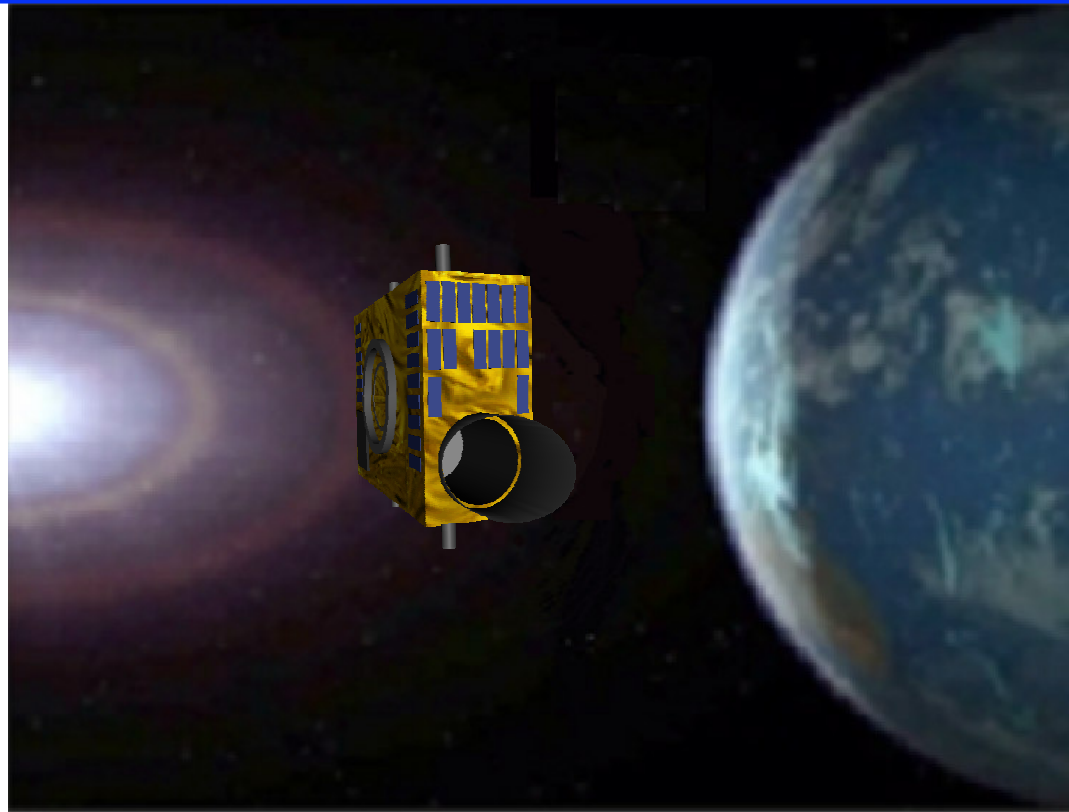




NEOSSat

Near Earth Objects Surveillance Satellite Canadian Space Agency – Defense Research & Development Canada



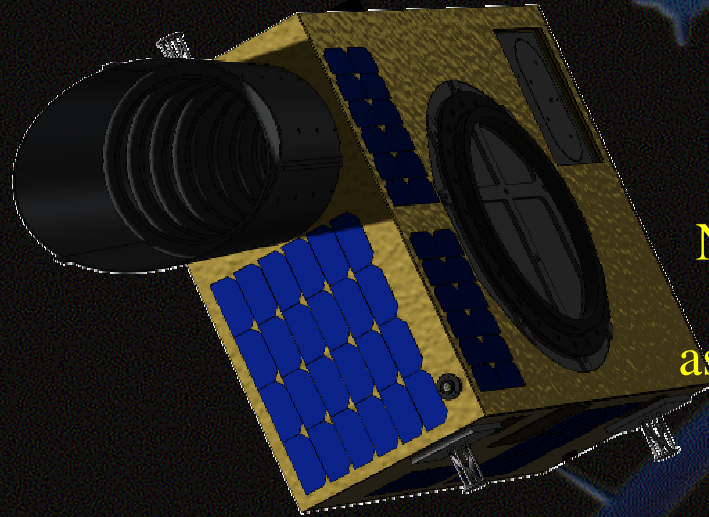
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NEOSSat

NESS

Near Earth Space
Surveillance of
asteroids & comets

HEOSS

High Earth Orbit
Surveillance System
and debris tracking

Project Scope

To demonstrate that the surveillance of space can be performed effectively at a lower cost and potentially more responsively utilizing micro-satellite platforms



