



# The Transient Name Server & the Weizmann Interactive SNe data REPOSITORY



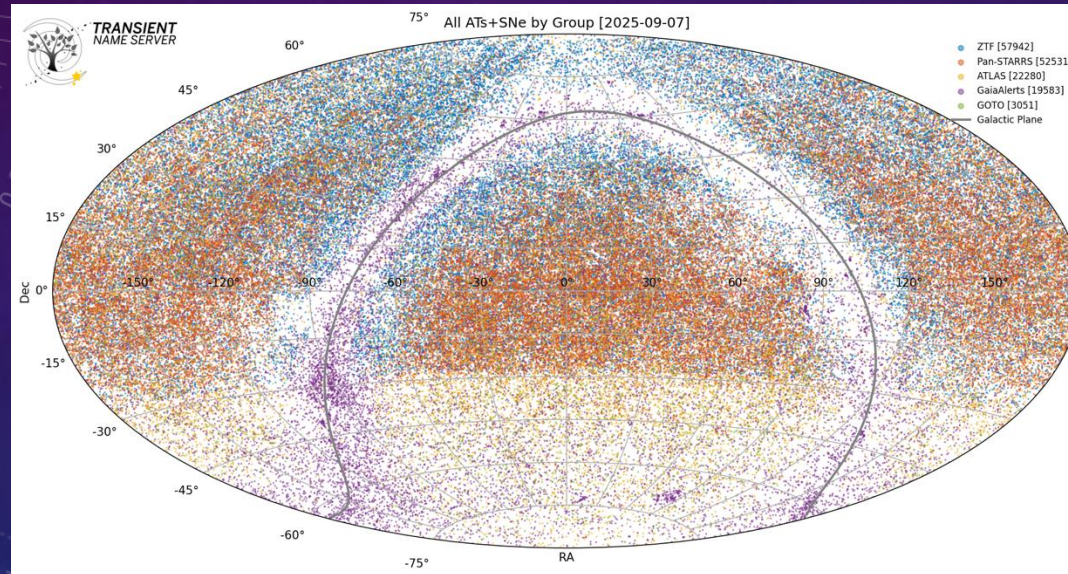
[SoXS Operations Workshop , Milano - Sep 2025]

Ofer Yaron

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

## Reports

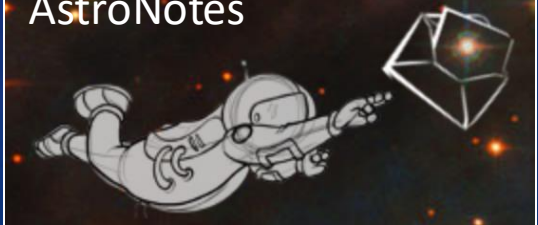
- “Manual” [forms] (including amateurs)
- Bulk via APIs [bots] (most surveys)
- Brokers



## Alerts on

- Transients (AT)
- Classifications (SN...)
- FRBs (GRBs, GW events ...)

## AstroNotes



Team: Avishay Gal-Yam (PI, chair of IAU SN WG),  
Avner Sass, Nikola Knezevic

Weizmann Institute for Science

# 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 Sep 2025] holds: **170k** reported transient candidates (“ATs”),  
**17k (10%)** classified SNe (in addition to the full catalog of all pre-2016 SNe),  
**>2k** active users, **>170** groups (programs/surveys...)
- 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, ATLAS, ZTF, Gaia...), 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 event by different surveys) and keeps a (fully searchable) record of “**internal names**” that are associated with each AT-rep.
- The system supports a citable service for short astronomical announcements - **AstroNotes** - which is a superior version of the ATEL system (flexibility, searchability; 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](#), utilizing high-availability and scalability architecture.
- On Dec 31<sup>st</sup> 2024 [TNS Ver2.0](#) was deployed, with some new features such as:
  - An option to provide Automatic Classification info as part of the AT (Discovery) report
  - An option to indicate that an object (candidate transient) was found to be unreal (bogus)
  - Additional API capabilities, e.g. to include all possible search criteria
  - An official TDE prefix!



# Two major guidelines of the TNS



1. 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 up to a few hours per year).
  - A high-availability and scalable system configuration.
2. 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](#)
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[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.



Pan-Starrs (Hawaii)



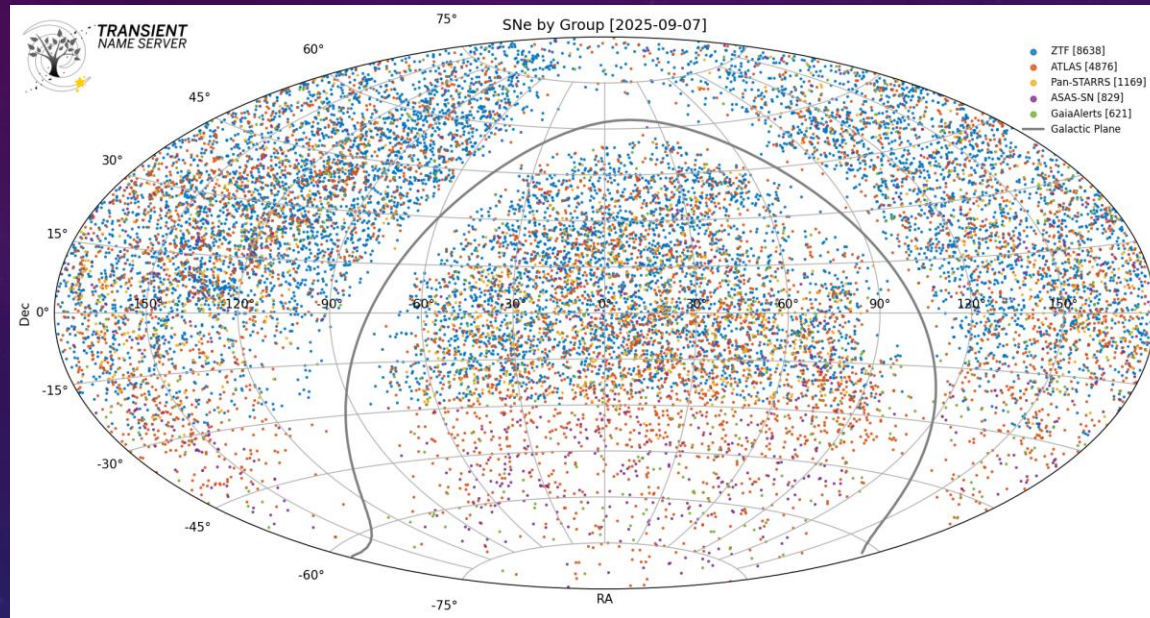
ZTF, i/PTF (Palomar, CA)



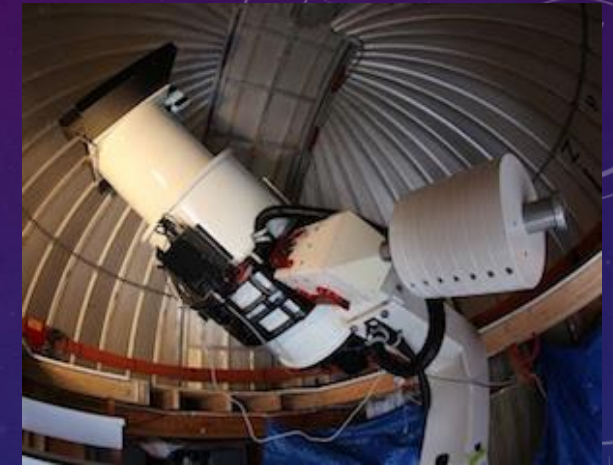
CHIME-FRB (Canada)



# Some of the major surveys reporting to the TNS



ATLAS (Multiple)



Gaia (Space)



Maybe also...

- GRBs
- LIGO-Virgo-KAGRA ?



