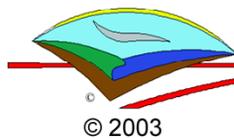

Satellite and Aerial Imagery Demonstration Project

USGS Topographic Digital Raster Graphics (DRG)



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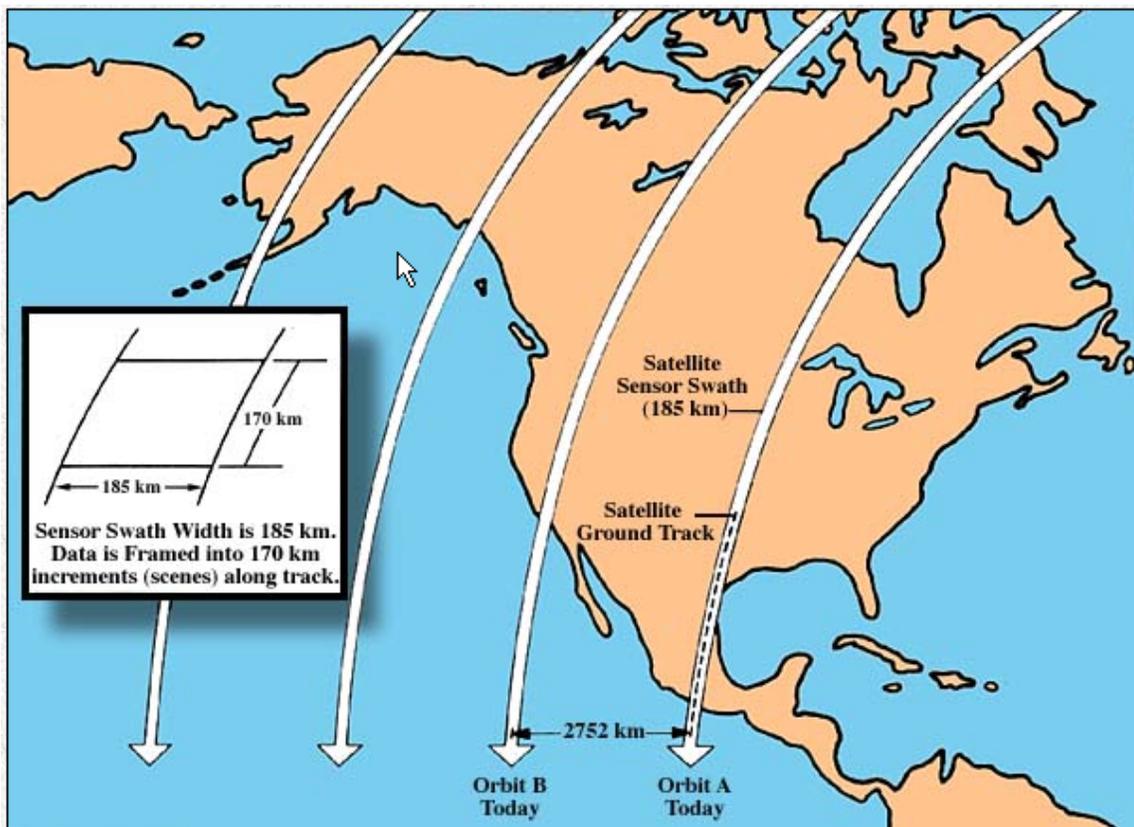
Gregg N. Teasdale, P.E.

