Searching for Asteroids

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Target NEO Workshop

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Asteroid Search at ETS

Experimental Test Site (ETS), Socorro, NM

Lincoln developed CCD technology
- Frame transfer
- Low readout noise
- Back illuminated
- 1960x2560
- 1024x1024

GTS-2 (GEODSS) Telescope
LINEAR Detection System

Input Data → Registration → Background Suppression Normalization → Binary Quantization → Clustering & Velocity Matched Filtering → Detection List

Composite of 5 Raw Discovery Frames
Detection Software Demo
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Sky Coverage: One Month

March 2008

RA

DEC

Single night bands

Ecliptic bands

Total Good–Weather–Equivalent Integration Time(s)
Equivalent Coverage Depth (Vμ or SNR=6.0 σμm)
Sky Coverage: One Year

Total Good-Weather Equivalent Integration Time (s)
Equivalent Coverage Depth (v/m of SNR=5.0, 140s)

2007

RA
DEC
Where to Find Near-Earth Asteroids

- **Opposition region:**
  - Good illumination
  - Simpler orbit determination
  - Night-time accessible

- **Sweet-spots:**
  - Higher density of NEOs
  - Complex target motion
  - Twilight or space-based observations

Plot prepared by the Minor Planet Center (2010 Oct 4).
Closing

- Discovering asteroids requires finding a dim, moving object against a cluttered background
- A good strategy is to maximize sky coverage and repeat every 2 weeks
- Lots of constraints:
  - Night time, twilight
  - Moon
  - Atmosphere (minimize airmass)
  - Weather