# TNS Statistics (2025-09)

<b>ALL transients</b> reported since Jan 1, 2016	171,769			<b>PUBLIC classified SNe</b> by type			
<b>PUBLIC transients</b> reported since Jan 1, 2016	171,769			SN Ia	11,413	65%	
<b>PUBLIC transients</b> for the top 10 reporting groups				SN II	2,759	16%	
Pan-STARRS	48,411	28%		SN IIIn	495	3%	
ZTF	29,036	17%		SN Ia-91T-like	449	3%	
ALeRCE	24,825	15%		SN Ic	385	2%	
ATLAS	22,293	13%		SN Ib	308	2%	
GaiaAlerts	19,751	12%		SN IIP	297	2%	
YSE	4,373	3%		SN IIb	267	2%	
GOTO	3,055	2%		SLSN-I	194	1%	
WFST	2,941	2%		SN Ic-BL	169	1%	
DESIRT	2,325	1%		SN Ia-91bg-like	158	1%	
SGLF	2,164	1%		SLSN-II	107	1%	
<b>PUBLIC transients</b> for the top 10 data source groups				SN Ia-pec	97	1%	
ZTF	58,032	34%		SN	86	1%	
Pan-STARRS	52,547	31%		SN Ib/c	78	0%	
ATLAS	22,293	13%		SN Ibn	69	0%	
GaiaAlerts	19,751	12%		SN Iax[02cx-like]	58	0%	
GOTO	3,056	2%		SN I	56	0%	
WFST	2,941	2%		SN Ia-CSM	41	0%	
DESIRT	2,318	1%		SN Ib-pec	17	0%	
iPTF	1,642	1%		SN II-pec	15	0%	
MASTER	1,398	1%		SN Ia-SC	14	0%	
ASAS-SN	1,363	1%		SN Ib-Ca-rich	12	0%	
<b>PUBLIC classified SNe</b> reported since Jan 1, 2016	17,567			SN Icn	7	0%	
<b>PUBLIC classified SNe</b> for the top 10 reporting groups				SN IIIn-pec	5	0%	
ZTF	5,282	30%		SN Ic-pec	3	0%	
ATLAS	4,884	28%		SN IIIL	3	0%	
ALeRCE	2,922	17%		SN Ibn/Icn	2	0%	
Pan-STARRS	902	5%		SN Ic-Ca-rich	1	0%	
ASAS-SN	831	5%		SN Ia-Ca-rich	1	0%	
GaiaAlerts	621	4%		SN Ien	1	0%	
GOTO	459	3%					
SGLF	290	2%					
YSE	268	2%					
iPTF	131	1%					
<b>PUBLIC classified SNe</b> for the top 10 data source groups							
ZTF	8,652	49%					
ATLAS	4,884	28%					
Pan-STARRS	1,169	7%					
ASAS-SN	829	5%					
GaiaAlerts	621	4%					
GOTO	459	3%					
iPTF	132	1%					
XOSS	94	1%					
PTSS	72	0%					
POSS	47	0%					

<b>ALL spectra</b> reported to the TNS	21,010		
<b>PUBLIC spectra</b> reported to the TNS	20,839		
<b>PUBLIC classifications</b> for the top 10 contributing groups			
ZTF	8,364	44%	
ePESSTO+	2,446	13%	
SCAT	1,934	10%	
ePESSTO	723	4%	
UCSC	387	2%	
TCD	368	2%	
Global SN Project	357	2%	
PESSTO	277	1%	
iPTF	256	1%	
ASAS-SN	238	1%	
<b>PUBLIC spectral classifications</b> for the top 10 instruments			
Pan-STARRS	6,834%	33%	
ESO-NTT/EFOSC2-NTT	3,729%	18%	
UH88/SNIFS	2,018%	10%	
LT/SPRAT	1,399%	7%	
P200/DBSP	1,102%	5%	
NOT/ALFOSC	698%	3%	
Lick-3m/KAST	623%	3%	
Keck1/LRIS	617%	3%	
Other/Other	551%	3%	
SOAR/Goodman	349%	2%	

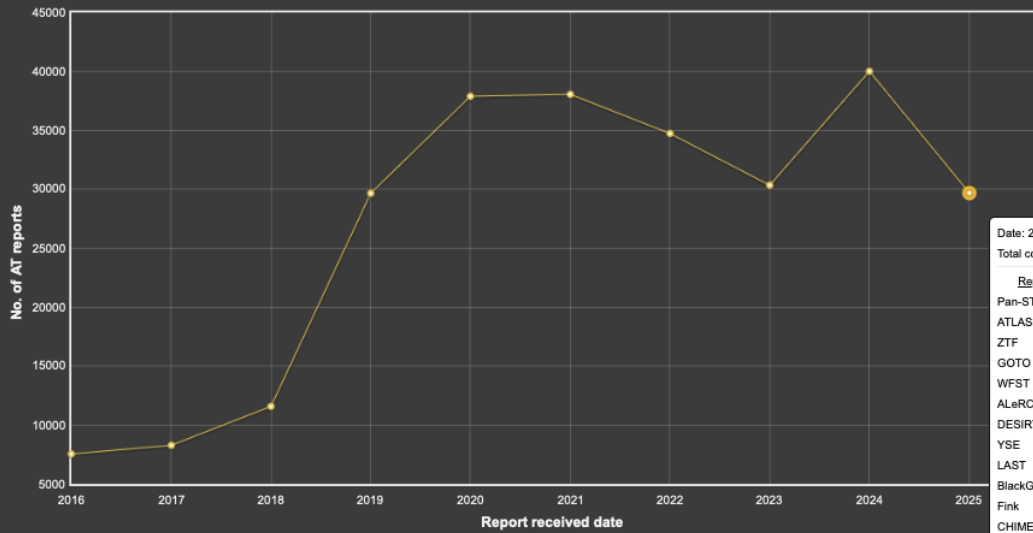


# TNS Reports Yearly Timeline (2025-09)

## Discovery reports

## Classification reports

AT reports submitted to the TNS

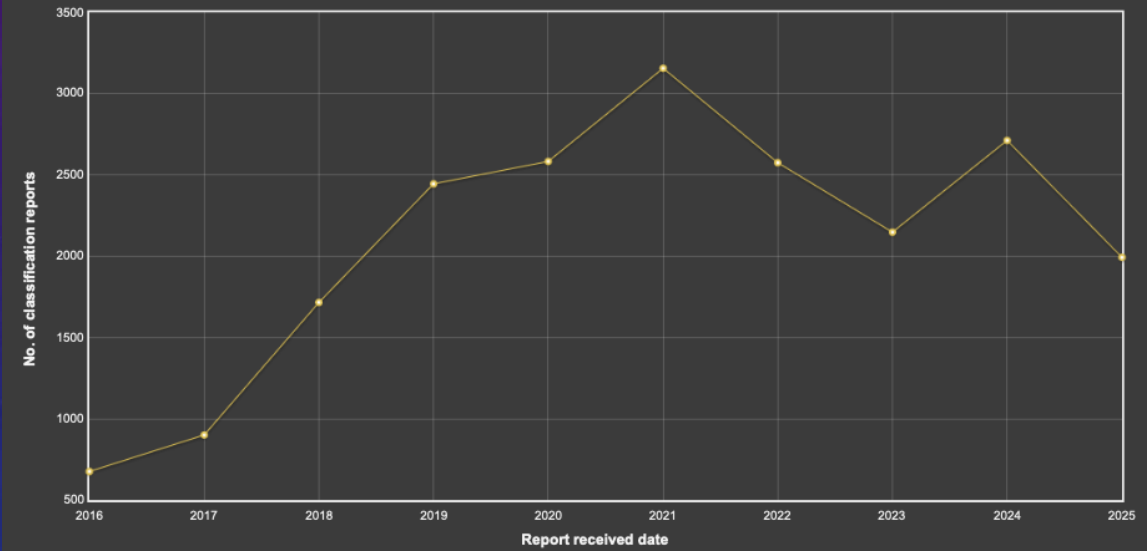


Date: 2025  
Total count: 29682

Reporting Group	Discovery Data Source
Pan-STARRS	6112 Pan-STARRS 7009
ATLAS	4770 ZTF 6945
ZTF	4384 ATLAS 4772
GOTO	3826 GOTO 3826
WFST	2293 WFST 2293
ALeRCE	2059 DESIRT 1142
DESIRT	1142 LAST 968
YSE	1128 BlackGEM 753
LAST	968 CHIMEFRB 338
BlackGEM	753 XOSS 317
Fink	379 MASTER 314
CHIMEFRB	338 YSE 232
XOSS	317 GW-MMADS 180
MASTER	314 TSST_COSMOS_3D137
GW-MMADS	180 GaiaAlerts 117
TSST_COSMOS_3D137	None 113
GaiaAlerts	117 DESGW 50

