First Results from the DECam Ecliptic Exploration Project (DEEP)

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The first round of DEEP papers is accepted!

- DEEP I: Survey description (Trilling et al., in press)

- DEEP II: Observing strategy and design (Trujillo et al., in press)

- DEEP III: Survey Characterization and Simulation (Bernardinelli et al., in press)

- DEEP IV: TNO lightcurve characterization (**Strauss et al., in press**)

- DEEP V: Absolute Magnitude Distribution (Napier et al., in press)

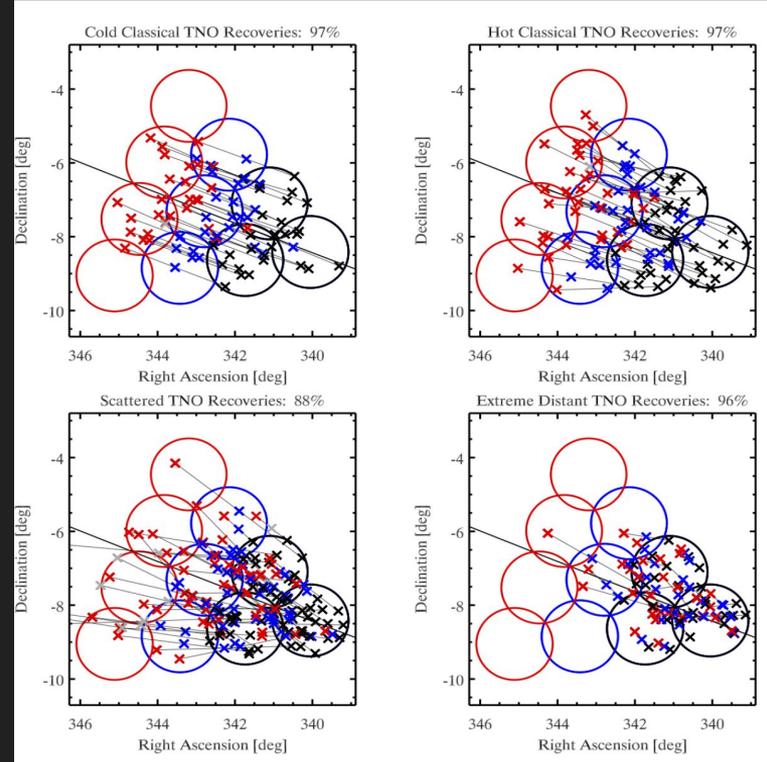- DEEP VI: Multi-epoch detections (Smotherman et al., in press)

| Introduction | DEEP IV (Lightcurves) | DEEP V (shift-and-stack) | DEEP VI (Multi-year orbits) |

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The DECam Ecliptic Exploration Project

- Instrument: Dark Energy Camera (DECam)

- Total sky coverage: >130 square degrees

- Long sequences of short exposures:

