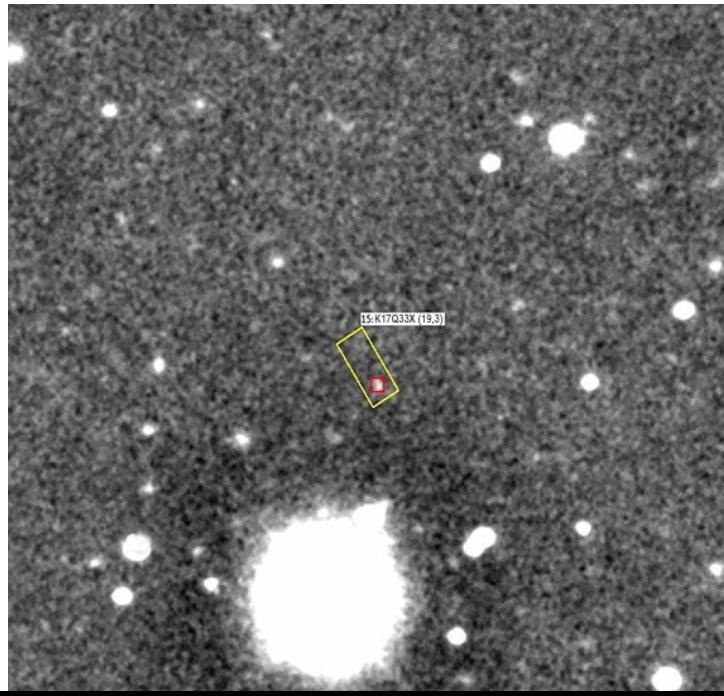
Discovery of small Solar system bodies with OMT-800 telescope

Volodymyr Troianskyi,

Volodymyr Kashuba, Vadym Savanevych,

Oleksandr Bazyey, Vadym Zhukov



Gaia Science Alerts workshop

Warsaw, Poland, 6 - 8 Dec. 2017

ACM Group

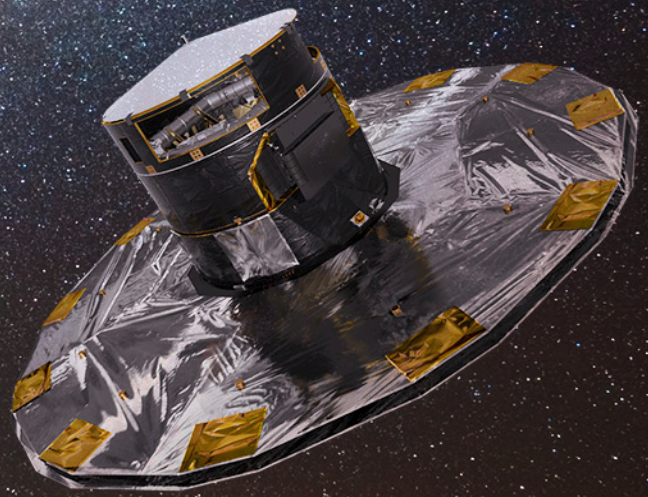
ASTRONOMICAL OBSERVATORY, ODESSA NATIONAL UNIVERSITY

Astrometry and Celestial Mechanics Group

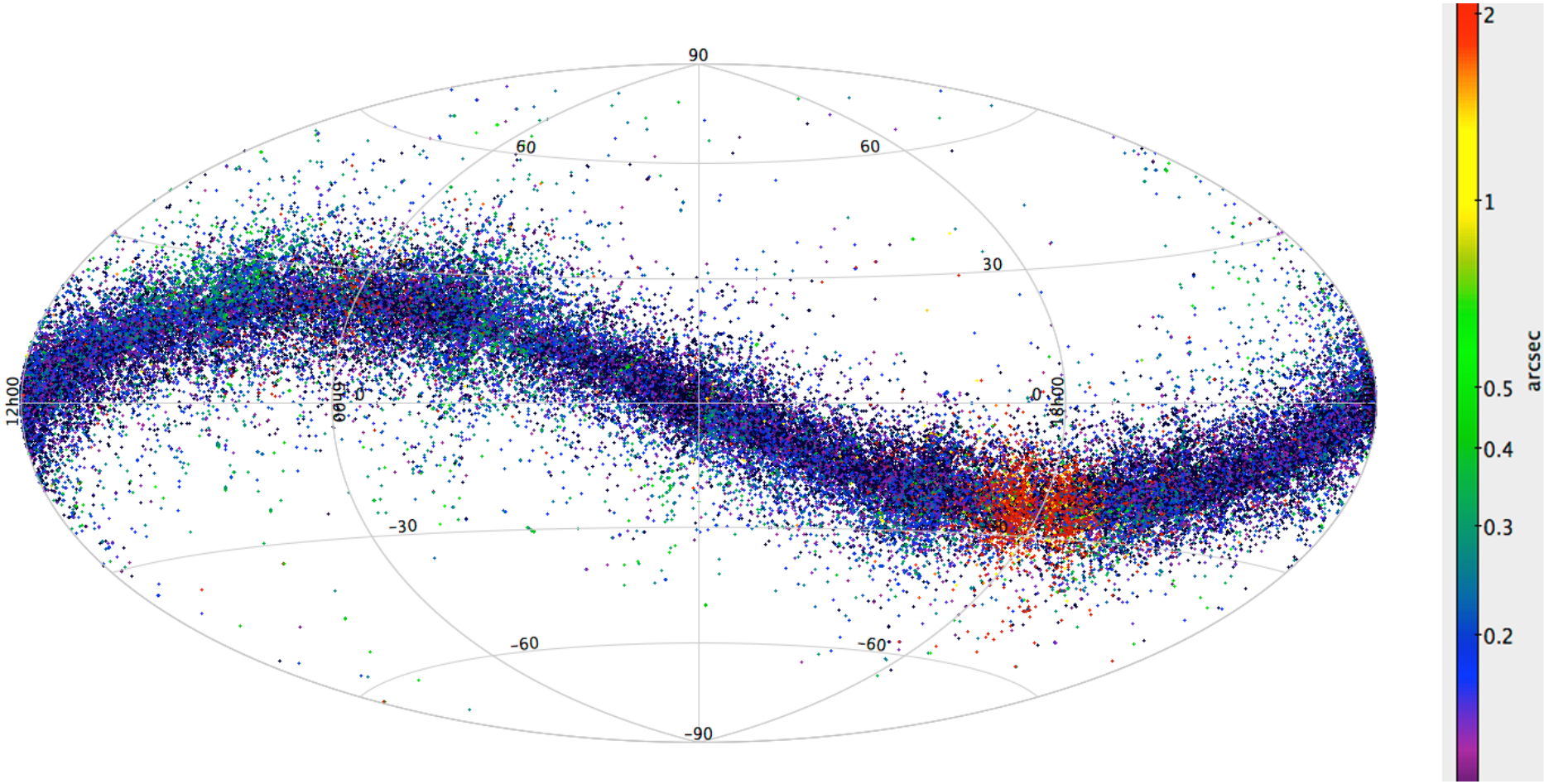
Gaia Space Telescope
(Global Astrometric Interferometer for Astrophysics)