Yearly  Received in the last: Date range  01/01/2016 and 11/09/2025

Classification reports submitted to the TNS

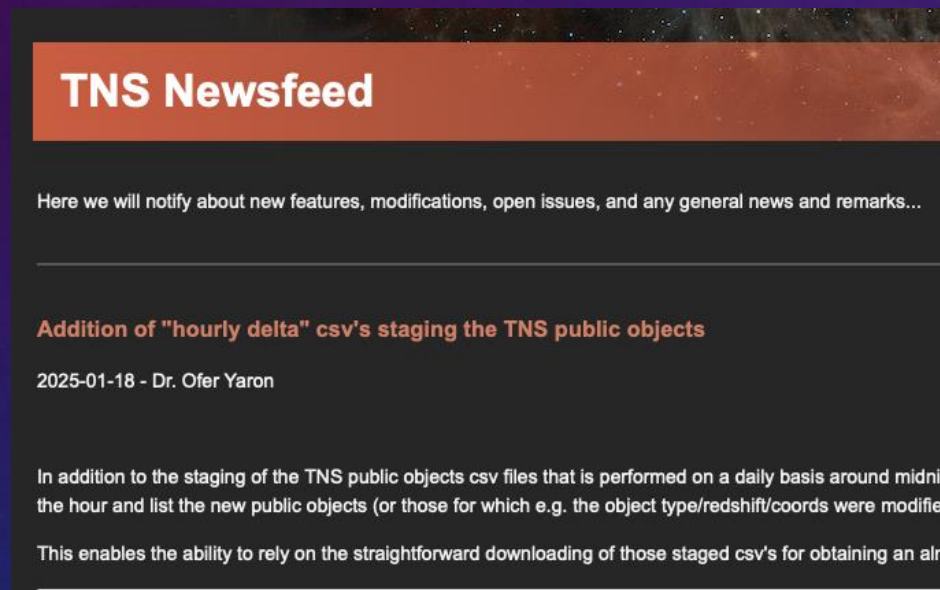


Yearly  Received in the last: Date range  01/01/2016 and 11/09/2025



# 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...

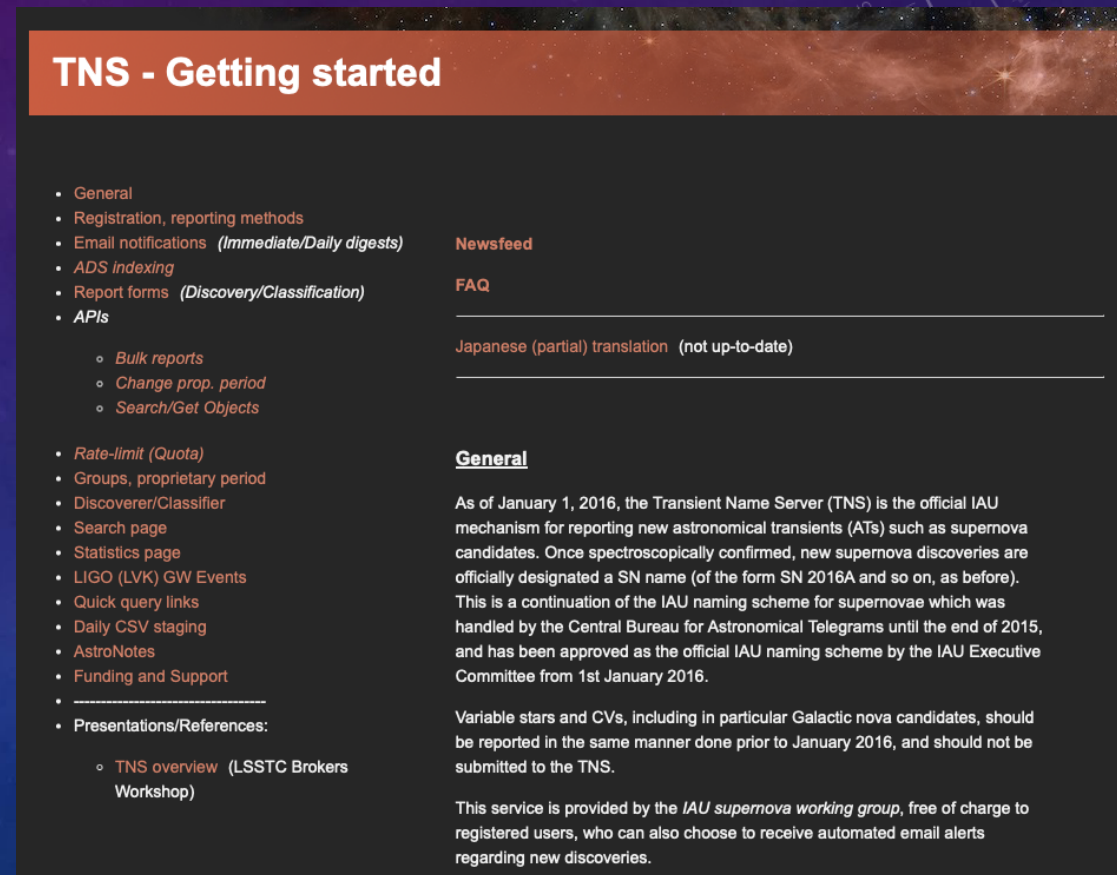
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### Addition of "hourly delta" csv's staging the TNS public objects

2025-01-18 - Dr. Ofer Yaron

In addition to the staging of the TNS public objects csv files that is performed on a daily basis around midnig the hour and list the new public objects (or those for which e.g. the object type/redshift/coords were modified)

This enables the ability to rely on the straightforward downloading of those staged csv's for obtaining an alr



## 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*
- *Rate-limit (Quota)*
- Groups, proprietary period
- Discoverer/Classifier
- Search page
- Statistics page
- LIGO (LVK) GW Events
- Quick query links
- Daily CSV staging
- AstroNotes
- Funding and Support
- Presentations/References:
  - *TNS overview* (LSSTC Brokers Workshop)

### Newsfeed

### FAQ

[Japanese \(partial\) translation](#) (not up-to-date)

### General

As of January 1, 2016, the Transient Name Server (TNS) is the official IAU mechanism for reporting new astronomical transients (ATs) such as supernova candidates. Once spectroscopically confirmed, new supernova discoveries are officially designated a SN name (of the form SN 2016A and so on, as before). This is a continuation of the IAU naming scheme for supernovae which was handled by the Central Bureau for Astronomical Telegrams until the end of 2015, and has been approved as the official IAU naming scheme by the IAU Executive Committee from 1st January 2016.

Variable stars and CVs, including in particular Galactic nova candidates, should be reported in the same manner done prior to January 2016, and should not be submitted to the TNS.

This service is provided by the *IAU supernova working group*, free of charge to registered users, who can also choose to receive automated email alerts regarding new discoveries.



