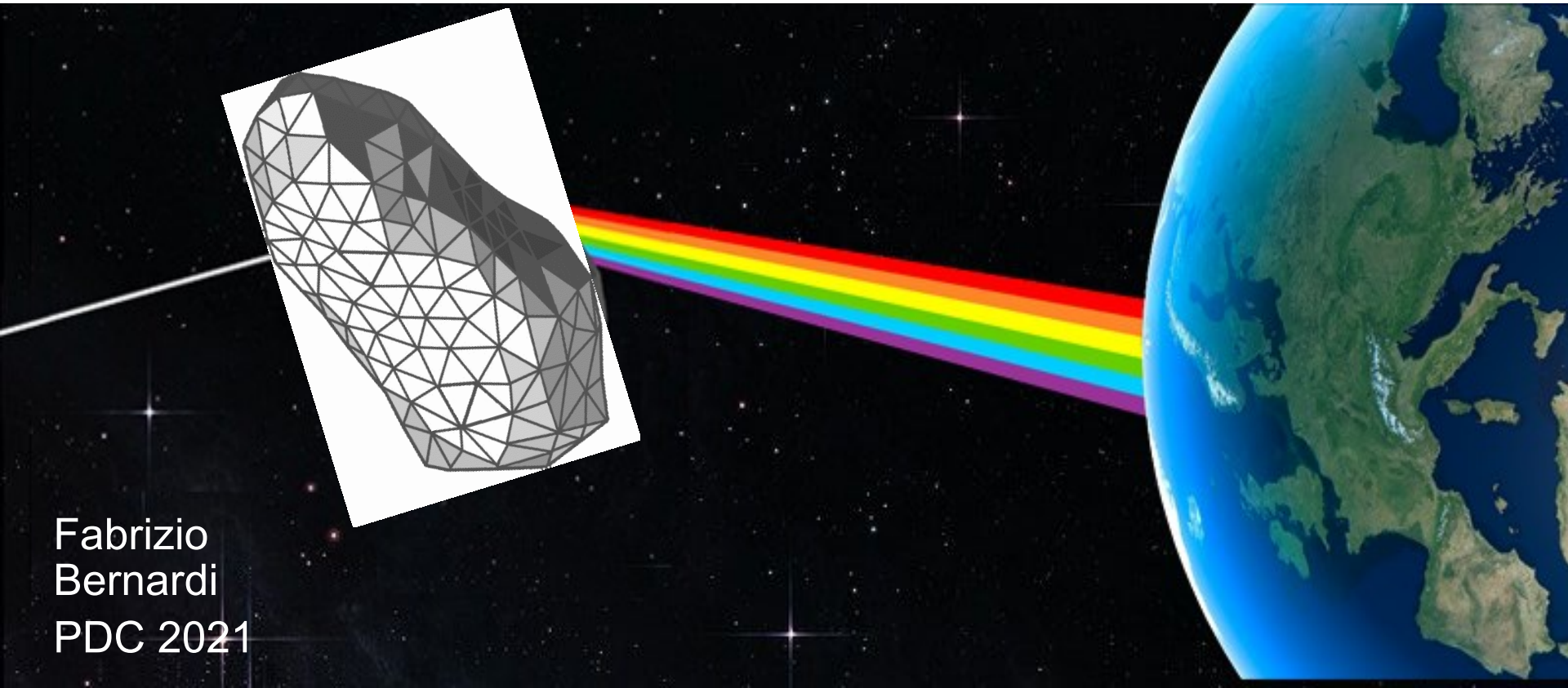
New NEODyS Tools for the EU funded NEOROCKS Project: Observations support and Priority Lists



Fabrizio Bernardi

PDC 2021

NEOROCKS stands for:

THE NEO RAPID OBSERVATION, CHARACTERIZATION AND KEY SIMULATIONS

EU funded project

Please, see the e-lightning talk: NEOROCKS: An innovative and pragmatic approach to planetary defense – E. Dotto et al.

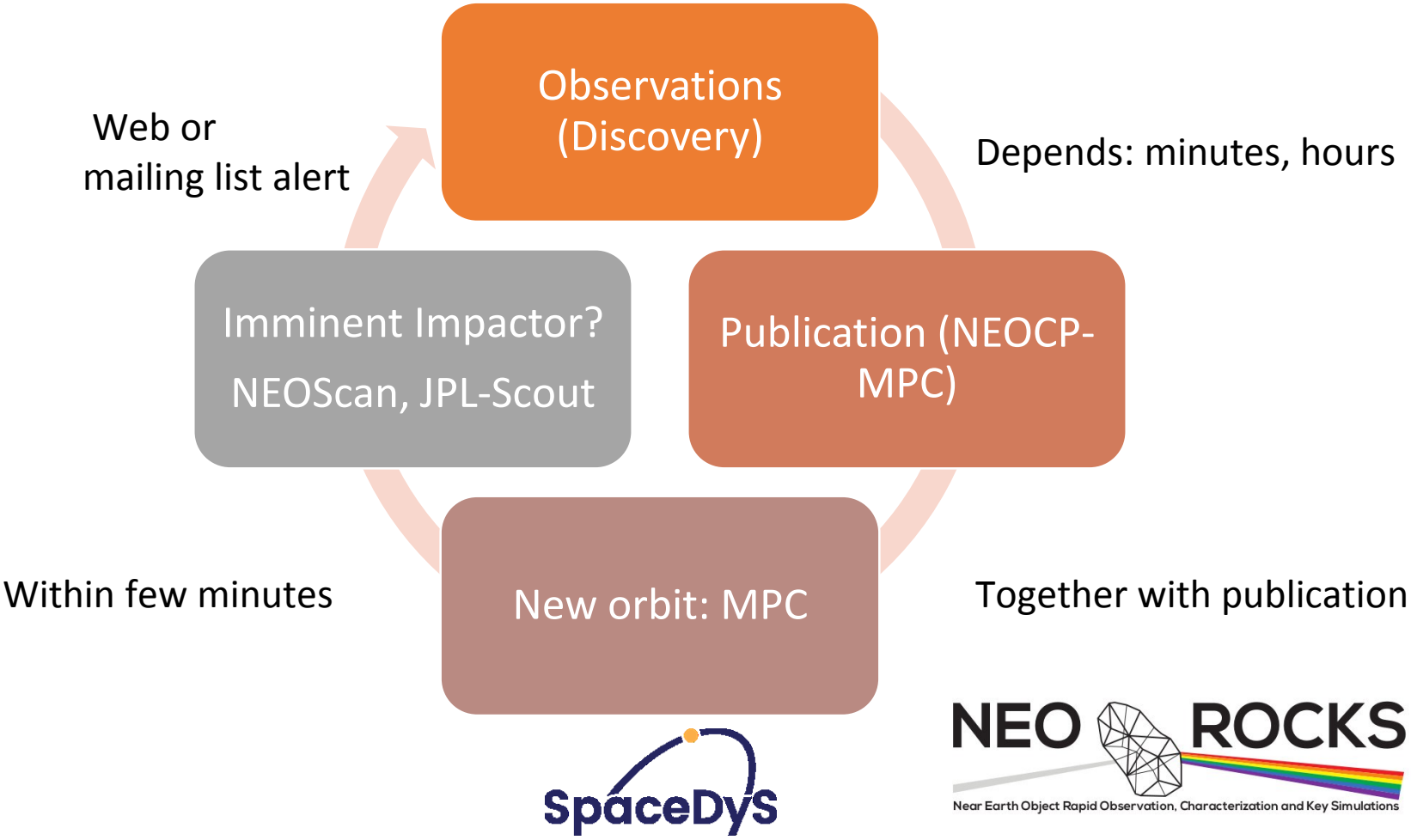
SpaceDyS

NEO ROCKS

Near Earth Object Rapid Observation, Characterization and Key Simulations

Key point: Speed

- We want to reduce the time from discovery to the time when the orbit is well constrained, such that physical observations are possible.



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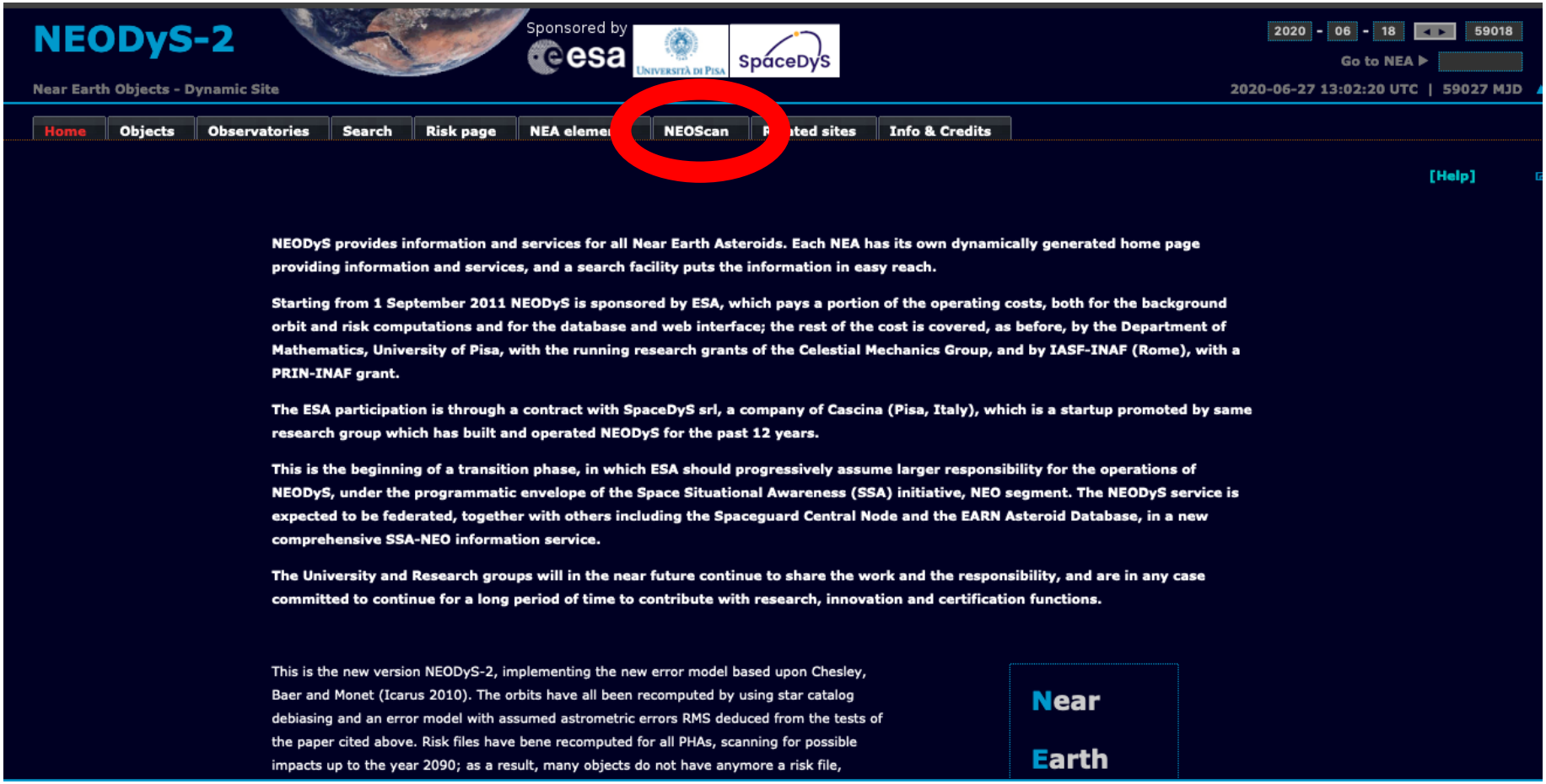
NEO ROCKS
Near Earth Object Rapid Observation, Characterization and Key Simulations