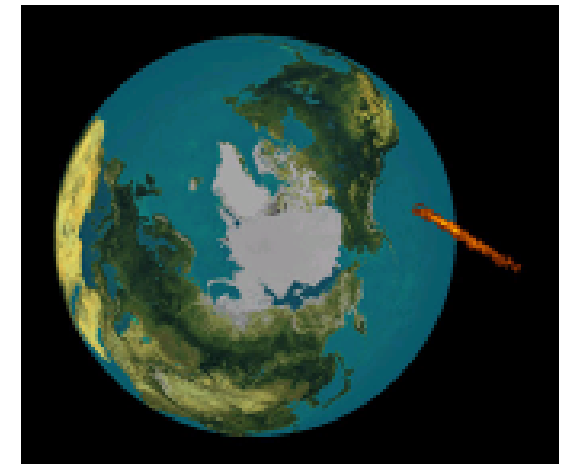
Project Objectives



CSA objectives of the NEOSSat mission are to:

- Discover and monitor near-Earth asteroids and comets and quantify their trajectories.
- Enhance and develop the Canadian scientific community in research related to solar system small bodies.
- Enhance and develop a Canadian capability in micro-satellite missions.

Near Earth
Space
Surveillance -
NESS (CSA)



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NEOSSat Mission



Micro-satellite:

- ✓ < 75 kg
- ✓ Approx. 1 m x 0.8 m x 0.4 m
- ✓ Approx. power 30 W
- ✓ Reaction wheels
- ✓ No propulsion
- ✓ ACS: sun sensor, star tracker, magnetometers, solar cells

- Compatible with multiple launch vehicles
- Generic subsystems and ground support equipment
- On-Orbit re-programmable
- Consistent with CSA microsatellite philosophy
 - Tailored PA and COTS parts
 - Emphasis on test versus analysis
 - Use of flatsat to demonstrate functionality

Satellite Bus

- ✓ 1 arcsec pointing stability
- ✓ S-band up/downlink CCSDS
- ✓ 1 GB/day downlink capacity
- ✓ On-board Pre-processing

Payload

- ✓ 15cm reflecting telescope
- ✓ Space-quality CCD 1k x 1k
- ✓ 0.85 deg field-of-view
- ✓ High performance baffle

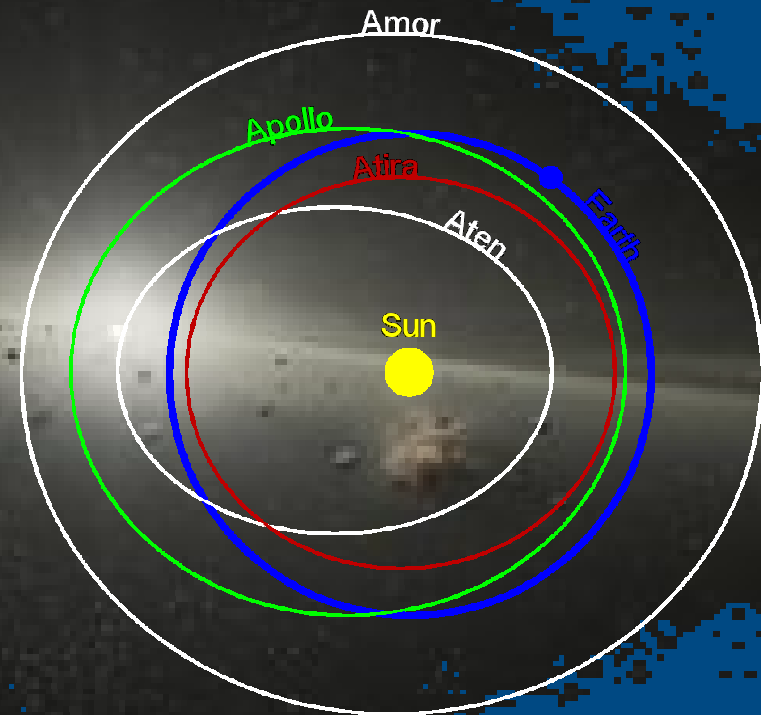




NESS - Near Earth Space Surveillance



- Search for Near Earth asteroids
 - Atens, Apollos, Amors, IEO, (& comets)
 - Ground based telescopes limitations, biases
 - Difficult for Atens, very difficult for IEO
- Understand NEA population
- Dynamically close to Earth, opportunity for exploration
- Solar system primitive objects
- Understand interaction of the NEO population with the planets
- Improve modeling: understand orbital distribution, physical characteristics, composition, origin, and history of NEO
- Societal goals (impact hazards)