# 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, and all other query parameters)
  - 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 & hourly “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
```



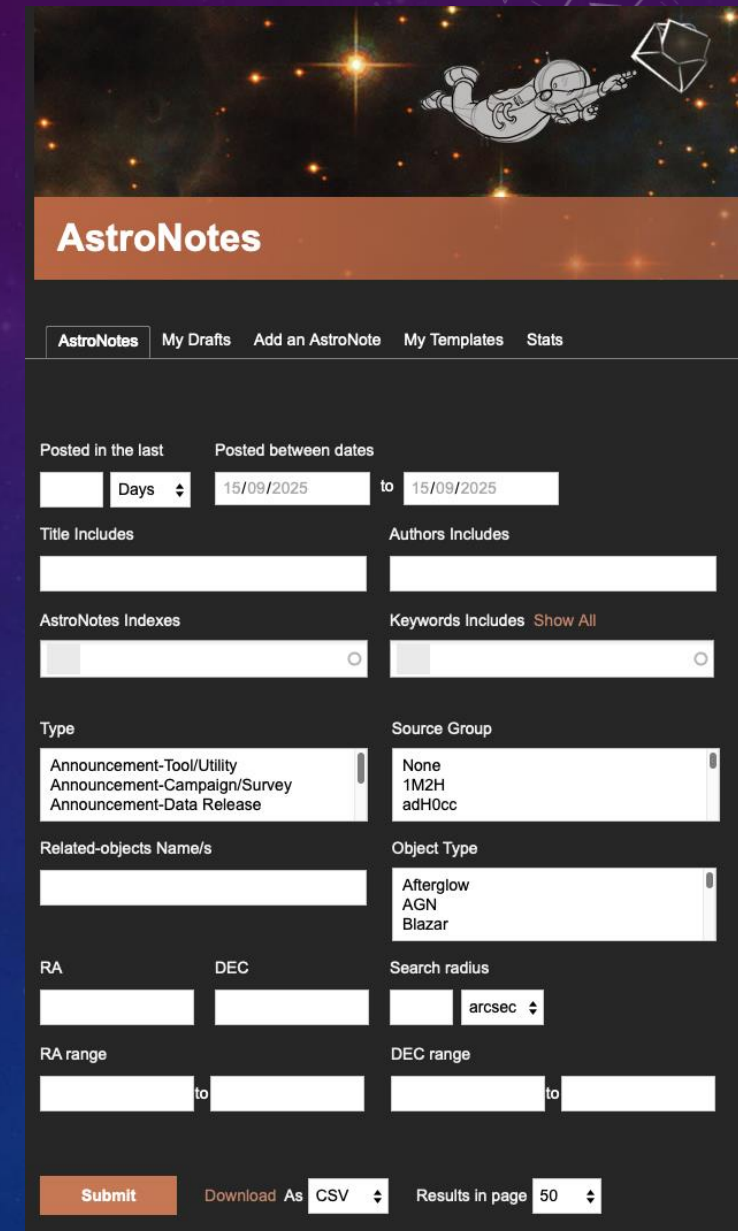
# AstroNotes!!!

- 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...**

Type\* \* 
 Source group\* \* 
 ASCL index

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

notification emails)



**AstroNotes**

[AstroNotes](#) [My Drafts](#) [Add an AstroNote](#) [My Templates](#) [Stats](#)

Posted in the last  Days  15/09/2025 to  15/09/2025

Title Includes  Authors Includes

AstroNotes Indexes  Keywords Includes  Show All

Type  Source Group

Related-objects Name/s  Object Type

RA  DEC  Search radius  arcsec

RA range  to  DEC range  to

Download As  Results in page

# 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 and homogenous writing of a new AstroNote.
- Easy sharing of **Drafts** with the colleagues; allowing definition of several co-editors to continue editing the draft until submission.

AstroNotes My Drafts **Add an AstroNote** My Templates Stats

Save as draft

Use template

ePESSTO+ spectroscopic classification of optical transients [ ePESSTO+ ]

Template instructions

- This ePESSTO+ main template includes all/most options for the feeding surveys and template matching programs used. Make sure to leave only the relevant ones for each specific AstroNote.
- Additional columns for the Related Objects section currently include:
  - Source (feeding survey/s), Phase.
 If necessary, add additional required columns.
- Classification notes can be specified in the *Remarks* field, in the *Additional values* section for each Related object.
- Make sure to replace (or remove) all occurrences of {{ ... }} with the relevant text before submission of the AstroNote.
- To summarize - in creating an AstroNote based on this template, the required adjustments/changes are:
  - **Authors list.** Currently, the only listed authors are the survey builders. While iterating on the draft AstroNote, the person in duty from Weizmann will make sure to update which people should be included in the coauthors list; one/two of: I. Irani, E. Zimmerman, N. Linn-Strotjohan, R.J. Bruch
  - **Abstract:** Reviewing which classifications are included in the report and highlighting interesting ones. (The abstract is shown in the notification emails.)
  - **Body:** leave the relevant feeding surveys and classification programs, update the observing date.
  - Add the relevant Related objects, filling the values for the additional columns and Remarks. The column source refers to the survey that reported the object (e.g. ATLAS, ZTF, PS, ASASSN, GOTO, etc)

(Admin Only) Show in Util section.

Additional AstroNote editors

Title

ePESSTO+ spectroscopic classification of optical transients

Authors\*