NEOScan

- Since a few years the service **NEOScan** is available at NEODyS: https://newton.spacedys.com/neodys2/NEOScan/



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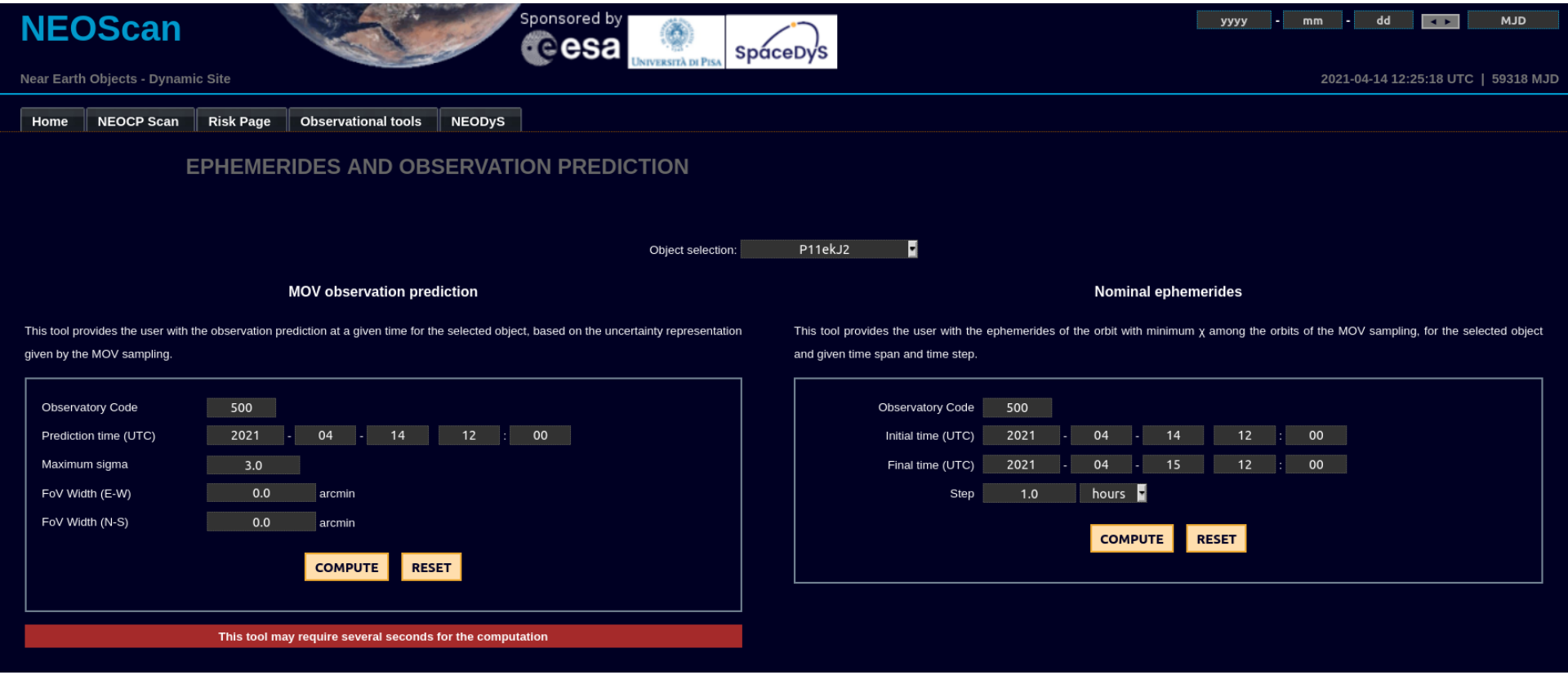
Near Earth Object Rapid Observation, Characterization and Key Simulations

Observer tools in NEOScan



Fixed time, full uncertainty

Time range, only nominal

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Near Earth Object Rapid Observation, Characterization and Key Simulations

Observation Prediction output at a fixed time

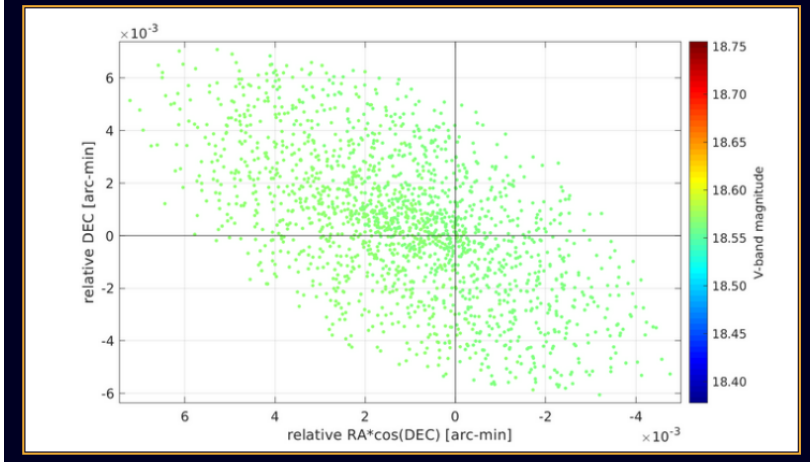
OBSERVATION PREDICTION FOR C18N021

Observation prediction data of the orbit with minimum χ: **ASCII file**

Prediction time = 2020/06/03,09:12:00 UTC; 59003.38333 MJD,   Observatory = 0500

RA = 17:19:23.386 [HH:MM:SS]   4.53519 [deg]
DEC = +39 05 28.37 [deg min sec]   0.68227 [deg]

RA/DEC Apparent motion =   16.660 [arcsec/min]   53.597 [arcsec/min]
Apparent motion =   56.126 [arcsec/min], Position angle = 17.267 [deg]
Visual magnitude = 18.57
Solar elongation = 118.07 [deg], Lunar elongation = -62.95 [deg], Galactic latitude and longitude =   0.00 [deg]   31.73 [deg]
Elevation =   60.86 [deg], Airmass =   33.887, Phase angle =   63.55 [deg]



Plot by colour code

-Select a colour code- PLOT

Plot object classes

-Select a class of objects- PLOT

Plot impacting orbits

-Select an action for impactors- PLOT

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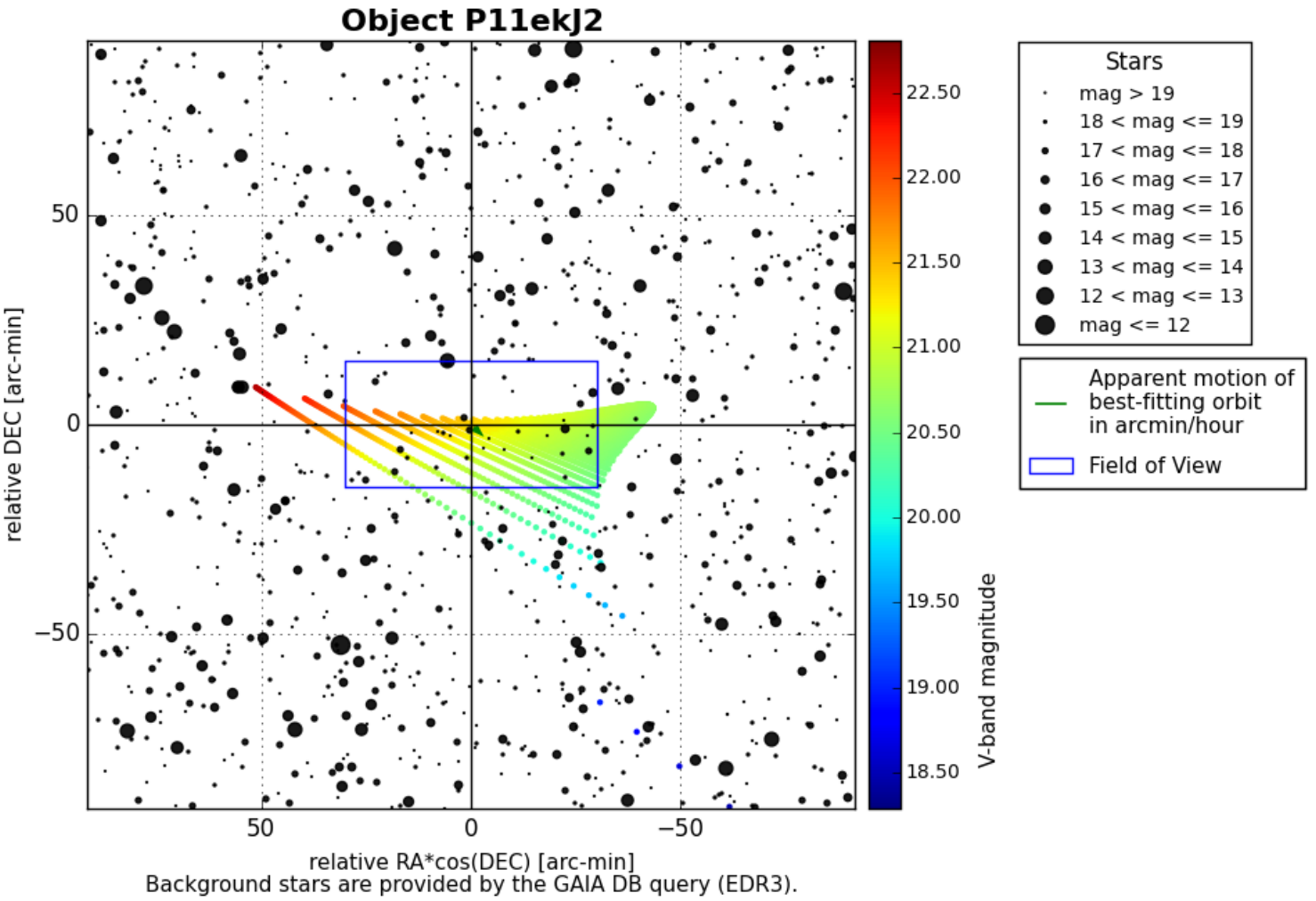
NEO ROCKS