Mission Science

- ✓ Galactic Structure
- ✓ Stars
- ✓ Solar System
- ✓ Asteroids
- ✓ Exoplanets



Gaia's asteroid detections



ESA/Gaia/DPAC/CU4, L. Galluccio, F. Mignard, P. Tanga (Observatoire de la Côte

gaia

esa

ESA | SCIENCE & TECHNOLOGY | GAIA

Missions
- Show All Missions

Mission Home
- Summary
- Fact Sheet
- Objectives
- Mission Team
- Industrial Team

A History of Astrometry
- The oldest sky maps
- Seeing and measuring farther
- Astrometry in space

Mission Science
- Galactic Structure
- Stars
- Solar System
- Asteroids
- Exoplanets

GAIA FOLLOW-UP NETWORK FOR SOLAR SYSTEM OBJECTS

Date: 24 January 2017
Satellite: Gaia
Depicts: Map of Gaia-FUN-SSO observing sites
Copyright: Google Earth

The Gaia Follow-Up Network for Solar System Objects (Gaia-FUN-SSO) coordinates ground-based observations of candidate asteroids that have been identified during Gaia data processing.

Search here

26-Nov-2017 14:14 UT

Shortcut URL
http://sci.esa.int/jump.cfm?oid=58711

Also Available As
JPG 1030 × 501
< 1 MB

Related Links
- Gaia Follow-Up Network for Solar System Objects

See Also
- Gaia turns its eyes to asteroid hunting

The main characteristics of OMT-800

Main mirror diameter, *mm*	**800**
Telescope effective focal length, *mm*	**2134.3**
Focal ratio	**1:2.67**
Main mirror eccentricity square	**1.1986**
Max deviation of the main mirror from ideal surface, *nm*	**60**
Linear diameter of the field of view, *mm*	**49.14**
Angular diameter of the field of view, *arc min*	**78**
Spectral range of achromatization, *nm*	**486-820**

Gaia follow-up network for Solar system objects

Gaia FUN SSO: Gaia Alerts

Gaia-FUN-SSO | Circulars | ★ Gaia alert | ☆ GBOT alert | Settings | Help | Logout | Volodymyr Troianskyi

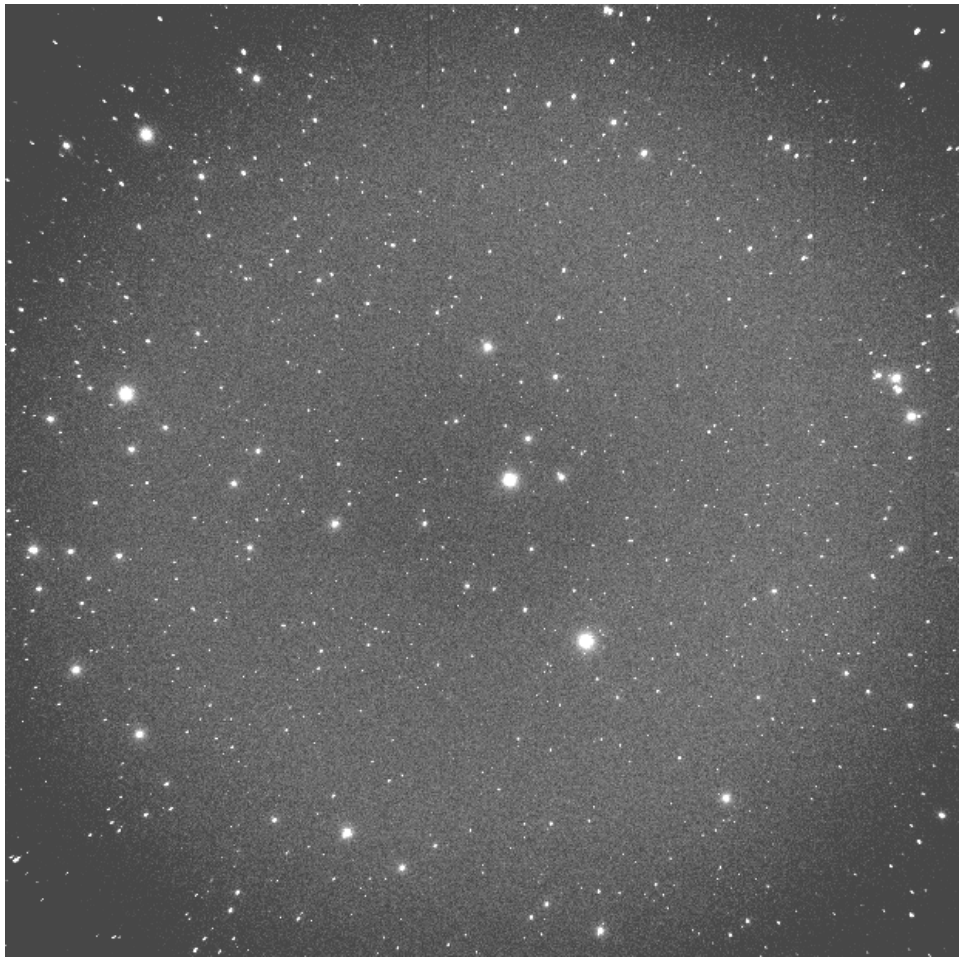
Potential discoveries of Solar System Objects by Gaia

This page lists all the calls, dubbed *alerts* for follow-up observations on Solar System Objects recently discovered by the ESA Gaia mission, currently visible for the criteria you specified for your instrument (OMT-800). You can obtain detailed information on each alert in the *Details* pages and report the results (positive, missed) of your observations in the *Report* pages (see links in the table).
If you observed an alert which is no longer listed below, use this link to report observations.