# 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 and homogenous 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, object types and coords.

The screenshot displays the AstroNotes web interface. At the top, there is a header with the text "AstroNotes" and a navigation menu with links for "AstroNotes", "My Drafts", "Add an AstroNote", "My Templates", and "Stats". Below the header, there are several search filters: "Posted in the last" (set to "Days"), "Posted between dates" (set to "15/09/2025" to "15/09/2025"), "Title Includes", "Authors Includes", "AstroNotes Indexes", "Keywords Includes", "Type" (with options: "Announcement-Tool/Utility", "Announcement-Campaign/Survey", "Announcement-Data Release"), "Source Group" (with options: "None", "1M2H", "adH0cc"), "Related-objects Name/s", "Object Type" (with options: "Afterglow", "AGN", "Blazar"), "RA", "DEC", "Search radius" (set to "arcsec"), "RA range", and "DEC range". At the bottom, there is a "Submit" button, a "Download As" dropdown menu (set to "CSV"), and a "Results in page" dropdown menu (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.
- 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

FRB Discovery

Discovery magnitude cut

Mag ≤

Notify on new transients coincident with sources from the

Systems of interest

AstroNotes notifications

Set all to Never    Revert to defaults

Announcement-Tool/Utility	Daily ▾
Announcement-Campaign/Survey	Daily ▾
Announcement-Data Release	Daily ▾
Announcement-General	Immediate ▾
Object/s-Discovery/Classification	Immediate ▾
Object/s-Data/Analysis	Immediate ▾

# AstroNotes!!!

A query for ePESSTO+ AstroNotes:

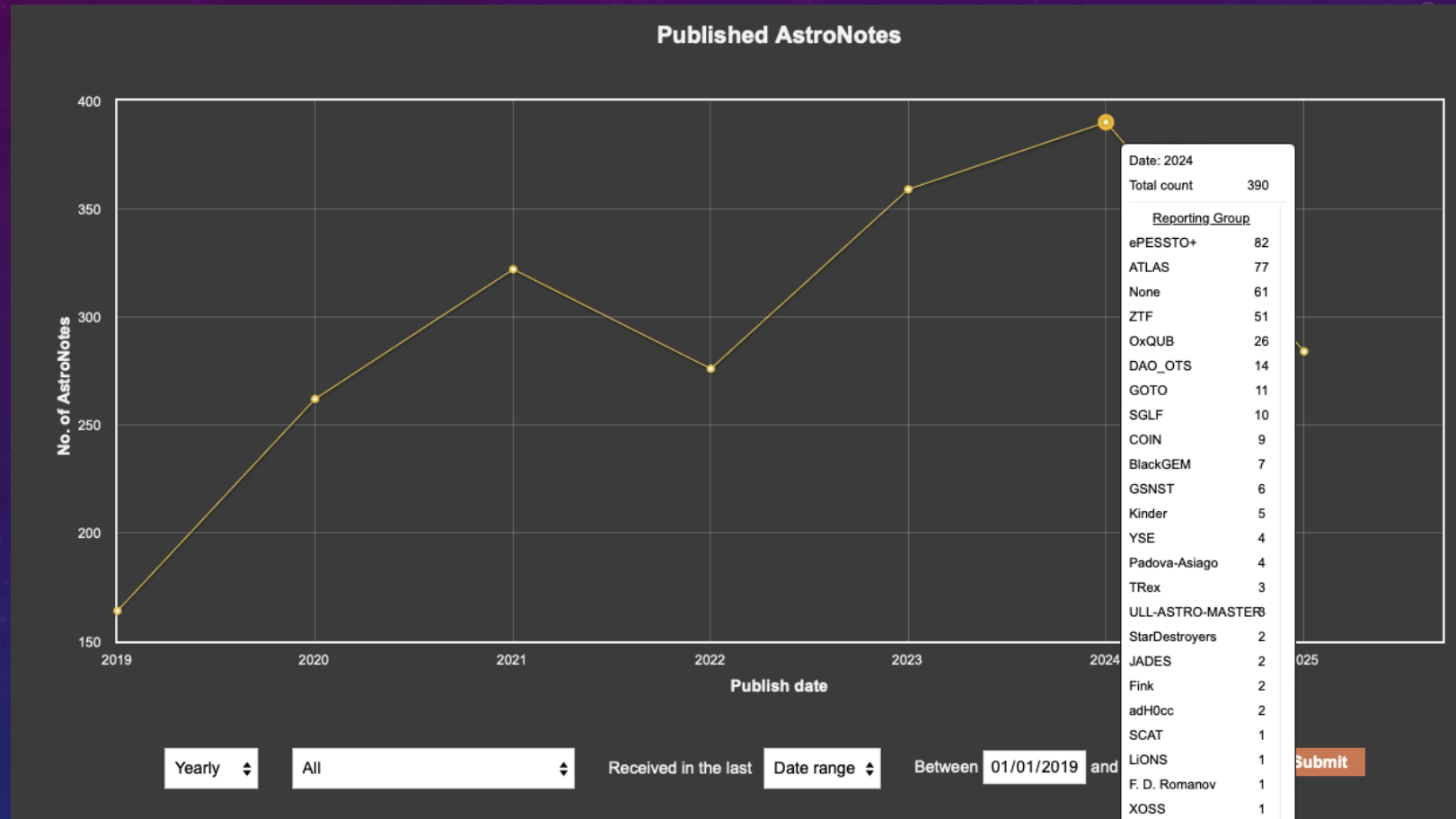
- Major surveys and groups of the Transients community have already moved to using solely AstroNotes – ATLAS, Pan-Starrs, PESSTO, ZTF...

Posted in the last: Days  
Posted between dates: 14/09/2025 to 14/09/2025  
Title Includes:   
AstroNotes Indexes:   
Type: Announcement-Tool/Utility, Announcement-Campaign/Survey, Announcement-Data Release  
Source Group: ePESSTO, ePESSTO+, Euclid STSWG  
Object Type: Afterglow, AGN, Blazar  
Search radius: arcsec  
Submit, Download As CSV, Results in page 50

Showing results 1 to 50 out of 482  
1 2 3 4 5 6 7 8 9 ...  
AstroNote 2025-268 Type: Object/s-Discovery/Classification Released: 2025-08-26 18:29:30  
**ePESSTO+ spectroscopic classification of optical transients**  
C. Gutiérrez, R. Sanfeliu, H-Y. Miao, L. Galbany (ICE-CSIC/IEEC), A. Aryan (Taiwan), T. Kravstov (Turku), J. Anderson ...  
Source Group: ePESSTO+  
Keywords: Transient, Supernova, Optical, Spectroscopy  
Related Objects: 2025tfc [ZTF25abghcmh], 2025tml [ATLAS25jgc], 2025tsw [ZTF25abikgia]  
This report includes classifications of 3 Type Ia's.  
AstroNote 2025-267 Type: Object/s-Discovery/Classification Released: 2025-08-25 21:41:35  
**ePESSTO+ spectroscopic classification of optical transients**  
R. Sanfeliu, H-Y. Miao, L. Galbany (ICE-CSIC/IEEC), A. Aryan (Taiwan), T. Kravstov (Turku), J. Anderson ...  
Source Group: ePESSTO+  
Keywords: Transient, Supernova, Optical, Spectroscopy  
Related Objects: 2025uwe [ZTF25abjileo], 2025vaw [ATLAS25kew]  
This report includes classifications of 2 Type Ic's.  
AstroNote 2025-260 Type: Object/s-Discovery/Classification Released: 2025-08-17 19:19:53  
**ePESSTO+ spectroscopic classification of optical transients**  
Hao-Yu Miao, Ramon Sanfeliu, Caludia Gutiérrez, Lluís Galbany (ICE-CSIC/IEEC), Jesper Sollerman (Stockholm), Thallis d...  
Source Group: ePESSTO+  