Near Earth Object Rapid Observation, Characterization and Key Simulations

Observation Prediction output at a fixed time



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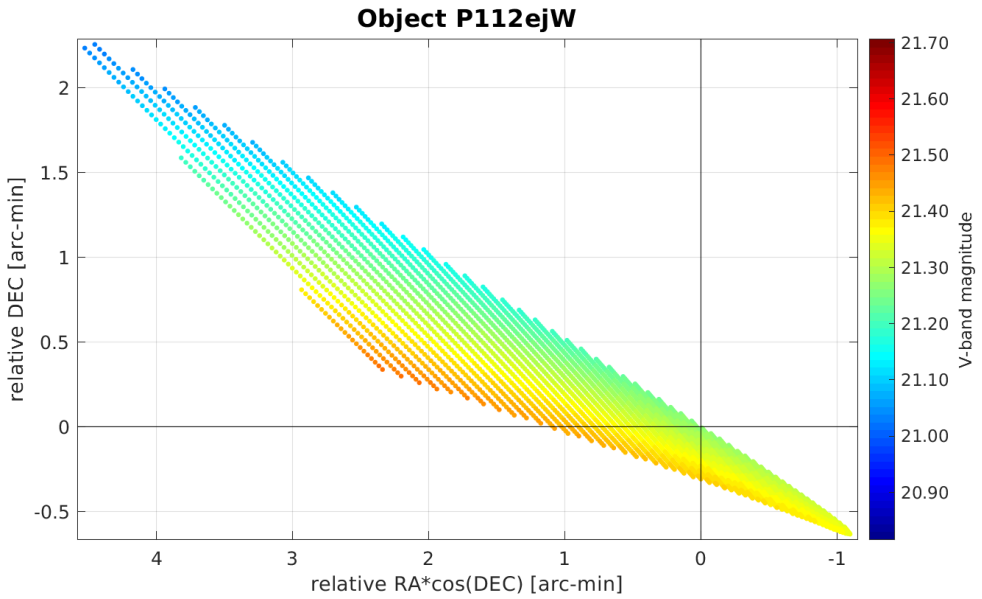
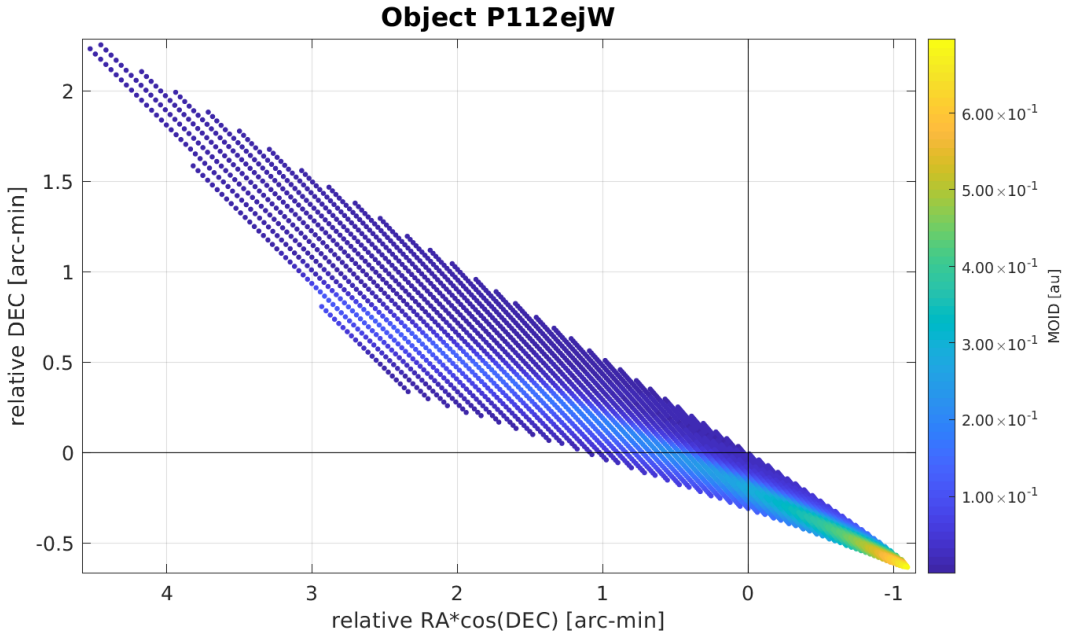
V mag and MOID graphs

Visual Magnitudes Prediction





MOID Prediction

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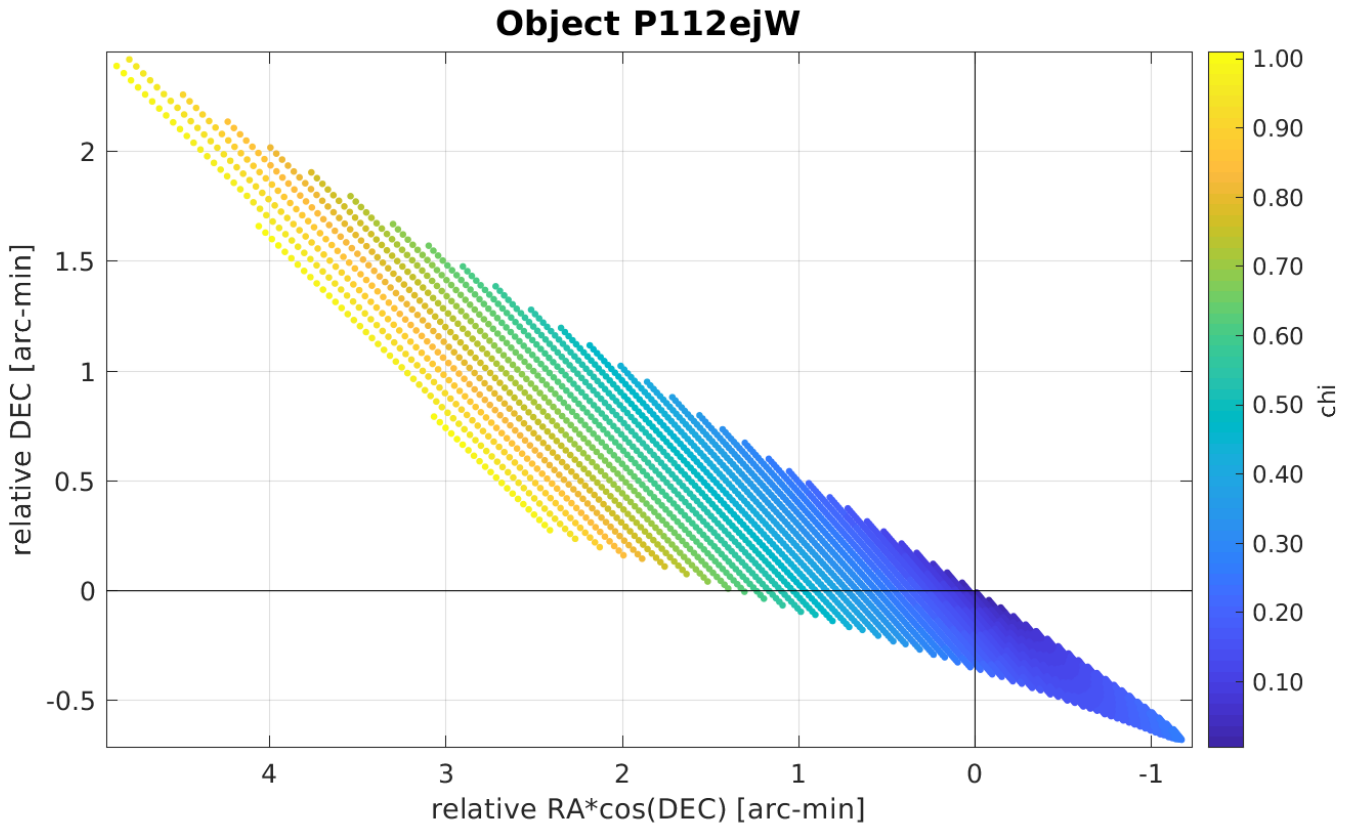
Near Earth Object Rapid Observation, Characterization and Key Simulations

Most likely positions



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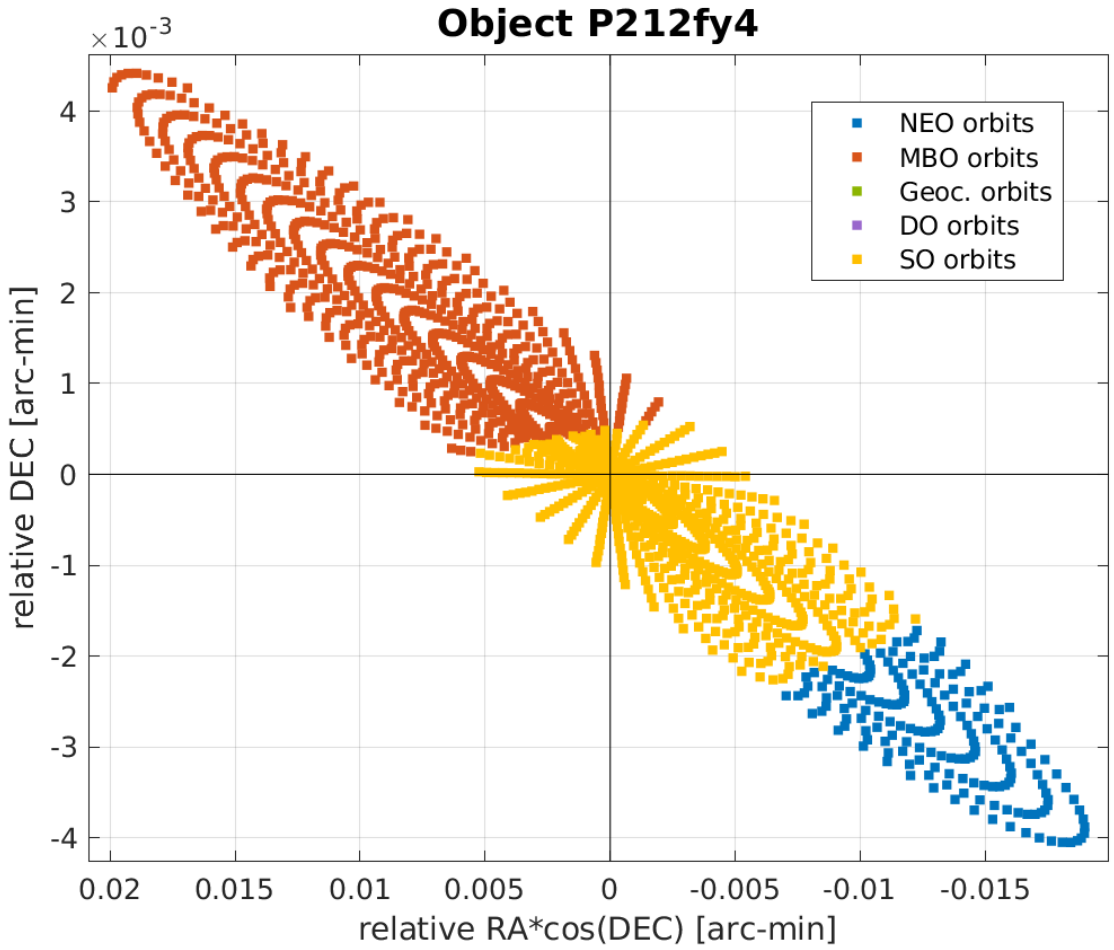
Object classes graph