  - 100 exposures over ~4 hours

  - Fast cadence photometry for lightcurves
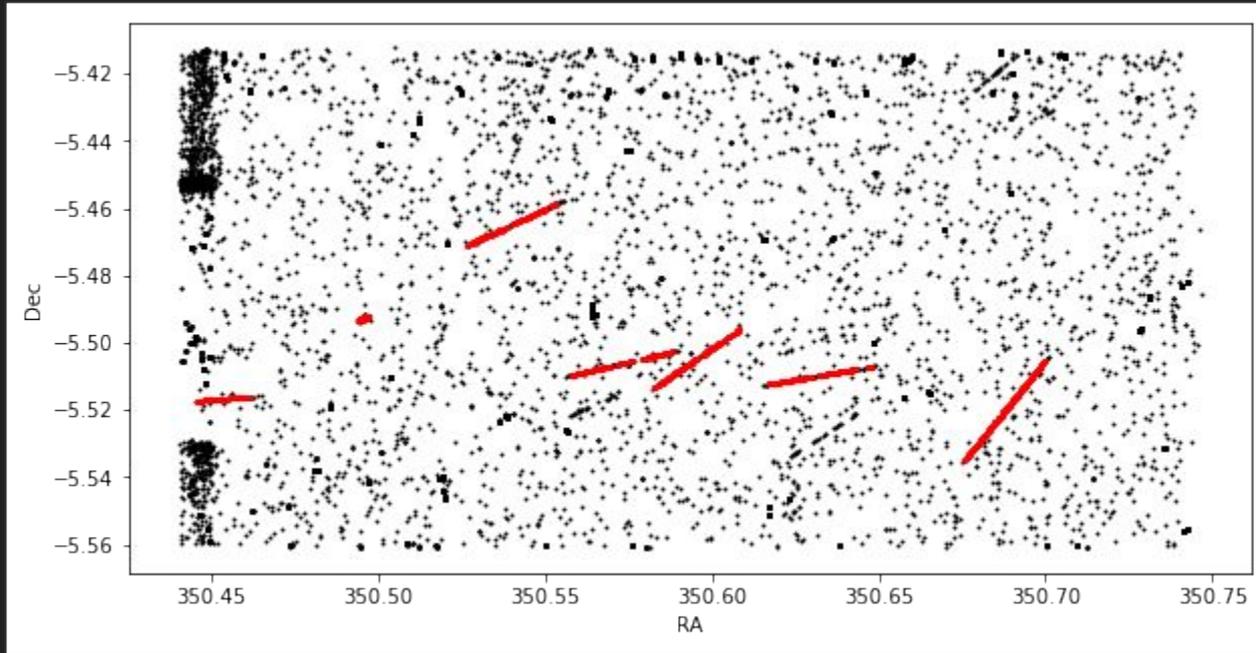
  - Digital tracking for sub-threshold TNOs

Cold Classical TNO Recoveries: 97%

Hot Classical TNO Recoveries: 97%

Scattered TNO Recoveries: 88%

Extreme Distant TNO Recoveries: 96%

Streaks are detected in transient source catalogs with a straight-line Hough transform

