBEL,<sup>1,2</sup> M. M. BOYCE,<sup>5</sup> P. J. BOYLE,<sup>1,2</sup> C. BRAR,<sup>1,2</sup> T. CASSANELLI,<sup>6,7</sup> P. CHAWLA,<sup>1,2</sup>

The discovery of the first repeating FRB source, FRB 121102, at a dispersion measure  $DM \simeq 560 \text{ pc cm}^{-3}$  (Spitler et al. 2014, 2016), eliminated cataclysmic models as the only means for producing FRB emission. The repetitive nature of FRB 121102 enabled sub-arcsecond localization of the source via radio interferometry and subsequent optical identification of the low-metallicity host galaxy

200 deg<sup>2</sup>, wide bandwidth 400-800 MHz  
Predicted discovery rate: few-50/day



### FRB Advanced Search

Repeater  Repeater of

☐ FRB with measured redshift

DM Range  to

RM Range  to

SNR Range  to

Flux Range  to

☐ Show main query ☐ Explain main query

Submit

Download as CSV

Download as TSV

Results in page 50

> Columns to display

Showing results 1 to 2 out of 2

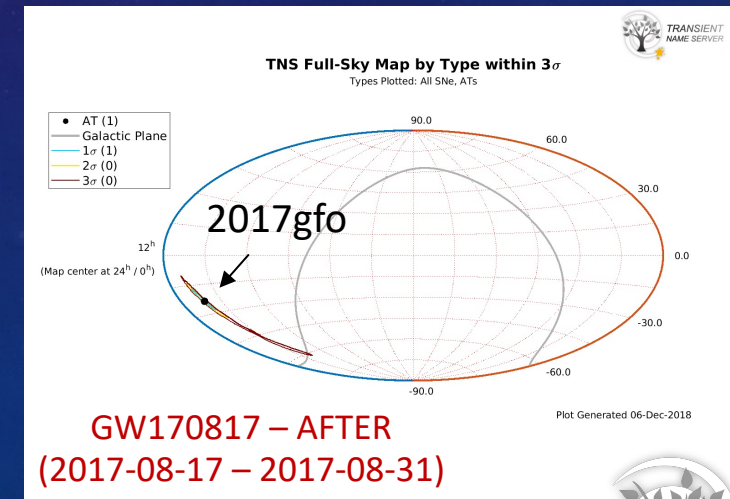
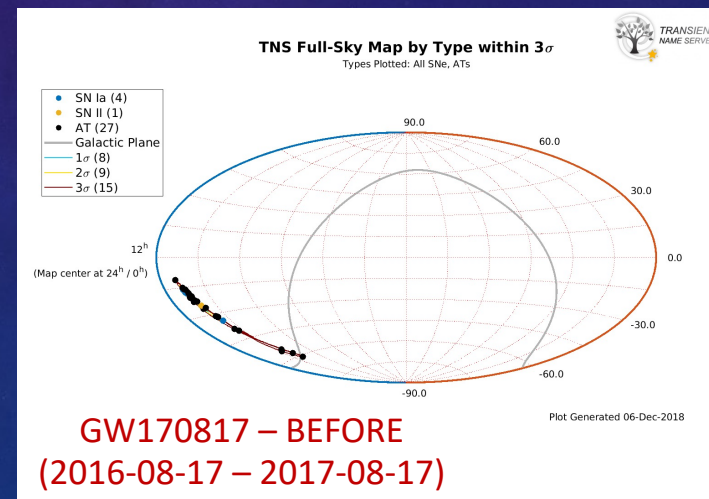
ID	Name	Reps	Class	RA	DEC	Obj. Type	Repeater of Primary Burst	DM (Err)	Galactic DM Limit	Barycentric Datetime
51465	<a href="#">FRB 20191202A</a>	1		02:15:50.000	+33:00:00.00	FRB	<a href="#">FRB 20191202A</a>	680 (68) pc/cc	24 (NE2001)	
51466	<a href="#">FRB 20190807A</a>	1		00:08:00.000	+02:00:00.00	FRB	<a href="#">FRB 20191202A</a>	430 (43) pc/cc	23 (YMW16)	



# Current LIGO pages on the TNS – a clarification

- During O1-O3 observing runs, we ingested to the TNS the reported LIGO events and based on the localization maps (HEALPix) provided to the community maps and tables of the known transients (ATs) on the TNS discovered within half a year BEFORE the GW event and the discovered transients within the localizations during the 2 weeks AFTER the event.
- The plan is to continue doing so for the future LVK runs. Any ideas and recommendations are clearly welcome.

