# ESA's Planetary Defense Activities

Richard Moissl and the Planetary Defence Office Team

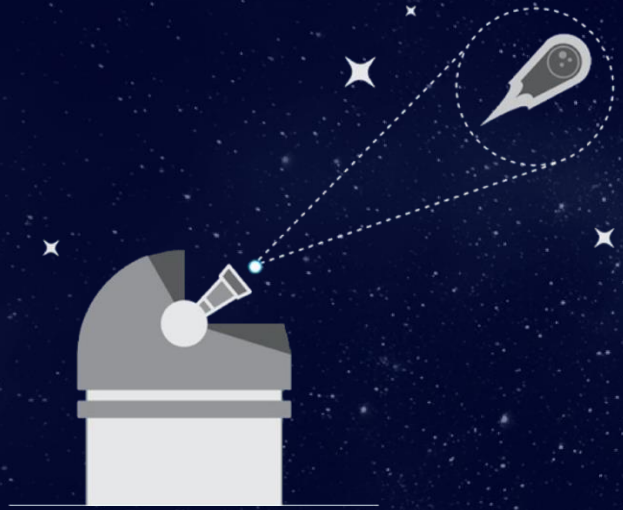
Image credit: ESA/P. Carril

# Our ‘mission statement’

*“The goal of Space Safety is [] **the protection of our planet, humanity and assets in space and on Earth from dangers originating in Space”** (PB-SSA 2018(24))*

- Detecting Near Earth Objects, determining their dynamic and physical properties
- Assessment and prediction of impact risk, warning decision makers and disaster relief forces in case of threats
- Risk mitigation through potential reconnaissance and/or deflection missions