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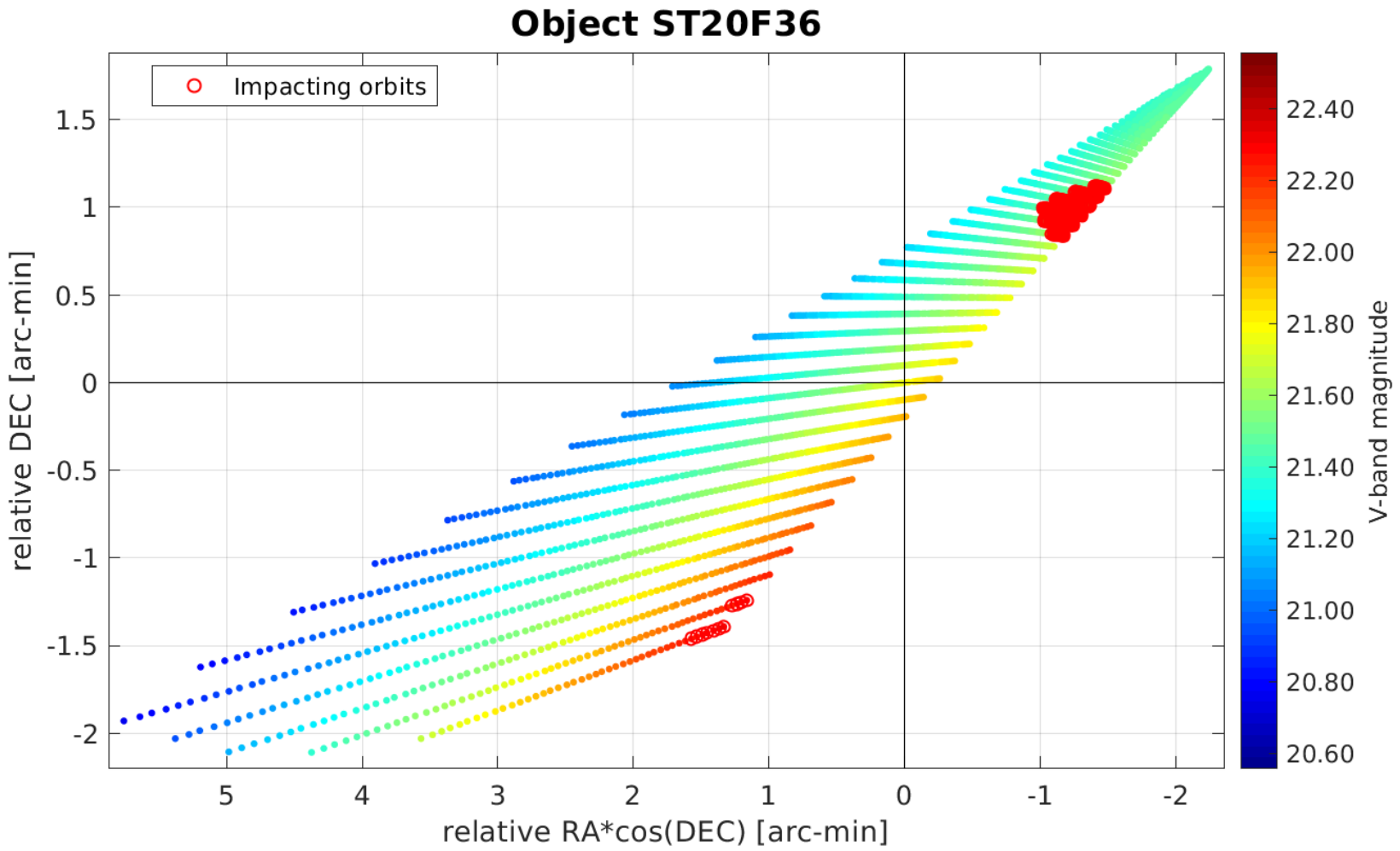
Near Earth Object Rapid Observation, Characterization and Key Simulations

Possible Imminent Impactors Graph



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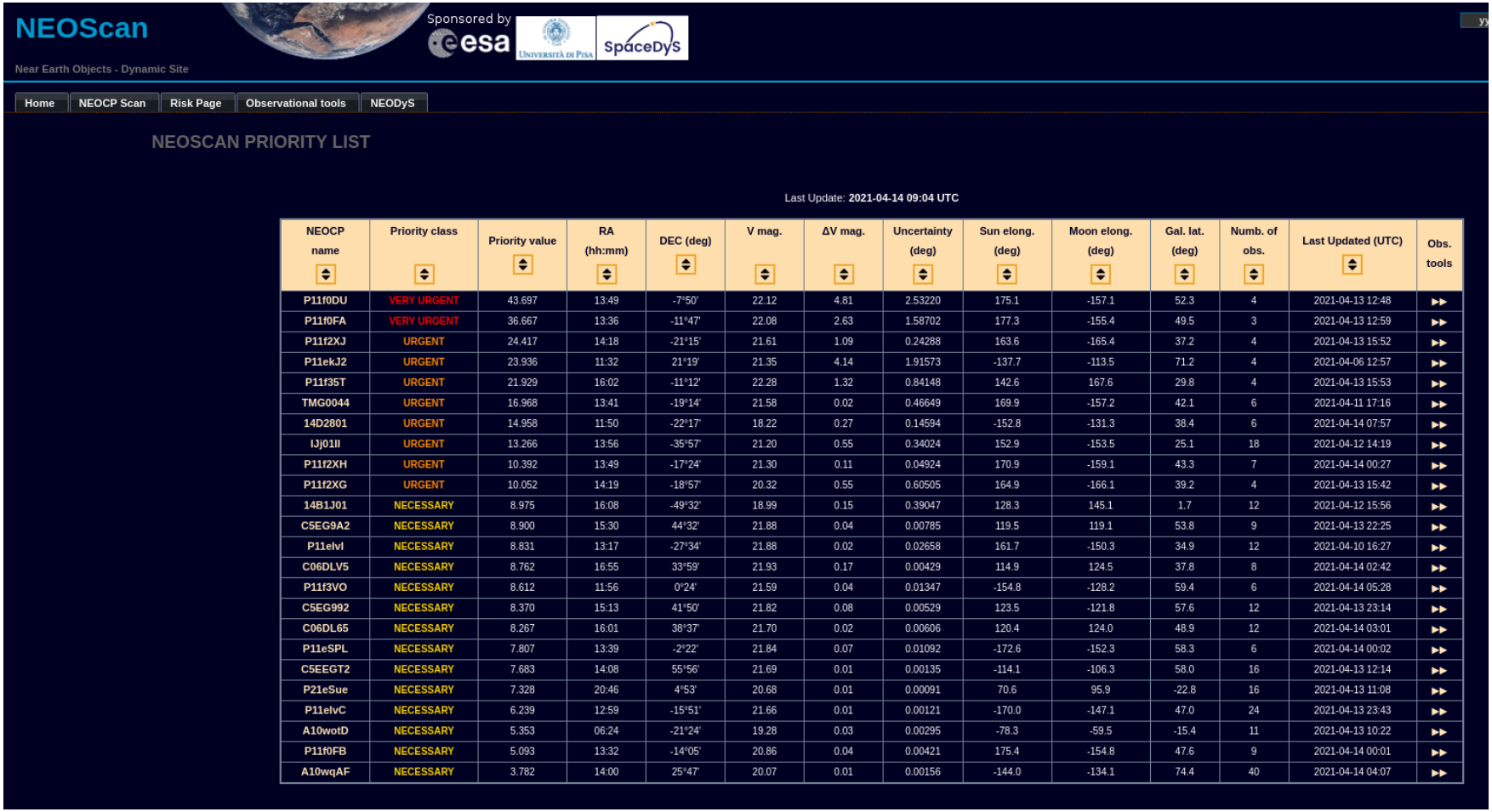
NEO ROCKS

Near Earth Object Rapid Observation, Characterization and Key Simulations

NEOCP Priority List



NEOScan

Near Earth Objects - Dynamic Site

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Home | NEOCP Scan | Risk Page | Observational tools | NEODyS

