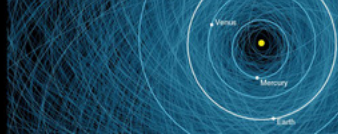# Minor Planet Center Update & Status

Tim Spahr, NEO Sciences, LLC & University of Maryland Small Bodies Node

James Bauer (UMD), Matthew Holman (MPC, CfA)

IAWN Steering Committee Meeting, Vienna, 5 February 2020

Brief update items

--Minor Planet Center has hired several new staff members and given each specific tests and projects; much progress!

--NEO Confirmation Page & Comet Confirmation Page updated automatically/frequently and running smoothly

--Automated processing of identifications submitted by external parties
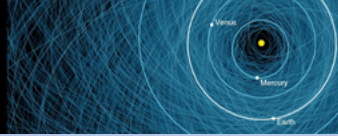
More update items

Running Tallies

Near-Earth Objects Discovered

THIS MONTH:	127
THIS YEAR:	127
LAST YEAR:	2436
ALL TIME:	21951

Minor Planets Discovered

THIS MONTH:	128
THIS YEAR:	128
LAST YEAR:	4956
ALL TIME:	853561

Comets Discovered

THIS MONTH:	3
THIS YEAR:	3
LAST YEAR:	68
ALL TIME:	4138

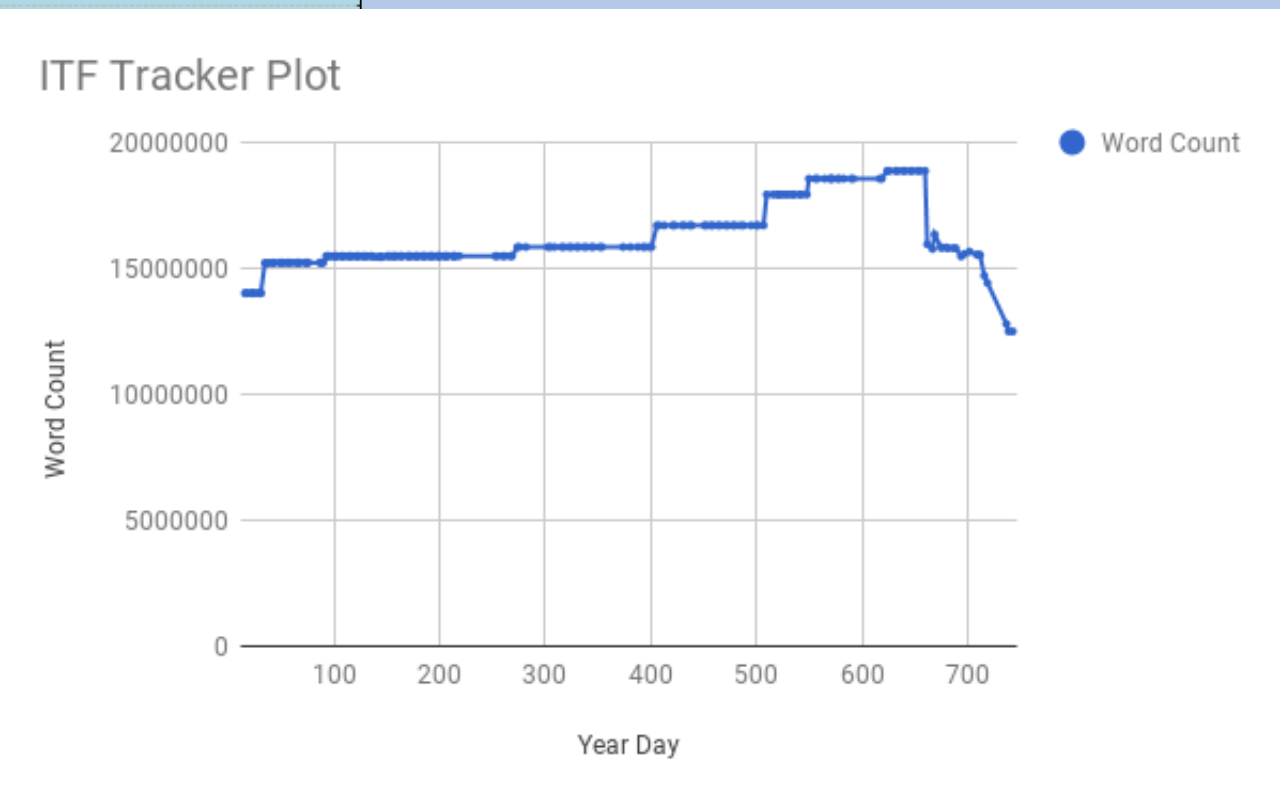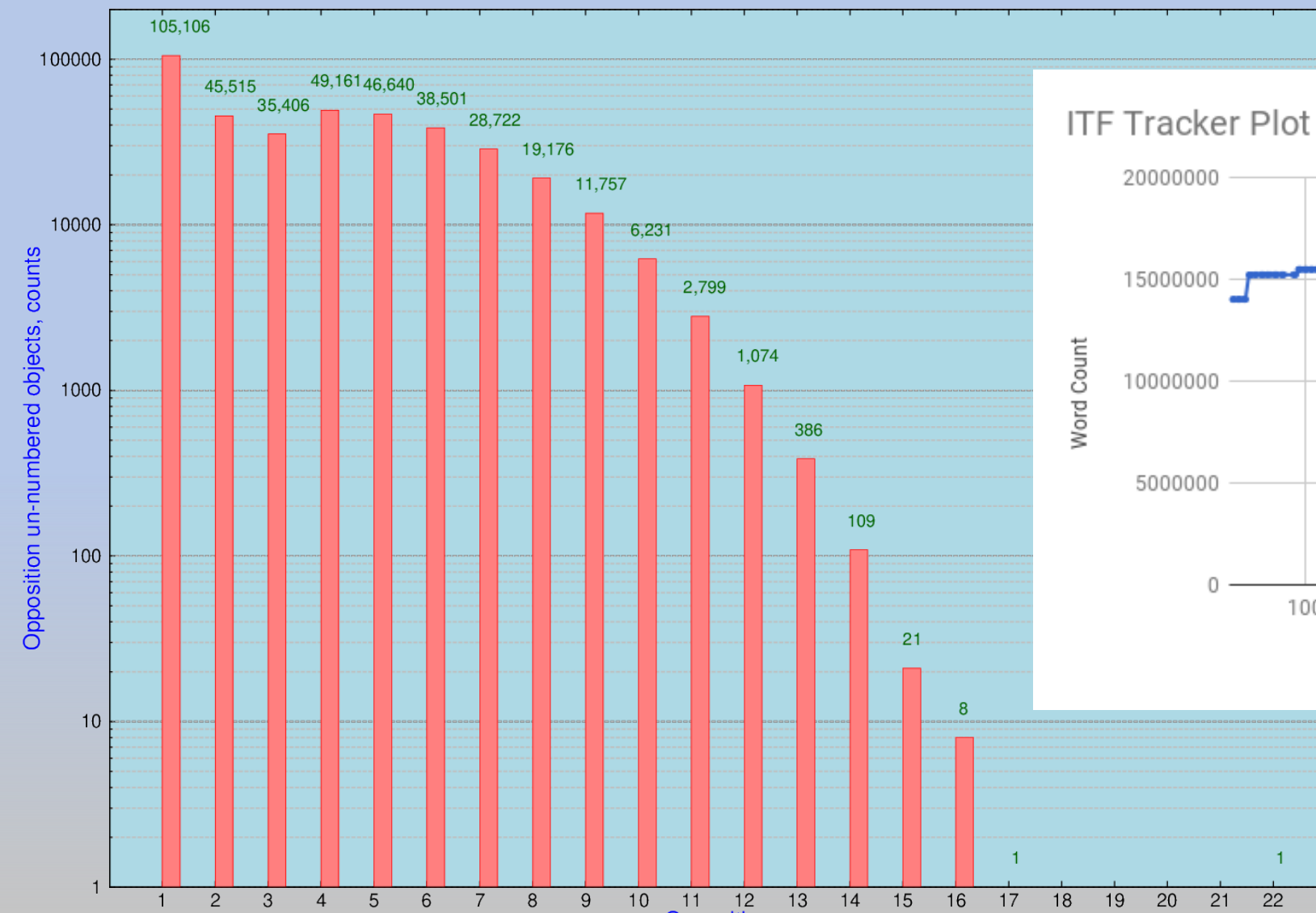### Observations