# The Three Pillars of ESA's Planetary Defence

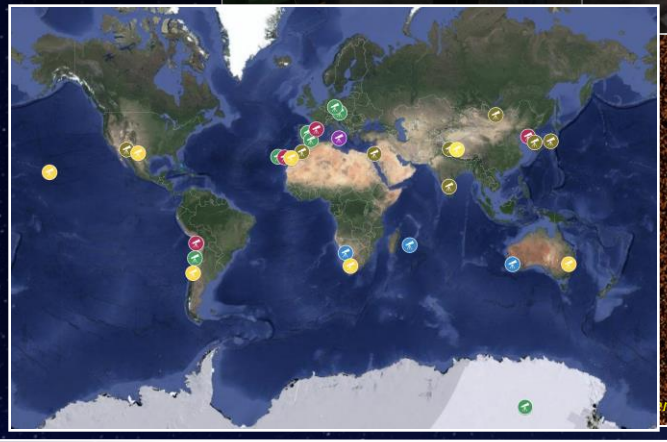


Observation


Assessment

Mitigation

# Observations

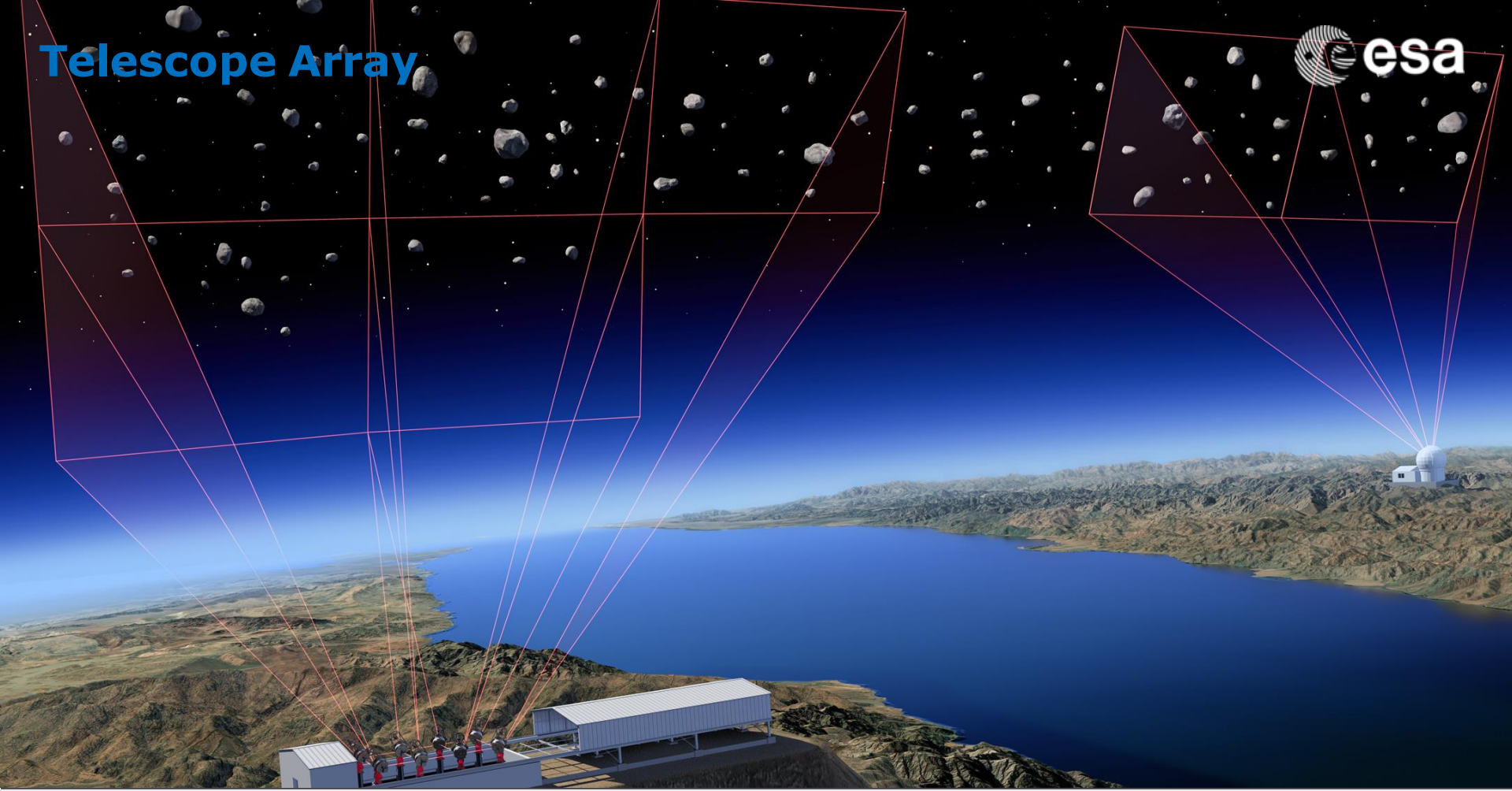


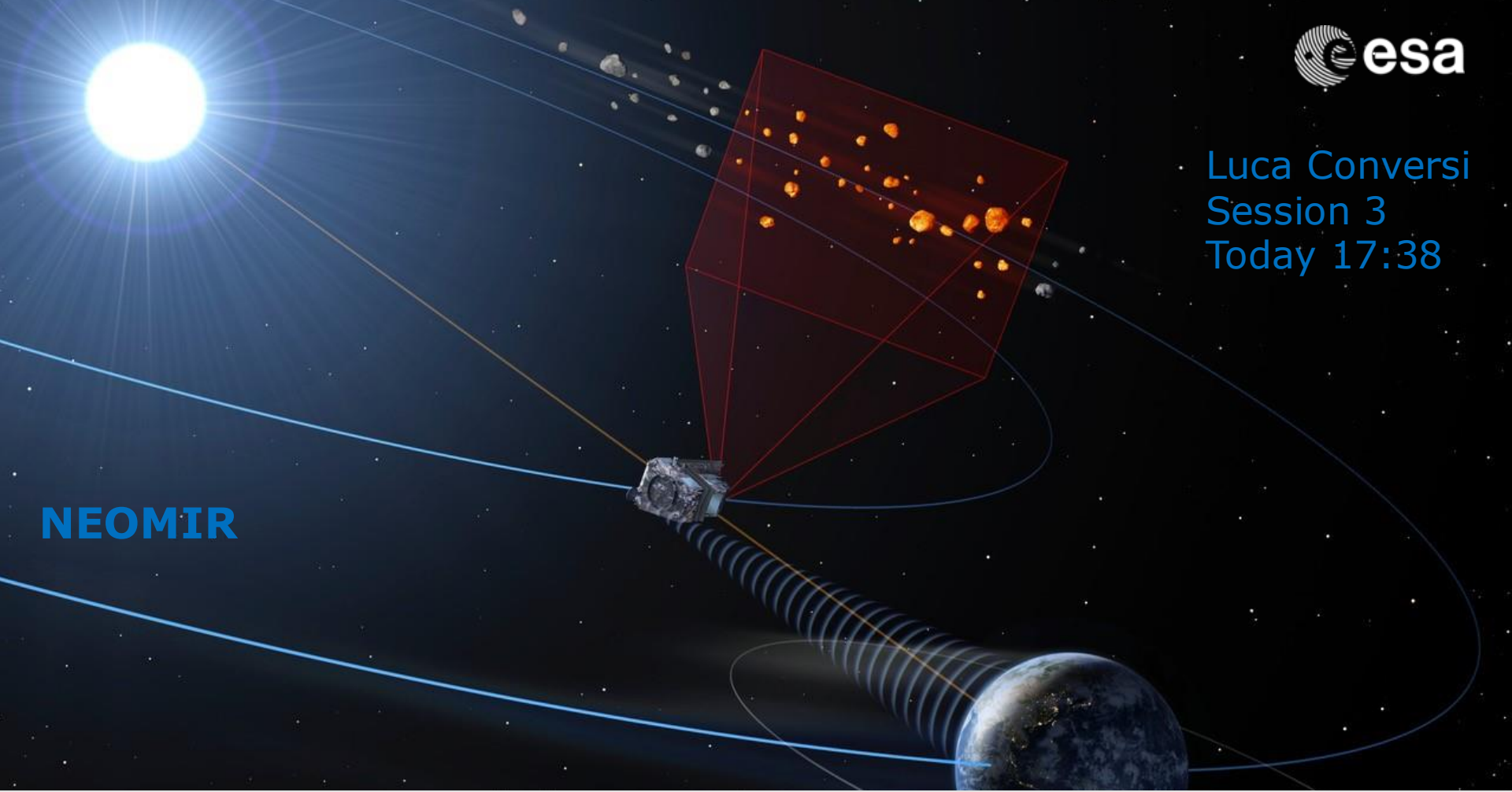
Marco Micheli