NEOSCAN PRIORITY LIST

Last Update: **2021-04-14 09:04 UTC**

NEOCP name	Priority class	Priority value	RA (hh:mm)	DEC (deg)	V mag.	ΔV mag.	Uncertainty (deg)	Sun elong. (deg)	Moon elong. (deg)	Gal. lat. (deg)	Numb. of obs.	Last Updated (UTC)	Obs. tools
P11f0DU	VERY URGENT	43.697	13:49	-7°50'	22.12	4.81	2.53220	175.1	-157.1	52.3	4	2021-04-13 12:48	▶▶
P11f0FA	VERY URGENT	36.667	13:36	-11°47'	22.08	2.63	1.58702	177.3	-155.4	49.5	3	2021-04-13 12:59	▶▶
P11f2XJ	URGENT	24.417	14:18	-21°15'	21.61	1.09	0.24288	163.6	-165.4	37.2	4	2021-04-13 15:52	▶▶
P11ekJ2	URGENT	23.936	11:32	21°19'	21.35	4.14	1.91573	-137.7	-113.5	71.2	4	2021-04-06 12:57	▶▶
P11f35T	URGENT	21.929	16:02	-11°12'	22.28	1.32	0.84148	142.6	167.6	29.8	4	2021-04-13 15:53	▶▶
TMG0044	URGENT	16.968	13:41	-19°14'	21.58	0.02	0.46649	169.9	-157.2	42.1	6	2021-04-11 17:16	▶▶
14D2801	URGENT	14.958	11:50	-22°17'	18.22	0.27	0.14594	-152.8	-131.3	38.4	6	2021-04-14 07:57	▶▶
IJj01II	URGENT	13.266	13:56	-35°57'	21.20	0.55	0.34024	152.9	-153.5	25.1	18	2021-04-12 14:19	▶▶
P11f2XH	URGENT	10.392	13:49	-17°24'	21.30	0.11	0.04924	170.9	-159.1	43.3	7	2021-04-14 00:27	▶▶
P11f2XG	URGENT	10.052	14:19	-18°57'	20.32	0.55	0.60505	164.9	-166.1	39.2	4	2021-04-13 15:42	▶▶
14B1J01	NECESSARY	8.975	16:08	-49°32'	18.99	0.15	0.39047	128.3	145.1	1.7	12	2021-04-12 15:56	▶▶
C5EG9A2	NECESSARY	8.900	15:30	44°32'	21.88	0.04	0.00785	119.5	119.1	53.8	9	2021-04-13 22:25	▶▶
P11elvI	NECESSARY	8.831	13:17	-27°34'	21.88	0.02	0.02658	161.7	-150.3	34.9	12	2021-04-10 16:27	▶▶
C06DLV5	NECESSARY	8.762	16:55	33°59'	21.93	0.17	0.00429	114.9	124.5	37.8	8	2021-04-14 02:42	▶▶
P11f3VO	NECESSARY	8.612	11:56	0°24'	21.59	0.04	0.01347	-154.8	-128.2	59.4	6	2021-04-14 05:28	▶▶
C5EG992	NECESSARY	8.370	15:13	41°50'	21.82	0.08	0.00529	123.5	-121.8	57.6	12	2021-04-13 23:14	▶▶
C06DL65	NECESSARY	8.267	16:01	38°37'	21.70	0.02	0.00606	120.4	124.0	48.9	12	2021-04-14 03:01	▶▶
P11eSPL	NECESSARY	7.807	13:39	-2°22'	21.84	0.07	0.01092	-172.6	-152.3	58.3	6	2021-04-14 00:02	▶▶
C5EEGT2	NECESSARY	7.683	14:08	55°56'	21.69	0.01	0.00135	-114.1	-106.3	58.0	16	2021-04-13 12:14	▶▶
P21eSue	NECESSARY	7.328	20:46	4°53'	20.68	0.01	0.00091	70.6	95.9	-22.8	16	2021-04-13 11:08	▶▶
P11elvC	NECESSARY	6.239	12:59	-15°51'	21.66	0.01	0.00121	-170.0	-147.1	47.0	24	2021-04-13 23:43	▶▶
A10wotD	NECESSARY	5.353	06:24	-21°24'	19.28	0.03	0.00295	-78.3	-59.5	-15.4	11	2021-04-13 10:22	▶▶
P11f0FB	NECESSARY	5.093	13:32	-14°05'	20.86	0.04	0.00421	175.4	-154.8	47.6	9	2021-04-14 00:01	▶▶
A10wqAF	NECESSARY	3.782	14:00	25°47'	20.07	0.01	0.00156	-144.0	-134.1	74.4	40	2021-04-14 04:07	▶▶

Priority based upon:

- Impact Probability and End of Visibility determined by:
  - Sky uncertainty
  - Visual Magnitude
  - Solar Elongation
  - Moon (phase and target lunar elongation)
  - Galactic Latitude

SpaceDyS

NEO ROCKS

Near Earth Object Rapid Observation, Characterization and Key Simulations

New Priority List

- The **(Old) Priority List** is a protocol to provide a list of observable NEO targets to observers according to a priority defined by the observability conditions and dynamical constraints
- The protocol and algorithm were defined in the paper: «A New Protocol for the Astrometric Follow-up of Near Earth Asteroids»; Boattini, D'Abramo, Valsecchi e Carusi; Earth, Moon and Planets, V.100, pp.31-41, 2007
- The priority List has been published since 2000 by the Spaceguard Central Node and since a few years it has been integrated into the ESA portal of the NEO Cordination Centre:
  - http://neo.ssa.esa.int/PSDB-portlet/download?file=esa_priority_neo_list
- After a couple of decades, the algorithm needs necessary a review:
  - Now we observe much smaller objects
  - The algorithm didn't take into account the Moon. Several NEOs have been lost when the Moon is getting full or the lunar elongation is too small
  - The algorithm didn't take into account the galactic latitude. If an asteroid is going to a densely star populated field, the observers usually avoid to observe it.
  - Objects going to negative declinations are more likely to get lost

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NEO ROCKS
Near Earth Object Rapid Observation, Characterization and Key Simulations

New Priority List – Mailing service

- The **New Priority List** will list and sort the objects according to a Priority List Value determined according to observational and dynamical considerations (see later)
- New service:
  - Automatic daily (or configurable) e-mail to subscribers with some customizations:
    - Obscode ephemerides, limiting magnitude, declination range,…)
  - Right now, we have some beta-testers of this service among the Italian amateurs community
  - If you are interested, please contact me:
    bernardi@spacedys.com

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NEO ROCKS
Near Earth Object Rapid Observation, Characterization and Key Simulations

Priority List Mailing Service layout

NEODyS-2

Near Earth Objects - Dynamic Site

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Good Morning,

This email contains the ephemerides for objects in **NEODyS' Priority List**.

Observatory Code: **K83**

Observatory Name: **Beppe Forti Astronomical Observatory, Montelupo**

Limiting Magnitude: **20.5**

Declination Range: **-30** to **+90**

CAL 2021/Feb/16 00:00:00 UTC

Name	RA (HH MM SS)	DEC (DD MM SS)	Vmag	Elo.Sun (deg)	Ph. (deg)	El.Moo (deg)	Gal.lat. (deg)	Mot. ("/min)	& Dir. (deg)	Uncertainty Ellipse (arcmin)	(arcmin)	(deg)	Urgency	End of Vis Recov	Ephemerides
2021CZ7	15 18 44	+ 4 41 17	20.5	100.5	79.0	145.9	48.4	86.2	165.9	1.373	0.043	164.9	URGENT	2021-02-18	2021CZ7 1-day Eph. for K83
2021CL4	15 29 48	+11 51 52	20.5	99.2	79.9	141.5	49.9	51.6	113.9	0.130	0.011	121.0	URGENT	2021-02-17	2021CL4 1-day Eph. for K83
2021CW8	9 49 30	+75 19 1	19.7	-117.1	61.5	-98.0	36.8	62.2	5.0	0.024	0.008	192.4	URGENT	2021-02-18	2021CW8 1-day Eph. for K83
2021CH8	7 54 34	+ 4 4 35	20.0	-148.4	30.0	-102.4	15.9	9.2	327.0	0.606	0.020	148.0	URGENT	2021-02-19	2021CH8 1-day Eph. for K83
2021CU8	10 32 14	+ 5 5 55	20.5	168.8	11.0	-141.4	50.2	21.8	93.0	0.119	0.011	91.5	NECESSARY	2021-02-19	2021CU8 1-day Eph. for K83
2021CX4	7 25 37	+44 57 58	20.3	-134.1	42.7	-92.6	24.6	8.4	308.5	0.019	0.004	136.8	NECESSARY	2021-02-19	2021CX4 1-day Eph. for K83
2021CD2	10 2 49	-14 38 10	19.4	152.9	24.6	-133.3	31.5	9.7	196.9	0.051	0.017	195.9	USEFUL	2021-02-20	2021CD2 1-day Eph. for K83
2021CY5	8 31 8	+ 6 51 52	20.3	-157.9	21.1	-111.3	25.3	8.2	332.5	0.012	0.004	154.3	USEFUL	2021-02-20	2021CY5 1-day Eph. for K83
2021CG8	11 35 31	+15 46 49	20.5	156.1	22.8	-152.0	69.1	13.3	273.5	0.108	0.012	94.1	USEFUL	2021-02-23	2021CG8 1-day Eph. for K83
2001CQ36	4 6 17	+31 0 22	20.5	-98.2	75.1	-52.0	-15.6	4.8	86.8	0.003	0.001	58.8	LOW	2021-02-17	2001CQ36 1-day Eph. for K83
2021CM1	11 25 42	-10 17 33	20.4	148.5	30.1	-154.0	47.2	10.7	129.1	0.097	0.011	124.3	LOW	2021-02-27	2021CM1 1-day Eph. for K83
2021CS4	14 17 39	+ 7 36 28	20.2	116.0	59.8	159.5	61.7	17.2	65.2	0.049	0.012	64.4	LOW	2021-02-22	2021CS4 1-day Eph. for K83
2010VU198	4 12 35	+26 23 21	20.4	-98.7	47.7	-51.5	-17.9	1.6	7.2	0.001	0.000	171.5	LOW	2021-02-17	2010VU198 1-day Eph. for K83
2017BL31	1 36 21	+34 46 5	19.9	-70.0	86.1	-34.0	-27.2	4.0	256.1	0.002	0.001	68.0	LOW	2021-02-17	2017BL31 1-day Eph. for K83
2021CQ1	9 59 40	+45 3 20	20.5	-147.4	25.6	-117.9	51.5	6.0	351.8	0.007	0.003	190.1	LOW	2021-02-22	2021CQ1 1-day Eph. for K83
2017YZ1	5 14 38	-25 56 2	20.5	-101.2	61.4	-66.3	-31.8	1.7	221.8	0.002	0.001	204.1	LOW	2021-02-19	2017YZ1 1-day Eph. for K83
2021CU5	9 32 50	+10 34 23	19.9	-173.6	6.1	-126.0	40.6	6.2	170.7	0.011	0.005	164.8	LOW	2021-02-22	2021CU5 1-day Eph. for K83

For any concern, please send an email to neodys-help@spacedys.com.