List of active alerts — Selected alerts: 3/9

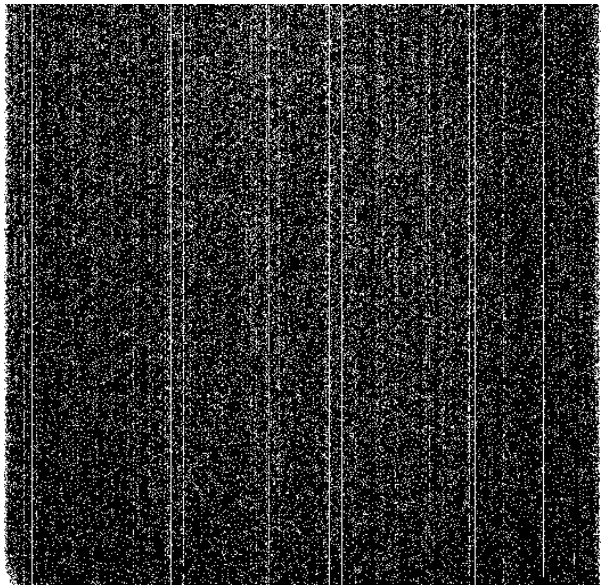
ID	Begin	End	V_{mag}	RA	Dec	Area	Name	Report	Details
46455	2017-11-25	2017-12-04	20.34	84.2889	-12.4893	0.14856	g1u02B		
46560	2017-11-26	2017-12-04	20.34	84.4313	-12.489	0.13347	g1u05C		
46376	2017-11-25	2017-11-30	20.15	90.444	-0.2453	0.44822	g1u0D9		

