Meerkat: ESA Alert System to **Warn** the NEO Community of **Imminent Impactors**



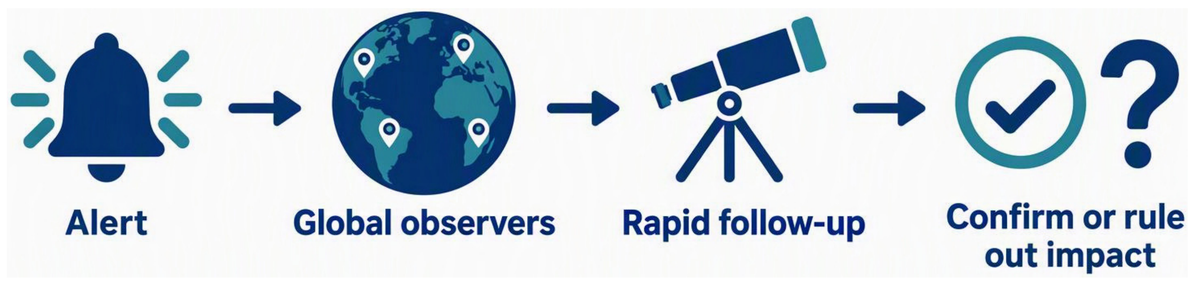
Meerkat: An Operational Software System for Automated Imminent Impactor Detection and Community Alerting

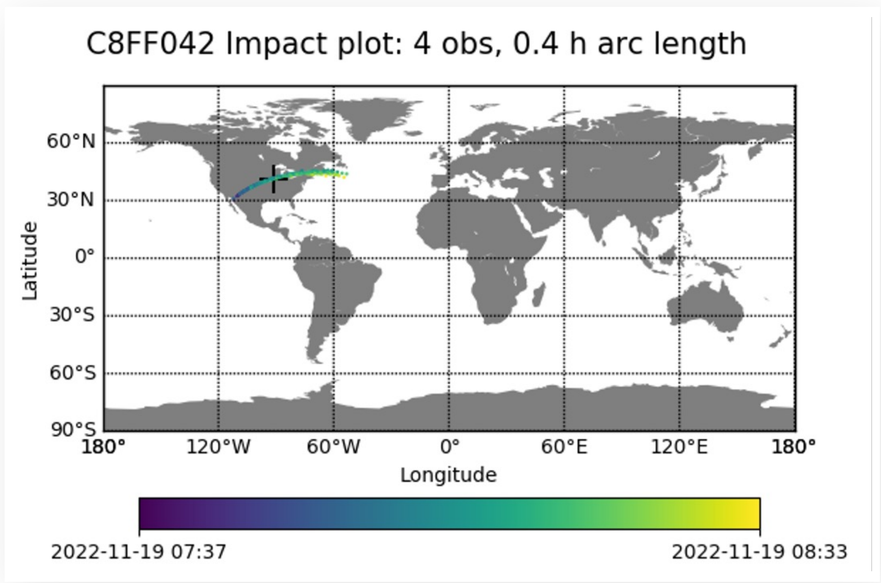
Background: New asteroids and comets are discovered every day. Their detections need to be immediately analyzed to detect imminent impactors and start mitigation actions.

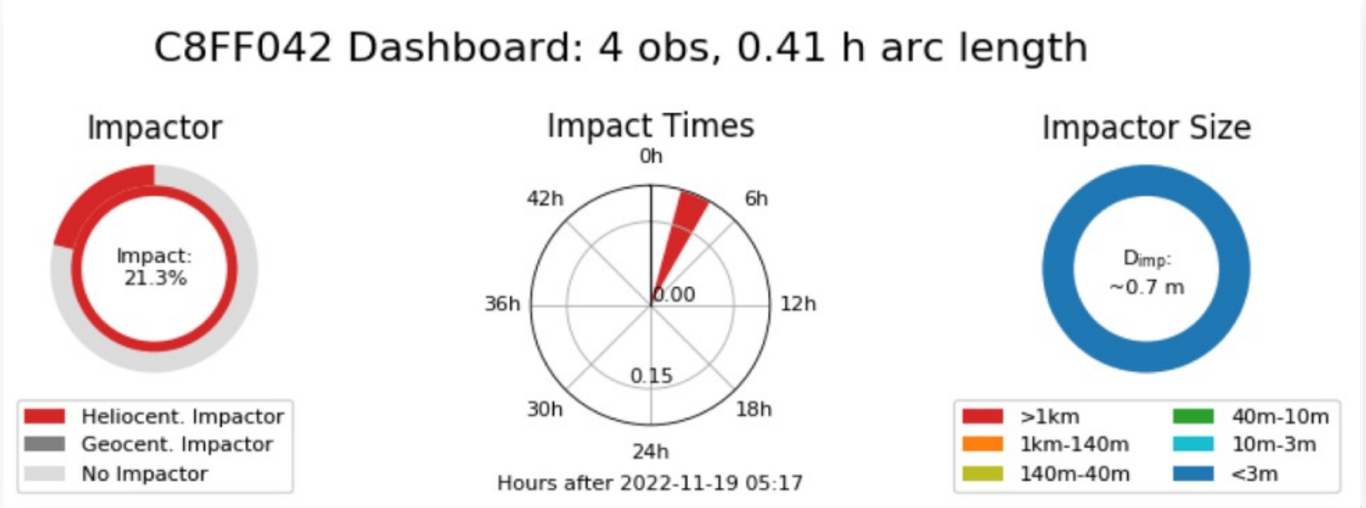
First of all, observers need to be promptly notified to speed up follow-up observations for notable objects.

Method – from observations to alerts

1. Retrieve observations from Minor Planet Center (MPC)
2. Estimate possible orbits using systematic ranging method
3. Compute impact scores and impact corridors
4. Send warning email to dedicated mailing lists







Architecture for 24/7 operation

- Containerized Docker services
- Automated pipeline and multiprocessing
- CI/CD for software maintenance
- ESA's GODOT library

To subscribe to Meerkat mailing list, please send an email to **neocc@esa.int**

Alerting framework

Email alerts reach professional and amateur observers worldwide. NEOCC operators also receive automated phone calls and messages.

Mailing list	Alert criteria
Observers	Impact score > 0.01 or close approach < 7 Earth radii
Fireball	Impact score > 0.9
Mitigation	Impact score > 0.1 and impactor size > 5 m

Conclusions: Meerkat provides time-critical alerts to the community within minutes. Since becoming operational in 2021, it has contributed to the identification and follow-up of all asteroids discovered before impact.

Future developments: A dedicated Meerkat portal and APIs are in the final stages before operational release.

Scan QR code for access:

Meerkat Email Manual

Meerkat Paper

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