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A list of candidate TNOs is produced with a rate of motion cutoff
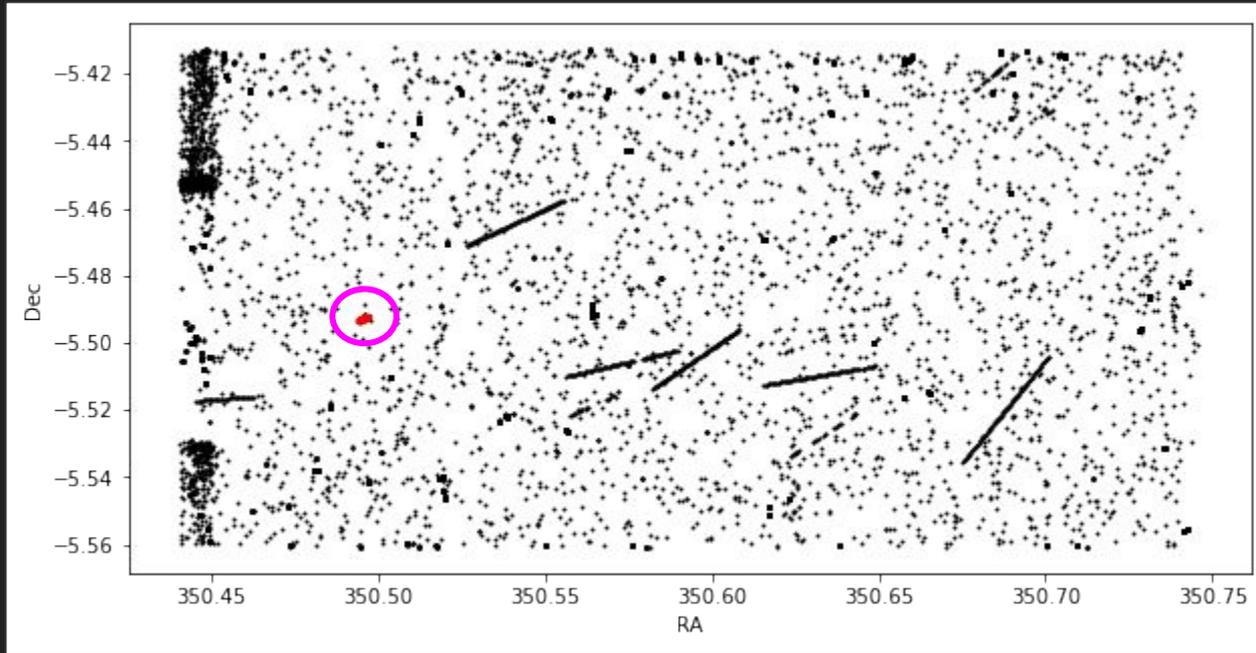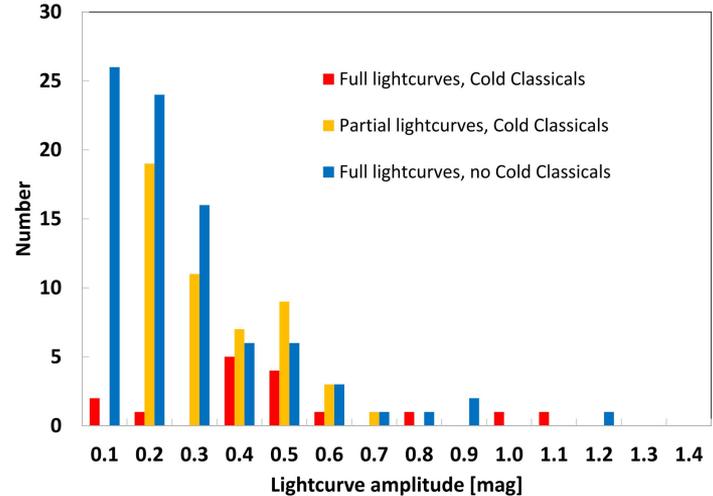
TNO candidates are visually verified with thumbnail animations
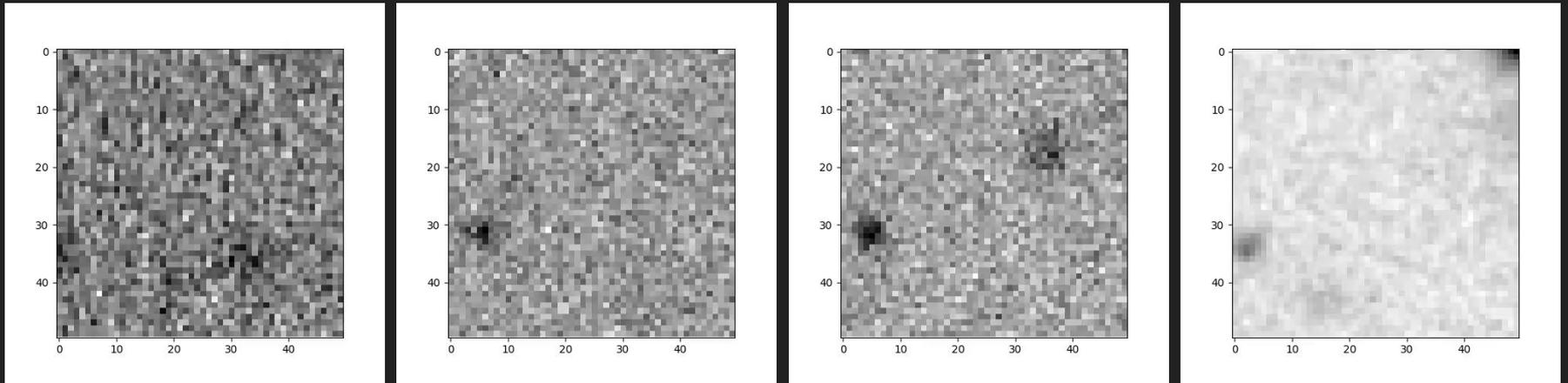
The DEEP partial lightcurve amplitude distribution is similar to the literature

