WorldView 1

WorldView-1 provides earth imagery at 50cm spatial resolution. Being a panchromatic(Black & White) sensor, WorldView-1 can acquire very large areas in short period of time. This sensor was launched by DigitalGlobe on September 18, 2007. With an average revisit time of 1.7 days, WorldView-1 is capable of collecting up to 750,000 square kilometers (290,000 sq. mi) per day of half-meter imagery. WorldView-1 satellite sensor was successfully launched from Vandenberg Air Force Base, California, U.S.A.
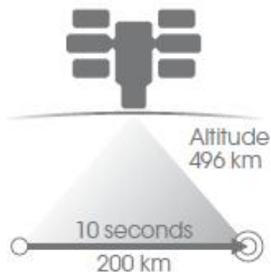
Below are the specifications of WorldView-1 sensor:

Launch Information:
Date: September 18, 2007
Launch Vehicle: Delta II 7920
Launch Site: Vandenberg Air Force Base

Orbit:
Altitude: 496 kilometers
Type: Sun synchronous, 10:30 am descending node
Period: 94.6 minutes

Sensor Bands:
Panchromatic

Sensor Resolution (GSD Ground Sample Distance):
0.50 meters GSD at nadir
0.59 meters GSD at 25° off-nadir

NIIRS Equivalency:
NIIRS potential of greater than 5.0

Dynamic Range:
11-bits per pixel

Swath Width:
17.6 kilometers at nadir

Pointing Accuracy & Knowledge:
Accuracy: <500 meters at image start and stop

Knowledge:
Supports geolocation accuracy below

Retargeting Agility:
Acceleration: 2.5 deg/s/s
Rate: 4.5 deg/s
Time to slew 300 kilometers: 10.5 seconds

On-board Storage:
2199 gigabits solid state with EDAC

Max Viewing Angle / Accessible Ground Swath:
Nominally +/-45° off-nadir = 1036 km wide swath Higher angles selectively available

Per Orbit Collection:
331 gigabits

Max Contiguous Area Collected in a Single Pass:
60 x 110 km mono 30 x 110 km stereo

Revisit Frequency:
1.7 days at 1 meter GSD 4.6 days at 25° off-nadir or less (0.59 meter GSD)

Geolocation Accuracy (CE90):
Geolocation Accuracy specification of 6.5m CE90% at nadir, with actual accuracy in the range of 4.0 – 5.5m CE90%, excluding terrain and off-nadir effects

Ball Aerospace provided its BCP 5000 spacecraft bus, and the WorldView 60(Similar to the one used by QuickBird sensor) camera for the commercial imaging satellite. A new feature of the WorldView-1 spacecraft are CMG (Control Moment Gyroscopes) actuators for precise and highly responsive pointing control. The BCP-5000 bus provides increased power, stability, agility, data storage and transmission (over the BCP-2000 bus) as the demand for Earth remote-sensing information becomes more comprehensive.

The S/C is 3-axis stabilized. The ADCS (Attitude Determination and Control Subsystem) employs star trackers, IRU (Inertial Reference Unit) and GPS for attitude sensing, and CMGs as actuators. A S/C body-pointing range of ±40º about nadir is provided corresponding to a FOR (Field of Regard) of 775 km in cross-track. An instantaneous pointing accuracy of ≤ 500 m is provided at any start and stop of an imaging sequence. On the ground, the geolocation accuracy of the imagery is 5.8 to 7.6 m without GPCs (Ground Control Points) and 2 m with GPCs (3σ). The agile S/C provides retargeting at a rate of 4.5º/s with an acceleration of 2.5º/s2; it takes 9 s to slew the S/C over a ground distance of 300 km.

Altitude and Slew Time

Altitude 496 km

10 seconds
200 km

Collection Scenarios

(30° off-nadir angle)

LONG STRIP

LARGE AREA COLLECT

112 km

111 km

360 km

MULTIPLE POINT TARGETS

17.7 km

17.7 km

17.7 km

STEREO AREA COLLECT

112 km

51 km