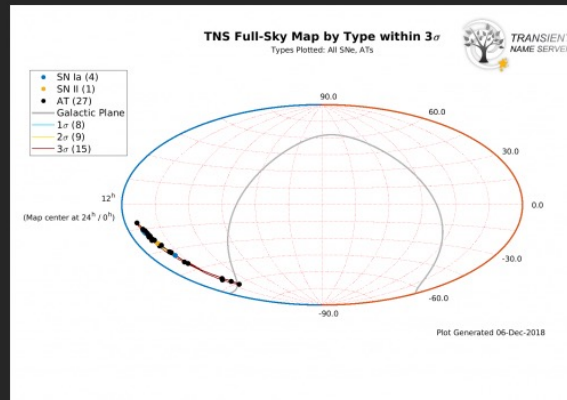
Event Date ▼	Event Name	GraceDB	Instruments	Classification	Distance [Mpc] (Err)
2020-03-16 21:57:56	<a href="#">S200316bj</a>	<a href="#">To GraceDB event page</a>	H1, L1, V1	Mass-Gap: (99.57%) Terrestrial: (0.43%)	1177.983 (283.01)
2020-03-11 11:58:53	<a href="#">S200311bg</a>	<a href="#">To GraceDB event page</a>	H1, L1, V1	BBH: (100%) Terrestrial: (0%)	1114.588 (174.59)
2020-03-02 01:58:11	<a href="#">S200302c</a>	<a href="#">To GraceDB event page</a>	H1, V1	BBH: (88.96%) Terrestrial: (11.04%)	1820.133 (536.10)
2020-02-25 06:04:21	<a href="#">S200225q</a>	<a href="#">To GraceDB event page</a>	H1, L1	BBH: (95.77%) Terrestrial: (4.23%)	994.913 (187.86)
2020-02-24 22:22:34	<a href="#">S200224ca</a>	<a href="#">To GraceDB event page</a>	H1, L1, V1	BBH: (100%) Terrestrial: (0%)	1574.996 (322.37)
2020-02-19 09:44:15	<a href="#">S200219ac</a>	<a href="#">To GraceDB event page</a>	H1, L1, V1	BBH: (96.4%) Terrestrial: (3.6%)	3533.071 (1031.11)
2020-02-13 04:10:40	<a href="#">S200213t</a>	<a href="#">To GraceDB event page</a>	H1, L1, V1	Terrestrial: (37.05%)	200.919 (80.01)
2020-02-08 13:01:17	<a href="#">S200208q</a>	<a href="#">To GraceDB event page</a>	H1, L1, V1	BBH: (99.34%) Terrestrial: (0.66%)	2142.007 (459.01)
2020-01-29 06:54:58	<a href="#">S200129m</a>	<a href="#">To GraceDB event page</a>	H1, L1, V1	BBH: (100%) Terrestrial: (0%)	754.616 (193.72)
2020-01-28 02:20:11	<a href="#">S200128d</a>	<a href="#">To GraceDB event page</a>	H1, L1	BBH: (96.9%) Terrestrial: (3.1%)	3701.586 (1264.51)





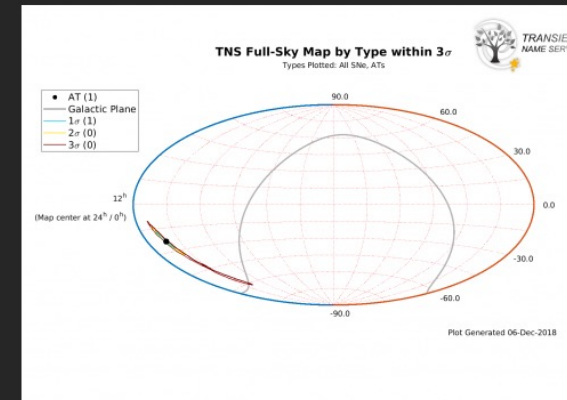
# Current LIGO pages on the TNS – a clarification

TNS Transients discovered BEFORE the GW event  
(within date range 2016-08-17 - 2017-08-17)



Skymap before JSON format transient list before TSV format transient list before

TNS Transients discovered AFTER the GW event  
(within date range 2017-08-17 - 2017-08-31)



Skymap after JSON format transient list after TSV format transient list after

## TNS Transients within localization

Discovered AFTER the GW event (2017-08-17 12:41:04 - 2017-08-31 12:41:04):

Name ▾	RA	DEC	Type	Discovery Date	Discovery Mag	Filter	Source Group	Probability	Sigma
AT 2017gfo	13:09:48.089	-23:22:53.35	Kilonova Swope SN	2017-08-17 23:31:12	17.3	Sloan-i	Survey	0.063670	1

Discovered BEFORE the GW event (2016-08-17 12:41:04 - 2017-08-17 12:41:04):

