PSF photometry analysis of small solar system objects from ZTF as preparation for the LSST era

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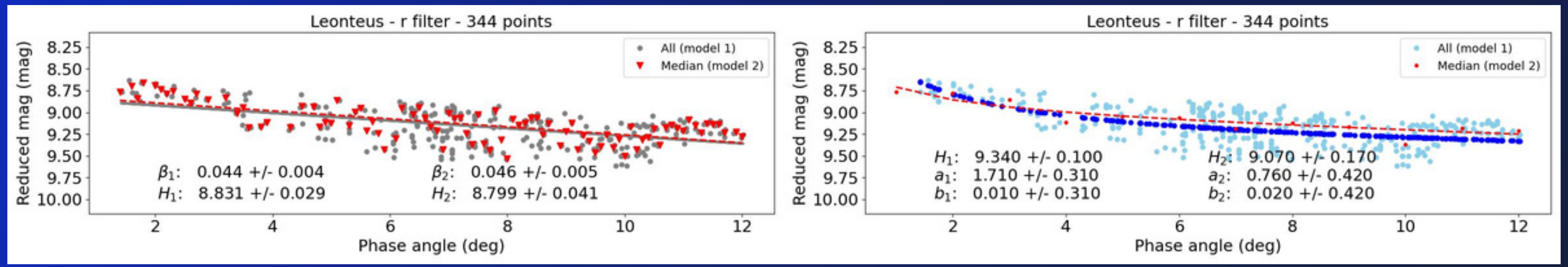
Which small bodies we are interested?

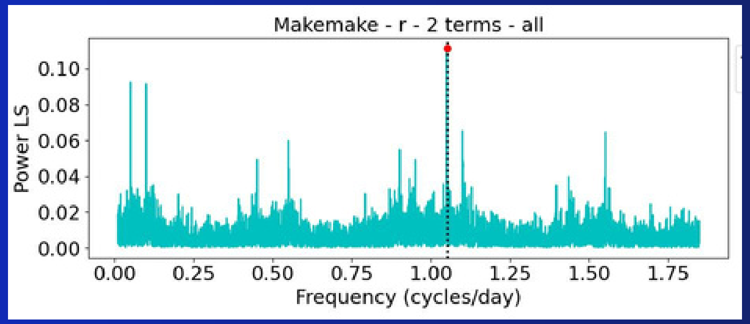
Our international collaboration focuses on predicting and observing stellar occultation events by Trans-Neptunian Objects, Centaurs, Trojans, and Satellites. Beyond more complete physical characterization, we seek to determine their rotation periods and derived properties to maximize the information measured from occultation events.

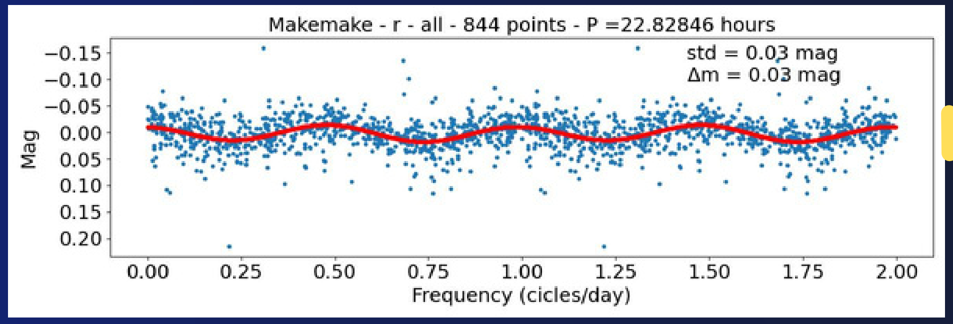
Why using ZTF photometry data?

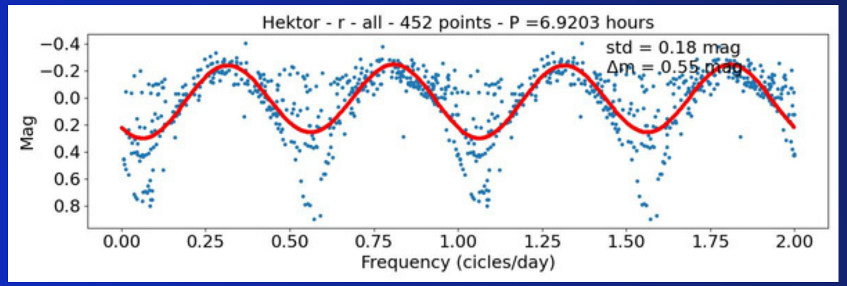
- Extensive and public database that allows us to emulate LSST similar environment;
- It is a rich source of inputs to exhaustively test our Python script;
- It has sky and magnitude coverage that provides valuable insights to model data requirements and limitations, preparing the path for LSST data analysis;
- Provides new data for known objects.

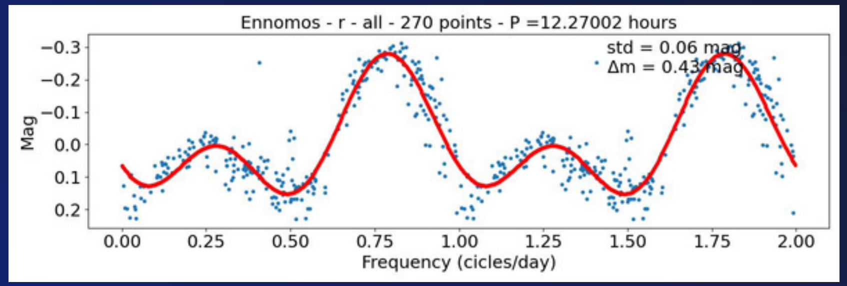
Preliminary results from ZTF's data











- Absolute magnitudes on different filters can be used to obtain colors;
- On average, the rotational light curves obtained from ZTF PSF photometry have a relatively large standard deviation of ~ 0.04 magnitudes. Even though a period was retrieved for Makemake, which has a rotation amplitude of the order of the average standard deviation. Therefore, it is clear that one can overcome such limitations with more measurements;
- Jupyter Trojans may (or may not) present significant variations in their rotational amplitudes due to changes in the aspect angle. It seems that depends on the object's tridimensional shape.