(General area : Advancements and Progress in NEO Discovery)

Find_Orb: orbit determination and analysis software

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Find_Orb is probably the most widely used orbit determination software at present, particularly in the NEO community. It was used to determine the impacting natures of 2008 TC3, 2014 AA, and 2018 LA, the only three impactors thus far found while still in space. A server-based version currently provides publicly available orbital elements, ephemerides, and short-term impact data. Users can upload observations and get back orbits and analysis of their observations. The software can and is used for longer-term analysis and for almost any object in an orbit in the solar system, but the focus thus far has been on NEOs in general and near-term impacts and close approaches in particular.

The software has been written in an effort to make the somewhat arcane art of orbit determination and analysis available to all. This has included experts, students, and amateur astronomers, but a great deal of attention during its development has been given to observers who need to know where to look for objects, when to do so, and whether observations will actually help our knowledge of the object significantly. (If we already have precise knowledge of an object's position, getting an imprecise measurement won't tell us anything we didn't already know.) Such observers need a quick, accurate response; ease of use is very important in that situation.

Find_Orb played an important role in each of the three impactors, and each impactor gave some important lessons as to what was needed for orbit analysis software. The history of this progress and some larger issues for the NEO discovery community will be discussed. There is still much work to be done, particularly in making initial NEO follow-up more effective.