September 2003

Tutorial Landsat 7 Acquisition Schedule

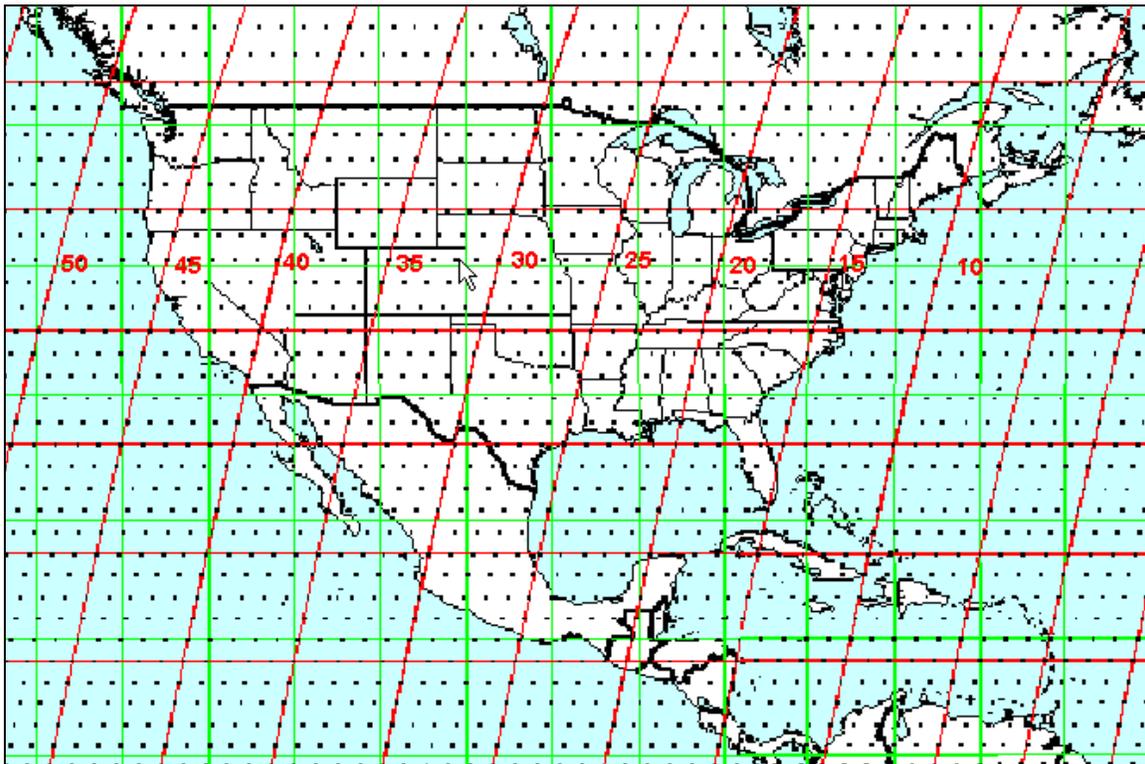
Landsat 7 collects new images of the earth surfaces on a 16-day cycle. It can be advantageous to conduct field studies on the day of a Landsat 7 overpass. This tutorial presents basic information about the organization of Landsat & imagery and demonstrates use of the Landsat 7 acquisition calendar for planning field studies.

The orbit of Landsat 7 is repetitive, circular, Sun-synchronous, and near polar at a nominal altitude of 705 km (438 miles) at the Equator. The spacecraft crosses the Equator from north to south on a descending orbital node from between 10:00 AM and 10:15 AM on each pass. Circling the Earth at 7.5 km/sec, each orbit takes nearly 99 minutes. The spacecraft completes just over 14 orbits per day. Landsat 7 images (scenes) cover a nominal area of 185 by 170 km.



