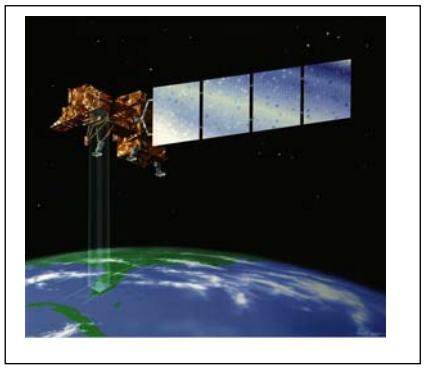
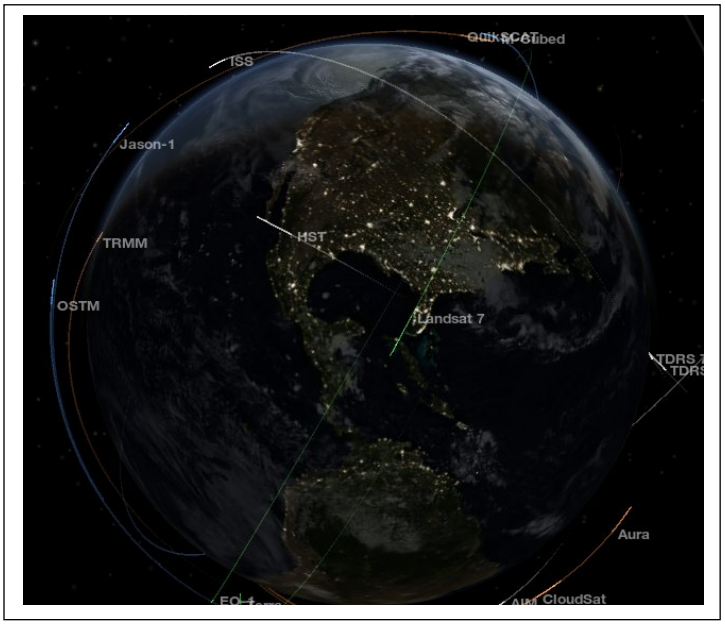
# Eye Spy – Exploring Satellite Orbits Periods






## Get the Data

Visit EOSS **http://1.usa.gov/ODMSKc** to recreate the scene shown above. Recommended operating system: MS Vista or later; Browser: MS Internet Explorer 8 or later.

**Step 1** – Click on the 'Visual Controls' tab and make sure that the following items are selected with a 'white spot': spacecraft, planets, labels, orbit lines, trails and metric.

**Step 2** - Activate the 'Distance Tool' by pointing cursor at a planet name label ( example 'Sun') and right-clicking mouse. Select bottom function 'Measure distances'. Then point to destination target name label (example 'Mars') and left-click mouse to open From-To measurement panel. Read out the distance in kilometers. Also provided is the light travel time!

## Answering Questions

Spacecraft and satellites that orbit near Earth take different amounts of time to complete a single orbit. The basic formula for orbits close to 700 kilometers is

$$P = 5081 + 1.26\,H$$

where P is the orbit period in seconds and H is the altitude of the spacecraft above Earth's surface in kilometers.

Use the *Eyes on the Solar System* Distance Tool and measure the distance, H, of each satellite from Earth's surface in kilometers, then calculate each satellite's orbit period in seconds and in minutes.

## Math Challenge

**Problem 1** – Aura at H=731 kilometers.

**Problem 2** – The International Space Station (ISS) at H=437 kilometers

**Problem 3** – Landsat at 717 kilometers.

**Problem 4** – A satellite has an orbit period of 97 minutes. What is its altitude?

# Answer Key

**Problem 1** – Aura at H=731 kilometers.

P = 5081 + 1.26(731) = 6002 seconds or 100 minutes.

**Problem 2** – The International Space Station (ISS) at H=437 kilometers

P=5081 + 1.26(437) = 5632 sec. or 94 minutes.

**Problem 3** – Landsat at 717 kilometers.

P=5081 + 1.26(717) = 5984 sec. or 99 minutes.

**Problem 4** – A satellite has an orbit period of 97 minutes. What is its altitude?

P = 97 minutes x (60 seconds/1 minute) = 5820 seconds then solve

5820 = 5081 + 1.26(H)

5820 - 5081 = 5081 + 1.26H - 5081

739 = 1.26H

H = 586 kilometers.