Results of observations

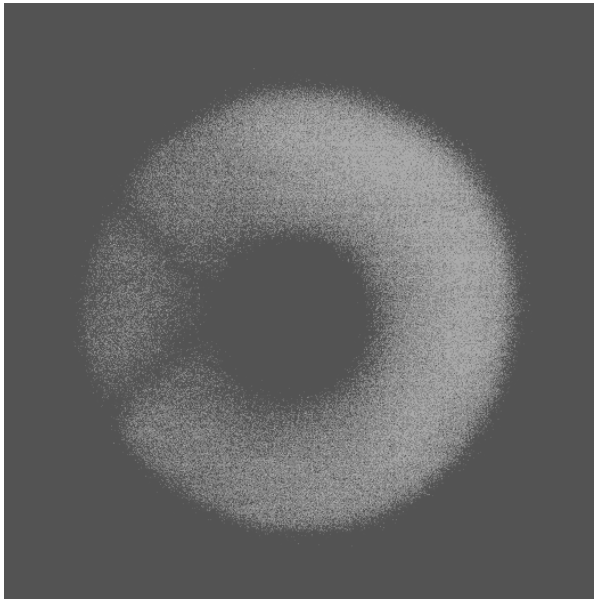


**.FITS frame*

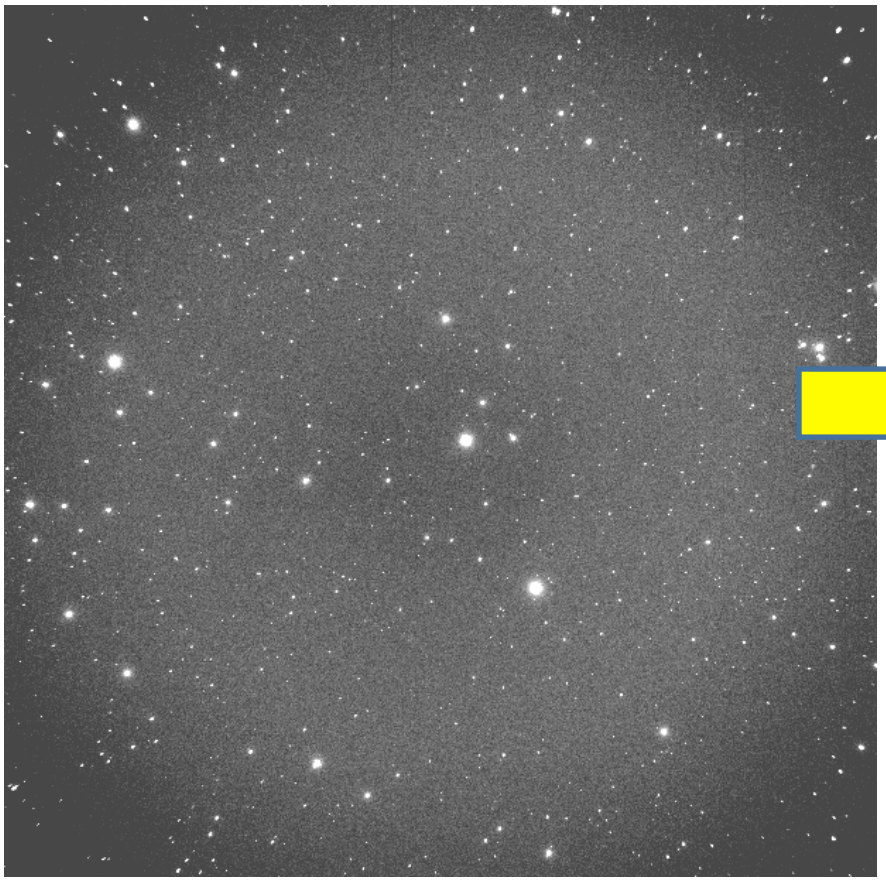
"DARK" frame

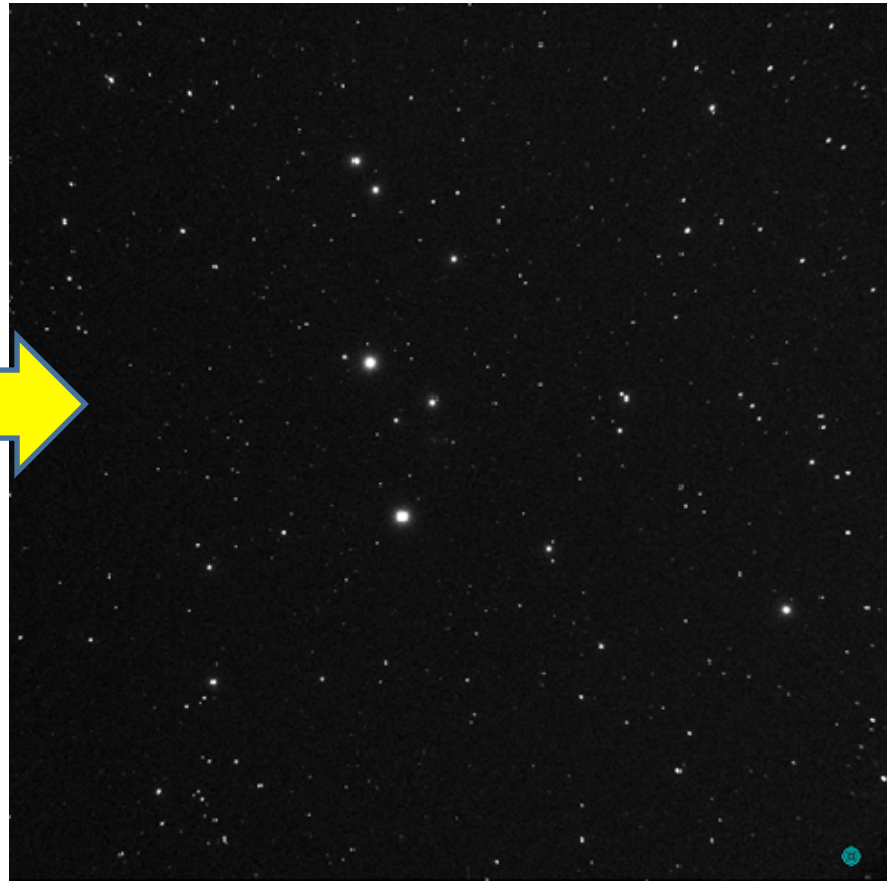


"FLATFIELD" frame

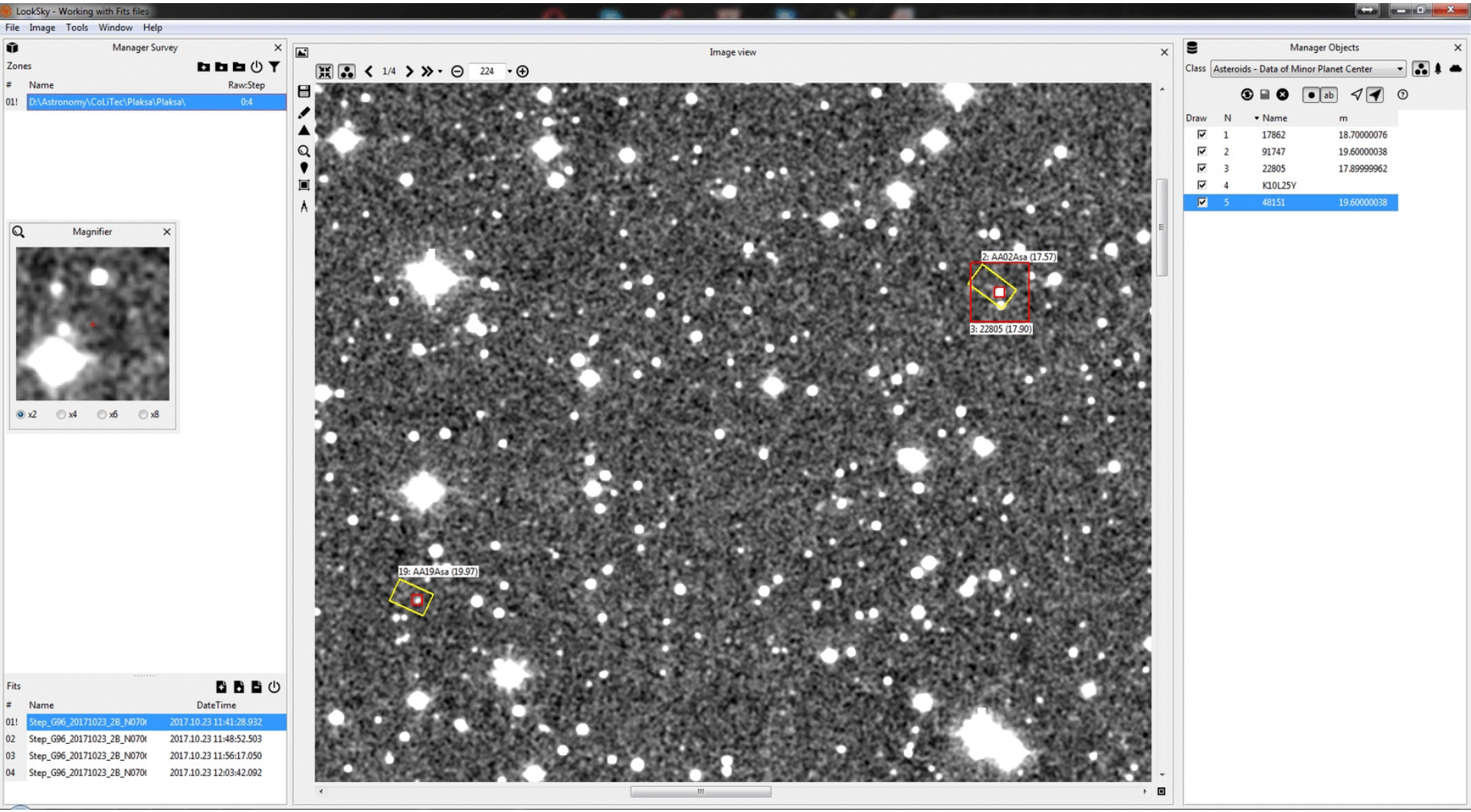


Preprocessing of frames





CoLiTec software



