

Bulletin of the AAS • Vol. 55, Issue 2

The Asteroid Discovery, Analysis, and Mapping (ADAM) Precovery Service

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Published on: Jan 31, 2023

URL: <https://baas.aas.org/pub/2023n2i105p41>

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The B612 Asteroid Institute has developed the Asteroid Discovery, Analysis, and Mapping (ADAM) platform to analyze and understand asteroid data sets. ADAM uses Google Compute Engine to perform precision cloud-based asteroid orbit propagations, orbit determination, targeted deflections, Monte Carlo impact probability calculations, orbit visualizations, and asteroid discovery. Our vision with ADAM is to create a cloud-based astrodynamics platform available to the scientific community that provides a unified interface to multiple tools and enables large-scale studies. ADAM includes pre-configured settings to match common practices, such as the use of various time standards and coordinate frames, removing the need for users to perform any necessary transformations for comparison to results from external tools. ADAM's architecture consists of a web-service front-end, cloud-based storage, and cloud-based compute engines encapsulating multiple tools for computation and analysis.

We present the integration of a new algorithm for the preccovery of asteroid candidates in large datasets that utilizes ADAM's cloud capabilities to greatly improve the speed to recover observations. We report our findings using the service to extend the arcs of ~ 100 asteroids discovered by the Tracklet-less Heliocentric Orbit Recovery (THOR) algorithm. We also describe the results of at-scale preccovery searches in the NOIRLab Source Catalog (DR2) for each of the 1.2 million known minor planets, including detailed analysis of preccovery searches for the 1429 objects on the ESA Risk List. Lastly, we describe the ongoing work to add additional datasets, such as PanSTARRS, ZTF, and SDSS, to those available to use with the preccovery service.