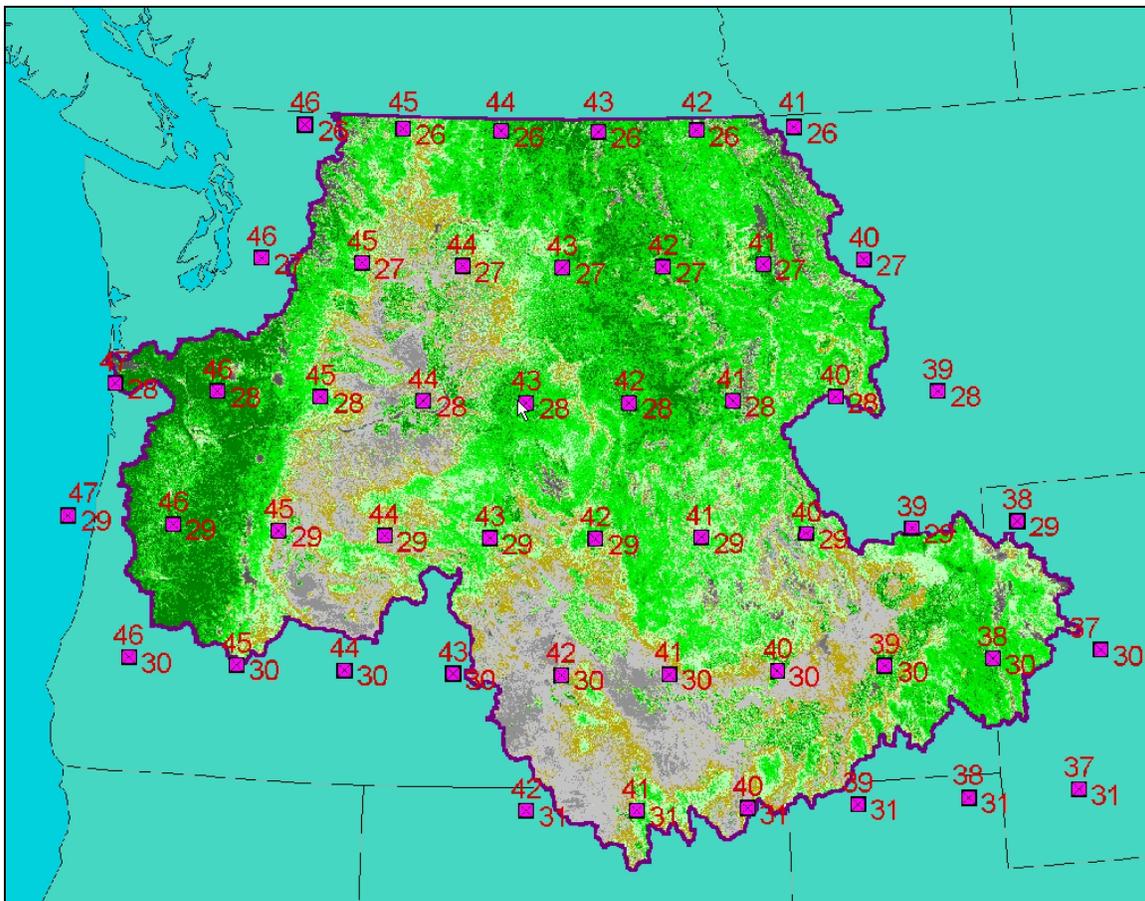
Source: USGS Landsat 7 Science Data Users Handbook

Landsat 7 images are organized and identified by a path and row numbering system. The standard worldwide reference system (WRS-2) defined for Landsat 4 and 5 was adopted for Landsat 7. The WRS-2 indexes orbits (paths) and scene centers (rows) into a global grid system (daytime and night time) comprising 233 paths by 248 rows. The figure below shows WRS tracks and image centers for the conterminous U.S. Paths 37 to 47 cover the Columbia River Basin.

