### Hashtags: #asteroid, #asteroidmovie

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### Tags: Data Visualization, Model

Create an asteroid movie with real asteroid observation data. Potential solutions may include:

Manually-generated individual asteroid movies. Asteroid observation movies typically visualize an asteroid’s trajectory, spin rate, shape, albedo, bi-directional reflection, texture, roughness, strength and composition;

Code for an algorithm-driven automated asteroid movie production which may include a file transformation (FileTrans) code to enable the automated translation of observation files from one format to another; asteroid-AMP movie interactive subscription and search web pages; pipeline control scripts that extract knowledge from images and metadata to detect features and events, organize time-lapse sequences, co-register image mosaics and 3D terrain, and add graphic and text overlays to asteroid movies.

**Background**

In June 2013, NASA announced a grand challenge to “find all asteroid threats to human populations and know what to do about them.” This Grand Challenge expands the role of individual inventors, tinkerers, citizen scientists, developers and technologists. Asteroids pose the threat of impact, while presenting an opportunity to expand our knowledge of this natural phenomenon. The Grand Challenge seeks to shine a spotlight on asteroids, and garner global participation in providing impact prevention solutions.

During the last five decades, sensor technology has increased ground and space based observation image size. Voyager images were 800x 800 pixels. Mars Reconnaissance Orbiter (MRO) HiRISE camera images are 20,000 x 60,000 pixels. Increases in computer processor and graphics processor chip speeds, cluster and cloud computing have greatly increased image processing and movie creation speeds. The internet has increased public access to NASA archived data. Cable, satellite, broadband and fiber internet television developed the technology to distribute compressed HD movies directly to our homes. Home computers, digital and High Definition television (HDTV) (1920 x 1080 pixels) provided inexpensive display systems. In the last few years, the evolution of 3D HDTV displays (1920x1080), 4K digital cinema displays, 3D Digital IMAX movies (8000x 4000 pixels), and Hyper-walls (35,640 by 8,000 pixels) provided the technology required to display high resolution observations and movies. Universities and industry have pioneered the capability to send uncompressed HD-4K movies over dedicated point-to-point high bandwidth fiber optic networks in real-time. In spite of these advances only a handful of 2D asteroid movies are created each year at resolutions of 1280 x 720 pixels or less. This is your opportunity to make an amazing movie in 3D and high definition.

**Details**

*Manually-generated movie:*

* Specify the data sources used to generate the movie;
* Specify the specific asteroid the movie is illustrating;
* Specify any assumptions/ processing algorithms used to generate the movie;
* Use any movie format; and
* Post source code on github.

*Code for automated algorithm functions:*

* Specify Python control scripts; and
* Post, with documentation and code, on github.

**Sample resources**

* <http://ssv.jpl.nasa.gov/ssv/asteroidamp>
* <http://missionjuno.swri.edu/>
* <http://www.jpl.nasa.gov/msl/>
* <http://photojournal.jpl.nasa.gov/>
* <http://www.nature.com/news/specials/hubble/slideshow.html>
* <http://marswatch.astro.cornell.edu/pancam_instrument/>
* <http://www.nasa.gov/multimedia/3d_resources/>
* <http://www-mipl.jpl.nasa.gov/mipex.html>
* <http://ssv.jpl.nasa.gov/ssv/asteroidmovies> (Username = asteroidmovies, Password = Asteroid2014)