This service has beend developed for the NEOROCKS (***NEO Rapid Observation, Characterization And Key Simulation***) Project, which has received funding from the European's Horizon 2020 research and innovation programme under grant agreement **No 870403.**

NEO ROCKS

Near Earth Object Rapid Observation, Characterization and Key Simulations

Thanks to this mailing service, a recovery of 2017 FH128 has been done by the Galhassin-Robotic-Telescope which is one of our beta-tester. They are using it already as a standard tool to schedule their observing night

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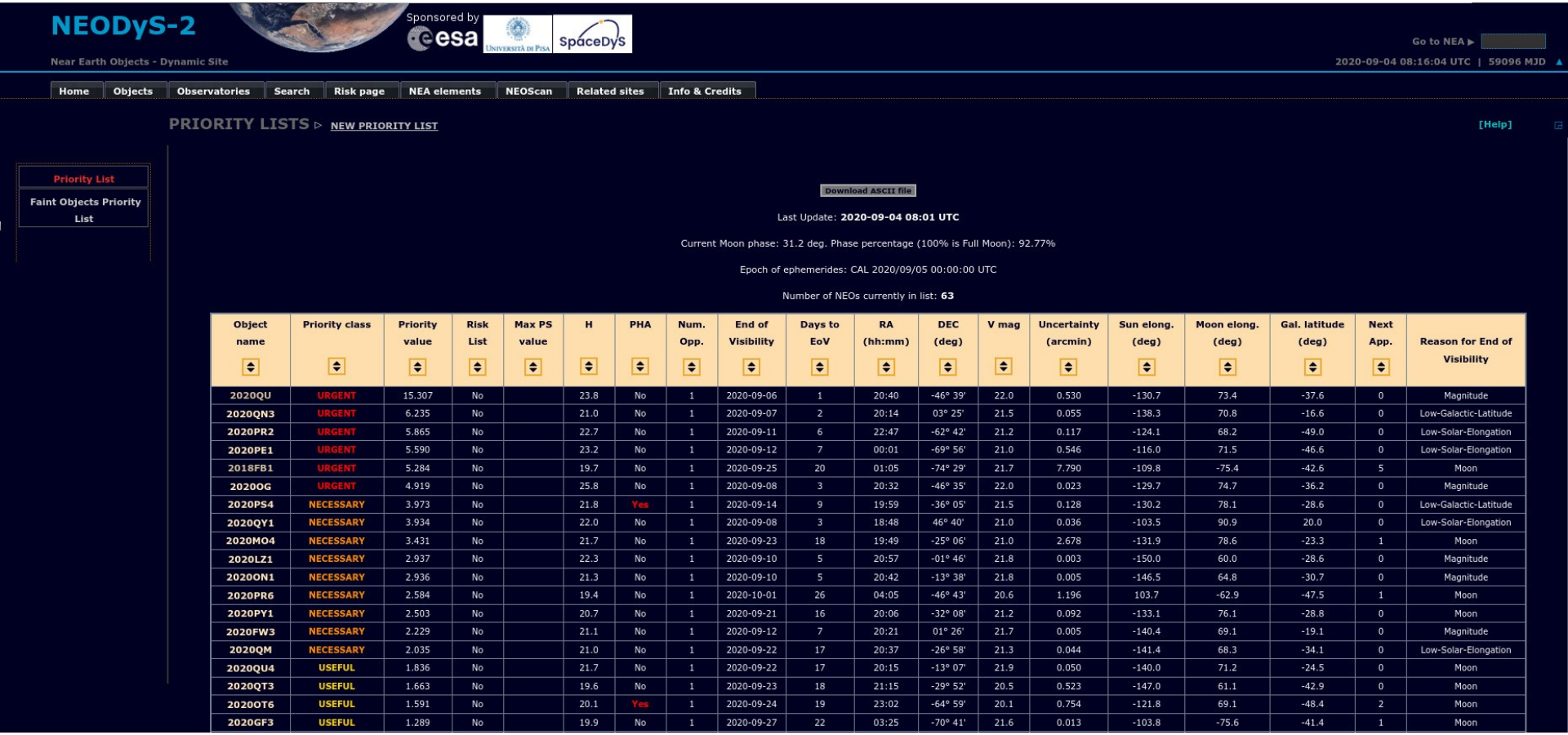
NEO ROCKS

Near Earth Object Rapid Observation, Characterization and Key Simulations

Present New Priority List General Layout



NEODyS-2

Near Earth Objects - Dynamic Site

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Go to NEA ▶

2020-09-04 08:16:04 UTC | 59096 MJD ▲

Home | Objects | Observatories | Search | Risk page | NEA elements | NEOScan | Related sites | Info & Credits

PRIORITY LISTS ▷ NEW PRIORITY LIST [Help]

Priority List

Faint Objects Priority List

Download ASCII file

Last Update: **2020-09-04 08:01 UTC**

Current Moon phase: 31.2 deg. Phase percentage (100% is Full Moon): 92.77%

Epoch of ephemerides: CAL 2020/09/05 00:00:00 UTC

Number of NEOs currently in list: **63**

Object name	Priority class	Priority value	Risk List	Max PS value	H	PHA	Num. Opp.	End of Visibility	Days to EoV	RA (hh:mm)	DEC (deg)	V mag	Uncertainty (arcmin)	Sun elong. (deg)	Moon elong. (deg)	Gal. latitude (deg)	Next App.	Reason for End of Visibility
2020QU	URGENT	15.307	No		23.8	No	1	2020-09-06	1	20:40	-46° 39'	22.0	0.530	-130.7	73.4	-37.6	0	Magnitude
2020QN3	URGENT	6.235	No		21.0	No	1	2020-09-07	2	20:14	03° 25'	21.5	0.055	-138.3	70.8	-16.6	0	Low-Galactic-Latitude
2020PR2	URGENT	5.865	No		22.7	No	1	2020-09-11	6	22:47	-62° 42'	21.2	0.117	-124.1	68.2	-49.0	0	Low-Solar-Elongation
2020PE1	URGENT	5.590	No		23.2	No	1	2020-09-12	7	00:01	-69° 56'	21.0	0.546	-116.0	71.5	-46.6	0	Low-Solar-Elongation
2018FB1	URGENT	5.284	No		19.7	No	1	2020-09-25	20	01:05	-74° 29'	21.7	7.790	-109.8	-75.4	-42.6	5	Moon
2020OG	URGENT	4.919	No		25.8	No	1	2020-09-08	3	20:32	-46° 35'	22.0	0.023	-129.7	74.7	-36.2	0	Magnitude
2020PS4	NECESSARY	3.973	No		21.8	Yes	1	2020-09-14	9	19:59	-36° 05'	21.5	0.128	-130.2	78.1	-28.6	0	Low-Galactic-Latitude
2020QY1	NECESSARY	3.934	No		22.0	No	1	2020-09-08	3	18:48	46° 40'	21.0	0.036	-103.5	90.9	20.0	0	Low-Solar-Elongation
2020MO4	NECESSARY	3.431	No		21.7	No	1	2020-09-23	18	19:49	-25° 06'	21.0	2.678	-131.9	78.6	-23.3	1	Moon
2020LZ1	NECESSARY	2.937	No		22.3	No	1	2020-09-10	5	20:57	-01° 46'	21.8	0.003	-150.0	60.0	-28.6	0	Magnitude
2020ON1	NECESSARY	2.936	No		21.3	No	1	2020-09-10	5	20:42	-13° 38'	21.8	0.005	-146.5	64.8	-30.7	0	Magnitude
2020PR6	NECESSARY	2.584	No		19.4	No	1	2020-10-01	26	04:05	-46° 43'	20.6	1.196	103.7	-62.9	-47.5	1	Moon
2020PY1	NECESSARY	2.503	No		20.7	No	1	2020-09-21	16	20:06	-32° 08'	21.2	0.092	-133.1	76.1	-28.8	0	Moon
2020FW3	NECESSARY	2.229	No		21.1	No	1	2020-09-12	7	20:21	01° 26'	21.7	0.005	-140.4	69.1	-19.1	0	Magnitude
2020QM	NECESSARY	2.035	No		21.0	No	1	2020-09-22	17	20:37	-26° 58'	21.3	0.044	-141.4	68.3	-34.1	0	Low-Solar-Elongation
2020QU4	USEFUL	1.836	No		21.7	No	1	2020-09-22	17	20:15	-13° 07'	21.9	0.050	-140.0	71.2	-24.5	0	Moon
2020QT3	USEFUL	1.663	No		19.6	No	1	2020-09-23	18	21:15	-29° 52'	20.5	0.523	-147.0	61.1	-42.9	0	Moon
2020OT6	USEFUL	1.591	No		20.1	Yes	1	2020-09-24	19	23:02	-64° 59'	20.1	0.754	-121.8	69.1	-48.4	2	Moon
2020GF3	USEFUL	1.289	No		19.9	No	1	2020-09-27	22	03:25	-70° 41'	21.6	0.013	-103.8	-75.6	-41.4	1	Moon

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Present New Priority List Layout

Download ASCII file

Last Update: **2020-09-04 08:01 UTC**

Current Moon phase: 31.2 deg. Phase percentage (100% is Full Moon): 92.77%

Epoch of ephemerides: CAL 2020/09/05 00:00:00 UTC

Number of NEOs currently in list: **63**

Object name	Priority class	Priority value	Risk List	Max PS value	H	PHA	Num. Opp.	End of Visibility	Days to EoV	RA (hh:mm)	DEC (deg)	V mag	Uncertainty (arcmin)	Sun elong. (deg)	Moon elong. (deg)	Gal. latitude (deg)	Next App.	Reason for End of Visibility
2020QU	URGENT	15.307	No		23.8	No	1	2020-09-06	1	20:40	-46° 39'	22.0	0.530	-130.7	73.4	-37.6	0	Magnitude
2020QN3	URGENT	6.235	No		21.0	No	1	2020-09-07	2	20:14	03° 25'	21.5	0.055	-138.3	70.8	-16.6	0	Low-Galactic-Latitude
2020PR2	URGENT	5.865	No		22.7	No	1	2020-09-11	6	22:47	-62° 42'	21.2	0.117	-124.1	68.2	-49.0	0	Low-Solar-Elongation
2020PE1	URGENT	5.590	No		23.2	No	1	2020-09-12	7	00:01	-69° 56'	21.0	0.546	-116.0	71.5	-46.6	0	Low-Solar-Elongation
2018FB1	URGENT	5.284	No		19.7	No	1	2020-09-25	20	01:05	-74° 29'	21.7	7.790	-109.8	-75.4	-42.6	5	Moon
2020OG	URGENT	4.919	No		25.8	No	1	2020-09-08	3	20:32	-46° 35'	22.0	0.023	-129.7	74.7	-36.2	0	Magnitude
2020PS4	NECESSARY	3.973	No		21.8	Yes	1	2020-09-14	9	19:59	-36° 05'	21.5	0.128	-130.2	78.1	-28.6	0	Low-Galactic-Latitude
2020QY1	NECESSARY	3.934	No		22.0	No	1	2020-09-08	3	18:48	46° 40'	21.0	0.036	-103.5	90.9	20.0	0	Low-Solar-Elongation
2020MO4	NECESSARY	3.431	No		21.7	No	1	2020-09-23	18	19:49	-25° 06'	21.0	2.678	-131.9	78.6	-23.3	1	Moon
2020LZ1	NECESSARY	2.937	No		22.3	No	1	2020-09-10	5	20:57	-01° 46'	21.8	0.003	-150.0	60.0	-28.6	0	Magnitude
2020ON1	NECESSARY	2.936	No		21.3	No	1	2020-09-10	5	20:42	-13° 38'	21.8	0.005	-146.5	64.8	-30.7	0	Magnitude
2020PR6	NECESSARY	2.584	No		19.4	No	1	2020-10-01	26	04:05	-46° 43'	20.6	1.196	103.7	-62.9	-47.5	1	Moon
2020PY1	NECESSARY	2.503	No		20.7	No	1	2020-09-21	16	20:06	-32° 08'	21.2	0.092	-133.1	76.1	-28.8	0	Moon
2020FW3	NECESSARY	2.229	No		21.1	No	1	2020-09-12	7	20:21	01° 26'	21.7	0.005	-140.4	69.1	-19.1	0	Magnitude
2020QM	NECESSARY	2.035	No		21.0	No	1	2020-09-22	17	20:37	-26° 58'	21.3	0.044	-141.4	68.3	-34.1	0	Low-Solar-Elongation
2020QU4	USEFUL	1.836	No		21.7	No	1	2020-09-22	17	20:15	-13° 07'	21.9	0.050	-140.0	71.2	-24.5	0	Moon
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New Priority List