Keywords: Transient, Supernova, Optical, Spectroscopy  
Related Objects: 2025tqb [ATLAS25jjs]  
This report includes one classification of a Type Ia 91T-like.

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

# AstroNotes - Stats



(Almost) monotonic increase since 2019, currently dominated by ePESSTO+, ATLAS and ZTF;  $> \sim 1/\text{day}$

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

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

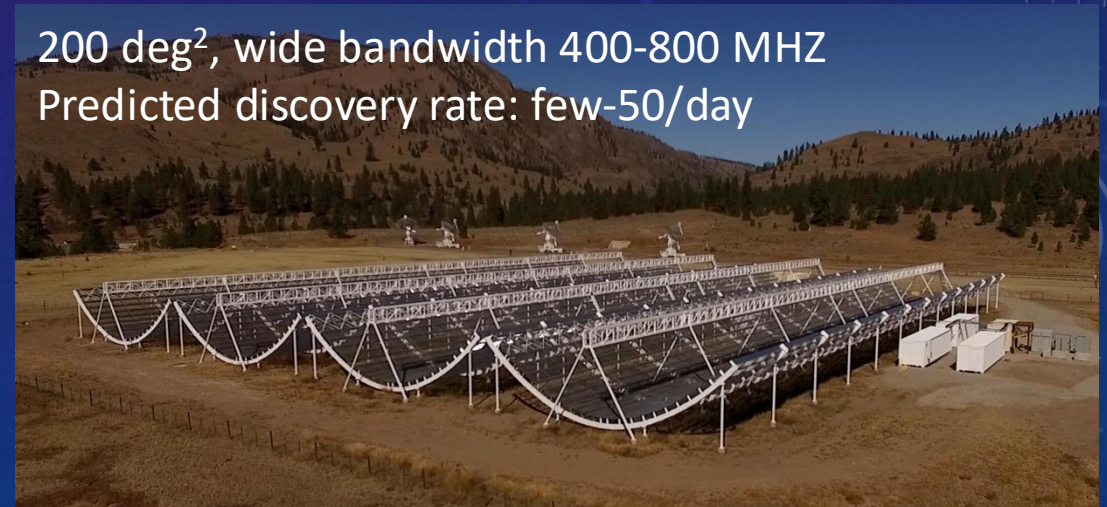
- Repeaters are distinct objects on the TNS, allowing flexible associations of multiple bursts with the **Primary Burst**.

## 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

> 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		02:15:60.000	+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)	

# LVK (LIGO/Virgo/KAGRA) GW service on the TNS

See AstroNote  
2024-79

- Following the past O1-O3 observing runs, we now follow the O4 incoming LVK GW public alerts.
- We provide a list of both the high & low significance events with their basic info.
- For every newly released real alert, we create Aitoff-projection skymaps showing the localizations, with all known public TNS transients that lie within the 50/90/99% credibility regions, over-plotted.
- We show and provide downloadable tables of the existing TNS transients that have existed **BEFORE** the exact time of event and the transients that stream in **AFTER** the time of the GW; updated on an hourly basis during two weeks from the event time.

## LVK GW events

O4 events O1-3 events

Significance High

Showing 208 events out of 3286

Event Date	Event ID	Last Alert Type	Significance	GraceDB URL	Instruments	Classification	Distance [Mpc] (Err)	FAR [Hz]	Group	Last Processed	Download zip file
2025-09-12 20:04:17	<a href="#">S250912x</a>	PRELIMINARY	High	<a href="#">To GraceDB event page</a>	L1, V1	BNS: (0%) NSBH: (0%) BBH: (94.44%) Terrestrial: (5.56%)	2208.087 (728.65)	7.852e-08	CBC	2025-09-14 12:00:03	<a href="#">S250912x_20250912_200417.zip</a>
2025-09-12 06:40:08	<a href="#">S250912f</a>	UPDATE	High	<a href="#">To GraceDB event page</a>	L1, V1	BNS: (0%) NSBH: (0%) BBH: (99.92%) Terrestrial: (0.08%)	2740.199 (721.72)	2.873e-13	CBC	2025-09-14 12:00:40	<a href="#">S250912f_20250912_064008.zip</a>
2025-09-11 07:46:39	<a href="#">S250911ac</a>	UPDATE	High	<a href="#">To GraceDB event page</a>	H1, L1	BBH: (96.35%) Mass-Gap: (6.96%) Terrestrial: (3.65%)	1123.517 (285.32)	6.018e-09	CBC	2025-09-14 12:01:37	<a href="#">S250911ac_20250911_074639.zip</a>
2025-09-10 00:07:57	<a href="#">S250910b</a>	RETRACTION	High	<a href="#">To GraceDB event page</a>	H1, L1	Retracted	134.094 (45.31)	5.577e-08	CBC	2025-09-10 00:09:43	<a href="#">S250910b_20250910_000757.zip</a>
2025-09-08 14:34:28	<a href="#">S250908y</a>	UPDATE	High	<a href="#">To GraceDB event page</a>	H1, V1	BNS: (0%) NSBH: (0%) BBH: (99.98%) Mass-Gap: (0.23%) Terrestrial: (0.02%)	1146.454 (333.87)	1.150e-10	CBC	2025-09-14 12:02:35	<a href="#">S250908y_20250908_143428.zip</a>
2025-09-06 12:23:59	<a href="#">S250906ca</a>	UPDATE	High	<a href="#">To GraceDB event page</a>	H1, L1, V1	BNS: (0%) NSBH: (0.06%) BBH: (99.94%) Mass-Gap: (5.77%) Terrestrial: (0%)	1121.426 (266.45)	1.097e-13	CBC	2025-09-14 12:03:42	<a href="#">S250906ca_20250906_122359.zip</a>