Session 3
Today 15:15

# The Flyeye Survey Telescope Network

Dora Föhring
Session 3
Today 17:22

# Telescope Array

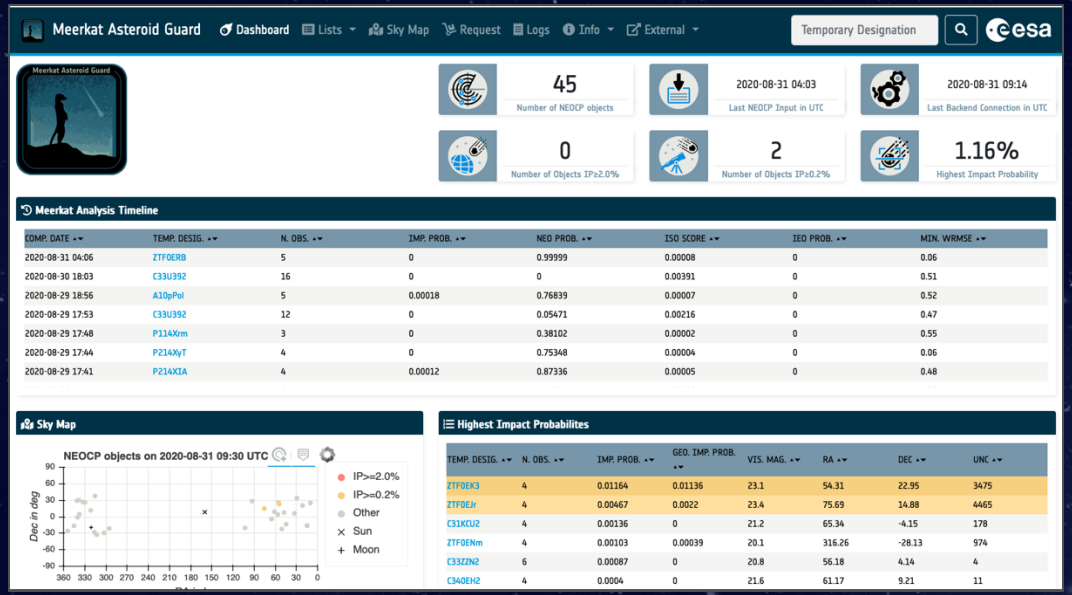




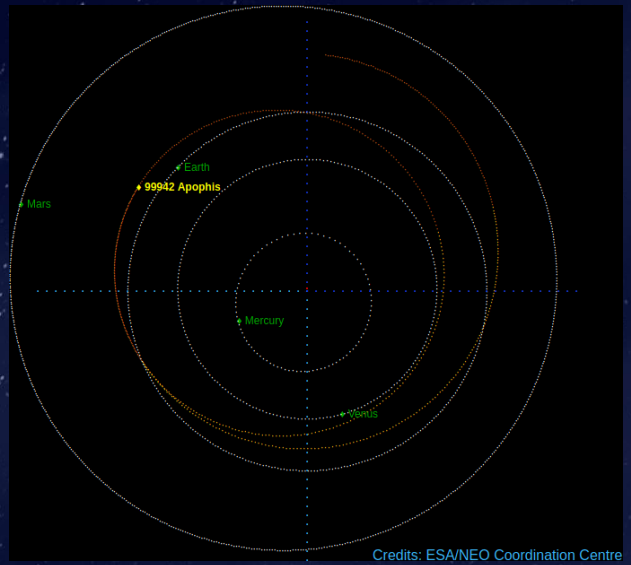

Luca Conversi
Session 3
Today 17:38