DEEP amplitude distribution
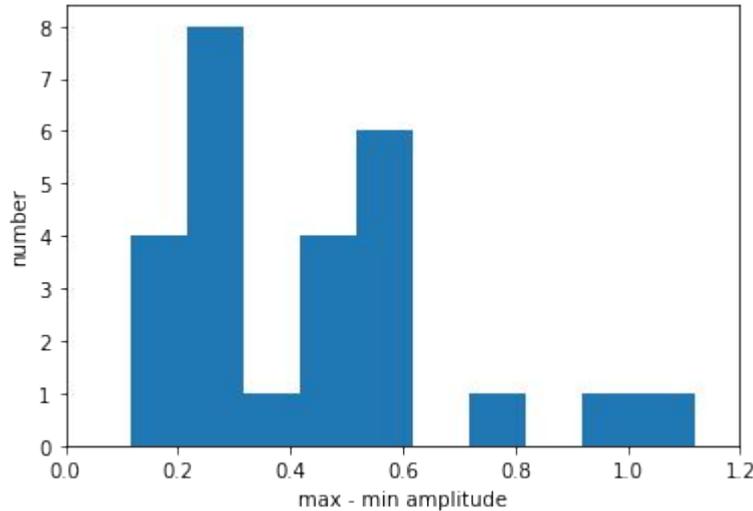
From Thirouin & Sheppard (2019)
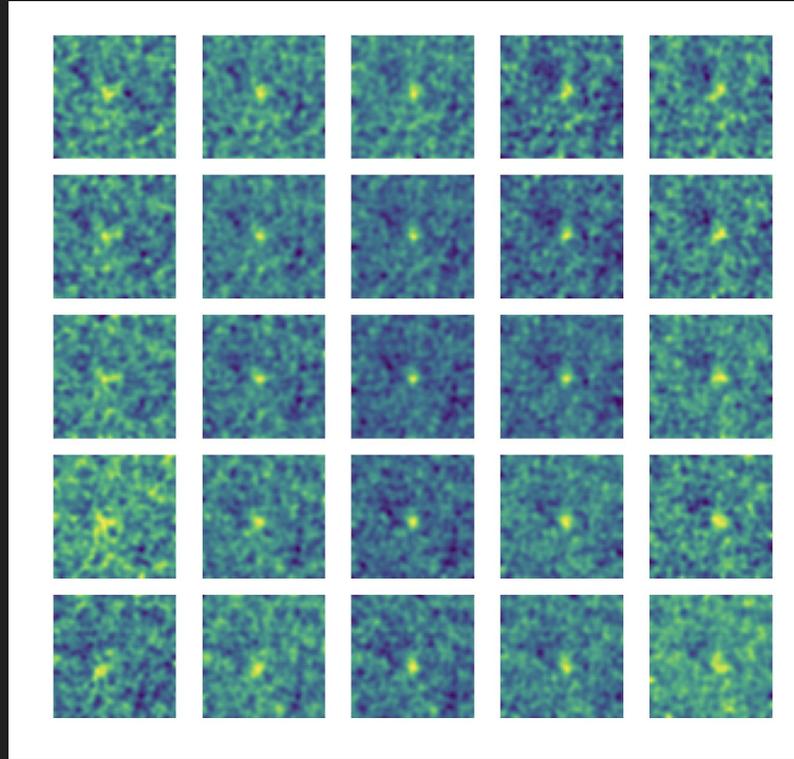
DEEP lightcurves consistent with elongated population
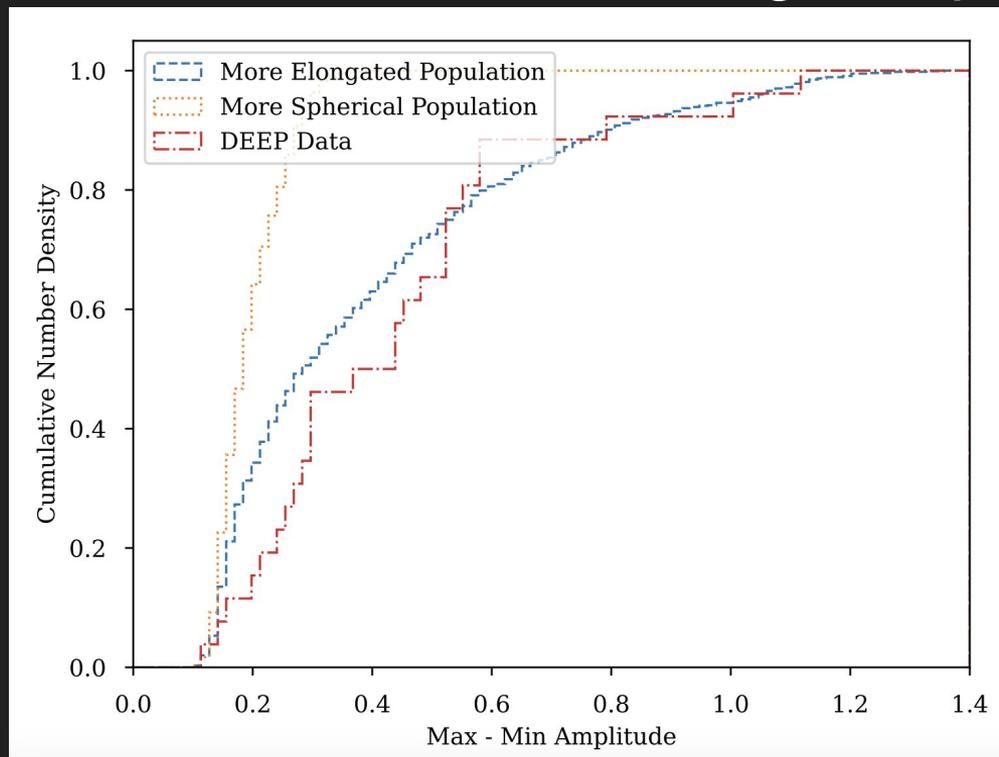
Digital tracking permits sub-threshold detection

