CURE Fall 2017
Precision Astrometry

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Purpose:
Why do we do precision asteroid astrometry?

Asteroid characterization - size and shape
Optical Navigation
Accumulated Uncertainties
Obstacles to our Research this Semester

Welcome to the life of an astronomical observer.
Issues with the tracking motors on our telescope interfered with multiple scheduled observation sessions.
Cloudy skies interfered with most of our other scheduled observation nights.
How do we Characterize Asteroids?

Occultation Events!
Optical Navigation

Image from JPL -
Research Process

Predictions ➔ TMO Observations ➔ Data Reduction ➔ Data Delivery
Predictions

Choosing targets of opportunity based on the occultation schedule, Right Ascension and Declination.

Methods and equipment:

- Linux computer at JPL
- Trajectory Geometry Program
- Ghostview
- Hard copies
Predictions

Trajectory Geometry Program and Ghostview
Observations

All the windows.
Observations

All the windows.
Observations

All the windows.
Observations

All the windows.
Observations

All the windows.
Data Reduction

Locating targets and reduction of data by five orders of magnitude.

- **Scripts**
  - Least-Squares Fit
  - Weather/Refraction Effects

- **Manual Troubleshooting**
  - XROVER
  - Astrometric Data Analysis Program
Data Reduction

XROVER
Data Reduction

XROVER
Data Reduction

XROVER
Data Reduction

XROVER
Data Delivery

Sending data to interested parties in the form of updated R.A. and Dec values for targets.
Data Delivery

Minor Planet Center publishes our data to their website.

(1149) Volga = 1929 PF
Discovered at Simeis on 1929-08-01 by E. Skvortsov.

Orbit
Orbit type: Main Belt
Delivered Data

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If you learn one thing today...
Observational Astronomy is real world science, reliant upon real world conditions...

Unlike theoretical physicists, observational astronomers are at the whim of Mother Nature and other real world issues that can interfere with our hands-on work.
Acknowledgement

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Resources