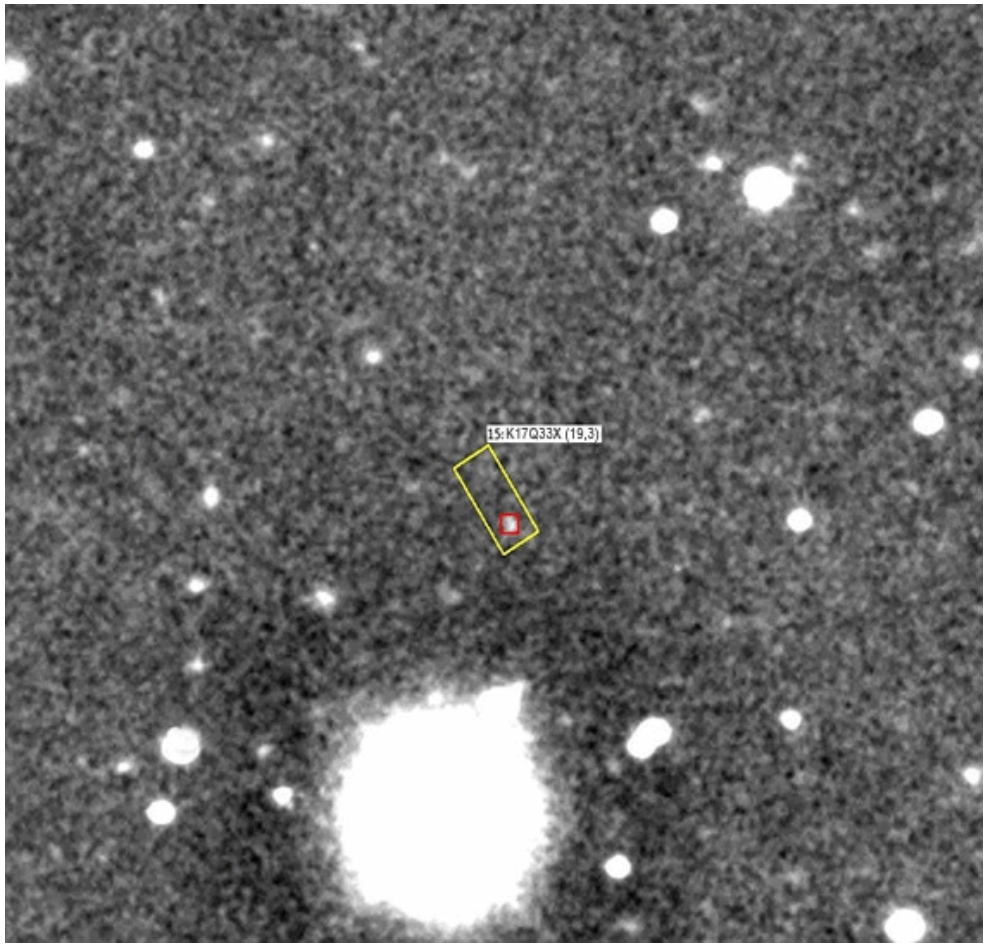
Discovered objects

MPC 583 Odessa-Mayaki

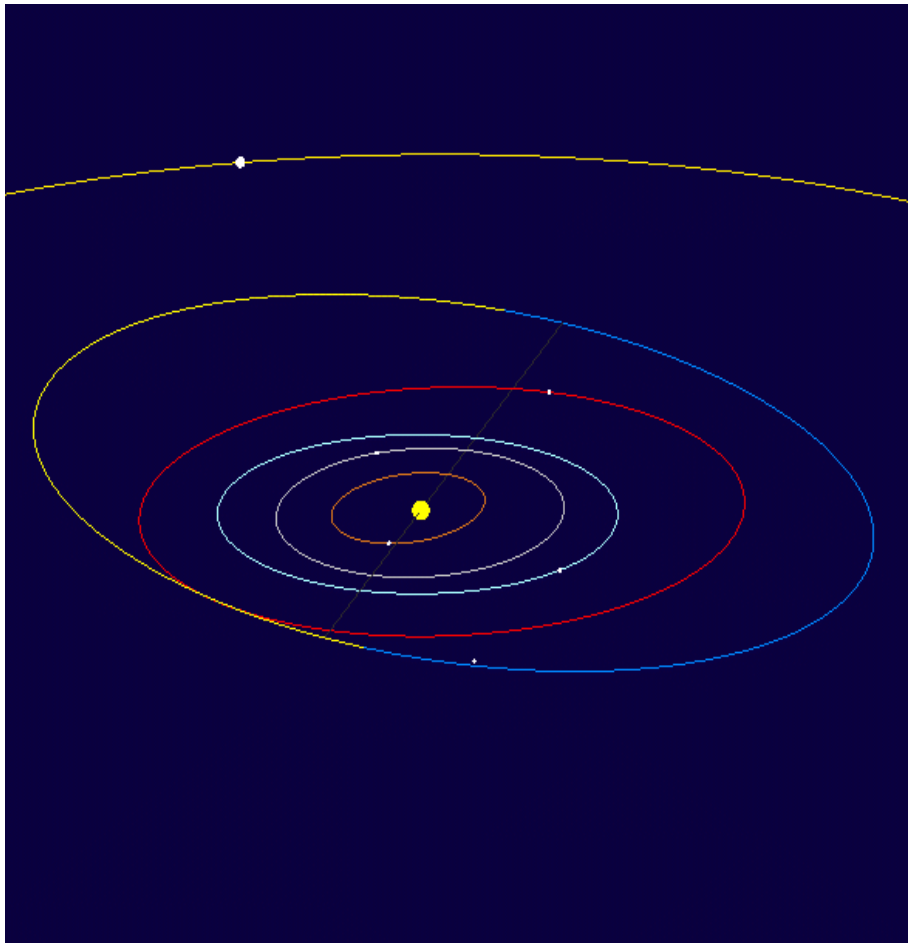
- ✓ 2017 BC94 (near-Earth), *MPS 766258*
- ✓ 2017 QX33 (Mars-crosser), *MPS 813479*
- ✓ 2017 QJ36 (near-Earth), *MPS 817122*
- ✓ 2017 RV12 (near-Earth), *MPS 817137*

