Space junk raises risks for Hubble repair mission

AP – This computer generated image, supplied by NASA, shows objects that are currently being tracked in Earth …

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By SETH BORENSTEIN, AP Science WriterSeth Borenstein, Ap Science Writer –2 hrs 25 mins ago

WASHINGTON – Space shuttle Atlantis is now in a rough orbital neighborhood — a place littered with thousands of pieces of space junkzipping around the Earth at nearly 20,000 mph. There are more pieces of shattered satellites and used-up rockets in this region than astronauts have ever encountered. And the crew must be there for more than a week to repair theHubble Space Telescope. As soon as the job is complete, the shuttle will scamper to safety.

The telescope orbits about 350 miles above Earth, a far dirtier place than where shuttles normally fly. And all those tiny projectiles raise the constant threat of a potentially fatal collision.

"It's a riskier environment when we go to this altitude," said NASA safety chief Bryan O'Connor, a former shuttle commander. But, he added, it's a risk thatNASAcan handle.

After the 2003 Columbia accident, just going up to Hubble was deemed too dangerous because flying to the telescope entails climbing to a different orbit than theinternational space station. That means the shuttle cannot use the outpost as a safe harbor in an emergency.

NASA now puts the risk for a catastrophic collision with junk during the mission at 1 in 229 — greater than typical flights to the space station but lower than the agency's initial estimates.

On Wednesday, the crew will grab the telescope and tuck it inside the shuttle's cargo bay, where spacewalking astronauts will make repairs and upgrades over the next week. The work begins Thursday.

The crew spent Tuesday checking the outside of the shuttle for any damage from debris during launch, finding four nicks that initially seem minor. It's a standard procedure since Columbia got hit by a piece of foam during launch and later disintegrated during re-entry.

But the biggest danger on any shuttle flight is getting hit with space junk or tiny space rocks at high speeds during orbit, not during launch. Because objects circle the Earth at high speed, something as small as one-third the width of a dime can penetrate the shuttle's cabin, causing a major — maybe even fatal — problem, according to NASA.

And where Atlantis is camped out has only gotten messier recently. In 2007, China destroyed one of its satellites to test a weapon, scattering debris. In February, a dead Russian satellite and anAmerican communications satellitecollided, spreading more trash in higher orbits.

So far, space junk trackers have spotted about 950 pieces from this year's crash and more than 2,500 from the 2007 explosion. And there's much more they have not seen.

Harvard astronomer Jonathan McDowell, who tracks objects in orbit, said "people are going to be watching (Atlantis' mission) very carefully. It's a real danger."

While it's unlikely debris will cause a serious problem, McDowell expects Atlantis to come home "with a couple major dings in its windshield or radiator."

NASA's top space junk expert said it's important to put the worries into perspective.

"It's not something to lose sleep over," said NASA chiefspace debrisscientistNicholas Johnson. "We do take it very, very seriously, but in the scheme of things, it's a small risk."

Still, Johnson acknowledged that the higher orbit is far more dangerous than the space station's position 225 miles above Earth.

"Hubble is being pummeled regularly," Johnson said. "We see evidence of thousands of impacts."

Initially, when Johnson and other experts at the Johnson Space Center calculated the risk for losing Atlantis because of debris, it was slightly worse than 1 in 200.

That's the threshold for NASA to think twice about doing the flight. Engineers came up with some maneuvers to reduce the likelihood of getting hit, and have now decided the risk is an acceptable 1 in 229. That risk is usually about 1 in 300 duringspace station missions.

NASA canceled this Hubble mission in 2004, citing the risks of not being able to go to the space station in case of emergency. But the mission was reinstated after engineers devised ways to patch damage in flight, and the space agency created a plan for a quick rescue flight if needed. Theshuttle Endeavoursits on thelaunch padon standby to retrieve the Atlantis crew if the shuttle is too damaged to fly home.

NASA also found other ways to curb the risk of damage. As soon as Atlantis finishes fixing Hubble and places it back in orbit, the shuttle will skedaddle down to a lower, cleaner and safer orbit. The crew will also make another inspection of the shuttle before heading back to Earth.

In addition, Atlantis is flying an egg-shaped orbit, going as high as 350 miles to catch up to Hubble, but also dropping as close as 135 miles, making it less prone to space junk and easier for a rescue flight if necessary, according to NASA spokesman Rob Navias.

The Air Force is tracking more than 19,000 objects in all sorts of orbits — most of it junk.

The dirtiest spots are at 525 miles up where the Chinese satellite was destroyed and 490 miles, where the Russian-American satellite collision occurred.

Even though the Hubble-Atlantis orbit is more than 100 miles below those zones, it's too close for complete comfort. That's because the trash spreads into nearby orbits, Johnson said.

And the higher the space junk orbits, the longer it stays aloft because there's even less drag from the ultra-thin atmosphere pulling stuff down. For example, a 4-inch object 490 miles up will stay in orbit for more than a century, Johnson said.

At Hubble's altitude, the same object would come down in about a decade; from the space station, it would be gone in a few months.

The Air Force Space Commandtracks debris larger than 4 inches and gives warning toNASAand others if trash is projected to come close to astronauts. Twice in the past year, NASA has moved the space station to dodge nearby junk. But that's only the debris the Air Force can track.

Objects between one-tenth of an inch and 4 inches are dangerous enough to cause major and even fatal damage, but cannot be specifically tracked.
"The greatest risk tospace missionscomes from the non-trackable debris," Johnson said.

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On the Net
NASA Orbital Debris Program Office:http://www.orbitaldebris.jsc.nasa.gov