# Assessment

## Meerkat: Early warning system




## Aegis: Orbit Determination and Impact Monitoring software



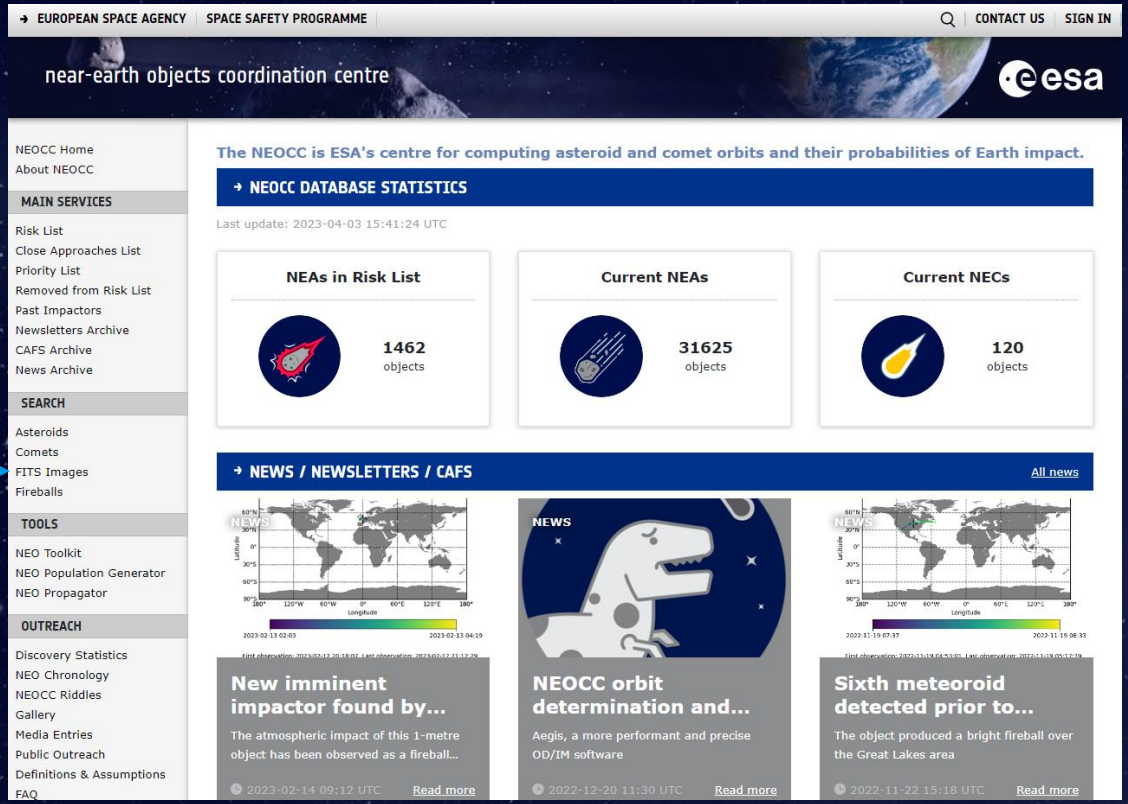

Laura Fagioli, Francesco Gianotto et al.
Poster Session (related poster by Marco Fenucci)