2025-09-04 13:49:52	<a href="#">S250904cv</a>	UPDATE	High	<a href="#">To GraceDB event page</a>	H1, L1	BBH: (99.97%) Terrestrial: (0.03%)	1806.496 (595.45)	3.168e-10	CBC	2025-09-14 12:10:41	<a href="#">S250904cv_20250904_134952.zip</a>
2025-09-04 10:22:07	<a href="#">S250904br</a>	INITIAL	High	<a href="#">To GraceDB event page</a>	H1, L1, V1	BBH: (100%) Terrestrial: (0%)	2748.449 (680.70)	3.168e-10	CBC	2025-09-14 12:17:55	<a href="#">S250904br_20250904_102207.zip</a>
2025-09-04 03:33:07	<a href="#">S250904ae</a>	UPDATE	High	<a href="#">To GraceDB event page</a>	H1, L1, V1	BBH: (100%) Terrestrial: (0%)	3544.907 (913.01)	3.168e-10	CBC	2025-09-14 12:24:37	<a href="#">S250904ae_20250904_033307.zip</a>
2025-09-01 18:59:41	<a href="#">S250901cb</a>	UPDATE	High	<a href="#">To GraceDB event page</a>	H1, L1, V1	BNS: (0%) NSBH: (0%) BBH: (100%) Terrestrial: (0%)	2017.763 (482.33)	3.193e-14	CBC	2025-09-14 12:41:24	<a href="#">S250901cb_20250901_185941.zip</a>
2025-08-31 12:30:48	<a href="#">S250831cc</a>	PRELIMINARY	High	<a href="#">To GraceDB event page</a>	H1, L1, V1	BNS: (9.25%) Mass-Gap: (8.28%) Terrestrial: (90.75%)	371.411 (108.17)	3.817e-07	CBC	2025-09-14 12:44:20	<a href="#">S250831cc_20250831_123048.zip</a>



# LVK (LIGO/Virgo/KAGRA) GW “service” on the TNS

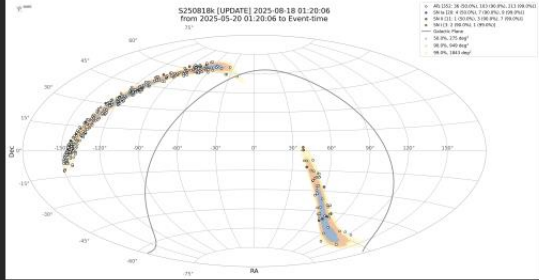
e.g. for S250818k:

## LIGO GW Event S250818k, 2025-08-18 01:20:06

O4 events | O1-3 events

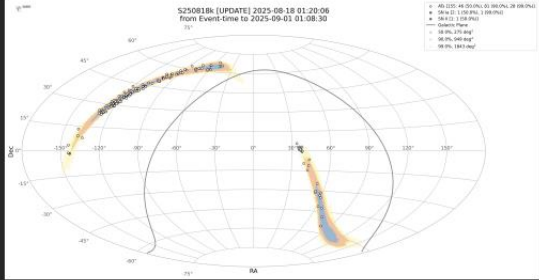
<b>Event ID</b> S250818k_20250818_012006	<b>FAR [Hz]</b> 6.810e-08
<b>Significance</b> High	<b>Group</b> CBC
<b>Event Date</b> 2025-08-18 01:20:06	<b>Last Processed</b> 2025-09-01 01:08:30
<b>Instruments</b> H1, L1, V1	<b>Metadata JSON</b> <a href="#">METADATA_S250818k_20250818_012006.json</a>
<b>Distance [Mpc] (Err)</b> 236.89 (61.94)	<b>LIGO Alert JSON</b> <a href="#">S250818k_20250818_012006.json</a>
<b>Classification</b> BNS: (29.45%) Mass-Gap: (7.07%) Terrestrial: (70.55%)	<b>Download zip file</b> <a href="#">S250818k_20250818_012006.zip</a>

### TNS Transients discovered BEFORE the GW event (within date range 2025-05-20 - 2025-08-18)



Skymap before | [JSON format transient list before](#) | [TSV format transient list before](#)

### TNS Transients discovered AFTER the GW event (within date range 2025-08-18 - 2025-09-01)



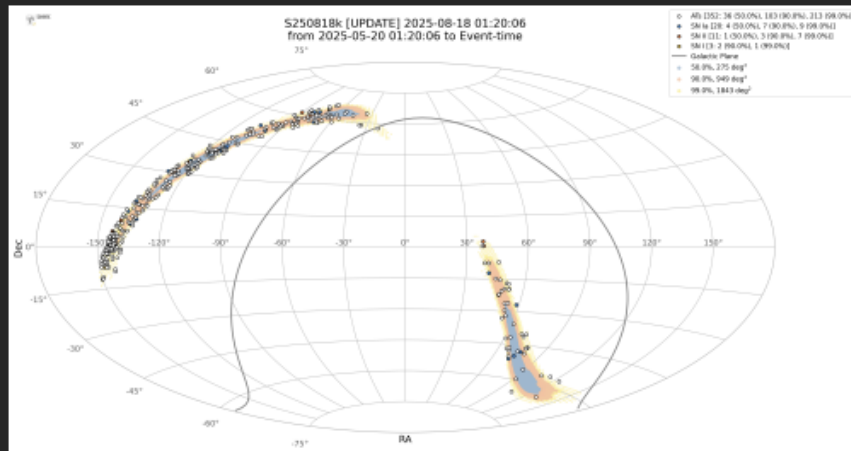
Skymap after | [JSON format transient list after](#) | [TSV format transient list after](#)



# LVK (LIGO/Virgo/KAGRA) GW “service” on the TNS

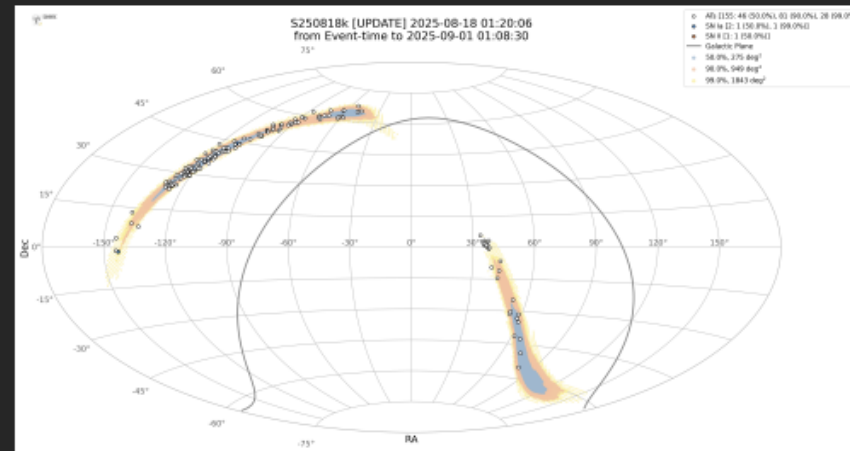
e.g. for S250818k:

TNS Transients discovered BEFORE the GW event  
(within date range 2025-05-20 - 2025-08-18)



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

TNS Transients discovered AFTER the GW event  
(within date range 2025-08-18 - 2025-09-01)



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

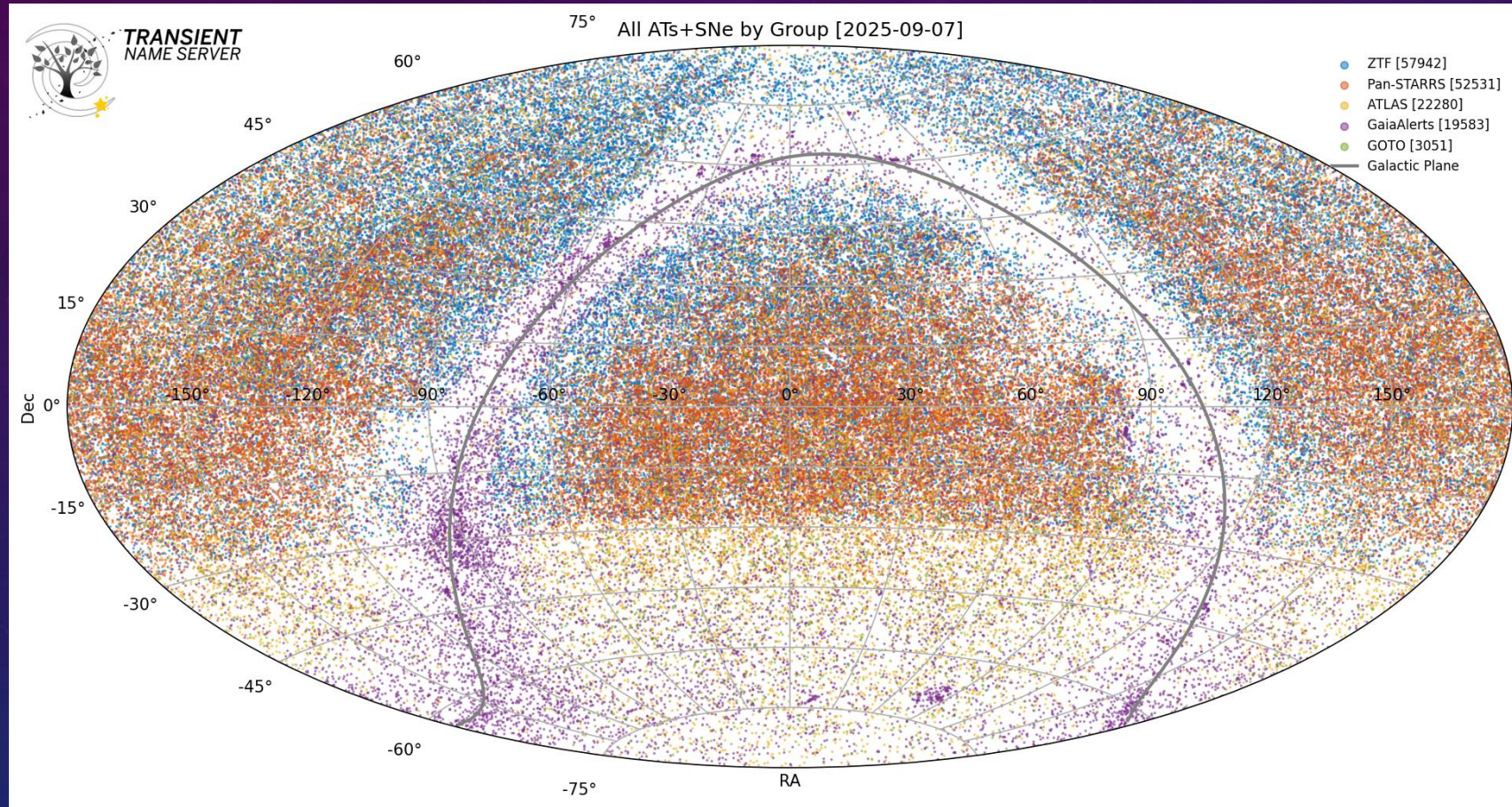
## Discovered AFTER the GW event (2025-08-18 - 2025-09-01):

Name	RA	DEC	Type	Discovery Date	Discovery Mag	Filter	Source Group	Credibility Level	Region
<a href="#">AT 2025wnq</a>	05:17:56.596	-55:09:07.02	None	2025-08-31 15:41:10.176	20.01	L	GOTO	0.689	90.0%