THIS MONTH:	303043
THIS YEAR:	303043
LAST YEAR:	27.8 million
ALL TIME:	246.1 million

--MPC is exporting ADES-format observations to JPL/CNEOs for use in SCOUT and Sentry NEO impact calculations & uncertainties
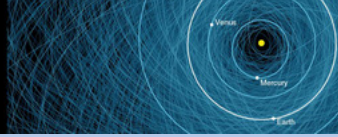
> 930,000 orbits on file with the MPC right now (!!)
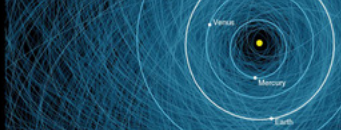
Some figures

Significant progress on linking backlogs (> 33% reduction of Individual Tracklet File entries).

Many New MPC Products: *in Beta Testing*

- **Cometary Activity Observations**
  - Regularize Cometary reporting
  - Further automation of PCCP processing

- **MPC Pointings Database Submissions & Queries**
  - Decreases duplication of phase space coverage in NEO follow-up

- **Observation Disposition Search Page**
  - https://www.minorplanetcenter.net/beta/wamo.html
  - Identification and reference for published data
  - Other disposition possibilities, e.g. ITF
  - Simply "we have it" or "we don't" for unprocessed data

- Other products include New Observatory code request form, information on previous NEOCP objects.
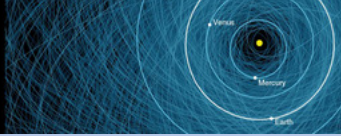
Recent SBN-MPC Operations Developments:

- Archiving the MPC database: SBN hosts a live copy of the MPC Database

  - Backed up to UMD's cloud-based resources, history of db & incremental upgrades

  - *SBN is the distributor of the MPC Postgres database; beta-distribution has begun… .*

    - *Initial test of new Postgres DB ingest and distribution completed in Feb 2019.*

    - *"Alpha" Testing underway for NEO DB distribution (SpaceDys, CSS, Astronomical Research Institute, SpaceWatch).*

    - *Status Boards for database uptime and some basic products*

  - *Integration of MPC DB in SBN tools (CATCH, Comet Cross-ID tool)*

Postgres mpcbeta:

| Table	Count	Created_at	Updated_at
neocp_els	99	2020-01-31 09:59:40.344292	2020-01-31 12:23:40.614618
neocp_events	35463	2020-01-31 12:23:49.390546	2020-01-31 12:23:49.390546
neocp_obs_archive	108399	2020-01-31 12:23:40.60739	2020-01-31 12:23:40.60739
neocp_obs	894	2020-01-31 12:23:40.602097	2020-01-31 12:23:40.602097
neocp_prev_des	33800	2020-01-31 12:06:18.783104	2020-01-31 12:06:18.783104
neocp_var	197932	2020-01-31 12:23:49.372314	2020-01-31 12:23:49.372314

YYYY-MM-DD - latest record is older than 3 days

YYYY-MM-DD - latest record is older than 1 day

YYYY-MM-DD - latest record is less than 1 day old

DB Live Copy Status:

https://pdssbn.astro.umd.edu/MPC_database/statusDB.shtml
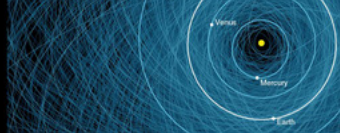
Forward-looking

--MPC has a part-time systems engineering support through the SBN... looking for technical manager from within CfA.

--Detailed work plan going forward for transitioning products to database operations from flat files

--Preliminary discussions and Memorandum of Understanding with both NEO Surveyor (completed) and LSST/Vera Rubin (final draft circulating); interface documentation
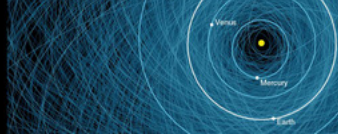
MPC Near-Future Steps

- Robustly automated Monthly product generation,

- Spring stand-up of several Postgres DB pipeline elements,

- integration of heliocentric linking into pipeline,

- retirement of outdated/unused products (e.g. pdf format publications, etc.), as per interface change policies,

- DOI issuances through SBN for MPC products.
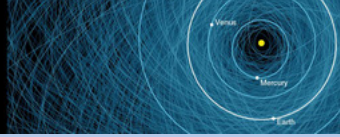
Ranking the Importance of Observations

--Much background discussion from PDCO/CNEOS/MPC/UMD on the subject evaluating the importance of NEO observations

--not all NEOs need observing! Objects with good orbits, objects with small uncertainties, tiny objects, objects that will become lost, etc
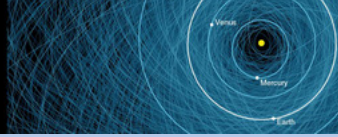
Notional NASA "guidelines"

Category	Secure Orbit for Future Apparitions	Objective of Follow-up			
		Predict Future Close Encounters	Predict Future Potential Impacts	Determine Close Approach Distance	Determine Time and Location of Impact
NEO	>100 meters				
NHATS	>30 meters?	Follow-up			
PHA	>20 meters	Follow-up	Follow-up		
Close Approach < 1LD	> 10 meters	Follow-up	Follow-up		
Close Approach < 6 RE	> 1 meter	Follow-up	Follow-up	Follow-up	
Impactor?	> 1 meter	Follow-up	Follow-up	Follow-up	Follow-up
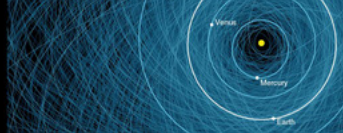
Trying to rank importance of each NEO!

--NEOs with collision probability > 0

--Large NEOs

--NEOs with close approaches possible

--NEOs with large orbital uncertainty

--Spacecraft targets

--NEOs easily accessible by spacecraft

--NEOs for which a few observations can dramatically improve the orbital uncertainty
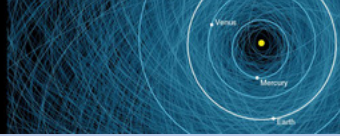
Sum contributions from participants

--Super simple way to measure contributions

Contribution = $\sum NEO\_score$s

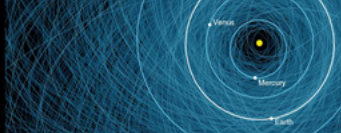--can compute scores and 'contribution' daily, weekly, etc

Completely mathematical representation

--Ok, so I have a hammer (math) so I hit the nail (created a way to measure mathematical contributions)

--is this sensible? Do we like it?

--how to measure non-mathematical contributions?

To IAWN Steering Committee

What NEO attributes matter to you and your constituents?

discuss