- Several data:
  - Name of target
  - Urgency → Urgent, Necessary, Useful, Low Priority
  - PL Value (it will explained later)
  - Presence in Risk list and, in case, PS value
  - Absolute magnitude H
  - If it is a PHA
  - Number of observed oppositions/apparitions (source MPC)
  - End of Visibility at present apparition
  - Remaining days to EoV
  - RA, DEC and Vmag at next midnight UTC
  - Present Sky uncertainty,
  - Sun elongation
  - Moon elongation
  - Galactic Latitude
  - Next Apparitions (number of visibility windows in the next 10000 days – 27.4 ys)
  - Reason for EoV
- All fields are sortable
- RA is sortable starting from present Sun RA (list objects from sunset to sunrise going East)

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New Priority List

- The **Priority List Value**, used to determine the urgency for observations is computed in this way:
  - For each object that is visible today, we compute the **ephemerides for 10000 days** (a bit more than 27 years)
  - An analysis of the visibility windows in this timeframe is performed:
    - If the only visibility window is now, the PL value is very high
    - If there are several more opportunities, the PL value is lower
  - The Visibility Window is determined by:
    - V mag limits
    - Sky uncertainty constraints
    - Solar elongation
    - Lunar elongation and phase
    - Galactic latitude
  - The PL is computed taking into account:
    - Present End of Visibility
    - Visibility during the next 10000 days
    - Presence in Risk List and its PS value
    - MOID
    - Present solar and lunar elongations, uncertainty and V magnitude

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Priority List and Faint Objects Priority List

- We decided to keep a legacy from the original Priority List Service of the SCN
- We implemented two lists: the “main” Priority List and the Faint Objects Priority List
- The differences are the following:
  - Priority List:
    - V mag lim to 22
    - Solar elongation greater than 40 deg
  - Faint Objects Priority List:
    - V mag between 22 and 25
    - Solar elongation greater than 30 deg
    - Lunar brightness less important
- The **Priority List** is tailored for the general observer, from amateur to professional, but with limited telescope resources
- The **Faint Objects Priority List** is tailored only for observers with meter-class telescope and bigger

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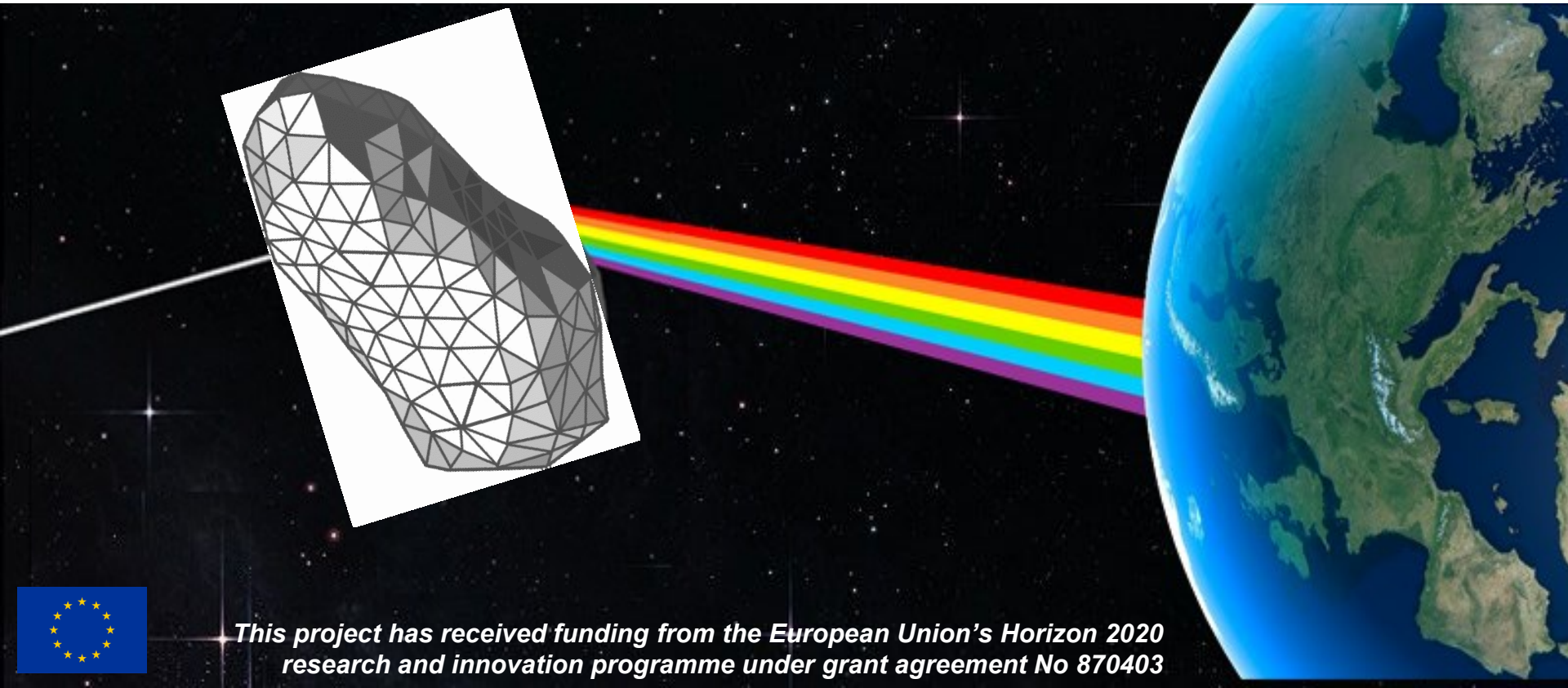
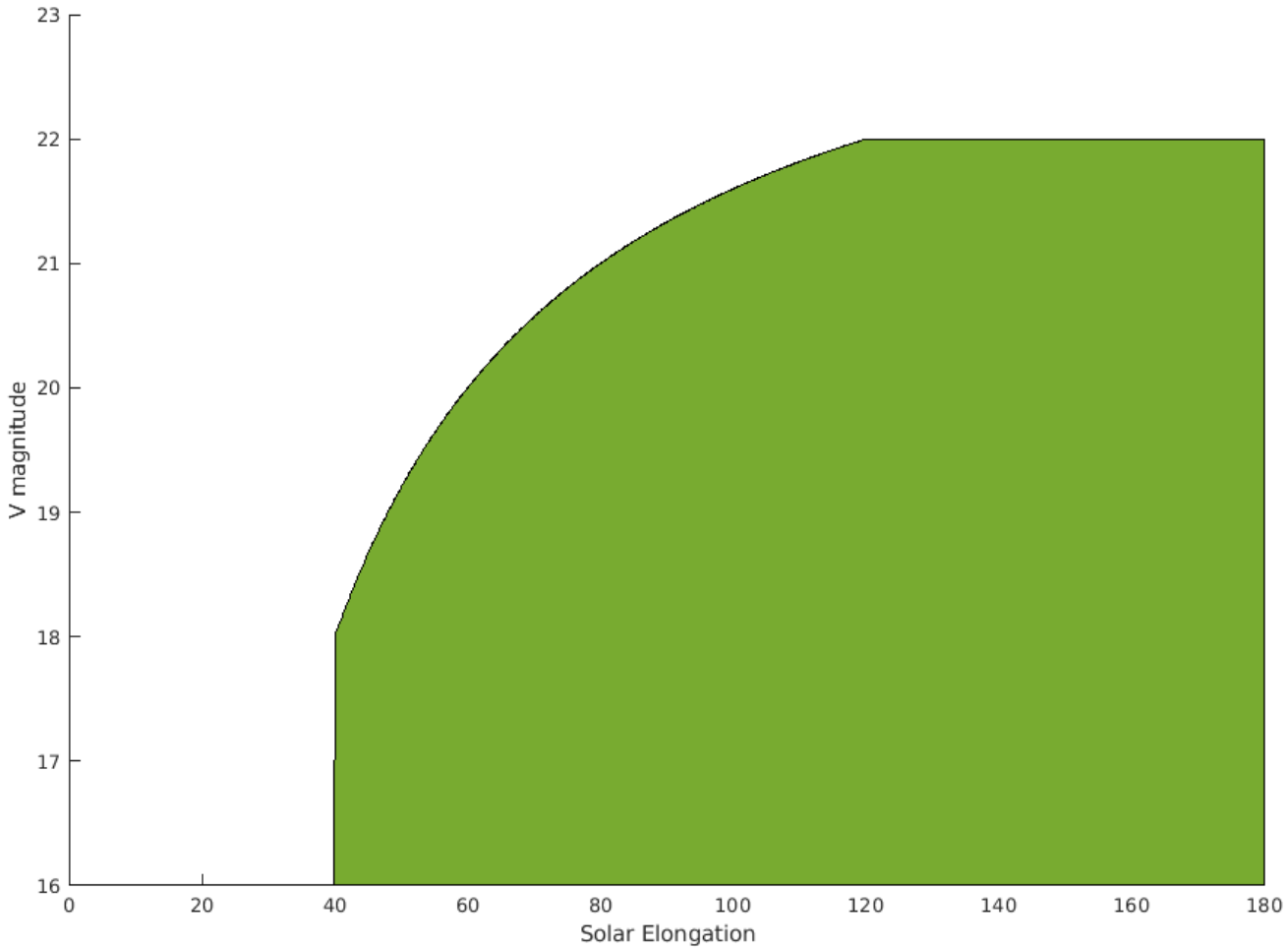
Thanks!