Name ▾	RA	DEC	Type	Discovery Date	Discovery Mag	Filter	Source Group	Probability	Sigma
AT 2016fth	13:08:10.020	-21:51:00.86		2016-08-28 17:06:43	17.9	Gaia-G	GaiaAlerts	0.335878	1
AT 2016fru	13:22:28.700	-26:22:55.06		2016-08-30 05:03:50	18.92	Gaia-G	GaiaAlerts	0.993992	3
AT 2016hrh	14:35:01.810	-57:45:44.96		2016-10-22 03:37:26	18.77	Gaia-G	GaiaAlerts	0.993315	3
AT 2016hst	14:39:44.180	-60:55:39.83		2016-10-23 09:37:26	18.59	Gaia-G	GaiaAlerts	0.996566	3
AT 2016ity	13:39:32.600	-39:04:05.88		2016-12-07 09:12:57	17.69	Gaia-G	GaiaAlerts	0.983240	3
AT 2016iuo	14:09:25.370	-55:17:54.35		2016-12-08 21:31:40	18.22	Gaia-G	GaiaAlerts	0.997280	3
AT 2016iuu	14:18:09.130	-54:35:54.28		2016-12-10 03:33:07	18.83	Gaia-G	GaiaAlerts	0.980654	3
AT 2017amm	13:00:31.951	-19:49:44.77		2017-02-03 14:35:31	19.98	PS1-uv	Pan-STARRS1	0.432000	1





# Clarifications / to summarize

- The TNS manages discovery & classification information (data), NOT extended LCs, spectral sequences etc... For this, data repositories such as WISeREP are relevant.
- Initiated mainly for SN candidates, the TNS also handles other extra-galactic transients, including novae (CVs), AGN flares, TDEs, Kilonovae... BUT NOT variable stars, asteroids or other such galactic/local variable/moving sources.

**PLEASE DO NOT submit varstars/moving objects but only secure extra-galactic transient candidates!!!**

- “Area Transients” are also officially joining the TNS: FRBs, and soon also GRBs, GW events.  
(In future more sophisticated cross-matching and association capabilities should be implemented – both on the TNS, and hopefully also by the additional utilities being developed.)
- Classifications must be supported by a spectrum (not relevant for the area transients), and currently the TNS only switches the **prefixes** from **AT** to **SN**. (TDEs, Kilonovae... remain AT until an official decision will be made.)
- API sample codes are available for download on the help page.
- For any questions/feedback/suggestions related to the use of the TNS, its APIs, AstroNotes, please do not hesitate to contact us: [www.wis-tns.org/content/contact-us](http://www.wis-tns.org/content/contact-us) (or me in person)









# Astrometric accuracies of surveys on the TNS

- Several reporting groups/surveys have a defined astrometric accuracy that is significantly better than the default threshold of 5 arcsec.
- This affects the setting of an object's "principal" coordinates (in case of multiple reports from several groups), and also the decision on the creation of a new object vs association with an existing one.
- See AstroNotes [2019-15](#) and [2019-37](#) for detailed descriptions, and do let us know if the astrometric accuracy of certain groups need to be considered/revised.

### ≡ AstroNote 2019-15

[AstroNotes](#) [Stats](#)

2019-05-20 13:31:06    Type: Announcement-Tool/Utility    Bibcode: [2019TNSAN..15....1Y](#)

Revising the treatment of object coordinates (astrometric accuracies) on the TNS  
\*\*\* CALL FOR FEEDBACK \*\*\*

Authors: Ofer Yaron, Avishay Gal-Yam, Eran Ofek, Avner Sass, Nikola Knezevic (Weizmann)

Keywords: [Surveys](#), [Astrometry](#), [Transient](#)

We are now in a process of implementing an improved treatment of object coordinates on the TNS, based on measured astrometric accuracies of the major reporting surveys, as detailed below.

As described in the bottom section relating to the estimation of the surveys' accuracies, **we plan to apply this revision on June 10 (postponed to the 23rd), 2019, and we encourage the community's feedback and inputs by that date.**

### ≡ AstroNote 2019-37

[AstroNotes](#) [Stats](#)

2019-06-23 12:16:05    Type: Announcement-Tool/Utility    Bibcode: [2019TNSAN..37....1Y](#)

The revised treatment of object coordinates (astrometric accuracies) is now active on the TNS

Authors: Ofer Yaron, Avishay Gal-Yam, Eran Ofek, Avner Sass (Weizmann)

Keywords: [Surveys](#), [Astrometry](#), [Transient](#)

Abstract: Revision of the treatment of object coordinates (astrometric accuracies) was deployed today - 2019-06-23 - on the TNS. Currently 9 groups have a defined astrometric accuracy (that is below the default value of 5 arcsec). Coordinates were updated backwards for a total of 3157 objects, not affecting the actual objects and existing AT reports, and without any merging or splitting of objects. We encourage further feedback from the reporting groups.

Following the details described in AstroNote 2019-15, we have deployed today the revision in the treatment of object coordinates on the TNS, according to the defined astrometric accuracies of the reporting groups/surveys.



# Astrometric accuracies of surveys on the TNS