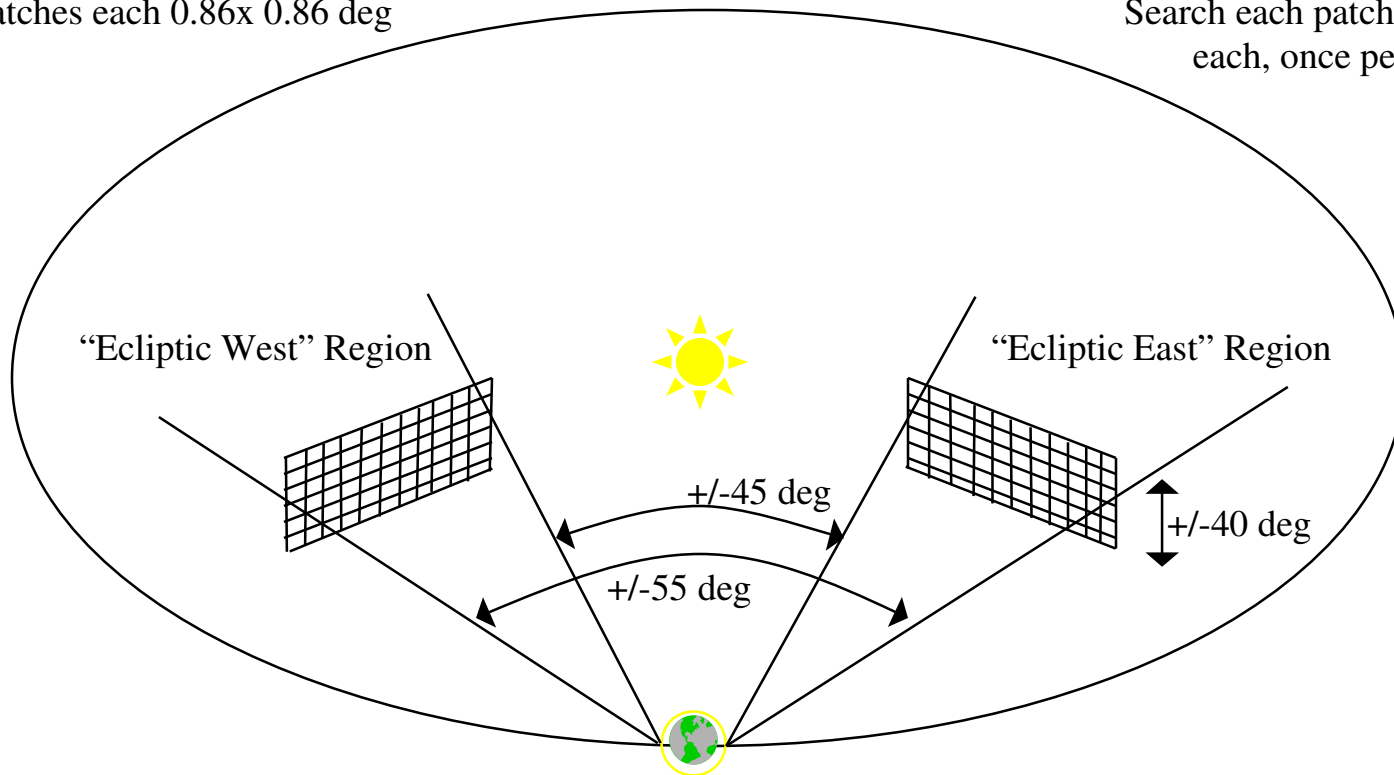


Asteroid Search Regions



Search patches each 0.86x 0.86 deg

Search each patch 4 times each, once per month



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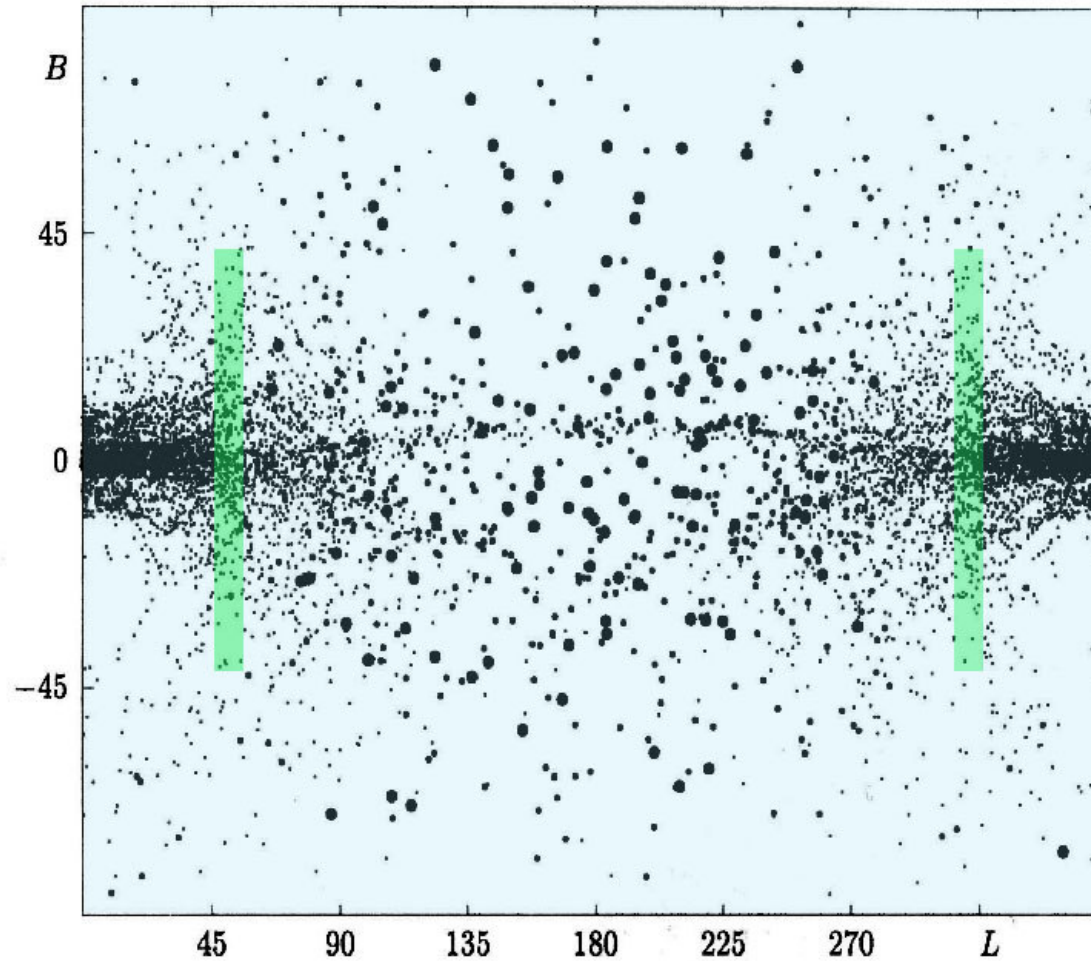