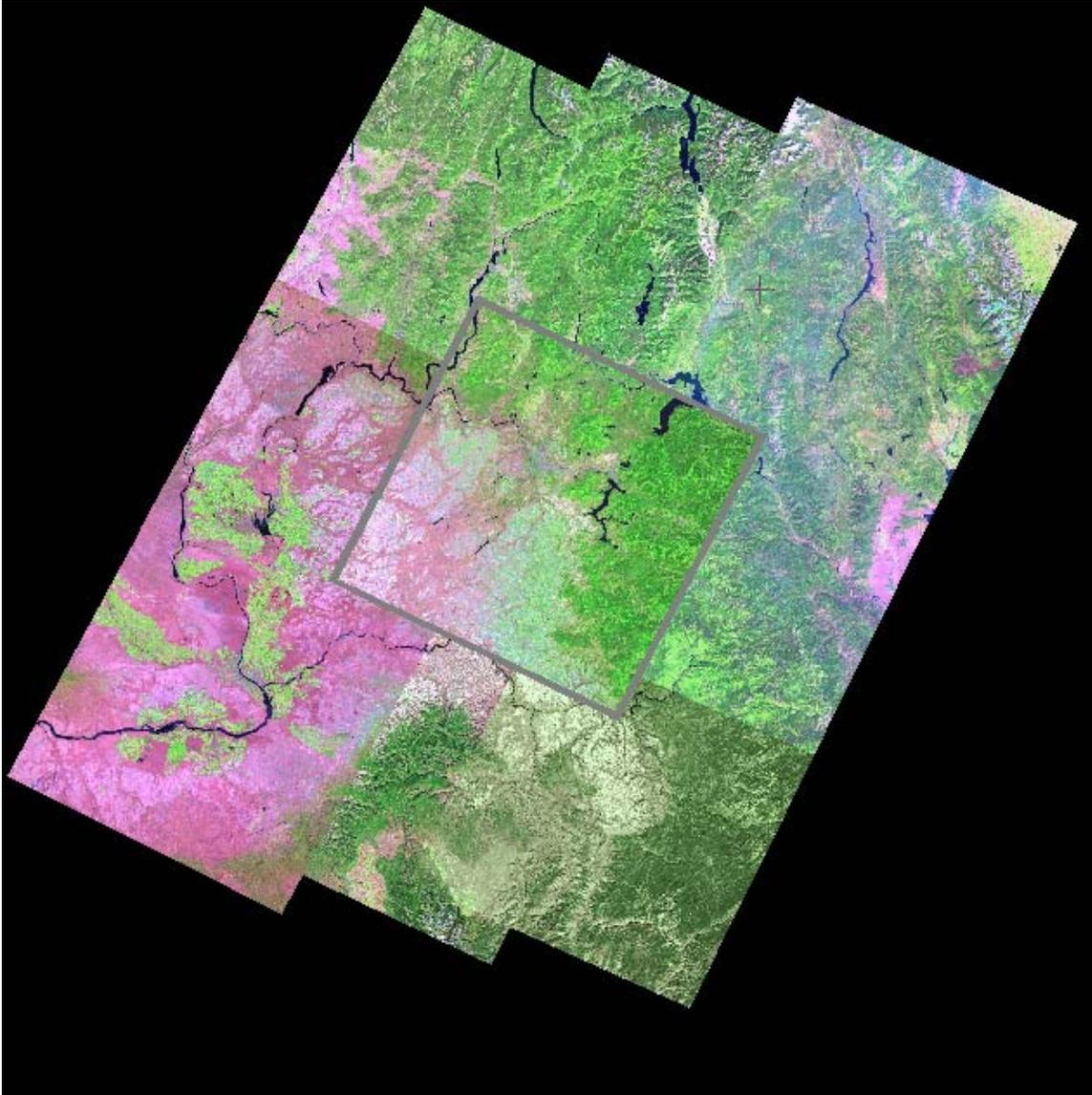


USGS Landsat 7 Science Data Users Handbook

The Columbia River Basin is covered by portions of 48 individual Landsat 7 scenes. The figure below shows a GIS image of the center points of the scenes. Path and row numbers are annotated above and to the side of the center points. The underlying colored image is a MODIS 16-day composite normalized difference vegetation index (NDVI) for the period June 9 through June 25, 2002. Landsat 7 images overlap between paths by about 35 percent in the Columbia River Basin. End lap between rows is about 15 percent.