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 870403

Extra slides

Visibility window depending upon Vmag and Solar Elongation



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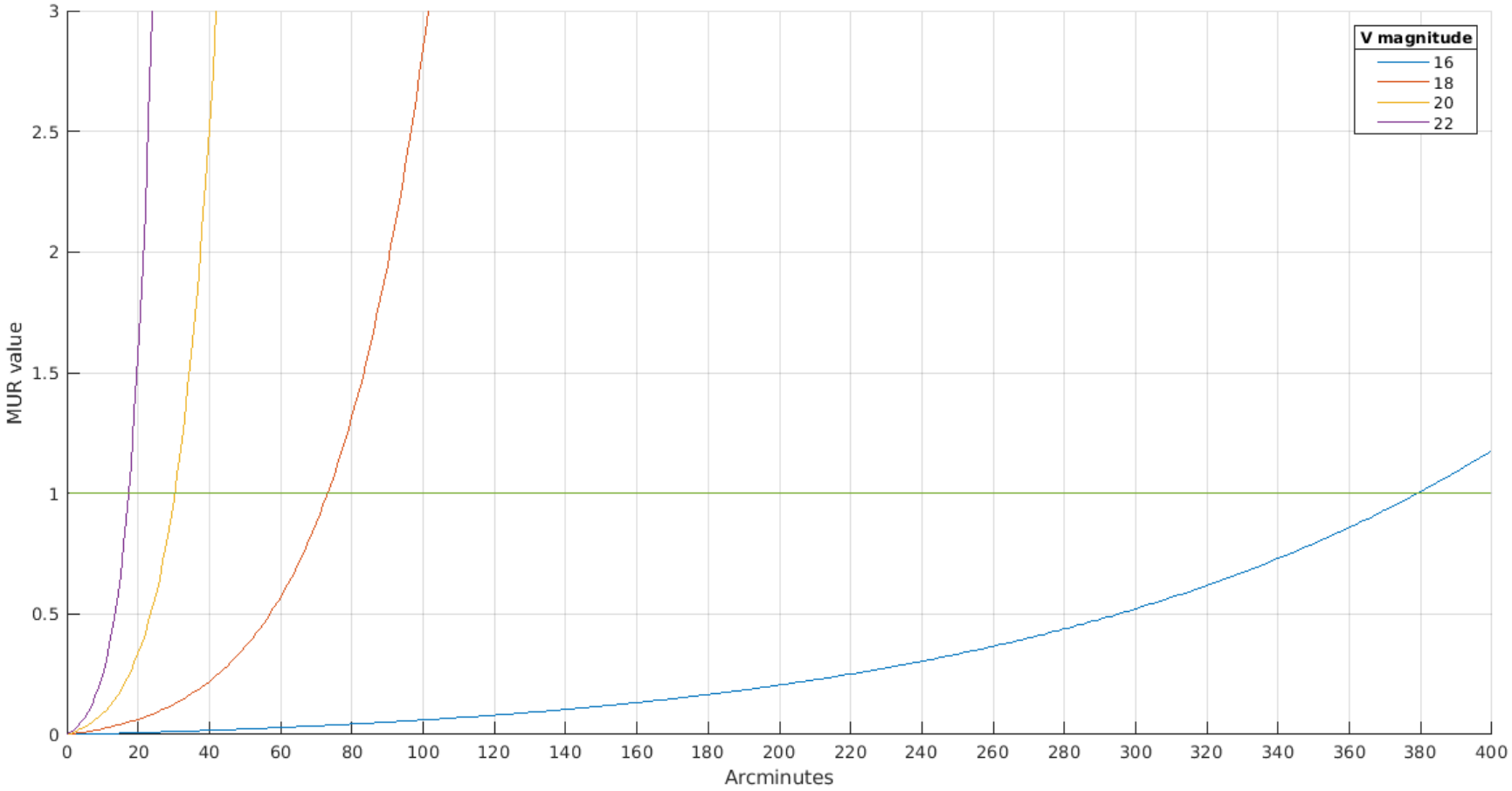
Visibility window depending upon Sky uncertainty



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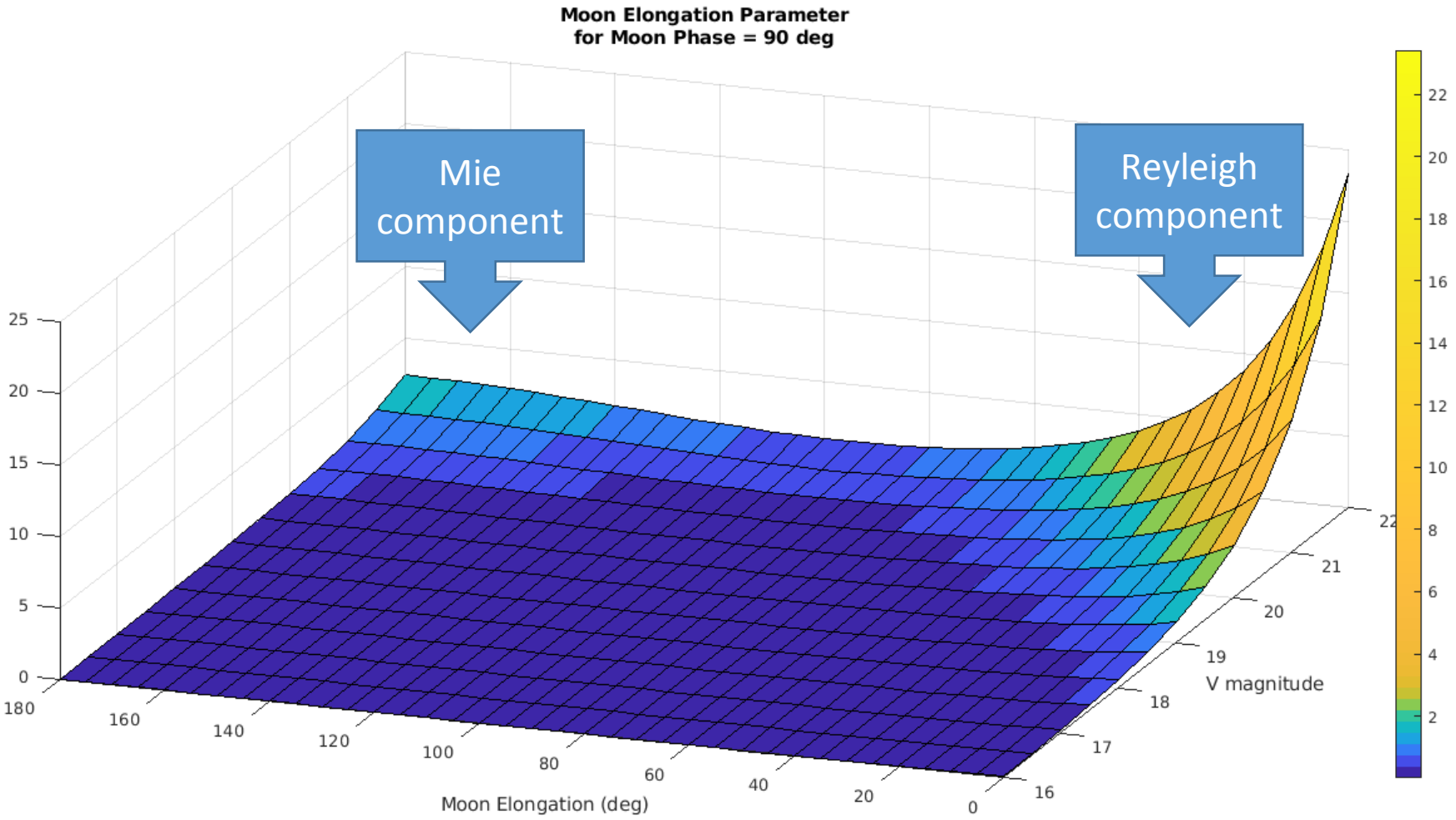
Moon elongation effect



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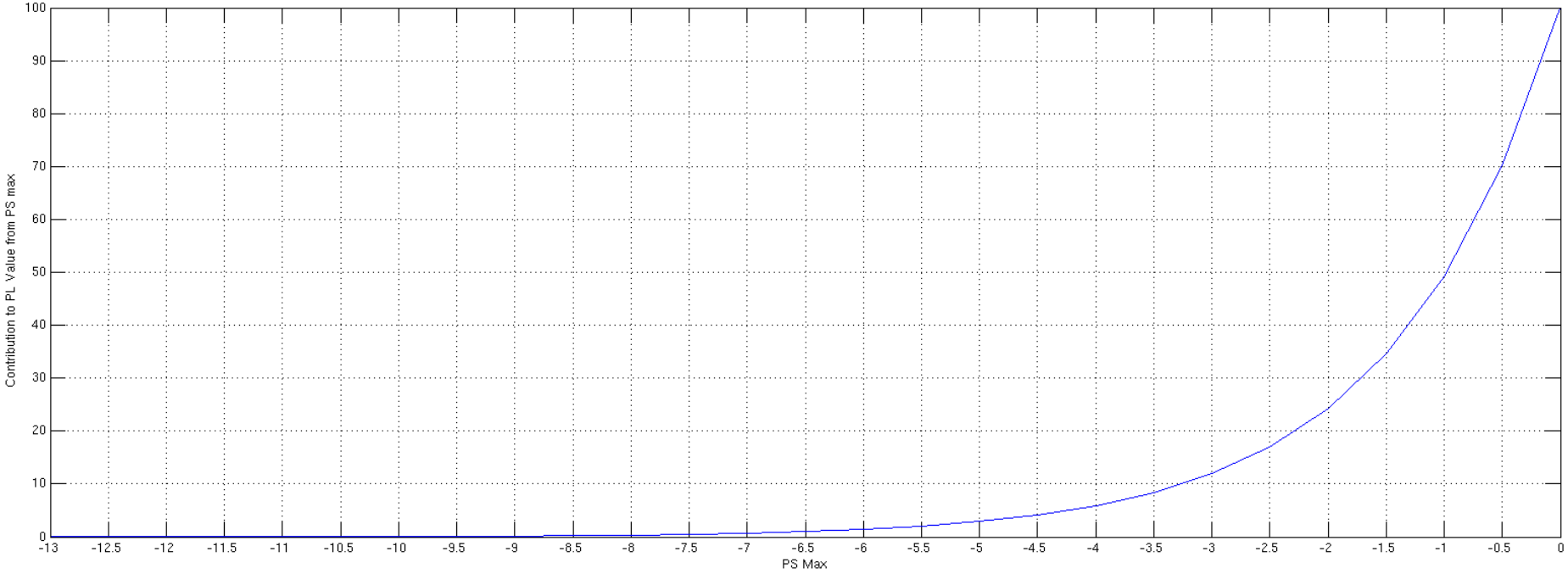
Priority List Value and Palermo Scale dependency



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