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Known Asteroid Fields

(Boattini and Carusi, 1997)



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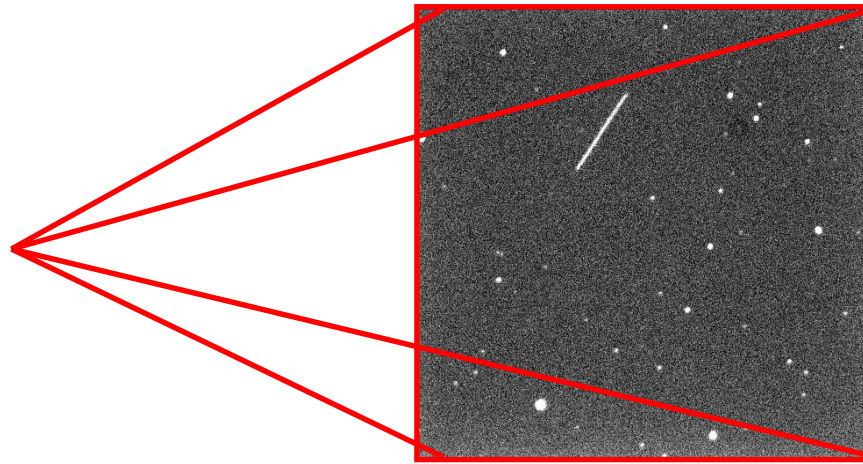
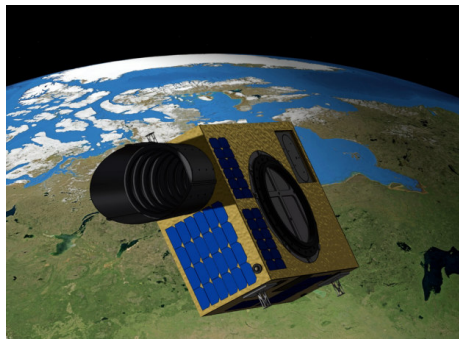