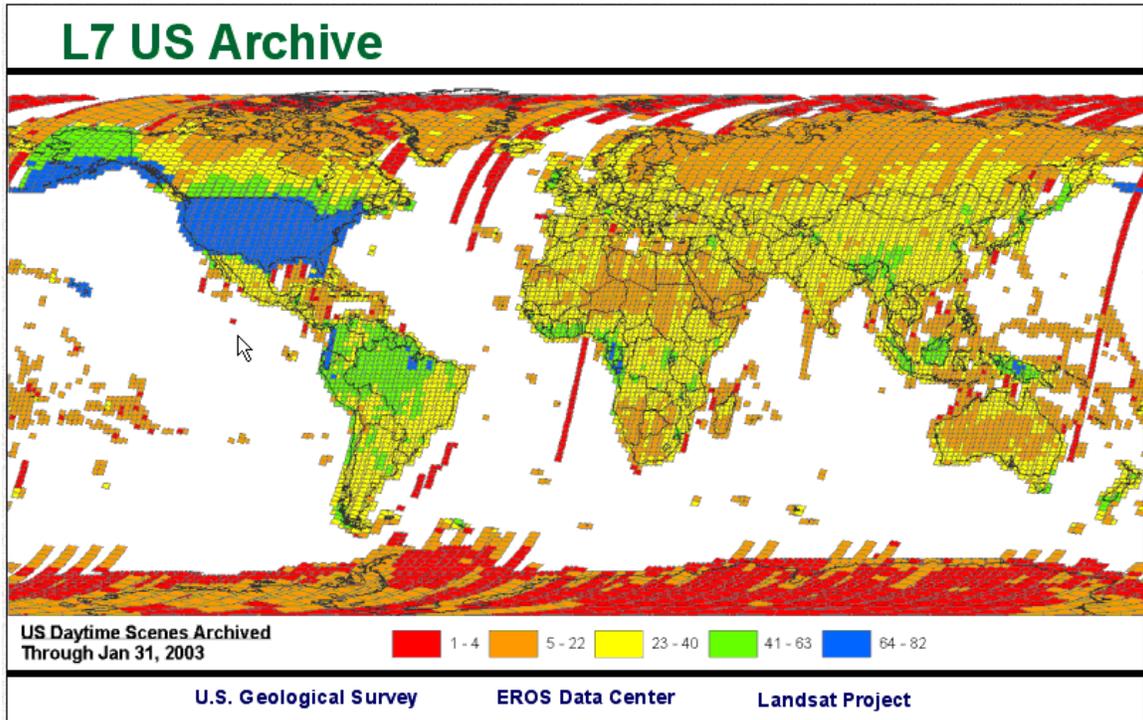


This composite of Landsat 7 images centered on Path 43 Row 27 gives a visual indication of the overlap between images in the Pacific Northwest. Overlap in equatorial regions is small, less than 10 percent.



Source: USGS Global Visualization Viewer

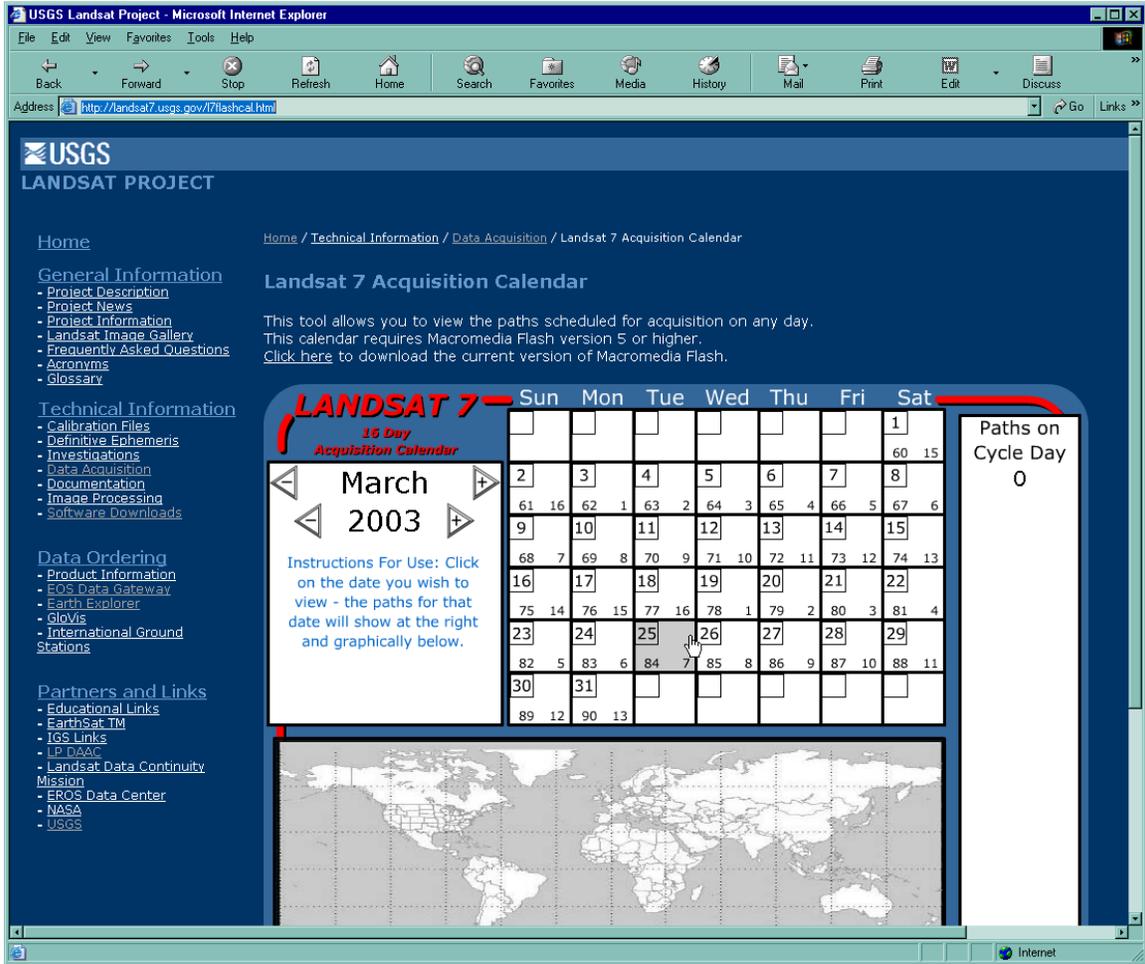
Landsat 7 does not acquire data continually. Acquisitions are scheduled according to a Long Term Acquisition Plan (LTAP). The WRS-2 system divides the Earth into a grid of 57,784 image scenes. Each scene centered on the intersection of a path (groundtrack parallel) and row (latitude parallel). Many images have been collected world wide since Landsat 7 was launched in April 1999. The figure below shows the scene density as of January 2003. The highest image density is in the U.S.