Tracking to unphysical rates reveals the kuiper belt
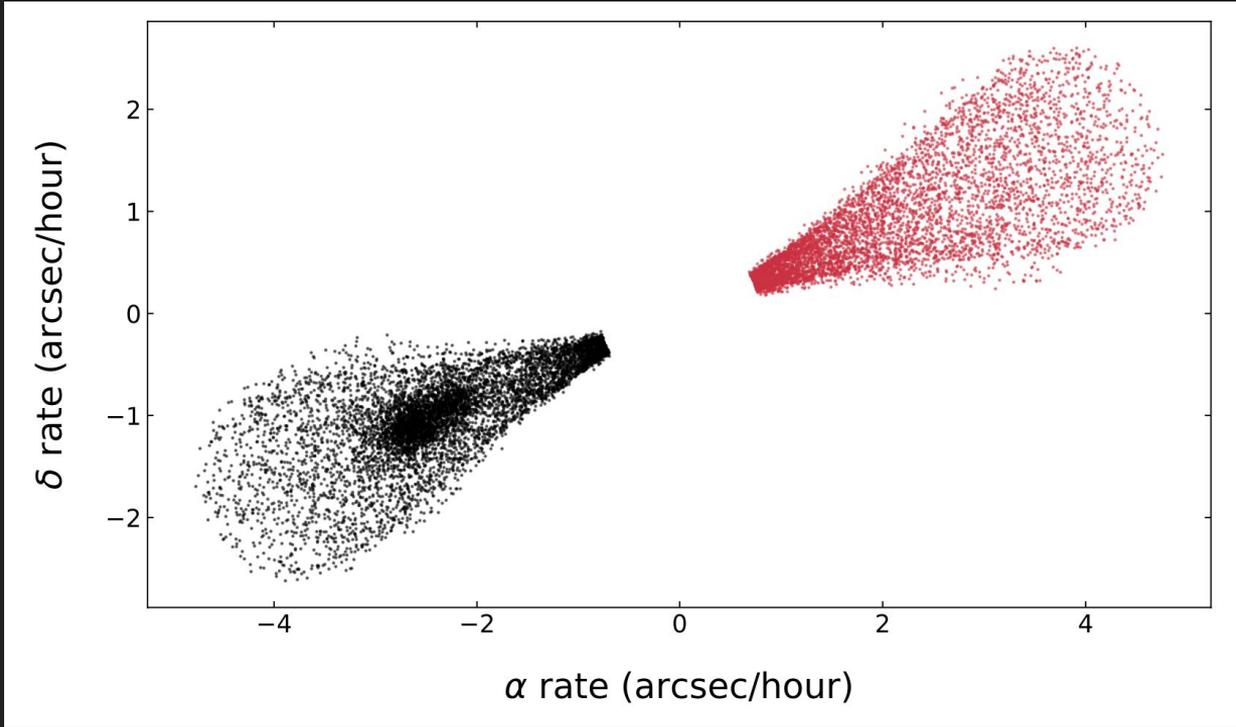
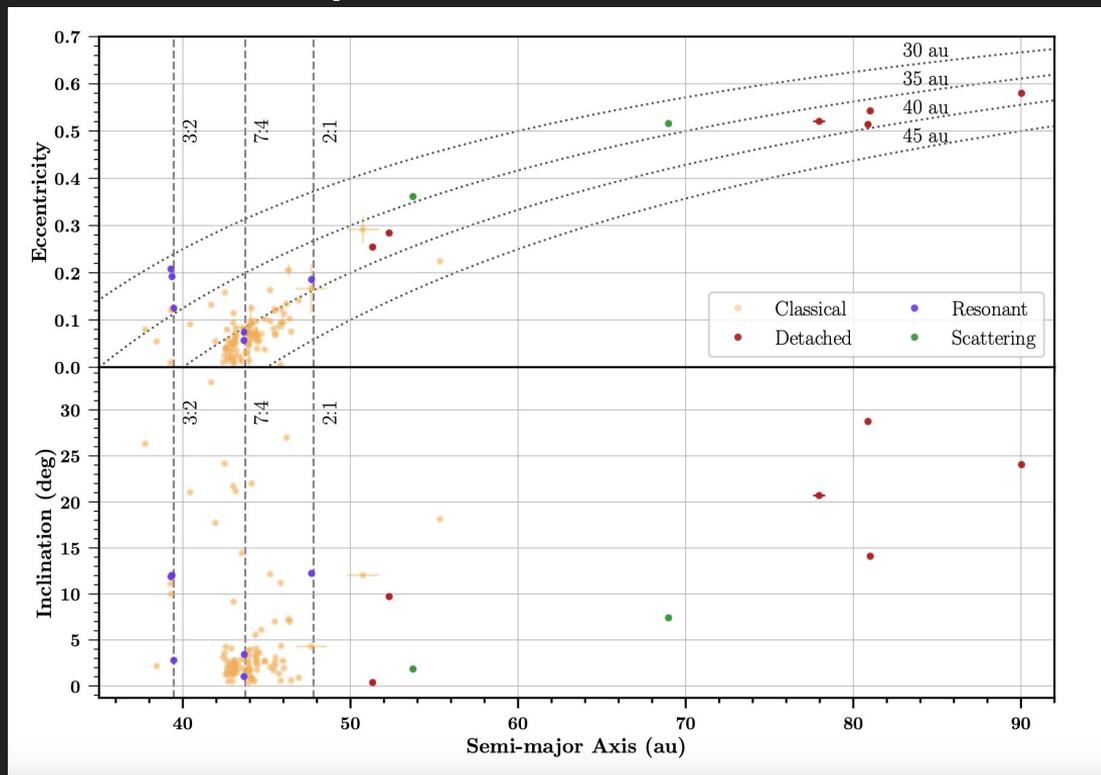# DEEP TNO H distribution is consistent with literature