Orbit determination.
Coordination with NASA

# Information Provision

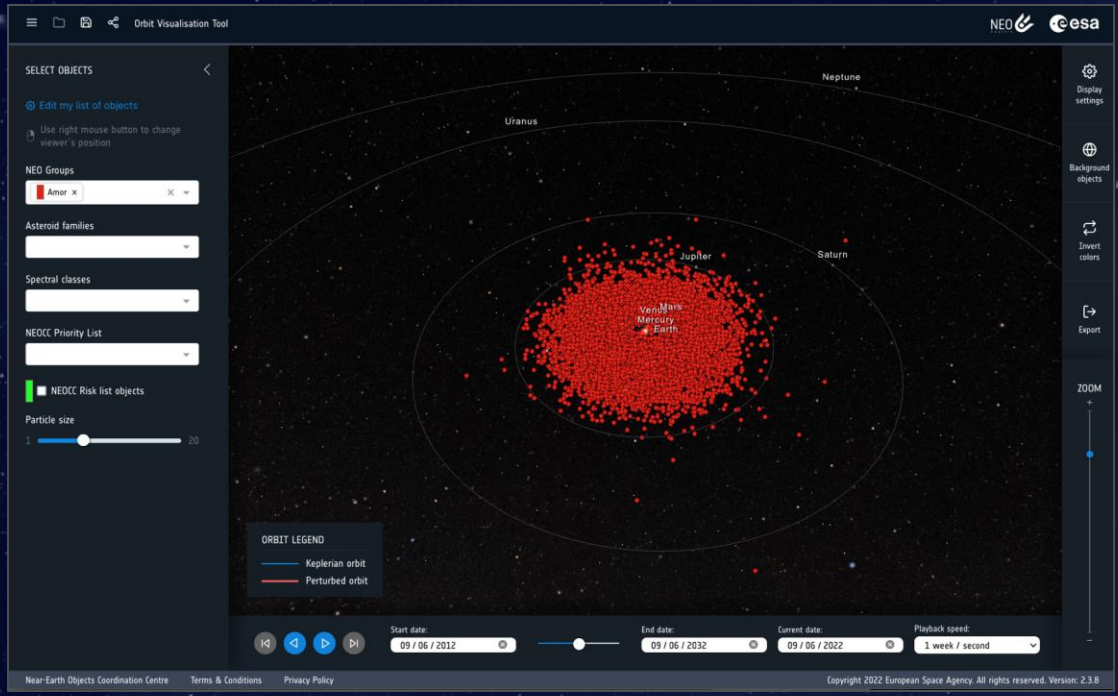
## NEOCC Portal

Regina Rudawska
Poster Session



# Information Provision

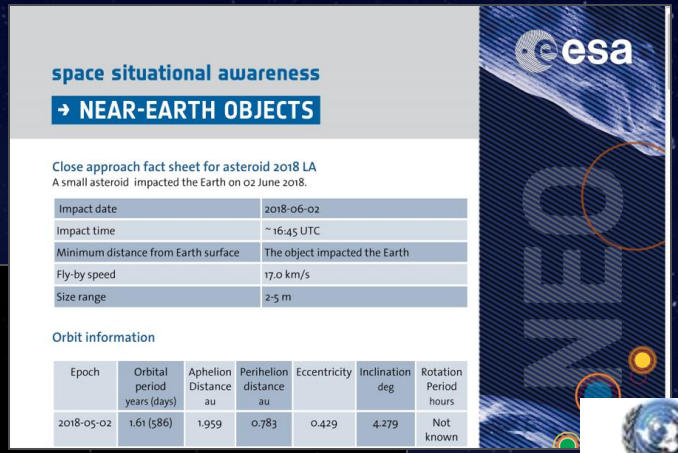
## NEO Toolkit and API access


Dario Oliviero
Poster Session

# Mitigation

Juan Luis Cano
Session 8
Thursday 11:56




space situational awareness

→ NEAR-EARTH OBJECTS

Close approach fact sheet for asteroid 2018 LA

A small asteroid impacted the Earth on 02 June 2018.

| | |
|---|---|
| Impact date | 2018-06-02 |
| Impact time | ~16:45 UTC |
| Minimum distance from Earth surface | The object impacted the Earth |
| Fly-by speed | 17.0 km/s |
| Size range | 2-5 m |