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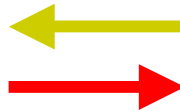
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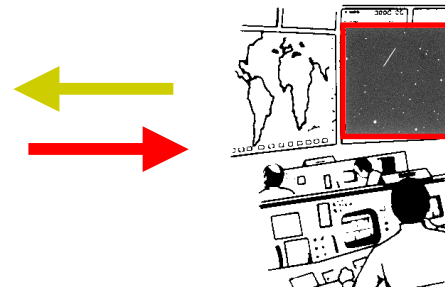
NEOSSat Operations



MOC, ground station
(CSA)



MPS OPS
Center



Tasking Centers
U of Calgary & DRDC



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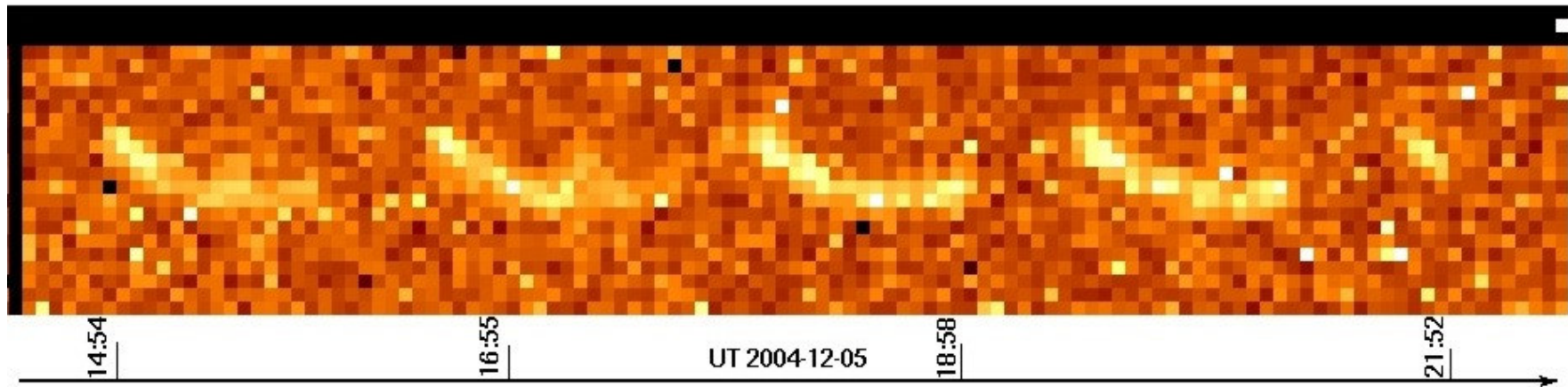
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MOST Asteroid Imaging Test

2693 Yan'an main belt asteroid



Verified instrument magnitude sensitivity



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Project Status



Project in Phases:

- Heritage from very successful MOST astronomy microsatellite [in operation since 2003 (NASA GO mission)]
 - Phase A completed in 2005
 - PDR held April 2008
 - Currently in Phase C
 - CDR in March 2009
 - Launch planned for Mid-2010
 - Operations - minimum 1 year
 - Launcher TBD (contractor supplied)
-
- **Principal Contractor, MSCI / Dynacon Ltd, Toronto**
 - Main sub-contractors:
 - Spectral Applied Research (payload)
 - Routes Astro-Engineering (power)





Conclusion



For CSA, the NEOSSat mission will:

- Contribute to the international body of knowledge relating to NEO populations and their threats
- Successfully implement the world's first space-based NEO detection and tracking mission
- Develop Canadian capacity in NEO science
- Enhance Canadian micro-sat capabilities
- Train the next generation of scientists and engineers in leading-edge space systems
- Enhance the close collaboration in the space sciences with international partners through invitations for international membership on the NESS science team



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