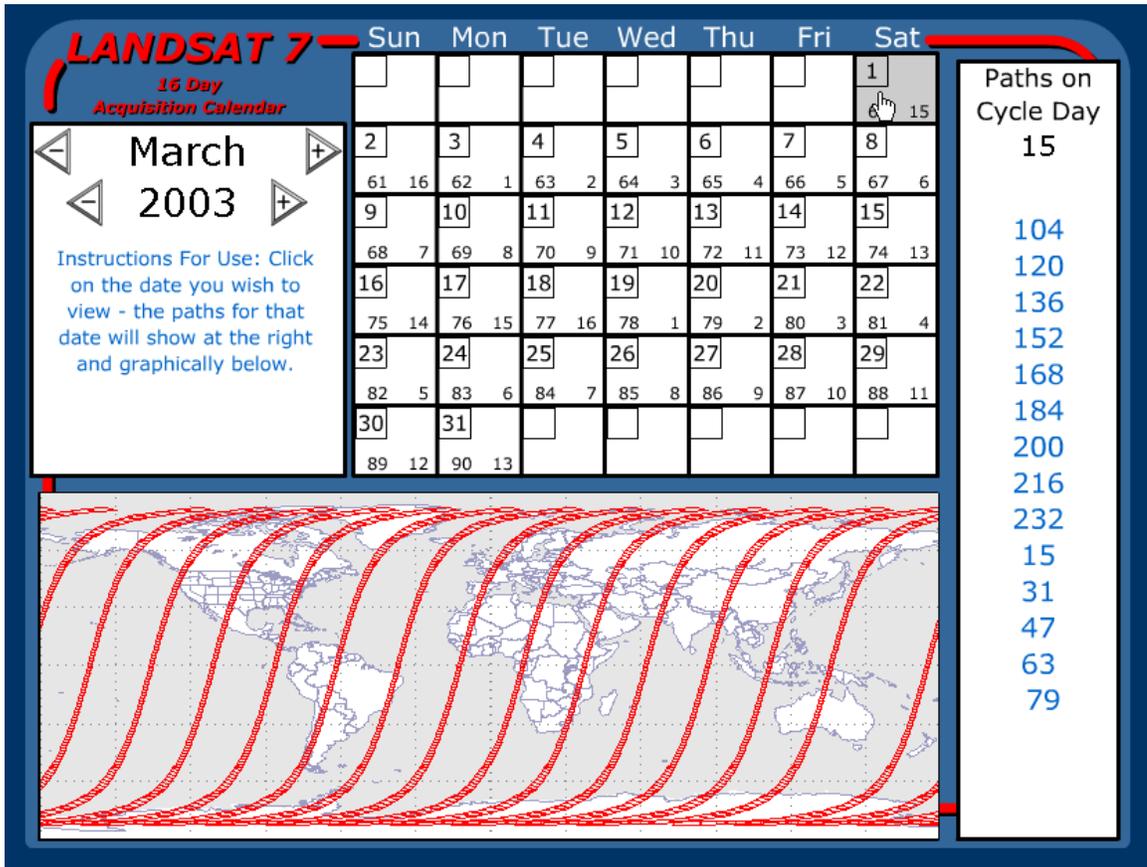
Exercise 1

Introduction to the USGS Landsat Acquisition Calendar

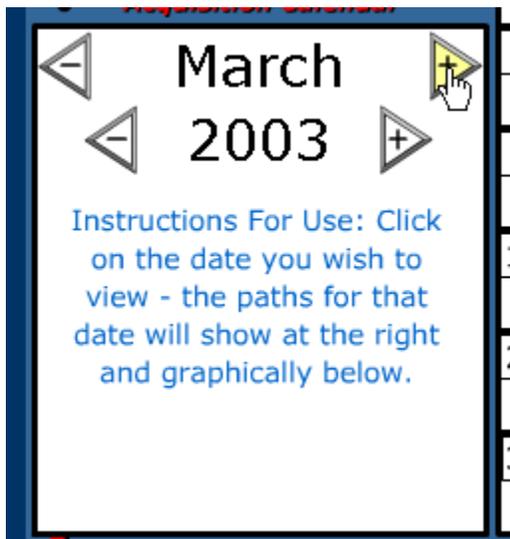
1. Open a web browser and navigate to the USGS Landsat 7 calendar at <http://landsat7.usgs.gov/l7flashcal.html>.



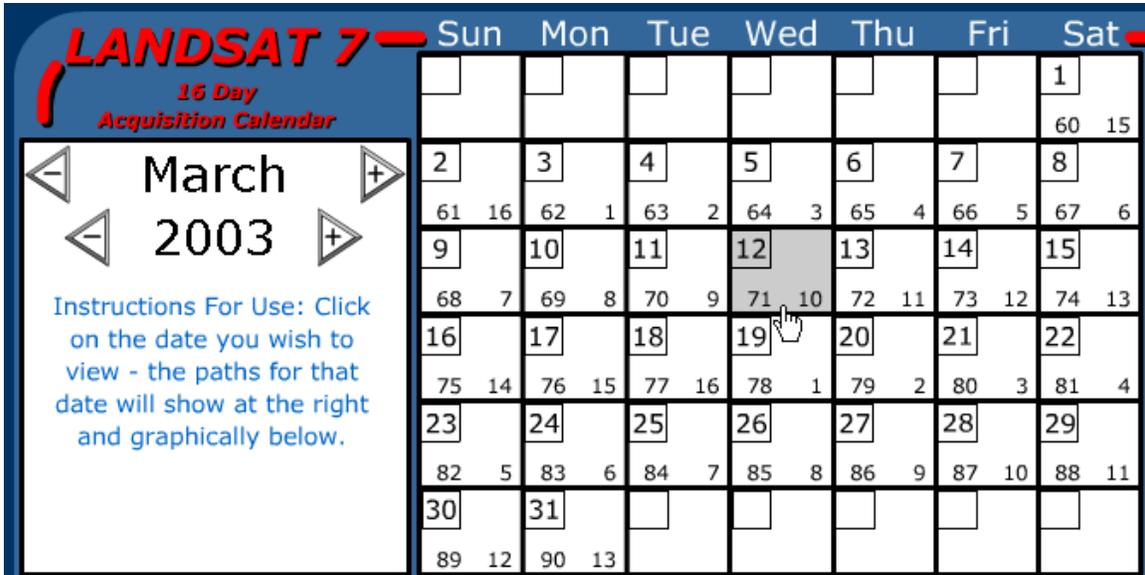
- The Landsat 7 calendar screen has several components that assist in determining the day the Landsat 7 satellite passes over a particular location. The graphic below the calendar shows Landsat 7's path on March 1, 2003.



