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# AEROSPACE AMERICA

# Out there somewhere could be A PLANET LIKE OURS

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# The tech behind WorldView-3

**For satellite imagery provider** DigitalGlobe of Longmont, Colo., timing is everything. Its WorldView-3 satellite arrived in orbit in August, just months after the U.S. Department of Commerce relaxed commerical satellite resolution restrictions, giving companies like DigitalGlobe permission to collect and sell imagery showing details as fine as 25 centimeteres across. The previous limit was 50 centimeters for imagery provided to non-U.S. government customers. First sales are targeted for Spring 2015.

WorldView-3 will generate images with a 31-centimeter resolution once it is declared operational. Six months after that, DigitalGlobe will be free to sell the imagery commercially.

The 2,800-kilogram satellite was built by Ball Aerospace in Boulder, Colo., and launched from Vandenberg Air Force Base, Calif., atop a United Launch Alliance Atlas 5, joining three other DigitalGlobe satellties in orbit.

WorldView-3 will collect imagery with 31-centimeter panchromatic or black-and-white resolution; 1.24-meter multispectral or color resolution; and 3.7-meter short-wave infrared resolution. The level of resolution is made possible by a 1.1-meter aperture telescope built by Exelis Inc. of Rochester.

DigitalGlobe expects the satellite to be in demand for more than its resolution, however. The satellite has 16 multispectral bands and an atmospheric instrument called CAVIS, for Cloud, Aerosol, water Vapor, Ice, Snow. CAVIS will monitor the atmosphere and provide correction data to improve WorldView-3's imagery. CAVIS allows targeting of ground scenes through haze, soot, smoke and dust and will basically "true up" its color readings, says Ball Aerospace's Jeff Dierks, senior program manager for the company's WorldView-3 work.

The 16 spectral bands are another key attribute. Various materials reflect sunlight differently, and so they can be distinguished by multiple bands, including some not visible to the naked eye.

"From seeing the visible to the invisible, WorldView-3 will offer dramatically more information in every image collected," explains Craig Oswald, manager of commercial imaging at Exelis Geospatial Systems, which in addition to making the telescope for WorldView-3 provided its shortwave infrared sensor.

The satellite is also more responsive than other designs. By using advanced Control Moment Gyroscopes, the spacecraft can be reoriented over a desired collection area in 4 to 5 seconds, compared to 30 to 45 seconds needed for traditional reaction wheels. "The spacecraft can take images very rapidly, up to about 35 degrees off its orbit track, and gives you quicker access to any point in the world," explains Dierks, the Ball manager.

WorldView-3 will have an average revisit time of less than one day and will be capable of collecting up to 680,000 square kilometers of imagery per day. It flies in a sun-synchronous altitude of about 617 kilometers.

**Leonard David**
NewsSpace@aol.com

Ball Aerospace

The WorldView-3 satellite is encapsulated within the Atlas 5 rocket. Its August launch came shortly after relaxation of government restrictions on satellite imagery for commercial customers.