✓25 objects confirmed

Discoveries Mars-crosser **2017 QX33**



Animation of 3 frames crops



Orbit Sketch with MPC

Calculation ephemerides of discovered objects

"MPC" Ephemeris

The International Astronomical Union
Minor Planet Center

OBSERVERS PUBLIC D

- Processing (Info)

New Object Ephemeris Generator

Use the form below to generate ephemerides for your new objects prior to the assignment of
MPC format) for each object into the form below. The observations of each object can be on t
Generate ephemerides to obtain the ephemerides.

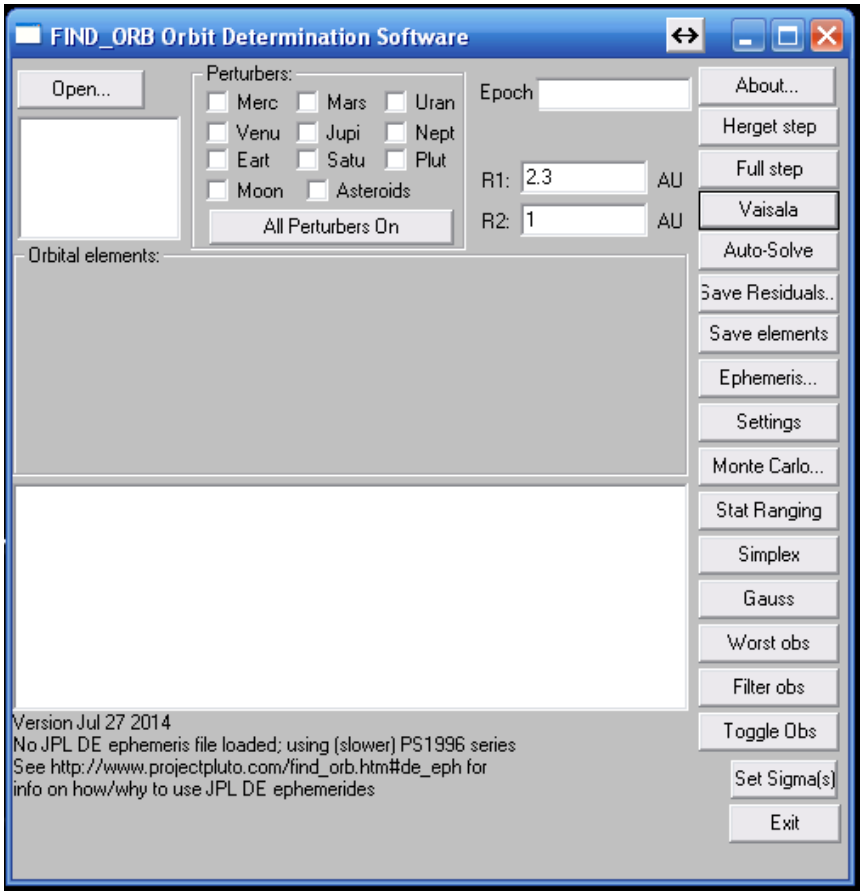
Observations that are not formatted correctly will be rejected. Ensure that there is a Carriage

Generate ephemerides

Enter observations below (a guide is included to allow manual entry of the data on those plat