Orbit information

| Epoch | Orbital period years (days) | Aphelion Distance au | Perihelion distance au | Eccentricity | Inclination deg | Rotation Period hours |
|---|---|---|---|---|---|---|
| 2018-05-02 | 1.61 (586) | 1.959 | 0.783 | 0.429 | 4.279 | Not known |

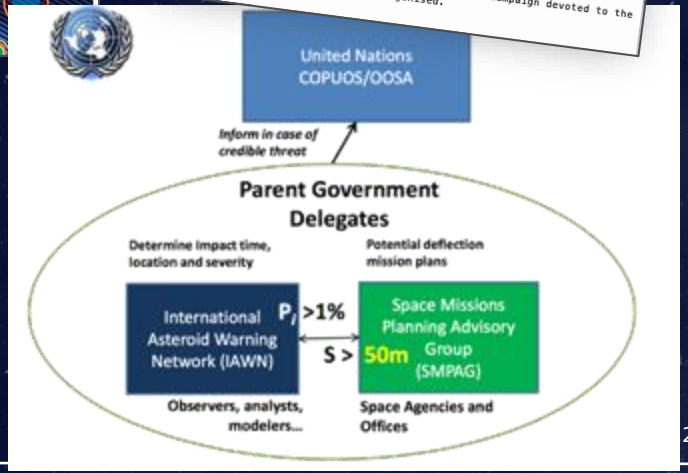
The medium-sized asteroid 2012TC4 had a close approach with the Earth on 12 October 2017. The minimum distance was outside the geostationary ring. This is a special-interest event.

Flyby information:
Flyby date: 2017-10-12
Closest approach time: 05:41 UTC +/- 0 s
Flyby distance from Earth surface: 43832 km +/- 1 km
Flyby speed: 7.26 km/s
Size range: 13.0 m to 30.0 m
Discovery date: 2012-10-04
Discovery site: Haleakala

Orbit information:
The flyby caused a change in the orbit elements.
Date before and after flyby: Before = 2017-09-12, after = 2017-22-12
Orbital periods in years/days: Before = 0.005/1.67, after= 0.006/2.06
Aphelion distances in au: Before = 1.878, after = 2.275
Perihelion distances in au: Before = 0.934, after = 0.965
Eccentricities: Before = 0.336, after = 2017-22-12
Inclinations in deg: Before = 0.857, after = 0.536

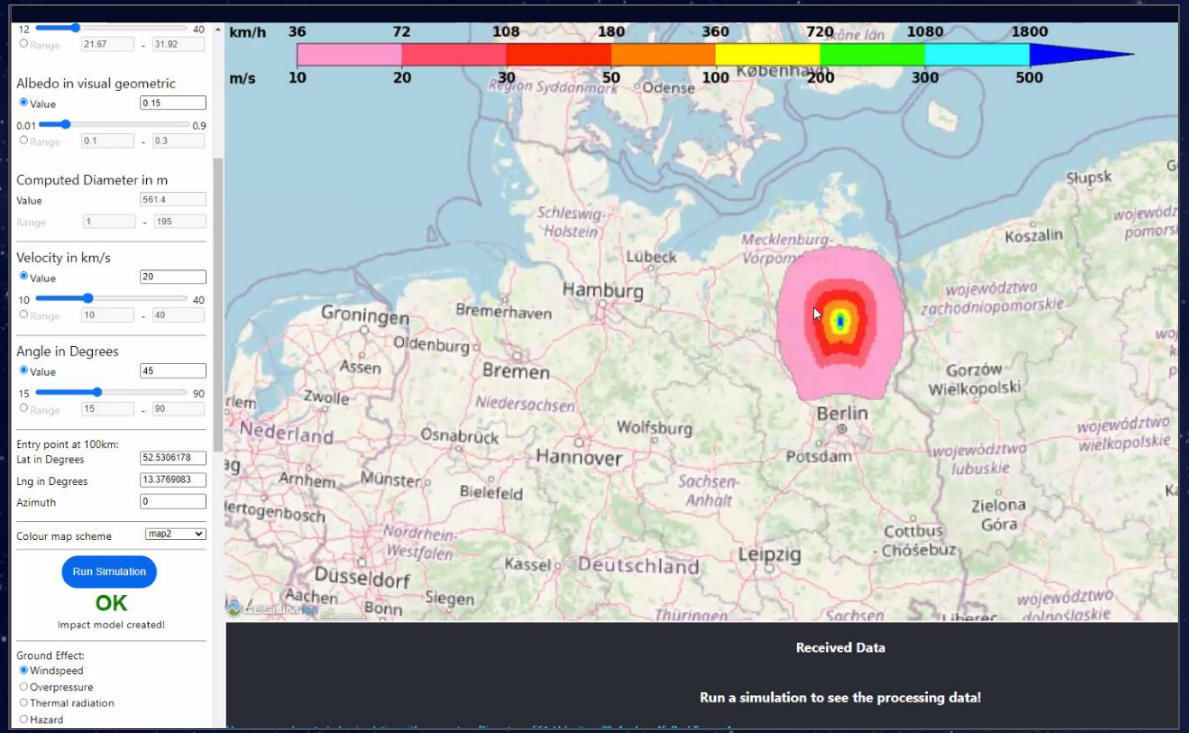
Mitigation Information:
No mitigation actions required for this object.
Days since closest approach: -1203
Cumulative impact probability: 0
Composition (Taxonomic type): Unknown
Rotation period in hours: 0.204