<a href="#">AT 2025wno</a>	04:49:23.666	-48:50:15.56	None	2025-08-31 15:11:13.056	19.75	L	GOTO	0.255	50.0%
<a href="#">AT 2025wnm</a>	04:23:09.093	-42:30:53.50	None	2025-08-31 14:48:36.576	19.9	L	GOTO	0.246	50.0%
<a href="#">AT 2025wnj</a>	17:09:20.794	+54:07:57.97	None	2025-08-29 05:21:46.002	20.1547	r	ZTF	0.928	99.0%



# Skymaps & Plots

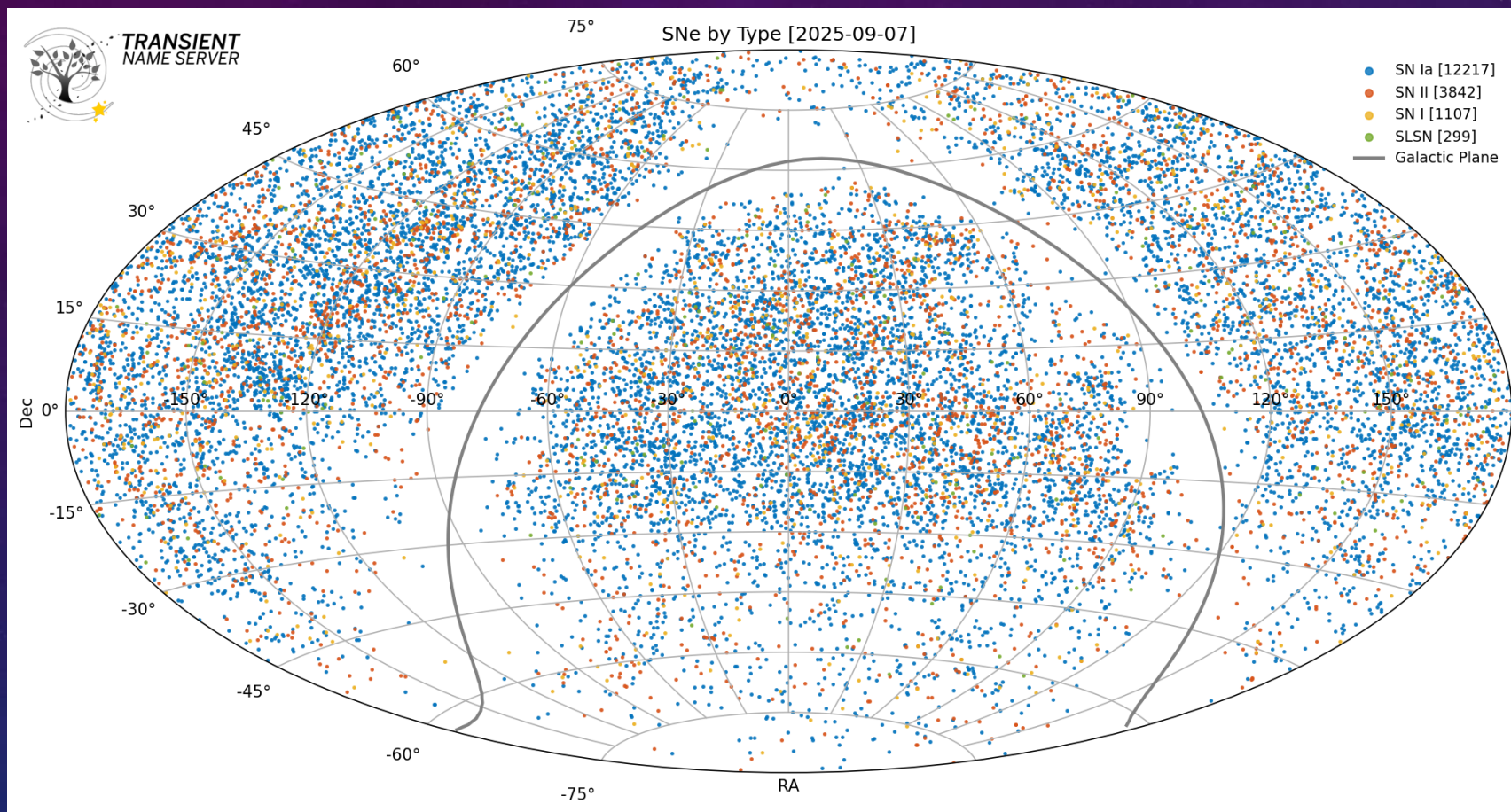
Aitoff-projection skymaps of all TNS objects by various cuts & groupings, updated every Sunday



Can see the various regions covered by the top contributing surveys

# Skymaps & Plots

Aitoff-projection skymaps of all TNS objects by various cuts & groupings, updated every Sunday

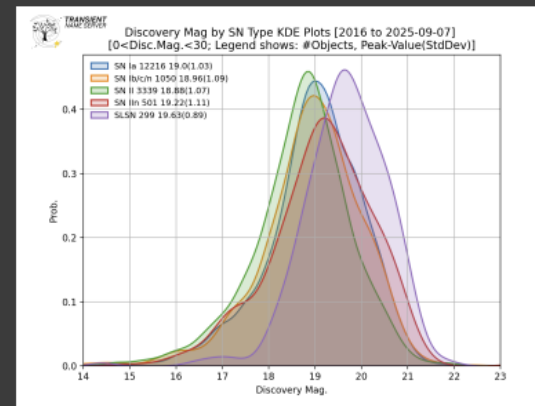
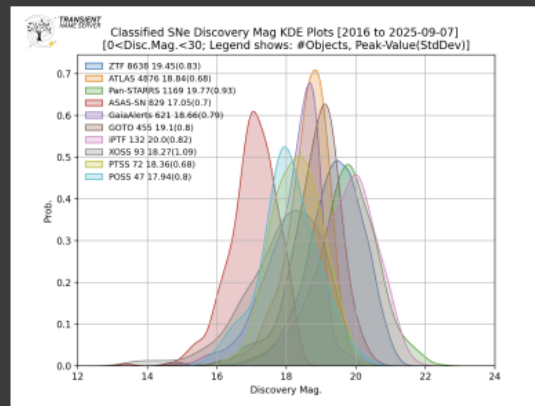
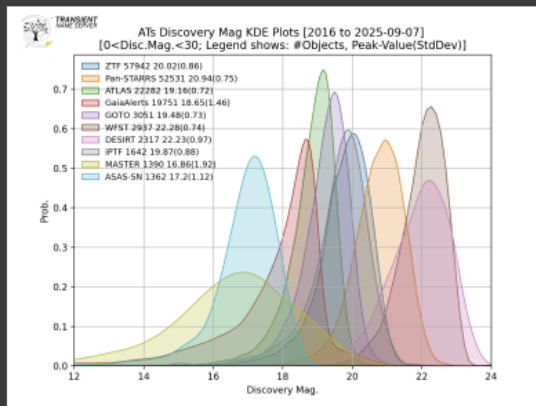


Hardly any SNe around the galactic plane...

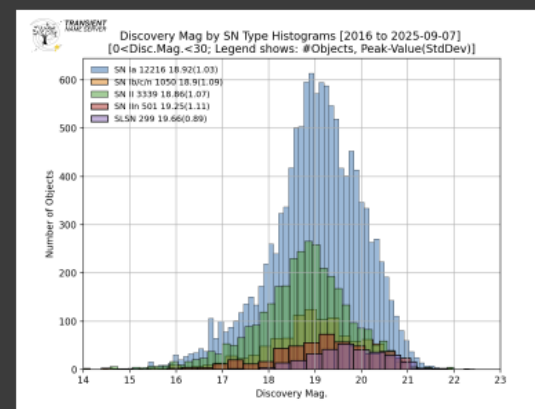
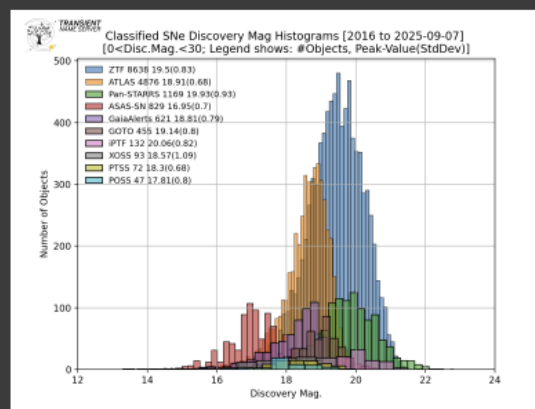
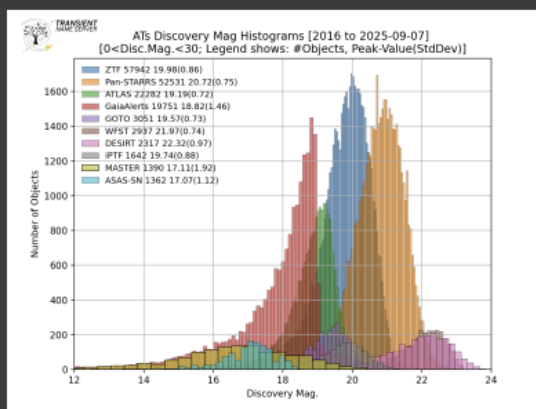
# Skymaps & Plots

Discovery magnitude distributions plots by various cuts & groupings, also the evolution over the past 6 years.

### Discovery Magnitude Distributions - KDE Plots



### Discovery Magnitude Distributions - Histogram Plots



# TNS 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 (<https://www.wiserep.org>).
- Initiated mainly for SN candidates, the TNS also handles other extra-galactic transients, including novae (CVs), AGN variability, TDEs, Kilonovae... BUT NOT variable stars, asteroids or other such galactic/local variable/moving sources.

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

- “Area/precise-time” Transients are also officially managed on the TNS: FRBs have joined, maybe GRBs in the future.

(In future more sophisticated cross-matching and association capabilities should be implemented – both on the TNS, and hopefully also by the additional tools and brokers being developed.)

- Classifications must be supported by a spectrum (not relevant for the area transients), and currently the TNS switches the **prefixes** from **AT** to **SN** and **TDE** (Kilonovae... remain ‘AT’ until an official decision will be made).
- API sample codes are available for download on the help page.



# TNS Clarifications / to summarize

- Prospects for Rubin LSST:
  - The TNS will accommodate receipt of up to several thousands of transient candidates per day, also potential duplicate reports (for the same event) from the various brokers; however...
  - We expect “clean” streams of transient candidates, with minimal “contamination” such as variable stars, moving objects, bogus detections etc...
  - One should also note that with the depth of LSST, only a small fraction of the transients will get a spectroscopic classification.

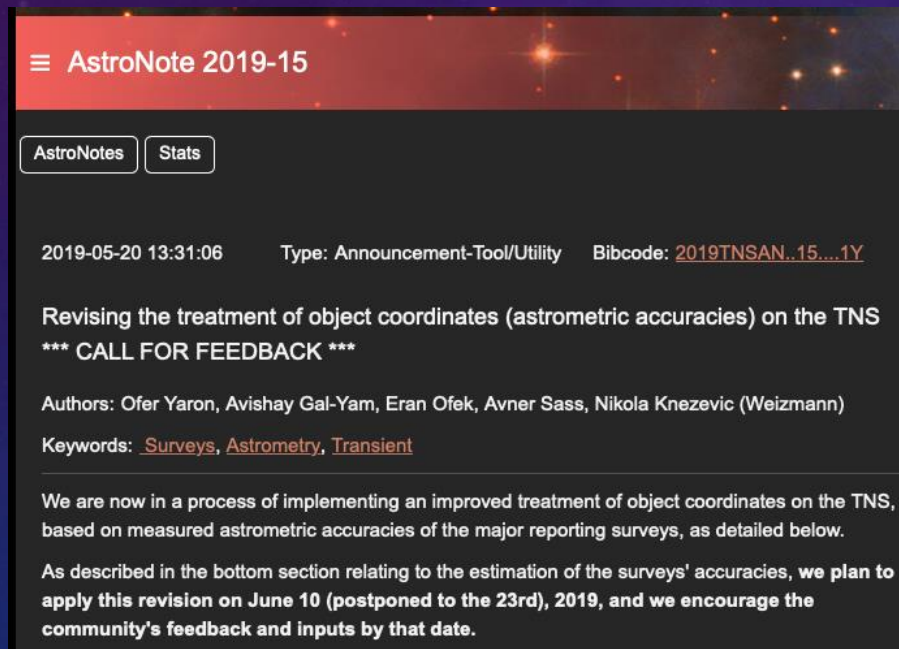
(May have to consider enabling additional classification methods, but a slippery slope...)

- For any questions/feedback/suggestions related to the use of the TNS, its APIs and 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/revisted.



≡ AstroNote 2019-15

AstroNotes Stats

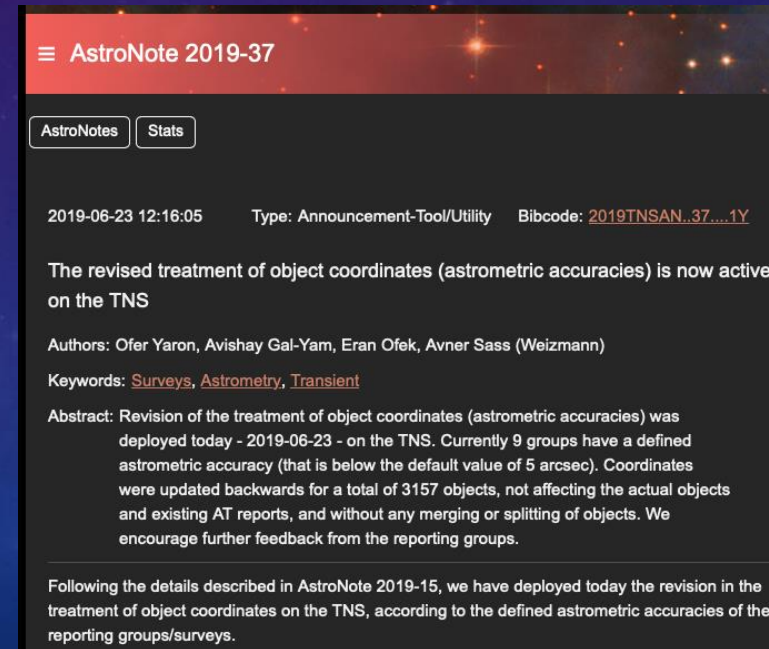
2019-05-20 13:31:06 Type: Announcement-Tool/Utility Bibcode: [2019TNSAN..15....1Y](#)

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