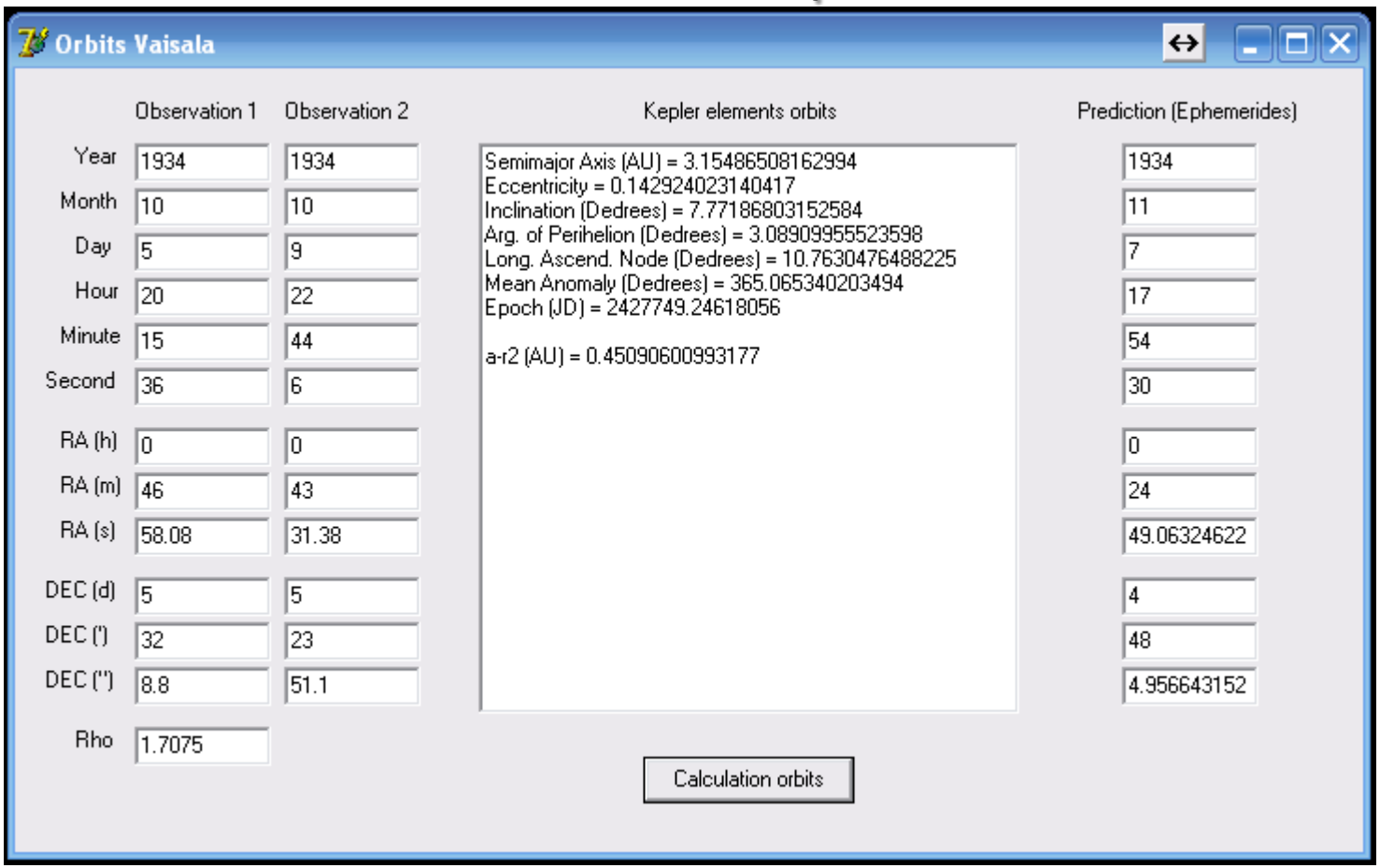
NNNNNPPPPPPPANNYYYY MM DD.ddddd HH MM SS.dd sDD MM SS.d MM.M B OOO

"Find_Orb" Ephemeris



Calculation ephemerides of discovered objects

“Orbits Väisälä” Ephemeris



Discovered objects

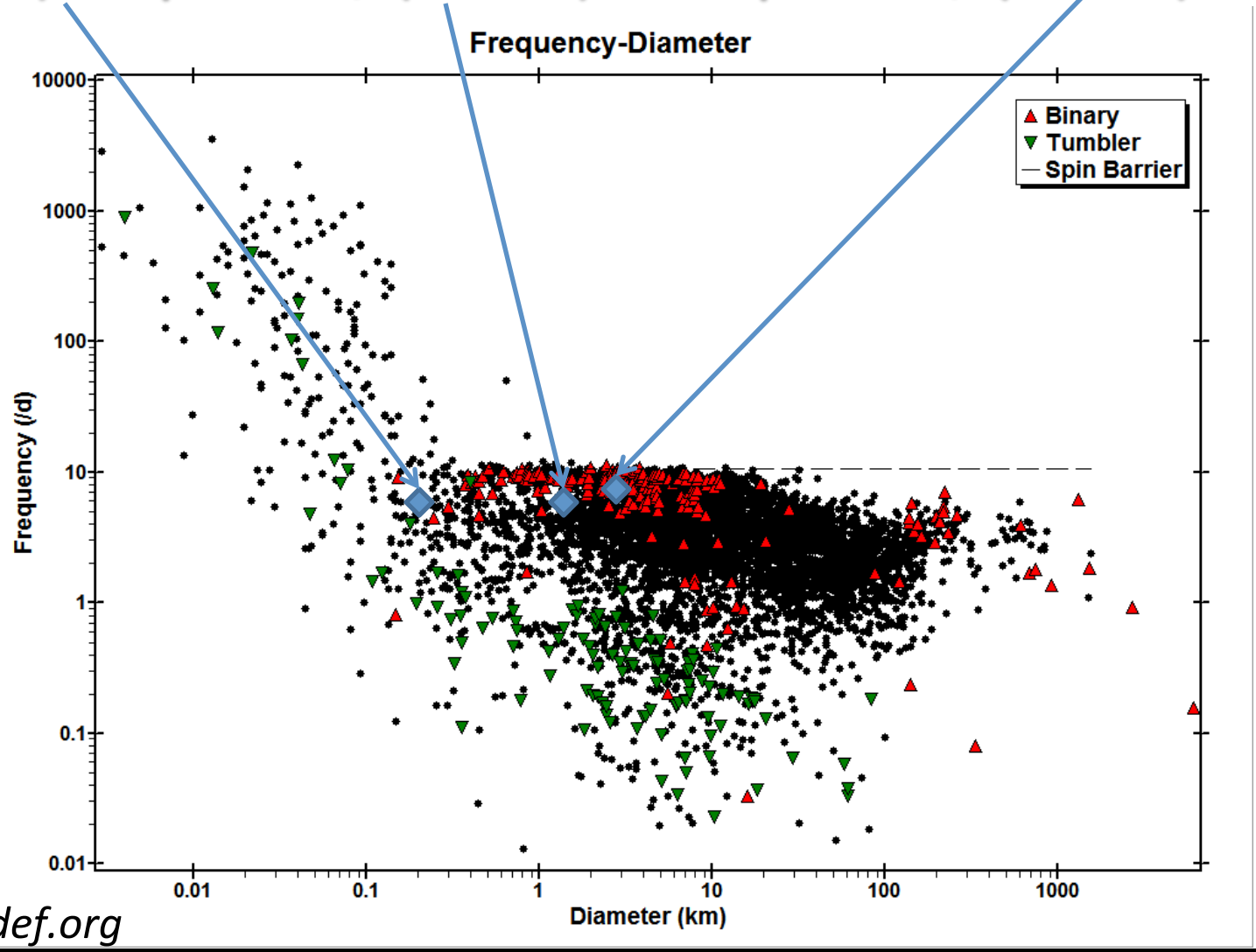
MPC 585 Kyiv comet station

- ✓ **2017 ST39** (Main Belt), *MPS 828365* – calculation ephemerides "*Orbits Väisälä*"
- ✓ **2017 SV39** (Main Belt), *MPS 828365* – calculation ephemerides "*Orbits Väisälä*" and confirmation with OMT-800
- ✓ **2017 TS7** (Main Belt), *MPS 828378* – calculation ephemerides "*Orbits Väisälä*"