Other information:
Peak brightness magnitude: 12.7
Date of previous encounter: 2012-20-12
Date of next encounter: 2050-10-19
Encounter peculiarities: An international observation campaign devoted to the very close flyby of 2012TC4 had been organised.



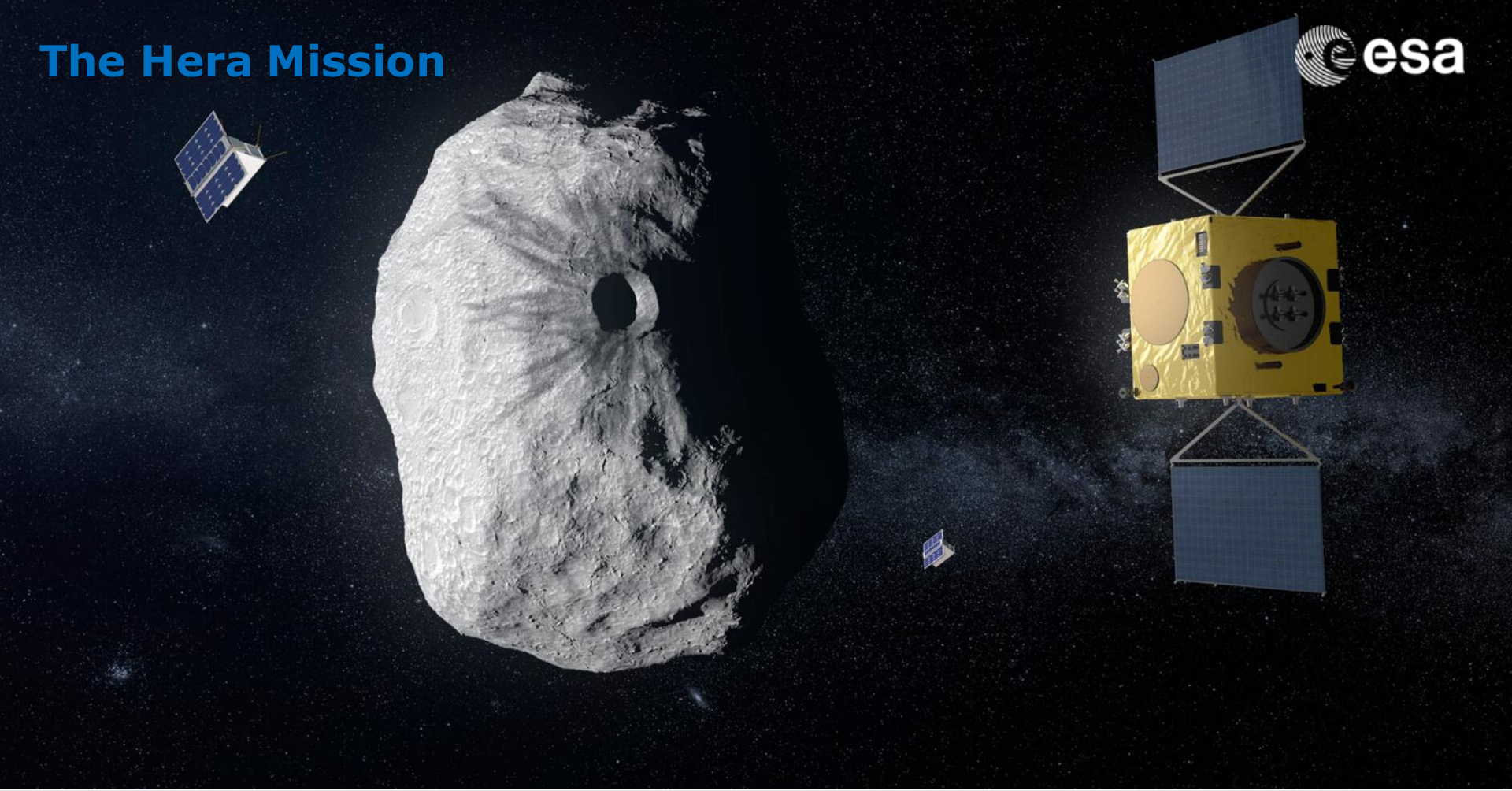
# Mitigation

## Impact Effects Tools




Robert Luther
Session 7a
Thursday 9:25

# The Hera Mission



# Apophis Reconnaissance Mission

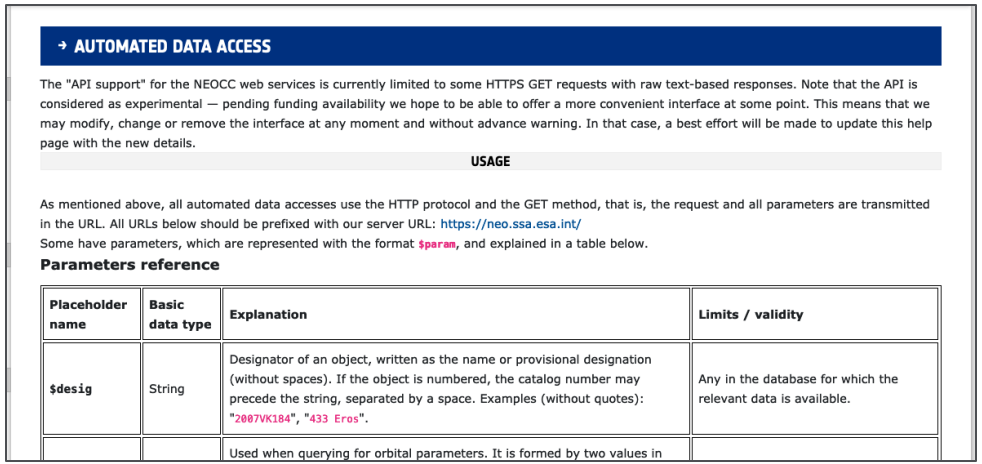
Image: ScienceMark Garlick/
Photo Library/Getty Images

# Thank you!

# Backup Slides

# Information provision

- Access to our data– API and Python script (beta version):



## → AUTOMATED DATA ACCESS

The "API support" for the NEOCC web services is currently limited to some HTTPS GET requests with raw text-based responses. Note that the API is considered as experimental — pending funding availability we hope to be able to offer a more convenient interface at some point. This means that we may modify, change or remove the interface at any moment and without advance warning. In that case, a best effort will be made to update this help page with the new details.

**USAGE**

As mentioned above, all automated data accesses use the HTTP protocol and the GET method, that is, the request and all parameters are transmitted in the URL. All URLs below should be prefixed with our server URL: https://neo.ssa.esa.int/
Some have parameters, which are represented with the format `$param`, and explained in a table below.

**Parameters reference**

| Placeholder name | Basic data type | Explanation | Limits / validity |
|---|---|---|---|
| $desig | String | Designator of an object, written as the name or provisional designation (without spaces). If the object is numbered, the catalog number may precede the string, separated by a space. Examples (without quotes): "2007VK184", "433 Eros". | Any in the database for which the relevant data is available. |
| | | Used when querying for orbital parameters. It is formed by two values in | |

```
[In [2]: from ESANEOCC import neocc

[In [3]: list_data = neocc.query_list(list_name="nea_list")

[In [4]: list_data
Out[4]:
0            433 Eros
1          719 Albert
2          887 Alinda
3        1036 Ganymed
4           1221 Amor
              ...
29068        2022LX1
29069        2022LY1
29070         2022LZ
29071        2022LZ1
29072        6344P-L
Name: 0, Length: 29073, dtype: object
```