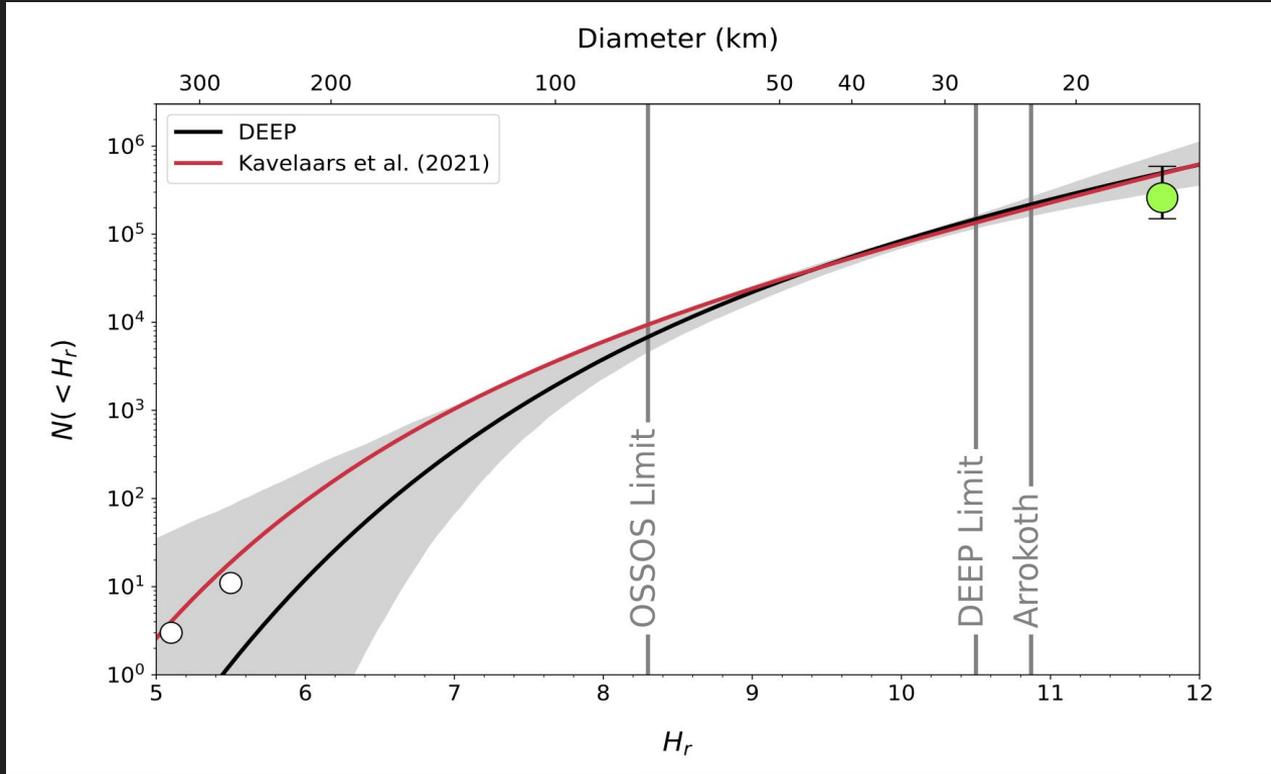
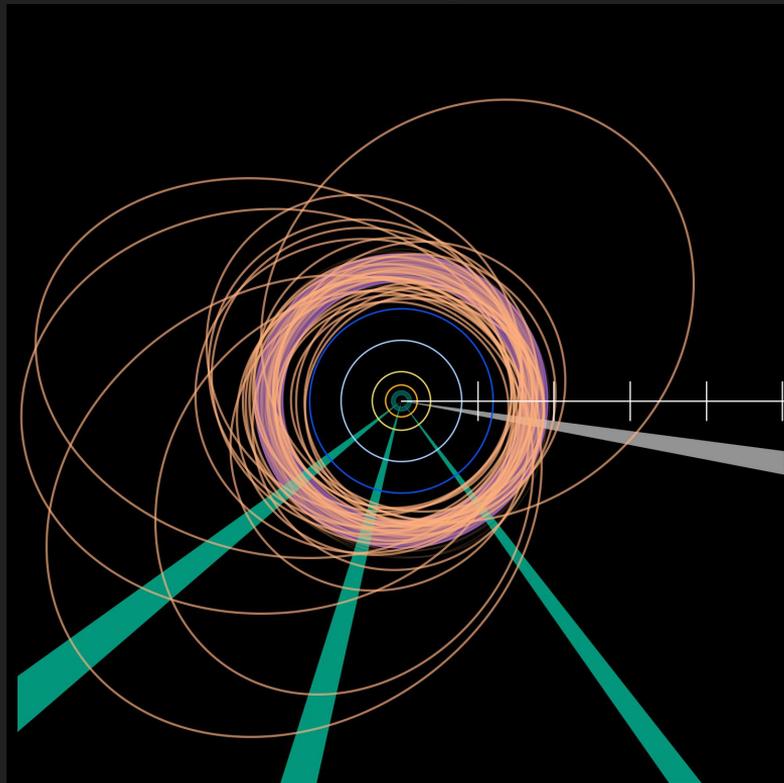| Introduction | DEEP IV (Lightcurves) | DEEP V (shift-and-stack) | DEEP VI (Multi-year orbits) |

Orbits are fit for multi-epoch TNOs

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We have lots more data left to process!