Photometric observations of Solar system objects with OMT-800 in 2017

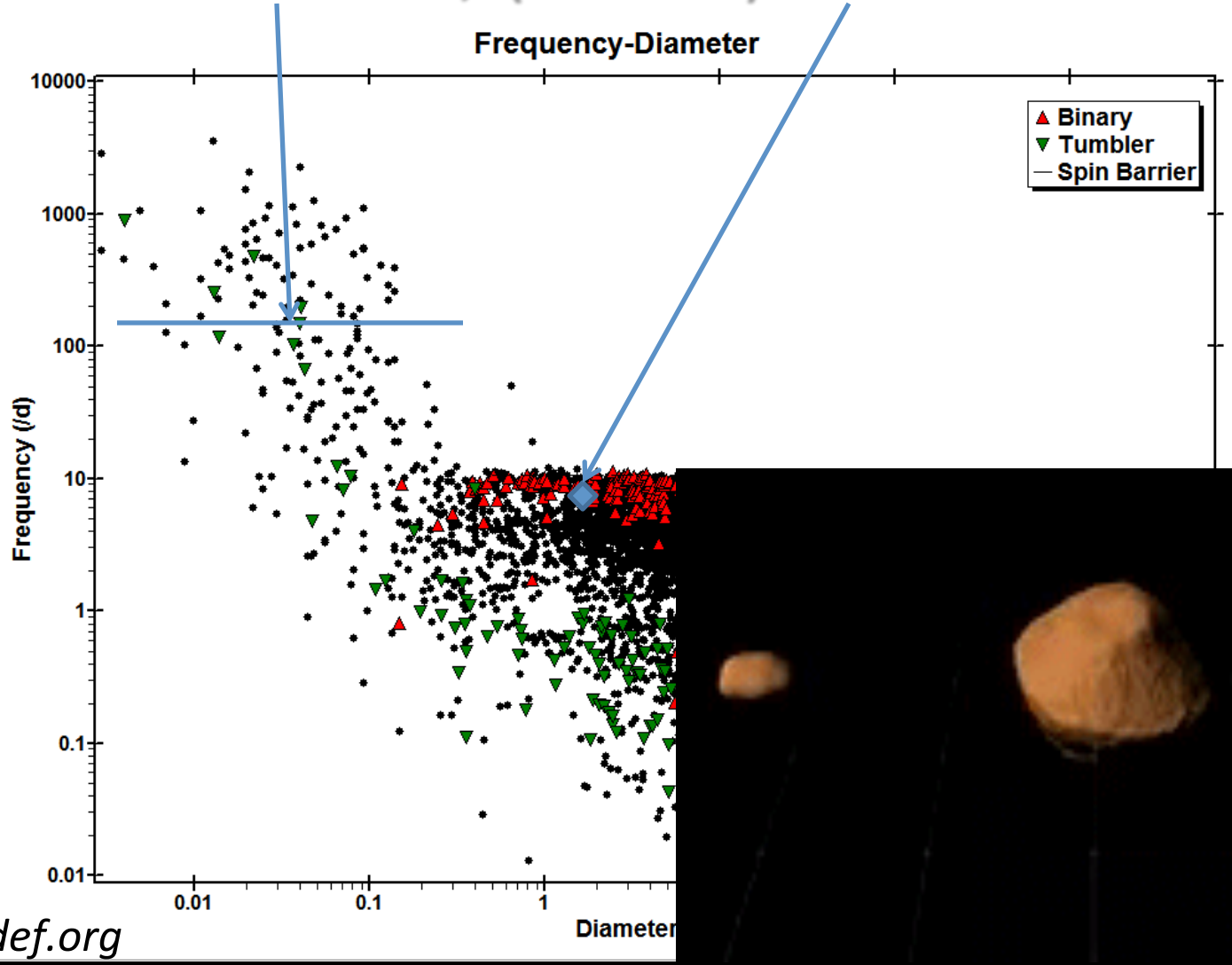
- ✓ (3361) Orpheus
- ✓ (3749) Balam
- ✓ (4197) Morpheus
- ✓ (20460) Robwhiteley
- ✓ (66391) 1999 KW4
- ✓ (153415) 2001 QP153
- ✓ (496018) 2008 NU
- ✓ 2012 TC4
- ✓ 2014 YC15
- ✓ 2017 MB1
- ✓ 2017 TE5

(3361) Orpheus, (4197) Morpheus, (3749) Balam



http://alcdef.org

2012 TC4, (66391) 1999 KW4



http://alcdef.org

Photometric observations of Solar system objects with OMT-800 in 2017

- ✓ Unknown rotation period:
  (20460) Robwhiteley
- ✓ Unknown rotation period and diameter:
  (153415) 2001 QP153,
  (496018) 2008 NU,
  2014 YC15,
  2017 MB1,
  2017 TE5

Results

- ✓ Discovered 4 and confirmed 25 asteroids
- ✓ Created and tested original software which implements Orbit search methods
- ✓ Received photometrical observations of more than 10 asteroids and asteroids systems for comparison results of our observations with celestial mechanical models of motion of these object.

Thanks for attention !!!

Volodymyr Troianskyi

v.troianskyi@onu.edu.ua

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