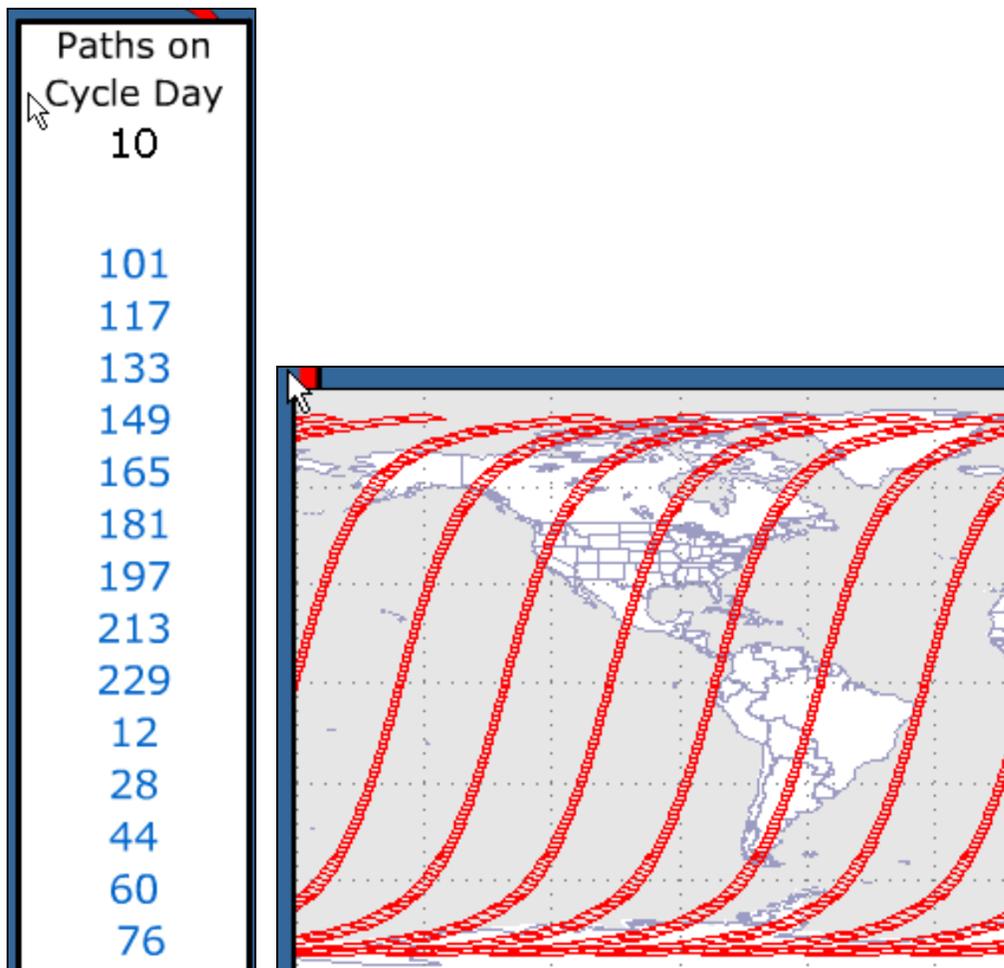
3. Try some of the interactive features of the calendar. Change the month and year of the calendar by clicking the  and  buttons. Select the March 2003 calendar sheet to duplicate the screens in this tutorial.



- The two numbers in the lower half of the day boxes on the calendar sheet gives the day-of-year and the number of the day in the Landsat 7 16-day world coverage orbital cycle. Click on the day box for Saturday March 12, 2003. This day is the 71st day of the year and is day 10 of the Landsat orbital cycle (16 days total).



5. A sidebar along the right side of the calendar identifies the WRS-2 paths that will be acquired on the selected day. For the selected day, March 12, 2003, Landsat 7 will collect images along 14 different paths. Path 44 passes over the interior of the Columbia River Basin. The location of the active paths are for the selected day shown in the graphic below the calendar screen.



- Experiment with calendar application by selecting other days while noting the paths that will be covered and observing the change in the active path graphic. We know that images along path 44 will be acquired on March 12, so we would expect path 44 to be imaged again 16 days later on March 28. Click on the day box for March 28 to verify that Path 44 is an active path.

