Innovative **plots** for **threat assessment** and faster **follow-up** scheduling of newly discovered **NEOs**

Meerkat Asteroid Guard imminent impactor warning service of the European Space Agency

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Motivation

- Independent system for **imminent impactor** warning
- Clear and quick **threat assessment**
- Reduce time for scheduling **follow-up** observations

Meerkat System

- Using **MPC NEOCP tracklets** as input data
- Implemented **systematic ranging** orbit determination [1,2,3]
- Determining **impact** score, **NEO** classes, close **approaches**, etc.
- Fully **automated**, running **24/7**
- **Web** interface and **e-Mail** notifications
- **Ephemeris service** with option of only impactors for so-called **negative observations** [4,5]

Dashboard Plot

The Dashboard plot gives a **clear overview** for **threat assessment** for identifying an object as **scientifically interesting** by visualizing available relevant information as **pie charts**. Among others:

- **Impact** Score (heliocentric and geocentric)
- Estimated **impact time** within 48 hours
- Class dependent **object size** estimate (impactor, NEO, all)
- **Interior-Earth object** (IEO) score

Station Selection Plot

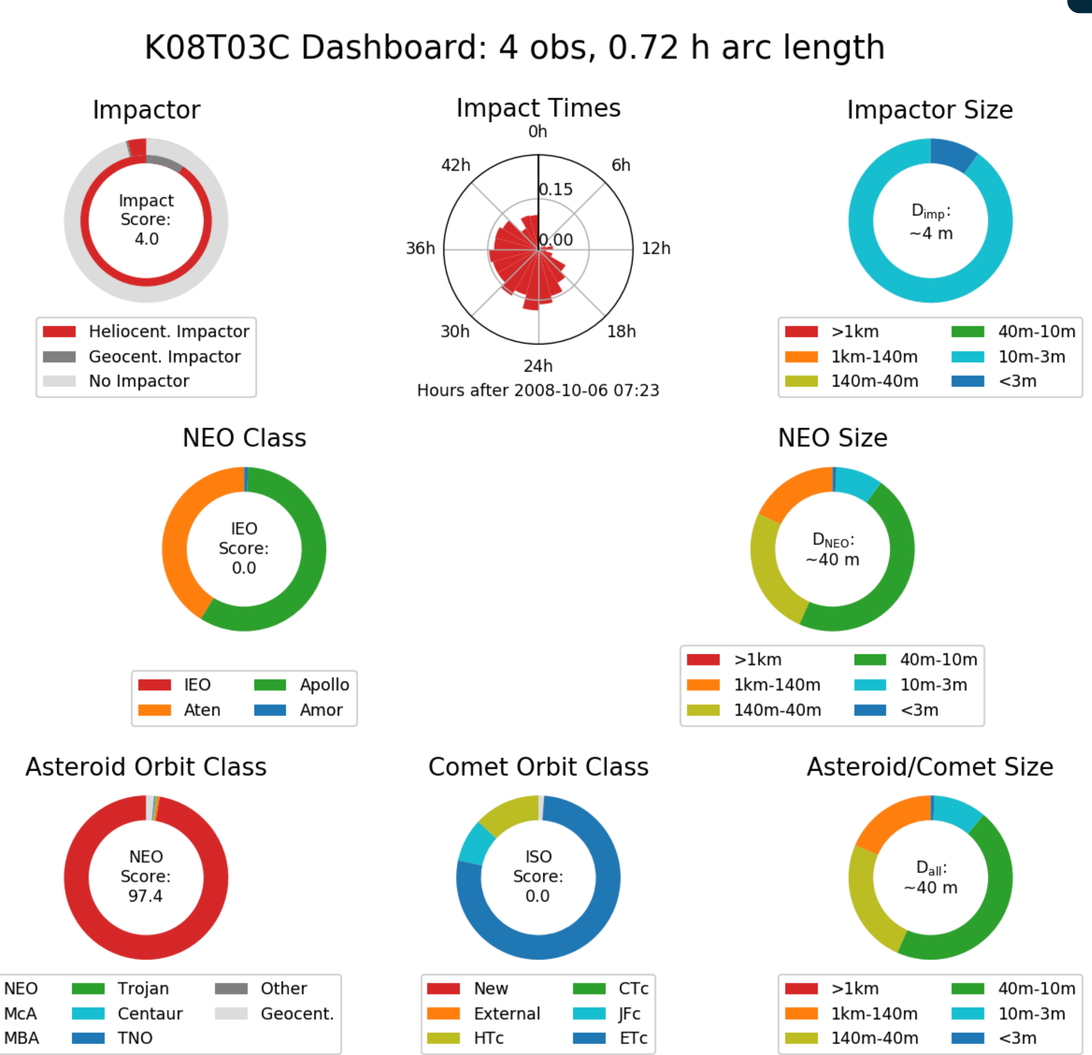
The Station Selection plot helps **picking** the right observatory from a set a preselected stations for **follow-up** observations by showing all relevant information:

1. Is the object **above the horizon** for a certain station
2. Is the object **bright** enough for a certain station
3. Is the **position uncertainty** low enough for a certain station
4. Might the object have **impacted** before potential observation

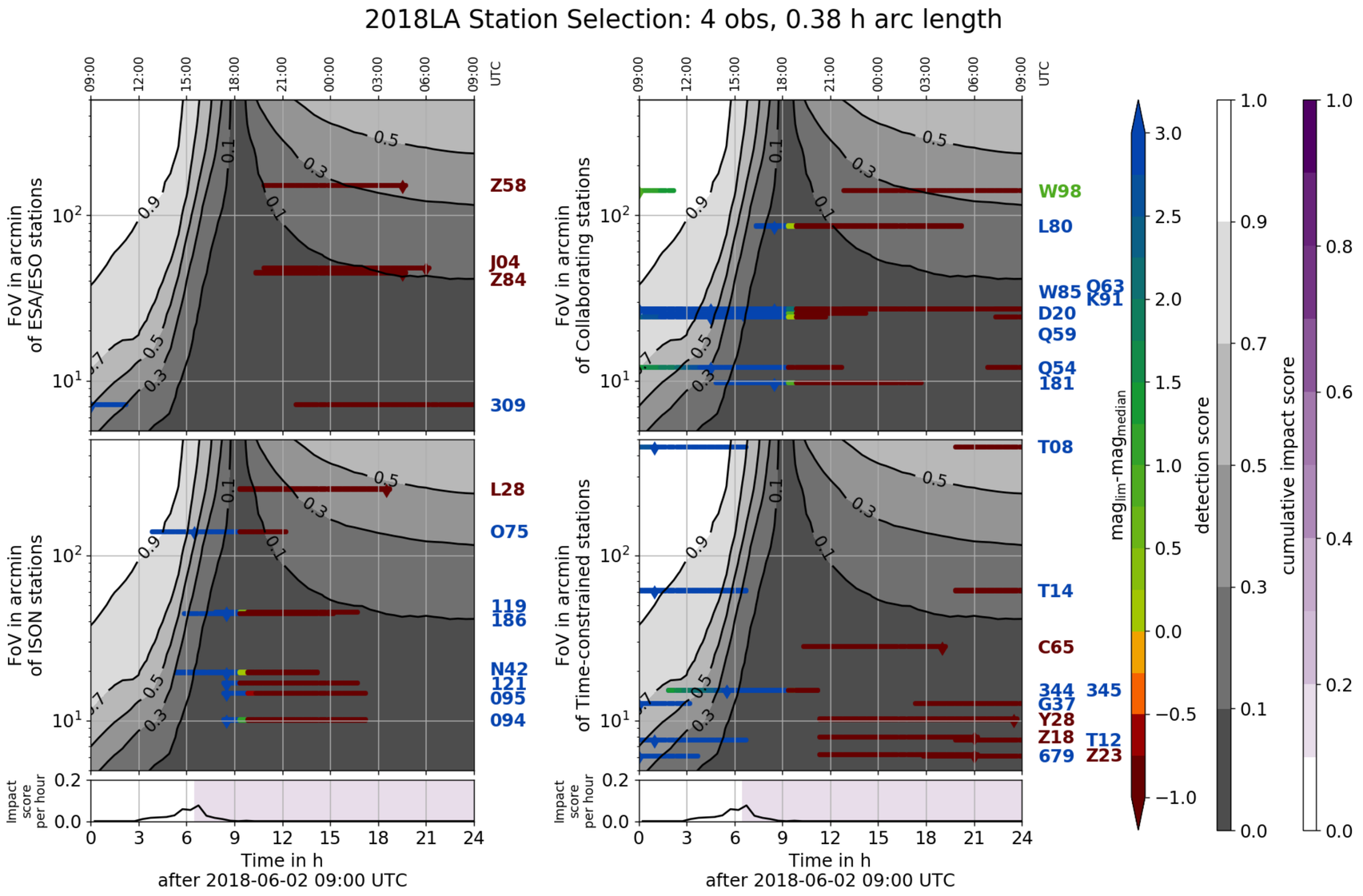
The plot splits into two parts:

- 4 Main panels for station selection:
  - X-Axis: **Time** (24 hours) after computation was done and corresponding UTC
  - Y-Axis: **Field of view** (FoV)
  - Contour Lines: **Detection score** for geocentric observer
  - Bars: Represent **stations** with their specific FoV and the visibility of the object
  - Bar diamonds: Show the **culmination** of the object for the station
  - Bar colours: Show the difference between the object **apparent magnitude** (median) and the **limiting magnitude** of the station. A 0 is barely visible.
  - Observatory Codes: Located on the right of each panel and **link the bars** to the stations
- 2 Lower panels for impact time estimate:
  - X-Axis: **Time**, equally for other panels
  - Y-Axis: **Impact** score **per hour**
  - Colours: **Cumulative impact** score

Dashboard Plot



Station Selection Plot



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References:

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